Appendix B – Borehole Logs
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Armstrongs Road, Seaford

<table>
<thead>
<tr>
<th>Hole ID:</th>
<th>ARM-GWBH01</th>
</tr>
</thead>
<tbody>
<tr>
<td>date started:</td>
<td>06 Feb 2017</td>
</tr>
<tr>
<td>date completed:</td>
<td>06 Feb 2017</td>
</tr>
<tr>
<td>logged by:</td>
<td>KG</td>
</tr>
<tr>
<td>checked by:</td>
<td>KJ</td>
</tr>
</tbody>
</table>

**Position:** E: 335838; N: 5782323 (MGA94)  
**surface elevation:** 5.10 m (AHD)  
**angle from horizontal:** 90°  
**equipment type:** Geoprobe 6610DT, Track mounted  
**drilling fluid:** None  
**hole diameter:** 150 mm

**Drilling Information**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>auger drilling</td>
<td>water</td>
</tr>
<tr>
<td>H</td>
<td>hand auger</td>
<td>samples &amp; field tests</td>
</tr>
<tr>
<td>N</td>
<td>non destructive drilling</td>
<td>material substance</td>
</tr>
</tbody>
</table>

**Material Description**

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILL: SILTY SAND</td>
<td>fine to coarse grained, dark brown, with some fine to coarse grained gravel (basalt), trace of cobbles, boulders and rootlets.</td>
</tr>
<tr>
<td>SAND:</td>
<td>fine to medium grained, grey, pale grey, pale brown.</td>
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<tr>
<td>becoming pale brown</td>
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<tr>
<td>becoming orange brown, trace of fines</td>
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</tr>
<tr>
<td>becoming fine to medium grained, pale brown, trace of fines</td>
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</tr>
<tr>
<td>with some fines</td>
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</tr>
<tr>
<td>SILTY SAND:</td>
<td>fine to medium grained, dark grey, dark brown, trace of shell fragments.</td>
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<tr>
<td>becoming fine grained sand</td>
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</tbody>
</table>

**Classification Symbol & Soil Description**

<table>
<thead>
<tr>
<th>consistency / relative density</th>
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</thead>
<tbody>
<tr>
<td>VS</td>
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<td>S</td>
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<tr>
<td>F</td>
</tr>
<tr>
<td>ST</td>
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<tr>
<td>VST</td>
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<td>H</td>
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<td>Fb</td>
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<tr>
<td>VL</td>
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<tr>
<td>L</td>
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<tr>
<td>MD</td>
</tr>
<tr>
<td>D</td>
</tr>
<tr>
<td>VD</td>
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</tbody>
</table>

**Structure and Additional Observations**

<table>
<thead>
<tr>
<th>structure and additional observations</th>
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<tbody>
<tr>
<td>M</td>
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</table>

**Quaternary Sands**

<table>
<thead>
<tr>
<th>SWAMP DEPOSITS</th>
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<tbody>
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</table>

**Drilling Fluid:** None

**Samples & Field Tests**

- Water level on date shown:
- Water inflow
- Water outflow

**Classification Symbol:**

- SP: Undisturbed sample
- SM: Undisturbed sample

**Consistency / Relative Density:**

- VS: Very soft
- S: Soft
- F: Firm
- ST: Stiff
- VST: Very stiff
- H: Hard
- Fb: Friable
- VL: Very loose
- L: Loose
- MD: Medium dense
- D: Dense
- VD: Very dense
### Engineering Log - Borehole

**Hole ID.** ARM-GWBH01  
**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Armstrongs Road, Seaford  
**Date Started:** 06 Feb 2017  
**Date Completed:** 06 Feb 2017  
**Logged by:** KG  
**Checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>SM</td>
<td>SWAMP DEPOSITS</td>
</tr>
<tr>
<td>10.0</td>
<td></td>
<td></td>
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</tbody>
</table>

**Depth (m):** 9.0 and 10.0  
**Sample & Field Tests:** SM  
**Material Substance:** SWAMP DEPOSITS

**SOIL TYPE:** Plasticity or particle characteristics, colour, secondary and minor components

- **Classification Symbol:** SM
- **Material Description:** Silty Sand: fine to medium grained, dark grey, dark brown, trace of shell fragments. Becoming dark grey mottled pale grey

**CLAY:** High plasticity, pale grey.

#### Borehole ARM-GWBH01 Terminated at 10.00 m Target Depth

**Well Details:**
- **Well ID:** ARM-GWBH01
- **Date:** 06 Feb 2017
- **Logged by:** KG
- **Checked by:** KJ

**Equipment Type:** Geoprobe 6610DT, Track mounted
- **Angle from horizontal:** 90°
- **Drilling Fluid:** None
- **Drilling Fluid:** None
- **Drill Bit:** Auger drilling
- **Subsample:** N
d

**Samples & Field Tests**
- **Borehole ARM-GWBH01 Terminated:**
  - **10.00 m**
  - **Target Depth**

**Consistency / Relative Density**
- **Moisture:** DMW
- **Dense:** M
- **Moist:** C
- **Wet:** N

**Penetration Test:**
- **10-Oct-12 Water Level:**
  - **Dry:** D
  - **Muddy:** M
  - **Wet:** W

**Consistency / Relative Density**
- **Very Soft:** VS
- **Soft:** S
- **Firm:** F
- **Stiff:** ST
- **Very Stiff:** VST
- **Hard:** H
- **Fragile:** FI
- **Very Loose:** VL
- **Loose:** L
- **Medium Dense:** MD
- **Dense:** D
- **Very Dense:** VD

**Other Details:**
- **Bore Construction License:** WRK098873
- **Backfill Details:**
  - 0.0-3.0 m: Bentonite
  - 3.0-4.0 m: Bentonite
  - 4.0-7.5 m: Sand
  - 7.5-10.0 m: Bentonite
- **Standpipe Piezo:** ARM-GWBH01
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Armstong Road, Seaford

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**Hole ID:** ARM-GWBH02  
**sheet no.:** 1 of 2  
**project no.:** GEOTABTF10294AA

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**position:** E: 335709; N: 5782088 (MGA94)  
**surface elevation:** 2.17 m (AHD)  
**angle from horizontal:** 90°  
**equipment type:** Geoprobe 6610DT, Track mounted  
**drilling fluid:** None  
**hole diameter:** 150 mm

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**material description**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **classification symbol & soil description**
  - BASED ON Unified Classification System
- **moisture**
  - **condition:** dry, moist, wet
  - **limit:** plastic
- **mud**
  - **support:** M
  - **penetration:** C
  - **samples & field tests:** B
- **classification symbol & soil description**
  - **limit:** SPT
  - **penetration:** refusal

---

**structure and additional observations**

- **method & support:** AD
  - auger drilling
- **samples & field tests:** B
  - bulk disturbed sample
- **classification symbol & soil description**
  - **limit:** SPT
  - **penetration:** refusal

---

**additional observations**

- **method & support:** AD
  - auger drilling
- **samples & field tests:** B
  - bulk disturbed sample
- **classification symbol & soil description**
  - **limit:** SPT
  - **penetration:** refusal
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Armstrongs Road, Seaford

---

**material substance**

<table>
<thead>
<tr>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
<th>material description</th>
<th>graphic log</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, grey, medium plasticity, with some shell fragments. (continued)</td>
<td>SC</td>
<td>W MD</td>
</tr>
</tbody>
</table>

---

**structure and additional observations**

Borehole ARM-GWBH02 terminated at 10.00 m Target depth

---

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

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

---

**samples & field tests**

- **method & support:**  
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger
  - W: washbore
  - HS: hollow stem flight auger  
  - NDD: non destructive drilling  
  - *: bit shown by suffix  
  - e.g: AD/T, B: blank bit, V: V bit

- **samples & field tests:**  
  - water
  - penetration
  - no resistance ranging to refusal
  - 10-Oct-12 water level on date shown
  - water inflow
  - water outflow

---

**method & support**

- **method & support:**  
  - AD: auger drilling  
  - AS: auger screwing  
  - HA: hand auger  
  - W: washbore  
  - HS: hollow stem flight auger  
  - NDD: non destructive drilling  
  - *: bit shown by suffix  
  - e.g.: AD/T, B: blank bit, V: V bit

---

**classification symbol & soil description**

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

---

**drilling information**

- **drilling information:**  
  - method: AD auger drilling
  - support: M mud, N nil
  - penetration: water
  - water level: 10-Oct-12
  - water inflow: level on date shown
  - water outflow: no resistance ranging to refusal

---

**well details**

- **well details:**  
  - bore construction license: WRK098870  
  - drilling company: Drillworx  
  - driller: J. Boyd  
  - backfill details:  
    - 0.0-5.5m: Grout  
    - 5.5-6.5m: Bentonite  
    - 6.5-10.0m: Sand
  - standpipe piezo. ARM-GWBH02: details:
    - 7.0-10.0m: screen

---

**material substance**

- **material substance:**  
  - water
  - penetration
  - no resistance ranging to refusal
  - 10-Oct-12 water level on date shown
  - water inflow
  - water outflow
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Armstrongs Road, Seaford

**Position:** E: 335707; N: 5782088 (MGA94)  
**Surface Elevation:** 2.40 m (AHD)  
**Angle from horizontal:** 90°  
**Equipment type:** Geoprobe 6610DT, Track mounted  
**Drilling Fluid:** None  
**Hole Diameter:** 150 mm

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Description</th>
<th>Classification Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>FILL</td>
<td>Sandy GRAVEL: fine to coarse grained, brown.</td>
<td>M D FILL</td>
</tr>
<tr>
<td></td>
<td>SP</td>
<td>SAND: fine to medium grained, pale brown.</td>
<td>MD QUATERNARY SANDS</td>
</tr>
</tbody>
</table>

### Well Details

- **Samples & Field Tests:**
  - Water
  - Consistency / Relative Density
  - Support
  - Soil Description

### Material Substance

- **Soil Type:** Plasticity or particle characteristic, colour, secondary and minor components

### Additional Observations

- **Position:** E: 335707; N: 5782088 (MGA94)  
  - Equipment Type: Geoprobe 6610DT, Track mounted  
  - Angle from horizontal: 90°  
  - Hole Diameter: 150 mm
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Armstrongs Road, Seaford

<table>
<thead>
<tr>
<th>Graphic log</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>TERTIARY BRIGHTON GROUP - clayey sand: fine to medium grained, brown-grey, with some shell fragments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Graphic log</th>
<th>structure and additional observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI-CH</td>
<td>TERTIARY BRIGHTON GROUP - sandy clay: medium to high plasticity, red and grey, fine to medium grained sand.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material substance</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAYEY SAND</td>
<td>fine to medium grained, brown-grey, with some shell fragments.</td>
</tr>
<tr>
<td>Sandy CLAY</td>
<td>medium to high plasticity, red and grey, fine to medium grained sand.</td>
</tr>
</tbody>
</table>

**Hole ID:** ARM-GWBH03  
**date started:** 20 Feb 2017  
**date completed:** 23 Feb 2017  
**logged by:** SJS  
**checked by:** KJ
## Engineering Log - Borehole

**Hole ID:** ARM-GWBH03  
**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Armstongs Road, Seaford  
**equipment type:** Geoprobe 6610DT, Track mounted  
**drilling fluid:** None  
**hole diameter:** 150 mm

### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>method</td>
<td>support</td>
<td>classification symbol</td>
</tr>
<tr>
<td>AD</td>
<td>M mud</td>
<td>CI-CH</td>
</tr>
<tr>
<td>AS</td>
<td>N nil</td>
<td>Sand</td>
</tr>
<tr>
<td>HA</td>
<td>C casing</td>
<td>Sandy CLAY: medium to high plasticity, red and grey, fine to medium grained sand.</td>
</tr>
<tr>
<td>W</td>
<td></td>
<td>(continued)</td>
</tr>
<tr>
<td>HS</td>
<td></td>
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<tr>
<td>NDD</td>
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</tbody>
</table>

###_borehole ARM-GWBH03 terminated at 20.00 m Target depth_

### Borehole Details

- **Well Details:**
  - Bore construction license: WRK098871
  - Drilling company: Drillworx
  - Driller: J. Boyd
  - Backfill details:
    - 0.0-14.0m: Grout
    - 14.0-15.0m: Bentonite
    - 15.0-20.0m: Sand

### Engineering Log - Borehole

<table>
<thead>
<tr>
<th>RL (m)</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>-14</td>
<td>CI-CH</td>
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<tr>
<td>-15</td>
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</tbody>
</table>

### Water Sample & Field Tests

- **Consistency / Relative Density**
  - VS: very soft
  - S: soft
  - F: firm
  - SI: stiff
  - VST: very stiff
  - H: hard
  - P: plastic
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VI: very dense

### Soil Description

- **Soil Type:** plasticity or particle characteristic, colour, secondary and minor components
- **Classification Symbol:**
  - B: bulk disturbed sample
  - D: disturbed sample
  - E: environmental sample
  - SS: split spoon sample
  - U#: undisturbed sample #mm diameter
  - HP: hand penetrometer (kPa)
  - N: standard penetration test (SPT)
  - N*: SPT - sample recovered
  - NC: SPT with solid cone
  - VS: vane shear; peak/remoulded (kPa)
  - R: refusal
  - HB: hammer bouncing

### Structure and Additional Observations

- **100mm hard band- not evident in return cuttings**
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Armstong Road, Seaford

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Hole ID.</th>
<th>ARM-GWBH04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet no.</td>
<td>1 of 5</td>
</tr>
<tr>
<td>Project no.</td>
<td>GEOTABTF10294AA</td>
</tr>
<tr>
<td>Date started</td>
<td>20 Feb 2017</td>
</tr>
<tr>
<td>Date completed</td>
<td>10 Mar 2017</td>
</tr>
<tr>
<td>Logged by</td>
<td>SJS</td>
</tr>
<tr>
<td>Checked by</td>
<td>KJ</td>
</tr>
</tbody>
</table>

---

**Borehole Details**

- **Position:** E: 335703, N: 5782088 (MGA94)  
- **Surface elevation:** 2.58 m (AHD)  
- **Angle from horizontal:** 90°  
- **Equipment type:** Hanjin D&B, Track mounted  
- **Drilling fluid:** Polymer  
- **Hole diameter:** 150 mm

---

**Drilling Fluid**

- **Polymer**

---

**SOIL TYPE**

- **FILL:** Gravel: fine to coarse grained, brown.
- **SAND:** fine to medium grained, pale brown.
- **SILTY SAND:** fine grained, dark grey, trace of shell fragments.
- **SILTY SAND:** fine to coarse grained, dark grey, with some bands of high plasticity clay, black, distinct sandfroes odour
- **CLAY:** high plasticity, black.
- **SILTY SAND:** fine grained, dark grey, with some fibrous, green-grey peat.
- **SWAMP DEPOSITS**
- **QUATERNARY SANDS**

---

**Consistency / Relative Density**

- **Moisture:**
  - **DM:** Dry
  - **WW:** Wet
  - **wp:** Plastic limit
  - **LL:** Liquid limit

- **Consistency:**
  - **VS:** Very soft
  - **S:** Soft
  - **F:** Firm
  - **ST:** Stiff
  - **VST:** Very stiff
  - **H:** Hard
  - **Fb:** Failure
  - **VL:** Very loose
  - **L:** Loose
  - **MD:** Medium dense
  - **D:** Dense
  - **VD:** Very dense
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Armstrongs Road, Seaford

<table>
<thead>
<tr>
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<td>checked by</td>
<td>KJ</td>
</tr>
</tbody>
</table>

### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>method</td>
<td>support</td>
<td>material description</td>
</tr>
<tr>
<td>AD</td>
<td>auger drilling</td>
<td>SM - SILTY SAND: fine grained, dark grey, with some fibrous, green-grey peat. (continued)</td>
</tr>
<tr>
<td>AS</td>
<td>auger coring</td>
<td>SC - CLAYEY SAND: fine to medium grained, grey, high plasticity.</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
<td>CH - Silty CLAY: high plasticity, grey, mottled brown.</td>
</tr>
<tr>
<td>W</td>
<td>wash bore</td>
<td>SC - CLAYEY SAND: fine to medium grained, brown with dark brown bands.</td>
</tr>
<tr>
<td>HS</td>
<td>hollow stem flight auger</td>
<td>CH - Silty CLAY: high plasticity, grey, mottled brown.</td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
<td>SC - CLAYEY SAND: fine to medium grained, pale grey.</td>
</tr>
</tbody>
</table>

### Material Substance

<table>
<thead>
<tr>
<th>classification symbol</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td>soil description based on Unified Classification System</td>
</tr>
</tbody>
</table>

### Moisture Condition

<table>
<thead>
<tr>
<th>moisture</th>
<th>condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>SWAMP DEPOSITS</td>
</tr>
<tr>
<td>MD</td>
<td>BRIGHTON GROUP DEPOSITS</td>
</tr>
<tr>
<td>VST</td>
<td></td>
</tr>
</tbody>
</table>

### Structure and Additional Observations

<table>
<thead>
<tr>
<th>position: E: 335703; N: 5782088 (MGA94)</th>
</tr>
</thead>
<tbody>
<tr>
<td>surface elevation: 2.58 m (AHD)</td>
</tr>
<tr>
<td>angle from horizontal: 90°</td>
</tr>
<tr>
<td>equipment type: Hanjin D&amp;B, Track mounted</td>
</tr>
<tr>
<td>drilling fluid: Polymer</td>
</tr>
<tr>
<td>hole diameter: 150 mm</td>
</tr>
</tbody>
</table>

### Drilling Details

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
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<tbody>
<tr>
<td>method</td>
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</tr>
<tr>
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<td>auger drilling</td>
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</tr>
<tr>
<td>AS</td>
<td>auger coring</td>
<td>SC - CLAYEY SAND: fine to medium grained, grey, high plasticity.</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
<td>CH - Silty CLAY: high plasticity, grey, mottled brown.</td>
</tr>
<tr>
<td>W</td>
<td>wash bore</td>
<td>SC - CLAYEY SAND: fine to medium grained, brown with dark brown bands.</td>
</tr>
<tr>
<td>HS</td>
<td>hollow stem flight auger</td>
<td>CH - Silty CLAY: high plasticity, grey, mottled brown.</td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
<td>SC - CLAYEY SAND: fine to medium grained, pale grey.</td>
</tr>
</tbody>
</table>

### Soil Types

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>SILTY SAND: fine grained, dark grey, with some fibrous, green-grey peat.</td>
</tr>
<tr>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, grey, high plasticity.</td>
</tr>
</tbody>
</table>

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>consistency / relative density</th>
<th>moisture</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>ST</td>
<td>stiff</td>
</tr>
<tr>
<td>VST</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>V</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VN</td>
<td>very dense</td>
</tr>
</tbody>
</table>
Hole ID: ARM-GWBH04
client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: Armstongs Road, Seaford
position: E: 335703; N: 5782088 (MGA94 )

equipment type: Hanjin D&B, Track mounted
drilling fluid: Polymer

drilling information

<table>
<thead>
<tr>
<th>graphic log</th>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>17.0</td>
<td>CLAYEY SAND: fine to medium grained, pale grey. (continued)</td>
</tr>
<tr>
<td>SC</td>
<td>19.0</td>
<td>CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands.</td>
</tr>
<tr>
<td>SC</td>
<td>21.0</td>
<td>cemented sand layer - 50 to 80mm thick</td>
</tr>
</tbody>
</table>

material description

SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

material description

CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. 

CLAY: high plasticity, pale grey, becoming red-brown, with some cemented sand nodules

CLAY: high plasticity, pale grey.

BRIGHTON GROUP DEPOSITS

HP 370 - 540 kPa

HP 350 - 400 kPa

HP 180 - 230 kPa

BUDGET GROUP DEPOSITS

structure and additional observations

MD

push tube stopped on cemented sands

MD

push tube stopped on cemented sands

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# Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Armstrongs Road, Seaford

## General Information

- **Hole ID:** ARM-GWBH04  
- **Sheet:** 4 of 5  
- **Project No.:** GEOTABTF10294AA  
- **Date Started:** 20 Feb 2017  
- **Date Completed:** 10 Mar 2017  
- **Logged By:** SJS  
- **Checked By:** KJ

## Borehole Details

- **Surface Elevation:** 2.58 m (AHD)  
- **Angle from Horizontal:** 90°  
- **Drilling Fluid:** Polymer  
- **Hole Diameter:** 150 mm

## Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.0</td>
<td>C - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)</td>
</tr>
<tr>
<td>26.0</td>
<td>C - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)</td>
</tr>
<tr>
<td>27.0</td>
<td>C - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)</td>
</tr>
<tr>
<td>28.0</td>
<td>C - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)</td>
</tr>
<tr>
<td>29.0</td>
<td>C - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)</td>
</tr>
<tr>
<td>30.0</td>
<td>C - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)</td>
</tr>
</tbody>
</table>

## Well Details

- **Depth:** 30.45 m
- **Target Stratum:** B - BRIGHTON GROUP DEPOSITS

## Soil Types

- **Classification Symbol & Soil Description:**
  - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)
  - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)
  - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)
  - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)

## Moisture Condition

- **W:** dry  
- **D:** moist  
- **M:** wet

## Drilling Support

- **Support:** C - casing  
- **Method:** AD - auger drilling

## Classification Symbol & Soil Description

- **Classifications:**
  - C - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)
  - C - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)
  - C - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)
  - C - CLAYEY SAND: fine to medium grained, pale grey, with some mottles brown and some clay bands. (continued)

## Additional Observations

- **Position:** E: 335703; N: 5782088 (MGA94)  
- **Equipment Type:** Hanjin D&B, Track mounted  
- **Surface Elevation:** 2.58 m (AHD)  
- **Angle from Horizontal:** 90°
### Engineering Log - Borehole

**Hole ID:** ARM-GWBH04  
**Project no.:** GEOTABTF10294AA  
**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Armstong Road, Seaford

**Position:** E: 335703; N: 5782088 (MGA94)  
**Surface Elevation:** 2.58 m (AHD)  
**Angle from horizontal:** 90°  
**Equipment type:** Hanjin D&B, Track mounted  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 150 mm

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Well Details</th>
<th>Material Substance</th>
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<tr>
<td><strong>Method &amp; Support</strong></td>
<td><strong>Penetration</strong></td>
<td><strong>SOIL TYPE</strong></td>
</tr>
<tr>
<td>AD auger drilling*</td>
<td>M mud</td>
<td>B bulke disturbed sample</td>
</tr>
<tr>
<td>AS auger screwing*</td>
<td>N nil</td>
<td>D disturbed sample</td>
</tr>
<tr>
<td>HA hand auger</td>
<td>C casing</td>
<td>E environmental sample</td>
</tr>
<tr>
<td>W washbore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS hollow stem flight auger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
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<tr>
<td>NDD non destructive drilling</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Depth (m)</strong></th>
<th><strong>Graphic Log</strong></th>
<th><strong>Classification Symbol</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
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<td></td>
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<tr>
<td>34.0</td>
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<td>35.0</td>
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<tr>
<td>36.0</td>
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<td>37.0</td>
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</tr>
<tr>
<td>38.0</td>
<td></td>
<td></td>
</tr>
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<td>39.0</td>
<td></td>
<td></td>
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</table>

<table>
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<tr>
<th><strong>Classification Symbol &amp; Soil Description</strong></th>
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<td>Based on Unified Classification System</td>
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</table>

<table>
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<tbody>
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</tr>
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</tr>
<tr>
<td>H hard</td>
</tr>
<tr>
<td>Fb friable</td>
</tr>
<tr>
<td>VL very loose</td>
</tr>
<tr>
<td>L loose</td>
</tr>
<tr>
<td>MD medium dense</td>
</tr>
<tr>
<td>D dense</td>
</tr>
<tr>
<td>VD very dense</td>
</tr>
</tbody>
</table>
TOPSOIL: SILT: low liquid limit, dark grey, dark brown, orange-brown mottling, organic odour, rootlets throughout, trace of fine sand.

Silty SAND: fine to coarse grained, dark brown, dark grey, dark grey, trace of fine to medium grained gravel.

Silty CLAY: high plasticity, black, dark grey, high organic content.

Sandy SILT: low liquid limit, dark grey, fine to coarse grained sand.

Sandy CLAY: high plasticity, dark grey, fine to medium grained sand.

Silty SAND: fine to coarse grained, pale grey.

Silty CLAY: high plasticity, dark grey, fine to medium grained sand.

Sandy CLAY: high plasticity, pale grey, with some fine to coarse grained sand.

TOPSOIL: SILT: low liquid limit, dark grey, dark brown, orange-brown mottling, organic odour, rootlets throughout, trace of fine sand.

Silty SAND: fine to coarse grained, dark brown, dark grey, dark grey, trace of fine to medium grained gravel.

Silty CLAY: high plasticity, black, dark grey, high organic content.

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Silty SAND: fine to coarse grained, pale grey.

Silty CLAY: high plasticity, dark grey, fine to medium grained sand.

Sandy CLAY: high plasticity, pale grey, with some fine to coarse grained sand.
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Armstrongs Road, Seaford

#### drilling information

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>CH</td>
</tr>
<tr>
<td>10.0</td>
<td>M - W</td>
</tr>
<tr>
<td>10.0</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
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</table>

Borehole ARM-GWBH05 terminated at 10.00 m  
Target depth

#### method & support

<table>
<thead>
<tr>
<th>method</th>
<th>support</th>
<th>samples &amp; field tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>M mud</td>
<td>N nl</td>
</tr>
<tr>
<td>AS</td>
<td>C casing</td>
<td></td>
</tr>
</tbody>
</table>

#### structure and additional observations

No resistance ranging to refusal

#### water outflow

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

#### soil description

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**classification symbol & soil description**

- M - W: Silty CLAY: high plasticity, pale grey, with some fine to coarse grained sand. (continued)
- Grading to sandy clay, occasionally iron cemented sand

#### bore details:

- bore construction license: WRK098874  
- drilling company: Drillworx  
- driller: J. Boyd  
- backfill details:
  - 0.0-3.0m: Grout  
  - 3.0-4.0m: Bentonite  
  - 4.0-7.5m: Sand  
  - 7.5-10.0m: Bentonite  
- standpipe piezo. ARM-GWBH05 details:
  - 4.5-7.5m: screen
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Armstrongs Road, Seaford

---

### Drilling Information

<table>
<thead>
<tr>
<th>Graphic Log</th>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 0, 0, 0 N*=0</td>
<td>-0.5</td>
<td>TOPSOIL: SILT, low liquid limit, dark grey, dark brown, orange brown mottling, organic odour, rootlets.</td>
</tr>
<tr>
<td>SPT 2, 3, 2 N*=5</td>
<td>1.0</td>
<td>SILTY SAND: fine to coarse grained, brown, dark brown, dark grey, trace of fine to coarse grained gravel.</td>
</tr>
<tr>
<td>SPT 3, 4, 6 N*=10</td>
<td>1.5</td>
<td>Clayey SILT: low to medium liquid limit, dark grey, high organic content.</td>
</tr>
<tr>
<td>SPT 3, 5, 6 N*=11</td>
<td>2.0</td>
<td>CLAY: medium plasticity, dark grey to black, strong &quot;rotten egg&quot;, sulphur dioxide odour, trace of fine grained sand, shell fragments and brown plant (grass like) matter, trace of interbedded fine grained, grey silty sand layers (approximately 30mm thick spaced 200mm apart).</td>
</tr>
<tr>
<td>SPT 2, 4, 6 N*=15</td>
<td>2.5</td>
<td>SILTY SAND: fine to medium grained, dark grey, distinct &quot;rotten egg&quot;, sulphur dioxide odour, with some black clay pockets/bands, trace of shell fragments.</td>
</tr>
<tr>
<td>SPT 3, 4, 6 N*=10</td>
<td>3.0</td>
<td>CLAYEY SAND: fine to coarse grained, dark blue - grey, low plasticity.</td>
</tr>
<tr>
<td>SPT 3, 5, 6 N*=11</td>
<td>3.5</td>
<td>SAND: medium to coarse grained, grey to dark grey, trace of fines.</td>
</tr>
</tbody>
</table>

---

### Samples & Field Tests

<table>
<thead>
<tr>
<th>MOIST</th>
<th>MOISTURE CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM</td>
<td>dry</td>
</tr>
<tr>
<td>WP</td>
<td>wet</td>
</tr>
</tbody>
</table>

---

### Classification System

- **Mud:** sludge, not suitable for diaphragm wall/lockwall, not suitable for bentonite grouting.  
- **Casing:** sludge, not suitable for diaphragm wall/lockwall, suitable for bentonite grouting.  
- **Nil:** sludge, suitable for diaphragm wall/lockwall, not suitable for bentonite grouting.

---

### Additional Observations

- **SPT sunk 1.3m under own weight.**
- **SPT with solid cone.**
- **SPT - sample recovered.**
- **SPT - sample excavated.**
- **Hammer bashing.**

---

**Hole ID:** ARM-GWBH06  
**date started:** 06 Feb 2017  
**date completed:** 07 Feb 2017  
**logged by:** LW  
**checked by:** KJ
**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>graphic log</th>
<th>material description</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>SAND: medium to coarse grained, grey to dark grey, trace of fines. (continued)</td>
<td>W</td>
</tr>
<tr>
<td>MH</td>
<td>Sandy SILT: high liquid limit, grey mottled dark grey, fine to coarse grained sand.</td>
<td>M H</td>
</tr>
<tr>
<td>CL</td>
<td>CLAY: low plasticity, red mottled grey and brown-orange, with some moderately cemented bands (20-50mm spacing) and fine to coarse gravel.</td>
<td>M VSt</td>
</tr>
<tr>
<td>CI</td>
<td>Silty CLAY: medium plasticity, pale blue - grey, trace of fine grained sand, coarse grained sand pockets and weakly cemented, dark red pockets/bands.</td>
<td>M St - VSt</td>
</tr>
</tbody>
</table>

**method & support:**
- AD: auger drilling*
- AS: auger screwing*
- HA: hand auger
- W: washhole
- HS: hollow stem flight auger
- NDD: non destructive drilling

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

**classification symbol & soil description:**
- VS: very soft
- S: soft
- F: firm
- St: stiff
- VSt: very stiff
- H: hard
- Fb: friable
- VL: very loose
- L: loose
- MD: medium dense
- D: dense
- VD: very dense
Tertiary Brighton Group
150/350mm
Silty Clay: medium plasticity, pale blue-grey, trace of fine grained sand, coarse grained sand pockets and weakly cemented, dark red pockets/bands. (continued)
becoming grey mottled red, dark red and dark brown
Sandy Clay: low plasticity, grey mottled brown, fine grained.
Clayey Silt: low liquid limit, brown, trace of fine grained sand.

Borehole ARM-GWBH06 terminated at 20.95 m
Target depth
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Balcombe Road, Mentone

**drilling information**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>water</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling</td>
<td>M mud</td>
<td>N nl</td>
<td>FILL: ASPHALT: 20mm.</td>
</tr>
<tr>
<td>HA hand auger</td>
<td>C casing</td>
<td></td>
<td>FILL: Sandy GRAVEL: fine to coarse grained, grey, fine to coarse grained sand.</td>
</tr>
<tr>
<td>VS washbore</td>
<td></td>
<td></td>
<td>SAND: fine to medium grained, pale brown, pale grey.</td>
</tr>
<tr>
<td>HS hollow stem flight auger</td>
<td></td>
<td></td>
<td>CLAY: high plasticity, pale grey and orange-brown, trace of fine grained sand.</td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td></td>
<td></td>
<td>becoming pale grey, mottled orange-brown</td>
</tr>
</tbody>
</table>

**graphic log**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>CLAYEY SAND: fine to coarse grained, pale grey, medium plasticity.</td>
</tr>
<tr>
<td>1.0</td>
<td>SILTY SAND: fine to coarse grained, pale brown, with some clayey sand bands.</td>
</tr>
<tr>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td></td>
</tr>
</tbody>
</table>

**structure and additional observations**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description:** based on Unified Classification System

---

**drill details**

- **Hole ID:** ID03-GWBH05  
- **date started:** 25 Jan 2017  
- **date completed:** 25 Jan 2017  
- **logged by:** KG  
- **checked by:** KJ
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Balcombe Road, Mentone

### Borehole Details
- **Hole ID:** ID03-GWBH05  
- **Date:** 25 Jan 2017  
- **Log by:** KG  
- **Checked by:** KJ

### Well Details
- **Borehole ID:** ID03-GWBH05  
- **Samples & Field Tests:** water  
- **Consistency/Relative Density:** M  
- **Support:** N  
- **Penetration:** nil  
- **Method:** auger drilling  
- **Environmental Sample:** yes  
- **Logging:** yes  
- **Equipment:** Geoprobe 6610DT, Track mounted  
- **Angle from Horizontal:** 90°  
- **Drilling Fluid:** None  
- **Surface Elevation:** 16.16 m (AHD)  
- **Drill Hole Diameter:** 150 mm

### Material Substance

<table>
<thead>
<tr>
<th>Material Substance</th>
<th>Graphic Log</th>
<th>Depth (m)</th>
<th>Classification Symbol</th>
<th>Soil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>10.0</td>
<td>SM</td>
<td>silty sand: fine to coarse grained, pale brown, pale grey, with some clayey sand bands. (continued)</td>
<td></td>
</tr>
</tbody>
</table>

### Drilling Information

<table>
<thead>
<tr>
<th>Material Substance</th>
<th>Classification Symbol &amp; Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
</tbody>
</table>

Borehole ID03-GWBH05 terminated at 15.00 m Target depth

### Soil Type

- **Classification Symbol & Soil Description:** based on Unified Classification System
- **Materials:** plasticity or particle characteristic, colour, secondary and minor components

### Additional Observations

- **Borescope:** Geoprobe 6610DT, Track mounted
- **Surface Elevation:** 16.16 m (AHD)
- **Drilling Fluid:** None
- **Logging:** yes
- **Environmental Sample:** yes
- **Method:** auger drilling
- **Environmental Sample:** yes
- **Logging:** yes
- **Equipment:** Geoprobe 6610DT, Track mounted
- **Angle from Horizontal:** 90°
- **Drilling Fluid:** None
- **Surface Elevation:** 16.16 m (AHD)
- **Drill Hole Diameter:** 150 mm

### Well Details

- **Borehole ID:** ID03-GWBH05  
- **Samples & Field Tests:** water  
- **Consistency/Relative Density:** M  
- **Support:** N  
- **Penetration:** nil  
- **Method:** auger drilling  
- **Environmental Sample:** yes  
- **Logging:** yes  
- **Equipment:** Geoprobe 6610DT, Track mounted  
- **Angle from Horizontal:** 90°  
- **Drilling Fluid:** None  
- **Surface Elevation:** 16.16 m (AHD)  
- **Drill Hole Diameter:** 150 mm
### Engineering Log - Borehole

#### client: Metro Trains Melbourne
#### principal: Level Crossing Removal Authority
#### project: LCRP-CTF
#### location: Balcombe Road, Mentone

**Hole ID:** ID03-GWBH05  
**Date started:** 25 Jan 2017  
**Date completed:** 25 Jan 2017  
**Logged by:** KG  
**Checked by:** KJ

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Graphic Log</th>
<th>Material Description</th>
<th>Moisture Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.5-15.0m: Sand</td>
<td>Standpipe piezo</td>
<td>based on Unified Classification System</td>
<td>DMWWpWldrymoistwetplastic limit</td>
</tr>
<tr>
<td>12.0-15.0m: Screen</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Camp details:**
- **Hole Diameter:** 150 mm
- **Angle from Horizontal:** 90°
- **Surface Elevation:** 16.16 m (AHD)
- **Equipment Type:** Geoprobe 6610DT, Track mounted
- **Drilling Fluid:** None

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>classification symbol &amp; soil description</th>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
<td>based on Unified Classification System</td>
<td>VS very soft</td>
<td>S soft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S very firm</td>
<td>F firm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V very stiff</td>
<td>t stiff</td>
</tr>
<tr>
<td>Water outflow</td>
<td>water inflow</td>
<td>VST very stiff</td>
<td>very soft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H hard</td>
<td>Fb friable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W wet</td>
<td>VL very loose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L loose</td>
<td>MD medium dense</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D dense</td>
<td>VD very dense</td>
</tr>
</tbody>
</table>

**Additional Observations:**
- **11.5-15.0m: sand standpipe piezo, ID03-GWBH05 details:**
- **12.0-15.0m: screen**
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Balcombe Road, Mentone

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
<th>Classification Symbol &amp; Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling*</td>
<td>SP</td>
<td>N 11, N 13, N 15, N 17, N 20</td>
<td>SAND: fine to medium grained, pale grey, with some high plasticity clay and clayey pockets. (continued)</td>
<td>M - W VD</td>
<td></td>
</tr>
<tr>
<td>AS auger screwing*</td>
<td>SP</td>
<td>N 12, N 17, N 21, N 23</td>
<td>becoming grey, with bands of fine grained, pale grey clayey sand</td>
<td>D - VD</td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td>SP</td>
<td>N 12, N 18, N 24</td>
<td>becoming fine to medium grained, grey with some coarse grained sand pockets and some fines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W washbore</td>
<td>SP</td>
<td>N 15, N 20, N 25</td>
<td>SAND: fine to coarse grained, grey.</td>
<td>W VD</td>
<td></td>
</tr>
<tr>
<td>HS hollow stem flight auger</td>
<td>SP</td>
<td>N 16, N 21</td>
<td>CLAYEY SAND: fine grained, dark green-brown, medium plasticity.</td>
<td>M D</td>
<td></td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td>SP</td>
<td>N 17</td>
<td>SILTY SAND: fine grained, dark green.</td>
<td>W</td>
<td></td>
</tr>
</tbody>
</table>

### Additional Observations

- **Position:** E 329932; N 5794127 (MGA94)  
- **Surface Elevation:** 15.98 m (AHD)  
- **Angle from Horizontal:** 90°  
- **Equipment Type:** Hanjin D&B, Track mounted  
- **Drilling Fluid:** Polymer  
- **Hole Diameter:** 200 mm

---

*Note: The document contains detailed geological data and classification symbols.*
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Balcombe Road, Mentone

**position:** E: 329932; N: 5794127 (MGA94)  
**surface elevation:** 15.98 m (AHD)  
**angle from horizontal:** 90°

**equipment type:** Hanjin D&B, Track mounted  
**drilling fluid:** Polymer  
**hole diameter:** 200 mm

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Samples &amp; Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPT</strong></td>
<td>7, 13, 18 N*31</td>
<td>SM</td>
<td>SILTY SAND: fine grained, dark green.</td>
</tr>
<tr>
<td></td>
<td>9, 13, 18 N*31</td>
<td></td>
<td>(continued)</td>
</tr>
<tr>
<td></td>
<td>10, 18, 20 N*38</td>
<td></td>
<td>possibly clay layer (from cuttings)</td>
</tr>
<tr>
<td></td>
<td>23, 31, 39 N*70</td>
<td></td>
<td>trace of clay and shell fragments</td>
</tr>
<tr>
<td></td>
<td>30, 47,35/100mm N*31</td>
<td></td>
<td>becoming dark grey-green, trace of shell fragments</td>
</tr>
</tbody>
</table>

- **SPT:** Standard Penetration Test
- **SM:** Soil description based on Unified Classification System

---

**Additional Observations**

- **SPT:** Standard Penetration Test
- **SM:** Soil description based on Unified Classification System
- **VD:** Very dense

---

**SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components

**graphic log:**

<table>
<thead>
<tr>
<th>Graphic Log</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.0</td>
<td>18.0</td>
</tr>
<tr>
<td>19.0</td>
<td>20.0</td>
</tr>
<tr>
<td>21.0</td>
<td>22.0</td>
</tr>
</tbody>
</table>

---

**Additional Observations:**

- **SM:** Soil description based on Unified Classification System
- **VD:** Very dense

---

**Water outflow:**

- **water inflow:**

---

**Penetration:**

- **no resistance:**
- **8-10 mm:**
- **10-12 mm:**
- **12-14 mm:**
- **15-17 mm:**
- **18-20 mm:**
- **21-23 mm:**

---

**Classification symbol & soil description:**

- **VS:** Very soft
- **S:** Soft
- **F:** Firm
- **H:** Hard
- **W:** Wet
- **E:** Environmental sample
- **C:** Casing
- **D:** Disturbed sample
- **N:** Undisturbed sample
- **Nc:** SPT with solid cone
- **NC:** SPT with solid cone
- **NS:** SPT - sample recovered
- **NY:** SPT - sample recovered
- **CS:** Cored sample
- **VS:** Vane shear; peak/remoulded (kPa)
- **R:** Refusal
- **H:** Hammer bouncing
- **VD:** Very dense

---

**Consistency / relative density:**

- **V:** Very soft
- **S:** Soft
- **F:** Firm
- **H:** Hard
- **W:** Wet
- **E:** Environmental sample
- **C:** Casing
- **D:** Disturbed sample
- **N:** Undisturbed sample
- **Nc:** SPT with solid cone
- **NC:** SPT with solid cone
- **NS:** SPT - sample recovered
- **NY:** SPT - sample recovered
- **CS:** Cored sample
- **VS:** Vane shear; peak/remoulded (kPa)
- **R:** Refusal
- **H:** Hammer bouncing
- **VD:** Very dense
**Engineering Log - Borehole**

- **client:** Metro Trains Melbourne
- **principal:** Level Crossing Removal Authority
- **project:** LCRP-CTF
- **location:** Balcombe Road, Mentone

**Well Details:**
- **ID03-GWBH06**
- **Sheet:** 4 of 4
- **Project No.:** GEOTABTF10294AA
- **Date Started:** 25 Jan 2017
- **Date Completed:** 22 Feb 2017
- **Logged by:** KG/LW
- **Checked by:** KJ

**Drilling Information:**
- **Position:** E: 329932, N: 5794127 (MGA94)
- **Surface Elevation:** 15.98 m (AHD)
- **Angle from Horizontal:** 90°
- **Equipment Type:** Hanjin D&B, Track mounted
- **Drilling Fluid:** Polymer
- **Hole Diameter:** 200 mm

**SOIL TYPE:**
- Plasticity or particle characteristic, colour, secondary and minor components

**Samples & Field Tests:**
- **10-Oct-12 Water Level on Date Shown**
- **Water Outflow**
- **Water Inflow**

**Classification Symbol & Soil Description:**
- Based on Unified Classification System

**Consistency / Relative Density:**
- VS: very soft
- D: dry
- S: soft
- F: firm
- V: very firm
- H: hard
- Fb: brittle
- VL: very loose
- M: medium dense
- MD: medium dense
- D: dense
- VD: very dense

**Graphic Log:**
- **SPT:**细粒度，深绿色.
- **SPT:** with pocket of shell fragments

**Borehole ID03-GWBH06 Terminated at 29.95 m**

**Target Depth**
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Balcombe Road, Mentone  
**Date Started:** 01 Feb 2017  
**Date Completed:** 01 Feb 2017

#### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Graphic Log</th>
<th>Classification</th>
<th>Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Well Details

- **FILL:** ASPHALT: 20mm.
- **FILL:** SANDY GRAVEL: fine to coarse grained, sub-angular to angular, dark grey, dark brown, fine grained sand, with some rootlets. With some sub-rounded cobbles.
- **CLAY:** high plasticity, pale grey, orange-brown, trace of fine grained gravel and fine grained sand.
- **CLAY:** Silty CLAY: medium plasticity, orange brown, mottled pale grey, becoming pale grey, trace of fine grained sand.
- With some fine grained sand.

#### Material Substance

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Moisture

- **DM:** dry
- **W:** wet
- **VS:** very soft
- **S:** soft
- **F:** firm
- **St:** stiff
- **VST:** very stiff
- **H:** hard
- **Fb:** friable
- **VL:** very loose
- **L:** loose
- **MD:** medium dense
- **D:** dense
- **VD:** very dense
### Engineering Log - Borehole

**Hole ID:** ID03-GWBH07  
**Sheet no.:** 2 of 3  
**Project no.:** GEOTABTF10294AA

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Balcombe Road, Mentone

**Position:** E: 330114; N: 5794397 (MGA94)  
**Surface Elevation:** 20.02 m (AHD)  
**Angle from horizontal:** 90°  
**Equipment Type:** Geoprobe 6610DT, Track mounted  
**Drilling Fluid:** None  
**Hole Diameter:** 150 mm

**Samples & Field Tests**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>M mud</td>
<td>SM</td>
<td>SILTY SAND: fine to medium grained, pale red, orange, mottled pale brown.</td>
</tr>
<tr>
<td>C casing</td>
<td>SP</td>
<td>SAND: fine to medium grained, brown, orange-brown, pale-brown, with some fines.</td>
</tr>
<tr>
<td>T blank bit</td>
<td>ML</td>
<td>Sandy SILT: low liquid limit, pale brown, mottled pale grey, orange, fine to coarse grained sand.</td>
</tr>
</tbody>
</table>

**Classification Symbol & Soil Description**

- **SOIL TYPE:** plasticity or particle characteristics, colour, secondary and minor components.
- **Graphic Log Depth (m):**
  - 9.0
  - 10.0
  - 11.0
  - 12.0
  - 13.0
  - 14.0
  - 15.0

**Consistency / Relative Density**

- **MOISTURE:**
  - DM - Very dry
  - WP - Moist
  - PL - Plastic limit
  - LL - Liquid limit

**Classification System**

- **CONSISTENCY:**
  - VS - Very soft
  - S - Soft
  - F - Firm
  - ST - Stiff
  - VST - Very stiff
  - H - Hard
  - Fb - Frangible
  - W - Wet
  - L - Very loose
  - VL - Loose
  - MD - Medium dense
  - D - Dense
  - VD - Very dense

**Additional Observations**

- **Borehole ID03-GWBH07 terminated at 15.00 m Target depth**

---

**Engineering Log - Borehole Details**

**Well Details:**

- **Bore Construction License:** WRK098289  
- **Drilling Company:** Drillworx  
- **Driller:** J. Boyd  
- **Backfill Details:** 0.0-6.5m: Grout 6.5-7.5m: Bentonite

---

**Drilling Information**

<table>
<thead>
<tr>
<th>RL (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>SM</td>
</tr>
<tr>
<td>11</td>
<td>SM</td>
</tr>
<tr>
<td>10</td>
<td>SM</td>
</tr>
<tr>
<td>9</td>
<td>SM</td>
</tr>
<tr>
<td>8</td>
<td>SM</td>
</tr>
<tr>
<td>7</td>
<td>SM</td>
</tr>
<tr>
<td>6</td>
<td>SM</td>
</tr>
<tr>
<td>5</td>
<td>SM</td>
</tr>
</tbody>
</table>

**Classification Symbol: TERTIARY BRIGHTON GROUP**
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**princip: **Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Balcombe Road, Mentone

---

**Drilling Information**

<table>
<thead>
<tr>
<th>RL (m)</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Geotechnical</td>
</tr>
<tr>
<td>-1</td>
<td>Bentonite</td>
</tr>
<tr>
<td>-2</td>
<td>Sand</td>
</tr>
<tr>
<td>-3</td>
<td>Casing</td>
</tr>
<tr>
<td>1</td>
<td>Screen</td>
</tr>
<tr>
<td>2</td>
<td>Bentonite</td>
</tr>
<tr>
<td>3</td>
<td>Sand</td>
</tr>
<tr>
<td>4</td>
<td>Casing</td>
</tr>
</tbody>
</table>

**Logging Information**

- **Hole ID:** ID03-GWBH07  
- **Date Started:** 01 Feb 2017  
- **Date Completed:** 01 Feb 2017  
- **Logged by:** KG  
- **Checked by:** KJ

**Equipment Type:** Geoprobe 6610DT, Track mounted  
**Drilling Fluid:** None  
**Angle from Horizontal:** 90°  
**Equipment:** Geoprobe 6610DT, Track mounted  
**Surface Elevation:** 20.02 m (AHD)  
**Drill Diameter:** 150 mm  
**Position:** E: 330114; N: 5794397 (MGA94)

**Classification Symbol & Soil Description**

- **SOIL TYPE:** Clays, sands, silts, gravels
- **classificationsymbol:** M, C, N
- **graphic log:** based on Unified Classification System

**Additional Observations**

- **7.5-11.0m:** sand  
- **11.0-15.0m:** Bentonite standpipe piezo. ID03-GWBH07 details:  
- **8.0-11.0m:** screen
**Engineering Log - Borehole**

Client: Metro Trains Melbourne  
Principal: Level Crossing Removal Authority  
Project: LCRP-CTF  
Location: Balcombe Road, Mentone

**Drilling Information**
- **Hole ID:** ID03-GWBH08  
- **Date started:** 31 Jan 2017  
- **Date completed:** 31 Jan 2017  
- **Logged by:** KG  
- **Checked by:** KJ

**Material Substance**
- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components
- **Classification Symbol:** Based on Unified Classification System
- **Consistency / Relative Density:** Moisture condition

**Samples & Field Tests**
- **Borehole:** 6610DT, Track mounted  
- **Drilling Fluid:** None  
- **Hole Diameter:** 125 mm  
- **Surface Elevation:** 20.00 m (AHD)  
- **Angle from Horizontal:** 90°

**Structure and Additional Observations**
- **FILL: ASPHALT:** 100mm.
- **SAND:** Fine to medium grained, dark brown, grey, trace of fine grained gravel. Becoming fine to coarse grained sand.
- **Silty CLAY:** High plasticity, orange-brown, mottled pale grey, pale brown, trace of fine grained sand. Becoming medium plasticity, orange.
- **Clayey SILT:** Low liquid limit, orange brown, trace of fine grained sand.

**Classifications**
- **SP:** FILL  
- **CH:** Silty CLAY  
- **ML:** Clayey SILT

---

**Well Details**

**Graphic Log**
- **Depth (m):** 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0

**Samples & Field Tests**
- **ID03-GWBH08**

---

**Drilling Information**
- **Position:** E: 330688; N: 5794471 (MGA94)  
- **Equipment Type:** Geoprobe 6610DT, Track mounted  
- **Angle from Horizontal:** 90°

---

**Drilling Method**
- **Method:** Hollow stem flight auger  
- **Support:** Mud  
- **Penetration:** No resistance ranging to refusal

---

**Drilling Fluid**
- **Type:** None

---

**Additional Observations**
- **Position:** E: 330688; N: 5794471 (MGA94)  
- **Equipment Type:** Geoprobe 6610DT, Track mounted  
- **Angle from Horizontal:** 90°

---

**Material Substance**
- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components
- **Classification Symbol:** Based on Unified Classification System
- **Consistency / Relative Density:** Moisture condition
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Balcombe Road, Mentone

**position:** E: 330068; N: 5794471 (MGA94)  
**surface elevation:** 20.00 m (AHD)  
**equipment type:** Geoprobe 6610DT, Track mounted  
**drilling fluid:** None

**samples & field tests**  
**material substance**

- **Clayey SILT:** low liquid limit, orange brown, trace of fine grained sand.  
- **Silty SAND:** fine grained, pale brown.

Borehole ID03-GWBH08 terminated at 15.00 m.  
Target depth

**method:** hollow stem flight auger  
**support:** M mud  
**penetration:** N nil

**samples & field tests**

- **bulk disturbed sample**
- **disturbed sample**
- **environmental sample**
- **split spoon sample**
- **standard penetration test (SPT)**
- **SPT - sample recovered**
- **SPT with solid cone**
- **vane shear; peak/remoulded (kPa)**
- **refusal**
- **hammer bouncing**

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

- **VS:** very soft  
- **S:** soft  
- **F:** firm  
- **ST:** stiff  
- **VST:** very stiff  
- **H:** hard  
- **FB:** friable  
- **VL:** very loose  
- **L:** loose  
- **MD:** medium dense  
- **D:** dense  
- **VD:** very dense

**method & support**

- **AD:** auger drilling
- **AS:** auger screwing
- **HA:** hand auger
- **W:** wash hole
- **HS:** hollow stem flight auger
- **NDD:** non destructive drilling

**support**

- **M:** mud  
- **N:** nil  
- **C:** casing

**samples & field tests**

- **water**
- **water inflow**
- **water outflow**

**classification symbol**

- **ML:** Clayey SILT
- **SM:** Silty SAND

**material description**

- **TERTIARY BRIGHTON GROUP**

- Becoming pale grey, fine to coarse grained.
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Balcombe Road, Mentone

**Hole ID:** ID03-GWBH08  
**Project No.:** GEOTABTF10294AA  
**Sheet No.:** 3 of 3

**Date Started:** 31 Jan 2017  
**Date Completed:** 31 Jan 2017  
**Logged By:** KG  
**Checked By:** KJ

**Surface Elevation:** 20.00 m (AHD)  
**Angle from Horizontal:** 90°  
**Drilling Fluid:** None  
**Hole Diameter:** 125 mm

---

**Position:** E: 330068; N: 5794471 (MGA94)  
**Equipment Type:** Geoprobe 6610DT, Track mounted  
**Penetration:** 10-Oct-12 water level on date shown

---

**Method & Support:**  
- AD: auger drilling*  
- AS: auger screwing*  
- HA: hand auger  
- W: washbore  
- HS: hollow stem flight auger  
- NDD: non destructive drilling

**Material Substance:**  
- 11.5-15.0m: Sand standpipe piezo. ID03-GWBH08 details:  
- 12.0-15.0m: screen

---

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**Classification Symbol:** based on Unified Classification System

---

**Classification Symbol & Soil Description:**  
- **Consistency / Relative Density:**  
  - VS: very soft  
  - S: soft  
  - F: firm  
  - ST: stiff  
  - VST: very stiff  
  - H: hard  
  - Fb: friable  
  - VL: very loose  
  - L: loose  
  - MD: medium dense  
  - D: dense  
  - VD: very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Charman Road, Cheltenham

**Hole ID:** ID13-GWBH05  
**date started:** 25 Jan 2017  
**date completed:** 25 Jan 2017  
**logged by:** KG  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>water</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td></td>
<td></td>
<td>TOPSOIL: SILT, low liquid limit, dark grey, with some rootlets.</td>
</tr>
<tr>
<td>AS</td>
<td></td>
<td></td>
<td>SAND: fine to medium grained, brown, pale brown.</td>
</tr>
<tr>
<td>HA</td>
<td></td>
<td></td>
<td>CLAYEY SAND: fine to medium grained, orange-brown, trace of gravel, sub-rounded to sub-angular.</td>
</tr>
<tr>
<td>WD</td>
<td></td>
<td></td>
<td>Sandy CLAY: high plasticity, pale grey, orange-brown mottled dark red, fine to medium grained sand.</td>
</tr>
<tr>
<td>HSS</td>
<td></td>
<td></td>
<td>becoming fine to coarse grained sand</td>
</tr>
<tr>
<td>NDD</td>
<td></td>
<td></td>
<td>becoming orange-brown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CLAYEY SAND: fine to coarse grained, orange-brown, mottled pale grey, medium plasticity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SILTY SAND: fine to coarse grained, orange brown, mottled pale grey.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CLAYEY SAND: fine to coarse grained, orange brown, mottled pale grey and dark red, medium plasticity.</td>
</tr>
</tbody>
</table>

#### Material Substance

<table>
<thead>
<tr>
<th>soil description</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOPSOIL</td>
<td>M F TOPSOIL QUATERNARY SANDS</td>
</tr>
<tr>
<td>QUATERNARY SANDS</td>
<td></td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Soil Type

- **topsoil:** Silt, low liquid limit, dark grey, with some rootlets.
- **sand:** fine to medium grained, brown, pale brown.
- **clayey sand:** fine to medium grained, orange-brown, trace of gravel, sub-rounded to sub-angular.
- **sandy clay:** high plasticity, pale grey, orange-brown mottled dark red, fine to medium grained sand.
- **clayey sand:** fine to coarse grained, orange-brown, mottled pale grey, medium plasticity.
- **silty sand:** fine to coarse grained, orange-brown, mottled pale grey.
- **clayey sand:** fine to coarse grained, orange brown, mottled pale grey and dark red, medium plasticity.

#### Other Observations

- **method & support:**
  - AD: auger drilling
  - AS: auger screening
  - HA: hand auger
  - WD: washbore
  - HSS: hollow stem flight auger
  - NDD: non destructive drilling

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

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

- **consistency / relative density:**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff
  - H: hard
  - Fb: friable
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VD: very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Charman Road, Cheltenham

**Hole ID:** ID13-GWBH05  
**sheet no:** 2 of 3  
**project no:** GEOTABTF10294AA  
**date started:** 25 Jan 2017  
**date completed:** 25 Jan 2017  
**logged by:** KG  
**checked by:** KJ

---

**method & support**  
- AD: auger drilling  
- AS: auger screwing  
- HA: hand auger  
- W: washhole  
- HS: hollow stem flight auger  
- NDD: non destructive drilling

**soil type description**  
- **CLAYEY SAND:** fine to coarse grained, orange brown, mottled pale grey and dark red, medium plasticity. (continued)  
- trace of high plasticity clay pockets, pale grey

**material description**  
- **Silty Sand:** fine to medium grained, orange-brown, mottled grey.  
- **Sandy Silt:** low liquid limit, orange-brown, fine to medium grained sand.

**samples & field tests**  
- B: bulk disturbed sample  
- D: disturbed sample  
- E: environmental sample  
- SS: split spoon sample  
- HP: hand penetrometer (kPa)  
- N: standard penetration test (SPT)  
- Nc: SPT with solid cone  
- V: vane shear; peak/remoulded (kPa)

**classification symbol & soil description**  
- **VSt:** TERTIARY BRIGHTON GROUP

**structure and additional observations**  
- **VD:**

---

**samples & field tests**  
- water outflow  
- water inflow  
- penetration  
- refusal

**material description**  
- **CLAYEY SAND:** fine to coarse grained, orange brown, mottled pale grey and dark red, medium plasticity. (continued)  
- trace of high plasticity clay pockets, pale grey

---

**method & support**  
- AD: auger drilling  
- AS: auger screwing  
- HA: hand auger  
- W: washhole  
- HS: hollow stem flight auger  
- NDD: non destructive drilling

**soil type description**  
- **CLAYEY SAND:** fine to coarse grained, orange brown, mottled pale grey and dark red, medium plasticity. (continued)  
- trace of high plasticity clay pockets, pale grey

**samples & field tests**  
- B: bulk disturbed sample  
- D: disturbed sample  
- E: environmental sample  
- SS: split spoon sample  
- HP: hand penetrometer (kPa)  
- N: standard penetration test (SPT)  
- Nc: SPT with solid cone  
- V: vane shear; peak/remoulded (kPa)

**classification symbol & soil description**  
- **VSt:** TERTIARY BRIGHTON GROUP

**structure and additional observations**  
- **VD:**
Sandy SILT: low liquid limit, orange-brown, fine to medium grained sand. Occasionally pale brown

Silt: low liquid limit, orange-brown, trace of fine grained sand.

Silty CLAY: low to medium plasticity, orange-brown, with some fine grained sand. Trace of fine to medium grained gravel, sub-angular

Borehole ID13-GWBH05 terminated at 20.00 m Target depth
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Charman Road, Cheltenham

**Sample Details:**
- **Hole ID:** ID13-GWBH06  
- **Date started:** 13 Feb 2017  
- **Date completed:** 28 Feb 2017

### Drilling Information

<table>
<thead>
<tr>
<th>Sample &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOIL TYPE:</strong> plasticity or particle characteristic, colour, secondary and minor components</td>
<td></td>
</tr>
<tr>
<td><strong>graphic log</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SOIL TYPE:</strong> plasticity or particle characteristic, colour, secondary and minor components</td>
<td></td>
</tr>
<tr>
<td><strong>material description</strong></td>
<td></td>
</tr>
<tr>
<td><strong>classification symbol</strong></td>
<td></td>
</tr>
<tr>
<td><strong>material description</strong></td>
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<td><strong>classification symbol</strong></td>
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<td><strong>classification symbol</strong></td>
<td></td>
</tr>
<tr>
<td><strong>material description</strong></td>
<td></td>
</tr>
<tr>
<td><strong>classification symbol</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Soil Description
- **TOPSOIL:** Silt. Low liquid limit, dark grey, with some rootlets.
- **SAND:** Fine to medium grained, brown, pale brown.
- **SANDY CLAY:** Fine to coarse grained, orange-brown, pale-brown, mottled pale grey, low plasticity.
- **Silty CLAY:** High plasticity, orange, brown, mottled pale grey, dark red.
- **Silty CLAY:** Fine to medium grained, orange, brown, medium plasticity, trace of fine to medium grained gravel, sub-rounded to sub-angular.
- **SANDY CLAY:** Fine to coarse grained, orange-brown, pale-brown, mottled pale grey, low plasticity.
- **CLAYEY SAND:** Fine to medium grained, orange-brown, pale-brown, mottled pale grey, low plasticity, becoming dark red.

### Method & Support
- **method & support:** AD auger drilling
- **samples & field tests:** B bulk disturbed sample, C casing penetration
- **classification symbol:** SP SPT - sample recovered, SC SPT - sample recovered
- **material description:** SAND: fine to medium grained, brown, pale brown.
- **classification symbol:** CL-CISC
- **material description:** CLAYEY SAND: fine to medium grained, orange, brown, medium plasticity, trace of fine to medium grained gravel, sub-rounded to sub-angular.
- **classification symbol:** VD VSP - plastic limit
- **material description:** SANDY CLAY: fine to coarse grained, orange-brown, pale-brown, mottled pale grey, low plasticity.
- **classification symbol:** H rigid

### Classification System
- **moisture:** D dry, M moist, W wet
- **consistency / relative density:** VS very soft, S soft, F firm, ST stiff, VST very stiff, H hard, Fb friable, VL very loose, L loose, MD medium dense, D dense,VD very dense

---

**Equipment:**
- Geoprobe 6610DT, Track mounted
- Drilling fluid: Polymer
- Hole diameter: 150 mm

**Position:** E: 329009; N: 5795780 (MGA94)

**Surface Elevation:** 37.78 m (AHD)

**Angle from Horizontal:** 90°

---

**Drilling Information:**
- **method & support:** AD auger drilling
- **samples & field tests:** B bulk disturbed sample, C casing penetration
- **classification symbol:** SP SPT - sample recovered, SC SPT - sample recovered
- **material description:** SAND: fine to medium grained, brown, pale brown.
- **classification symbol:** CL-CISC
- **material description:** CLAYEY SAND: fine to medium grained, orange, brown, medium plasticity, trace of fine to medium grained gravel, sub-rounded to sub-angular.
- **classification symbol:** VD VSP - plastic limit
- **material description:** SANDY CLAY: fine to coarse grained, orange-brown, pale-brown, mottled pale grey, low plasticity.
- **classification symbol:** H rigid

---

**Classification System:**
- **moisture:** D dry, M moist, W wet
- **consistency / relative density:** VS very soft, S soft, F firm, ST stiff, VST very stiff, H hard, Fb friable, VL very loose, L loose, MD medium dense, D dense,VD very dense

---

**Samples Details:**
- **Hole ID:** ID13-GWBH06  
- **Date started:** 13 Feb 2017  
- **Date completed:** 28 Feb 2017

---

**Logging Details:**
- **client:** Metro Trains Melbourne  
- **principal:** Level Crossing Removal Authority  
- **project:** LCRP-CTF  
- **location:** Charman Road, Cheltenham

---

**Date:** 13 Feb 2017

**Logged by:** KG

**Checked by:** KJ
### Engineering Log - Borehole

#### client:
**Metro Trains Melbourne**

#### principal:
**Level Crossing Removal Authority**

#### project:
**LCRP-CTF**

#### location:
**Charman Road, Cheltenham**

---

**Hole ID:** ID13-GWBH06  
**sheet no.:** 2 of 4  
**project no.:** GEOTABTF10294AA  
**date started:** 13 Feb 2017  
**date completed:** 28 Feb 2017  
**logged by:** KG  
**checked by:** KJ  

---

**Position:** E: 329099, N: 5795780 (MGA94)  
**Surface elevation:** 37.78 m (AHD)  
**Angle from horizontal:** 90°  
**Equipment type:** GeoProbe 6610DT, Track mounted  
**Drilling fluid:** Polymer  
**Hole diameter:** 150 mm

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Graphic Log</th>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N**=**R</td>
<td>SC</td>
<td>CLAYEY SAND</td>
<td>fine to coarse grained, orange-brown, pale-brown, mottled pale grey, low plasticity. (continued)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>becoming orange, orange-brown, mottled pale grey</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>becoming fine to medium grained, pale brown</td>
</tr>
</tbody>
</table>

---

**Materials Substance**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Moisture Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>DMWWpWldry</td>
</tr>
<tr>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td></td>
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<tr>
<td>14.0</td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td></td>
</tr>
<tr>
<td>16.0</td>
<td></td>
</tr>
</tbody>
</table>

---

**Additional Observations**

- **TERTIARY BRIGHTON GROUP**
- **CLAYEY SAND:** fine to coarse grained, orange-brown, pale-brown, mottled pale grey, low plasticity. (continued)
- becoming orange, orange-brown, mottled pale grey
- becoming fine to medium grained, pale brown

---

**Support**

- **M** mud
- **N** nil
- **C** casing

**Method**

- **AD** auger drilling
- **AS** auger screwing
- **HA** hand auger
- **W** washbore
- **HS** hollow stem flight auger
- **NDD** non destructive drilling

**Consistency / Relative Density**

- **VS** very soft
- **S** soft
- **F** firm
- **ST** stiff
- **VST** very stiff
- **H** hard
- **Fb** friable
- **VL** very loose
- **L** loose
- **MD** medium dense
- **D** dense
- **VD** very dense
Hole ID: ID13-GWBH06
project: LCRP-CTF
location: Charman Road, Cheltenham
client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF

TERTIARY BRIGHTON GROUP

CLAYEY SAND: fine to medium grained, pale brown.
becoming orange-brown, brown, mottled dark grey
with interbedded layers of moderately cemented sand, fine grained, red-brown, (approximately 100mm-200mm thick, at 100mm-300mm spacing).
becoming fine grained, trace of fine grained gravel and medium to coarse grained sand, grading to silty sand

Sandy SILT: low to medium liquid limit, orange-brown, fine grained sand.

structure and additional observations

method & support
AD  auger drilling
AS  auger screwing
HA  hand auger
W  washbar
HS  hollow stem flight auger
NDD  non destructive drilling
*  bit shown by suffix
e.g. AD/T B blank bit
T  TC bit
V  V bit

samples & field tests
M  mud
C  casing
N  nil
disturbed sample
S  split spoon sample
SS#  standard penetration test (SPT)
N  SPT - sample recovered
HP  hand penetration meter (kPa)
Nc  SPT with solid cone
VS  vane shear, peak/remoulded (kPa)
R  refusal
HB  hammer bouncing

classification symbol
SC  CDF_0_9_06_LIBRARY.GLB

moisture
DM  dry
Wp  plastic limit
VL  very loose
MD  medium dense
D  dense
V  very dense

consistency / relative density
VS  very soft
S  soft
F  firm
St  stiff
VSt  very stiff
H  hard
Fr  friable
L  loose
ML  medium
ML  medium

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

material description
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

CLAYEY SAND: fine to medium grained, pale brown.
becoming orange-brown, brown, mottled dark grey
with interbedded layers of moderately cemented sand, fine grained, red-brown, (approximately 100mm-200mm thick, at 100mm-300mm spacing).
becoming fine grained, trace of fine grained gravel and medium to coarse grained sand, grading to silty sand

Sandy SILT: low to medium liquid limit, orange-brown, fine grained sand.

structure and additional observations

method & support
AD  auger drilling
AS  auger screwing
HA  hand auger
W  washbar
HS  hollow stem flight auger
NDD  non destructive drilling
*  bit shown by suffix
e.g. AD/T B blank bit
T  TC bit
V  V bit

samples & field tests
M  mud
C  casing
N  nil
disturbed sample
S  split spoon sample
SS#  standard penetration test (SPT)
N  SPT - sample recovered
HP  hand penetration meter (kPa)
Nc  SPT with solid cone
VS  vane shear, peak/remoulded (kPa)
R  refusal
HB  hammer bouncing

classification symbol
SC  CDF_0_9_06_LIBRARY.GLB

moisture
DM  dry
Wp  plastic limit
VL  very loose
MD  medium dense
D  dense
V  very dense

consistency / relative density
VS  very soft
S  soft
F  firm
St  stiff
VSt  very stiff
H  hard
Fr  friable
L  loose
ML  medium
ML  medium

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

material description
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

CLAYEY SAND: fine to medium grained, pale brown.
becoming orange-brown, brown, mottled dark grey
with interbedded layers of moderately cemented sand, fine grained, red-brown, (approximately 100mm-200mm thick, at 100mm-300mm spacing).
becoming fine grained, trace of fine grained gravel and medium to coarse grained sand, grading to silty sand

Sandy SILT: low to medium liquid limit, orange-brown, fine grained sand.

structure and additional observations

method & support
AD  auger drilling
AS  auger screwing
HA  hand auger
W  washbar
HS  hollow stem flight auger
NDD  non destructive drilling
*  bit shown by suffix
e.g. AD/T B blank bit
T  TC bit
V  V bit

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M  mud
C  casing
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classification symbol
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VS  very soft
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H  hard
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L  loose
ML  medium
ML  medium

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

material description
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

CLAYEY SAND: fine to medium grained, pale brown.
becoming orange-brown, brown, mottled dark grey
with interbedded layers of moderately cemented sand, fine grained, red-brown, (approximately 100mm-200mm thick, at 100mm-300mm spacing).
becoming fine grained, trace of fine grained gravel and medium to coarse grained sand, grading to silty sand

Sandy SILT: low to medium liquid limit, orange-brown, fine grained sand.
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Charman Road, Cheltenham

**position:** E: 329009, N: 5795780 (MGA94)  
**surface elevation:** 37.78 m (AHD)  
**angle from horizontal:** 90°  
**equipment type:** Geoprobe 6610DT, Track mounted  
**drilling fluid:** Polymer  
**hole diameter:** 150 mm

---

**samples & field tests**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0-3.0</td>
<td>Grout</td>
</tr>
<tr>
<td>3.0-4.5</td>
<td>Bentonite</td>
</tr>
<tr>
<td>4.5-8.0</td>
<td>Sand</td>
</tr>
<tr>
<td>8.0-20.0</td>
<td>Bentonite</td>
</tr>
</tbody>
</table>

**SPT samples**

<table>
<thead>
<tr>
<th>graphic log depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0</td>
<td>Sandy Silt: low to medium liquid limit, orange-brown, fine grained sand. (continued)</td>
</tr>
<tr>
<td>13.0</td>
<td>Silty Sand: fine grained, dark grey, trace of shell fragments and weakly cemented sand bands.</td>
</tr>
</tbody>
</table>

**structure and additional observations**

- Borehole ID13-GWBH06 terminated at 30.00 m
- Target depth

---

**samples & field tests**

- water
- samples & field tests
- consistency / relative density
- support
- material substance
- penetration
- classification symbol
- soil description
- material description
- SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

**method & support**

- AD: auger drilling
- AS: auger screening
- HA: hand auger
- W: washbore
- HS: hollow stem flight auger
- NDD: non destructive drilling

**penetration**

- no resistance
- 10-Oct-12 water level on date shown
- hammer bouncing

**classification symbol & soil description**

- based on Unified Classification System
- V: very soft
- S: soft
- F: firm
- ST: stiff
- VS: very stiff
- H: hard
- Fb: friable
- VL: very loose
- L: loose
- MD: medium dense
- D: dense
- VD: very dense
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Charman Road, Cheltenham

**Hole ID:** ID13-GWBH07  
**date started:** 16 Feb 2017  
**date completed:** 17 Feb 2017  
**logged by:** SJS  
**checked by:** KJ

---

**FILL:** ASPHALT: 150mm.

**FILL:** GRAVEL: fine to coarse grained, pale brown, with some cobbles.

**CLAYEY SAND:** fine to coarse grained, pale grey, mottled orange.

becoming pale grey-brown

**SAND:** fine to coarse grained, pale grey, trace of fines.

becoming fine grained

**SAND:** fine to medium grained, pale brown.

---

**method & support**  
A D auger drilling  
AS auger screwing  
H A hand auger  
W washbore  
H S hollow stem flight auger  
N D non destructive drilling

---

**samples & field tests**  
B bulk disturbed sample  
D disturbed sample  
E environmental sample  
S S split spoon sample  
L## undisturbed sample #2mm diameter  
N## SPT - sample recovered  
N SPT with solid cone  
V VS vane shear; peak/remoulded (kPa)  
R refusal  
H HB hammer bouncing

---

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

**moisture**  
D dry  
M moist  
W wet

**consistency / relative density**  
VS very soft  
S soft  
F firm  
ST stiff  
VST very stiff  
H hard  
Fb friable  
VL very loose  
L loose  
MD medium dense  
D dense  
VD very dense
### Soil Descriptions

- **TERTIARY BRIGHTON GROUP**
  - **SAND**: fine to medium grained, pale brown.
  - **CLAYEY SAND**: fine to medium grained, pale grey, medium plasticity.
  - **Silty Sand**: fine to medium grained, pale brown.

### Drilling Information

- **Hole ID**: ID13-GWBH07
- **Project**: LCRP-CTF
- **Principal**: Level Crossing Removal Authority
- **Client**: Metro Trains Melbourne
- **Location**: Charman Road, Cheltenham

### Sample Data

#### Material Substance

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>SP</td>
<td>SAND: fine to medium grained, pale brown. (continued)</td>
</tr>
<tr>
<td>10.0</td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, pale grey, medium plasticity.</td>
</tr>
<tr>
<td>11.0</td>
<td>SM</td>
<td>SILTY SAND: fine to medium grained, pale brown.</td>
</tr>
</tbody>
</table>

### Additional Observations

- **Method**: AD - auger drilling
- **Support**: M - mud, N - nil, C - casing
- **Consistency/Relative Density**: VS - very soft, S - soft, F - firm, St - stiff, VSt - very stiff
- **Moisture**: DM - dry, M - moist, W - wet
- **Penetration**: O - no resistance, R - refusal
- **Equipment**: Geoprobe, Track mounted
- **Drilling Fluid**: None

---

**Note:** The above information is a sample of the full document content. The full document contains detailed records of drilling operations, soil descriptions, and additional observations.
# Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Charman Road, Cheltenham

**Hole ID:** ID13-GWBH07  
**date started:** 16 Feb 2017  
**date completed:** 17 Feb 2017  
**logged by:** SJS  
**checked by:** KJ

**well details:** bore construction license: WRK098290  
**backfill details:**  
- 0.0-3.0m: Grout  
- 3.0-4.5m: Bentonite  
- 4.5-8.0m: Sand  
- 8.0-20.0m: Bentonite  
**standpipe piezo. ID13-GWBH07 details:**  
- 5.0-8.0m: screen

**method & support:**  
- AD: auger drilling  
- AS: auger screwing  
- HA: hand auger  
- W: wash bore  
- HS: hollow stem flight auger  
- NDD: non-destructive drilling

**material description:**  
- SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>Graphic Log</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI</td>
<td>Silty CLAY: medium plasticity, grey.</td>
</tr>
</tbody>
</table>

**structure and additional observations:**  
- borehole ID13-GWBH07 terminated at 20.00 m Target depth

**drilling information:**  
- method & support: auger drilling  
- water:  
  - 10-Oct-12 water level on date shown  
  - water inflow  
  - water outflow  
- support: M mud  
- penetration: no resistance ranging to refusal

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.0</td>
<td></td>
</tr>
<tr>
<td>18.0</td>
<td></td>
</tr>
<tr>
<td>19.0</td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td></td>
</tr>
</tbody>
</table>

**samples & field tests:**  
- method:  
  - 123: HSNDD  
  - hollow stem flight auger  
  - non destructive drilling  
- support: N Nl  
- penetration: no resistance ranging to refusal

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

<table>
<thead>
<tr>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>Sf</td>
<td>stiff</td>
</tr>
<tr>
<td>Vs</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VS</td>
<td>very dense</td>
</tr>
</tbody>
</table>

**equipment type:** Geoprobe, Track mounted  
**angle from horizontal:** 90°  
**hole diameter:** 200 mm  
**surface elevation:** 32.36 m (AHD)  
**drilling fluid:** None

**samples & field tests details:**  
- method & support:  
  - ADASHAW  
  - auger drilling  
  - hand auger  
  - non destructive drilling  
- support: N Nl  
- penetration: no resistance ranging to refusal

**material description:**  
- moisture:  
  - D: dry  
  - M: moist  
  - W: wet  
- consistency / relative density:  
  - VS: very soft  
  - S: soft  
  - F: firm  
  - Sf: stiff  
  - Vs: very stiff  
  - H: hard  
  - Fb: friable  
  - VL: very loose  
  - L: loose  
  - MD: medium dense  
  - D: dense  
  - VS: very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Charman Road, Cheltenham

---

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td></td>
<td>M mud</td>
</tr>
<tr>
<td>AD</td>
<td></td>
<td>N nil</td>
</tr>
<tr>
<td>AS</td>
<td></td>
<td>C casing</td>
</tr>
<tr>
<td>HA</td>
<td></td>
<td>G</td>
</tr>
<tr>
<td>W</td>
<td></td>
<td>H</td>
</tr>
<tr>
<td>HS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Classification Symbol & Soil Description

Based on Unified Classification System

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **classification symbol:**
  - B: bulk disturbed sample
  - D: disturbed sample
  - E: environmental sample
  - SS: split spoon sample
  - U#: undisturbed sample #mm diameter
  - HP: hand penetrometer (kPa)
  - SPT: standard penetration test (SPT)
- **soil description:**
  - N: SPT - sample recovered
  - N*: SPT - sample recovered
  - SPT with solid cone
  - V: vane shear; peak/remoulded (kPa)
  - W: plastic limit
  - WI:
- **moisture condition:**
  - DM: dry
  - W: very wet
  - P: plastic limit
  - S: soft
  - F: friable
  - L: very loose
  - MD:
  - D: dense
  - VD:
- **penetration:**
  - no resistance ranging to refusal
  - 10-Oct-12 water level on date shown
  - refusal
  - SB:
- **structure and additional observations:**
  - V: hammer bouncing
  - MD:
  - MD:

---

**hole diameter:** 200 mm  
**drilling fluid:** Polymer  
**surface elevation:** 32.33 m (AHD)

### Drilling Information

- **position:** E: 329107; N: 5796362 (MGA94)  
- **angle from horizontal:** 90°  
- **equipment type:** Geoprobe 6610DT, Track mounted

---

**Hole ID:** ID13-GWBH08  
**date started:** 20 Feb 2017  
**date completed:** 10 Mar 2017  
**logged by:** SJS  
**checked by:** KJ

---

**SOIL TYPE:**

- **CLAYEY SAND:** fine to coarse grained, pale brown-grey, with some orange.
- **SAND:** fine to coarse grained, pale brown-grey, with some fines.

---

**samples & field tests:**

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

---

**classification log:**

- **graphic log:**
  - SPT 8, 16, 16 N=32
  - SPT 16, 24, 28 N=52
  - SPT 11, 22, 27 N=49
  - SPT 5, 6, 10 N=16

---

**material description:**

- **FILL:** ASPHALT: 200mm.
- **FILL:** GRAVEL: fine to coarse grained, rounded to angular, pale brown, with some clay.

---

**classificationsymbol & soil description:**

- **V:** very soft
- **S:** soft
- **F:** firm
- **ST:** stiff
- **VST:** very stiff
- **H:** hard
- **Fb:** friable
- **VL:** very loose
- **MD:** medium dense
- **D:** dense
- **VD:** very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Charman Road, Cheltenham

**Hole ID:** ID13-GWBH08  
**sheet no:** 3 of 4  
**project no:** GEOTABTF10294AA  
**date started:** 20 Feb 2017  
**date completed:** 10 Mar 2017  
**logged by:** SJS  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>equipment type</th>
<th>angle from horizontal</th>
<th>hole diameter</th>
<th>drilling fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 1/2 1/2 1/2 1/2</td>
<td>Geoprobe 6610DT, Track mounted</td>
<td>90°</td>
<td>200 mm</td>
<td>Polymer</td>
</tr>
</tbody>
</table>

#### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**material description:**

- **Silty Sand:** fine to medium grained, dark green-grey.

<table>
<thead>
<tr>
<th>sample type</th>
<th>classification symbol</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bulk disturbed sample</td>
<td>SM</td>
<td>GELLIBRAND MARL</td>
</tr>
</tbody>
</table>

#### Well Details

<table>
<thead>
<tr>
<th>graphic log</th>
<th>depth (m)</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 5, 9, 18</td>
<td>16</td>
<td>SM</td>
</tr>
<tr>
<td>SPT 16, 24, 37</td>
<td>10-16</td>
<td>SM</td>
</tr>
<tr>
<td>SPT 16, 24, 37</td>
<td>16-26</td>
<td>SM</td>
</tr>
<tr>
<td>SPT 16, 24, 37</td>
<td>21-26</td>
<td>SM</td>
</tr>
<tr>
<td>SPT 16, 24, 37</td>
<td>26</td>
<td>SM</td>
</tr>
</tbody>
</table>

#### Classification symbol & soil description based on Unified Classification System

<table>
<thead>
<tr>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>ST</td>
<td>stiff</td>
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<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
</tr>
</tbody>
</table>

#### Additional Observations

- No resistance ranging to refusal
- Hand penetrometer (kPa)
- Standard penetration test (SPT)
- Hammer bouncing
- Vane shear; peak/remoulded (kPa)
- Very soft
- Soft
- Firm
- Stiff
- Very stiff
- Hard
- Fraiseable
- Very loose
- Loose
- Medium dense
- Dense
- Very dense
Hole ID: ID13-GWBH08

project no. GEOTABTF10294AA

client: Metro Trains Melbourne

principal: Level Crossing Removal Authority

project: LCRP-CTF

location: Charman Road, Cheltenham

position: E 329107; N 5796362 (MGA94)
surface elevation: 32.33 m (AHD)
angle from horizontal: 90°
equipment type: Geoprobe 6610DT, Track mounted
drilling fluid: Polymer
hole diameter: 200 mm

Borehole ID13-GWBH08 terminated at 30.25 m
Target depth

classification symbol & soil description
Clayey SILT: high liquid limit, grey - green, with some fine grained sand.

material substance
GELLIBRAND MARL

method & support
auger drilling
C casing
 penetration

samples & field tests
SPT 12, 23, 25 N=48
SPT 22, 31, 39 N=70
SPT 8, 12, 23 N=55
SPT 9, 21, 33 N=54
SPT 11, 22, 27 N=49

material description
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
material substance
Clayey SILT: high liquid limit, grey - green, with some fine grained sand.

method & support
auger drilling
C casing
 penetration

samples & field tests
SPT 12, 23, 25 N=48
SPT 22, 31, 39 N=70
SPT 8, 12, 23 N=55
SPT 9, 21, 33 N=54
SPT 11, 22, 27 N=49

material description
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
material description
Clayey SILT: high liquid limit, grey - green, with some fine grained sand.

method & support
auger drilling
C casing
 penetration

samples & field tests
SPT 12, 23, 25 N=48
SPT 22, 31, 39 N=70
SPT 8, 12, 23 N=55
SPT 9, 21, 33 N=54
SPT 11, 22, 27 N=49

material description
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
material description
Clayey SILT: high liquid limit, grey - green, with some fine grained sand.

method & support
auger drilling
C casing
 penetration

samples & field tests
SPT 12, 23, 25 N=48
SPT 22, 31, 39 N=70
SPT 8, 12, 23 N=55
SPT 9, 21, 33 N=54
SPT 11, 22, 27 N=49

material description
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
material description
Clayey SILT: high liquid limit, grey - green, with some fine grained sand.

method & support
auger drilling
C casing
 penetration

samples & field tests
SPT 12, 23, 25 N=48
SPT 22, 31, 39 N=70
SPT 8, 12, 23 N=55
SPT 9, 21, 33 N=54
SPT 11, 22, 27 N=49

material description
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
material description
Clayey SILT: high liquid limit, grey - green, with some fine grained sand.

method & support
auger drilling
C casing
 penetration

samples & field tests
SPT 12, 23, 25 N=48
SPT 22, 31, 39 N=70
SPT 8, 12, 23 N=55
SPT 9, 21, 33 N=54
SPT 11, 22, 27 N=49

material description
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
material description
Clayey SILT: high liquid limit, grey - green, with some fine grained sand.

method & support
auger drilling
C casing
 penetration

samples & field tests
SPT 12, 23, 25 N=48
SPT 22, 31, 39 N=70
SPT 8, 12, 23 N=55
SPT 9, 21, 33 N=54
SPT 11, 22, 27 N=49

material description
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
material description
Clayey SILT: high liquid limit, grey - green, with some fine grained sand.
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Edithvale Road, Edithvale

**Hole ID:** ID18-GWBH01  
**date started:** 14 Dec 2016  
**date completed:** 14 Dec 2016  
**logged by:** DM  
**checked by:** KJ

**position:** E: 333950; N: 5788227 (MGA94)  
**surface elevation:** 4.75 m (AHD)  
**angle from horizontal:** 90°  
**equipment type:** Geoprobe 6610DT, Track mounted  
**drilling fluid:** None  
**hole diameter:** 150 mm

### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>sample &amp; field tests</th>
<th>material substance</th>
<th>soil description based on Unified Classification System</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling*</td>
<td>SP samples</td>
<td>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</td>
<td></td>
</tr>
<tr>
<td>AD auger screwing*</td>
<td>D disturbed sample</td>
<td>M - mud</td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td>C casing</td>
<td>C - casing</td>
<td></td>
</tr>
<tr>
<td>W washbore</td>
<td>E environmental sample</td>
<td>N - nil</td>
<td></td>
</tr>
<tr>
<td>HS hollow stem flight auger</td>
<td>U# undisturbed sample</td>
<td>N* - SPT - sample recovered</td>
<td></td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td>HP hand penetrometer (kPa)</td>
<td>Nc - SPT with solid cone</td>
<td></td>
</tr>
<tr>
<td>e.g AD/T</td>
<td>N standard penetration test (SPT)</td>
<td>VS - vane shear, peak remoulded (kPa)</td>
<td></td>
</tr>
<tr>
<td>B blank bit</td>
<td>N* - SPT - sample recovered</td>
<td>WB plastic limit</td>
<td></td>
</tr>
<tr>
<td>T TC bit</td>
<td>VS - vane shear, peak remoulded (kPa)</td>
<td>WI - liquid limit</td>
<td></td>
</tr>
<tr>
<td>V V bit</td>
<td>N - SPT - sample recovered</td>
<td>VS - vane shear, peak remoulded (kPa)</td>
<td></td>
</tr>
</tbody>
</table>

### Well Details

<table>
<thead>
<tr>
<th>Graphic log</th>
<th>Classification symbol</th>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>D</td>
<td>-3.0</td>
<td>FILL: QUATERNARY SANDS</td>
</tr>
</tbody>
</table>

**FILL:** CLAYEY GRAVEL: coarse grained, brown, low plasticity.

**FILL:** ASPHALT: 150mm.

**SAND:** fine to medium grained, pale grey, becoming brown

- becoming pale grey, fine grained
- becoming medium grained, with some shell fragments
- becoming brown

### Material Substance

<table>
<thead>
<tr>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>V</td>
<td>very stiff</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
</tbody>
</table>

**Hole diameter:** 150 mm  
**Surface elevation:** 4.75 m (AHD)
HS
N
QUATERNARY SANDS
TERTIARY BRIGHTON GROUP
MD
St
MM - W
SAND: fine to medium grained, pale grey.
(continued)
CLAYEY SAND: fine to medium grained, brown, dark brown, with some shell fragments.
CLAY: medium plasticity, brown, black, trace of sand.

Borehole ID18-GWBH01 terminated at 9.90 m Target depth

DRILLING INFORMATION

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>water</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>B</td>
<td>C</td>
<td>M mud</td>
</tr>
<tr>
<td>AS</td>
<td>D</td>
<td>E</td>
<td>environmental sample</td>
</tr>
<tr>
<td>HA</td>
<td>SS</td>
<td>U#</td>
<td>undisturbed sample, #mm diameter</td>
</tr>
<tr>
<td>W</td>
<td>HP</td>
<td>N</td>
<td>standard penetration test (SPT)</td>
</tr>
<tr>
<td>HS</td>
<td>N*</td>
<td>SPT - sample recovered</td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td>NC</td>
<td>SPT with solid cone</td>
<td></td>
</tr>
<tr>
<td>hollow stem flight auger</td>
<td>VS</td>
<td>vane shear, peak/remoulded (kPa)</td>
<td></td>
</tr>
<tr>
<td>non destructive drilling</td>
<td>R</td>
<td>refusal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HB</td>
<td>hammer bouncing</td>
<td></td>
</tr>
</tbody>
</table>

CLAYEY SAND: fine to medium grained, brown, dark brown, with some shell fragments.

SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

Moisture:
M = dry
M = moist
W = wet

Consistency:
VS = very soft
S = soft
F = firm
St = stiff
VSf = very stiff
H = hard
Fb = fragile
VL = very loose
L = loose
MD = medium dense
D = dense
VD = very dense
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principle:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Edithvale Road, Edithvale

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
<th>Soil Type: Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD: auger drilling*</td>
<td>M mud, N nil</td>
<td>FILL: ASPHALT: 100mm.</td>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td>VS: water</td>
<td>SP</td>
<td>FILL: CLAYEY GRAVEL: fine to coarse grained, brown, low plasticity.</td>
<td></td>
</tr>
<tr>
<td>SS: split spoon sample</td>
<td>SM</td>
<td>SAND: fine to medium grained, grey.</td>
<td></td>
</tr>
<tr>
<td>U#2: undisturbed sample</td>
<td>SM</td>
<td>SILTY SAND: fine to coarse grained, grey.</td>
<td></td>
</tr>
<tr>
<td>SPT: 2, 3, 4, 5</td>
<td>PT</td>
<td>PEAT: black, distinct 'rotten egg', sulphur dioxide odour, some rootlets and other plant matter.</td>
<td></td>
</tr>
<tr>
<td>SPT: 6, 15, 25</td>
<td>UM</td>
<td>SILTY SAND: fine grained, grey, slight 'rotten egg', sulphur dioxide odour, trace of peat pockets and shell fragments.</td>
<td></td>
</tr>
</tbody>
</table>

### Method & Support

- **AD**: auger drilling
- **AS**: auger screwing
- **HA**: hand auger
- **W**: washbore
- **HS**: hollow stem flight auger
- **NDDD**: non destructive drilling

### Samples & Field Tests

- **B**: bulk disturbed sample
- **D**: disturbed sample
- **E**: environmental sample
- **SS**: split spoon sample
- **U#2**: undisturbed sample
- **SPT**: standard penetration test (SPT)
- **HP**: hand penetrometer (kPa)
- **Nc**: SPT with solid cone
- **N**: SPT - sample recovered
- **R**: refusal
- **V**: hammer bashing

### Classification Symbol & Soil Description

- **MF**: very soft
- **S**: soft
- **F**: firm
- **ST**: stiff
- **VST**: very stiff
- **H**: hard
- **Fb**: friable
- **VL**: very loose
- **L**: loose
- **MD**: medium dense
- **D**: dense
- **VD**: very dense

### Water

- **M**: mud
- **C**: clay
- **B**: chalk
- **T**: till
- **V**: silt

### Consistency / Relative Density

- **VS**: very soft
- **S**: soft
- **F**: firm
- **ST**: stiff
- **VST**: very stiff
- **H**: hard
- **Fb**: friable
- **VL**: very loose
- **L**: loose
- **MD**: medium dense
- **D**: dense
- **VD**: very dense
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Edithvale Road, Edithvale

**Sample Details:**
- **SPT14, 35, 30 N**: 65
- **SPT10, 15, 23 N**: 38
- **SPT14, 9, 5 N**: 14
- **SPT7, 9, 11 N**: 20

**Drilling Information:**
- **Hole ID.:** ID18-GWBH02  
- **Date Started:** 15 Dec 2016  
- **Date Completed:** 21 Dec 2016  
- **Logged By:** LW  
- **Checked By:** KJ

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>graphical log</th>
<th>SOIL TYPE</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>SILTY SAND: fine grained, grey, slight 'rotten egg', sulphur dioxide odour, trace of peat pockets and shell fragments. (continued)</td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>SAND: fine grained, dark brown, distinct 'rotten egg', sulphur dioxide odour, with some organic material.</td>
<td></td>
</tr>
<tr>
<td>CI</td>
<td>Sandy CLAY: medium plasticity, dark grey, fine to medium grained sand.</td>
<td></td>
</tr>
</tbody>
</table>

**Sampling & Field Tests:**
- **M:** mud
- **C:** casing
- **N:** nil

**Classifications & Symbols:**
- **B:** bulk disturbed sample
- **D:** disturbed sample
- **E:** environmental sample
- **SS:** split spoon sample
- **U**/**S:** undisturbed sample #mm diameter
- **N:** standard penetration test (SPT)
- **Nc:** SPT with solid cone
- **VS:** vane shear; peak/remoulded (kPa)
- **R:** refusal
- **HB:** hammer bouncing

**Consistency / Relative Density:**
- **VS:** very soft
- **S:** soft
- **F:** firm
- **St:** stiff
- **VSf:** very stiff
- **H:** hard
- **Hf:** hard-firm
- **VL:** very loose
- **L:** loose
- **MD:** medium dense
- **D:** dense
- **VD:** very dense

**Equipment:**
- **Drilling Fluid:** None
- **Casing Diameter:** 125/200

**Additional Observations:**
- **Material:** QUATERNARY SANDS
- **Depth:** 3.51 m (AHD)
- **Angle from Horizontal:** 90°
- **Surface Elevation:** 3.51 m (AHD)

**Locality:**
- **Position:** E: 333904; N: 5788205 (MGA94)
- **Penetration:** 10-Oct-12 water level on date shown

**Source:**
- **CDF_0_9_06_LIBRARY.GLB rev:AS  Log  COF PIEZOMETER  GEOTABTF10294AA HYDRO.GPJ"
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Edithvale Road, Edithvale

**Position:** E: 333904; N: 5788205 (MGA94)  
**Surface elevation:** 3.51 m (AHD)  
**Angle from horizontal:** 90°  
**Equipment type:** Hanjin D&B, Track mounted  
**Drilling fluid:** None  
**Casing diameter:** 125/200

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>material description</th>
<th>SOIL TYPE: Plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.0</td>
<td>Sandy CLAY: medium plasticity, dark grey, fine to medium grained sand. (continued) pockets of weakly cemented, medium grained sand</td>
<td></td>
</tr>
<tr>
<td></td>
<td>becoming grey motiled green-brown, becoming fine to medium grained sand</td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td>CLAYEY SAND: fine to medium grained, red mottled gray, pale green-brown, with some weakly cemented bands</td>
<td></td>
</tr>
<tr>
<td>22.0</td>
<td>CLAYEY SAND: fine grained, dark grey, mottled grey, low plasticity, with some clay bands</td>
<td></td>
</tr>
<tr>
<td>23.0</td>
<td>CLAYEY SAND: fine grained, dark grey, low plasticity</td>
<td></td>
</tr>
</tbody>
</table>

---

**Method & Support:**
- **AD:** auger drilling  
- **AS:** auger screwing  
- **HA:** hand auger  
- **W:** wash boring  
- **HS:** hollow stem flight auger  
- **NDD:** non destructive drilling

**Samples & Field Tests:**
- **B:** bulk disturbed sample  
- **D:** disturbed sample  
- **E:** environmental sample  
- **S:** split spoon sample  
- **HP:** hand penetrometer (kPa)  
- **N:** SPT - sample recovered  
- **Nc:** SPT with solid cone  
- **V:** vane shear, peak/remoulded (kPa)  
- **R:** refusal  
- **HB:** hammer bouncing

**Classification Symbol & Soil Description:**
- **M:** very soft  
- **S:** soft  
- **F:** firm  
- **ST:** stiff  
- **VST:** very stiff  
- **H:** hard  
- **Fb:** friable  
- **VL:** very loose  
- **L:** loose  
- **MD:** medium dense  
- **D:** dense  
- **VD:** very dense

---

**Drilling Fluid:** None

**Consistency / Relative Density:**
- **VS:** very soft  
- **S:** soft  
- **F:** firm  
- **ST:** stiff  
- **VST:** very stiff  
- **H:** hard  
- **Fb:** friable  
- **VL:** very loose  
- **L:** loose  
- **MD:** medium dense  
- **D:** dense  
- **VD:** very dense

**Additional Observations:**
- **E:** 333904; N: 5788205 (MGA94)
- **Equipment Type:** Hanjin D&B, Track mounted
- **Drilling Fluid:** None
- **Casing Diameter:** 125/200

---

**Position & Surface Details:**
- **E: 333904; N: 5788205 (MGA94)**  
- **Surface Elevation:** 3.51 m (AHD)

**Logged By:** LW  
**Checked By:** KJ
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Edithvale Road, Edithvale

**Borehole ID:** ID18-GWBH02  
**date started:** 15 Dec 2016  
**date completed:** 21 Dec 2016  
**logged by:** LW  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>method &amp; support</td>
<td>water</td>
<td>material description</td>
</tr>
<tr>
<td>AD</td>
<td>mud</td>
<td>SOIL TYPE: plasticity or particle characteristic, colour, secondary, and minor components</td>
</tr>
<tr>
<td>AS</td>
<td>auger drilling</td>
<td>GELLIBRAND MARL</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
<td>SPT sunk 400mm under own weight</td>
</tr>
<tr>
<td>W</td>
<td>washbore</td>
<td>U63 attempted, no sample recovery</td>
</tr>
<tr>
<td>HS</td>
<td>hollow stem flight auger</td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
<td></td>
</tr>
</tbody>
</table>

#### Well Details

- **Borehole ID:** ID18-GWBH02  
- **Target Depth:** 29.95 m  
- **Drilling Fluid:** None  
- **Casing Diameter:** 125/200

#### Soil Type

- **CLAYEY SAND:** fine grained, dark grey, low plasticity (continued)

#### Water Details

- **Method:** 10-Oct-12 water level on date shown
- **Samples & Field Tests:** water inflow, water outflow

#### Classification Symbol & Soil Description

- **Based on Unified Classification System**
- **Moisture:** very soft, very dry
- **Consistency/Relative Density:** very soft, soft
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne

**principle:** Level Crossing Removal Authority

**project:** LCRP-CTF

**location:** Edithvale Road, Edithvale

---

### Samples & Field Tests

<table>
<thead>
<tr>
<th>10-Oct-12 water level on date shown</th>
<th>10-Oct-12 water inflow</th>
<th>10-Oct-12 water outflow</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>water</strong></td>
<td><strong>water inflow</strong></td>
<td><strong>water outflow</strong></td>
</tr>
</tbody>
</table>

---

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

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

<table>
<thead>
<tr>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>VS</td>
</tr>
<tr>
<td>M</td>
<td>S</td>
</tr>
<tr>
<td>D</td>
<td>S</td>
</tr>
<tr>
<td>W</td>
<td>F</td>
</tr>
<tr>
<td>W</td>
<td>F</td>
</tr>
<tr>
<td>W</td>
<td>V</td>
</tr>
<tr>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>

---

**material description**

- **SAND:** fine to medium grained, pale brown, orange brown. (continued)
- **Sandy CLAY:** high plasticity, grey, fine to medium grained sand, trace of fine to medium grained gravel.

---

**borehole details**

- **bore construction license:** WRK098857
- **drilling company:** Drillworx
- **driller:** J. Boyd

**backfill details**

- **0.0-1.5m:** Grout
- **1.5-2.5m:** Bentonite
- **2.5-6.0m:** Sand
- **6.0-10.0m:** Bentonite

**standpipe piezo. ID18-GWBH03 details**

- **3.0-6.0m:** screen

---

**graphical log**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>graphic log</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>SP</td>
</tr>
<tr>
<td>10.0</td>
<td>CH</td>
</tr>
</tbody>
</table>

---

**material substance**

<table>
<thead>
<tr>
<th>material substance</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
<th>classification symbol &amp; soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>based on Unified Classification System</td>
</tr>
</tbody>
</table>

---

**structure and additional observations**

- **Hole ID.** ID18-GWBH03
- **Target depth:** 10.00 m

---

**well details**

- **client:** Metro Trains Melbourne
- **principal:** Level Crossing Removal Authority
- **project:** LCRP-CTF
- **location:** Edithvale Road, Edithvale

---

**sheet:** 2 of 2

**project no.** GEOTABTF10294AA

**date started:** 16 Jan 2017

**date completed:** 16 Jan 2017

**logged by:** KG

**checked by:** KJ
TOPSOIL: SILT: low liquid limit, dark brown, dark grey, rootlets.

SAND: fine grained, brown, dark brown, with some fines, becoming fine to medium grained

trace of shell fragments

Sandy SILT: low liquid limit, dark brown, fine to medium grained sand.

Silty CLAY: medium plasticity, pale grey, trace of fine grained sand.

TERTIARY BRIGHTON GROUP: Adjacent to tree roots

Metro Trains Melbourne
Level Crossing Removal Authority
LCRP-CTF
Edithvale Road, Edithvale

Hole ID: ID18-GWBH04
Sheet: 1 of 2
Date started: 04 Feb 2017
Date completed: 04 Feb 2017
Logged by: KG
Checked by: KJ

Position: E: 334375, N: 5788330 (MGA94)
Surface elevation: 2.33 m (AHD)
Angle from horizontal: 90°
Equipment type: Geoprobe 6610DT, Track mounted
Drilling fluid: None
Hole diameter: 150 mm

Drilling Information
Method & Support
F Support
SB penetration
W: Water

Samples & Field Tests
ID: ID18-GWBH04
SP: Topsilt:
Low liquid limit, dark brown, dark grey, rootlets.

SAND:
Fine grained, brown, dark brown, with some fines, becoming fine to medium grained.

Trace of shell fragments.

Sandy SILT:
Low liquid limit, dark brown, fine to medium grained sand.

Silty CLAY:
Medium plasticity, pale grey, trace of fine grained sand.

Topsoil: Tertiary Brighton Group
Adjacent to tree roots.
**Engineering Log - Borehole**

**Hole ID:** ID18-GWBH04  
**Sheet:** 2 of 2  
**Project No.:** GEOTABTF10294AA

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Edithvale Road, Edithvale

**Position:** E: 334375; N: 5788330 (MGA94)  
**Elevation:** 2.33 m (AHD)  
**Angle from Horizontal:** 90°  
**Equipment Type:** Geoprobe 6610DT, Track mounted  
**Drilling Fluid:** None  
**Hole Diameter:** 150 mm

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling*</td>
<td>B bulk disturbed sample</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>AS auger screwing*</td>
<td>C casing</td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td>D disturbed sample</td>
<td></td>
</tr>
<tr>
<td>W washbore</td>
<td>E environmental sample</td>
<td></td>
</tr>
<tr>
<td>HS hollow stem flight auger</td>
<td>SS split spoon sample</td>
<td></td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td>U unconfined sample</td>
<td></td>
</tr>
</tbody>
</table>

**Well Details**

- **Borehole ID:** ID18-GWBH04 terminated at 10.00 m  
- **Target Depth:**

**Material Description**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**Classification Symbol & Soil Description**

- **Based on Unified Classification System**

**Consistency / Relative Density**

- **VS:** very soft  
- **S:** soft  
- **F:** firm  
- **St:** stiff  
- **VSt:** very stiff  
- **H:** hard  
- **Plastic Limit**
  - **W:** wet  
  - **Moisture:**
    - **V:** very loose  
    - **L:** loose  
    - **M:** medium dense  
    - **D:** dense

**Additional Observations**

- **Penetration Position:** E: 334375; N: 5788330 (MGA94)  
- **Equipment Type:** Geoprobe 6610DT, Track mounted  
- **Angle from Horizontal:** 90°  
- **Hole Diameter:** 150 mm

---

**Notes:**

- *bit shown by suffix
- e.g. AD/T, B blank bit, T TC bit, V V bit

---

**Backfill Details:**

- **0.0-1.0m:** Grout  
- **1.0-2.0m:** Bentonite  
- **2.0-5.5m:** Sand  
- **5.5-10.0m:** Bentonite

**Standpipe Piezo ID18-GWBH04:**

- **Details:**
  - **2.5-5.5m:** screen
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Edithvale Road, Edithvale

**Hole ID:** ID18-GWBH05  
**sheet no.:** 3 of 3  
**project no.:** GEOTABTF1029AA

**date started:** 13 Feb 2017  
**date completed:** 14 Feb 2017  
**logged by:** LW  
**checked by:** KJ

**equipment type:** Hanjin D&B, Track mounted  
**drilling fluid:** Polymer  
**hole diameter:** 200 mm

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; support</th>
<th>Sample &amp; field tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 38, 15, 5</td>
<td>N*20</td>
<td>CH</td>
</tr>
</tbody>
</table>

Borehole ID18-GWBH05 terminated at 16.45 m Target depth

#### Well Details

**Type:** TERTIARY BRIGHTON GROUP

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; support</th>
<th>Sample &amp; field tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 38, 15, 5</td>
<td>N*20</td>
<td>CH</td>
</tr>
</tbody>
</table>

Borehole ID18-GWBH05 terminated at 16.45 m Target depth

#### Well Details

- **Type:** TERTIARY BRIGHTON GROUP
- bore construction license: WRK096295  
- drilling company: DRILLWORX  
- driller: R.Thorne

#### Backfill Details

- 0.0-9.0 m: Grout  
- 9.0-10.4 m: Bentonite  
- 10.4-14.0 m: Sand  
- 14.0-16.45 m: Cuttings

#### Standpipe Piezo. ID18-GWBH05 Details

- 11.0-14.0 m: screen

#### Drilling Information

- position: E: 334373; N: 578833 (MGA94)  
- surface elevation: 2.38 m (AHD)  
- angle from horizontal: 90°

#### Structure and Additional Observations

- **Soil Type:** plasticity or particle characteristic, colour, secondary and minor components

#### Water Outflow

<table>
<thead>
<tr>
<th>Penetration</th>
<th>Support</th>
<th>Samples &amp; field tests</th>
<th>Classification symbol &amp; soil description based on Unified Classification System</th>
<th>Consistency / Relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>M</td>
<td>N</td>
<td>VS: very soft</td>
<td>S: soft</td>
</tr>
<tr>
<td>C: casing</td>
<td>E</td>
<td>D</td>
<td>F: firm</td>
<td>St: stiff</td>
</tr>
<tr>
<td></td>
<td>SS</td>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>U#</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HP</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nc</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VS</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>Wp</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HB</td>
<td>WD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hole ID: ID43-GWBH01

client: Metro Trains Melbourne

principal: Level Crossing Removal Authority

project: LCRP-CTF

location: Seaford Road, Seaford

surface elevation: 5.46 m (AHD)

angle from horizontal: 90°

hole diameter: 250 mm

material description:

SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

graphic log:

FILL: ASPHALT: 150mm.

FILL: Sandy CLAY: low plasticity, dark brown, coarse grained sand.

SAND: medium grained, yellow-brown, becoming grey

becoming yellow brown

becoming brown

becoming pale brown, with some shell fragments

method & support:

AD auger drilling*

AS auger screwing

HA hand auger

W washbore

HS hollow stem flight auger

NDN non destructive drilling

* bit shown by suffix
e.g. AD/T

samples & field tests:

B bulk disturbed sample

D disturbed sample

E environmental sample

SS split spoon sample

U# undisturbed sample #mm diameter

N standard penetration test (SPT)

N* SPT - sample recovered

NC SPT with solid cone

VS vane shear; peak/remoulded (kPa)

R refusal

HB hammer bouncing

classification symbol & soil description:

based on Unified Classification System

moisture:

D dry

M moist

W wet

consistency / relative density:

VS very soft

S soft

F firm

St stiff

Vst very stiff

H hard

Fb friable

VL very loose

L loose

MD medium dense

D dense

VD very dense

1.0

2.0

3.0

4.0

5.0

6.0

7.0

8.0

9.0

10-Oct-12 water level on date shown

water inflow

water outflow
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Seaford Road, Seaford

<table>
<thead>
<tr>
<th>graphic code</th>
<th>soil description</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI</td>
<td>Silty CLAY: medium plasticity, dark brown, black, with some shell fragments.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>graphic code</th>
<th>soil description</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>SAND: medium grained, grey, trace of dark grey clayey bands/pockets.</td>
<td></td>
</tr>
</tbody>
</table>

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**material description:**

- **SOIL TYPE:**
  - Silty CLAY
  - SAND

- **color:**
  - dark brown, black
  - grey, mottled brown

- **particle characteristic:**
  - medium plasticity
  - medium grained

**structure and additional observations:**

**well details:**

- **Hole ID:** ID43-GWBH01
- **date started:** 14 Dec 2016
- **date completed:** 14 Dec 2016
- **logged by:** DM
- **checked by:** KJ

**drilling information:**

- **bore construction license:** WRK098860
- **drilling company:** Drillworx
- **driller:** J. Boyd

**backfill details:**

- 0.0-9.0m: Grout
- 9.0-11.0m: Bentonite

**samples & field tests:**

- **water:**
  - samples & field tests
- **consistency / relative density**
  - moisture
    - very soft
    - dry
    - wet
- **support:**
  - M: mud
  - C: casing
  - N: nil
- **penetration:**
  - no resistance ranging to refusal
  - 10-Oct-1.2 water level on date shown
  - water inflow
  - water outflow

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

- **SPT:** standard penetration test
- **HP:** hand penetrometer (kPa)
- **N:** standard penetration test (SPT)

**method & support:**

- **AD:** auger drilling
- **AS:** auger screwing
- **HA:** hand auger
- **W:** washbore
- **HS:** hollow stem flight auger
- **NDD:** non destructive drilling

**notes:**

- **KJ:** 5780358 (MGA94)
- **RL (m):**
  - -3
  - -4
  - -5
  - -6
  - -7
  - -8
  - -9
  - -10

**structure and additional observations:**

- **hole diameter:** 250 mm
- **equipment type:** Geoprobe 6610DT, Track mounted
- **angle from horizontal:** 90°
- **surface elevation:** 5.46 m (AHD)
- **drilling fluid:** None
- **position:** E: 335849; N: 5780358 (MGA94)
- **hole length:** 15.00 m
- **Borehole ID43-GWBH01 terminated at 15.00 m Target depth**

- **consistency / relative density:**
  - moisture
    - VS: very soft
    - V: very dense
- **penetration:**
  - refusal
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** Seaford Road, Seaford  
**Date Started:** 14 Dec 2016  
**Date Completed:** 14 Dec 2016  
**Logged By:** DM  
**Checked By:** KJ  

#### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>-11</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>-12</td>
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<td>-16</td>
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<td>-22</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>-23</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Well Details

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **Classification Symbol & Soil Description:** based on Unified Classification System
- **Consistency / Relative Density:**
  - VS: very soft
  - S: soft
  - F: firm
  - St: stiff
  - VSt: very stiff
  - H: hard
  - Fb: friable
  - VL: very loose
  - LS: loose
  - Md: medium dense
  - D: dense
  - VD: very dense

#### Material Substance

- **Moisture:**
  - DM: dry
  - W: wet

#### Additional Observations

- **Structure and Additional Observations:**
  - 11.0-15.0m: Sand
  - 15.5-14.5m: Screen
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Seaford Road, Seaford  
**date started:** 12 Dec 2016  
**date completed:** 11 Jan 2017  
**logged by:** LW  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
<th>Soil Type</th>
<th>Classification Symbol &amp; Soil Description</th>
<th>Moisture Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling*</td>
<td>FILL: ASPHALT: 100mm.</td>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
<td>C dry</td>
<td>C dry</td>
</tr>
<tr>
<td>AS auger screwing*</td>
<td>FILL: CLAYEY GRAVEL: medium to coarse grained, brown, medium plasticity.</td>
<td></td>
<td>C moist</td>
<td>C moist</td>
</tr>
<tr>
<td>HA hand auger</td>
<td>FILL: SILTY SAND: fine to medium grained, dark grey, trace of sub-rounded, fine grained gravel.</td>
<td></td>
<td>M dry</td>
<td>M dry</td>
</tr>
<tr>
<td>W washbore</td>
<td>SAND: fine to medium grained, pale brown. with some shell fragments</td>
<td></td>
<td>M dry</td>
<td>M dry</td>
</tr>
<tr>
<td>HS hollow stem flight auger</td>
<td>becoming medium to coarse grained</td>
<td></td>
<td>M dry</td>
<td>M dry</td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td>becoming brown</td>
<td></td>
<td>M dry</td>
<td>M dry</td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td>with some sub-rounded medium grained gravel</td>
<td></td>
<td>M dry</td>
<td>M dry</td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td>becoming fine to medium grained, grey-brown, with some fines, trace of pockets of coarse grained sand</td>
<td></td>
<td>M dry</td>
<td>M dry</td>
</tr>
</tbody>
</table>

#### Well Details

<table>
<thead>
<tr>
<th>Graphic Log</th>
<th>Material Substance</th>
<th>Soil Type</th>
<th>Classification Symbol &amp; Soil Description</th>
<th>Moisture Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 4, 6, 6 N=12</td>
<td>FILL: ASPHALT: 100mm.</td>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
<td>C dry</td>
<td>C dry</td>
</tr>
<tr>
<td>SPT 1, 2, 3 N=5</td>
<td>FILL: CLAYEY GRAVEL: medium to coarse grained, brown, medium plasticity.</td>
<td></td>
<td>C moist</td>
<td>C moist</td>
</tr>
<tr>
<td>SPT 1, 2, 3 N=5</td>
<td>FILL: SILTY SAND: fine to medium grained, dark grey, trace of sub-rounded, fine grained gravel.</td>
<td></td>
<td>M dry</td>
<td>M dry</td>
</tr>
<tr>
<td>SPT 4, 8, 12 N=20</td>
<td>SAND: fine to medium grained, pale brown. with some shell fragments</td>
<td></td>
<td>M dry</td>
<td>M dry</td>
</tr>
</tbody>
</table>

#### Material Description

<table>
<thead>
<tr>
<th>Classification Symbol &amp; Soil Description</th>
<th>Moisture Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
<td>C dry</td>
</tr>
<tr>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
<td>C moist</td>
</tr>
<tr>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
<td>M dry</td>
</tr>
<tr>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
<td>M dry</td>
</tr>
<tr>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
<td>M dry</td>
</tr>
</tbody>
</table>

#### Additional Observations

- **E: 335855; N: 5780336 (MGA94 )**: Surface elevation: 4.70 m (AHD)  
- **angle from horizontal: 90°**: Hole diameter: 200 mm  
- **equipment type:** Hanjin D&B, Track mounted  
- **angle from horizontal: 90°**: Drilling fluid: Polymer

---

* bit shown by suffix  
e.g. AD/T, B, TC bit, V, V bit
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Seaford Road, Seaford  
**Hole ID:** ID43-GWBH02  
**date started:** 12 Dec 2016  
**date completed:** 11 Jan 2017  
**logged by:** LW  
**checked by:** KJ

### Drilling Information

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>CI-CH</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>Silty CLAY: medium to high plasticity, black, with some shell fragments and pockets of silty sand.</td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>Silty SAND: fine to medium grained, dark grey.</td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td>Clayey SAND: fine to medium grained, brown, mottled grey.</td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>SAND: medium grained, grey, with some grey clay bands/pockets.</td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td>Silty CLAY: medium to high plasticity, grey, mottled brown, trace of fine to medium grained sand.</td>
<td></td>
</tr>
</tbody>
</table>

### Soil Type

<table>
<thead>
<tr>
<th>classification symbol &amp; soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWAMP DEPOSITS</td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
</tbody>
</table>

### Drilling Fluid

- Polymer

### Moisture Condition

- DM: W (Dry, Moist)
- WW: P (Wet, Plastic)
- Wldry: Moist

### Classifications

- C: Clay
- S: Sand
- M: Mud

### Consistency / Relative Density

- VS: Very stiff
- S: Soft
- F: Firm
- ST: Stiff
- VL: Very loose
- L: Loose
- MD: Medium dense
- D: Dense
- LD: Very dense

### Support

- M: Mud
- N: Nil
- C: Casing

### Classification Symbol & Soil Description

- Based on Unified Classification System

### Structure and Additional Observations

<table>
<thead>
<tr>
<th>hole diameter: 200 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>equipment type: Hanjin D&amp;B, Track mounted</td>
</tr>
<tr>
<td>surface elevation: 4.70 m (AHD)</td>
</tr>
<tr>
<td>angle from horizontal: 90°</td>
</tr>
<tr>
<td>position: E: 335855; N: 5780336 (MGA94)</td>
</tr>
<tr>
<td>client: Metro Trains Melbourne</td>
</tr>
<tr>
<td>project: LCRP-CTF</td>
</tr>
<tr>
<td>location: Seaford Road, Seaford</td>
</tr>
<tr>
<td>hole depth: 15.0 m</td>
</tr>
</tbody>
</table>

### Method & Support

- M: Mud
- N: Nil
- C: Casing
- no resistance ranging to refusal
- water level on date shown

### Additional Observations

- Hammer bouncing
- Water inflow
- Water outflow
- Hand auger
- Track mounted
- Hanjin D&B
- Polymer
- Track mounted hollow stem flight auger
- 200 mm diameter
- 4.70 m (AHD)
- 90° angle from horizontal
### TERTIARY BRIGHTON GROUP

**HP 100 - 320 kPa**

**St - VSt**

**VSt - H**

**M**

**Silty CLAY**: medium plasticity, green-brown, mottled grey, with some fine grained sand.

becoming grey mottled brown, trace of weakly cemented sand pockets

**CI-CH**

**Silty CLAY**: medium to high plasticity, pale grey, mottled brown, trace of fine grained sand.

becoming grey mottled brown, trace of weakly cemented sand pockets

---

**method & support**

- **AD**: auger drilling
- **AS**: auger crowning
- **HA**: hand auger
- **W**: washpipe
- **HS**: hollow stem flight auger
- **NDD**: non destructive drilling

**penetration**

- **no resistance ranging to refusal**

**samples & field tests**

- **B**: bulk disturbed sample
- **D**: disturbed sample
- **E**: environmental sample
- **SS**: split spoon sample
- **US**: undisturbed sample #1mm diameter
- **N**: standard penetration test (SPT)
- **Nc**: SPT with solid cone
- **VSt**: Vane shear; peak/remoulded (kPa)
- **R**: refusal
- **HB**: hammer bouncing

**classification symbol & soil description**

- **VS**: very soft
- **S**: soft
- **F**: firm
- **St**: stiff
- **VSt**: very stiff
- **H**: hard
- **Fb**: friable
- **VL**: very loose
- **L**: loose
- **MD**: medium dense
- **D**: dense
- **VD**: very dense
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Seaford Road, Seaford

<table>
<thead>
<tr>
<th>Hole ID.</th>
<th>ID43-GWBH02</th>
</tr>
</thead>
<tbody>
<tr>
<td>sheet no.</td>
<td>4 of 4</td>
</tr>
<tr>
<td>project no.</td>
<td>GEOTABTF10294AA</td>
</tr>
<tr>
<td>date started</td>
<td>12 Dec 2016</td>
</tr>
<tr>
<td>date completed</td>
<td>11 Jan 2017</td>
</tr>
<tr>
<td>logged by</td>
<td>LW</td>
</tr>
<tr>
<td>checked by</td>
<td>KJ</td>
</tr>
</tbody>
</table>

**Position:** E: 335855; N: 5780336 (MGA94)  
**Surface elevation:** 4.70 m (AHD)  
**Angle from horizontal:** 90°  
**Equipment type:** Hanjin D&B, Track mounted  
**Drilling fluid:** Polymer  
**Hole diameter:** 200 mm

### Drilling Information

<table>
<thead>
<tr>
<th>RL (m)</th>
<th>CI-CH</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20</td>
<td>Silty CLAY: medium to high plasticity, pale grey, mottled brown, trace of fine grained sand. (continued)</td>
</tr>
</tbody>
</table>

### Well Details

- **Borehole ID:** ID43-GWBH02  
- **Target depth:** 25.00 m  
- **Terminated at:** 25.00 m

### Water Outflow

- **Samples & Field Tests:**  
  - **Penetrometer:** N = 29
  - **Water:**  
    - **Water Level on Date Shown:**  
      - **10-Oct-12:**  
    - **Water Inflow:**  
      - **Water Outflow:**

### Soil Type

- **Classification Symbol:** CI-CH

### Sample Types

- **Method & Support:**  
  - AD: auger drilling  
  - AS: auger screwing  
  - HA: hand auger  
  - W: washbore  
  - HS: hollow stem flight auger  
  - NDD: non-destructive drilling

### Soil Description

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

### Consistency / Relative Density

- **Moisture:**  
  - **DM:** dry  
  - **W:** wet  
  - **VL:** very loose

### Classification System

- **Consistency / Relative Density:**  
  - **VS:** very soft  
  - **S:** soft  
  - **F:** firm  
  - **ST:** stiff  
  - **VST:** very stiff  
  - **H:** hard  
  - **FL:** firm  
  - **VL:** very loose  
  - **MD:** medium dense  
  - **D:** dense  
  - **VD:** very dense
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principals:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Seaford Road, Seaford

**Hole ID:** ID43-GWBH03  
**date started:** 20 Jan 2017  
**date completed:** 03 Feb 2017  
**logged by:** KG  
**checked by:** KJ

**position:** E: 336094; N: 5780251 (MGA94)  
**surface elevation:** 3.02 m (AHD)  
**angle from horizontal:** 90°

**equipment type:** Geoprobe 6610DT, Track mounted  
**drilling fluid:** None  
**hole diameter:** 150 mm

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td><strong>FILL:</strong> Gravely SAND: fine to coarse grained, dark brown, fine to coarse grained gravel, angular, with some ballast, trace of rootlets.</td>
</tr>
<tr>
<td>2.0</td>
<td><strong>SAND:</strong> fine to coarse grained, brown, pale brown.</td>
</tr>
<tr>
<td>3.0</td>
<td><strong>Sandy CLAY:</strong> high plasticity, dark grey, mottled brown, fine to coarse grained sand.</td>
</tr>
<tr>
<td>4.0</td>
<td><strong>Silty SAND:</strong> fine to coarse grained, dark grey, grey, pale grey.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>M (Mud) D (Disturbed) N (Nil)</td>
</tr>
<tr>
<td>2.0</td>
<td>S (Soft) F (Firm) T (Stiff)</td>
</tr>
<tr>
<td>3.0</td>
<td>V (Very soft) S (Soft)</td>
</tr>
<tr>
<td>4.0</td>
<td>W (Wet) V (Very wet)</td>
</tr>
<tr>
<td>5.0</td>
<td>L (Loose)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td><strong>FILL:</strong> Gravely SAND: fine to coarse grained, dark brown, fine to coarse grained gravel, angular, with some ballast, trace of rootlets.</td>
</tr>
<tr>
<td>2.0</td>
<td><strong>SAND:</strong> fine to coarse grained, brown, pale brown.</td>
</tr>
<tr>
<td>3.0</td>
<td><strong>Sandy CLAY:</strong> high plasticity, dark grey, mottled brown, fine to coarse grained sand.</td>
</tr>
<tr>
<td>4.0</td>
<td><strong>Silty SAND:</strong> fine to coarse grained, dark grey, grey, pale grey.</td>
</tr>
</tbody>
</table>

**structure and additional observations**

**method & support**

**method**

- AD: auger drilling
- AS: auger screwing
- HA: hand auger
- W: washbore
- HS: hollow stem flight auger
- NDD: non-destructive drilling

**support**

- M: mud
- C: casing

**penetration**

- no resistance ranging to refusal

**classification symbol & soil description**

- based on Unified Classification System

**consistency / relative density**

- VS: very soft
- S: soft
- F: firm
- T: stiff
- VT: very stiff
- H: hard
- Fb: friable
- VL: very loose
- L: loose
- MD: medium dense
- D: dense
- VD: very dense
### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0-10.5</td>
<td>Grout</td>
<td></td>
</tr>
<tr>
<td>10.5-11.5</td>
<td>Bentonite</td>
<td></td>
</tr>
</tbody>
</table>

### Soil Type

- **Sandy Clay**: High plasticity, orange-brown, mottled pale grey, fine to coarse grained sand.
- **Sandy Silt**: Low liquid limit, orange-brown, pale grey, fine to coarse grained sand.
- **Clayey Sand**: Fine to coarse grained, orange-brown, pale grey, medium plasticity.

### Additional Observations

- Trace of fine to medium grained gravel, angular to sub-angular.
- Becoming brown, orange-brown, with some coarse grained gravel, sub-angular.
- Borehole ID43-GWBH03 terminated at 15.00 m

### Well Details

- **Client**: Metro Trains Melbourne
- **Project**: LCRP-CTF
- **Location**: Seaford Road, Seaford

- **Date Started**: 20 Jan 2017
- **Date Completed**: 03 Feb 2017
- **Logged by**: KG
- **Checked by**: KJ

### Method & Support

- **Support**: M mud, N nil, C casing
- **Penetration**: B bulk disturbed sample, D disturbed sample, E environmental sample, SS split spoon sample, U unconfined sample (kPa), N standard penetration test (SPT) sample recovered, N* SPT - sample recovered, NC SPT with solid cone, VS vane shear; peak/remoulded (kPa), R refusal, H hammer bashing

### Moisture

- **Moisture Condition**: DM dry, W wet, M moist, V very moist
## Engineering Log - Borehole

**Hole ID.** ID43-GWBH03  
**Sheet no.** 3 of 3  
**Project no.** GEOTABTF10294AA  
**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Seaford Road, Seaford

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.5-15.0m</td>
<td>Sand standpipe piezo. ID43-GWBH03</td>
</tr>
<tr>
<td>12.0-15.0m</td>
<td>Screen</td>
</tr>
</tbody>
</table>

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method:</strong> auger drilling*</td>
<td><strong>Samples &amp; Field Tests:</strong></td>
<td><strong>Material Substance:</strong></td>
</tr>
<tr>
<td>AD</td>
<td>bulk disturbed sample</td>
<td>B: bulk disturbed sample</td>
</tr>
<tr>
<td>AS</td>
<td>disturbed sample</td>
<td>D: disturbed sample</td>
</tr>
<tr>
<td>HA</td>
<td>environmental sample</td>
<td>E: environmental sample</td>
</tr>
<tr>
<td>W</td>
<td>split spoon sample</td>
<td>SS: split spoon sample</td>
</tr>
<tr>
<td>washbore</td>
<td>undisturbed sample</td>
<td>U: undisturbed sample</td>
</tr>
<tr>
<td>HS</td>
<td>hand penetrometer (kPa)</td>
<td>HP: hand penetrometer (kPa)</td>
</tr>
<tr>
<td>hollow stem flight auger</td>
<td>SPT - sample recovered</td>
<td>N: SPT - sample recovered</td>
</tr>
<tr>
<td>NDD</td>
<td>SPT with solid cone</td>
<td>Nc: SPT with solid cone</td>
</tr>
<tr>
<td>non destructive drilling</td>
<td>vane shear, peak/reduced (kPa)</td>
<td>VS: vane shear, peak/reduced</td>
</tr>
<tr>
<td></td>
<td>refusal</td>
<td>R: refusal</td>
</tr>
<tr>
<td></td>
<td>hammer bouncing</td>
<td>HB: hammer bouncing</td>
</tr>
</tbody>
</table>

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>very soft</td>
</tr>
<tr>
<td>M</td>
<td>soft</td>
</tr>
<tr>
<td>W</td>
<td>firm</td>
</tr>
<tr>
<td>V</td>
<td>stiff</td>
</tr>
<tr>
<td>L</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
</tr>
</tbody>
</table>

### Structure and Additional Observations

- 11.5-15.0m: Sand standpipe piezo. ID43-GWBH03 details: 12.0-15.0m: Screen

* * bit shown by suffix e.g. AD/T (for Auger Drilling: Trench)
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Seaford Road, Seaford

**drilling information**
- **method & support:** NDD - non destructive drilling  
- **material substance:**  
  - **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components  
  - **classificationsymbol:** graphic log

**samples & field tests**
- **method:** ad  
- **penetration:** no resistance ranging to refusal  
- **water:** level on date shown  
- **surface elevation:** 2.12 m (AHD)  
- **angle from horizontal:** 90°

**structure and additional observations**
- **classification symbol & soil description based on Unified Classification System:**
  - **material description:**
    - **SAND:** fine to coarse grained, brown, trace of roots.  
      - becoming fine grained, pale grey  
    - **Sandy CLAY:** high plasticity, grey, pale grey, fine grained sand.

---

**FILL: ASPHALT:** 200mm.  
**FILL: GRAVEL:** fine to medium grained, grey, black, with some fines.  
**SP:** SAND: fine to coarse grained, brown, trace of roots.  
**becoming fine grained, pale grey**

---

**TERTIARY BRIGHTON GROUP**
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Seaford Road, Seaford

**Borehole ID:** ID43-GWBH04  
**date started:** 21 Dec 2016  
**date completed:** 21 Dec 2016  
**logged by:** DM  
**checked by:** KJ

**position:** E: 336367; N: 5780242 (MGA94)  
**surface elevation:** 2.12 m (AHD)  
**angle from horizontal:** 90°  
**equipment type:** Geoprobe 6610DT, Track mounted  
**drilling fluid:** None  
**hole diameter:** 250 mm

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AS auger screwing*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W washbore</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS hollow stem flight auger</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* bit shown by suffix  
e.g. AD/T  
B blank bit  
T TC bit  
V V bit

### Well Details

**graphic log**  
**material description**  
**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>Material Substance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandy CLAY</td>
<td>high plasticity, grey, pale grey, fine grained sand.</td>
</tr>
</tbody>
</table>

### In-situ Test Results

- **Borehole ID43-GWBH04 terminated at 10.00 m Target depth**

### Additional Observations

- **drilling fluid:** None  
- **equipment type:** Geoprobe 6610DT, Track mounted  
- **angle from horizontal:** 90°  
- **hole diameter:** 250 mm  
- **surface elevation:** 2.12 m (AHD)

### Soil Type Overview

<table>
<thead>
<tr>
<th>Classification Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M mud</td>
<td>mud</td>
</tr>
<tr>
<td>C casing</td>
<td>casing</td>
</tr>
<tr>
<td>N nil</td>
<td>nil</td>
</tr>
</tbody>
</table>

### Moisture Conditions

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM dry</td>
<td>dry</td>
</tr>
<tr>
<td>WW moist</td>
<td>moist</td>
</tr>
<tr>
<td>W wet</td>
<td>wet</td>
</tr>
</tbody>
</table>

### Water Outflow

- **October 12 water level on date shown**

### Support Details

<table>
<thead>
<tr>
<th>Support</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling*</td>
<td></td>
</tr>
<tr>
<td>AS auger screwing*</td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td></td>
</tr>
<tr>
<td>W washbore</td>
<td></td>
</tr>
<tr>
<td>HS hollow stem flight auger</td>
<td></td>
</tr>
</tbody>
</table>

* bit shown by suffix  
e.g. AD/T  
B blank bit  
T TC bit  
V V bit

### Soil Classification & Description

<table>
<thead>
<tr>
<th>Classification Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS very soft</td>
<td>soft</td>
</tr>
<tr>
<td>S firm</td>
<td>firm</td>
</tr>
<tr>
<td>F soft</td>
<td>soft</td>
</tr>
<tr>
<td>ST stiff</td>
<td>stiff</td>
</tr>
<tr>
<td>VST very stiff</td>
<td>very stiff</td>
</tr>
<tr>
<td>H hard</td>
<td>hard</td>
</tr>
<tr>
<td>Fb friable</td>
<td>friable</td>
</tr>
<tr>
<td>VL very loose</td>
<td>very loose</td>
</tr>
<tr>
<td>L loose</td>
<td>loose</td>
</tr>
<tr>
<td>MD medium dense</td>
<td>medium dense</td>
</tr>
<tr>
<td>D dense</td>
<td>dense</td>
</tr>
<tr>
<td>VD very dense</td>
<td>very dense</td>
</tr>
</tbody>
</table>
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Seaford Road, Seaford  

**Hole ID:** ID43-GWBH05  
**Sheet:** 1 of 3  
**Project No.:** GEOTABTF10294AA  
**Date Started:** 24 Jan 2017  
**Date Completed:** 25 Jan 2017  
**Logged By:** LW  
**Checked By:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad</td>
<td>M mud</td>
<td>TOPSOIL: SAND fine to medium grained, dark grey, trace of rootlets.</td>
</tr>
<tr>
<td>AS</td>
<td>C casing</td>
<td>SAND: fine to medium grained, grey, becoming pale brown, fine to coarse grained</td>
</tr>
<tr>
<td>HA</td>
<td>W washore</td>
<td>becoming medium to coarse grained, dark grey</td>
</tr>
<tr>
<td>W</td>
<td>SND</td>
<td>CLAYEY SAND: high plasticity, grey, mottled dark brown, fine to medium grained sand, trace of coarse grained sand.</td>
</tr>
<tr>
<td>HS</td>
<td>B diffuse</td>
<td>SAND: medium grained, grey, mottled brown, with some fines.</td>
</tr>
<tr>
<td>SSH</td>
<td>V diffuse</td>
<td>Sandy CLAY: medium to high plasticity, grey, mottled brown, medium grained sand.</td>
</tr>
</tbody>
</table>

#### Well Details

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **Graphic Log:**
  - TOPSOILQUATERNARY SANDS
  - TERTIARY BRIGHTON GROUP

#### Material Substance

- **Topsoil:** Sand
- **Quaternary Sands:**
- **Tertiary Brighton Group:**

#### Moisture Condition

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad</td>
<td>D dry</td>
</tr>
<tr>
<td>AS</td>
<td>M moist</td>
</tr>
<tr>
<td>HA</td>
<td>W wet</td>
</tr>
<tr>
<td>W</td>
<td>H hard</td>
</tr>
<tr>
<td>HS</td>
<td>Fb friable</td>
</tr>
<tr>
<td>SSH</td>
<td>VLL very loose</td>
</tr>
<tr>
<td>SSH</td>
<td>M MD medium dense</td>
</tr>
<tr>
<td>SSH</td>
<td>VD very dense</td>
</tr>
</tbody>
</table>

#### Additional Observations

- **Drilling Fluid:** Polymer
- **Position:** E: 336422; N: 5780225 (MGA94)
- **Surface Elevation:** 2.23 m (AHD)
- **Angle from Horizontal:** 90°
- **Hole Diameter:** 200 mm

---

* bit shown by suffix  
- Ad T  
- B blank bit  
- T TC bit  
- V V bit
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Seabord Road, Seabord

**Hole ID:** ID43-GWBH05  
**date started:** 24 Jan 2017  
**date completed:** 25 Jan 2017  
**logged by:** LW  
**checked by:** KJ

**position:** E: 336422, N: 5780225 (MGA 94)  
**surface elevation:** 2.23 m (AHD)  
**angle from horizontal:** 90°  
**equipment type:** Hanjin D&B, Track mounted  
**drilling fluid:** Polymer  
**hole diameter:** 200 mm

<table>
<thead>
<tr>
<th>Graphic Log</th>
<th>material description</th>
<th>soil classification symbol</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI-CH</td>
<td>Sandy CLAY: medium to high plasticity, grey, mottled orange-brown, fine to coarse grained sand</td>
<td>M</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, pale grey, mottled pale brown.</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>SAND: fine to medium grained, pale grey, mottled pale brown, trace of fines.</td>
<td>W</td>
<td></td>
</tr>
</tbody>
</table>

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>hole</th>
<th>material description</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI-CH</td>
<td>SPT sunk 100mm under own weight</td>
<td></td>
</tr>
</tbody>
</table>

**water**

- **samples & field tests**
  - **method & support:**
    - AD: auger drilling
    - AS: auger screwing
    - HA: hand auger
    - W: wash hole
    - HS: hollow stem flight auger
    - NDD: non destructive drilling
  - **penetration:**
    - 10-Oct-12 water level on date shown

- **material description**
  - **consistency / relative density**
    - VS: very soft
    - S: soft
    - F: firm
    - ST: stiff
    - VST: very stiff
    - H: hard
    - Fb: friable
    - VL: very loose
    - L: loose
    - MD: medium dense
    - D: dense
    - VD: very dense

**structure and additional observations**

- **method & support:**
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger
  - W: wash hole
  - HS: hollow stem flight auger
  - NDD: non destructive drilling
  - *: bit shown by suffix
e.g. AD/T  
- **penetration:**
  - 10-Oct-12 water level on date shown

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

- **consistency / relative density**
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  - H: hard
  - Fb: friable
  - VL: very loose
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  - MD: medium dense
  - D: dense
  - VD: very dense

**moisture**

- **samples & field tests**
  - **method & support:**
    - AD: auger drilling
    - AS: auger screwing
    - HA: hand auger
    - W: wash hole
    - HS: hollow stem flight auger
    - NDD: non destructive drilling
  - **penetration:**
    - 10-Oct-12 water level on date shown

- **material description**
  - **consistency / relative density**
    - VS: very soft
    - S: soft
    - F: firm
    - ST: stiff
    - VST: very stiff
    - H: hard
    - Fb: friable
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    - L: loose
    - MD: medium dense
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    - VD: very dense

- **water**
  - **samples & field tests**
    - **method & support:**
      - AD: auger drilling
      - AS: auger screwing
      - HA: hand auger
      - W: wash hole
      - HS: hollow stem flight auger
      - NDD: non destructive drilling
    - **penetration:**
      - 10-Oct-12 water level on date shown

- **material description**
  - **consistency / relative density**
    - VS: very soft
    - S: soft
    - F: firm
    - ST: stiff
    - VST: very stiff
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    - L: loose
    - MD: medium dense
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    - VD: very dense

**structure and additional observations**

- **method & support:**
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger
  - W: wash hole
  - HS: hollow stem flight auger
  - NDD: non destructive drilling
  - *: bit shown by suffix
e.g. AD/T  
- **penetration:**
  - 10-Oct-12 water level on date shown

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

- **consistency / relative density**
  - VS: very soft
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  - MD: medium dense
  - D: dense
  - VD: very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Seaford Road, Seaford  
**Hole ID:** ID43-GWBH05  
**sheet:** 3 of 3  
**project no.:** GEOTABTF10294AA  
**date started:** 24 Jan 2017  
**date completed:** 25 Jan 2017  
**logged by:** LW  
**checked by:** KJ

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Well Details</th>
<th>Material Substance</th>
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</thead>
<tbody>
<tr>
<td>Method &amp; Support</td>
<td>Penetration</td>
<td>Water</td>
</tr>
<tr>
<td>SPT 1, 1, 16 N=17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 30, 39, 30/80mm N=R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 8, 24, 30/90mm N=R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 8, 30/130mm N=R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **SOIL TYPE:** TERTIARY BRIGHTON GROUP  
- **Material Substance:** SAND: fine to medium grained, pale grey, mottled pale brown, trace of fines. (continued)  
- **becoming fine to coarse grained, grey**

### hole details:

- **Borehole ID:** ID43-GWBH05  
- **Terminated at:** 20.68 m  
- **Target depth:**  

### Drilling information:

- **Hole ID:** ID43-GWBH05  
- **GEOTABTF10294AA**  
- **24 Jan 2017**  
- **25 Jan 2017**  
- **LWKJ**  
- **Sheet:** 3 of 3  
- **project:** LCRP-CTF  
- **Engineering Log - Borehole**  
- **Seaford Road, Seaford**  
- **samples & field tests**  
- **water**  
- **samples & field tests**  
- **material substance**  
- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components  
- **structure and additional observations**

- **method & support:**  
  - **AD:** auger drilling  
  - **AS:** auger screwing  
  - **HA:** hand auger  
  - **W:** wash bore  
  - **HS:** hollow stem flight auger  
  - **NDD:** non destructive drilling  
- **penetration:**  
  - **SPT:** Standard penetration test  
  - **HB:** hammer bouncing

- **samples & field tests:**  
  - **B:** bulk disturbed sample  
  - **D:** disturbed sample  
  - **E:** environmental sample  
  - **USS:** undisturbed sample #4mm diameter  
  - **N:** standard penetration test (SPT)  
  - **Nc:** SPT with solid cone  
  - **VS:** vane shear; peak/remoulded (kPa)  
  - **R:** refusal  
  - **HB:** hammer bouncing

- **classification symbol & soil description:**  
  - **based on Unified Classification System**  
  - **moisture:**  
    - **D:** dry  
    - **M:** moist  
    - **W:** wet  
  - **consistency / relative density:**  
    - **VS:** very soft  
    - **S:** soft  
    - **F:** firm  
    - **ST:** stiff  
    - **VST:** very stiff  
    - **H:** hard  
    - **FB:** friable  
    - **VL:** very loose  
    - **L:** loose  
    - **MD:** medium dense  
    - **D:** dense  
    - **VD:** very dense

- **structure and additional observations:**
  - **Borehole ID43-GWBH05 terminated at 20.68 m**
  - **Target depth**

### Well Details:

- **Bore construction license:** WRK098964  
- **drilling company:** Drillworx  
- **driller:** R. Thorne  
- **backfill details:**  
  - **0.0-12.5m:** Grout  
  - **12.5-14.5m:** Bentonite  
  - **14.5-18.5m:** Sand  
  - **18.5-20.68m:** Bentonite  
- **standpipe piezo. ID43-GWBH05 details:**
  - **15.0-18.0m:** screen

### Drilling information:

- **method & support:**  
  - **AD:** auger drilling  
  - **AS:** auger screwing  
  - **HA:** hand auger  
  - **W:** wash bore  
  - **HS:** hollow stem flight auger  
  - **NDD:** non destructive drilling  
- **penetration:**  
  - **SPT:** Standard penetration test  
  - **HB:** hammer bouncing  
  - **no resistance ranging to refusal**

### Water:

- **consistency / relative density:**
  - **S:** soft  
  - **ST:** stiff  
  - **VST:** very stiff  
  - **H:** hard  
  - **FB:** friable  
  - **VL:** very loose  
  - **L:** loose  
  - **MD:** medium dense  
  - **D:** dense  
  - **VD:** very dense

### Soil Type:

- **classification symbol & soil description**
  - **based on Unified Classification System**
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Skye Road, Frankston North

**Hole ID.** ID44-GWBH01  
**Date Started:** 17 Jan 2017  
**Date Completed:** 17 Jan 2017  
**Logged By:** KG  
**Checked By:** KJ

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Soil Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AS auger screwing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W washer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS hollow stem flight auger</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD non-destructive drilling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Soil Description**

- **Topsoil:** Silty sand, fine to medium grained, grey, with some fine to medium grained gravel.
- **Sandy:** fine to medium grained, brown to dark brown, trace of fines.
- **Silt:** low liquid limit, dark brown, traces of roots.

---

**Well Details**

- **ID:** 33571; N: 5776280 (MGA94)  
- **Surface Elevation:** 4.94 m (AHD)  
- **Angle from Horizontal:** 90°

**Equipment Type:** Geoprobe 6610DT, Track mounted  
**Drilling Fluid:** None

**Drilling Information**

- **Position:** E: 335716; N: 5778280 (MGA94)  
- **Equipment Type:** Geoprobe 6610DT, Track mounted  
- **Angle from Horizontal:** 90°  
- **Hole Diameter:** 150 mm

---

**Material Substance**

- **Soil Type:** Plasticity or particle characteristic, colour, secondary, and minor components
- **Classification Symbol:**
  - SP: Silty sand
  - SM: Silty sand
- **Consistency / Relative Density:**
  - M: mud
  - F: casing
  - W: nil
- **Support:**
  - M: mud
  - N: nil
  - C: casing
- **Penetration:**
  - 10-Oct-12 water level on date shown
- **Water:**
  - 10-Oct-12 water level on date shown

---

**Classifications & Soil Description**

- **Soil Type:** Plasticity or particle characteristic, colour, secondary, and minor components
- **Classification Symbol:**
  - SP: Silty sand
  - SM: Silty sand
- **Consistency / Relative Density:**
  - M: mud
  - F: casing
  - W: nil
- **Support:**
  - M: mud
  - N: nil
  - C: casing
- **Penetration:**
  - 10-Oct-12 water level on date shown
- **Water:**
  - 10-Oct-12 water level on date shown

---

**Additional Observations**

- **Samples & Field Tests:**
  - B: bulk disturbed sample
  - D: disturbed sample
  - E: environmental sample
  - SS: split spoon sample
  - U#: undisturbed sample of diameter mm
  - NC: SPT with solid cone
  - VS: vane shear, peak/remoulded (kPa)
  - R: refusal
  - HB: hammer bouncing
- **Soil Description:**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff
  - H: hard
  - FB: friable
  - VL: very loose
  - MD: medium dense
  - D: dense
  - VD: very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Skye Road, Frankston North

- **Hole ID:** ID44-GWBH01  
- **date started:** 17 Jan 2017  
- **date completed:** 17 Jan 2017  
- **logged by:** KG  
- **checked by:** KJ

**drilling information**

- **method & support:**
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger
  - W: washbore
  - HS: hollow stem flight auger
  - NDD: non destructive drilling

- **penetration:**
  - 123: no resistance ranging to refusal

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

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

- **classification symbol & soil description:**
  - based on Unified Classification System
  - moisture:
    - D: dry
    - M: moist
    - W: wet
  - consistency / relative density:
    - VS: very soft
    - S: soft
    - F: firm
    - St: stiff
    - VSt: very stiff
    - H: hard
    - Fb: Failure
    - VL: very loose
    - L: loose
    - MD: medium dense
    - D: dense
    - VD: very dense

- **material description:**
  - **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
  - **graphic log:**
    - depth (m)
    - material description

- **Silty Sand:**
  - fine to medium grained, grey, with some fine to medium grained gravel.
  - (continued)

- **Sandy Clay:**
  - high plasticity, dark grey to pale grey, fine to medium grained sand.

- **Borehole ID44-GWBH01 terminated at 10.00 m Target depth**

- **well details:**
  - bore construction license: WRK098858
  - drilling company: Drillworx
  - driller: J. Boyd
  - backfill details:
    - 0.0-1.0m: Grout
    - 1.0-2.0m: Bentonite
    - 2.0-5.5m: Sand
    - 5.5-10.0m: Bentonite
  - standpipe piezo. ID44-GWBH01:
    - 2.5-5.5m: screen

- **equipment type:** Geoprobe 6610DT, Track mounted
- **drilling fluid:** None
- **hole diameter:** 150 mm
- **surface elevation:** 4.94 m (AHD)
- **angle from horizontal:** 90°
- **equipment type:** GeoProbe 6610DT, Track mounted
- **angle from horizontal:** 90°
- **hole diameter:** 150 mm

- **samples & field tests:**
  - water
  - consistency / relative density
  - support
  - classification symbol & soil description
  - material description

- **structure and additional observations:**
  - bore construction license: WRK098858
  - drilling company: Drillworx
  - driller: J. Boyd
  - backfill details:
    - 0.0-1.0m: Grout
    - 1.0-2.0m: Bentonite
    - 2.0-5.5m: Sand
    - 5.5-10.0m: Bentonite
  - standpipe piezo. ID44-GWBH01:
    - 2.5-5.5m: screen
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Skyre Road, Frankston North

**Hole ID:** ID44-GWBH02  
**date started:** 30 Jan 2017  
**date completed:** 03 Feb 2017  
**logged by:** LW  
**checked by:** KJ

**設備 & materials**

<table>
<thead>
<tr>
<th>graphic log</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOPSOIL:</strong> SILT</td>
<td>low liquid limit, dark brown, rootlets.</td>
</tr>
<tr>
<td><strong>SAND:</strong></td>
<td>fine to medium grained, brown.</td>
</tr>
<tr>
<td><strong>CLAYEY SAND:</strong></td>
<td>fine grained, grey, medium plasticity, with some clay seams.</td>
</tr>
</tbody>
</table>

**method & support**

- **AD:** auger drilling  
- **AS:** auger screwing  
- **HA:** hand auger  
- **W:** washbore  
- **HS:** hollow stem flight auger  
- **NDD:** non destructive drilling  

**samples & field tests**

- **B:** bulk disturbed sample  
- **D:** disturbed sample  
- **E:** environmental sample  
- **SS:** split spoon sample  
- **U:** undisturbed sample  
- **H:** hand penetrometer (kPa)  
- **N:** standard penetration test (SPT)  
- **V:** vane shear, peaks/remoulded (kPa)  
- **R:** refusal  
- **HB:** hammer bouncing

**classification symbol & soil description**

- **C:** clays  
- **S:** silts  
- **SP:** sandy clays  
- **SC:** silty clays  
- **M:** sand  
- **MD:** medium sands  
- **D:** very loose  
- **VL:** very loose  
- **L:** loose  
- **MD:** medium dense  
- **D:** dense  
- **VD:** very dense

**structure and additional observations**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Skyre Road, Frankston North

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>SPT 3, 5, 9 N=14</th>
<th>SPT 11, 9, 12 N=21</th>
<th>SPT 0, 7, 10 N=17</th>
<th>SPT 0, 7, 8 N=15</th>
<th>SPT 10, 18, 11 N=29</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material Substance</strong></td>
<td><strong>SOIL TYPE:</strong> plasticity or particle characteristic, colour, secondary and minor components</td>
<td><strong>SOIL TYPE:</strong> plasticity or particle characteristic, colour, secondary and minor components</td>
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<td><strong>SOIL TYPE:</strong> plasticity or particle characteristic, colour, secondary and minor components</td>
<td><strong>SOIL TYPE:</strong> plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
</tbody>
</table>

---

**SOIL DESCRIPTION**

- **QUATERNARY SANDS**
  - Sandy CLAY: medium to high plasticity, dark grey, medium grained sand, with some sand pockets.
  - SAND: medium grained, brown - grey, with some fines.
  - CLAYEY SAND: fine to medium grained, grey, mottled brown, medium plasticity, with some sand and clay pockets. Becoming grey mottled brown.
  - Silty CLAY: medium to high plasticity, grey mottled brown, brown-orange and dark green, trace of fine to medium grained sand.

**TERTIARY BRIGHTON GROUP**

- CLAYEY SAND: fine to medium grained, grey, low plasticity.

---

**Additional Observations**

- **Drilling Fluid:** Polymer
- **Angle from horizontal:** 90°
- **Surface Elevation:** 4.97 m (AHD)
- **Hole Diameter:** 200 mm

---

**Logging Details**

- **Hole ID:** ID44-GWBH02
- **Project No.:** GEOTABTF10294AA
- **Position:** E: 335717; N: 5776283 (MGA94)
- **Surface Elevation:** 4.97 m (AHD)
- **Angle from Horizontal:** 90°
- **Equipment Type:** Hanjin D&B, Track mounted
- **Drilling Fluid:** Polymer
- **Hole Diameter:** 200 mm

---

**Stratigraphy**

- **Classifications:**
  - **SC:** Sandy CLAY
  - **SP:** SAND
  - **SC:** CLAYEY SAND
  - **SC:** CLAYEY SAND
  - **SC:** CLAYEY SAND
  - **SC:** CLAYEY SAND

---

**Properties**

- **Classification Symbol:**
  - **CI:** Casing Injection
  - **CH:** Casing Hammer
  - **CI:** Casing Injection
  - **CH:** Casing Hammer
  - **CI:** Casing Injection
  - **CH:** Casing Hammer

---

**Drill Method & Support**

- **AD:** Auger drilling
- **AS:** Auger sampling
- **HA:** Hand auger
- **W:** Washhole
- **HS:** Hollow stem flight auger

---

**Samples & Field Tests**

- **B:** Bulk disturbed sample
- **D:** Disturbed sample
- **E:** Environmental sample
- **SS:** Split spoon sample
- **N:** Standard penetration test (SPT) sample
- **NC:** SPT with solid cone
- **RS:** Refusal sample
- **VS:** Vane shear; peak remoulded (kPa)
- **HB:** Hammer bouncing

---

**Consistency & Relative Density**

- **VS:** Very soft
- **S:** Soft
- **F:** Firm
- **St:** Stiff
- **VSt:** Very stiff
- **H:** Hard
- **Fb:** Failure
- **VL:** Very loose
- **L:** Loose
- **MD:** Medium dense
- **D:** Dense
- **VD:** Very dense
Engineering Log - Borehole

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: Skye Road, Frankston North

position: E: 335717; N: 5776283 (MGA94 )
surface elevation: 4.97 m (AHD)
angle from horizontal: 90°
equipment type: Hanjin D&B, Track mounted
drilling fluid: Polymer
hole diameter: 200 mm

method & support

<table>
<thead>
<tr>
<th>graphic log</th>
<th>classification symbol</th>
<th>soil type: plasticity or particle characteristic, colour, secondary and minor components</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 19, 23, 32</td>
<td>N=55</td>
<td>CLAYEY SAND: fine to medium grained, grey, medium plasticity. (continued)</td>
<td>M VD TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>SPT 7, 32/130mm</td>
<td>N=R</td>
<td>SAND: medium to coarse grained, grey, trace of medium plasticity clay and clay pockets.</td>
<td>W</td>
</tr>
<tr>
<td>SPT 6, 17, 50</td>
<td>N=IE7</td>
<td>SILTY SAND: fine grained, grey.</td>
<td></td>
</tr>
</tbody>
</table>

samples & field tests

<table>
<thead>
<tr>
<th>method</th>
<th>support</th>
<th>samples &amp; field tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>M mud</td>
<td>bulk disturbed sample</td>
</tr>
<tr>
<td>AS</td>
<td>C casing</td>
<td>disturbed sample</td>
</tr>
<tr>
<td>HA</td>
<td>N nil</td>
<td>environmental sample</td>
</tr>
<tr>
<td>W</td>
<td>S split spoon sample</td>
<td>undisturbed sample #mm diameter</td>
</tr>
<tr>
<td>WASH</td>
<td>U# #</td>
<td>standard penetration test (SPT)</td>
</tr>
<tr>
<td>D</td>
<td>N* SPT - sample recovered</td>
<td>SPT with solid cone</td>
</tr>
<tr>
<td>D</td>
<td>Nb</td>
<td>SPT with solid cone</td>
</tr>
<tr>
<td>V</td>
<td>VS</td>
<td>vane shear, peak/remoulded (kPa)</td>
</tr>
<tr>
<td>V</td>
<td>R</td>
<td>refusal</td>
</tr>
<tr>
<td>V</td>
<td>HB</td>
<td>hammer bouncing</td>
</tr>
</tbody>
</table>

classification symbol & soil description

<table>
<thead>
<tr>
<th>material description</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>fine to medium grained, grey, medium plasticity.</td>
<td>very soft</td>
</tr>
<tr>
<td>medium to coarse grained, grey, trace of medium plasticity clay and clay pockets.</td>
<td>soft</td>
</tr>
<tr>
<td>fine grained, grey.</td>
<td>firm</td>
</tr>
<tr>
<td>possible pockets/bands of coarse grained sand</td>
<td>stiff</td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td>very stiff</td>
</tr>
<tr>
<td>no sample recovery</td>
<td>hard</td>
</tr>
<tr>
<td>no sample recovery</td>
<td>friable</td>
</tr>
<tr>
<td>no sample recovery</td>
<td>medium dense</td>
</tr>
<tr>
<td>no sample recovery</td>
<td>dense</td>
</tr>
<tr>
<td>no sample recovery</td>
<td>very dense</td>
</tr>
</tbody>
</table>
## Engineering Log - Borehole

### Project Details
- **Client:** Metro Trains Melbourne
- **Principal:** Level Crossing Removal Authority
- **Location:** Skye Road, Frankston North
- **Hole ID:** ID44-GWBH02
- **Logged by:** LW
- **Checked by:** KJ
- **Date started:** 30 Jan 2017
- **Date completed:** 03 Feb 2017

### Soil Description
- **TERTIARY BRIGHTON GROUP**
  - SPT sunk 200mm under own weight
  - Possible interbedded layers of clay and sand

### Samples & Field Tests
- **Classification:** Silty CLAY
- **Description:** High plasticity, grey, trace of dark grey mottling.
- **Sample:** CLAYEY SAND
  - Fine grained, grey, medium plasticity.
- **Sample:** Sandy SILT
  - Low liquid limit, grey, fine grained sand.

### Drilling Information
- **Method & Support:**
  - Hand auger
  - Non-destructive drilling
- **Depth:** 25.0 to 31.0 m
- **Drilling Fluid:** Polymer

### Structure and Additional Observations
- **Position:** E: 335717; N: 5778283 (MGA94)
- **Angle from Horizontal:** 90°
- **Surface Elevation:** 4.97 m (AHD)
- **Equipment Type:** Hanjin D&B, Track mounted

### Soil Type
- **Classification:** Silty CLAY
- **Description:** High plasticity, grey, trace of dark grey mottling.

### Moisture
- **Condition:**
  - Dry
  - Moist
  - Wet
  - Plastic limit
  - Liquid limit

### Consistency / Relative Density
- **Classification:**
  - Very soft
  - Soft
  - FIRM
  - Very firm
  - Stiff
  - Very stiff
  - Hard
  - Very hard
  - Loose
  - Very loose
  - Medium dense
  - Very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Skye Road, Frankston North

- **Hole ID:** ID44-GWBH02  
- **Date started:** 30 Jan 2017  
- **Date completed:** 03 Feb 2017  
- **Logged by:** LW  
- **Checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD: auger drilling</td>
<td>SPT15, 19, 45 N=64</td>
<td>Silty CLAY: medium plasticity, grey mottled dark green, trace of fine grained sand.</td>
</tr>
<tr>
<td>AS: auger screwing</td>
<td>SPT40, 30/70mm N=R</td>
<td>SAND: fine to medium grained, grey, trace of fines.</td>
</tr>
<tr>
<td>HA: hand auger</td>
<td>SPT36, 38, 26 N=64</td>
<td>becoming fine to coarse grained</td>
</tr>
<tr>
<td>W: wash boring</td>
<td>SPT43, 44/120mm N=R</td>
<td>becoming fine to medium grained with some clay pockets</td>
</tr>
<tr>
<td>HS: hollow stem flight auger</td>
<td>SPT16, 20, 23 N=43</td>
<td></td>
</tr>
</tbody>
</table>

#### Consistency / Relative Density
- **Moisture:** dry, moist, wet
- **Consistency:** very soft, soft, firm, stiff, very stiff, hard
- **Relative Density:** very loose, loose, medium dense, dense

#### Classification Symbol & Soil Description
- **Based on Unified Classification System**

#### Structure and Additional Observations
- **No sample recovery**

---

**Additional Observations**

- **Position:** E: 335717; N: 5776283 (MGA94)  
- **Surface Elevation:** 4.97 m (AHD)  
- **Angle from Horizontal:** 90°  
- **Equipment Type:** Hanjin D&B, Track mounted  
- **Drilling Fluid:** Polymer  
- **Hole Diameter:** 200 mm

---

**Project Details**

- **Project:** LCRP-CTF  
- **Location:** Skye Road, Frankston North  
- **Samples & Field Tests:** water outflow, water inflow

---

**Drill Site Details**

- **Equipment Type:** Hanjin D&B, Track mounted  
- **Angle from Horizontal:** 90°  
- **Hole Diameter:** 200 mm  
- **Drilling Fluid:** Polymer  
- **Surface Elevation:** 4.97 m (AHD)  
- **Method:** SPT - sample recovered  

---

**Additional Observations**

- **No sample recovery**
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Skye Road, Frankston North

<table>
<thead>
<tr>
<th>Hole ID.</th>
<th>ID44-GWBH02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet.</td>
<td>6 of 6</td>
</tr>
<tr>
<td>Project no.</td>
<td>GEOTABTF10294AA</td>
</tr>
<tr>
<td>Date started</td>
<td>30 Jan 2017</td>
</tr>
<tr>
<td>Date completed</td>
<td>03 Feb 2017</td>
</tr>
</tbody>
</table>

**Well Details:**
- **Borehole ID44-GWBH02 terminated at 40.55 m**
- Target depth

**Drilling Information:**
- **Bore construction license:** WRK098859
- **Drilling company:** DRILLWORX
- **Driller:** R. Thorne
- **Backfill details:**
  - 0.0-32.5m: Grout
  - 32.5-34.5m: Bentonite
  - 34.5-40.55m: Sand

**Standpipe Piezo ID44-GWBH02 Details:**
- 35.0-40.5m: Screen

**Consistency / Relative Density**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Samples & Field Tests**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Sample Type</th>
<th>Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>mud</td>
<td>N nil</td>
</tr>
<tr>
<td>AS</td>
<td>auger drilling</td>
<td>N</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
<td>N</td>
</tr>
<tr>
<td>W</td>
<td>washbore</td>
<td>N</td>
</tr>
<tr>
<td>HS</td>
<td>hollow stem flight auger</td>
<td>N</td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
<td>N</td>
</tr>
</tbody>
</table>

**Material Substance**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Classification Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>GELLIBRAND MARL?</td>
<td></td>
</tr>
</tbody>
</table>

**Additional Observations**

- **Boresite:** bore construction license: WRK098859 drilling company: DRILLWORX driller: R. Thorne backfill details:
  - 0.0-32.5m: Grout
  - 32.5-34.5m: Bentonite
  - 34.5-40.55m: Sand standpipe piezo: ID44-GWBH02 details:
  - 35.0-40.5m: Screen

**Hole Details:**

- **Surface Elevation:** 4.97 m (AHD)
- **Angle from horizontal:** 90°
- **Hole Diameter:** 200 mm
- **Drilling Fluid:** Polymer
- **Drilling Information:**
  - **Method:** SPT
  - **Support:** N nil
  - **Penetration:** 10-Oct-12 water level on date shown
  - **Water:** no resistance ranging to refusal

**Field Tests:**

- **Consistency / Relative Density:**
  - VS: very soft
  - S: soft
  - F: firm
  - Stiff: stiffness
  - VS: very stiff
  - H: hard
  - F: friable
  - VL: very loose
  - MD: medium dense
  - D: dense
  - VD: very dense
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Bondi Street, Bonbeach

<table>
<thead>
<tr>
<th>Hole ID.</th>
<th>ID46-GWBH01</th>
</tr>
</thead>
<tbody>
<tr>
<td>sheet no.</td>
<td>1 of 6</td>
</tr>
<tr>
<td>project no.</td>
<td>GEOTABTF10294AA</td>
</tr>
</tbody>
</table>

**Position:** E: 335099, N: 5785467 (MGA94)  
**Surface elevation:** 5.19 m (AHD)  
**Angle from horizontal:** 90°  
**Equipment type:** Hanjin D&B, Track mounted  
**Drilling fluid:** None  
**Casing diameter:** 125/200

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>FILL: ASPHALT: 50mm.</td>
</tr>
<tr>
<td>1.0</td>
<td>FILL: CLAYEY GRAVEL: fine to medium grained, grey, black.</td>
</tr>
<tr>
<td>2.0</td>
<td>SAND: fine to medium grained, grey. becoming pale brown</td>
</tr>
<tr>
<td>3.0</td>
<td>SAND: fine to coarse grained, red to pale brown, with some shell fragments, trace of fines.</td>
</tr>
<tr>
<td>4.0</td>
<td>SILTY SAND: fine grained, grey, with some shell fragments.</td>
</tr>
</tbody>
</table>

### Drilling Support

- **Penetration:** No resistance ranging to refusal
- **Water:** 10-Oct-12 water level on date shown
- **Hole ID.:** ID46-GWBH01

### Soil Type

- **Classification Symbol:** SP
- **Soil Description:** Plasticity or particle characteristic, colour, secondary and minor components

### Moisture

- **Condition:** dry, moist, wet
- **Limit:** plastic limit, liquid limit

### Classification Symbol & Soil Description

- **Based on Unified Classification System**
- **Consistency / Relative Density:** VS, S, F, ST, VST, H, Fb, VL, MD, D, VD

### Samples & Field Tests

- **Supported:** B, C, D, E, SS, U, HP, N, N*, SPT
- **Undisturbed:** SPT with solid cone
- ** perturbation:** hammer bouncing
- **Penetration:** refusal, peak/remoulded (kPa)

### Additional Observations

- **Structure and Additional Observations:** MD, MD

---

**Note:** The document includes detailed information on drilling methods, soil types, classification symbols, and additional observations.
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Bondi Street, Bonbeach

**position:** E: 335009; N: 5785467 (MGA94)  
**surface elevation:** 5.19 m (AHD)  
**angle from horizontal:** 90°  
**equipment type:** Hanjin D&B, Track mounted  
**drilling fluid:** None  
**casing diameter:** 125/200

---

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>material description</th>
<th>classification symbol</th>
<th>graphic log</th>
<th>depth (m)</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SILTY SAND: fine grained, grey, with some shell fragments. (continued)</td>
<td>SM</td>
<td>SPT 0.0, 12 N=12</td>
<td>-3</td>
<td>W</td>
</tr>
<tr>
<td>becoming dark grey, with some soft to firm clay bands, distinct &quot;rotten egg&quot; sulphur dioxide odour</td>
<td></td>
<td>SPT 7.8, 13 N=21</td>
<td>9.0</td>
<td>MD</td>
</tr>
<tr>
<td>Sandy CLAY: medium to high plasticity, black, trace of shell fragments and slight &quot;rotten egg&quot;, sulphur dioxide odour.</td>
<td>Cl-CH</td>
<td>SPT 31.41, 23/79mm N=R</td>
<td>-5</td>
<td>M</td>
</tr>
<tr>
<td>Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand.</td>
<td>Cl-CH</td>
<td>SPT 8.14, 19 N=33</td>
<td>-10</td>
<td>M</td>
</tr>
<tr>
<td>SAND: fine to medium grained, grey - brown, trace of fines.</td>
<td>SP</td>
<td>SPT 14, 19 N=33</td>
<td>11.0</td>
<td>W</td>
</tr>
<tr>
<td>SAND: fine to medium grained, grey, trace of fines.</td>
<td>SP</td>
<td>SPT 14, 19 N=33</td>
<td>12.0</td>
<td>W</td>
</tr>
<tr>
<td>SAND: medium to high plasticity, grey, motiled brown, fine to medium grained sand.</td>
<td>Cl-CH</td>
<td>SPT 14, 19 N=33</td>
<td>15.0</td>
<td>M</td>
</tr>
</tbody>
</table>

---

**samples & field tests**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>auger drilling*</td>
<td>VS very soft</td>
</tr>
<tr>
<td>AS</td>
<td>auger screwing&quot;</td>
<td>S soft</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
<td>F firm</td>
</tr>
<tr>
<td>W</td>
<td>washbore</td>
<td>St stiff</td>
</tr>
<tr>
<td>HS</td>
<td>hollow stem flight auger</td>
<td>VSt very stiff</td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
<td>H hard</td>
</tr>
<tr>
<td>*</td>
<td>bit shown by suffix</td>
<td>Fb friable</td>
</tr>
<tr>
<td>e.g. AD/T</td>
<td></td>
<td>VL very loose</td>
</tr>
<tr>
<td>B</td>
<td>black bit</td>
<td>MD medium dense</td>
</tr>
<tr>
<td>T</td>
<td>TC bit</td>
<td>D dense</td>
</tr>
<tr>
<td>V</td>
<td>V bit</td>
<td>WD very dense</td>
</tr>
</tbody>
</table>

---

**log details**

- **Drill hole:** ID46-GWBH01  
- **Date started:** 17 Jan 2017  
- **Date completed:** 20 Jan 2017  
- **Logged by:** LW  
- **Checked by:** KJ
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Bondi Street, Bonbeach

**Position:** E: 335009, N: 5785467 (MGA94)  
**Surface Elevation:** 5.19 m (AHD)  
**Angle from Horizontal:** 90°  
**Casing Diameter:** 125/200

---

**Drilling Information:**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td>7, 15, 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N*=39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT</td>
<td>17, 26, 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N*=50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20/50mm H</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N=R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT</td>
<td>6, 10, 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N*=22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT</td>
<td>12, 12, 17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N*=29</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Classification Symbol & Soil Description:**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Soil Type</th>
<th>Physical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI-CH</td>
<td>Sandy CLAY</td>
<td>medium to high plasticity, grey, mottled brown, line to medium grained sand. (continued)</td>
</tr>
<tr>
<td>SC</td>
<td>Clayey SAND</td>
<td>medium grained, grey, with some clay pockets.</td>
</tr>
<tr>
<td>CI-CH</td>
<td>Sandy CLAY</td>
<td>medium to high plasticity, medium grey, line to medium grained sand, with some cemented sand nodules.</td>
</tr>
<tr>
<td>SC</td>
<td>Clayey SAND</td>
<td>line to medium grained, grey, mottled brown, medium plasticity, with some sand and clay pockets.</td>
</tr>
</tbody>
</table>

**Soil Type:** plasticity or particle characteristic, colour, secondary and minor components

---

**Material Substance:**

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>VST - H</td>
</tr>
<tr>
<td></td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>VST - H</td>
</tr>
<tr>
<td></td>
<td>HP 230 - 250 kPa</td>
</tr>
</tbody>
</table>

---

**General Observations:**

- No sample recovery, inferred refusal on cemented sand

---

**Additional Observations:**

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

---

**Mud Logging:**

- Casing
- Water

---

**Logging Method:**

- SPT
- VI

---

**Logging Equipment:**

- Hanjin D&B, Track mounted
- Equipment type: Hanjin D&B, Track mounted
- Surface elevation: 5.19 m (AHD)
- Drilling fluid: None
- Casing diameter: 125/200

---

**Logging Details:**

- Sheet: project no.  
- Checked by: KJ

---

**Hole ID:** ID46-GWBH01

---

**Date Started:** 17 Jan 2017

---

**Date Completed:** 20 Jan 2017

---

**Logged By:** LW

---

**Date:** 17 Jan 2017

---

**Location:** Bondi Street, Bonbeach

---

**Project:** LCRP-CTF

---

**Client:** Metro Trains Melbourne

---

**Principal:** Level Crossing Removal Authority

---

**Surface Elevation:** 5.19 m (AHD)

---

**Angle from Horizontal:** 90°

---

**Casing Diameter:** 125/200

---

**Position:** E: 335009, N: 5785467 (MGA94)
### Engineering Log - Borehole

#### Hole ID:
**ID46-GWBH01**

#### Client:
Metro Trains Melbourne

#### Principal:
Level Crossing Removal Authority

#### Project:
LCRP-CTF

#### Location:
Bondi Street, Bonbeach

#### Date Started:
17 Jan 2017

#### Date Completed:
20 Jan 2017

#### Logged By:
LW

#### Checked By:
KJ

---

#### Drilling Information

<table>
<thead>
<tr>
<th>Material Thickness</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 29, 41/110 mm N* R</td>
<td>CLAYEY SAND: fine to medium grained, grey, mottled brown, medium plasticity, with some sand and clay pockets. (continued)</td>
</tr>
<tr>
<td>SPT 9, 14, 14 N=28</td>
<td>SAND: fine to medium grained, grey, mottled pale brown, trace of clay and clayey pockets.</td>
</tr>
<tr>
<td>SPT 12, 23, 28 N=51</td>
<td>CLAYEY SAND: fine grained, grey, mottled dark brown, medium plasticity, with some silt pockets.</td>
</tr>
<tr>
<td>SPT 3, 10 N=10</td>
<td>becoming brown</td>
</tr>
<tr>
<td>SPT 18, 19, 24 N=43</td>
<td>Sandy CLAY: medium to high plasticity, green - brown, coarse grained sand, with some sand pockets and red cemented bands/pockets.</td>
</tr>
</tbody>
</table>

---

#### Water Outflow

- **Method**: HSNDD (hollow stem flight auger)
- **Support**: M mud
- **Water Inflow**: N nil
- **Penetration**: C casing
- **Samples & Field Tests**: B bulk disturbed sample
- **Classification Symbol & Soil Description**
  - **Clayey Sand**: M MD TERTIARY BRIGHTON GROUP
  - **Sand**: M W D - VD
  - **Sandy Clay**: M MD

---

#### Soil Type

- **Classification Symbol & Soil Description**
  - **Clayey Sand**: M MD TERTIARY BRIGHTON GROUP
  - **Sand**: M W D - VD
  - **Sandy Clay**: M MD

---

#### Additional Observations

- **Moisture Condition**: DM WW p W l dry moist wet plastic limit
- **Penetration Test**: SPT - sample recovered
- **Consistency / Relative Density**: VS very soft S soft F firm ST stiff VST very stiff
- **Moisture**: D dry M moist W wet
- **Liquid Limit**: Md dense
- **Consistency / Relative Density**: VS very soft S soft F firm ST stiff VST very stiff
- **Moisture**: D dry M moist W wet
- **Liquid Limit**: Md dense

---

#### Drilling Fluid

- **Equipment Type**: Hanjin D&B, Track mounted
- **Drilling Fluid**: None
- **Casing Diameter**: 125/200

---

#### Structure and Additional Observations

- **Surface Elevation**: 5.19 m (AHD)
- **Angle from Horizontal**: 90°
- **Equipment Type**: Hanjin D&B, Track mounted
- **Drilling Fluid**: None
- **Casing Diameter**: 125/200
- **Surface Elevation**: 5.19 m (AHD)
- **Angle from Horizontal**: 90°
- **Casing Diameter**: 125/200

---

#### Notes

- **Location**: Bondi Street, Bonbeach
- **Date Started**: 17 Jan 2017
- **Date Completed**: 20 Jan 2017
- **Logged By**: LW
- **Checked By**: KJ

---

#### Footer

Coffey A Tetra Tech Company
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Bondi Street, Bonbeach

**Hole ID:** ID46-GWBH01  
**project no:** GEOTABTF10294AA  
**date started:** 17 Jan 2017  
**date completed:** 20 Jan 2017  
**logged by:** LW  
**checked by:** KJ

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components  

**GELLIBRAND MARL**  
- CLAYEY SAND: fine grained, green-brown, medium plasticity, with some cemented bands.  
- SILTY SAND: fine grained, green-grey.  

Trace of shell fragments, coarse grained sandy pockets and moderately cemented bands, recovered as medium grained sand to medium grained gravel sized fragments.
**Engineering Log - Borehole**

**Client:** Metro Trains Melbourne  
**Principals:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Bondi Street, Bonbeach

<table>
<thead>
<tr>
<th>Position</th>
<th>Surface Elevation</th>
<th>Angle from Horizontal</th>
<th>Casing Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>E: 335009; N: 5785467 (MGA94)</td>
<td>5.19 m (AHD)</td>
<td>90°</td>
<td>125/200</td>
</tr>
</tbody>
</table>

**Borehole Details:**
- **ID46-GWBH01** terminated at 40.25 m  
- Target depth

**Drilling Information:**
- **Borehole Construction License:** WRK097794  
- **Drilling Company:** Drillworx  
- **Driller:** R. Thorne  
- **Backfill Details:**
  - 0.0-33.0 m: Grout  
  - 33.0-35.0 m: Bentonite  
  - 35.0-40.25 m: Sand

**Standpipe Piezo ID46-GWBH01 Details:**
- 35.5-38.5 m: Screen

**Drilling Information (RL in m):**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>-35</td>
<td>Sandy CLAY: medium to high plasticity, dark green, coarse grained sand, with some shells and shell fragments, brown-white, trace of clay and sand pockets. (continued)</td>
</tr>
<tr>
<td>-40</td>
<td>Target depth</td>
</tr>
</tbody>
</table>

**Well Details:**
- **Borehole ID:** ID46-GWBH01  
- **Date Started:** 17 Jan 2017  
- **Date Completed:** 20 Jan 2017  
- **Logged by:** LW  
- **Checked by:** KJ

**Well Log Table:**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>-35</td>
<td>Sandy CLAY: medium to high plasticity, dark green, coarse grained sand, with some shells and shell fragments, brown-white, trace of clay and sand pockets. (continued)</td>
</tr>
<tr>
<td>-40</td>
<td>Target depth</td>
</tr>
</tbody>
</table>

**Soil Type:**
- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components  
- **Classification Symbol & Soil Description:**
  - Based on Unified Classification System  
  - **Classification Symbol:** CI-CH  
  - **Soil Description:** Sandy CLAY: medium to high plasticity, dark green, coarse grained sand, with some shells and shell fragments, brown-white, trace of clay and sand pockets. (continued)

**Additional Observations:**
- **Borehole ID46-GWBH01 terminated at 40.25 m**

**Structure and Additional Observations:**
- **Position:** E: 335009; N: 5785467 (MGA94)  
- **Equipment Type:** Hanjin D&B, Track mounted  
- **Angle from Horizontal:** 90°  
- **Casing Diameter:** 125/200

**Consistency / Relative Density:**
- **Moisture:** D dry  
- **Mud:** M moist  
- **Wet:** W wet  
- **Liquid Limit:** Wp plastic limit  
- **Consistency / Relative Density:**
  - **Moisture:**
    - VS: very soft  
    - VS: soft  
    - VL: very loose  
    - LD: medium dense  
    - D: dense  
  - **Consistency:**
    - S: soft  
    - F: firm  
    - ST: stiff  
    - VST: very stiff  
    - H: hard  
    - Fb: friable  
    - VL: very loose  
    - LD: loose  
    - MD: medium dense  
    - D: dense  
    - VD: very dense
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Bondi Street, Bonbeach

**Hole ID:** ID46-GWBH02  
**date started:** 20 Dec 2016  
**date completed:** 20 Dec 2016  
**logged by:** DM  
**checked by:** KJ

**drilling information**

<table>
<thead>
<tr>
<th>Graphic log</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>graphic log</td>
<td>material description</td>
</tr>
<tr>
<td>1.0</td>
<td>FILL: ASPHALT: 50mm.</td>
</tr>
<tr>
<td>2.0</td>
<td>FILL: GRAVEL: fine to medium grained, dark grey, black, with some fines.</td>
</tr>
<tr>
<td>3.0</td>
<td>SAND: fine to medium grained, grey.</td>
</tr>
<tr>
<td>4.0</td>
<td>becoming pale brown</td>
</tr>
<tr>
<td>5.0</td>
<td>becoming yellow</td>
</tr>
<tr>
<td>6.0</td>
<td>becoming yellow-brown, medium grained</td>
</tr>
<tr>
<td>7.0</td>
<td>becoming grey, fine grained</td>
</tr>
</tbody>
</table>

**samples & field tests**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling*</td>
<td>B bulk disturbed sample</td>
</tr>
<tr>
<td>AS auger screwing*</td>
<td>D disturbed sample</td>
</tr>
<tr>
<td>HA hand auger</td>
<td>E environmental sample</td>
</tr>
<tr>
<td>W washbore</td>
<td>SS split spoon sample</td>
</tr>
<tr>
<td>HS hollow stem flight auger</td>
<td>U# undisturbed sample #2 mm diameter</td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td>HP hand penetrometer (kPa)</td>
</tr>
<tr>
<td></td>
<td>N* SPT - sample recovered</td>
</tr>
<tr>
<td></td>
<td>Nc SPT with solid cone</td>
</tr>
<tr>
<td></td>
<td>VS vane shear; peak/remoulded (kPa)</td>
</tr>
<tr>
<td></td>
<td>R refusal</td>
</tr>
<tr>
<td></td>
<td>HB hammer bouncing</td>
</tr>
</tbody>
</table>

**classification symbol & soil description**

<table>
<thead>
<tr>
<th>classification symbol &amp; soil description</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS very soft</td>
<td>S soft</td>
</tr>
<tr>
<td>M moist</td>
<td>H hard</td>
</tr>
<tr>
<td>W wet</td>
<td>Fb friable</td>
</tr>
<tr>
<td></td>
<td>VL very loose</td>
</tr>
<tr>
<td></td>
<td>L loose</td>
</tr>
<tr>
<td>MD medium dense</td>
<td>D dense</td>
</tr>
<tr>
<td>VD very dense</td>
<td></td>
</tr>
</tbody>
</table>

**drilling information**

<table>
<thead>
<tr>
<th>method</th>
<th>support</th>
<th>samples &amp; field tests</th>
<th>classification symbol &amp; soil description</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>M mud</td>
<td>B bulk disturbed sample</td>
<td>VS very soft</td>
<td></td>
</tr>
<tr>
<td>AS</td>
<td>C casing</td>
<td>D disturbed sample</td>
<td>S soft</td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td>N nil</td>
<td>E environmental sample</td>
<td>M moist</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
<td>SS split spoon sample</td>
<td>W wet</td>
<td></td>
</tr>
<tr>
<td>HS</td>
<td></td>
<td>U# undisturbed sample #2 mm diameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td></td>
<td>HP hand penetrometer (kPa)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N* SPT - sample recovered</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nc SPT with solid cone</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VS vane shear; peak/remoulded (kPa)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>R refusal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>HB hammer bouncing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Engineer Log - Borehole

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: Bondi Street, Bonbeach

Hole ID: ID46-GWBH02
sheet: 2
project no.: GEOTABTF010294AA

date started: 20 Dec 2016
date completed: 20 Dec 2016
logged by: DM
checked by: KJ

position: E: 334972, N: 5785456 (MGA94)
surface elevation: 5.04 m (AHD)
angle from horizontal: 90°
equipment type: Geoprobe 6610DT, Track mounted
drilling fluid: None
hole diameter: 150 mm

Drilling information

Method & Support | Water | Samples & Field Tests | Material Substance | Structure and Additional Observations
--- | --- | --- | --- | ---
AD | no resistance ranging to refusal | 10-Oct-12 water level on date shown | water in flow | 11.0
AS | auger drilling* | B | undisturbed sample 12mm diameter | 
HA | hand auger | N | standard penetration test (SPT) | 
W | wash hole | N* | SPT - sample recovered | 
HS | hollow stem flight auger | D | disturbed sample | 
NDD | non destructive drilling | E | environmental sample | 

SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

Moisture: VS very soft
Density: VST very stiff
Consistency: S very soft
Hand shearing: Fb friable
Penetration: W very loose

CLAYEY SAND: fine grained, pale grey.
Borehole ID46-GWBH02 terminated at 10.00 m Target depth

Water backfill:
- 0.0-3.5m: Grout
- 3.5-4.5m: Bentonite
- 4.5-8.0m: Sand
- 8.0-10.0m: Grout

Borehole ID46-GWBH02 details:
- Screen: 5.0-8.0m
- Grout: 0.0-3.5m
- Bentonite: 3.5-4.5m
- Sand: 4.5-8.0m
- Grout: 8.0-10.0m

Well details:
- bore construction license: WRK097795
- drilling company: Drillworx
- driller: J.Boyde
- backfill details:
  - 0.0-3.5m: Grout
  - 3.5-4.5m: Bentonite
  - 4.5-8.0m: Sand
  - 8.0-10.0m: Grout
- standpipe piezo: ID46-GWBH02
  - 5.0-8.0m: screen
### Engineering Log - Borehole

**Hole ID:** ID46-GWBH03  
**Sheet no:** 2 of 3  
**Project no:** GEOTABTF10294AA

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Bondi Street, Bonbeach

**Position:** E: 334910, N: 5785438  
**Surface elevation:** 3.44 m (AHD)  
**Angle from horizontal:** 90°  
**Equipment type:** Hanjin D&B, Track mounted  
**Drilling fluid:** Polymer  
**Casing diameter:** 125 mm

### Drilling Information

<table>
<thead>
<tr>
<th>Method</th>
<th>Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>M mud</td>
<td>B bulk disturbed sample</td>
<td>SAND: fine to medium grained, dark brown.</td>
</tr>
<tr>
<td>AS</td>
<td>C casing</td>
<td>D disturbed sample</td>
<td>(continued)</td>
</tr>
<tr>
<td>HA</td>
<td>N nil</td>
<td>E environmental sample</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
<td>S split spoon sample</td>
<td></td>
</tr>
<tr>
<td>HS</td>
<td></td>
<td>U undisturbed sample</td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td></td>
<td>HP hand penetrometer (kPa)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N* SPT - sample recovered</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nc SPT with solid cone</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VS vane shear, peak/remoulded (kPa)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>R refusal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>HB hammer bouncing</td>
<td></td>
</tr>
</tbody>
</table>

### Well Details

<table>
<thead>
<tr>
<th>Graphic Log</th>
<th>Depth (m)</th>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>0.0</td>
<td>M D</td>
<td>SAND: fine to medium grained, grey - brown, trace of fines.</td>
</tr>
<tr>
<td>SC</td>
<td>1.0</td>
<td>M D</td>
<td>CLAYEY SAND: fine to medium grained, dark grey, low plasticity.</td>
</tr>
<tr>
<td>CI-CH</td>
<td>2.0</td>
<td>M VSI</td>
<td>Sandy CLAY: medium to high plasticity, grey, fine grained sand.</td>
</tr>
</tbody>
</table>

### Additional Observations

- **Method & Support:** AD auger drilling*, AS auger crowning*, HA hand auger, W washbore, HS hollow stem flight auger, NDD non-destructive drilling
- **Samples & Field Tests:** B bulk disturbed sample, D disturbed sample, E environmental sample, S split spoon sample, U undisturbed sample #mm diameter, HP hand penetrometer (kPa), N* SPT - sample recovered, Nc SPT with solid cone, VS vane shear, peak/remoulded (kPa), R refusal, HB hammer bouncing
- **Material Description:** SAND: fine to medium grained, dark brown.

---

**Soil Type:** Plasticity or particle characteristics, colour, secondary and minor components

<table>
<thead>
<tr>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>SAND: fine to medium grained, dark brown.</td>
</tr>
<tr>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, dark grey, low plasticity.</td>
</tr>
<tr>
<td>CI-CH</td>
<td>Sandy CLAY: medium to high plasticity, grey - brown, fine to medium grained sand, becoming medium plasticity, yellow-brown, with some shell fragments</td>
</tr>
</tbody>
</table>

---

**Structure and Additional Observations**

- **Position:** E: 334910; N: 5785438 (MGA94)  
- **Surface elevation:** 3.44 m (AHD)  
- **Angle from horizontal:** 90°  
- **Equipment type:** Hanjin D&B, Track mounted  
- **Drilling fluid:** Polymer  
- **Casing diameter:** 125 mm  
- **Auxiliary information:** moisture DM WW pW Wldry moist wet plastic limit liquid limit

---

**Method & Support:** AD auger drilling*, AS auger crowning*, HA hand auger, W washbore, HS hollow stem flight auger, NDD non-destructive drilling

- **Samples & Field Tests:** B bulk disturbed sample, D disturbed sample, E environmental sample, S split spoon sample, U undisturbed sample #mm diameter, HP hand penetrometer (kPa), N* SPT - sample recovered, Nc SPT with solid cone, VS vane shear, peak/remoulded (kPa), R refusal, HB hammer bouncing

---

**Material Description:** SAND: fine to medium grained, dark brown.

---

**Classification Symbol & Soil Description:** Based on Unified Classification System

- **Moisture:** VS very soft, S soft, F firm, St stiff, VSt very stiff
- **Consistency:** H hard, Fb friable, VL very loose, L loose
- **Density:** MD medium dense, D dense, VH very dense
**Engineering Log - Borehole**

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Bondi Street, Bonbeach

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>method</strong></td>
<td>AD</td>
<td>auger drilling*</td>
<td><strong>support</strong></td>
</tr>
<tr>
<td></td>
<td>AS</td>
<td>auger screwing*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HA</td>
<td>hand auger</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>washbore</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS</td>
<td>hollow stem flight auger</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NDD</td>
<td>non destructive drilling</td>
<td></td>
</tr>
<tr>
<td><strong>penetration</strong></td>
<td></td>
<td>no resistance ranging to refusal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-Oct-12 water level on date shown</td>
<td></td>
</tr>
</tbody>
</table>

### Soil Type

<table>
<thead>
<tr>
<th>Classification Symbol</th>
<th>Graphic Log</th>
<th>Material Description</th>
</tr>
</thead>
</table>
| CH | Silty CLAY: high plasticity, brown, grey - brown, with some fine to medium grained sand. (continued) becoming brown mottled grey, decreasing sand content  
becoming grey |

### Well Details

<table>
<thead>
<tr>
<th>Hole ID.</th>
<th>ID46-GWBH03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet</td>
<td>3 of 3</td>
</tr>
<tr>
<td>Project no.</td>
<td>GEOTABTF10294AA</td>
</tr>
<tr>
<td>Hole ID</td>
<td>ID46-GWBH03</td>
</tr>
<tr>
<td>Date started</td>
<td>13 Jan 2017</td>
</tr>
<tr>
<td>Date completed</td>
<td>16 Jan 2017</td>
</tr>
<tr>
<td>Logged by</td>
<td>LW</td>
</tr>
<tr>
<td>Checked by</td>
<td>KJ</td>
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<tr>
<td>Position</td>
<td>E: 334910; N: 5785438 (MGA94)</td>
</tr>
<tr>
<td>Surface elevation</td>
<td>3.44 m (AHD)</td>
</tr>
<tr>
<td>Angle from horizontal</td>
<td>90°</td>
</tr>
<tr>
<td>Equipment type</td>
<td>Hanjin D&amp;B, Track mounted</td>
</tr>
<tr>
<td>Drilling fluid</td>
<td>Polymer</td>
</tr>
<tr>
<td>Casing diameter</td>
<td>125 mm</td>
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</tbody>
</table>

### Consistency / Relative Density

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<thead>
<tr>
<th>Moisture</th>
<th>Dry</th>
<th>Moist</th>
<th>Wet</th>
<th>Very Wet</th>
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<tbody>
<tr>
<td>V</td>
<td>very soft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>stiff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>ST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VST</td>
<td>very stiff</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Soil Description

<table>
<thead>
<tr>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very loose</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>C</td>
<td>stiff</td>
</tr>
<tr>
<td>ST</td>
<td>ST</td>
</tr>
<tr>
<td>VST</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
</tr>
</tbody>
</table>

### Additional Observations

- Borehole ID46-GWBH03 terminated at 18.00 m Target stratum
- bore construction license: WRK097796  
- drilling company: DRILLWORX  
- driller: R. Thorne  
- backfill details:  
  - 0.0-11.0 m: Grout  
  - 11.0-12.0 m: Bentonite  
  - 12.0-15.5 m: Sand  
  - 15.5-18.0 m: Bentonite  
- standpipe piezo. ID46-GWBH03 details:  
  - 12.5-15.5 m: screen  
- water inflow:  
  - 10-Oct-12 water level on date shown

### Notes

- [coffey](https://www.coffey.com) - A TETRA TECH COMPANY
- [CDF_0_9_06_LIBRARY.GLB rev:AS  Log  COF PIEZOMETER  GEOTABTF10294AA HYDRO.GPJ  <<DrawingFile>>  23/05/2017 13:29]
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Bondi Street, Bonbeach

---

**drilling information**

- **method & support:** M mud casing
- **penetration:** no resistance ranging to refusal
- **samples & field tests:** B bulk disturbed sample
- **material description:** SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

**material substance**

- **FILL:** ASPHALT: 100mm.
- **FILL:** GRAVEL: fine to coarse grained, black.
- **SAND:** fine to medium grained, pale grey, becoming pale brown, brown, mottled orange-brown.

---

**structure and additional observations**

- **quaternary sands**

---

**samples & field tests**

- **water:** consistency / relative density
- **material description:** classification symbol & soil description based on Unified Classification System

**moisture**

- **D:** dry
- **M:** moist
- **W:** wet
- **Wp:** plastic limit

**consistency / relative density**

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

---

**location:** E: 335102, N: 5785473 (MGA94)  
**surface elevation:** 5.97 m (AHD)  
**angle from horizontal:** 90°  
**equipment type:** Geoprobe 6610DT, Track mounted  
**drilling fluid:** None  
**hole diameter:** 150 mm

---

**log details**

- **ID46-GWBH04**
- **BDESSU##HPNN*NcVSRHB**
- **bulk disturbed sample
  disturbed sample
  environmental samples
  split spoon sample
  undisturbed sample
  ##mm diameter
  hand ... penetration test (SPT)
  SPT - sample recovered
  SPT with solid cone
  vs, shear, peak/remoulded (kPa)
  refusal
  hammer bouncing

---

**Coffey A Tetra Tech Company**
**Engineering Log - Borehole**

**Hole ID.** ID46-GWBH04  
**Sheet:** 2 of 2  
**Project No.:** GEOTABTF10294AA

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Bondi Street, Bonbeach

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Well Details**

- **Borehole ID:** ID46-GWBH04  
- **Target Depth:** 10.00 m  
- **Terminated at:** 10.00 m

**Material Substance**

- **Sand:** fine to medium grained, grey, trace of fines.  
- **Sandy Silty:** fine to medium grained, low liquid limit, pale grey.  
- **Sandy Clay:** medium plasticity, grey, fine to coarse grained sand.

**Soil Type:**

- **Quaternary Sands:**
- **Tertiary Brighton Group:**

---

**Well Details**

- **Backfill Details:**
  - 0.0-4.5m: Grout  
  - 4.5-5.5m: Bentonite  
  - 5.5-9.0m: Sand  
  - 9.0-10.0m: Bentonite

- **Standpipe Piezo.**
  - **ID46-GWBH04:**
    - **Stickup:** 9.0m  
    - **Screening:** 6.0-9.0m

---

**Drilling Information**

- **RL (m):**
  - -3  
  - -4  
  - -5  
  - -6  
  - -7  
  - -8  
  - -9  
  - -10  

- **Graphic Log:**
  - **Depth (m):**
    - 9.0  
    - 10.0  
    - 11.0  
    - 12.0  
    - 13.0  
    - 14.0  
    - 15.0

---

**Additional Observations**

- **Equipment Type:** Geoprobe 6610DT, Track mounted  
- **Surface Elevation:** 5.97 m (AHD)  
- **Drilling Fluid:** None  
- **Angle from Horizontal:** 90°  
- **Diameter:** 150 mm  
- **Position:** E: 335102; N: 5785473 (MGA94)
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Bondi Street, Bonbeach

<table>
<thead>
<tr>
<th>position: E: 335505, N: 5785360 (MGA94)</th>
<th>surface elevation: 2.16 m (AHD)</th>
<th>angle from horizontal: 90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>equipment type: Geoprobe 6610DT, Track mounted</td>
<td>drilling fluid: None</td>
<td>hole diameter: 125 mm</td>
</tr>
</tbody>
</table>

### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>method &amp; support</td>
<td>samples &amp; field tests</td>
<td>material substance</td>
</tr>
</tbody>
</table>

### Graphical Log

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>graphical log</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>SP</td>
<td>TOPSOIL: SILTY SAND: fine to medium grained, grey, rootlets. SAND: fine to medium grained, grey, pale grey, trace of fines.</td>
</tr>
<tr>
<td>-2</td>
<td>SM</td>
<td>SILTY SAND: fine to coarse grained, brown, grey brown.</td>
</tr>
</tbody>
</table>

### Soil Type Classification

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description:**
  - MS
  - SM

### Water Outflow

<table>
<thead>
<tr>
<th>penetration</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>no resistance ranging to refusal</td>
<td>VS: very soft</td>
</tr>
<tr>
<td>refusal</td>
<td>S: soft</td>
</tr>
<tr>
<td>SPT with solid cone</td>
<td>F: firm</td>
</tr>
<tr>
<td>SPT - sample recovered</td>
<td>ST: stiff</td>
</tr>
<tr>
<td>SPT - sample recovered</td>
<td>VST: very stiff</td>
</tr>
<tr>
<td>air pressure</td>
<td>H: hard</td>
</tr>
<tr>
<td>refusal</td>
<td>Fb: friable</td>
</tr>
<tr>
<td>hand penetrometer (kPa)</td>
<td>VL: very loose</td>
</tr>
<tr>
<td>standard penetration test (SPT)</td>
<td>L: loose</td>
</tr>
<tr>
<td>sample coned (kPa)</td>
<td>MD: medium dense</td>
</tr>
<tr>
<td>undisturbed sample (#mm diameter)</td>
<td>D: dense</td>
</tr>
<tr>
<td>sample recovered</td>
<td>VD: very dense</td>
</tr>
</tbody>
</table>

---

**ID46-GWBH05**

**Hole ID:** ID46-GWBH05  
**sheet:** 1 of 2  
**project no.:** GEOTABTF10294AA

---

**logging by:** KG  
**checked by:** KJ

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**Metro Trains Melbourne**  
**Level Crossing Removal Authority**  
**Bondi Street, Bonbeach**

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**Metro Trains Melbourne**  
**Level Crossing Removal Authority**  
**Bondi Street, Bonbeach**
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Bondi Street, Bonbeach

**Hole ID:** ID46-GWBH05  
**Sheet:** 2 of 2  
**Project No.:** GEOTABTF10294AA  
**Date Started:** 24 Jan 2017  
**Date Completed:** 24 Jan 2017  
**Logged By:** KG  
**Checked By:** KJ

**Position:** E: 335505; N: 5785360 (MGA94)  
**Surface Elevation:** 2.16 m (AHD)  
**Angle from Horizontal:** 90°  
**Equipment Type:** Geoprobe 6610DT, Track mounted  
**Drilling Fluid:** None  
**Hole Diameter:** 125 mm

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Consistency / Relative Density:**
- VS: very soft  
- S: soft  
- F: firm  
- St: stiff  
- VSt: very stiff  
- H: hard  
- Fb: brittle  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense  
- VD: very dense

**Moisture:**
- M: moist  
- W: wet

**Penetration:**
- 10-Oct-12  
- Water level on date shown  
- Water inflow  
- Water outflow

**Support:**
- M: mud  
- N: nil  
- C: casing

**Classification Symbol & Soil Description:**  
- Based on Unified Classification System

<table>
<thead>
<tr>
<th>Moisture</th>
<th>VS</th>
<th>S</th>
<th>F</th>
<th>St</th>
<th>VSt</th>
<th>H</th>
<th>Fb</th>
<th>VL</th>
<th>L</th>
<th>MD</th>
<th>D</th>
<th>VD</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Classification Symbol & Soil Description:**
- Very loose  
- LOOSE  
- M: medium dense  
- D: dense  
- VD: very dense

**Graph Log Depth (m):**
- 9.0  
- 10.0

**Borehole Details:**
- ID46-GWBH05 terminated at 10.00 m  
- Target depth

**Additional Observations:**
- Borehole ID46-GWBH05 terminated at 10.00 m  
- Target depth

**Well Details:**
- Bore construction license: WRK0977797  
- Driller: J. Boyd  
- Backfill details:
  - 0.0-1.5m: Grout  
  - 1.5-2.5m: Bentonite  
  - 2.5-6.0m: Sand  
  - 6.0-10.0m: Bentonite  
- Standpipe piezo. ID46-GWBH05 details:
  - 3.0-6.0m: screen

**Sample & Field Tests:**
- Water outflow  
- Water inflow

**Sampling:**
- Split spoon sample  
- Undisturbed sample  
- Standard penetration test (SPT)

**Soil Descriptions:**
- Very loose  
- Loose  
- Medium dense  
- Dense  
- Very dense
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Bondi Street, Bonbeach

**Date Started:** 15 Feb 2017  
**Date Completed:** 16 Feb 2017  
**Logged By:** KG/LW  
**Checked By:** KJ

**Drilling Information**

<table>
<thead>
<tr>
<th>Graphic Log</th>
<th>Depth (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>SAND: fine to medium grained, brown, pale brown, rootlets in top 100mm.</td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>SAND: fine to medium grained, brown to grey, with some shell fragments, trace of fines.</td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>SAND: fine to medium grained, dark grey, trace of shell fragments, strong &quot;rotten egg&quot; sulphur dioxide odour. Interbedded with high plasticity, very soft, black organic clay and silt (approximately 40mm thick layers).</td>
<td></td>
</tr>
<tr>
<td>Cl</td>
<td>Sandy CLAY: medium plasticity, dark grey, fine to medium grained sand, with clayey seams and sandy pockets.</td>
<td></td>
</tr>
<tr>
<td>Cl-CH</td>
<td>Sandy CLAY: medium to high plasticity, grey mottled brown, fine to medium grained sand.</td>
<td></td>
</tr>
</tbody>
</table>

**Material Substance**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components.
- **SPT sunk:** 100mm under own weight (disturbed during drilling).

**Well Details**

- **SPT:** 1, 1, 2\*  
- **SPT:** 1, 1, 3\*  
- **SPT:** 2, 7, 9\*  
- **SPT:** 2, 6, 7\*  
- **SPT:** 3, 6, 7\*  
- **SPT:** 3, 13\*  

---

**Consistency / Relative Density**

- **Moisture:**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff
  - H: hard
  - Fb: friable
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VD: very dense
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Bondi Street, Bonbeach

**position:** E: 335511; N: 5785347 (MGA94)  
**surface elevation:** 2.18 m (AHD)  
**angle from horizontal:** 90°  
**equipment type:** Geoprobe 6610DT, Track mounted  
**drilling fluid:** Polymer  
**hole diameter:** 200 mm

**drilling information**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>penetration</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>M mud</td>
<td>N nil</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**graphic log**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>classification symbol</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>CI-CH</td>
<td>Sandy CLAY: medium to high plasticity, grey mottled brown, fine to medium grained sand.</td>
</tr>
<tr>
<td>9</td>
<td>SM</td>
<td>SILTY SAND: fine to medium grained, grey.</td>
</tr>
<tr>
<td>8</td>
<td>CH</td>
<td>Silty CLAY: high plasticity, blue-grey, trace of fine grained sand.</td>
</tr>
<tr>
<td>11</td>
<td>SM</td>
<td>SILTY SAND: fine grained, grey.</td>
</tr>
<tr>
<td>13</td>
<td>CH</td>
<td>Silty CLAY: high plasticity, dark grey, trace of fine grained sand.</td>
</tr>
</tbody>
</table>

**structure and additional observations**

- U63 attempted. Sample fell out of tube during handling.
- Silt content decreasing, grading to sand.

**samples & field tests**

- Nbulked disturbed sample
- Ddisturbed sample
- Eenvironmental sample
- Ssplit spoon sample
- NHDP hand penetrometer (kPa)
- NCstandard penetration test (SPT)
- N*SPTrigid penetration test (SPT)
- NcsPT with solid cone
- VSmains shear; peak/remouded (kPa)
- Rrefusal
- HBhammer bouncing

**classification symbol & soil description**

- based on Unified Classification System
- VSvery soft
- Swet
- Ffirm
- Ststable
- VStvery stiff
- Hhard
- Fbfrangible
- VLvery loose
- Lloose
- MDmedium dense
- Ddense
- VDvery dense
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Bondi Street, Bonbeach  
**Hole ID:** ID46-GWBH06  
**Sheet:** 3 of 3  
**Project No.:** GEOTABTF10294AA  

**Date Started:** 15 Feb 2017  
**Date Completed:** 16 Feb 2017  
**Logged By:** KG/LW  
**Checked By:** KJ

**Position:** E: 335511; N: 5785347 (MGA94)  
**Surface Elevation:** 2.18 m (AHD)  
**Angle from Horizontal:** 90°  
**Equipment Type:** Geoprobe 6610DT, Track mounted  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 200 mm

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 4, 6, 7 N=13</td>
<td>CH</td>
<td>Silty CLAY: high plasticity, dark grey, trace of fine grained sand. (continued)</td>
</tr>
<tr>
<td>SPT 14, 25, 38 N=64</td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, pale brown mottled grey, medium plasticity.</td>
</tr>
<tr>
<td>SPT 33, 40/90mmHBN</td>
<td>SP</td>
<td>SAND: fine to medium grained, grey, trace of fines.</td>
</tr>
</tbody>
</table>

**Borehole ID46-GWBH06 terminated at 20.74 m**  
**Target Depth**

### Well Details

- **Bore construction license:** WRK097796  
- **Drilling company:** DRILLWORX  
- **Driller:** J. Boyd  
- **Backfill Details:** 0.0-15.0m: Grout  
  15.0-17.0m: Bentonite  
  17.0-20.74m: Sand  
- **Standpipe Piezo ID46-GWBH06 Details:**  
  17.2-20.2m: screen

### Start Date

<table>
<thead>
<tr>
<th>RL (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>-14</td>
<td>CH</td>
</tr>
<tr>
<td>-15</td>
<td></td>
</tr>
<tr>
<td>-16</td>
<td></td>
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<tr>
<td>-17</td>
<td></td>
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<tr>
<td>-18</td>
<td></td>
</tr>
<tr>
<td>-19</td>
<td></td>
</tr>
<tr>
<td>-20</td>
<td></td>
</tr>
<tr>
<td>-21</td>
<td></td>
</tr>
</tbody>
</table>

### Moisture

<table>
<thead>
<tr>
<th>Water Outflow</th>
<th>Water Inflow</th>
</tr>
</thead>
</table>

### Penetration Classification

- **SPT:**  
  - no resistance ranging to refusal  
  - 10-Oct-12 water level on date shown  
  - water inflow  
  - water outflow

### Hole Details

- **Position:** E: 335511; N: 5785347 (MGA94)  
- **Equipment Type:** Geoprobe 6610DT, Track mounted  
- **Angle from Horizontal:** 90°  
- **Hole Diameter:** 200 mm  
- **Surface Elevation:** 2.18 m (AHD)  

### Other Details

- **Well Details:**  
  - bore construction license: WRK097796  
  - drilling company: DRILLWORX  
  - driller: J. Boyd  
  - backfill details: 0.0-15.0m: Grout  
  15.0-17.0m: Bentonite  
  17.0-20.74m: Sand  
  - standpipe piezo: ID46-GWBH06 details: 17.2-20.2m: screen
**Engineering Log - Borehole**

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Station Street, Seaford

---

**Drilling Information**

- **Method & Support:**
  - AD: Auger drilling
  - AS: Auger screwing
  - HA: Hand auger
  - W: Wash hole
  - HS: Hollow stem flight auger
  - NDD: Non-destructive drilling

- **Samples & Field Tests:**
  - C: Casing
  - N: Nile
  - M: Mud
  - B: Bulky disturbed sample
  - D: Disturbed sample
  - E: Environmental sample
  - SS: Split spoon sample
  - US: Undisturbed sample
  - N: Standard penetration test (SPT)
  - N*: SPT - Sample recovered
  - V: Vane shear
  - VS: Vane shear/peak/remoulded (kPa)
  - H: Hammer bouncing

- **Classification Symbol & Soil Description:**
  - Soil Type: Plasticity or particle characteristic, colour, secondary and minor components
  - Consistency & Relative Density:
    - VS: Very Soft
    - S: Soft
    - F: Firm
    - St: Stiff
    - VS: Very Stiff
    - H: Hard
    - Fb: Frangible
    - VL: Very Loose
    - L: Loose
    - MD: Medium Dense
    - D: Dense
    - VD: Very Dense

- **Drilling Fluid:** None
- **Hole Diameter:** 250 mm
- **Surface Elevation:** 4.73 m (AHD)
- **Angle from Horizontal:** 90°
- **Equipment Type:** Geoprobe 6610DT, Track mounted

---

**Material Substance**

- **Fill:** ASPHALT: 150mm.
- **Fill:** Sandy GRAVEL: fine to coarse grained, brown, fine to coarse grained sand.
- **SAND:** fine to medium grained, pale grey becoming fine grained, yellow, pale grey becoming fine to medium grained, with some shell fragments

---

**Structure and Additional Observations**

- **Location:** E: 335660; N: 5781063 (MGA94)
- **Surface Elevation:** 4.73 m (AHD)
- **Equipment Type:** Geoprobe 6610DT, Track mounted
- **Angle from Horizontal:** 90°
- **Depth (m):**
  - 1.0
  - 2.0
  - 3.0
  - 4.0
  - 5.0
  - 6.0
  - 7.0

---

**Hole ID:** SS-GWBH01  
**Date Started:** 13 Dec 2016  
**Date Completed:** 13 Dec 2016  
**Logged By:** DM  
**Checked By:** KJ
Hole ID: SS-GWBH01
sheet: 2 of 2
project no. GEOTABTF10294AA

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: Station Street, Seaford

position: E: 335660; N: 5781063 (MGA94 )
surface elevation: 4.73 m (AHD)
angle from horizontal: 90°
equipment type: Geoprobe 6610DT, Track mounted
drilling fluid: None
hole diameter: 250 mm

Samples & field tests:
- water
- samples & field tests
- water outflow
- water inflow
- penetration
- no resistance ranging to refusal
- 10-Oct-12 water level on site shown
- water inflow
- water outflow
- 10-Oct-12 water level on site shown
- hammer bouncing

Classification symbol & soil description:
- CDF_0_9_06_LIBRARY.GLB rev: AS  Log  COF PIEZOMETER  GEOTABTF10294AA HYDRO.GPJ  <<DrawingFile>>  23/05/2017 13:30
- moisture
- VS
- very soft
- S
- soft
- F
- firm
- St
- stiff
- VSt
- very stiff
- H
- hard
- Pb
- flint
- W
- very loose
- L
- loose
- MD
- medium dense
- D
- dense
- VD
- very dense

Material substance:
- SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
classification symbol:
- SPT
- sample recovered
- SPT with solid cone
- SPT - sample recovered
- HS
- very soft
- dense
- very dense

Testing:
- penetration test (SPT)
- refusal
- hammer bouncing
- BTV
- bit shown by suffix
- AD/T
- e.g.
- V
- V bit
- N
- nil
- C casing
- penetration
- no resistance ranging to refusal
- 10-Oct-12 water level on site shown
- water inflow
- water outflow

Material substance:
- SAND: fine to medium grained, pale grey.
- QUATERNARY SANDS

Drilling information:
- method & support
- samples & field tests
- graphic log
- material description
- soil description

Well details:
- bore construction license: WRK098865
- drilling company: Drillworx
- driller: J. Boyd
- backfill details:
  - 0.0-1.5m: Grout
  - 1.5-2.5m: Bentonite
  - 2.5-6.0m: Sand
  - 6.0-10.0m: Bentonite
- standpipe piezo. SS-GWBH01 details:
  - 3.0-6.0m: screen

Borehole SS-GWBH01 terminated at 10.00 m Target depth

Drill details:
- method & support
- samples & field tests
- graphic log
- material description
- soil description

Well details:
- bore construction license: WRK098865
- drilling company: Drillworx
- driller: J. Boyd
- backfill details:
  - 0.0-1.5m: Grout
  - 1.5-2.5m: Bentonite
  - 2.5-6.0m: Sand
  - 6.0-10.0m: Bentonite
- standpipe piezo. SS-GWBH01 details:
  - 3.0-6.0m: screen

Borehole SS-GWBH01 terminated at 10.00 m Target depth
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Station Street, Seaford  

**Hole ID:** SS-GWBH02  
**sheet no.:** 1 of 3  
**project no.:** GEOTABTF10294AA  
**date started:** 28 Feb 2017  
**date completed:** 02 Mar 2017  
**logged by:** LW  
**checked by:** KJ

**Drilling Information**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material</th>
<th>classification symbol</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3.5</td>
<td>SP</td>
<td></td>
<td>FILL: ASPHALT: 100mm.</td>
</tr>
<tr>
<td>3.5-4.0</td>
<td>SP</td>
<td></td>
<td>FILL: Sandy GRAVEL: fine to medium grained, dark grey, fine to coarse grained sand.</td>
</tr>
<tr>
<td>4.0-5.5</td>
<td>SP</td>
<td></td>
<td>SAND: fine to medium grained, grey.</td>
</tr>
<tr>
<td>5.5-7.0</td>
<td>SM</td>
<td></td>
<td>SAND: fine to medium grained, grey, trace of fines.</td>
</tr>
</tbody>
</table>

**Method & Support**

- **Method:** AD - auger drilling, AS - auger screwing, HA - hand auger, W - washbore, HS - hollow stem flight auger, NDD - non-destructive drilling
- **Support:** M - mud, N - nil

**Soil Type**

- Plasticity or particle characteristic, colour, secondary and minor components

**Samples & Field Tests**

- B - bulk disturbed sample  
- D - disturbed sample  
- E - environmental sample  
- SS - split spoon sample  
- HP - hand penetrometer (kPa)  
- SPT - standard penetration test (SPT)  
- Nc - SPT with solid cone  
- VS - vane shear; peak/remoulded (kPa)  
- R - refusal  
- HB - hammer bouncing

**Classification Symbol & Soil Description**

- based on Unified Classification System

**Consistency / Relative Density**

- VS - very soft  
- S - soft  
- F - firm  
- ST - stiff  
- VST - very stiff  
- H - hard  
- Fb - brittle  
- VL - very loose  
- L - loose  
- MD - medium dense  
- D - dense  
- VD - very dense

**Additional Observations**

- **water outflow**
- **water inflow**
- **penetration**
- **no resistance ranging to refusal**

**Drilling Conditions**

- **equipment type:** Hanjin D&B - 8D, Track mounted  
- **angle from horizontal:** 90°  
- **hole diameter:** 125 mm

**Other Details**

- **surface elevation:** 4.78 m (AHD)  
- **position:** E: 335665, N: 5781063 (MGA94)
**Engineering Log - Borehole**

Client: Metro Trains Melbourne  
Principal: Level Crossing Removal Authority  
Project: LCRP-CTF  
Location: Station Street, Seaford

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>M</td>
<td>N</td>
<td>W</td>
<td>QUATERNARY SANDS</td>
</tr>
<tr>
<td>10.0</td>
<td>C</td>
<td></td>
<td></td>
<td>SWAMP DEPOSITS</td>
</tr>
<tr>
<td>11.0</td>
<td></td>
<td></td>
<td></td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>12.0</td>
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<td>15.0</td>
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<tr>
<td>16.0</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

---

**Soil Description**

- **SAND**: Fine to medium grained, grey, trace of fines. (continued)
- **Silty CLAY**: Medium to high plasticity, black, with some shell fragments and bands of fine grained, dark grey silty sand. Strong 'rotten egg', sulphur dioxide odour.
- **Silty CLAY**: High plasticity, grey mottled brown, trace of fine grained sand, sand pockets and moderately cemented bands.
- **Sandy CLAY**: Low to medium plasticity, brown mottled grey and dark red, fine grained sand, trace of moderately cemented, fine grained, dark brown sand bands (approx 50mm thick, spaced 100-200m).

---

**Consistency / Relative Density**

- VS: Very soft
- S: Soft
- F: Firm
- ST: Stiff
- VS: Very stiff
- H: Hard
- Fb: Failure
- VL: Very loose
- L: Loose
- MD: Medium dense
- D: Dense
- VD: Very dense

---

**Classifications**

- VS: Very soft
- S: Soft
- F: Firm
- ST: Stiff
- VS: Very stiff
- H: Hard
- Fb: Failure
- VL: Very loose
- L: Loose
- MD: Medium dense
- D: Dense
- VD: Very dense
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Station Street, Seaford  
**Date Started:** 28 Feb 2017  
**Date Completed:** 02 Mar 2017  
**Logged By:** LW  
**Checked By:** KJ

#### Borehole Details
- **Hole ID:** SS-GWBH02  
- **Sheet:** 3 of 3  
- **Project No.:** GEOTABTF10294AA

#### Drilling Information
- **Method:** hollow stem flight auger  
- **Support:** M mud  
- **Penetration:** no resistance ranging to refusal

#### Hydrogeological Log
- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **Classification Symbol:**
  - CL: Clay
  - ML: Clayey silt
  - MH: Clayey silty sand
  - SI: Silty clay
  - SM: Silty mud
- **Material Description:**
  - CL: low plasticity, brown mottled grey, orange brown and red-brown, trace of fine gained sand and weakly to moderately cemented sand bands.
  - ML: medium to high liquid limit, orange-brown mottled grey, with some fine-grained silt.
  - SI: medium plasticity, orange-brown.

#### Well Details
- **Borehole SS-GWBH02 terminated at 21.25 m Target depth**
- **Well Details:**
  - **Bore Construction License:** WFK098866
  - **Drilling Company:** DRILLWORX
  - **Driller:** R. Thorne
  - **Backfill Details:**
    - 0.0-11.5m: Grout
    - 11.5-12.5m: Bentonite
    - 12.5-16.0m: Sand
    - 16.0-21.25m: Bentonite
  - **Standpipe Piezo:** SS-GWBH02
  - **Details:**
    - 13.0-16.0m: screen

#### Consistency / Relative Density
- **Moisture:**
  - M: mud
  - C: casing
  - N: nil
- **Classification System:**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VT: very stiff
  - H: hard
  - Fb: fracture
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VD: very dense

#### Additional Observations
- **Position:** E: 335665; N: 5781063 (MGA94)
- **Equipment Type:** Hanjin D&B - 8D, Track mounted
- **Angle From Horizontal:** 90°
- **Surface Elevation:** 4.78 m (AHD)
- **Hole Diameter:** 125 mm
- **Drilling Fluid:** Polymer

---

**Note:** The text and diagrams in the image provide detailed information about the borehole, including soil characteristics, drilling methods, and well details. The image also includes a graphical log and a moisture classification system.
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Station Street, Seaford

**Hole ID:** SS-GWBH03  
**date started:** 11 Jan 2017  
**date completed:** 11 Jan 2017  
**logged by:** KG  
**checked by:** KJ

**material substance**

- **FILL QUERNARY SANDS**
  - **TERTIARY BRIGHTON GROUP**
  - **FILL: ASPHALT:** 100mm.
  - **FILL: GRAVEL:** fine to coarse grained, dark grey.
  - **SAND:** fine to medium grained, brown, becoming orange-brown, mottled pale brown
  - **CLAYEY SAND:** fine to medium grained, orange-brown, trace of fine to coarse grained gravel (inferred cemented sand).

**structure and additional observations**

- **CLAYEY SAND:** line to medium grained, orange-brown, trace of fine to coarse grained gravel (inferred cemented sand).

**samples & field tests**

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

**classification symbol & soil description**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**method & support**

- **AD:** auger drilling
- **AS:** auger screwing
- **HA:** hand auger
- **W:** wash rotor
- **HS:** hollow stem flight auger
- **NDD:** non destructive drilling

**samples & field tests**

- **B:** bulk disturbed sample
- **D:** disturbed sample
- **E:** environmental sample
- **SS:** split sample
- **U** & **#:** undisturbed sample #mm diameter
- **N**: standard penetration test (SPT)
- **Nc:** SPT with solid cone
- **VS:** vane shear; peak/remoulded (kPa)
- **R:** refusal
- **HB:** hammer bouching

**consistency / relative density**

- **VS:** very soft
- **S:** soft
- **F:** firm
- **ST:** stiff
- **VST:** very stiff
- **H:** hard
- **Fb:** friable
- **VL:** very loose
- **L:** loose
- **MD:** medium dense
- **D:** dense
- **VD:** very dense
**Engineering Log - Borehole**

**Hole ID:** SS-GWBH03  
**Date started:** 11 Jan 2017  
**Date completed:** 11 Jan 2017

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** Station Street, Seaford

**Position:** E: 335857, N: 5781022 (MGA94)  
**Surface elevation:** 4.86 m (AHD)  
**Angle from horizontal:** 90°  
**Equipment type:** Geoprobe 6610DT, Track mounted  
**Drilling fluid:** None  
**Hole diameter:** 150 mm

**Drilling information**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Support</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0-5.5</td>
<td>Grout</td>
<td></td>
</tr>
<tr>
<td>5.5-6.5</td>
<td>Bentonite</td>
<td></td>
</tr>
<tr>
<td>6.5-10.0</td>
<td>Sand</td>
<td></td>
</tr>
</tbody>
</table>

**Screened Depth:** 7.0-10.0

**Samples & Field Tests**

- **Clayey Sand:** Fine to medium grained, orange-brown, trace of fine to coarse grained gravel (inferred cemented sand).
- **Tertiary Brighton Group**

**Surface Details**

- **Borehole SS-GWBH03 terminated at 10.00 m Target depth**

**Well Details**

- **Bore construction license:** WRK098867  
- **Drilling company:** Drillworx  
- **Driller:** J. Boyd  
- **Backfill Details:**  
  - 0.0-5.5m: Grout  
  - 5.5-6.5m: Bentonite  
  - 6.5-10.0m: Sand

**Samples & Field Tests**

- **Routine soil tests:**  
  - **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components  
  - **Graphic Log:**  
    - **SOIL TYPE:**  
      - CLAYEY SAND: fine to medium grained, orange-brown, trace of fine to coarse grained gravel (inferred cemented sand).
  - **Classification Symbol:** SC  
  - **Material Description:**  
    - **TERTIARY BRIGHTON GROUP**

**Additional Observations**

- **Position:** E: 335857, N: 5781022 (MGA94)  
- **Equipment Type:** Geoprobe 6610DT, Track mounted  
- **Angle from horizontal:** 90°  
- **Drilling Fluid:** None  
- **Hole Diameter:** 150 mm
### Soil Description

**Topsoil: Silt**
- Low liquid limit
- Dark brown
- Trace of fine to coarse grained sand and fine grained gravel, rootlets
- Organic odour

**Silty Sand**
- Fine grained
- Dark grey

**Sandy Silt**
- Low liquid limit
- Grey
- Fine to medium grained sand
- Trace of gravel

**Clay**
- High plasticity
- Pale grey
- Trace of fine to coarse grained sand

**Sandy Silt**
- Low liquid limit
- Pale grey
- Fine to medium grained sand
- Trace of gravel

**Clay**
- High plasticity
- Pale brown

### Drilling Information

<table>
<thead>
<tr>
<th>Hole ID.</th>
<th>SS-GWBH04</th>
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</thead>
<tbody>
<tr>
<td>Sheet</td>
<td>1 of 2</td>
</tr>
<tr>
<td>Project</td>
<td>GEOTABTF10294AA</td>
</tr>
</tbody>
</table>

**Drilling Information**
- **Station Street, Seaford**
- **Mud**
- **No resistence ranging to refusal**
- **10-Oct-12 water level on date shown**
- **1.46 m (AHD)**
- **150 mm diameter**
- **None**

**Classification Symbol & Soil Description**
- Based on Unified Classification System

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>Very soft</td>
</tr>
<tr>
<td>S</td>
<td>Soft</td>
</tr>
<tr>
<td>F</td>
<td>Firm</td>
</tr>
<tr>
<td>ST</td>
<td>Stiff</td>
</tr>
<tr>
<td>VST</td>
<td>Very stiff</td>
</tr>
<tr>
<td>H</td>
<td>Hard</td>
</tr>
<tr>
<td>Fb</td>
<td>Frangible</td>
</tr>
<tr>
<td>VL</td>
<td>Very loose</td>
</tr>
<tr>
<td>L</td>
<td>Loose</td>
</tr>
<tr>
<td>MD</td>
<td>Medium dense</td>
</tr>
<tr>
<td>D</td>
<td>Dense</td>
</tr>
<tr>
<td>VD</td>
<td>Very dense</td>
</tr>
</tbody>
</table>
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Station Street, Seaford

### Borehole SS-GWBH04

- **Hole ID:** SS-GWBH04  
- **date started:** 07 Feb 2017  
- **date completed:** 07 Feb 2017  
- **logged by:** KG  
- **checked by:** KJ

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
<th>Clasification Symbol</th>
<th>Soil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 1</td>
<td>M - W</td>
<td>VSt</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>1.0 - 2</td>
<td>M - W</td>
<td>VSt</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>2.0 - 4.5</td>
<td>M - W</td>
<td>VSt</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>4.5 - 10</td>
<td>M - W</td>
<td>VSt</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
</tbody>
</table>

Borehole SS-GWBH04 terminated at 10.00 m Target depth

### Drilling Method & Support

- **method:** AD - auger drilling*  
- **support:** M - mud  
- **penetration:** 10-Oct-12 water inflow

### Structure and Additional Observations

- **material description:** CLAY: high plasticity, pale brown, trace of fine to coarse grained sand. (continued)

- **samples & field tests:**  
  - water
  - samples & field tests
  - water outflow

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

<table>
<thead>
<tr>
<th>moisture</th>
<th>VS</th>
<th>S</th>
<th>F</th>
<th>ST</th>
<th>VST</th>
<th>H</th>
<th>Fb</th>
<th>VL</th>
<th>MD</th>
<th>D</th>
<th>VD</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>pale</td>
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<td></td>
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</tbody>
</table>

*bit shown by suffix:  
e.g. AD/T - Auger drilling with track mounted equipment; TC - Track mounted
### Engineering Log - Borehole

**Hole ID:** SS-GWBH05  
**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** Station Street, Seaford  
**Date Started:** 08 Feb 2017  
**Date Completed:** 09 Feb 2017  
**Logged By:** LW  
**Checked By:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling*</td>
<td>M mud</td>
<td>N nil</td>
</tr>
<tr>
<td>AS auger screwing*</td>
<td>C casing</td>
<td></td>
</tr>
<tr>
<td>HS hollow stem flight auger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NND non destructive drilling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Bit shown by suffix e.g. AD/T

#### Soil Description

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Plasticity or Particle Characteristics</th>
<th>Colour</th>
<th>Secondary and Minor Components</th>
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</thead>
<tbody>
<tr>
<td>TOPSOIL: Silt</td>
<td>low liquid limit, dark brown, trace of fine to coarse grained sand and fine grained gravel, organic colour, rootlets.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silt Sand</td>
<td>fine grained, dark grey.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandy Silt</td>
<td>low liquid limit, dark grey, fine grained sand.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silt Sand</td>
<td>fine grained, grey.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clays</td>
<td>high plasticity, dark blue-grey, trace of fine grained sand.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandy Clays</td>
<td>medium to high plasticity, pale grey mottled orange, fine grained sand.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandy Silts</td>
<td>high plasticity, dark brown mottled grey, trace of fine grained sand.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandy Clays</td>
<td>medium to high plasticity, pale grey mottled orange, fine grained sand.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Water Outflow

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

### Method & Support

- **AD auger drilling**
- **AS auger screwing**
- **HA hand auger**
- **W washhole**
- **HS hollow stem flight auger**
- **NND non destructive drilling**

* Bit shown by suffix e.g. AD/T

### Soil Classification

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

### Additional Observations

- **Surface Elevation:** 1.52 m (AHD)
- **Angle from Horizontal:** 90°
- **Drilling Fluid:** Polymer
- **Equipment Type:** Hanjin D&B, Track mounted
# Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Station Street, Seaford

---

**position:** E: 336352; N: 5780991 (MGA94)  
**surface elevation:** 1.52 m (AHD)  
**angle from horizontal:** 90°  
**equipment type:** Hanjin D&B, Track mounted  
**drilling fluid:** Polymer  
**hole diameter:** 200 mm

---

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Well Details</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>method &amp; support</td>
<td>samples &amp; field tests</td>
<td>water</td>
<td>material description</td>
</tr>
</tbody>
</table>

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

---

**structure and additional observations**

---

**Hole ID:** SS-GWBH05  
**sheet:** 2 of 3  
**project no:** GEOTABTF10294AA  
**date started:** 08 Feb 2017  
**date completed:** 09 Feb 2017  
**logged by:** LW  
**checked by:** KJ
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Station Street, Seaford  
**Hole ID:** SS-GWBH05  
**date started:** 08 Feb 2017  
**date completed:** 09 Feb 2017  
**logged by:** LW  
**checked by:** KJ  

#### WELL DETAILS

<table>
<thead>
<tr>
<th>Material Substance</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
</tbody>
</table>

### DRILLING INFORMATION

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>auger drilling</td>
</tr>
<tr>
<td>AS</td>
<td>auger screwing</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
</tr>
<tr>
<td>W</td>
<td>washbore</td>
</tr>
<tr>
<td>HS</td>
<td>hollow stem flight auger</td>
</tr>
<tr>
<td>DDE</td>
<td>non destructive drilling</td>
</tr>
</tbody>
</table>

### Samples & Field Tests

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td>standard penetration test (SPT)</td>
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</table>

### Classification Symbol & Soil Description

<table>
<thead>
<tr>
<th>Consistency / Relative Density</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>V</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>ST</td>
<td>stiff</td>
</tr>
<tr>
<td>VST</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>VI</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
</tr>
</tbody>
</table>

### Soil Types

- **CI-CH:** Silty CLAY: medium to high plasticity, pale grey mottled brown, trace of fine grained sand.
  - (continued) becoming mottled grey, brown and dark red, with some fine grained sand
  - with bands (up to approximately 150mm thick) of fine to coarse grained clayey sand
  - becoming grey mottled green-brown

- **SC:** CLAYEY SAND: fine grained, brown, medium plasticity.

---

**Well details:***

- bore construction license: WRK098869
- drilling company: DRILLWORX
- driller: R. Thorne
- backfill details:
  - 0.0-9.0 m: Grout
  - 9.0-11.0 m: Bentonite
  - 11.0-15.0 m: Sand
  - 15.0-21.05 m: Bentonite
- standpipe piezo: SS-GWBH05
- details: 11.5-21.05 m: screen
Appendix F – Salinity Profiling Data
### Appendix F - Salinity Profiling Data

<table>
<thead>
<tr>
<th>DateTime</th>
<th>Logger Depth (mBD)</th>
<th>Water Temperature (°C)</th>
<th>Electrical Conductivity (mS/cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/07/2017 5:20</td>
<td>2.435</td>
<td>17.1</td>
<td>1.435</td>
</tr>
<tr>
<td>12/07/2017 5:21</td>
<td>2.436</td>
<td>17.1</td>
<td>1.435</td>
</tr>
<tr>
<td>12/07/2017 5:22</td>
<td>2.436</td>
<td>17.1</td>
<td>1.435</td>
</tr>
<tr>
<td>12/07/2017 5:23</td>
<td>2.436</td>
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<tr>
<td>12/07/2017 5:24</td>
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<td>12/07/2017 5:25</td>
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*Note: Well guaged with total depth of 23.41 mBDG. Some sedimentation at the base of the well.*
### Appendix F - Salinity Profiling Data

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<th>Salinity</th>
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*Note: Well gauged with total depth of 23.41 mBGS. Some sedimentation at the base of the well.*
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*Note: Well gauged with total depth of 23.41 mbGS. Some sedimentation at the base of the well.*

**Appendix F - Salinity Profiling Data**
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Appendix F - Salinity Profiling Data

*Note: Well guaged with total depth of 23.41 mBGS. Some sedimentation at the base of the well.*
Appendix F - Salinity Profiling Data

Borehole: ARM-GWB04  
Date: 11/07/2017  
Logger ID: 1070510  
Initial SWL (mbgs): 2.251  
Total Depth (mbgs): 23.41  
Screen Interval (mbgs): 22 to 25  

*Note: Well guaged with total depth of 23.41 mbGS. Some sedimentation at the base of the well.

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**Appendix F - Salinity Profiling Data**

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**Note:** Well gauged with total depth of 27.45 mbsa. Some sedimentation at the base of the well is indicated.

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The diagram shows the relationship between electrical conductivity and temperature, with depth as a variable. The data points are plotted on a graph, indicating trends and variations in conductivity and temperature with depth.
### Appendix F - Salinity Profiling Data

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*Note: Well gauged with total depth of 27.45 mbgs. Some sedimentation at the base of the well is indicated.*
**Borehole:** ID19-GWBH02  
**Date:** 13/04/2017  
**Logger ID:** 102388  
**Initial SWL (mbgs):** 2.665  
**Total Depth (mbgs):** 27.5  
**Screen Interval (mbgs):** 21 to 28

*Note: Well gauged with total depth of 27.45 mbgs. Some sedimentation at the base of the wall is indicated.*

<table>
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<td>21 to 28</td>
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**Appendix F - Salinity Profiling Data**
Note: Well gauged with total depth of 27.45 mbgs. Some sedimentation at the base of the wall is indicated.

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Appendix F - Salinity Profiling Data

ENAUABTF10254AA-BV
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<td>18.776</td>
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<td>19.000</td>
<td>17.8</td>
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Note: Well gauged with total depth of 27.45 mbgs. Some sedimentation at the base of the well is indicated.
**Appendix F - Salinity Profiling Data**

<table>
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**Borehole:** ID19-GWBH02

- **Screen Interval (mbgs):**
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  - 13/04/2017 9:50
  - 13/04/2017 9:49
  - 13/04/2017 9:48
  - 13/04/2017 9:47
  - 13/04/2017 9:46
  - 13/04/2017 9:45
  - 13/04/2017 9:44
  - 13/04/2017 9:43
  - 13/04/2017 9:42
  - 13/04/2017 9:41
  - 13/04/2017 9:40
  - 13/04/2017 9:39
  - 13/04/2017 9:38
  - 13/04/2017 9:37
  - 13/04/2017 9:36
  - 13/04/2017 9:35
  - 13/04/2017 9:34
  - 13/04/2017 9:33
  - 13/04/2017 9:32
  - 13/04/2017 9:31
  - 13/04/2017 9:30

**Logger ID:**

- **Borehole:**
  - 13/04/2017 9:52
  - 13/04/2017 9:51
  - 13/04/2017 9:50
  - 13/04/2017 9:49
  - 13/04/2017 9:48
  - 13/04/2017 9:47
  - 13/04/2017 9:46
  - 13/04/2017 9:45
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  - 13/04/2017 9:43
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  - 13/04/2017 9:41
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  - 13/04/2017 9:35
  - 13/04/2017 9:34
  - 13/04/2017 9:33
  - 13/04/2017 9:32
  - 13/04/2017 9:31
  - 13/04/2017 9:30

**Initial SWL (mbgs):**

- **Total Depth (mbgs):**
  - 27.5

**Screen Interval (mbgs):**

- 21 to 28

*Note: Well gauged with total depth of 27.45 mbgs. Some sedimentation at the base of the wall is indicated.*
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*Note: Well gauged to total depth of 27.45 mbs. Some sedimentation at the base of the well is indicated.*
Well gauged with total depth of 27.2 mbGS. Some sedimentation at the base of the well.

Sharp increase in EC between 21.9 and 22.0 mbGS.
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*Note: Well gauged with total depth of 27.2 m bgs. Some sedimentation at the base of the well.
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</table>

*Note: Well gauged with total depth of 27.2 mDGS. Some sedimentation at the base of the well.*

Appendix F - Salinity Profiling Data

Initial SWL (mbgs):

Initial SWL (mbgs):
<table>
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*Note: Well gauged with total depth of 27.2 m BGS. Some sedimentation at the base of the well.*
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### Appendix F - Salinity Profiling Data

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*Note: Wells gauged with total depth of 27.24 mbsf. Some sedimentation at the base of the well.*
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*Note: Well gauged with total depth of 27.24 m bgs. Some sedimentation at the base of the well.*
Well gauged with total depth of 27.24 mbGS. Some sedimentation at the base of the well.
Borehole: ID1A-GWH02
Date: 10/07/2017
Logger ID: 1070510
Initial SWL (mbgs): 2.865
Total Depth (mbgs): 27.24
Screen Interval (mbgs): 21 to 28

*Note: Well gauged with total depth of 27.24 mbGS. Some sedimentation at the base of the well.

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<th>TDS (ppm)</th>
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Appendix F - Salinity Profiling Data

<table>
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<th>Date/Time</th>
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<th>Water Temperature (°C)</th>
<th>Electrical Conductivity (mS/cm)</th>
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*Note: Well gauged with total depth of 12.7 mBGS. Some sedimentation at the base of the well.*
**Well gauged with total depth of 12.7 mGSS. Some sedimentation at the base of the well.**

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*Note: Well gauged with total depth of 12.7 mGSS. Some sedimentation at the base of the well.*

**Appendix F - Salinity Profiling Data**

---

**Borehole:** ID1A-GW5H05  
**Date:** 10/07/2017  
**Logger ID:** 170615  
**Initial SWL (mGSS):** 1.229  
**Total Depth (mGSS):** 12.7  
**Screen Interval (mGSS):** 11 to 14  

ENAUABTF10294AA-BV
**Appendix F - Salinity Profiling Data**

**Borehole:** ID1A-0W0H05  
**Date:** 10/07/2017  
**Logger ID:** 1070510  
**Initial SWL (mbgs):** 1.229  
**Total Depth (mbgs):** 12.7  
**Screen Interval (mbgs):** 11 to 14

*Note: Well gauged with total depth of 12.7 mbgs. Some sedimentation at the base of the well.*

<table>
<thead>
<tr>
<th>Date</th>
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<th>Salinity (%)</th>
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</table>

**ENAUABTF1294AA-BV**
**Appendix F - Salinity Profiling Data**

**Borehole:** ID43-GWBH02  
**Date:** 11/07/2017  
**Logger ID:** 107016  
**Initial SWL (mbgs):** 4.066  
**Total Depth (mbgs):** 20.560

*Note: Well gauged with total depth of 20.56 mbgs. Significant sedimentation at the base of the well.*

### Screen Interval (mbgs):

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### Electrical Conductivity (mS/cm) vs. Temperature (°C)

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<th>Water Temperature (°C)</th>
<th>Electrical Conductivity (mS/cm)</th>
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</thead>
<tbody>
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### Diagram:

- **Electrical Conductivity vs. Depth**
- **Temperature vs. Depth**
Appendix F - Salinity Profiling Data

<table>
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<tr>
<th>Date</th>
<th>SWL (mbGS)</th>
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<th>Initial SWL (mbGS)</th>
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<th>Borehole</th>
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</thead>
<tbody>
<tr>
<td>21/01/2135</td>
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<td>ID43-GWBH02</td>
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<td>15.044</td>
<td>ID43-GWBH02</td>
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</tr>
<tr>
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<td>22 to 24</td>
<td>15.044</td>
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<tr>
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<td>22 to 24</td>
<td>15.044</td>
<td>ID43-GWBH02</td>
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<tr>
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<td>22 to 24</td>
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*Note: Well gauged with total depth of 20.56 mbGS. Significant sedimentation at the base of the well.*
Appendix F - Salinity Profiling Data

Borehole: ID43-GWBH02
Date: 10/01/2017
Logger ID: 107916
Initial SWL (mbgs): 4.056
Total Depth (mbgs): 20.550
Screen Interval (mbgs): 21 to 24

*Note: Well gauged with total depth of 20.56 mbGS. Significant sedimentation at the base of the well.

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<th>Time</th>
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<th>Date</th>
<th>Time</th>
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19/07/2017
Appendix F - Salinity Profiling Data

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*Note: Well gauged with total depth of 20.56 mbGS. Significant sedimentation at the base of the well.*
### Water (mS/cm)

#### Appendix F - Salinity Profiling Data

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Well gauged with total depth of 39.46 mbGS. Some sedimentation at the base of the well.
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*Note: Well gauged with total depth of 39.46 mbGS. Some sedimentation at the base of the well.*
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Appendix F - Salinity Profiling Data

Note: Well gauged with total depth of 39.46 mbGS. Some sedimentation at the base of the well.
Well gauged with total depth of 39.46 mbGS. Some sedimentation at the base of the well.

*Note: Well gauged with total depth of 39.46 mbGS. Some sedimentation at the base of the well.*
Well gauged with total depth of 39.46 mBGS. Some sedimentation at the base of the well.

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*Note: Well gauged with total depth of 39.46 mBGS. Some sedimentation at the base of the well.
**Borehole:**

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*Note: Well gauged with total depth of 39.46 mbGS. Some sedimentation at the base of the well.*

Appendix F - Salinity Profiling Data

<table>
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<th>Total Depth (mbgs)</th>
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*Note: Well gauged with total depth of 39.46 mbGS. Some sedimentation at the base of the well.*
**Appendix F - Salinity Profiling Data**

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*Note: Well gauged with total depth of 39.46 mbGS. Some sedimentation at the base of the well.*

Well gauged with total depth of 39.46 mbGS. Some sedimentation at the base of the well.
Appendix F - Salinity Profiling Data

Borehole: ID44-GWBH02
Date: 11/07/2017
Logger ID: 1070510
Initial SWL (mbgs): 4.771
Total Depth (mbgs): 39.46
Screen Interval (mbgs): 35 to 40

*Note: Well gauged with total depth of 39.46 mbGS. Some sedimentation at the base of the well.

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</table>

19/07/2017
## Appendix F - Salinity Profiling Data

### Borehole: ID46-GW5H-01
#### Date:
10/07/2017

- **Logger ID:** 1070610
- **Initial SWL (mbgs):** 5.459
- **Total Depth (mbgs):** 24.69
- **Screen Interval (mbgs):** 35.3 to 26.5

*Note: Well gauged with total depth of 24.69 mbGS. Well may be compromised.*

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### Graph:

- **Electrical Conductivity** vs **Temperature**

---

**Electrical Conductivity** vs **Temperature**

**Temperature (°C)**

**Electrical Conductivity (mS/cm)**

- **Temperature** range: 15.0 to 20.0
- **Electrical Conductivity** range: 1.000 to 10.000
Appendix F - Salinity Profiling Data
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Well gauged with total depth of 24.69 mbGS. Well may be compromised.
Well gauged with total depth of 24.69 mbGS. Well may be compromised.

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*Note: Well gauged with total depth of 24.69 mbGS. Well may be compromised.
**Appendix F - Salinity Profiling Data**

**Borehole:** SS-GW-H02  
**Date:** 11/07/2017  
**Logger ID:** 1070510  
**Initial SWL (mbgs):** 4.49  
**Total Depth (mbgs):** 15.54

*Note: Well gauged with total depth of 15.54 mBGS. Some sedimentation at the base of the well.*

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- **DateTime**
- **Logger Depth (mbGS)**
- **Water Temperature (°C)**
- **Electrical Conductivity (mS/cm)**

**Electrical Conductivity (mS/cm)** vs **Depth (mbp)**

**Screen Interval (mbp):** 13 to 16
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*Note: Well gauged with total depth of 15.54 mbGS. Some sedimentation at the base of the well.*
**Appendix F - Salinity Profiling Data**

**Borehole:** SS-GWBH02  
**Date:** 11/07/2017  
**Logger ID:** 1070510  
**Initial SWL (mbgs):** 4.49  
**Total Depth (mbgs):** 15.54  
**Screen Interval (mbgs):** 13 to 16  

*Note: Well gauged with total depth of 15.54 mbGS. Some sedimentation at the base of the well.*

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<td>15.538</td>
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</table>

19/07/2017
Appendix G – Hydraulic Conductivity Tables and Recovery Curves
### Estimated Hydraulic Conductivity, K (m/day)

<table>
<thead>
<tr>
<th>Monitoring Zone</th>
<th>Well ID</th>
<th>Screen Interval Top - Base (mgs)</th>
<th>Initial Standing Water Level (mgs)</th>
<th>Falling-Head Test 01 Bocanier-Rice (1970)</th>
<th>Falling-Head Test 01 Hvorslev (1951)</th>
<th>Falling-Head Test 02 Bocanier-Rice (1970)</th>
<th>Falling-Head Test 02 Hvorslev (1951)</th>
<th>Rising-Head Test 01 Bocanier-Rice (1970)</th>
<th>Rising-Head Test 01 Hvorslev (1951)</th>
<th>Rising-Head Test 02 Bocanier-Rice (1970)</th>
<th>Rising-Head Test 02 Hvorslev (1951)</th>
<th>Geometric Mean Bocanier-Rice</th>
<th>Geometric Mean Hvorslev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chelbotra (K13)</td>
<td>QIA</td>
<td>ID13-GWBH07</td>
<td>5.0 to 8</td>
<td>5.813</td>
<td>0.01</td>
<td>0.01</td>
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<td>UMTD</td>
<td>ID13-GWBH08</td>
<td>11 to 14</td>
<td>5.988</td>
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<td>0.01</td>
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<td>Metessa (K20)</td>
<td>QIA</td>
<td>ID13-GWBH09</td>
<td>10.5 to 30</td>
<td>14.784</td>
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<td>UMTD</td>
<td>ID13-GWBH10</td>
<td>4.5 to 7.5</td>
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<td>1.14</td>
<td>1.18</td>
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<td>Edithvale (D18)</td>
<td>QIA</td>
<td>ID18-GWBH01</td>
<td>4.5 to 7.5</td>
<td>3.891</td>
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<td>UMTD</td>
<td>ID18-GWBH02</td>
<td>5.0 to 6</td>
<td>5.216</td>
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<td>0.04</td>
<td>0.04</td>
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<tr>
<td>Botobeach (D40)</td>
<td>QIA</td>
<td>ID46-GWBH02</td>
<td>12.0 to 15.5</td>
<td>2.812</td>
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<td>0.12</td>
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<td>ID46-GWBH03</td>
<td>17.0 to 20.7</td>
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<tr>
<td>Seaford Road, Seaford (E4A)</td>
<td>QIA</td>
<td>SS-GWBH03</td>
<td>5.0 to 6</td>
<td>3.602</td>
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<tr>
<td></td>
<td>UMTD</td>
<td>SS-GWBH04</td>
<td>5.0 to 6</td>
<td>4.104</td>
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<td>Frankston North (K4A)</td>
<td>QIA</td>
<td>ID44-GWBH01</td>
<td>2.5 to 5.5</td>
<td>4.405</td>
<td>7.06</td>
<td>10.63</td>
<td>7.43</td>
<td>10.63</td>
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<tr>
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<td>UMTD</td>
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<td>5.0 to 6</td>
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<td>13.95</td>
</tr>
</tbody>
</table>

**Assumptions:**
- Vertical to horizontal hydraulic conductivity anisotropy ratio (KH/KH) = 0.2
- Applied correction for effective casing radius, applied: KH = 0.3
- Due to rapid recovery in many wells, initial deployment taken from larger data, not manual gauging data.
- UMC02 - Unable to Match Curve or Poor Data Quality and or excessive noise in data.
FALLING-HEAD 01

Data Set: \..\AR-GWBH01_FH01_BR.aqt
Date: 05/22/17
Time: 12:23:49

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH01
Test Date: 18.04.17

AQUIFER DATA

Saturated Thickness: 8.247 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH01)

Initial Displacement: 0.304 m
Total Well Penetration Depth: 3.247 m
Casing Radius: 0.025 m
Static Water Column Height: 3.247 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 17.63 m/day
y0 = 0.209 m
FALLING-HEAD 01

Data Set: C:\\AR-GWBH01_FH01_Hv.aqt
Date: 05/22/17
Time: 14:23:04

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH01
Test Date: 18.04.17

AQUIFER DATA

Saturated Thickness: 8.247 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH01)

Initial Displacement: 0.304 m
Total Well Penetration Depth: 3.247 m
Casing Radius: 0.025 m
Static Water Column Height: 3.247 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 26.64 m/day
y0 = 0.2111 m
FALLING-HEAD 02

Data Set: AR-GWBH01_FH02_BR.aqt
Date: 05/22/17  Time: 14:22:51

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH01
Test Date: 18.04.17

AQUIFER DATA

Saturated Thickness: 8.247 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH01)

Initial Displacement: 0.358 m
Total Well Penetration Depth: 3.247 m
Casing Radius: 0.025 m
Static Water Column Height: 3.247 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
K = 16.25 m/day
Solution Method: Bouwer-Rice
y0 = 0.1758 m
FALLING-HEAD 02

Data Set: \..\AR-GWBH01_FH02_Hv.aqt
Date: 05/22/17  Time: 12:24:20

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH01
Test Date: 18.04.17

AQUIFER DATA

Saturated Thickness: 8.247 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH01)

Initial Displacement: 0.358 m
Total Well Penetration Depth: 3.247 m
Casing Radius: 0.025 m
Static Water Column Height: 3.247 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 23.53 m/day
y0 = 0.1782 m
RISING-HEAD 01

Data Set: ...\AR-GWBH01_RH01_BR.aqt
Date: 05/22/17  Time: 12:24:29

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH01
Test Date: 18.04.17

AQUIFER DATA

Saturated Thickness: 8.247 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH01)

Initial Displacement: 0.284 m  Static Water Column Height: 3.247 m
Total Well Penetration Depth: 3.247 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 21.2 m/day  y0 = 0.1906 m
Data Set: \..\AR-GWBH01_RH01_Hv.aqt
Date: 05/22/17  Time: 12:24:38

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH01
Test Date: 18.04.17

AQUIFER DATA

Saturated Thickness: 8.247 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH01)

Initial Displacement: 0.284 m  Static Water Column Height: 3.247 m
Total Well Penetration Depth: 3.247 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 29.13 m/day  y0 = 0.184 m
### RISING-HEAD 02

Data Set: \\AR-GWBH01_RH02_BR.aqt  
Date: 05/22/17  
Time: 12:24:47

### PROJECT INFORMATION

- **Company:** Coffey  
- **Client:** MTM  
- **Project:** GEOTABTF10294AA  
- **Location:** CTF  
- **Test Well:** AR-GWBH01  
- **Test Date:** 18.04.17

### AQUIFER DATA

- **Saturated Thickness:** 8.247 m  
- **Anisotropy Ratio (Kz/Kr):** 0.2

### WELL DATA (AR-GWBH01)

- **Initial Displacement:** 0.296 m  
- **Total Well Penetration Depth:** 3.247 m  
- **Casing Radius:** 0.025 m  
- **Static Water Column Height:** 3.247 m  
- **Screen Length:** 3. m  
- **Well Radius:** 0.1 m  
- **Gravel Pack Porosity:** 0.3

### SOLUTION

- **Aquifer Model:** Unconfined  
- **Solution Method:** Bouwer-Rice  
- **K = 22.78 m/day**  
- **y0 = 0.2341 m**
RISING-HEAD 02

Data Set: \..\AR-GWBH01_RH02_Hv.aqt
Date: 05/22/17  Time: 12:24:57

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH01
Test Date: 18.04.17

AQUIFER DATA

Saturated Thickness: 8.247 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH01)

Initial Displacement: 0.296 m
Total Well Penetration Depth: 3.247 m
Casing Radius: 0.025 m
Static Water Column Height: 3.247 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 31.09 m/day
y0 = 0.2192 m
**FALLING-HEAD 01**

Data Set: `\..\..\AR-GWBH04_FH01_BR.aqt`

Date: 05/22/17  
Time: 14:28:44

**PROJECT INFORMATION**

Company: Coffey  
Client: MTM  
Project: GEOTABTF10294AA  
Location: CTF  
Test Well: AR-GWBH04  
Test Date: 29.03.2017

**AQUIFER DATA**

Saturated Thickness: 28.43 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (Falling-Head 01)**

Initial Displacement: 0.4697 m  
Total Well Penetration Depth: 23.34 m  
Casing Radius: 0.025 m  
Static Water Column Height: 23.34 m  
Screen Length: 4. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
\[ K = 0.1081 \, \text{m/day} \]

\[ y_0 = 0.4431 \, \text{m} \]
**FALLING-HEAD 01**

Data Set: `\..\AR-GWBH04_FH01_Hv.aqt`
Date: 05/22/17
Time: 14:28:37

**PROJECT INFORMATION**

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH04
Test Date: 29.03.2017

**AQUIFER DATA**

Saturated Thickness: 28.43 m
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (Falling-Head 01)**

Initial Displacement: 0.4697 m
Total Well Penetration Depth: 23.34 m
Casing Radius: 0.025 m
Static Water Column Height: 23.34 m
Screen Length: 4. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 0.1252 m/day
y0 = 0.4431 m
FALLING-HEAD 02

Data Set: \AR-GWBH04\FH02_BR.aqt
Date: 05/22/17
Time: 14:28:32

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH04
Test Date: 29.03.2017

AQUIFER DATA

Saturated Thickness: 28.34 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH04)

Initial Displacement: 0.4706 m
Total Well Penetration Depth: 23.34 m
Casing Radius: 0.025 m

Static Water Column Height: 23.43 m
Screen Length: 4. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
K = 0.1144 m/day
Solution Method: Bouwer-Rice
y0 = 0.4504 m
FALLING-HEAD 02

Data Set: `\..\AR-GWBH04_FH02_Hv.aqt`
Date: 05/22/17  Time: 14:28:24

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH04
Test Date: 29.03.2017

AQUIFER DATA
Saturated Thickness: 28.34 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH04)
Initial Displacement: 0.4706 m
Total Well Penetration Depth: 23.34 m
Casing Radius: 0.025 m
Static Water Column Height: 23.43 m
Screen Length: 4. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 0.1326 m/day  y0 = 0.4503 m
RISING-HEAD 01

Data Set: \..\AR-GWBH04_RH01_BR.aqt
Date: 05/22/17  Time: 14:28:19

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH04
Test Date: 29.03.2017

AQUIFER DATA

Saturated Thickness: 28.34 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH04)

Initial Displacement: 0.475 m
Total Well Penetration Depth: 23.34 m
Casing Radius: 0.025 m
Static Water Column Height: 23.34 m
Screen Length: 4. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.09958 m/day
y0 = 0.4343 m
RISING-HEAD 01

Data Set: \..\AR-GWBH04_RH01_Hv.aqt
Date: 05/22/17 Time: 14:28:13

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH04
Test Date: 29.03.2017

AQUIFER DATA

Saturated Thickness: 28.34 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH04)

Initial Displacement: 0.475 m
Total Well Penetration Depth: 23.34 m
Casing Radius: 0.025 m
Static Water Column Height: 23.34 m
Screen Length: 4. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.1153 m/day
y0 = 0.4342 m
RISING-HEAD 02
Data Set: \..\AR-GWBH04_RH02_BR.aqt
Date: 05/22/17
Time: 14:28:08

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH04
Test Date: 29.03.2017

AQUIFER DATA
Saturated Thickness: 28.34 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH04)
Initial Displacement: 0.486 m
Total Well Penetration Depth: 23.34 m
Casing Radius: 0.025 m
Static Water Column Height: 23.34 m
Screen Length: 4. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1103 m/day
y0 = 0.4466 m
RISING-HEAD 02

Data Set: \..\AR-GWBH04_RH02_Hv.aqt
Date: 05/22/17          Time: 14:27:59

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH04
Test Date: 29.03.2017

AQUIFER DATA

Saturated Thickness: 28.34 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH04)

Initial Displacement: 0.486 m
Total Well Penetration Depth: 23.34 m
Casing Radius: 0.025 m
Static Water Column Height: 23.34 m
Screen Length: 4. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 0.1278 m/day
y0 = 0.4465 m
FALLING-HEAD TEST 01

Data Set: \..\AR-GWBH05_FH01_BR.aqt
Date: 05/22/17
Time: 14:37:00

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH05
Test Date: 10.03.2017

AQUIFER DATA

Saturated Thickness: 11.99 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH05)

Initial Displacement: 0.3905 m
Total Well Penetration Depth: 6.99 m
Casing Radius: 0.025 m
Static Water Column Height: 6.99 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.087 m/day
y0 = 0.3927 m
### FALLING-HEAD TEST 01

Data Set: `\..\AR-GWBH05_FH01_Hv.aqt`
Date: 05/22/17
Time: 14:36:55

### PROJECT INFORMATION

- Company: Coffey
- Client: MTM
- Project: GEOTABTF10294AA
- Location: CTF
- Test Well: AR-GWBH05
- Test Date: 10.03.2017

### AQUIFER DATA

- Saturated Thickness: 11.99 m
- Anisotropy Ratio (Kz/Kr): 0.2

### WELL DATA (AR-GWBH05)

- Initial Displacement: 0.3905 m
- Total Well Penetration Depth: 6.99 m
- Casing Radius: 0.025 m
- Static Water Column Height: 6.99 m
- Screen Length: 3. m
- Well Radius: 0.1 m
- Gravel Pack Porosity: 0.3

### SOLUTION

- Aquifer Model: Unconfined
- Solution Method: Hvorslev
- \( K = 2.732 \text{ m/day} \)
- \( y_0 = 0.3927 \text{ m} \)
FALLING-HEAD 02

Data Set: \..\AR-GWBH05_FH02_BR.aqt  
Date: 05/22/17  
Time: 14:36:50

PROJECT INFORMATION

Company: Coffey  
Client: MTM  
Project: GEOTABTF10294AA  
Location: CTF  
Test Well: AR-GWBH05  
Test Date: 10.03.2017

AQUIFER DATA

Saturated Thickness: 11.99 m  
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH05)

Initial Displacement: 0.375 m  
Total Well Penetration Depth: 6.99 m  
Casing Radius: 0.025 m  
Static Water Column Height: 6.99 m  
Screen Length: 3. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
K = 1.853 m/day  
y0 = 0.3737 m
AQUIFER DATA

Saturated Thickness: 11.99 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH05)

Initial Displacement: 0.375 m
Total Well Penetration Depth: 6.99 m
Casing Radius: 0.025 m
Static Water Column Height: 6.99 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
\( K = 2.426 \text{ m/day} \)
\( y_0 = 0.3738 \text{ m} \)
### FALLING-HEAD TEST 01

Data Set: `\..\AR-GWBH05_RH01_BR.aqt`
Date: 05/22/17  
Time: 14:36:39  

### PROJECT INFORMATION

Company: Coffey  
Client: MTM  
Project: GEOTABTF10294AA  
Location: CTF  
Test Well: AR-GWBH05  
Test Date: 10.03.2017

### AQUIFER DATA

- Saturated Thickness: 11.99 m  
- Anisotropy Ratio (Kz/Kr): 0.2

### WELL DATA (AR-GWBH05)

- Initial Displacement: 0.3905 m  
- Total Well Penetration Depth: 6.99 m  
- Casing Radius: 0.025 m  
- Static Water Column Height: 6.99 m  
- Screen Length: 3. m  
- Well Radius: 0.1 m  
- Gravel Pack Porosity: 0.3

### SOLUTION

- Aquifer Model: Unconfined  
- Solution Method: Bouwer-Rice  
- \( K = 2.087 \text{ m/day} \)  
- \( y_0 = 0.3927 \text{ m} \)
### FALLING-HEAD TEST 01

Data Set: `\..\AR-GWBH05_RH01_Hv.aqt`  
Date: 05/22/17  
Time: 14:36:33

### PROJECT INFORMATION

- Company: Coffey
- Client: MTM
- Project: GEOTABTF10294AA
- Location: CTF
- Test Well: AR-GWBH05
- Test Date: 10.03.2017

### AQUIFER DATA

- Saturated Thickness: 11.99 m  
- Anisotropy Ratio (Kz/Kr): 0.2

### WELL DATA (AR-GWBH05)

- Initial Displacement: 0.3905 m
- Total Well Penetration Depth: 6.99 m
- Casing Radius: 0.025 m
- Static Water Column Height: 6.99 m
- Screen Length: 3. m
- Well Radius: 0.1 m
- Gravel Pack Porosity: 0.3

### SOLUTION

- Aquifer Model: Unconfined
- Solution Method: Hvorslev
- \( K = 2.732 \text{ m/day} \)
- \( y_0 = 0.3927 \text{ m} \)
RISING-HEAD 02

Data Set: \..\AR-GWBH05_RH02_BR.aqt
Date: 05/22/17  Time: 14:36:27

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH05
Test Date: 10.03.2017

AQUIFER DATA

Saturated Thickness: 11.99 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH05)

Initial Displacement: 0.525 m
Total Well Penetration Depth: 6.99 m
Casing Radius: 0.025 m
Static Water Column Height: 6.99 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.178 m/day
y0 = 0.477 m
RISING-HEAD 02

Data Set: ...\AR-GWBH05_RH02_Hv.aqt
Date: 05/22/17
Time: 14:36:21

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH05
Test Date: 10.03.2017

AQUIFER DATA

Saturated Thickness: 11.99 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (AR-GWBH05)

Initial Displacement: 0.525 m
Total Well Penetration Depth: 6.99 m
Casing Radius: 0.025 m
Static Water Column Height: 6.99 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 2.853 m/day
y0 = 0.4771 m
Saturated Thickness: 21.75 m
Anisotropy Ratio (Kz/Kr): 0.2

Initial Displacement: 0.719 m
Total Well Penetration Depth: 16.76 m
Casing Radius: 0.025 m

Static Water Column Height: 16.76 m
Screen Length: 4.0 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.1582 m/day
y0 = 0.6662 m
**FALLING-HEAD 01**

Data Set: \...\AR-GWBH06_FH01_Hv.aqt  
Date: 05/22/17  
Time: 14:39:12

**PROJECT INFORMATION**

Company: Coffey  
Client: MTM  
Project: GEOTABTF10294AA  
Location: CTF  
Test Well: AR-GWBH 06  
Test Date: 06.03.2017

**AQUIFER DATA**

Saturated Thickness: 21.75 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (Falling-Head 01)**

Initial Displacement: 0.719 m  
Total Well Penetration Depth: 16.76 m  
Casing Radius: 0.025 m  
Static Water Column Height: 16.76 m  
Screen Length: 4. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Hvorslev  
\( K = 0.1902 \) m/day  
\( y_0 = 0.666 \) m
FALLING-HEAD 01

Data Set: \..\AR-GWBH06_RH01_BR.aqt
Date: 05/22/17 Time: 14:39:07

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH 06
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 21.76 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (Falling-Head 01)

Initial Displacement: 0.7217 m
Total Well Penetration Depth: 16.76 m
Casing Radius: 0.025 m
Static Water Column Height: 16.76 m
Screen Length: 4. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1705 m/day
\( y_0 = 0.6648 \) m
FALLING-HEAD 01

Data Set: \..\AR-GWBH06_RH01_Hv.aqt
Date: 05/22/17
Time: 14:39:02

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: AR-GWBH 06
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 21.76 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (Falling-Head 01)

Initial Displacement: 0.7217 m
Total Well Penetration Depth: 16.76 m
Casing Radius: 0.025 m
Static Water Column Height: 16.76 m
Screen Length: 4.0 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.205 m/day
y0 = 0.6647 m
FALLING HEAD 01

Data Set: \..\ID03-GWBH05_FH01_BR.aqt
Date: 05/22/17  Time: 14:44:06

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH05
Test Date: 05/04/2017

AQUIFER DATA

Saturated Thickness: 14.81 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH05)

Initial Displacement: 0.694 m
Total Well Penetration Depth: 9.593 m
Casing Radius: 0.025 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

Static Water Column Height: 9.806 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.2298 m/day
y0 = 0.64 m
FALLING HEAD 01
Data Set: \..\ID03-GWBH05_FH01_Hv.aqt
Date: 05/22/17 Time: 14:44:00

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH05
Test Date: 05/04/2017

AQUIFER DATA
Saturated Thickness: 14.81 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH05)
Initial Displacement: 0.694 m Static Water Column Height: 9.806 m
Total Well Penetration Depth: 9.593 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Hvorslev
K = 0.2888 m/day y0 = 0.64 m
FALLING HEAD 02
Data Set: \..\ID03-GWBH05_FH02_BR.aqt
Date: 05/22/17 Time: 14:43:55

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH05
Test Date: 05/04/2017

AQUIFER DATA
Saturated Thickness: 14.81 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH05)
Initial Displacement: 0.676 m Static Water Column Height: 9.806 m
Total Well Penetration Depth: 9.593 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m

Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.2151 m/day y0 = 0.6062 m
FALLING HEAD 02
Data Set: \..\ID03-GWBH05_FH02_Hv.aqt
Date: 05/22/17 Time: 14:43:50

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH05
Test Date: 05/04/2017

AQUIFER DATA
Saturated Thickness: 14.81 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH05)
Initial Displacement: 0.676 m Static Water Column Height: 9.806 m
Total Well Penetration Depth: 9.593 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Hvorslev
K = 0.2702 m/day y0 = 0.606 m
RISING HEAD 01
Data Set: \...\ID03-GWBH05_RH01_BR.aqt
Date: 05/22/17  Time: 14:43:46

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH05
Test Date: 05/04/2017

AQUIFER DATA
Saturated Thickness: 14.81 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH05)
Initial Displacement: 0.66 m  Static Water Column Height: 9.806 m
Total Well Penetration Depth: 9.593 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 0.1409 m/day  y0 = 0.5061 m
RISING HEAD 01
Data Set: \...\ID03-GWBH05_RH01_Hv.aqt
Date: 05/22/17 Time: 14:43:41

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH05
Test Date: 05/04/2017

AQUIFER DATA
Saturated Thickness: 14.81 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH05)
Initial Displacement: 0.66 m
Total Well Penetration Depth: 9.593 m
Casing Radius: 0.025 m

Static Water Column Height: 9.806 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Hvorslev
K = 0.1773 m/day y0 = 0.508 m
RISING HEAD 02

Data Set: \...\ID03-GWBH05_RH02_BR.aqt
Date: 05/22/17   Time: 14:43:35

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH05
Test Date: 05/04/2017

AQUIFER DATA

Saturated Thickness: 14.81 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH05)

Initial Displacement: 0.681 m  Static Water Column Height: 9.806 m
Total Well Penetration Depth: 9.593 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 0.1867 m/day  y0 = 0.6253 m
RISING HEAD 02

Data Set: \..\\ID03-GWBH05_RH02_Hv.aqt
Date: 05/22/17
Time: 14:43:31

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH05
Test Date: 05/04/2017

AQUIFER DATA

Saturated Thickness: 14.81 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH05)

Initial Displacement: 0.681 m
Total Well Penetration Depth: 9.593 m
Casing Radius: 0.025 m
Static Water Column Height: 9.806 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

\[ K = 0.2214 \text{ m/day} \]

\[ y_0 = 0.6165 \text{ m} \]
FALLING-HEAD 01

Data Set: ...
Date: 05/22/17
Time: 14:46:29

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH06
Test Date: 05/04/2017

AQUIFER DATA

Saturated Thickness: 28.61 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH06)

Initial Displacement: 0.4312 m
Total Well Penetration Depth: 23.61 m
Casing Radius: 0.025 m
Static Water Column Height: 23.61 m
Screen Length: 3.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

\[ K = 0.01281 \text{ m/day} \]
\[ y_0 = 0.4166 \text{ m} \]
FALLING-HEAD 01

Data Set: \..\ID03-GWBH06 FH01_Hv.aqt
Date: 05/22/17 Time: 14:46:22

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH06
Test Date: 05/04/2017

AQUIFER DATA

Saturated Thickness: 28.61 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH06)

Initial Displacement: 0.4312 m Static Water Column Height: 23.61 m
Total Well Penetration Depth: 23.61 m Screen Length: 3.5 m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev
K = 0.01467 m/day y0 = 0.4166 m
**FALLING-HEAD 02**

Data Set: `\..\ID03-GWBH06 FH02_BR.aqt`
Date: 05/22/17  Time: 14:46:14

**PROJECT INFORMATION**

- **Company:** Coffey
- **Client:** Metro
- **Project:** 754-GEOTABTF10294AA
- **Location:** CTF
- **Test Well:** ID03-GWBH06
- **Test Date:** 05/04/2017

**AQUIFER DATA**

- **Saturated Thickness:** 28.61 m
- **Anisotropy Ratio (Kz/Kr):** 0.2

**WELL DATA (ID03-GWBH06)**

- **Initial Displacement:** 0.4091 m
- **Total Well Penetration Depth:** 23.61 m
- **Casing Radius:** 0.025 m
- **Static Water Column Height:** 23.61 m
- **Screen Length:** 3.5 m
- **Well Radius:** 0.1 m
- **Gravel Pack Porosity:** 0.3

**SOLUTION**

- **Aquifer Model:** Unconfined
- **Solution Method:** Bouwer-Rice
- **$K = 0.01039$ m/day**
- **$y_0 = 0.3287$ m**
FALLING-HEAD 02
Data Set: \..\ID03-GWBH06 FH02_Hv.aqt
Date: 05/22/17 Time: 14:46:03

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH06
Test Date: 05/04/2017

AQUIFER DATA
Saturated Thickness: 28.61 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH06)
Initial Displacement: 0.4091 m Static Water Column Height: 23.61 m
Total Well Penetration Depth: 23.61 m Screen Length: 3.5 m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Hvorslev
K = 0.01189 m/day y0 = 0.3287 m
RISING-HEAD 01

Data Set: \...\ID03-GWBH06 RH01_BR.aqt
Date: 05/22/17
Time: 21:24:22

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH06
Test Date: 26/04/2017

AQUIFER DATA

Saturated Thickness: 28.61 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH06)

Initial Displacement: 0.4875 m
Total Well Penetration Depth: 23.61 m
Casing Radius: 0.025 m
Static Water Column Height: 23.61 m
Screen Length: 3.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.01067 m/day
y0 = 0.4824 m
RISING-HEAD 01

Data Set: \..\ID03-GWBH06 RH01_Hv.aqt
Date: 05/22/17                Time: 21:25:14

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH06
Test Date: 26/04/2017

AQUIFER DATA
Saturated Thickness: 28.61 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH06)
Initial Displacement: 0.4875 m
Total Well Penetration Depth: 23.61 m
Casing Radius: 0.025 m
Static Water Column Height: 23.61 m
Screen Length: 3.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.01221 m/day
y0 = 0.4824 m
FALLING HEAD 01

Data Set: \...\ID03-GWBH07_FH01_BR.aqt
Date: 05/22/17
Time: 14:53:42

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH07
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 9.488 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH07)

Initial Displacement: 0.328 m
Total Well Penetration Depth: 4.488 m
Casing Radius: 0.025 m
Static Water Column Height: 4.488 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.488 m/day
y0 = 0.2661 m
DATA SET: "ID03-GWBH07_FH01_Hv.aqt"
DATE: 05/22/17
TIME: 14:53:38

PROJECT INFORMATION

COMPANY: Coffey
CLIENT: Metro
PROJECT: 754-GEOTABTF10294AA
LOCATION: CTF
TEST WELL: ID03-GWBH07
TEST DATE: 04/04/2017

AQUIFER DATA

SATURATED THICKNESS: 9.488 m
ANISOTROPY RATIO (Kz/Kr): 0.2

WELL DATA (ID03-GWBH07)

INITIAL DISPLACEMENT: 0.328 m
TOTAL WELL PenetRATION DEPTH: 4.488 m
CASING RADIUS: 0.025 m
STATIC WATER COLUMN HEIGHT: 4.488 m
SCREEN LENGTH: 3.0 m
WELL RADIUS: 0.1 m
GRAVEL PACK POROSITY: 0.3

SOLUTION

AQUIFER MODEL: Unconfined
K = 2.077 m/day

SOLUTION METHOD: Hvorslev
y0 = 0.2659 m
FALLING HEAD 02

Data Set: \...\ID03-GWBH07_FH02_BR.aqt
Date: 05/22/17
Time: 14:53:32

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH07
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 9.488 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH07)

Initial Displacement: 0.3188 m
Total Well Penetration Depth: 4.488 m
Casing Radius: 0.025 m
Static Water Column Height: 4.488 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.137 m/day
y0 = 0.2385 m
FALLING HEAD 02

Data Set: \..\ID03-GWBH07_FH02_Hv.aqt
Date: 05/22/17               Time: 14:53:22

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH07
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 9.488 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH07)

Initial Displacement: 0.3188 m
Static Water Column Height: 4.488 m
Total Well Penetration Depth: 4.488 m
Screen Length: 3. m
Casing Radius: 0.025 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

\[ K = 1.583 \text{ m/day} \]
\[ y_0 = 0.2381 \text{ m} \]
RISING HEAD 01

Data Set: \...\ID03-GWBH07_RH01_BR.aqt
Date: 05/22/17 Time: 14:53:14

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH07
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 9.488 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH07)

Initial Displacement: 0.276 m Static Water Column Height: 4.488 m
Total Well Penetration Depth: 4.488 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
\[ K = 1.255 \text{ m/day} \]
\[ y_0 = 0.1738 \text{ m} \]
RISING HEAD 01

Data Set: \..\ID03-GWBH07_RH01_Hv.aqt
Date: 05/22/17 Time: 14:52:56

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH07
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 9.488 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH07)

Initial Displacement: 0.276 m
Total Well Penetration Depth: 4.488 m
Casing Radius: 0.025 m
Static Water Column Height: 4.488 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.57 m/day
y0 = 0.1804 m
Data Set: \...\ID03-GWBH07_RH02_BR.aqt
Date: 05/22/17  Time: 14:52:51

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH07
Test Date: 04/04/2017

AQUIFER DATA
Saturated Thickness: 9.488 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH07)
Initial Displacement: 0.374 m
Total Well Penetration Depth: 4.488 m
Casing Radius: 0.025 m
Static Water Column Height: 4.488 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 1.232 m/day  y0 = 0.2495 m

Aquifer Model:
K = 1.232 m/day
y0 = 0.2495 m

SOLUTION
AQUIFER DATA
Saturated Thickness: 9.488 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH07)
Initial Displacement: 0.374 m  Static Water Column Height: 4.488 m
Total Well Penetration Depth: 4.488 m  Screen Length: 3.0 m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 1.715 m/day  y0 = 0.249 m
FALLING HEAD 01
Data Set: \..\ID03-GWBH08_FH01_BR.aqt
Date: 05/22/17 Time: 14:55:53

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH08
Test Date: 04/04/2017

AQUIFER DATA
Saturated Thickness: 13.81 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH08)
Initial Displacement: 0.427 m
Total Well Penetration Depth: 8.813 m
Casing Radius: 0.025 m
Static Water Column Height: 8.813 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 7.044 m/day
y0 = 0.4229 m
FALLING HEAD 01

Data Set: \...\ID03-GWBH08_FH01_Hv.aqt
Date: 05/22/17 Time: 14:55:49

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH08
Test Date: 04/04/2017

AQUIFER DATA
Saturated Thickness: 13.81 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH08)
Initial Displacement: 0.427 m
Total Well Penetration Depth: 8.813 m
Casing Radius: 0.025 m
Static Water Column Height: 8.813 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 8.941 m/day
y0 = 0.4229 m
FALLING HEAD 02

Data Set: \...\ID03-GWBH08_FH02_BR.aqt
Date: 05/22/17                  Time: 14:55:45

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH08
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 13.81 m     Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH08)

Initial Displacement: 0.365 m     Static Water Column Height: 8.813 m
Total Well Penetration Depth: 8.813 m
Casing Radius: 0.025 m             Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined       Solution Method: Bouwer-Rice
K = 5.062 m/day                  y0 = 0.3422 m
FALLING HEAD 02

Data Set: \..\ID03-GWBH08_FH02_Hv.aqt
Date: 05/22/17  Time: 14:55:41

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH08
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 13.81 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH08)

Initial Displacement: 0.365 m  Static Water Column Height: 8.813 m
Total Well Penetration Depth: 8.813 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 6.425 m/day  y0 = 0.3422 m
RISING HEAD 01

Data Set: \ID03-GWBH08_RH01_BR.aqt
Date: 05/22/17  Time: 14:55:36

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH08
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 13.81 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH08)

Initial Displacement: 0.358 m  Static Water Column Height: 8.813 m
Total Well Penetration Depth: 8.813 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 5.297 m/day  y0 = 0.3337 m
RISING HEAD 01

Data Set: \..\ID03-GWBH08_RH01_Hv.aqt
Date: 05/22/17
Time: 14:55:32

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID03-GWBH08
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 13.81 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID03-GWBH08)

Initial Displacement: 0.358 m
Total Well Penetration Depth: 8.813 m
Casing Radius: 0.025 m
Static Water Column Height: 8.813 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 6.722 m/day
y0 = 0.3337 m
**RISING HEAD 02**

Data Set: \n\nDate: 05/22/17  
Time: 14:55:27

**PROJECT INFORMATION**

Company: Coffey  
Client: Metro  
Project: 754-GEOTABTF10294AA  
Location: CTF  
Test Well: ID03-GWBH08  
Test Date: 04/04/2017

**AQUIFER DATA**

Saturated Thickness: 13.81 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ID03-GWBH08)**

Initial Displacement: 0.439 m  
Total Well Penetration Depth: 8.813 m  
Casing Radius: 0.025 m  
Static Water Column Height: 8.813 m  
Screen Length: 3. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
\[ K = 5.495 \text{ m/day} \]  
\[ y_0 = 0.3791 \text{ m} \]
**RISING HEAD 02**

Data Set: \
\nDate: 05/22/17  
Time: 14:55:23

**PROJECT INFORMATION**

- Company: Coffey  
- Client: Metro  
- Project: 754-GEOTABTF10294AA  
- Location: CTF  
- Test Well: ID03-GWBH08  
- Test Date: 04/04/2017

**AQUIFER DATA**

- Saturated Thickness: 13.81 m  
- Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ID03-GWBH08)**

- Initial Displacement: 0.439 m  
- Total Well Penetration Depth: 8.813 m  
- Casing Radius: 0.025 m  
- Static Water Column Height: 8.813 m  
- Screen Length: 3. m  
- Well Radius: 0.1 m  
- Gravel Pack Porosity: 0.3

**SOLUTION**

- Aquifer Model: Unconfined  
- Solution Method: Hvorslev  
- K = 6.754 m/day  
- y0 = 0.3644 m
RISING HEAD 01

Data Set: \...\ID13-GWBH05_RH01_BR.aqt
Date: 05/22/17
Time: 14:58:43

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH05
Test Date: 05/04/2017

AQUIFER DATA

Saturated Thickness: 6.785 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH05)

Initial Displacement: 0.3022 m
Total Well Penetration Depth: 1.785 m
Casing Radius: 0.025 m
Static Water Column Height: 1.785 m
Screen Length: 1.785 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.2036 m/day
y0 = 0.07082 m
RISING HEAD 01

Data Set: `\..\..\ID13-GWBH05_RH01_Hv.aqt`
Date: 05/22/17 Time: 14:58:38

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH05
Test Date: 05/04/2017

AQUIFER DATA

Saturated Thickness: 6.785 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH05)

Initial Displacement: 0.3022 m Static Water Column Height: 1.785 m
Total Well Penetration Depth: 1.785 m Screen Length: 1.785 m
Casing Radius: 0.025 m Well Radius: 0.1 m

Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

$K = 0.3209$ m/day

$y_0 = 0.07085$ m
RISING HEAD 02

Data Set: \...\ID13-GWBH05_RH02_BR.aqt
Date: 05/22/17   Time: 14:58:34

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH05
Test Date: 05/04/2017

AQUIFER DATA

Saturated Thickness: 6.785 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH05)

Initial Displacement: 0.2463 m
Total Well Penetration Depth: 1.785 m
Casing Radius: 0.025 m
Static Water Column Height: 1.785 m
Screen Length: 1.785 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1318 m/day
y0 = 0.1067 m
RISING HEAD 02

Data Set: \...\ID13-GWBH05_RH02_Hv.aqt
Date: 05/22/17  Time: 14:58:27

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH05
Test Date: 05/04/2017

AQUIFER DATA

Saturated Thickness: 6.785 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH05)

Initial Displacement: 0.2463 m  Static Water Column Height: 1.785 m
Total Well Penetration Depth: 1.785 m  Screen Length: 1.785 m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
\[ K = 0.1822 \text{ m/day} \]
\[ y_0 = 0.1001 \text{ m} \]
FALLING HEAD 01

Data Set: \...\ID13-GWBH06_FH01_BR.aqt
Date: 05/22/17
Time: 15:04:18

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH06
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 20.22 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH06)

Initial Displacement: 0.764 m
Total Well Penetration Depth: 14.72 m
Casing Radius: 0.025 m
Static Water Column Height: 15.22 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
\[ K = 0.0202 \text{ m/day} \]
\[ y_0 = 0.6735 \text{ m} \]
FALLING HEAD 01

Data Set: \...\ID13-GWBH06_FH01_Hv.aqt
Date: 05/22/17
Time: 15:04:07

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH06
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 20.22 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH06)

Initial Displacement: 0.764 m
Total Well Penetration Depth: 14.72 m
Casing Radius: 0.025 m
Static Water Column Height: 15.22 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

\[ K = 0.02413 \text{ m/day} \]
\[ y_0 = 0.6733 \text{ m} \]
FALLING HEAD 02

Data Set: \...\ID13-GWBH06_FH02_BR.aqt
Date: 05/22/17 Time: 15:03:59

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH06
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 20.22 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH06)

Initial Displacement: 0.841 m
Total Well Penetration Depth: 14.72 m
Casing Radius: 0.025 m
Static Water Column Height: 15.22 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1364 m/day
y0 = 0.8649 m
FALLING HEAD 02

Data Set: \..\..\ID13-GWBH06_FH02_Hv.aqt
Date: 05/22/17 Time: 15:03:54

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF1029AA
Location: CTF
Test Well: ID13-GWBH06
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 20.22 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH06)

Initial Displacement: 0.841 m Static Water Column Height: 15.22 m
Total Well Penetration Depth: 14.72 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev
K = 0.1625 m/day y0 = 0.8661 m
**RISING HEAD 02**

Data Set: \...\ID13-GWBH06_RH02_BR.aqt  
Date: 05/22/17  
Time: 15:03:49

**PROJECT INFORMATION**

Company: Coffey  
Client: Metro  
Project: 754-GEOTABTF10294AA  
Location: CTF  
Test Well: ID13-GWBH06  
Test Date: 03/04/2017

**AQUIFER DATA**

Saturated Thickness: 20.22 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ID13-GWBH06)**

Initial Displacement: 0.8023 m  
Total Well Penetration Depth: 14.72 m  
Casing Radius: 0.025 m  
Static Water Column Height: 15.22 m  
Screen Length: 3 m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Hvorslev  
$K = 0.1707$ m/day  
$y_0 = 0.5017$ m
RISING HEAD 02

Data Set: \..\ID13-GWBH06_RH02_Hv.aqt
Date: 05/22/17  Time: 15:03:43

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH06
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 20.32 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH06)

Initial Displacement: 0.8023 m  Static Water Column Height: 15.32 m
Total Well Penetration Depth: 14.77 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 0.1707 m/day  y0 = 0.5017 m
RISING HEAD 01

Data Set: \...\ID13-GWBH07_RH01_BR.aqt
Date: 05/22/17 Time: 15:08:13

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH07
Test Date: 20.04.17

AQUIFER DATA

Saturated Thickness: 7.187 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH07)

Initial Displacement: 0.4718 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.025 m
Static Water Column Height: 2.187 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 60.91 m/day
y0 = 0.4985 m
RISING HEAD 01
Data Set: \...\ID13-GWBH07_RH01_Hv.aqt
Date: 05/22/17  Time: 15:08:09

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH07
Test Date: 20.04.17

AQUIFER DATA
Saturated Thickness: 7.187 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH07)
Initial Displacement: 0.4718 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.025 m
Static Water Column Height: 2.187 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 90.57 m/day
y0 = 0.4985 m
RISING HEAD 02

Data Set: \...\ID13-GWBH07_RH02_BR.aqt
Date: 05/22/17  Time: 15:08:04

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH07
Test Date: 20.04.17

AQUIFER DATA

Saturated Thickness: 7.187 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH07)

Initial Displacement: 0.615 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.025 m
Static Water Column Height: 2.187 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
K = 48.78 m/day
Solution Method: Bouwer-Rice
y0 = 0.6056 m
RISING HEAD 02

Data Set: \..\ID13-GWBH07_RH02_Hv.aqt
Date: 05/22/17  Time: 15:07:59

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH07
Test Date: 20.04.17

AQUIFER DATA

Saturated Thickness: 7.187 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH07)

Initial Displacement: 0.615 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.025 m
Static Water Column Height: 2.187 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 72.5 m/day  y0 = 0.6053 m
FALLING HEAD 01

Data Set: \...\ID13-GWBH08_FH01_BR.aqt
Date: 05/22/17
Time: 15:13:02

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH08
Test Date: 05/04/2017

AQUIFER DATA

Saturated Thickness: 13.15 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH08)

Initial Displacement: 0.727 m
Total Well Penetration Depth: 8.152 m
Casing Radius: 0.025 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

Static Water Column Height: 8.152 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

\[ K = 0.00966 \text{ m/day} \]
\[ y_0 = 0.7044 \text{ m} \]
FALLING HEAD 01
Data Set: \...\ID13-GWBH08_FH01_Hv.aqt
Date: 05/22/17 Time: 15:12:52

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH08
Test Date: 05/04/2017

AQUIFER DATA
Saturated Thickness: 13.15 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH08)
Initial Displacement: 0.727 m Static Water Column Height: 8.152 m
Total Well Penetration Depth: 8.152 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m

Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Hvorslev
K = 0.01186 m/day y0 = 0.6806 m
FALLING HEAD 02
Data Set: \..\ID13-GWBH08_FH02_BR.aqt
Date: 05/22/17  Time: 15:12:38

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH08
Test Date: 05/04/2017

AQUIFER DATA
Saturated Thickness: 13.15 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH08)
Initial Displacement: 0.8052 m  Static Water Column Height: 8.152 m
Total Well Penetration Depth: 8.152 m  Screen Length: 3 m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 0.01004 m/day  y0 = 0.6299 m
FALLING HEAD 02

Data Set: \...\ID13-GWBH08_FH02_Hv.aqt
Date: 05/22/17  Time: 15:12:28

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH08
Test Date: 05/04/2017

AQUIFER DATA

Saturated Thickness: 13.15 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH08)

Initial Displacement: 0.8052 m
Total Well Penetration Depth: 8.152 m
Casing Radius: 0.025 m
Static Water Column Height: 8.152 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 0.01287 m/day
y0 = 0.6299 m
RISING HEAD 01

Data Set: \...\ID13-GWBH08_RH01_BR.aqt
Date: 05/22/17  Time: 15:12:18

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH08
Test Date: 11.05.17

AQUIFER DATA
Saturated Thickness: 13.15 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH08)
Initial Displacement: 0.8052 m
Total Well Penetration Depth: 8.152 m
Casing Radius: 0.025 m
Static Water Column Height: 8.152 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1025 m/day
y0 = 0.6194 m
RISING HEAD 01

Data Set: \ldots\ID13-GWBH08_RH01_Hv.aqt
Date: 05/22/17  Time: 15:12:09

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID13-GWBH08
Test Date: 11.05.17

AQUIFER DATA

Saturated Thickness: 13.15 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID13-GWBH08)

Initial Displacement: 0.8052 m  Static Water Column Height: 8.152 m
Total Well Penetration Depth: 8.152 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 0.1316 m/day  y0 = 0.6199 m
RISING HEAD 02

Data Set: \..\ID18-GWBH01_FH02_BR.aqt
Date: 05/22/17 Time: 16:14:18

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH01
Test Date: 20/04/2017

AQUIFER DATA

Saturated Thickness: 9.109 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH01)

Initial Displacement: 0.424 m
Total Well Penetration Depth: 4.011 m
Casing Radius: 0.025 m
Static Water Column Height: 4.109 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 70.08 m/day
y0 = 0.4315 m
**PROJECT INFORMATION**

Company: Coffey  
Client: Metro  
Project: 754-GEOTABTF10294AA  
Location: CTF  
Test Well: ID18-GWBH01  
Test Date: 20/04/2017

**AQUIFER DATA**

Saturated Thickness: 9.109 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ID18-GWBH01)**

Initial Displacement: 0.424 m  
Total Well Penetration Depth: 4.011 m  
Casing Radius: 0.025 m  
Static Water Column Height: 4.109 m  
Screen Length: 3. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Hvorslev  

\[ K = 99.73 \text{ m/day} \]  
\[ y_0 = 0.4315 \text{ m} \]
RISING HEAD 01

Data Set: \...\ID18-GWBH01\RH01_BR.aqt
Date: 05/22/17  Time: 16:14:09

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH01
Test Date: 20/04/2017

AQUIFER DATA

Saturated Thickness: 9.109 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH01)

Initial Displacement: 0.433 m  Static Water Column Height: 4.109 m
Total Well Penetration Depth: 4.011 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 61.66 m/day  y0 = 0.4362 m
RISING HEAD 01

Data Set: \..\ID18-GWBH01_RH01_Hv.aqt
Date: 05/22/17
Time: 16:14:03

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH01
Test Date: 20/04/2017

AQUIFER DATA

Saturated Thickness: 9.109 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH01)

Initial Displacement: 0.433 m
Total Well Penetration Depth: 4.011 m
Casing Radius: 0.025 m
Static Water Column Height: 4.109 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 87.74 m/day
y0 = 0.4362 m
RISING HEAD 02

Data Set: \...\ID18-GWBH01_RH02_BR.aqt
Date: 05/22/17 Time: 16:13:54

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH01
Test Date: 20/04/2017

AQUIFER DATA

Saturated Thickness: 9.109 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH01)

Initial Displacement: 0.424 m
Total Well Penetration Depth: 4.011 m
Casing Radius: 0.025 m
Static Water Column Height: 4.109 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

$K = 70.08 \text{ m/day}$
$y0 = 0.4315 \text{ m}$
RISING HEAD 02

Data Set: \..\..\..\ID18-GWBH01_RH02_Hv.aqt
Date: 05/22/17
Time: 16:13:49

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH01
Test Date: 20/04/2017

AQUIFER DATA

Saturated Thickness: 9.109 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH01)

Initial Displacement: 0.424 m
Total Well Penetration Depth: 4.011 m
Casing Radius: 0.025 m
Static Water Column Height: 4.109 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 99.73 m/day
y0 = 0.4315 m
FALLING HEAD 01

Data Set: \...\ID18-GWBH02_FH01_BR.aqt
Date: 05/22/17
Time: 16:20:45

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH02
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 29.92 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH02)

Initial Displacement: 0.6724 m
Total Well Penetration Depth: 24.92 m
Casing Radius: 0.025 m
Static Water Column Height: 24.92 m
Screen Length: 7. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.3893 m/day
y0 = 0.6337 m
FALLING HEAD 01

Data Set: \..\ID18-GWBH02_FH01_Hv.aqt
Date: 05/22/17
Time: 16:20:40

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH02
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 29.92 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH02)

Initial Displacement: 0.6724 m
Total Well Penetration Depth: 24.92 m
Casing Radius: 0.025 m
Static Water Column Height: 24.92 m
Screen Length: 7. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.4688 m/day
y0 = 0.6337 m
### FALING HEAD 02

Data Set: `\..\..\ID18-GWBH02_FH02_BR.aqt`
Date: 05/22/17  Time: 16:20:35

### PROJECT INFORMATION

- Company: Coffey
- Client: Metro
- Project: 754-GEOTABTF10294AA
- Location: CTF
- Test Well: ID18-GWBH02
- Test Date: 03/04/2017

### AQUIFER DATA

- Saturated Thickness: 29.92 m
- Anisotropy Ratio (Kz/Kr): 0.2

### WELL DATA (ID18-GWBH02)

- Initial Displacement: 0.662 m
- Total Well Penetration Depth: 24.92 m
- Casing Radius: 0.025 m
- Static Water Column Height: 24.92 m
- Screen Length: 7. m
- Well Radius: 0.1 m
- Gravel Pack Porosity: 0.3

### SOLUTION

- Aquifer Model: Unconfined
- Solution Method: Bouwer-Rice
- \( K = 0.3554 \text{ m/day} \)
- \( y_0 = 0.6091 \text{ m} \)
FALLING HEAD 02

Data Set: \..\ID18-GWBH02_FH02_Hv.aqt
Date: 05/22/17 Time: 16:20:31

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH02
Test Date: 03/04/2017

AQUIFER DATA
Saturated Thickness: 29.92 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH02)
Initial Displacement: 0.662 m
Total Well Penetration Depth: 24.92 m
Casing Radius: 0.025 m
Static Water Column Height: 24.92 m
Screen Length: 7. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.428 m/day
y0 = 0.609 m
RISING HEAD 01

Data Set: ID18-GWBH02_RH01_BR.aqt
Date: 05/22/17  Time: 16:20:26

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH02
Test Date: 03/04/2017

AQUIFER DATA
Saturated Thickness: 29.92 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH02)
Initial Displacement: 0.7 m  Static Water Column Height: 24.92 m
Total Well Penetration Depth: 24.92 m  Screen Length: 7.0 m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 0.4274 m/day  y₀ = 0.6693 m
RISING HEAD 01

Data Set: \..\ID18-GWBH02_RH01_Hv.agq
Date: 05/22/17  Time: 16:20:21

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH02
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 29.92 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH02)

Initial Displacement: 0.7 m  Static Water Column Height: 24.92 m
Total Well Penetration Depth: 24.92 m  Screen Length: 7. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 0.47 m/day  y0 = 0.6693 m
**RISING HEAD 02**

Data Set: \..\ID18-GWBH02_RH02_BR.aqt  
Date: 05/22/17  
Time: 16:20:16

**PROJECT INFORMATION**

- **Company:** Coffey  
- **Client:** Metro  
- **Project:** 754-GEOTABTF10294AA  
- **Location:** CTF  
- **Test Well:** ID18-GWBH02  
- **Test Date:** 03/04/2017

**AQUIFER DATA**

- **Saturated Thickness:** 29.92 m  
- **Anisotropy Ratio (Kz/Kr):** 0.2

**WELL DATA (ID18-GWBH02)**

- **Initial Displacement:** 0.6967 m  
- **Total Well Penetration Depth:** 24.92 m  
- **Casing Radius:** 0.025 m  
- **Static Water Column Height:** 24.92 m  
- **Screen Length:** 7. m  
- **Well Radius:** 0.1 m  
- **Gravel Pack Porosity:** 0.3

**SOLUTION**

- **Aquifer Model:** Unconfined  
- **Solution Method:** Bouwer-Rice  
- **K = 0.4046 m/day**  
- **y0 = 0.6524 m**
RISING HEAD 02

Data Set: \..\ID18-GWBH02_RH02_Hv.aqt
Date: 05/22/17 Time: 16:20:11

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH02
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 29.92 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH02)

Initial Displacement: 0.6967 m Static Water Column Height: 24.92 m
Total Well Penetration Depth: 24.92 m Screen Length: 7. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev
K = 0.4872 m/day y0 = 0.6523 m
FALLING-HEAD 01
Data Set: \...\ID18-GWBH04_FH01_BR.aqt
Date: 05/22/17  Time: 17:38:03

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH04
Test Date: 07.03.2017

AQUIFER DATA
Saturated Thickness: 9.572 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH04)
Initial Displacement: 0.469 m  Static Water Column Height: 4.572 m
Total Well Penetration Depth: 4.572 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
\[ K = 38.54 \text{ m/day} \]
\[ y_0 = 0.4088 \text{ m} \]
FALLING-HEAD 01
Data Set: \..\ID18-GWBH04_FH01_Hv.aqt
Date: 05/22/17 Time: 17:37:58

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH04
Test Date: 07.03.2017

AQUIFER DATA
Saturated Thickness: 9.572 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH04)
Initial Displacement: 0.469 m
Total Well Penetration Depth: 4.572 m
Casing Radius: 0.025 m
Static Water Column Height: 4.572 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 53.5 m/day
y0 = 0.4089 m
FALLING-HEAD 02
Data Set: \...\ID18-GWBH04_FH02_BR.aqt
Date: 05/22/17  Time: 17:37:53

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH04
Test Date: 07.03.2017

AQUIFER DATA
Saturated Thickness: 9.572 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH04)
Initial Displacement: 0.666 m  Static Water Column Height: 4.572 m
Total Well Penetration Depth: 4.572 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 30.08 m/day  y0 = 0.4466 m
FALLING-HEAD 02

Data Set: \...\ID18-GWBH04_FH02_Hv.aqt
Date: 05/22/17          Time: 17:37:49

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH04
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 9.572 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH04)

Initial Displacement: 0.666 m
Total Well Penetration Depth: 4.572 m
Casing Radius: 0.025 m
Static Water Column Height: 4.572 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 39.84 m/day
y0 = 0.3966 m
RISING-HEAD 01

Data Set: \..\ID18-GWBH04_RH01_BR.aqt
Date: 05/22/17  Time: 17:37:43

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH04
Test Date: 07.03.2017

AQUIFER DATA
Saturated Thickness: 9.572 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH04)
Initial Displacement: 0.416 m  Static Water Column Height: 4.572 m
Total Well Penetration Depth: 4.572 m  Screen Length: 3.0 m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 33.96 m/day  y0 = 0.4255 m
**RISING-HEAD 01**

Data Set: \ldots\id18-GWBH04_RH01_Hv.aqt

Date: 05/22/17  
Time: 17:37:39

**PROJECT INFORMATION**

Company: Coffey  
Client: MTM  
Project: GEOTABTF10294AA  
Location: CTF  
Test Well: ID18-GWBH04  
Test Date: 07.03.2017

**AQUIFER DATA**

Saturated Thickness: 9.572 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ID18-GWBH04)**

Initial Displacement: 0.416 m  
Total Well Penetration Depth: 4.572 m  
Casing Radius: 0.025 m  
Static Water Column Height: 4.572 m  
Screen Length: 3. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Hvorslev  
\[ K = 47.13 \text{ m/day} \]  
\[ y_0 = 0.4255 \text{ m} \]
RISING-HEAD 02

Data Set: \...\ID18-GWBH04_RH02_BR.aqt
Date: 05/22/17
Time: 17:37:26

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH04
Test Date: 07.03.2017

AQUIFER DATA
Saturated Thickness: 9.572 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH04)
Initial Displacement: 0.781 m
Total Well Penetration Depth: 4.572 m
Casing Radius: 0.025 m
Static Water Column Height: 4.572 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 31.35 m/day
y0 = 0.8203 m
RISING-HEAD 02
Data Set: \..\ID18-GWBH04_RH02_Hv.aqt
Date: 05/22/17 Time: 17:37:21

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID18-GWBH04
Test Date: 07.03.2017

AQUIFER DATA
Saturated Thickness: 9.572 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH04)
Initial Displacement: 0.781 m Static Water Column Height: 4.572 m
Total Well Penetration Depth: 4.572 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Hvorslev
K = 43.69 m/day y0 = 0.8203 m
FALLING-HEAD 01
Data Set: \..\ID18-GWBH05_FH01_BR.aqt
Date: 05/22/17 Time: 17:45:04

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID-GWBH05
Test Date: 07/03/2017

AQUIFER DATA
Saturated Thickness: 17.91 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH05)
Initial Displacement: 0.423 m
Total Well Penetration Depth: 12.91 m
Casing Radius: 0.025 m
Static Water Column Height: 12.91 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.722 m/day
y0 = 0.3975 m
FALLING-HEAD 01

Data Set: \..\ID18-GWBH05_FH01_Hv.aqt
Date: 05/22/17
Time: 17:44:56

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID-GWBH05
Test Date: 07/03/2017

AQUIFER DATA
Saturated Thickness: 17.91 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH05)
Initial Displacement: 0.423 m
Total Well Penetration Depth: 12.91 m
Casing Radius: 0.025 m
Static Water Column Height: 12.91 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
\[ K = 2.083 \text{ m/day} \]
\[ y_0 = 0.3974 \text{ m} \]
FALLING-HEAD 02

Data Set: \...\ID18-GWBH05_FH02_BR.aqt
Date: 05/22/17
Time: 17:44:50

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID-GWBH05
Test Date: 07/03/2017

AQUIFER DATA

Saturated Thickness: 19.91 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH05)

Initial Displacement: 0.596 m
Total Well Penetration Depth: 12.91 m
Casing Radius: 0.025 m
Static Water Column Height: 12.91 m
Screen Length: 3 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
\[ K = 1.507 \text{ m/day} \]
\[ y_0 = 0.3813 \text{ m} \]
**FALLING-HEAD 02**

Data Set: \..\ID18-GWBH05_FH02_Hv.aqt  
Date: 05/22/17  
Time: 17:44:44

**PROJECT INFORMATION**

- Company: Coffey  
- Client: Metro  
- Project: 754-GEOTABTF10294AA  
- Location: CTF  
- Test Well: ID-GWBH05  
- Test Date: 07/03/2017

**AQUIFER DATA**

- Saturated Thickness: 19.91 m  
- Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ID18-GWBH05)**

- Initial Displacement: 0.596 m  
- Total Well Penetration Depth: 12.91 m  
- Casing Radius: 0.025 m  
- Static Water Column Height: 12.91 m  
- Screen Length: 3. m  
- Well Radius: 0.1 m  
- Gravel Pack Porosity: 0.3

**SOLUTION**

- Aquifer Model: Unconfined  
- Solution Method: Hvorslev  
- K = 1.699 m/day  
- y0 = 0.3498 m
RISING-HEAD 01

Data Set: \..\ID18-GWBH05_RH01_BR.aqt
Date: 05/22/17
Time: 17:44:39

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID-GWBH05
Test Date: 07/03/2017

AQUIFER DATA

Saturated Thickness: 17.91 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH05)

Initial Displacement: 0.439 m
Total Well Penetration Depth: 12.91 m
Casing Radius: 0.025 m

Static Water Column Height: 12.91 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.274 m/day
y0 = 0.3465 m
RISING-HEAD 01
Data Set: \..\ID18-GWBH05_RH01_Hv.aqt
Date: 05/22/17  Time: 17:44:33

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID-GWBH05
Test Date: 07/03/2017

AQUIFER DATA
Saturated Thickness: 17.91 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH05)
Initial Displacement: 0.439 m
Total Well Penetration Depth: 12.91 m
Casing Radius: 0.025 m
Static Water Column Height: 12.91 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.288 m/day
y0 = 0.3527 m
RISING-HEAD 02

Data Set: \..\ID18-GWBH05_RH02_BR.aqt
Date: 05/22/17
Time: 17:44:25

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID-GWBH05
Test Date: 07/03/2017

AQUIFER DATA

Saturated Thickness: 17.91 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID18-GWBH05)

Initial Displacement: 0.5801 m
Total Well Penetration Depth: 12.91 m
Casing Radius: 0.025 m
Static Water Column Height: 12.91 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.793 m/day
y0 = 0.441 m
**RISING-HEAD 02**

Data Set: `\..\ID18-GWBH05_RH02_Hv.aqt`
Date: 05/22/17
Time: 17:44:19

**PROJECT INFORMATION**

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID-GWBH05
Test Date: 07/03/2017

**AQUIFER DATA**

Saturated Thickness: 17.91 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ID18-GWBH05)**

Initial Displacement: 0.5801 m  
Total Well Penetration Depth: 12.91 m  
Casing Radius: 0.025 m  
Static Water Column Height: 12.91 m  
Screen Length: 3. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Hvorslev  
K = 1.826 m/day  
y0 = 0.377 m
FALLING HEAD 01

Data Set: \..\ID43-GWBH03_FH01_BR.aqt
Date: 05/23/17
Time: 10:29:08

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH03
Test Date: 13/04/2017

AQUIFER DATA

Saturated Thickness: 17.41 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH03)

Initial Displacement: 0.309 m
Total Well Penetration Depth: 12.41 m
Casing Radius: 0.025 m
Static Water Column Height: 12.41 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
K = 9.28 m/day
Solution Method: Bouwer-Rice
y0 = 0.3129 m
FALLING HEAD 01

Data Set: \...\ID43-GWBH03_FH01_Hv.aqt
Date: 05/23/17  Time: 10:32:34

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH03
Test Date: 13/04/2017

AQUIFER DATA

Saturated Thickness: 17.41 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH03)

Initial Displacement: 0.309 m  Static Water Column Height: 12.41 m
Total Well Penetration Depth: 12.41 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m

Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 10.3 m/day  y0 = 0.3184 m
FALLING HEAD 02

Data Set: \...\ID43-GWBH03_FH02_BR.aqt
Date: 05/23/17 Time: 10:32:50

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH03
Test Date: 13/04/2017

AQUIFER DATA

Saturated Thickness: 17.41 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH03)

Initial Displacement: 0.409 m Static Water Column Height: 12.41 m
Total Well Penetration Depth: 12.41 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 8.249 m/day y0 = 0.3464 m
FALLING HEAD 02

Data Set: \...\ID43-GWBH03_FH02_Hv.aqt
Date: 05/23/17
Time: 10:32:45

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH03
Test Date: 13/04/2017

AQUIFER DATA

Saturated Thickness: 17.41 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH03)

Initial Displacement: 0.409 m
Total Well Penetration Depth: 12.41 m
Casing Radius: 0.025 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

Static Water Column Height: 12.41 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 10.04 m/day
y0 = 0.3465 m
RISING HEAD 01

Data Set: \...\ID43-GWBH03_RH01_BR.aqt
Date: 05/23/17                   Time: 10:33:30

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH03
Test Date: 13/04/2017

AQUIFER DATA

Saturated Thickness: 17.41 m            Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH03)

Initial Displacement: 0.409 m
Total Well Penetration Depth: 12.41 m
Casing Radius: 0.025 m
Static Water Column Height: 12.41 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
K = 11.49 m/day

Solution Method: Bouwer-Rice
y0 = 0.396 m
RISING HEAD 01

Data Set: ID43-GWBH03 RH01 Hv.aqt
Date: 05/23/17
Time: 10:34:06

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH03
Test Date: 13/04/2017

AQUIFER DATA

Saturated Thickness: 17.41 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH03)

Initial Displacement: 0.409 m
Total Well Penetration Depth: 12.41 m
Casing Radius: 0.025 m
Static Water Column Height: 12.41 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

\[ K = 13.98 \text{ m/day} \]
\[ y_0 = 0.3961 \text{ m} \]
RISING HEAD 02

Data Set: \..\ID43-GWBH03_RH02_BR.aqt
Date: 05/23/17  Time: 10:34:44

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH03
Test Date: 13/04/2017

AQUIFER DATA

Saturated Thickness: 17.41 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH03)

Initial Displacement: 0.409 m  Static Water Column Height: 12.41 m
Total Well Penetration Depth: 12.41 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 11.94 m/day  y0 = 0.3708 m
RISING HEAD 02

Data Set: \ldots\ldots\text{ID43-GWBH03\_RH02\_Hv.aqt}
Date: 05/23/17                          Time: 10:35:11

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH03
Test Date: 13/04/2017

AQUIFER DATA

Saturated Thickness: 17.41 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH03)

Initial Displacement: 0.409 m
Total Well Penetration Depth: 12.41 m
Casing Radius: 0.025 m
Static Water Column Height: 12.41 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 14.52 m/day
y0 = 0.3709 m
### FALLING-HEAD 01

Data Set: \..\ID43-GWBH04_FH01_BR.aqt  
Date: 05/22/17  
Time: 18:03:13

### PROJECT INFORMATION

Company: Coffey  
Client: MTM  
Project: GEOTABTF10294AA  
Location: CTF  
Test Well: ID43-GWBH04  
Test Date: 06.03.2017

### AQUIFER DATA

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated Thickness</td>
<td>9.518 m</td>
</tr>
<tr>
<td>Anisotropy Ratio (Kz/Kr)</td>
<td>0.2</td>
</tr>
</tbody>
</table>

### WELL DATA (ID43-GWBH04)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Displacement</td>
<td>0.237 m</td>
</tr>
<tr>
<td>Total Well Penetration Depth</td>
<td>4.518 m</td>
</tr>
<tr>
<td>Casing Radius</td>
<td>0.025 m</td>
</tr>
<tr>
<td>Static Water Column Height</td>
<td>4.518 m</td>
</tr>
<tr>
<td>Screen Length</td>
<td>3. m</td>
</tr>
<tr>
<td>Well Radius</td>
<td>0.1 m</td>
</tr>
<tr>
<td>Gravel Pack Porosity</td>
<td>0.3</td>
</tr>
</tbody>
</table>

### SOLUTION

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquifer Model</td>
<td>Unconfined</td>
</tr>
</tbody>
</table>
| Solution Method              | Bouwer-Rice  
| K                            | 3.162 m/day  
| y0                           | 0.2546 m  

\[ K = 3.162 \text{ m/day} \]  
\[ y_0 = 0.2546 \text{ m} \]
FALLING-HEAD 01

Data Set: \...\ID43-GWBH04_FH01_Hv.aqt
Date: 05/22/17  Time: 18:02:40

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH04
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 9.518 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH04)

Initial Displacement: 0.237 m  Static Water Column Height: 4.518 m
Total Well Penetration Depth: 4.518 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 4.412 m/day  y0 = 0.2546 m
RISING-HEAD 01

Data Set: \...\ID43-GWBH04_RH01_BR.aqt
Date: 05/22/17 Time: 18:02:35

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH04
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 9.518 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH04)

Initial Displacement: 0.377 m
Total Well Penetration Depth: 4.518 m
Casing Radius: 0.025 m
Static Water Column Height: 4.518 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
K = 2.29 m/day

Solution Method: Bouwer-Rice
y0 = 0.391 m
RISING-HEAD 01
Data Set: \..\ID43-GWBH04_RH01_Hv.aqt
Date: 05/22/17 Time: 18:02:31

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH04
Test Date: 06.03.2017

AQUIFER DATA
Saturated Thickness: 9.518 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH04)
Initial Displacement: 0.377 m
Total Well Penetration Depth: 4.518 m
Casing Radius: 0.025 m

Static Water Column Height: 4.518 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
K = 3.196 m/day

Solution Method: Hvorslev
y0 = 0.391 m
RISING-HEAD 02

Data Set: \..\ID43-GWBH04_RH02_BR.aqt
Date: 05/22/17 Time: 21:11:09

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH04
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 9.518 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH04)

Initial Displacement: 0.472 m Static Water Column Height: 4.518 m
Total Well Penetration Depth: 4.518 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 1.383 m/day y0 = 0.4916 m
### PROJECT INFORMATION

**Company:** Coffey  
**Client:** MTM  
**Project:** GEOTABTF10294AA  
**Location:** CTF  
**Test Well:** ID43-GWBH04  
**Test Date:** 06.03.2017

### AQUIFER DATA

- **Saturated Thickness:** 9.588 m  
- **Anisotropy Ratio (Kz/Kr):** 0.2

### WELL DATA (ID43-GWBH04)

- **Initial Displacement:** 0.472 m  
- **Total Well Penetration Depth:** 4.518 m  
- **Casing Radius:** 0.025 m  
- **Static Water Column Height:** 4.588 m  
- **Screen Length:** 3. m  
- **Well Radius:** 0.1 m  
- **Gravel Pack Porosity:** 0.3

### SOLUTION

- **Aquifer Model:** Unconfined  
- **Solution Method:** Hvorslev  
- **K = 1.93 m/day**  
- **y0 = 0.4916 m**
FALLING-HEAD 01

Data Set: \..\ID43-GWBH05_FH01_BR.aqt
Date: 05/23/17 Time: 10:42:15

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH05
Test Date: 07.03.2017

AQUIFER DATA
Saturated Thickness: 22.23 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH05)
Initial Displacement: 0.4317 m
Total Well Penetration Depth: 17.23 m
Casing Radius: 0.025 m
Static Water Column Height: 17.23 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.03108 m/day
y0 = 0.3792 m
FALLING-HEAD 01
Data Set: \...\ID43-GWBH05_FH01_Hv.aqt
Date: 05/23/17  Time: 10:43:12

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH05
Test Date: 07.03.2017

AQUIFER DATA
Saturated Thickness: 22.23 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH05)
Initial Displacement: 0.4317 m  Static Water Column Height: 17.23 m
Total Well Penetration Depth: 17.23 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 0.03639 m/day  y0 = 0.3792 m
RISING-HEAD 01

Data Set: \..\ID43-GWBH05_RH01_BR.aqt
Date: 05/23/17
Time: 10:44:22

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH05
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 22.23 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH05)

Initial Displacement: 0.458 m
Total Well Penetration Depth: 17.23 m
Casing Radius: 0.025 m
Static Water Column Height: 17.23 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.02604 m/day
y0 = 0.3094 m
RISING-HEAD 01

Data Set: \..\ID43-GWBH05_RH01_Hv.aqt
Date: 05/23/17  Time: 10:44:01

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID43-GWBH05
Test Date: 07.03.2017

AQUIFER DATA
Saturated Thickness: 22.23 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID43-GWBH05)
Initial Displacement: 0.458 m
Total Well Penetration Depth: 17.23 m
Casing Radius: 0.025 m
Static Water Column Height: 17.23 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
K = 0.02981 m/day
Solution Method: Hvorslev
y0 = 0.3105 m
RISING-HEAD 01
Data Set: \
\ID44-GWBH01_RH01_BR.aqt
Date: 05/22/17
Time: 18:26:28

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID44-GWBH01
Test Date: 07.03.2017

AQUIFER DATA
Saturated Thickness: 6.095 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID44-GWBH01)
Initial Displacement: 0.459 m
Total Well Penetration Depth: 1.095 m
Casing Radius: 0.025 m
Static Water Column Height: 1.095 m
Screen Length: 1.095 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

\( K = 11.89 \text{ m/day} \)
\( y_0 = 0.233 \text{ m} \)
RISING-HEAD 01

Data Set: \..\ID44-GWBH01_RH01_Hv.aqt
Date: 05/22/17
Time: 18:26:23

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID44-GWBH01
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 6.095 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID44-GWBH01)

Initial Displacement: 0.459 m
Total Well Penetration Depth: 1.095 m
Casing Radius: 0.025 m
Static Water Column Height: 1.095 m
Screen Length: 1.095 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
K = 14.76 m/day
Solution Method: Hvorslev
y0 = 0.2045 m
RISING-HEAD 02

Data Set: \..\ID44-GWBH01_RH02_BR.aqt
Date: 05/22/17
Time: 18:26:17

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID44-GWBH01
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 6.095 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID44-GWBH01)

Initial Displacement: 0.649 m
Total Well Penetration Depth: 1.095 m
Casing Radius: 0.025 m
Static Water Column Height: 1.095 m
Screen Length: 1.095 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 17.36 m/day
y0 = 0.5189 m
RISING-HEAD 02

Data Set: ID44-GWBH01_RH02_Hv.aqt
Date: 05/22/17
Time: 18:26:10

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID44-GWBH01
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 6.095 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID44-GWBH01)

Initial Displacement: 0.649 m
Total Well Penetration Depth: 1.095 m
Casing Radius: 0.025 m
Static Water Column Height: 1.095 m
Screen Length: 1.095 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 19.61 m/day
y0 = 0.3792 m
**FALLING-HEAD 01**

Data Set: `\..\..\..\ID44-GWBH02_FH01_BR.aqt`
Date: 05/22/17  
Time: 18:39:43

**PROJECT INFORMATION**

Company: Coffey  
Client: MTM  
Project: GEOTABTF10294AA  
Location: CTF  
Test Well: ID44-GWBH02  
Test Date: 07.03.2017

**AQUIFER DATA**

Saturated Thickness: 40.2 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ID44-GWBH02)**

Initial Displacement: 0.312 m  
Total Well Penetration Depth: 35.2 m  
Casing Radius: 0.025 m  
Static Water Column Height: 35.2 m  
Screen Length: 5.5 m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice

\[ K = 13.75 \text{ m/day} \]  
\[ y_0 = 0.3082 \text{ m} \]
**FALLING-HEAD 01**

Data Set: \...\ID44-GWBH02_FH01_Hv.aqt
Date: 05/22/17  Time: 18:39:36

**PROJECT INFORMATION**

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID44-GWBH02
Test Date: 07.03.2017

**AQUIFER DATA**

Saturated Thickness: 40.2 m
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ID44-GWBH02)**

Initial Displacement: 0.312 m
Static Water Column Height: 35.2 m
Total Well Penetration Depth: 35.2 m
Screen Length: 5.5 m
Casing Radius: 0.025 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 15.63 m/day
y0 = 0.3082 m
FALLING-HEAD 02

Data Set: \
\ID44-GWBH02_FH02_BR.aqt

Date: 05/22/17  Time: 18:39:31

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID44-GWBH02
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 40.2 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID44-GWBH02)

Initial Displacement: 0.68 m
Total Well Penetration Depth: 35.2 m
Casing Radius: 0.025 m
Static Water Column Height: 35.2 m
Screen Length: 5.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

$K = 19.96 \text{ m/day}$
$y_0 = 0.417 \text{ m}$
FALLING-HEAD 02

Data Set: \...\ID44-GWBH02_FH02_Hv.aqt
Date: 05/22/17
Time: 18:39:26

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID44-GWBH02
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 40.2 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID44-GWBH02)

Initial Displacement: 0.68 m
Total Well Penetration Depth: 35.2 m
Casing Radius: 0.025 m
Static Water Column Height: 35.2 m
Screen Length: 5.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

\( K = 24.27 \text{ m/day} \)
\( y_0 = 0.4744 \text{ m} \)
RISING-HEAD 01

Data Set: \...\ID44-GWBH02_RH01_BR.aqt
Date: 05/22/17 Time: 18:39:20

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID44-GWBH02
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 40.2 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID44-GWBH02)

Initial Displacement: 0.417 m
Total Well Penetration Depth: 35.2 m
Casing Radius: 0.025 m
Static Water Column Height: 35.2 m
Screen Length: 5.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 25.58 m/day
y0 = 0.4261 m
RISING-HEAD 01

Data Set: \...\ID44-GWBH02_RH01_Hv.aqt
Date: 05/22/17  Time: 18:39:14

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID44-GWBH02
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 40.2 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID44-GWBH02)

Initial Displacement: 0.417 m  Static Water Column Height: 35.2 m
Total Well Penetration Depth: 35.2 m  Screen Length: 5.5 m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 29.1 m/day  y0 = 0.4261 m
RISING-HEAD 02

Data Set: \Id44-GWBH02_RH02_BR.aqt
Date: 05/22/17
Time: 18:39:09

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID44-GWBH02
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 40.2 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID44-GWBH02)

Initial Displacement: 0.642 m
Total Well Penetration Depth: 35.2 m
Casing Radius: 0.025 m
Static Water Column Height: 35.2 m
Screen Length: 5.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
K = 18.3 m/day

Solution Method: Bouwer-Rice
y0 = 0.5291 m
RISING-HEAD 02

Data Set: \..\ID44-GWBH02_RH02_Hv.aqt
Date: 05/22/17  Time: 18:39:04

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID44-GWBH02
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 40.2 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID44-GWBH02)

Initial Displacement: 0.642 m  Static Water Column Height: 35.2 m
Total Well Penetration Depth: 35.2 m  Screen Length: 5.5 m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 18.7 m/day  y0 = 0.4746 m
FALLING HEAD 01

Data Set: \..\ID46-GWBH01_FH01_BR.aqt
Date: 05/22/17  Time: 18:43:46

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH01
Test Date: 13/04/2017

AQUIFER DATA
Saturated Thickness: 38.88 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH01)
Initial Displacement: 0.735 m
Total Well Penetration Depth: 33.89 m
Casing Radius: 0.025 m
Static Water Column Height: 33.88 m
Screen Length: 4.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.001704 m/day
y0 = 0.7044 m
FALLING HEAD 01

Data Set: \..\\ID46-GWBH01_FH01_Hv.aqt
Date: 05/22/17
Time: 18:43:12

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH01
Test Date: 13/04/2017

AQUIFER DATA

Saturated Thickness: 38.88 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH01)

Initial Displacement: 0.735 m
Total Well Penetration Depth: 33.89 m
Casing Radius: 0.025 m
Static Water Column Height: 33.88 m
Screen Length: 4.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.001916 m/day
y0 = 0.7044 m
FALLING HEAD 02
Data Set: ID46-GWBH01_FH02_BR.aqt
Date: 05/22/17
Time: 18:43:23

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH01
Test Date: 07/04/2017

AQUIFER DATA
Saturated Thickness: 38.88 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH01)
Initial Displacement: 0.498 m
Total Well Penetration Depth: 33.89 m
Casing Radius: 0.025 m
Static Water Column Height: 33.88 m
Screen Length: 4.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.001151 m/day
y0 = 0.5005 m
FALLING HEAD 02

Data Set: \...\ID46-GWBH01_FH02_Hv.aqt
Date: 05/22/17  Time: 18:43:34

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH01
Test Date: 07/04/2017

AQUIFER DATA

Saturated Thickness: 38.88 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH01)

Initial Displacement: 0.498 m
Total Well Penetration Depth: 33.89 m
Casing Radius: 0.025 m
Static Water Column Height: 33.88 m
Screen Length: 4.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 0.001294 m/day
y0 = 0.5005 m
RISING HEAD 02

Data Set: \...\ID46-GWBH01_RH02_BR.aqt
Date: 05/22/17  Time: 18:42:56

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH01
Test Date: 17/04/2017

AQUIFER DATA
Saturated Thickness: 38.88 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH01)
Initial Displacement: 0.511 m  Static Water Column Height: 33.88 m
Total Well Penetration Depth: 33.89 m  Screen Length: 4.5 m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
\[ K = 0.001737 \text{ m/day} \]
\[ y_0 = 0.4939 \text{ m} \]
RISING HEAD 02
Data Set: \..\\ID46-GWBH01_RH02_Hv.aqt
Date: 05/22/17  Time: 18:42:43

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH01
Test Date: 17/04/2017

AQUIFER DATA
Saturated Thickness: 38.88 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH01)
Initial Displacement: 0.511 m
Total Well Penetration Depth: 33.89 m
Casing Radius: 0.025 m
Static Water Column Height: 33.88 m
Screen Length: 4.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.001953 m/day
y0 = 0.4939 m
FALLING HEAD 01

Data Set: \..\ID46-GWBH03_FH01_BR.aqt
Date: 05/22/17  Time: 18:46:52

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH03
Test Date: 29/03/2017

AQUIFER DATA
Saturated Thickness: 17.59 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH03)
Initial Displacement: 0.7242 m  Static Water Column Height: 12.59 m
Total Well Penetration Depth: 12.59 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 0.09696 m/day  y0 = 0.6931 m
FALLING HEAD 01
Data Set: \...\ID46-GWBH03_FH01_Hv.aqt
Date: 05/22/17 Time: 18:46:46

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH03
Test Date: 29/03/2017

AQUIFER DATA
Saturated Thickness: 17.59 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH03)
Initial Displacement: 0.7242 m Static Water Column Height: 12.59 m
Total Well Penetration Depth: 12.59 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Hvorslev
K = 0.1176 m/day y0 = 0.693 m
FALLING HEAD 02

Data Set: \..\ID46-GWBH03_FH02_BR.aqt
Date: 05/22/17  Time: 18:46:41

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH03
Test Date: 29/03/2017

AQUIFER DATA

Saturated Thickness: 17.59 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH03)

Initial Displacement: 0.7375 m  Static Water Column Height: 12.59 m
Total Well Penetration Depth: 12.59 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 0.04068 m/day  y0 = 0.5979 m
FALLING HEAD 02

Data Set: \..\ID46-GWBH03_FH02_Hv.aqt
Date: 05/22/17
Time: 18:46:35

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH03
Test Date: 29/03/2017

AQUIFER DATA

Saturated Thickness: 17.59 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH03)

Initial Displacement: 0.7375 m
Total Well Penetration Depth: 12.59 m
Casing Radius: 0.025 m
Static Water Column Height: 12.59 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.04936 m/day
y0 = 0.5978 m
**RISING HEAD 01**

Data Set: \...\ID46-GWBH03_RH01_BR.aqt  
Date: 05/22/17  Time: 18:46:29

**PROJECT INFORMATION**

Company: Coffey  
Client: Metro  
Project: 754-GEOTABTF10294AA  
Location: CTF  
Test Well: ID46-GWBH03  
Test Date: 29/03/2017

**AQUIFER DATA**

Saturated Thickness: 17.59 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ID46-GWBH03)**

Initial Displacement: 0.6996 m  
Total Well Penetration Depth: 12.59 m  
Casing Radius: 0.025 m  
Static Water Column Height: 12.59 m  
Screen Length: 3. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
K = 0.04645 m/day  
y0 = 0.548 m
RISING HEAD 01

Data Set: \..\ID46-GWBH03_RH01_Hv.aqt
Date: 05/22/17 Time: 18:46:24

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH03
Test Date: 29/03/2017

AQUIFER DATA
Saturated Thickness: 17.59 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH03)
Initial Displacement: 0.6996 m
Total Well Penetration Depth: 12.59 m
Casing Radius: 0.025 m
Static Water Column Height: 12.59 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.05077 m/day
y0 = 0.4924 m
RISING HEAD 02

Data Set: \..\ID46-GWBH03_RH02_BR.aqt
Date: 05/22/17     Time: 18:46:18

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH03
Test Date: 29/03/2017

AQUIFER DATA
Saturated Thickness: 17.59 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH03)
Initial Displacement: 0.7304 m
Total Well Penetration Depth: 12.59 m
Casing Radius: 0.025 m
Static Water Column Height: 12.59 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.05715 m/day
y0 = 0.6671 m
RISING HEAD 02

Data Set: \..\ID46-GWBH03_RH02_Hv.aqt
Date: 05/22/17
Time: 18:46:12

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH03
Test Date: 29/03/2017

AQUIFER DATA

Saturated Thickness: 17.59 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH03)

Initial Displacement: 0.7304 m
Total Well Penetration Depth: 12.59 m
Casing Radius: 0.025 m
Static Water Column Height: 12.59 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.06937 m/day
y0 = 0.6671 m
FALLING-HEAD 01

Data Set: \..\ID46-GWBH04_FH01_BR.aqt
Date: 05/22/17  Time: 18:56:15

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH04
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 9.152 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (Falling-Head 01)

Initial Displacement: 0.151 m
Total Well Penetration Depth: 4.152 m
Casing Radius: 0.025 m
Static Water Column Height: 4.152 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 29.15 m/day
y0 = 0.1252 m
FALLING-HEAD 01
Data Set: \..\ID46-GWBH04_FH01_Hv.aqt
Date: 05/22/17 Time: 18:56:10

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH04
Test Date: 07.03.2017

AQUIFER DATA
Saturated Thickness: 9.152 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (Falling-Head 01)
Initial Displacement: 0.151 m Static Water Column Height: 4.152 m
Total Well Penetration Depth: 4.152 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: UnconfinedSolution Method: Hvorslev
K = 46.04 m/day y0 = 0.1428 m
PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH04
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 9.152 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (Falling-Head 02)

Initial Displacement: 0.1362 m
Total Well Penetration Depth: 4.152 m
Casing Radius: 0.025 m
Static Water Column Height: 4.152 m
Screen Length: 3.0 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 29.78 m/day
y0 = 0.1258 m
### FALLING-HEAD 02

- **Data Set:** `\..\ID46-GWBH04_FH02_Hv.aqt`
- **Date:** 05/22/17  
- **Time:** 18:56:02

### PROJECT INFORMATION

- **Company:** Coffey
- **Client:** MTM
- **Project:** GEOTABTF10294AA
- **Location:** CTF
- **Test Well:** ID46-GWBH04
- **Test Date:** 07.03.2017

### AQUIFER DATA

- **Saturated Thickness:** 9.152 m
- **Anisotropy Ratio (Kz/Kr):** 0.2

### WELL DATA (Falling-Head 02)

- **Initial Displacement:** 0.1362 m
- **Total Well Penetration Depth:** 4.152 m
- **Casing Radius:** 0.025 m
- **Static Water Column Height:** 4.152 m
- **Screen Length:** 3. m
- **Well Radius:** 0.1 m
- **Gravel Pack Porosity:** 0.3

### SOLUTION

- **Aquifer Model:** Unconfined
- **Solution Method:** Hvorslev
- **K:** 42.06 m/day
- **y0:** 0.1257 m
RISING-HEAD 01

Data Set: \..\ID46-GWBH04_RH01_BR.aqt
Date: 05/22/17
Time: 18:55:58

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: TD46-GWBH04
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 9.152 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (Rising-Head 01)

Initial Displacement: 0.424 m
Total Well Penetration Depth: 4.152 m
Casing Radius: 0.025 m
Static Water Column Height: 4.152 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

\[ K = 45.14 \text{ m/day} \]
\[ y_0 = 0.4344 \text{ m} \]
RISING-HEAD 01

Data Set: \..\ID46-GWBH04_RH01_Hv.aqt
Date: 05/22/17 Time: 18:55:49

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH04
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 9.152 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (Rising-Head 01)

Initial Displacement: 0.424 m
Total Well Penetration Depth: 4.152 m
Casing Radius: 0.025 m
Static Water Column Height: 4.152 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

\[ K = 63.86 \text{ m/day} \]
\[ y_0 = 0.4344 \text{ m} \]
RISING-HEAD 02

Data Set: \D46-GWBH04_RH02_BR.aqt
Date: 05/22/17
Time: 18:55:53

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH04
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 9.152 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (Rising-Head 02)

Initial Displacement: 0.365 m
Total Well Penetration Depth: 4.152 m
Casing Radius: 0.025 m
Static Water Column Height: 4.152 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 44.43 m/day
y0 = 0.3686 m
RISING-HEAD 02

Data Set: \..\ID46-GWBH04_RH02_Hv.aqt
Date: 05/22/17
Time: 18:55:43

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH04
Test Date: 07.03.2017

AQUIFER DATA

Saturated Thickness: 9.152 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (Rising-Head 02)

Initial Displacement: 0.365 m
Total Well Penetration Depth: 4.152 m
Casing Radius: 0.025 m
Static Water Column Height: 4.152 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 62.87 m/day
y0 = 0.3686 m
**FALLING-HEAD 01**

Data Set: ...\ID46-GWBH05_FH01_BR.aqt  
Date: 05/22/17  
Time: 19:03:19  

**PROJECT INFORMATION**

Company: Coffey  
Client: MTM  
Project: GEOTABTF10294AA  
Location: CTF  
Test Well: ID46-GWBH05  
Test Date: 11/4/17  

**AQUIFER DATA**

Saturated Thickness: 9.524 m  
Anisotropy Ratio (Kz/Kr): 0.2  

**WELL DATA (ID46-GWBH05)**

Initial Displacement: 0.2754 m  
Total Well Penetration Depth: 4.524 m  
Casing Radius: 0.025 m  
Static Water Column Height: 4.524 m  
Screen Length: 3.0 m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3  

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
K = 57.92 m/day  
y0 = 0.2624 m
FALLING-HEAD 01

Data Set: \..\ID46-GWBH05_FH01_Hv.aqt
Date: 05/22/17  Time: 19:03:15

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH05
Test Date: 11/4/17

AQUIFER DATA

Saturated Thickness: 9.524 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH05)

Initial Displacement: 0.2754 m  Static Water Column Height: 4.524 m
Total Well Penetration Depth: 4.524 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 80.85 m/day  y0 = 0.2624 m
RISING-HEAD 01

Data Set: \..\ID46-GWBH05_RH01_BR.aqt
Date: 05/22/17  Time: 19:03:12

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH05
Test Date: 11/4/17

AQUIFER DATA

Saturated Thickness: 9.524 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH05)

Initial Displacement: 0.3264 m  Static Water Column Height: 4.524 m
Total Well Penetration Depth: 4.524 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
K = 75.2 m/day
Solution Method: Bouwer-Rice
y0 = 0.3316 m
RISING-HEAD 01

Data Set: \..\ID46-GWBH05_RH01_Hv.aqt
Date: 05/22/17 Time: 19:03:08

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH05
Test Date: 11/4/17

AQUIFER DATA
Saturated Thickness: 9.524 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH05)
Initial Displacement: 0.3264 m Static Water Column Height: 4.524 m
Total Well Penetration Depth: 4.524 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Hvorslev
K = 105. m/day y0 = 0.3316 m
RISING-HEAD 02

Data Set: \..\ID46-GWBH05_RH02_BR.aqt
Date: 05/22/17
Time: 19:03:04

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH05
Test Date: 11/4/17

AQUIFER DATA

Saturated Thickness: 9.524 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH05)

Initial Displacement: 0.3264 m
Total Well Penetration Depth: 4.524 m
Casing Radius: 0.025 m
Static Water Column Height: 4.524 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 81.04 m/day
y0 = 0.3684 m
RISING-HEAD 02

Data Set: ..\ID46-GWBH05_RH02_Hv.aqt
Date: 05/22/17
Time: 19:03:00

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH05
Test Date: 11/4/17

AQUIFER DATA

Saturated Thickness: 9.524 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH05)

Initial Displacement: 0.3264 m
Total Well Penetration Depth: 4.524 m
Casing Radius: 0.025 m
Static Water Column Height: 4.524 m
Screen Length: 3.0 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

\[ K = 113.1 \text{ m/day} \]
\[ y_0 = 0.3685 \text{ m} \]
FALLING-HEAD 01

Data Set: \..\ID46-GWBH06_FH01_BR.aqt
Date: 05/22/17 Time: 19:06:00

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH06
Test Date: 07/03/2017

AQUIFER DATA

Saturated Thickness: 23.67 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH06)

Initial Displacement: 0.7366 m
Total Well Penetration Depth: 18.67 m
Casing Radius: 0.025 m
Static Water Column Height: 18.67 m
Screen Length: 3.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.03565 m/day
y0 = 0.7257 m
**AQUIFER DATA**

- Saturated Thickness: 23.67 m
- Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ID46-GWBH06)**

- Initial Displacement: 0.7366 m
- Total Well Penetration Depth: 18.67 m
- Casing Radius: 0.025 m
- Static Water Column Height: 18.67 m
- Screen Length: 3.5 m
- Well Radius: 0.1 m
- Gravel Pack Porosity: 0.3

**SOLUTION**

- Aquifer Model: Unconfined
- Solution Method: Hvorslev
- $K = 0.04188 \text{ m/day}$
- $y_0 = 0.7257 \text{ m}$
RISING-HEAD 01

Data Set: \..\ID46-GWBH06_RH01_BR.aqt
Date: 05/22/17  Time: 19:05:51

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH06
Test Date: 07/03/2017

AQUIFER DATA

Saturated Thickness: 23.67 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH06)

Initial Displacement: 0.7724 m  Static Water Column Height: 18.67 m
Total Well Penetration Depth: 18.67 m  Screen Length: 3.5 m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 0.005773 m/day  y0 = 0.6848 m
RISING-HEAD 01

Data Set: \...\ID46-GWBH06_RH01_Hv.aqt
Date: 05/22/17
Time: 19:05:43

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ID46-GWBH06
Test Date: 07/03/2017

AQUIFER DATA

Saturated Thickness: 23.67 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ID46-GWBH06)

Initial Displacement: 0.7724 m
Total Well Penetration Depth: 18.67 m
Casing Radius: 0.025 m
Static Water Column Height: 18.67 m
Screen Length: 3.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.006781 m/day
y0 = 0.6848 m
FALLING HEAD 01
Data Set: SS-GWBH02_FH01_BR.aqt
Date: 05/22/17  Time: 19:10:00

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH02
Test Date: 21/04/2017

AQUIFER DATA
Saturated Thickness: 16.11 ft  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH02)
Initial Displacement: 0.86 ft  Static Water Column Height: 11.11 ft
Total Well Penetration Depth: 11.11 ft  Screen Length: 3. ft
Casing Radius: 0.025 ft  Well Radius: 0.1 ft
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
\( K = 0.04625 \text{ m/day} \)
\( y_0 = 0.7486 \text{ ft} \)
FALLING HEAD 01
Data Set: \..\SS-GWBH02_FH01_Hv.aqt
Date: 05/22/17 Time: 19:09:55

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH02
Test Date: 21/04/2017

AQUIFER DATA
Saturated Thickness: 16.11 ft Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH02)
Initial Displacement: 0.86 ft Static Water Column Height: 11.11 ft
Total Well Penetration Depth: 11.11 ft Screen Length: 3. ft
Casing Radius: 0.025 ft Well Radius: 0.1 ft
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Hvorslev
K = 0.057 m/day y0 = 0.7486 ft
RISING HEAD 01

Data Set: \..\SS-GWBH02_RH01_Br.aqt
Date: 05/22/17 Time: 19:09:50

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH02
Test Date: 21/04/2017

AQUIFER DATA
Saturated Thickness: 16.11 ft Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH02)
Initial Displacement: 0.8912 ft Static Water Column Height: 11.11 ft
Total Well Penetration Depth: 11.11 ft Screen Length: 3. ft
Casing Radius: 0.025 ft Well Radius: 0.1 ft
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.04479 m/day y0 = 0.6491 ft
RISING HEAD 01

Data Set: \SS-GWBH02_RH01_Hv.aqt
Date: 05/22/17  Time: 19:09:44

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH02
Test Date: 21/04/2017

AQUIFER DATA

Saturated Thickness: 16.11 ft  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH02)

Initial Displacement: 0.8912 ft  Static Water Column Height: 11.11 ft
Total Well Penetration Depth: 11.11 ft  Screen Length: 3. ft
Casing Radius: 0.025 ft  Well Radius: 0.1 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 0.05519 m/day  y0 = 0.6491 ft
**FALLING HEAD 01**

Data Set: `\..\SS-GWBH03_FH01_BR.aqt`
Date: 05/22/17  Time: 19:15:45

**PROJECT INFORMATION**

Company: Coffey  
Client: Metro  
Project: 754-GEOTABTF10294AA  
Location: CTF  
Test Well: SS-GWBH03  
Test Date: 30/03/2017

**AQUIFER DATA**

Saturated Thickness: 10.79 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (SS-GWBH03)**

Initial Displacement: 0.468 m  
Total Well Penetration Depth: 5.786 m  
Casing Radius: 0.025 m  
Static Water Column Height: 5.786 m  
Screen Length: 3. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  

\[ K = 1.376 \text{ m/day} \]
\[ y_0 = 0.3955 \text{ m} \]
FALLING HEAD 01

Data Set: SS-GWBH03_FH01_Hv.aqt
Date: 05/22/17  Time: 19:15:41

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH03
Test Date: 30/03/2017

AQUIFER DATA

Saturated Thickness: 10.79 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH03)

Initial Displacement: 0.468 m
Total Well Penetration Depth: 5.786 m
Casing Radius: 0.025 m
Static Water Column Height: 5.786 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.849 m/day
y0 = 0.3954 m
FALLING HEAD 02

Data Set: \...\SS-GWBH03_FH02_BR.aqt
Date: 05/22/17  Time: 19:15:37

PROJECT INFORMATION

Company: Coffey  
Client: Metro  
Project: 754-GEOTABTF10294AA  
Location: CTF  
Test Well: SS-GWBH03  
Test Date: 30/03/2017

AQUIFER DATA

Saturated Thickness: 10.79 m  
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH03)

Initial Displacement: 0.352 m  
Total Well Penetration Depth: 5.786 m  
Casing Radius: 0.025 m  
Static Water Column Height: 5.786 m  
Screen Length: 3. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
K = 1.462 m/day  
y0 = 0.3345 m
FALLING HEAD 02

Data Set: \..\SS-GWBH03_FH02_Hv.aqt
Date: 05/22/17  Time: 19:15:33

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH03
Test Date: 30/03/2017

AQUIFER DATA
Saturated Thickness: 10.79 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH03)
Initial Displacement: 0.352 m
Total Well Penetration Depth: 5.786 m
Casing Radius: 0.025 m
Static Water Column Height: 5.786 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 1.967 m/day  y0 = 0.3345 m
RISING HEAD 01

Data Set: \...\SS-GWBH03_RH01_BR.aqt
Date: 05/22/17 Time: 19:15:29

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH03
Test Date: 30/03/2017

AQUIFER DATA

Saturated Thickness: 10.79 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH03)

Initial Displacement: 0.473 m
Total Well Penetration Depth: 5.786 m
Casing Radius: 0.025 m
Static Water Column Height: 5.786 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

$K = 1.387$ m/day
$y_0 = 0.4044$ m
RISING HEAD 01

Data Set: \
\SS-GWBH03_RH01_Hv.aqt
Date: 05/22/17 Time: 19:15:24

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH03
Test Date: 30/03/2017

AQUIFER DATA

Saturated Thickness: 10.79 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH03)

Initial Displacement: 0.473 m
Total Well Penetration Depth: 5.786 m
Casing Radius: 0.025 m
Static Water Column Height: 5.786 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

\[ K = 1.864 \text{ m/day} \]
\[ y_0 = 0.4042 \text{ m} \]
**RISING HEAD 02**

Data Set: \..\SS-GWBH03_RH02_BR.aqt  
Date: 05/22/17  
Time: 19:15:18

**PROJECT INFORMATION**

Company: Coffey  
Client: Metro  
Project: 754-GEOTABTF10294AA  
Location: CTF  
Test Well: SS-GWBH03  
Test Date: 30/03/2017

**AQUIFER DATA**

Saturated Thickness: 10.79 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (SS-GWBH03)**

Initial Displacement: 0.463 m  
Total Well Penetration Depth: 5.786 m  
Casing Radius: 0.025 m  
Static Water Column Height: 5.786 m  
Screen Length: 3. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
$K = 1.411 \text{ m/day}$  
$y_0 = 0.4088 \text{ m}$
RISING HEAD 02

Data Set: SS-GWBH03_RH02_Hv.aqt
Date: 05/22/17  Time: 19:15:12

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH03
Test Date: 30/03/2017

AQUIFER DATA
Saturated Thickness: 10.79 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH03)
Initial Displacement: 0.463 m
Total Well Penetration Depth: 5.786 m
Casing Radius: 0.025 m
Static Water Column Height: 5.786 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 1.897 m/day  y0 = 0.4087 m
### FALLING-HEAD 01

Data Set: `\..\..\SS-GWBH04_FH01_BR.aqt`

Date: 05/22/17  
Time: 19:39:57

### PROJECT INFORMATION

Company: Coffey  
Client: MTM  
Project: GEOTABTF10294AA  
Location: CTF  
Test Well: SS-GWBH04  
Test Date: 06.03.2017

### AQUIFER DATA

Saturated Thickness: 8.439 m  
Anisotropy Ratio (Kz/Kr): 0.2

### WELL DATA (SS-GWBH 04)

Initial Displacement: 0.5224 m  
Total Well Penetration Depth: 3.439 m  
Casing Radius: 0.025 m  
Static Water Column Height: 3.439 m  
Screen Length: 2. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

### SOLUTION

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
\( K = 0.2118 \text{ m/day} \)  
\( y_0 = 0.2708 \text{ m} \)
FALLING-HEAD 01

Data Set: \SS-GWBH04_FH01_Hv.aqt
Date: 05/22/17
Time: 19:39:52

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH04
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 8.439 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH 04)

Initial Displacement: 0.5224 m
Total Well Penetration Depth: 3.439 m
Casing Radius: 0.025 m
Static Water Column Height: 3.439 m
Screen Length: 2. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
\( K = 0.2494 \text{ m/day} \)
\( y_0 = 0.2416 \text{ m} \)
FALLING-HEAD 02

Data Set: C:\\SS-GWBH04_FH02_BR.aqt
Date: 05/22/17  Time: 19:39:45

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH04
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 8.439 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH 04)

Initial Displacement: 0.499 m
Total Well Penetration Depth: 3.439 m
Casing Radius: 0.025 m
Static Water Column Height: 3.439 m
Screen Length: 2. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 0.1405 m/day  y0 = 0.2544 m
### FALLING-HEAD 02

- **Data Set:** `\..\SS-GWBH04_FH02_Hv.aqt`
- **Date:** 05/22/17
- **Time:** 19:39:40

### PROJECT INFORMATION

- **Company:** Coffey
- **Client:** MTM
- **Project:** GEOTABTF10294AA
- **Location:** CTF
- **Test Well:** SS-GWBH04
- **Test Date:** 06.03.2017

### AQUIFER DATA

- **Saturated Thickness:** 8.439 m
- **Anisotropy Ratio (Kz/Kr):** 0.2

### WELL DATA (SS-GWBH 04)

- **Initial Displacement:** 0.499 m
- **Total Well Penetration Depth:** 3.439 m
- **Casing Radius:** 0.025 m
- **Static Water Column Height:** 3.439 m
- **Screen Length:** 2. m
- **Well Radius:** 0.1 m
- **Gravel Pack Porosity:** 0.3

### SOLUTION

- **Aquifer Model:** Unconfined
- **Solution Method:** Hvorslev
- **K = 0.1854 m/day**
- **y0 = 0.2425 m**
RISING-HEAD 01
Data Set: \..\SS-GWBH04_RH01_BR.aqt
Date: 05/22/17  Time: 19:39:35

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH04
Test Date: 06.03.2017

AQUIFER DATA
Saturated Thickness: 8.439 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH 04)
Initial Displacement: 0.729 m
Total Well Penetration Depth: 3.439 m
Casing Radius: 0.025 m
Static Water Column Height: 3.439 m
Screen Length: 2. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1204 m/day
y0 = 0.4907 m
RISING-HEAD 01

Data Set: \..\SS-GWBH04_RH01_Hv.aqt
Date: 05/22/17  Time: 19:39:31

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH04
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 8.439 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH 04)

Initial Displacement: 0.729 m
Total Well Penetration Depth: 3.439 m
Casing Radius: 0.025 m
Static Water Column Height: 3.439 m
Screen Length: 2. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 0.1425 m/day  y0 = 0.427 m
RISING-HEAD 02

Data Set: \..\SS-GWBH04_RH02_BR.aqt
Date: 05/22/17  Time: 19:39:26

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH04
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 8.389 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH 04)

Initial Displacement: 0.707 m
Total Well Penetration Depth: 3.389 m
Casing Radius: 0.025 m
Static Water Column Height: 3.389 m
Screen Length: 1.95 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1022 m/day
y0 = 0.4018 m
**RISING-HEAD 02**

Data Set: \..\SS-GWBH04_RH02_Hv.aqt
Date: 05/22/17  Time: 19:39:19

**PROJECT INFORMATION**

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH04
Test Date: 06.03.2017

**AQUIFER DATA**

Saturated Thickness: 8.439 m  Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (SS-GWBH 04)**

Initial Displacement: 0.707 m
Total Well Penetration Depth: 3.389 m
Casing Radius: 0.025 m

Static Water Column Height: 3.439 m
Screen Length: 1.95 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  Solution Method: Hvorslev

\[ K = 0.1397 \text{ m/day} \]

\[ y_0 = 0.4053 \text{ m} \]
FALLING-HEAD 01

Data Set: `\...\SS-GWBH05_FH01_BR.aqt`
Date: 05/22/17  Time: 19:42:36

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH05
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 19.36 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH05)

Initial Displacement: 0.541 m  Static Water Column Height: 14.36 m
Total Well Penetration Depth: 14.36 m  Screen Length: 3.5 m
Casing Radius: 0.025 m  Well Radius: 0.1 m

Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 0.7954 m/day  y0 = 0.527 m
FALLING-HEAD 01

Data Set: \..\SS-GWBH05_FH01_Hv.aqt
Date: 05/22/17  Time: 19:42:32

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH05
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 19.36 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH05)

Initial Displacement: 0.541 m  Static Water Column Height: 14.36 m
Total Well Penetration Depth: 14.36 m  Screen Length: 3.5 m
Casing Radius: 0.025 m  Well Radius: 0.1 m

Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev

K = 0.9631 m/day  y0 = 0.527 m
FALLING-HEAD 02

Data Set: \...\SS-GWBH05_FH02_BR.aqt
Date: 05/22/17  Time: 19:42:28

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH05
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 19.36 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH05)

Initial Displacement: 0.575 m
Total Well Penetration Depth: 14.36 m
Casing Radius: 0.025 m

Static Water Column Height: 14.36 m
Screen Length: 3.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.7404 m/day
y0 = 0.5486 m
FALLING-HEAD 02

Data Set: SS-GWBH05_FH02_Hv.aqt
Date: 05/22/17  Time: 19:42:24

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH05
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 19.36 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH05)

Initial Displacement: 0.575 m
Total Well Penetration Depth: 14.36 m
Casing Radius: 0.025 m
Static Water Column Height: 14.36 m
Screen Length: 3.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

\( K = 0.8961 \text{ m/day} \)
\( y_0 = 0.5485 \text{ m} \)
RISING-HEAD 01

Data Set: \..\SS-GWBH05_RH01_BR.aqt
Date: 05/22/17 Time: 19:42:19

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH05
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 19.36 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH05)

Initial Displacement: 0.7288 m
Total Well Penetration Depth: 14.36 m
Casing Radius: 0.025 m
Static Water Column Height: 14.36 m
Screen Length: 3.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.6141 m/day
y0 = 0.6303 m
RISING-HEAD 01

Data Set: \SS-GWBH05_RH01_Hv.aqt
Date: 05/22/17 Time: 19:42:15

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH05
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 19.36 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH05)

Initial Displacement: 0.7288 m
Total Well Penetration Depth: 14.36 m
Casing Radius: 0.025 m
Static Water Column Height: 14.36 m
Screen Length: 3.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.7437 m/day
y0 = 0.6304 m
RISING-HEAD 02

Data Set: \..\SS-GWBH05_RH02_BR.aqt
Date: 05/22/17
Time: 19:42:09

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH05
Test Date: 06.03.2017

AQUIFER DATA

Saturated Thickness: 19.36 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH05)

Initial Displacement: 0.706 m
Total Well Penetration Depth: 14.36 m
Casing Radius: 0.025 m

Static Water Column Height: 14.36 m
Screen Length: 3.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.7187 m/day
y0 = 0.6454 m
RISING-HEAD 02

Data Set: \SS-GWBH05_RH02_Hv.aqt
Date: 05/22/17            Time: 19:42:04

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: SS-GWBH05
Test Date: 06.03.2017

AQUIFER DATA
Saturated Thickness: 19.36 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (SS-GWBH05)
Initial Displacement: 0.706 m
Total Well Penetration Depth: 14.36 m
Casing Radius: 0.025 m
Static Water Column Height: 14.36 m
Screen Length: 3.5 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.8696 m/day
y0 = 0.6452 m
Figures
Geological boundaries are only known at the test site locations and have been inferred between the test sites. These geological boundaries have been provided to assist with the geological interpretation and should not be considered to represent actual boundaries that may vary from these lines.
Appendix B – Borehole Logs
**DEFINITION:**
In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

**CLASSIFICATION SYMBOL & SOIL NAME**
Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

---

### PARTICLE SIZE DESCRIPTIVE TERMS

<table>
<thead>
<tr>
<th>NAME</th>
<th>SUBDIVISION</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
<td></td>
<td>&gt;200 mm</td>
</tr>
<tr>
<td>Cobble</td>
<td>coarse</td>
<td>63 mm to 200 mm</td>
</tr>
<tr>
<td></td>
<td>medium</td>
<td>20 mm to 63 mm</td>
</tr>
<tr>
<td></td>
<td>fine</td>
<td>6 mm to 20 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.36 mm to 6 mm</td>
</tr>
<tr>
<td>Gravel</td>
<td>coarse</td>
<td>600 μm to 2.36 mm</td>
</tr>
<tr>
<td></td>
<td>medium</td>
<td>200 μm to 600 μm</td>
</tr>
<tr>
<td></td>
<td>fine</td>
<td>75 μm to 200 μm</td>
</tr>
</tbody>
</table>

**MOISTURE CONDITION**
- **Dry**: Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.
- **Moist**: Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
- **Wet**: As for moist but with free water forming on hands when handled.

**CONSISTENCY OF COHESIVE SOILS**

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

**DENSITY OF GRANULAR SOILS**

<table>
<thead>
<tr>
<th>TERM</th>
<th>DENSITY INDEX (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very loose</td>
<td>Less than 15</td>
</tr>
<tr>
<td>Loose</td>
<td>15 - 35</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>35 - 65</td>
</tr>
<tr>
<td>Dense</td>
<td>65 - 85</td>
</tr>
<tr>
<td>Very Dense</td>
<td>Greater than 85</td>
</tr>
</tbody>
</table>

**MINOR COMPONENTS**

<table>
<thead>
<tr>
<th>TERM</th>
<th>ASSESSMENT GUIDE</th>
<th>PROPORTION OF MINOR COMPONENT IN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace of</td>
<td>Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.</td>
<td>Coarse grained soils: &lt;5% Fine grained soils: &lt;15%</td>
</tr>
<tr>
<td>With some</td>
<td>Presence easily detected by feel or eye, soil properties little different to general properties of primary component.</td>
<td>Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%</td>
</tr>
</tbody>
</table>

**SOIL STRUCTURE**

<table>
<thead>
<tr>
<th>ZONING</th>
<th>CEMENTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layers</td>
<td>Continuous across exposure or sample.</td>
</tr>
<tr>
<td>Lenses</td>
<td>Discontinuous layers of lenticular shape.</td>
</tr>
<tr>
<td>Pockets</td>
<td>Irregular inclusions of different material.</td>
</tr>
</tbody>
</table>

**GEOLOGICAL ORIGIN**

**WEATHERED IN PLACE SOILS**

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

**NOTE:** Consistency/density has been provided for FILL material to assist site access and temporary works design. Near surface conditions may vary with time.
Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES
(Excluding particles larger than 60 mm and basing fractions on estimated mass)

<table>
<thead>
<tr>
<th>USC</th>
<th>PRIMARY NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>GW</td>
<td>GRAVEL</td>
</tr>
<tr>
<td>SP</td>
<td>SAND</td>
</tr>
<tr>
<td>SM</td>
<td>SILTY SAND</td>
</tr>
<tr>
<td>SC</td>
<td>CLAYEY SAND</td>
</tr>
</tbody>
</table>

IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm

<table>
<thead>
<tr>
<th>DRY STRENGTH</th>
<th>DILATANCY</th>
<th>TOUGHNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>None to Low</td>
<td>Quick to slow</td>
<td>None</td>
</tr>
<tr>
<td>Medium to High</td>
<td>None</td>
<td>Medium</td>
</tr>
<tr>
<td>Low to medium</td>
<td>Slow to very slow</td>
<td>Low</td>
</tr>
<tr>
<td>Low to medium</td>
<td>Slow to very slow</td>
<td>Low to medium</td>
</tr>
<tr>
<td>High</td>
<td>None</td>
<td>High</td>
</tr>
<tr>
<td>Medium to High</td>
<td>None</td>
<td>Low to medium</td>
</tr>
</tbody>
</table>

COMMON DEFECTS IN SOIL

<table>
<thead>
<tr>
<th>TERM</th>
<th>DEFINITION</th>
<th>DIAGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTING</td>
<td>A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.</td>
<td><img src="https://via.placeholder.com/150" alt="Diagram" /></td>
</tr>
<tr>
<td>JOINT</td>
<td>A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term ‘fissure’ may be used for irregular joints &lt;0.2 m in length.</td>
<td><img src="https://via.placeholder.com/150" alt="Diagram" /></td>
</tr>
<tr>
<td>SHEARED ZONE</td>
<td>Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.</td>
<td><img src="https://via.placeholder.com/150" alt="Diagram" /></td>
</tr>
<tr>
<td>SHEARED SURFACE</td>
<td>A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.</td>
<td><img src="https://via.placeholder.com/150" alt="Diagram" /></td>
</tr>
</tbody>
</table>

* Low plasticity – Liquid Limit \( w_L \) less than 35%. * Medium plasticity – \( w_L \) between 35% and 50%. * High plasticity – \( w_L \) greater than 50%.
Borehole ID: ID18-BH01  
sheet: 1 of 6  
project no. GEOTABTF10294AA  

client: Metro Trains Melbourne  
principal: Level Crossing Removal Authority  
project: LCRP-CTF  
location: ID18 - Edithvale Road, Edithvale  

position: E: 333,705.93; N: 5,788,924.49 (MGA94)  
surface elevation: 6.56 m (AHD)  
angle from horizontal: 90°  
drill model: Explora E50, Truck mounted  
drilling fluid: Polymer  
hole diameter: 100 mm  

Drilling Information  

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Support</th>
<th>Classification Symbol</th>
<th>Water</th>
<th>Soil Type</th>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>E</td>
<td>GP</td>
<td></td>
<td>FILL: ASPHALT: 40mm.</td>
<td>D</td>
<td>very soft</td>
</tr>
<tr>
<td>1-2</td>
<td>E</td>
<td>SP</td>
<td></td>
<td>FILL: Sandy GRAVEL: fine to coarse grained, angular, brown, orange, fine to coarse grained sand, with some angular cobbles.</td>
<td>M</td>
<td>soft</td>
</tr>
<tr>
<td>2-3</td>
<td>SPT</td>
<td>2, 3, 5 N=8</td>
<td></td>
<td>SAND: fine to medium grained, sub-rounded to sub-angular, mottled pale grey and grey-brown. becoming fine to coarse grained, pale grey, brown</td>
<td>MD</td>
<td>firm</td>
</tr>
<tr>
<td>3-4</td>
<td>SPT</td>
<td>2, 3, 6 N=9</td>
<td></td>
<td>SAND: fine to medium grained, brown, dark brown</td>
<td>MD</td>
<td>stiff</td>
</tr>
<tr>
<td>4-5</td>
<td>SPT</td>
<td>2, 6, 7 N=13</td>
<td></td>
<td>SAND: fine to coarse grained, pale grey, brown</td>
<td>MD</td>
<td>very stiff</td>
</tr>
<tr>
<td>5-6</td>
<td>SPT</td>
<td>2, 3, 4 N=7</td>
<td></td>
<td>becoming fine to coarse grained</td>
<td>D</td>
<td>very dense</td>
</tr>
<tr>
<td>6-7</td>
<td>SPT</td>
<td>3, 9, 16 N=25</td>
<td></td>
<td>becoming fine to coarse grained</td>
<td>D</td>
<td>very dense</td>
</tr>
<tr>
<td>7-8</td>
<td></td>
<td></td>
<td></td>
<td>becoming fine grained</td>
<td>D</td>
<td>very dense</td>
</tr>
<tr>
<td>8-9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>very dense</td>
</tr>
<tr>
<td>9-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>very dense</td>
</tr>
</tbody>
</table>
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

material description

SP: SAND: fine to medium grained, sub-rounded to sub-angular, mottled pale grey and grey-brown. (continued)
becoming pale grey-brown, with some medium to coarse grained sand lenses

clay band, Highly Plastic, dark brown, grey, approximately 0.3m thick
becoming dark brown, grey, brown

trace of dark brown clay bands

CH: Silty CLAY: high plasticity, grey, with some fine grained sand, slight organic odour.

CH: Sandy CLAY: high plasticity, pale grey, mottled orange, fine to medium grained sand.

SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

material description

SP: SAND: fine to medium grained, sub-rounded to sub-angular, mottled pale grey and grey-brown. (continued)
becoming pale grey-brown, with some medium to coarse grained sand lenses

clay band, Highly Plastic, dark brown, grey, approximately 0.3m thick
becoming dark brown, grey, brown

trace of dark brown clay bands

CH: Silty CLAY: high plasticity, grey, with some fine grained sand, slight organic odour.

CH: Sandy CLAY: high plasticity, pale grey, mottled orange, fine to medium grained sand.

SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

material description

SP: SAND: fine to medium grained, sub-rounded to sub-angular, mottled pale grey and grey-brown. (continued)
becoming pale grey-brown, with some medium to coarse grained sand lenses

clay band, Highly Plastic, dark brown, grey, approximately 0.3m thick
becoming dark brown, grey, brown

trace of dark brown clay bands

CH: Silty CLAY: high plasticity, grey, with some fine grained sand, slight organic odour.

CH: Sandy CLAY: high plasticity, pale grey, mottled orange, fine to medium grained sand.

SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

material description

SP: SAND: fine to medium grained, sub-rounded to sub-angular, mottled pale grey and grey-brown. (continued)
becoming pale grey-brown, with some medium to coarse grained sand lenses

clay band, Highly Plastic, dark brown, grey, approximately 0.3m thick
becoming dark brown, grey, brown

trace of dark brown clay bands

CH: Silty CLAY: high plasticity, grey, with some fine grained sand, slight organic odour.

CH: Sandy CLAY: high plasticity, pale grey, mottled orange, fine to medium grained sand.
## Engineering Log - Borehole

**ID18-BH01**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**date started:** 14 Sep 2016  
**date completed:** 20 Sep 2016  
**logged by:** JLy  
**checked by:** KJ

### SOIL TYPE

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandy CLAY</td>
<td>high plasticity, pale grey, mottled orange, fine to medium grained sand. (continued) becoming pale grey mottled orange-brown becoming pale grey, mottled orange brown, fine to medium grained sand trace of gravel, slight organic odour</td>
</tr>
<tr>
<td>CLAYEY SAND</td>
<td>fine grained, red, orange, brown, medium plasticity, with some medium to coarse grained sand. with some fine grained gravel</td>
</tr>
</tbody>
</table>

### drilling information

- **method & support:** non destructive drilling
- **samples & field tests:** water
- **depth (m):** 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0
- **classification symbol:** CH
- **material description:** Sandy CLAY: high plasticity, pale grey, mottled orange, fine to medium grained sand. (continued) becoming pale grey mottled orange-brown becoming pale grey, mottled orange brown, fine to medium grained sand trace of gravel, slight organic odour

### material substance

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description:** based on Unified Classification System
- **samples & field tests:** water
- **support:** M mud, N nil, C casing
- **penetration:** no resistance ranging to refusal
- **samples & field tests:** B bulk disturbed sample, D disturbed sample, E environmental sample, SS split spoon sample, UH# undisturbed sample #mm diameter, HP hand penetrometer (kPa), N standard penetration test (SPT), N* SPT - sample recovered, Nc SPT with solid cone, VS vane shear; peak/remoulded (kPa), R refusal, HB hammer bouncing

### engineering details

- **Borehole ID.:** ID18-BH01  
- **date:** 02/06/2017 17:14
- **material description:** water outflow, water inflow
- **penetration:** 10-Oct-12 water level on date shown, water inflow, water outflow
- **hand penetrometer:** 0-100 kPa
- **structure and additional observations:** TERTIARY BRIGHTON GROUP

### TERTIARY BRIGHTON GROUP

- **methods & support:** AD auger drilling*, AS auger screwing*, HA hand auger, W wash hole, NDD non destructive drilling
- **material description:** very soft, soft, firm, stiff, very stiff, friable, very loose, loose, medium dense, dense
- **method & support:** NDD non destructive drilling
- **penetration:** no resistance ranging to refusal
- **samples & field tests:** water
- **material description:** water outflow, water inflow
- **penetration:** 10-Oct-12 water level on date shown, water inflow, water outflow
- **hand penetrometer:** 0-100 kPa
- **structure and additional observations:** TERTIARY BRIGHTON GROUP

### engineering details

- **Borehole ID.:** ID18-BH01  
- **date:** 02/06/2017 17:14
- **material description:** water outflow, water inflow
- **penetration:** 10-Oct-12 water level on date shown, water inflow, water outflow
- **hand penetrometer:** 0-100 kPa
- **structure and additional observations:** TERTIARY BRIGHTON GROUP
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH01  
**Date started:** 14 Sep 2016  
**Date completed:** 20 Sep 2016  
**Logged by:** JLy  
**Checked by:** KJ

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method &amp; Support</strong></td>
<td><strong>Material Description</strong></td>
</tr>
<tr>
<td>Non-destructive drilling</td>
<td><strong>SOIL TYPE:</strong> Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td>D</td>
<td><strong>CLAYEY SAND:</strong> Fine grained, red, orange, brown, medium plasticity, with some medium to coarse grained sand. (continued) cemented band approximately 200mm thick, dark brown, dark grey trace of weakly cemented bands, up to 20mm</td>
</tr>
<tr>
<td>SI</td>
<td><strong>CLAYEY SAND:</strong> Medium to high plasticity, red, orange-brown, fine grained sand.</td>
</tr>
<tr>
<td>SI</td>
<td><strong>SANDY CLAY:</strong> Low plasticity, green-brown, fine grained sand, with some layers of gravel</td>
</tr>
<tr>
<td></td>
<td><strong>Silty CLAY:</strong> Low plasticity, brown, red-brown, with some fine grained sand, with some layers of gravel and cemented sand bands.</td>
</tr>
</tbody>
</table>

---

### Soil Type

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components

---

### Drilling Information

- **Method & Support:** Non-destructive drilling
- **Materials Substance:** **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components

---

### Water

- **Water outflow:** None
- **Water inflow:** None

---

### Penetration

- **No resistance detected:** None

---

### Support

- **Type:** M - mud, N - nil, C - casing
- **Penetration:** Hand

---

### Samples & Field Tests

- **Samples & Field Tests:** B - bulk disturbed sample, D - disturbed sample, E - environmental sample, SS - split spoon sample, US - undisturbed sample #1mm diameter, HP - hand penetrometer (kPa), N - standard penetration test (SPT), N* - SPT - sample recovered, NC - SPT with solid cone, VS - vane shear; peak/remoulded (kPa), R - refusal, HB - hammer bouncing

---

### Classification Symbol & Soil Description

- **Classification Symbol:** Based on Unified Classification System
- **Soil Description:** Moist, Wet, Plastic limit, Liquid limit

---

### Consistency / Relative Density

- **Consistency:** Very soft, Soft, Firm, Stiff, Very stiff
- **Relative Density:** Hard, Medium dense, Dense, Very dense
## Engineering Log - Borehole

### Client
- **Metro Trains Melbourne**

### Project
- **Level Crossing Removal Authority**

### Project Details
- **ID18-BH01**
- **Sheet Number**: 5 of 6
- **Project No**: GEOTABTF10294AA
- **Date Started**: 14 Sep 2016
- **Date Completed**: 20 Sep 2016
- **Logged By**: JLy
- **Checked By**: KJ

### Location
- **ID18 - Edithvale Road, Edithvale**

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Method &amp; Support</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>CI-CH</td>
<td>Silty CLAY: medium to high plasticity, brown, red brown, with some fine grained sand, with some layers of gravel and cemented sand bands. (continued)</td>
</tr>
<tr>
<td>27</td>
<td>SPT 1, 6, 9 N=15</td>
<td>hard band approximately 100mm thick</td>
</tr>
<tr>
<td>28</td>
<td>SPT 10, 12, 12 N=24</td>
<td>Silty CLAY: high plasticity, brown, dark green-brown, some lenses of fine to coarse grained sand and fine grained gravel, trace of shell fragments. soft band, approximately 300mm thick</td>
</tr>
<tr>
<td>30</td>
<td>SPT 6, 7, 9 N=16</td>
<td>sandy clay band, grey, coarse grained sand</td>
</tr>
<tr>
<td>31</td>
<td>SPT 6, 8, 9 N=17</td>
<td>Sandy SILT: low liquid limit, green-brown, trace of shell fragments. becoming grey, green, brown</td>
</tr>
</tbody>
</table>

### Material Substance
- **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components
- **M**: mud
- **C**: casing
- **N**: nil

### Samples & Field Tests
- **B**: bulk disturbed sample
- **D**: disturbed sample
- **E**: environmental sample
- **SS**: split spoon sample
- **US**: undisturbed sample #1
- **HP**: hand penetrometer (kPa)
- **N**: standard penetration test (SPT) sample recovered
- **Nc**: SPT with solid cone
- **VS**: vane shear; peak/reduced (kPa)
- **R**: refusal
- **HB**: hammer bouncing

### Consistency / Relative Density
- **VS**: very soft
- **S**: soft
- **F**: firm
- **St**: stiff
- **VSt**: very stiff
- **H**: hard
- **Fb**: failure
- **VL**: very loose
- **L**: loose
- **MD**: medium dense
- **D**: dense
- **VD**: very dense

### Moisture
- **CDF_0_9_06_LIBRARY.GLB rev:AS  Log  COF BOREHOLE: NON CORED  GEOTABTF10294AA_ID18.GPJ  <<DrawingFile>>  02/06/2017 17:14
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH01  
**date started:** 14 Sep 2016  
**date completed:** 20 Sep 2016  
**logged by:** JLyKJ  
**checked by:** KJ

**surface elevation:** 6.56 m (AHD)  
**angle from horizontal:** 90°  
**drill model:** Explora E50, Truck mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>mud</td>
<td>N</td>
<td>nil</td>
</tr>
<tr>
<td>AS</td>
<td>auger screwing*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>washhoe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* bit shown by suffix  
e.g. AD/T blank bit  
T TC bit  
V V bit

---

**Classification Symbol & Soil Description**  
**Based on Unified Classification System**

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>D</td>
<td>dry</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>ST</td>
<td>stiff</td>
</tr>
<tr>
<td>VSt</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
</tr>
</tbody>
</table>

---

**Material Substance**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M mud</td>
<td>Sandy SILT: low liquid limit, green-brown, trace of shell fragments. (continued)</td>
</tr>
<tr>
<td>C casing</td>
<td></td>
</tr>
<tr>
<td>VV</td>
<td>hammer bouncing</td>
</tr>
</tbody>
</table>

**Borehole ID18-BH01 terminated at 45.15 m**

**Target depth**

**Standpipe installation**

**Backfill details**

0.0m-1.7m: grout
1.7m-5.4m: machine slotted, filter sock covered, 50mm PVC, Class 18
End caps and flush mounted gatic cover

---

**Drilling Information**

<table>
<thead>
<tr>
<th>position</th>
<th>E: 333,705.93; N: 5,788,924.49 (MGA94)</th>
</tr>
</thead>
<tbody>
<tr>
<td>drill model</td>
<td>Explora E50, Truck mounted</td>
</tr>
<tr>
<td>angle from horizontal</td>
<td>90°</td>
</tr>
<tr>
<td>hole diameter</td>
<td>100 mm</td>
</tr>
</tbody>
</table>

---

**Graphic Log**

<table>
<thead>
<tr>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>bulk disturbed sample</td>
</tr>
<tr>
<td>C</td>
<td>casing</td>
</tr>
<tr>
<td>D</td>
<td>disturbed sample</td>
</tr>
<tr>
<td>E</td>
<td>environmental sample</td>
</tr>
<tr>
<td>SS</td>
<td>split spoon sample</td>
</tr>
<tr>
<td>US#</td>
<td>undisturbed sample #1mm diameter</td>
</tr>
<tr>
<td>HP</td>
<td>hand penetrometer (kPa)</td>
</tr>
<tr>
<td>N</td>
<td>standard penetration test (SPT)</td>
</tr>
<tr>
<td>N*</td>
<td>SPT - sample recovered</td>
</tr>
<tr>
<td>Nc</td>
<td>SPT with solid cone</td>
</tr>
<tr>
<td>R</td>
<td>refusal</td>
</tr>
<tr>
<td>HB</td>
<td>hammer bouncing</td>
</tr>
<tr>
<td>NS</td>
<td>SPT with solid cone (Brown)</td>
</tr>
<tr>
<td>VS</td>
<td>vane shear; peak/remoulded (kPa)</td>
</tr>
</tbody>
</table>

---

**Grading to SILTY SAND, non-plastic**

---

**structure and additional observations**

---

**Notes:**

- Sandy SILT: low liquid limit, green-brown, trace of shell fragments. (continued)
- with some shell fragments

---

**Drilling Fluid:** Polymer

---

**Additional Observations:**

- Borehole ID18-BH01 terminated at 45.15 m
- Target depth
- Standpipe installation
- Backfill details
- End caps and flush mounted gatic cover
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**position:** E: 333,853.25; N: 5,786,624.58 (MGA94)  
**surf. elevation:** 6.44 m (AHD)  
**angle from horizontal:** 90°

**drill model:** Explora E50, Truck mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Samples &amp; Field Tests</th>
<th>Soil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>water</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>method</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Material Substance

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILL</td>
<td>ASPHALT: 100mm.</td>
</tr>
<tr>
<td>FILL</td>
<td>CONCRETE: 100mm.</td>
</tr>
<tr>
<td>SAND</td>
<td>Sandy GRAVEL: fine to coarse grained, angular, orange, Fine to course grained sand, trace of cobbles.</td>
</tr>
<tr>
<td>SAND</td>
<td>Sandy GRITS: fine to medium grained, grey. becoming pale grey</td>
</tr>
<tr>
<td>SAND</td>
<td>Sandy GRAVEL: fine to medium grained, grey. becoming brown to pale brown</td>
</tr>
<tr>
<td>SAND</td>
<td>Sandy GRAVEL: fine to medium grained, grey. becoming fine to coarse grained, brown</td>
</tr>
<tr>
<td>SAND</td>
<td>Sandy GRAVEL: fine to medium grained, grey. becoming grey, with some fines</td>
</tr>
<tr>
<td>SAND</td>
<td>Sandy GRAVEL: fine to medium grained, grey. becoming brown to pale brown</td>
</tr>
</tbody>
</table>

### Sample & Field Tests

<table>
<thead>
<tr>
<th>Water</th>
<th>Penetration</th>
<th>Sample Type</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>bulk disturbed sample</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D</td>
<td>disturbed sample</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E</td>
<td>environmental sample</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SS</td>
<td>split spoon sample</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US</td>
<td>undisturbed sample #1mm diameter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>standard penetration test (SPT)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N*</td>
<td>SPT - sample recovered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NS</td>
<td>SPT with solid cone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VS</td>
<td>vane shear; peak/remoulded (kPa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R</td>
<td>refusal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HB</td>
<td>hammer bouncing</td>
</tr>
</tbody>
</table>

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>VS: very soft</td>
</tr>
<tr>
<td>M</td>
<td>S: soft</td>
</tr>
<tr>
<td>W</td>
<td>F: firm</td>
</tr>
<tr>
<td>V</td>
<td>St: stiff</td>
</tr>
<tr>
<td>L</td>
<td>VS: very stiff</td>
</tr>
<tr>
<td>H</td>
<td>H: hard</td>
</tr>
<tr>
<td>Fb</td>
<td>P: friable</td>
</tr>
<tr>
<td>VL</td>
<td>VL: very loose</td>
</tr>
<tr>
<td>L</td>
<td>L: loose</td>
</tr>
<tr>
<td>MD</td>
<td>MD: medium dense</td>
</tr>
<tr>
<td>D</td>
<td>D: dense</td>
</tr>
<tr>
<td>VD</td>
<td>VD: very dense</td>
</tr>
</tbody>
</table>

---

**Borehole ID:** ID18-BH02  
**sheet:** 1 of 6  
**date started:** 20 Sep 2016  
**date completed:** 23 Sep 2016  
**logged by:** JLy  
**checked by:** KJ
# Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

**Drilling Information**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Type</th>
<th>Description</th>
<th>Sample &amp; Field Tests</th>
<th>Water Outflow</th>
<th>Water Inflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>SP</td>
<td>SAND: fine to medium grained, grey. (continued)</td>
<td>SPT 6, 4, 4 N=8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11.0</td>
<td>CI</td>
<td>Sandy CLAY: medium plasticity, green-grey, fine grained sand.</td>
<td>SPT 7, 10, 10 N=20</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12.0</td>
<td>CH</td>
<td>Silty CLAY: high plasticity, green-grey, mottled orange and pale grey, with some lenses of sand.</td>
<td>SPT 7, 8, 6 N=14</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Material Substance**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Plasticity or Particle Characteristic, Colour, Secondary and Minor Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAND</td>
<td>Fine to medium grained, grey. (continued) becoming fine grained, dark grey, with some silt, organic odour</td>
</tr>
<tr>
<td>Sandy CLAY</td>
<td>Low plasticity, green-grey, mottled orange-brown, fine grained sand.</td>
</tr>
<tr>
<td>Silty CLAY</td>
<td>High plasticity, green-grey, mottled orange and pale grey, with some lenses of sand.</td>
</tr>
</tbody>
</table>

**Method & Support**

- M: mud support  
- N: nil  
- C: casing  

**Penetration**

- B: bulk disturbed sample  
- D: disturbed sample  
- E: environmental sample  
- SS: split spoon sample  
- US#: undisturbed sample #mm diameter  
- HP: hand penetrometer (kPa)  
- N*: SPT - sample recovered  
- Nc: SPT with solid cone  
- VS: vane shear; peak/menoudued (kPa)  
- R: refusal  
- HB: hammer bouncing  

**Consistency / Relative Density**

- VS: very soft  
- S: soft  
- F: firm  
- ST: stiff  
- VST: very stiff  
- H: hard  
- Fb: failable  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense  
- VD: very dense
**Silty CLAY**: high plasticity, green-grey, mottled orange and pale grey, with some lenses of sand. (continued)

Cemented sand band approximately 150mm thick

**SAND**: fine to medium grained, pale grey-brown, brown, with some fines.

**CLAYEY SAND**: fine to medium grained, brown, mottled red, low plasticity. becoming green-brown, green-grey

becoming dark brown-grey, green-brown

---

**TERTIARY BRIGHTON GROUP**

**CLAYEY SAND**: fine to medium grained, brown, mottled red, low plasticity.

becoming green-brown, green-grey
### Soil Type

**Material Description:**
- **Clayey Sand:** fine to medium grained, brown, mottled red, low plasticity.
- **Silty Sand:** fine grained, green-brown, green-grey, low liquid limit, with some clay pockets, grey, dark grey, medium plasticity.
- Cementsed band up to 50mm thick with some dark green mottling with some shell fragments
- Trace of cemented bands

### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

**Position:** E: 333,853.25, N: 5,788,624.58 (MGA94)  
**Surface Elevation:** 6.44 m (AHD)  
**Angle from Horizontal:** 90°  
**Drill Model:** Explora E50, Truck mounted  
**Drilling Fluid:** Polymer

### Drilling Information

<table>
<thead>
<tr>
<th>Sample &amp; Field Tests</th>
<th>Water</th>
<th>Soil Type</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 5, 2, 6 N=8</td>
<td>SC</td>
<td>Clayey Sand</td>
<td>Fine to medium grained, brown, mottled red, low plasticity. (continued)</td>
</tr>
<tr>
<td>SPT 2, 3, 3 N=18</td>
<td>SM</td>
<td>Silty Sand</td>
<td>Fine grained, green-brown, green-grey, low liquid limit, with some clay pockets, grey, dark grey, medium plasticity.</td>
</tr>
<tr>
<td>SPT 1, 6, 8 N=14</td>
<td></td>
<td></td>
<td>Cemented band up to 50mm thick with some dark green mottling with some shell fragments</td>
</tr>
<tr>
<td>SPT 2, 3, 5 N=8</td>
<td></td>
<td></td>
<td>Trace of cemented bands</td>
</tr>
</tbody>
</table>

### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**Classification Symbol & Soil Description**

- **Clayey Sand:** SC
- **Silty Sand:** SM

**Hand Penetrometer (kPa):**
- W MD

**Tertiary Brighton Group**

**Gellibrand Marl**

### Method & Support

- **Method:** NDD (Non-Destructive Drilling)
- **Support:** M (mud) N (nil) C (casing)
- **Penetration:** T (hand auger) TC (washbore) V (V bit)

### Additional Observations

- Trace of cemented bands
- Cementsed band up to 50mm thick with some dark green mottling with some shell fragments
- Cemented band with some dark green mottling
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH02  
**Logged by:** JLy  
**Checked by:** KJ  
**Date Started:** 20 Sep 2016  
**Date Completed:** 23 Sep 2016

#### Drilling Information

<table>
<thead>
<tr>
<th>Sl (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
<td>SM SILTY SAND: fine grained, green-brown, green-grey, low liquid limit, with some clay pockets, grey, dark grey, medium plasticity. (continued)</td>
</tr>
<tr>
<td>34.0</td>
<td>cemented band approximately 200mm thick</td>
</tr>
<tr>
<td>35.0</td>
<td>becoming grey-green, with some shell fragments and sand pockets</td>
</tr>
<tr>
<td>36.0</td>
<td>becoming pale grey-grey</td>
</tr>
</tbody>
</table>

#### SOIL TYPE

- Plasticity or particle characteristic, colour, secondary and minor components
- Material description
- Structure and additional observations

### Drilling Fluid

- Polymer

### Moisture Condition

- DMW: dry
- WP: wet
- PL: plastic limit
- LL: liquid limit

### Consistency / Relative Density

- VS: very soft
- S: soft
- F: firm
- S'F: stiff
- VS': very stiff
- H: hard
- Fb: failable
- M: medium dense
- D: dense
- VL: very loose
- L: loose

### Classification Symbol & Soil Description

- Based on Unified Classification System

### Additional Observations

- Water outflow
- Water inflow
- Penetration
- No resistance ranging to refusal
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

---

**Borehole ID:** ID18-BH02  
**sheet:** 6 of 6  
**project no.:** GEOTABTF10294AA  
**date started:** 20 Sep 2016  
**date completed:** 23 Sep 2016  
**logged by:** JLy  
**checked by:** KJ

---

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Water Inflow</th>
<th>Water Outflow</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td></td>
<td></td>
<td></td>
<td>Silty Sand</td>
</tr>
<tr>
<td>SPT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Gellibrand Marl**
  - borehole ID18-BH02 terminated at 45.05 m
  - target depth
  - standpipe installation
  - backfill details
  - 0.0m-1.3m: grout
  - 1.3m-6.3m: bentonite
  - 6.3m-10.5m: sand

- **Standpipe Details**
  - 0.0m-7.0m: unslotted 50mm PVC, Class 18
  - 7.0m-10.5m: machine slotted, filter sock covered, 50mm PVC, Class 18

- **End caps and flush mounted galic cover**

---

#### Drilling Fluid

- **Polymer**

---

#### SOIL TYPE

- **Plasticity or Particle Characteristic, Colour, Secondary and Minor Components**
- **Material Description**
- **Structure and Additional Observations**

---

#### Moisture

- **DM WWp Wl**
  - Dry
  - Moist
  - Wet

---

#### Consistency / Relative Density

- **VS**
  - Very Soft
- **S**
  - Soft
- **F**
  - Firm
- **ST**
  - Stiff
- **VST**
  - Very Stiff
- **H**
  - Hard
- **Fb**
  - Fissile
- **VL**
  - Very Loose
- **L**
  - Loose
- **MD**
  - Medium Dense
- **D**
  - Dense
- **VD**
  - Very Dense
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

#### Drilling Information

- **Borehole ID:** ID18-BH03  
- **Date started:** 26 Sep 2016  
- **Date completed:** 28 Sep 2016  
- **Logged by:** JLy  
- **Checked by:** KJ

**Surface Elevation:** 6.40m (AHD)  
**Angle from Horizontal:** 90°

**Drill Model:** Explora E50, Truck mounted  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 100mm

#### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>mud</td>
</tr>
<tr>
<td>C</td>
<td>casing</td>
</tr>
<tr>
<td>E</td>
<td>disturbed sample</td>
</tr>
<tr>
<td>N</td>
<td>nil</td>
</tr>
<tr>
<td>SS</td>
<td>split spoon sample</td>
</tr>
<tr>
<td>U#</td>
<td>undisturbed sample #; mm diameter</td>
</tr>
<tr>
<td>HP</td>
<td>hand penetrometer (kPa)</td>
</tr>
<tr>
<td>N</td>
<td>standard penetration test (SPT)</td>
</tr>
<tr>
<td>N*</td>
<td>SPT - sample recovered</td>
</tr>
<tr>
<td>NC</td>
<td>SPT with solid cone</td>
</tr>
<tr>
<td>VS</td>
<td>vane shear; peak/remoulded (kPa)</td>
</tr>
<tr>
<td>R</td>
<td>refusal</td>
</tr>
<tr>
<td>HB</td>
<td>hammer bouncing</td>
</tr>
</tbody>
</table>

**Consistency / Relative Density**

- **VS:** very soft
- **S:** soft
- **F:** firm
- **ST:** stiff
- **VST:** very stiff
- **H:** hard
- **Fal:** failure
- **VL:** very loose
- **L:** loose
- **MD:** medium dense
- **D:** dense
- **VD:** very dense

#### Material Substance

- **FILL:** ASPHALT; 50mm.
- **FILL:** CONCRETE; 100mm.
- **FILL:** Sandy GRAVEL: fine to coarse grained, angular, grey; fine to course grained, with some pockets of high plasticity, orange clay.
- **SAND:** fine to coarse grained, pale grey; becoming fine to medium grained, pale grey-brown
- **becoming brown, with some bands of dark brown**
- **trace of fine to medium grained gravel**
- **becoming pale brown**

---

**Additional Observations**

- **Classification Symbol & Soil Description:** based on Unified Classification System

---

**Additional Observations**

- **Moisture:**
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**Method & Support**

- **Method:** auger drilling, auger screwing, hand auger, washbore, non-destructive drilling
- **Support:** mud, casing, disturbed sample, environmental sample, split spoon sample, undisturbed sample #; mm diameter, hand penetrometer (kPa), standard penetration test (SPT), SPT - sample recovered, SPT with solid cone, vane shear; peak/remoulded (kPa), refusal, hammer bouncing

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**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**date started:** 26 Sep 2016  
**date completed:** 28 Sep 2016  
**logged by:** JLy  
**checked by:** KJ

<table>
<thead>
<tr>
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<td>Auger drilling</td>
<td>SAND: fine to coarse grained, pale grey. (continued)</td>
<td>with an organic odour</td>
</tr>
<tr>
<td>Auger screwing</td>
<td>SAND: fine to medium grained, green-grey, with some fines. becoming brown</td>
<td></td>
</tr>
<tr>
<td>Hand auger</td>
<td>SANDY CLAY: medium plasticity, green-grey, fine to medium grained sand.</td>
<td></td>
</tr>
<tr>
<td>Washbore</td>
<td>SANDY CLAY: low plasticity, green-grey, fine grained sand, with some pockets of fine to medium grained sand.</td>
<td></td>
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**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**structure and additional observations**

**method & support**
- Auger drilling
- Auger screwing
- Hand auger
- Washbore
- NDD non destructive drilling

**samples & field tests**
- B: bulk disturbed sample
- C: casing
- D: disturbed sample
- E: environmental sample
- F: fine spoon sample
- SS: split spoon sample
- UCS: undisturbed sample 45mm diameter
- HP: hand penetrometer (kPa)
- N: standard penetration test (SPT)
- N*: SPT - sample recovered
- Nc: SPT with solid cone
- T: hammer test (SPT)
- V: refusal
- VS: refusal
- W: water inflow
- WI: water inflow
- WI: refusal
- WB: water inflow

**classification symbol & soil description**
- VS: very soft
- S: soft
- F: firm
- St: stiff
- VSf: very stiff
- H: hard
- Fb: fixable
- VL: very loose
- L: loose
- MD: medium dense
- D: dense

**moisture**
- moisture content
- dry basis
- wet basis
- plastic limit
- liquid limit

**density**
- consistency / relative density
- very soft
- soft
- firm
- stiff
- very stiff
- hard
- fixable
- very loose
- loose
- medium dense
- dense

---

**graphic log**

- classification symbol: SP, CI, CH

- samples & field tests: water level, water inflow, water outflow, hammer test (SPT), refusal

- soil type: SAND, SANDY CLAY, CLAY, Silt Clays

- structural properties: plasticity, particle characteristics, colour, secondary and minor components

- environmental conditions: water inflow, water outflow, hammer test (SPT), refusal

---

**material description**

- SAND: fine to coarse grained, pale grey. (continued) with an organic odour
- SAND: fine to medium grained, green-grey, with some fines. becoming brown
- SANDY CLAY: medium plasticity, green-grey, fine to medium grained sand.
- SANDY CLAY: low plasticity, green-grey, fine grained sand, with some pockets of fine to medium grained sand.

---

**structure and additional observations**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **structure and additional observations:**
  - non destructive drilling
  - auger drilling
  - auger screwing
  - hand auger
  - washbore

---

**additional observations**

- **consistency / relative density:**
  - very soft
  - soft
  - firm
  - stiff
  - very stiff
  - hard
  - fixable
  - very loose
  - loose
  - medium dense
  - dense

---

**materials**

- **materials description:**
  - SAND: fine to coarse grained, pale grey. (continued) with an organic odour
  - SAND: fine to medium grained, green-grey, with some fines. becoming brown
  - SANDY CLAY: medium plasticity, green-grey, fine to medium grained sand.
  - SANDY CLAY: low plasticity, green-grey, fine grained sand, with some pockets of fine to medium grained sand.

---

**log information**

- **log information:**
  - method: auger drilling
  - support: M: mud, N: nil
  - penetration: C: casing, D: disturbed sample
  - samples & field tests: B: bulk disturbed sample
  - classification symbol: SP, CI, CH
  - structural properties: plasticity, particle characteristics, colour, secondary and minor components
  - environmental conditions: water inflow, water outflow, hammer test (SPT), refusal

---

**drilling information**

- **drilling information:**
  - method: auger drilling
  - support: M: mud, N: nil
  - penetration: C: casing, D: disturbed sample
  - samples & field tests: B: bulk disturbed sample
  - classification symbol: SP, CI, CH
  - structural properties: plasticity, particle characteristics, colour, secondary and minor components
  - environmental conditions: water inflow, water outflow, hammer test (SPT), refusal
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silty CLAY: high plasticity, brown-grey.</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>CLAYEY SAND: fine to medium grained, brown-grey, low plasticity.</td>
<td></td>
</tr>
<tr>
<td>SAND: fine to coarse grained, grey, brown, trace of clay pockets.</td>
<td></td>
</tr>
<tr>
<td>CLAYEY SAND: fine grained, pale grey, low plasticity.</td>
<td></td>
</tr>
<tr>
<td>CLAYEY SAND: fine grained, grey, bands of dark brown, green-brown, low plasticity.</td>
<td></td>
</tr>
</tbody>
</table>

**material description**

- **water**
  - samples & field tests
  - water outflow
  - water inflow
  - penetration
  - no resistance ranging to refusal
  - 10-Oct-12 water level on date shown
  - water inflow
  - water outflow

- **samples & field tests**
  - classification symbol
  - soil description
  - based on Unified Classification System

- **method & support**
  - M mud
  - N nil

- **penetration**
  - SPT

- **classification symbol & soil description**
  - consistency / relative density
  - moisture
  - CDF_0_9_06_LIBRARY.GLB rev:AS  Log  COF BOREHOLE: NON CORED  GEOTABTF10294AA_ID18.GPJ  <<DrawingFile>>  02/06/2017 17:14
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

---

**surface elevation:** 6.40 m (AHD)  
**angle from horizontal:** 90°

---

**method:** Explora E50, Truck mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm

---

**method & support:**  
- AD: auger drilling  
- AS: auger screwing  
- HA: hand auger  
- W: washout  
- NDD: non destructive drilling

---

**samples & field tests:**  
- B: bulk disturbed sample  
- D: disturbed sample  
- E: environmental sample  
- SS: split spoon sample  
- US#d: undisturbed sample #4mm diameter  
- HP: hand penetrometer (kPa)  
- N: standard penetration test (SPT)  
- N*: SPT - sample recovered  
- Nc: SPT with solid cone  
- VS: vane shear; peak/remoued (kPa)  
- R: refusal  
- HB: hammer bouncing

---

**material description:**  
- CLAYEY SAND: fine grained, grey, bands of dark brown, green-grey, low plasticity. (continued)  
- SILTY SAND: fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel.  
- gravel becoming cemented

---

**material type:** Plasticity or particle characteristic, colour, secondary and minor components  
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---

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---

**consistency / relative density:**  
- VS: very soft  
- S: soft  
- F: firm  
- ST: stiff  
- VSt: very stiff  
- H: hard  
- Fa: flake  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense  
- VD: very dense

---

**moisture:**  
- D: dry  
- M: moist  
- W: wet  
- WP: plastic limit  
- WI: liquid limit

---

**drill model:** Explora E50, Truck mounted  
**angle from horizontal:** 90°  
**hole diameter:** 100 mm

---

**depth:**  
- 25.0  
- 26.0  
- 27.0  
- 28.0  
- 29.0  
- 30.0  
- 31.0

---

**support:**  
- M: mud  
- N: nil  
- C: casing  
- W: washout  
- S: soil  
- U: unknown

---

**penetration:**  
- B: bulk disturbed sample  
- D: disturbed sample  
- E: environmental sample  
- SS: split spoon sample  
- US#d: undisturbed sample #4mm diameter  
- HP: hand penetrometer (kPa)  
- N: standard penetration test (SPT)  
- N*: SPT - sample recovered  
- Nc: SPT with solid cone  
- VS: vane shear; peak/remoued (kPa)  
- R: refusal  
- HB: hammer bouncing

---

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

---

**moisture condition:**  
- DM: dry  
- WW: wet  
- pW: plastic limit  
- WD: wet  
- MDD: medium dense  
- VSA: very soft  
- VS: soft  
- S: stiff  
- H: hard  
- VS: very soft  
- Fa: flake  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense  
- VD: very dense

---

**additional observations:**

---

**structure & additional observations:**

---

**graph:**

---

**sheet:** 4 of 6  
**project no:** GEOTABTF10294AA  
**date started:** 26 Sep 2016  
**date completed:** 28 Sep 2016  
**logged by:** JLy  
**checked by:** KJ
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

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<td>trace of medium to coarse grained gravel with some brown cemented layers</td>
</tr>
<tr>
<td><strong>GELLIBRAND MARL</strong></td>
<td>50mm cemented layer</td>
</tr>
<tr>
<td>50mm cemented layer becoming pale green grey, trace of shells</td>
<td></td>
</tr>
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**Borehole ID:** ID18-BH03  
**date started:** 26 Sep 2016  
**date completed:** 28 Sep 2016  
**logged by:** JLy  
**checked by:** KJ

<table>
<thead>
<tr>
<th>method &amp; support</th>
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<tbody>
<tr>
<td>AD</td>
<td>10-Oct-12 water</td>
<td>level on date shown</td>
<td>water inflow</td>
<td>water outflow</td>
<td>no resistance ranging to refusal</td>
</tr>
<tr>
<td>AS</td>
<td>blank bit</td>
<td></td>
<td></td>
<td></td>
<td>10-Oct-12 water</td>
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<td></td>
<td></td>
<td>10-Oct-12 water</td>
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<td></td>
<td></td>
<td></td>
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<td>10-Oct-12 water</td>
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<tr>
<td>NDD</td>
<td></td>
<td></td>
<td></td>
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**method:** auger drilling*  
**support:** M mud  
**penetration:** N nil  
**samples & field tests:** B bulk disturbed sample  
**classification symbol:** SP  
**material description:** SILTY SAND: fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel. (continued) trace of medium to coarse grained gravel with some brown cemented layers  
**structure and additional observations:** GELLIBRAND MARL  

**moisture:** moisture |

**dry:** D  
**wet:** W  
**fluid:** Fb  
**very loose:** VL  
**loose:** L  
**medium dense:** MD  
**dense:** D  
**very dense:** VD

**consistency / relative density:** consistency / relative density |

**very soft:** VS  
**soft:** S  
**firm:** F  
**stiff:** ST  
**very stiff:** VST  
**hard:** H  
**frangible:** Fb  
**very loose:** VL  
**loose:** L  
**medium dense:** MD  
**dense:** D  
**very dense:** VD

**classification symbol & soil description:** soil description |

**based on Unified Classification System**  

**Wp** plastic limit  
**Wi** liquid limit
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH03  
**date started:** 26 Sep 2016  
**date completed:** 28 Sep 2016  
**logged by:** JLy  
**checked by:** KJ

**Borehole ID:** ID18-BH03 terminated at 47.85 m

**SOIL TYPE:** GELLIBRAND MARL

**material description:** Silty sand: fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel.

---

**Method & Support**

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<td>34</td>
<td>SP</td>
<td>N=24</td>
<td>SILTY SAND: fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel.</td>
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<td>SPT 12, 16, 23</td>
<td>35</td>
<td>SP</td>
<td>N=39</td>
<td></td>
</tr>
<tr>
<td>SPT 7, 12, 16, 23</td>
<td>37</td>
<td>SP</td>
<td>N=39</td>
<td></td>
</tr>
<tr>
<td>SPT 14, 26, 29, 30</td>
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<td>SP</td>
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**material description:** Silty sand: fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel.

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<th>penetration</th>
<th>water</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 7, 9, 15</td>
<td>34</td>
<td>SP</td>
<td>N=24</td>
<td>SILTY SAND: fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel.</td>
</tr>
<tr>
<td>SPT 12, 16, 23</td>
<td>35</td>
<td>SP</td>
<td>N=39</td>
<td></td>
</tr>
<tr>
<td>SPT 7, 12, 16, 23</td>
<td>37</td>
<td>SP</td>
<td>N=39</td>
<td></td>
</tr>
<tr>
<td>SPT 14, 26, 29, 30</td>
<td>39</td>
<td>SP</td>
<td>N=40</td>
<td></td>
</tr>
</tbody>
</table>

**material description:** Silty sand: fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel.

---

**Method & Support**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>penetration</th>
<th>water</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
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<tbody>
<tr>
<td>SPT 7, 9, 15</td>
<td>34</td>
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<td>SILTY SAND: fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel.</td>
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<td>SPT 12, 16, 23</td>
<td>35</td>
<td>SP</td>
<td>N=39</td>
<td></td>
</tr>
<tr>
<td>SPT 7, 12, 16, 23</td>
<td>37</td>
<td>SP</td>
<td>N=39</td>
<td></td>
</tr>
<tr>
<td>SPT 14, 26, 29, 30</td>
<td>39</td>
<td>SP</td>
<td>N=40</td>
<td></td>
</tr>
</tbody>
</table>

**material description:** Silty sand: fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel.
Engineering Log - Borehole

Borehole ID.

ID18-BH04

sheet:

1 of 6

project no.

client:

Metro Trains Melbourne

date started:

GEOTABTF10294AA
22 Sep 2016

principal:

Level Crossing Removal Authority

date completed:

27 Sep 2016

project:

LCRP-CTF

logged by:

BK/LW

location:

ID18 - Edithvale Road, Edithvale

checked by:

KJ

position: E: 333,950.94; N: 5,788,425.73 (MGA94 )

surface elevation: 6.55 m (AHD)

angle from horizontal: 90°

drill model: Ausroc 9000, Truck mounted

drilling fluid: Polymer

hole diameter : 100 mm

23/09/16

NDD

E

SP

FILL: ASPHALT: 50mm.
FILL: CONCRETE: 200mm.
FILL: Sandy GRAVEL: fine to coarse grained,
angular, brown, fine to coarse grained sand.
SAND: fine to medium grained, pale grey.

hand
penetrometer

structure and
additional observations

(kPa)
100
200
300
400

SOIL TYPE: plasticity or particle characteristic,
colour, secondary and minor components

consistency /
relative density

material description
moisture
condition

classification
symbol

6

FILL
M

VD

D

L

1.0

E

SPT
2, 3, 4
N*=7

graphic log

RL (m)

samples &
field tests

depth (m)

material substance

water

penetration
1
2
3

method &
support

drilling information

PID: 0.1 ppm
QUATERNARY SANDS
PID: 0.1 ppm

5

becoming fine to coarse grained, pale brown, trace
of fines

MD

4

3.0

SPT
4, 6, 7
N*=13

D - VD

3

N

4.0

SPT
8, 13, 16
N*=29
2
W

5.0

SPT
7, 13, 16
N*=29

becoming brown, dark brown

M-W

D

1

6.0

0

becoming pale brown
7.0

SPT
7, 10, 11
N*=21
-1

method
AD
auger drilling*
AS
auger screwing*
HA
hand auger
W
washbore
NDD non destructive drilling

*
e.g.
B
T
V

bit shown by suffix
AD/T
blank bit
TC bit
V bit

support
M mud
C casing

N nil

penetration
1
2
3

CDF_0_9_06_LIBRARY.GLB rev:AS Log COF BOREHOLE: NON CORED GEOTABTF10294AA_ID18.GPJ <<DrawingFile>> 02/06/2017 17:14

2.0

no resistance
ranging to
refusal

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

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

classification symbol &
soil description
based on Unified
Classification System
moisture
D
dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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


### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH04  
**date started:** 22 Sep 2016  
**date completed:** 27 Sep 2016  
**logged by:** BK/LW  
**checked by:** KJ

#### Drilling Information
- **Method & Support:**
  - AD - auger drilling  
  - AS - auger screwing  
  - HA - hand auger  
  - W - wash hose  
- **NDD - Non Destructive Drilling:**
  - M - mud  
  - N - nil  
  - C - casing  
  - D - disturbed sample  
  - E - environmental sample  
  - SS - split spoon sample  
  - U - undisturbed sample  
  - HP - hand penetrometer (kPa)  
  - N - standard penetration test (SPT)  
  - VS - vane shear  
  - VB - hammer bouncing

#### Material Substance
- **SOIL TYPE:**
  - Classification symbol & soil description  
  - Consistency / relative density  
  - Moisture & additional observations

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Samples &amp; Field Tests</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>SPT 10,13,12 N=25</td>
<td>SP SAND: fine to medium grained, pale grey.</td>
</tr>
<tr>
<td>3.0</td>
<td>SPT 11,17,24 N=41</td>
<td>becoming pale grey</td>
</tr>
<tr>
<td>4.0</td>
<td>SPT 25,1040mm HB</td>
<td>becoming dark brown</td>
</tr>
<tr>
<td>5.0</td>
<td>SPT 13,15,20 N=35</td>
<td>SC CLAYEY SAND: fine to coarse grained, pale grey, medium plasticity.</td>
</tr>
<tr>
<td>6.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Position:** E: 333.950.94; N: 5,788.425.73 (MGA94)  
**Surface Elevation:** 6.55 m (AHD)  
**Angle from Horizontal:** 90°  
**Drill Model:** Ausroc 9000, Truck mounted  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 100 mm

---

**classification symbol & soil description**
- **Based on Unified Classification System**
  - **MOISTURE & ADDITIONAL OBSERVATIONS**
    - **CONSISTENCY / RELATIVE DENSITY**
      - **VS:** very soft  
      - **S:** soft  
      - **F:** firm  
      - **ST:** stiff  
      - **VST:** very stiff  
      - **H:** hard  
      - **Fb:** friable  
      - **VL:** very loose  
      - **L:** loose  
      - **MD:** medium dense  
      - **D:** dense  
      - **VD:** very dense

---

**Additional Observations:**
- **Structure and Additional Observations**
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH04  
**date started:** 22 Sep 2016  
**date completed:** 27 Sep 2016  
**logged by:** BK/LW  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td>N=20</td>
<td>SC</td>
<td>CLAYEY SAND: fine to coarse grained, pale grey, medium plasticity. (continued)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT</td>
<td>N=41</td>
<td>SC</td>
<td>CLAYEY SAND: fine to coarse grained, pale grey mottled brown, medium plasticity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT</td>
<td>N=34</td>
<td>SP</td>
<td>SAND: fine to coarse grained, pale grey mottled brown, trace of fines.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT</td>
<td>N=8R</td>
<td>SP</td>
<td>becoming fine grained sand with some fines</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Material Substance

<table>
<thead>
<tr>
<th>Water</th>
<th>Consistency/Relative Density</th>
<th>Moisture</th>
<th>Sample Type</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>DMWWpWldry</td>
<td></td>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
</tbody>
</table>

#### Support

- M: mud  
- N: nil  
- C: casing  
- D: disturbed sample  
- E: environmental sample  
- SS: split spoon sample  
- U#: undisturbed sample  
- HP: hand penetrometer (kPa)  
- N: standard penetration test (SPT)  
- N*: SPT - sample recovered  
- Nc: SPT with solid cone  
- VS: vane shear; peak/remoulded (kPa)  
- R: refusal  
- HB: hammer bouncing  

#### Classification Symbol & Soil Description

- VS: very soft  
- S: soft  
- F: firm  
- St: stiff  
- VS: very stiff  
- H: hard  
- Fb: friable  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense  
- VD: very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>classification symbol</th>
<th>material description</th>
<th>hand penetration (kPa)</th>
<th>structure and additional observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>SP</td>
<td>SAND: fine to coarse grained, pale grey mottled brown, trace of fines. (continued)</td>
<td>W MD</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>25.0</td>
<td></td>
<td>becoming pale grey, pale brown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.0</td>
<td>SC SM</td>
<td>SILTY SAND / CLAYEY SAND: fine grained, dark grey - dark brown, low plasticity, with some dark grey clay bands, medium to high plasticity.</td>
<td>M - W L - MD</td>
<td>GELLIBRAND MARL</td>
</tr>
<tr>
<td>29.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**drilling information**

- **position:** E: 333,950.94; N: 5,788,425.73 (MGA94)  
- **surface elevation:** 6.55 m (AHD)  
- **angle from horizontal:** 90°  
- **drill model:** Ausroc 9000, Truck mounted  
- **drilling fluid:** Polymer  
- **hole diameter:** 100 mm

**material substance**

- **material description**
  - SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
  - CONSISTENCY / RELATIVE DENSITY
  - MOISTURE
  - CONSISTENCY / RELATIVE DENSITY

**samples & field tests**

- **samples & field tests**
  - B: bulk disturbed sample
  - C: casing
  - D: disturbed sample
  - E: environmental sample
  - SS: split spoon sample
  - U#: undisturbed sample #1mm diameter
  - HP: hand penetrometer (kPa)
  - N: standard penetration test (SPT)
  - N*: SPT - sample recovered
  - Nc: SPT with solid cone
  - VS: vane shear; peak/remoulded (kPa)
  - R: refusal
  - HB: hammer bouncing

**method & support**

- **method & support**
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger
  - W: washbore
  - NDD: non destructive drilling
  - AD/T: AD auger drilling
  - LS: soil boring
  - TB: TC bit
  - VB: V bit

**penetration**

- **penetration**
  - no resistance ranging to refusal
  - 10-Oct-12 water level on date shown
  - water inflow
  - water outflow

**Borehole ID:** ID18-BH04  
**date started:** 22 Sep 2016  
**date completed:** 27 Sep 2016  
**logged by:** BK/LW  
**checked by:** KJ
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**position:** E: 333,950.94; N: 5,788,425.73 (MGA94)  
**surface elevation:** 6.55 m (AHD)  
**angle from horizontal:** 90°

**drill model:** Ausroc 9000, Truck mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC-SM</td>
<td>SILTY SAND / CLAYEY SAND: fine grained, dark grey - dark brown, low plasticity, with some dark grey clay bands, medium to high plasticity. (continued)</td>
</tr>
<tr>
<td></td>
<td>Sandy SILT: low liquid limit, dark green, fine to coarse grained sand.</td>
</tr>
</tbody>
</table>

**trace of medium to coarse grained, cemented sandy gravel**

**with some pockets of clayey sand**

**SPT sunk 300mm under hammer weight**
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**Borehole ID:** ID18-BH04  
**date started:** 22 Sep 2016  
**date completed:** 27 Sep 2016  
**logged by:** BK/LW  
**checked by:** KJ

### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>penetration</th>
<th>water</th>
<th>samples &amp; field tests</th>
<th>SOIL TYPE</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>non destructive drilling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD/T</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>surface elevation: 6.55 m (AHD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>angle from horizontal: 90°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hole diameter: 100 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Material Substance

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>SI (m)</th>
<th>graphic log</th>
<th>classification symbol</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0-9.5m</td>
<td></td>
<td>SPT 16, 9, 11 N°=25</td>
<td>ML</td>
<td>Sandy SILT: low liquid limit, dark green, fine gained sand, with some shell fragments and bands of coarse grained, clayey sand.</td>
<td></td>
</tr>
<tr>
<td>9.5-10.5m</td>
<td></td>
<td>SPT 7, 16, 24 N°=40</td>
<td></td>
<td>becoming grey, green-grey, mottled orange-brown</td>
<td></td>
</tr>
<tr>
<td>10.5-14.0m</td>
<td></td>
<td>SPT 11, 22, 27 N°=49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0-15.0m</td>
<td></td>
<td>SPT 9, 17, 25 N°=42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0-16.0m</td>
<td></td>
<td>SPT 10, 19, 26 N°=45</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Drilling Fluid

- **Polymer**

### Borehole Details

- **Terminated at 46.45 m**
- **Target depth**
- **Standpipe installation**
- **Backfill details**
- **0.0m-9.5m: grout**
- **9.5m-10.5m: PVC, Class 18**
- **11.0m-14.0m: machine slotted, filter sock covered, 50mm PVC, Class 18**
- **End caps and flush mounted gatric cover**

### Soil Description

- **GELLIBRAND MARL**
- U63 attempted, no penetration

### Soil Testing

- **SPT:** Standard penetration test (SPT) with solid cone
- **SPT - sample recovered**
- **Nc:** SPT with solid cone
- **HP:** Hand penetrometer (kPa)
- **N**
- **N°:** SPT - sample recovered
- **VS:** Vane shear; peak/remoulded (kPa)
- **R:** Refusal
- **HB:** Hammer bouncing

### Moisture

- **DM:** Dry (kPa)
- **WM:** Wet (kPa)
- **PL:** Plastic limit (kPa)
- **LL:** Liquid limit (kPa)

### Consistency / Relative Density

- **VS:** Very soft
- **S:** Soft
- **F:** Firm
- **ST:** Stiff
- **VST:** Very stiff
- **H:** Hard
- **Plasticity Index (PI):**
  - **D:** Dense
  - **L:** Loose
  - **MD:** Medium dense
  - **V:** Very loose

### Drilling Fluids

- **Polymer**

### Additional Observations

- **No resistance ranging to refusal**

---

**CDF_0_9_06_LIBRARY.GLB rev:** AS  Log  COF BOREHOLE: NON CORED  GEOTABTF10294AA_ID18.GPJ  <<DrawingFile>>  02/06/2017 17:14
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

**Position:**  
E: 333,996.11; N: 5,788,333.77 (MGA94)  
surface elevation: 6.49 m (AHD)  
angle from horizontal: 90°

**Drilling Information**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>classification symbol</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>SP</td>
<td>FILL: ASPHALT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150mm.</td>
</tr>
<tr>
<td>0.5</td>
<td>SPT3, 4, 5 N=9</td>
<td>FILL: Sandy GRAVEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fine to coarse grained, angular, grey brown, fine to coarse grained sand.</td>
</tr>
<tr>
<td>1.0</td>
<td>SPT4, 4, 6 N=10</td>
<td>SAND: fine to medium grained, pale grey.</td>
</tr>
<tr>
<td>2.0</td>
<td>SPT8, 10, 13 N=23</td>
<td>becoming pale grey, pale brown</td>
</tr>
<tr>
<td>3.0</td>
<td>SPT8, 16, 21 N=37</td>
<td>becoming fine to medium grained, brown</td>
</tr>
<tr>
<td>4.0</td>
<td>SPT4, 6, 11 N=17</td>
<td>becoming brown to dark brown, with some coarse grained quartz gravel</td>
</tr>
<tr>
<td>5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Material Substance**

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**Consistency / relative density**

- **D:** dry  
- **W:** wet  
- **Moist:** moist

**Consistency / relative density**

- **VS:** very soft  
- **V:** soft  
- **S:** firm  
- **ST:** stiff  
- **VS:** very stiff  
- **H:** hard  
- **Fb:** friable  
- **VL:** very loose  
- **L:** loose  
- **MD:** medium dense  
- **D:** dense  
- **VD:** very dense

**Sample & Field Tests**

- **M:** mud  
- **C:** casing  
- **E:** environmental sample  
- **H:** hand penetrometer (kPa)  
- **S:** split spoon sample  
- **H:** hammer bounce (kPa)

**Soil Description**

- **FILL:** Sandy GRAVEL: fine to coarse grained, angular, grey brown, fine to coarse grained sand.
- **SAND:** fine to medium grained, pale grey.
- **becoming pale grey, pale brown**
- **becoming fine to medium grained, brown**
- **becoming brown to dark brown, with some coarse grained quartz gravel**

---

**Technical Details**

- **Drill Model:** Explora E50, Truck mounted  
- **Drilling Fluid:** Polymer  
- **Angle from Horizontal:** 90°  
- **Hole Diameter:** 100 mm

---

**Location Details**

- **Latitude:** 33.399611  
- **Longitude:** 5.78833377 (MGA94)  
- **Surface Elevation:** 6.49 m (AHD)  
- **Drill Model:** Explora E50, Truck mounted  
- **Drilling Fluid:** Polymer  
- **Angle from Horizontal:** 90°  
- **Hole Diameter:** 100 mm

---

**Additional Observations**

- **Quaternary Sands**

---

**Checked by:** KJ  
**Logged by:** OP  
**Date Started:** 29 Sep 2016  
**Date Completed:** 05 Oct 2016
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**date started:** 29 Sep 2016  
**date completed:** 05 Oct 2016  
**logged by:** OP  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Sl (m)</th>
<th>Method &amp; Support</th>
<th>Materials Substance</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
<th>Structure and Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>SPT 7, 7, 7 N=14</td>
<td>SP</td>
<td>SAND: fine to medium grained, pale grey. (continued)</td>
<td></td>
</tr>
<tr>
<td>-3</td>
<td>U43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>SPT 10, 17, 26 N=43</td>
<td>SM</td>
<td>SILTY SAND: fine to medium grained, dark grey, medium liquid limit.</td>
<td></td>
</tr>
<tr>
<td>-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>SPT 20, 26/90mm</td>
<td>SM</td>
<td>SILTY SAND: fine grained, grey, medium liquid limit.</td>
<td></td>
</tr>
<tr>
<td>-6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0</td>
<td>SPT 2, 4, 6 N=10</td>
<td>CI</td>
<td>Sandy CLAY: medium plasticity, grey, green, mottled brown, fine grained sand.</td>
<td></td>
</tr>
<tr>
<td>-8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Soil Type and Material Description

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components.
- **Structure and Additional Observations:**

#### Drilling Method and Support

- **Method & Support:**
  - AD auger drilling
  - AS auger screwing
  - HA hand auger
  - W washbore
  - NDD non destructive drilling

#### Materials Substance

- **SOIL TYPE:**
  - SAND: fine to medium grained, pale grey.
  - SILTY SAND: fine to medium grained, dark grey, medium liquid limit.
  - CL Silty CLAY: low plasticity, grey to dark grey, with some fine grained sand.
  - SILTY SAND: fine grained, grey, medium liquid limit.
  - SAND: fine to coarse grained, grey.
  - Sandy CLAY: medium plasticity, grey, green, mottled brown, fine grained sand.

#### Additional Observations

- With some shell fragments

---

**Additional Observations:**

- No resistance ranging to refusal
- 10-Oct-12 water level on date shown
- Water inflow
- Water outflow
- Moisture: dry, moist, wet
- Moisture condition: dry, moist, wet
- SPT: sample recovered
- SPT with solid cone
- Refusal
- Hammer bouncing

---

**Consistency / Relative Density:**

- VS very soft
- S soft
- F firm
- ST stiff
- VST very stiff
- H hard
- Fo fragile
- VL very loose
- L loose
- MD medium dense
- D dense
# Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**date started:** 29 Sep 2016  
**date completed:** 05 Oct 2016  
**logged by:** OP  
**checked by:** KJ

## Drilling Information

**Borehole ID:** ID18-BH05  
**log number:** GEOTABTF10294AA  
**date:** 29 Sep 2016  
**project:** LCPR-CTF  
**description:** Engineering Log - Borehole

## Material Substance

**SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components  
**material description:**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>penetration</th>
<th>water</th>
<th>samples &amp; field tests</th>
<th>soil type</th>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>M = mud</td>
<td>N = nil</td>
<td>B = bulk disturbed sample</td>
<td>VS = very soft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AS</td>
<td>H = hard</td>
<td>W = washboard</td>
<td>D = disturbed sample</td>
<td>S = soft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td>N = nil</td>
<td>W = washboard</td>
<td>E = environmental sample</td>
<td>F = firm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>N = nil</td>
<td>W = washboard</td>
<td>SS = split spoon sample</td>
<td>ST = stiff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
<td>HP = hand penetrometer (kPa)</td>
<td>V = very stiff</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**classification symbol:**

<table>
<thead>
<tr>
<th>classification symbol</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI Sandy CLAY: medium plasticity, grey, green, mottled brown, fine grained sand. (continued)</td>
<td>becoming grey, green</td>
</tr>
<tr>
<td>CH Sandy CLAY: high plasticity, pale grey blue, mottled green-brown, fine to medium grained sand, becoming brown, coarse grained sand, with some fine grained gravel</td>
<td>becoming red, brown, cemented</td>
</tr>
</tbody>
</table>

**additional observations:**

- **TERTIARY BRIGHTON GROUP**
  - **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components
  - **material description:**
    - **SOIL TYPE:** Silty Sand: fine grained, pale grey blue, low liquid limit.
  - **additional observations:**
    - **structure and additional observations:**
      - **hand penetrometer:**
        - **VSSF:** very soft
        - **St:** stiffer
        - **MD:** medium dense

## Drilling Details

**position:** E: 333,996.11; N: 5,788,333.77 (MGA94)  
**surface elevation:** 6.49 m (AHD)  
**angle from horizontal:** 90°  
**drill model:** Explora E50, Truck mounted  
**drilling fluid:** Polymer

**drilling fluid:**

<table>
<thead>
<tr>
<th>water</th>
<th>consistent / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMW</td>
<td>dry</td>
</tr>
<tr>
<td>WP</td>
<td>wet</td>
</tr>
<tr>
<td>VS</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
</tbody>
</table>

**method & support:**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>penetration</th>
<th>water</th>
<th>samples &amp; field tests</th>
<th>classification symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>M = mud</td>
<td>N = nil</td>
<td>B = bulk disturbed sample</td>
<td>CI Sandy CLAY: medium plasticity, grey, green, mottled brown, fine grained sand. (continued)</td>
</tr>
<tr>
<td>AS</td>
<td>H = hard</td>
<td>W = washboard</td>
<td>D = disturbed sample</td>
<td>CH Sandy CLAY: high plasticity, pale grey blue, mottled green-brown, fine to medium grained sand, becoming brown, coarse grained sand, with some fine grained gravel</td>
</tr>
<tr>
<td>HA</td>
<td>N = nil</td>
<td>W = washboard</td>
<td>E = environmental sample</td>
<td>VS = very soft</td>
</tr>
<tr>
<td>W</td>
<td>N = nil</td>
<td>W = washboard</td>
<td>SS = split spoon sample</td>
<td>S = soft</td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
<td>HP = hand penetrometer (kPa)</td>
<td>F = firm</td>
<td></td>
</tr>
</tbody>
</table>

**additional observations:**

- **structure and additional observations:**
  - **hand penetrometer:**
    - **VSSF:** very soft
    - **St:** stiffer
    - **MD:** medium dense

**additional observations:**

- **structure and additional observations:**
  - **hand penetrometer:**
    - **VSSF:** very soft
    - **St:** stiffer
    - **MD:** medium dense

## Soil Descriptions

**SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components

1. **Sandy CLAY:**
   - medium plasticity, grey, green, mottled brown, fine grained sand.
   - becoming grey, green

2. **Sandy CLAY:**
   - high plasticity, pale grey blue, mottled green-brown, fine to medium grained sand, becoming brown, coarse grained sand, with some fine grained gravel

3. **Silty SAND:**
   - fine grained, pale grey blue, low liquid limit.
   - very soft, soft, firm, stiff, hard, friable, very loose, loose, medium dense, dense, very dense
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>plasticity or particle characteristic, colour, secondary and minor components</th>
<th>material description</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SILTY SAND</td>
<td>fine grained, brown, low liquid limit. (continued)</td>
<td>with some fine to coarse grained cemented gravel layers</td>
<td>W MD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>red brown cemented layer, 30mm thick</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Silty CLAY: high plasticity, grey, with some gravel.</td>
<td>GELIBRAND MARL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SILTY SAND: fine grained, grey, low liquid limit.</td>
<td></td>
</tr>
</tbody>
</table>

**Drilling Information**

- **Method & Support:**  
- **Penetration:**
- **Samples & Field Tests:**
- **Classification Symbol:**
- **Material Description:**
- **Material Substance:**
- **Consistency / Relative Density:**
- **Moisture:**
- **Conservation:**
- **Hand Penetrometer:**
- **Soil Description:**
- **Penetration Test:**
- **Soil Test:**
- **Additional Observations:**

**Drilling Fluid:** Polymer

**Drill Model:** Explora E50, Truck mounted

**Angle from horizontal:** 90°

**Drilling Fluid:** Polymer

**Hole Diameter:** 100 mm

**Surface Elevation:** 6.49 m (AHD)

**Angle from horizontal:** 90°
Engineering Log - Borehole

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: ID18 - Edithvale Road, Edithvale

Borehole ID: ID18-BH05

---

**SOIL TYPE**

<table>
<thead>
<tr>
<th>classification symbol</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>SILTY SAND: fine grained, grey, low liquid limit. (continued)</td>
</tr>
<tr>
<td></td>
<td>becoming grey, green, with some fine to course grained gravel.</td>
</tr>
<tr>
<td>ML</td>
<td>Gravelly SILT: medium liquid limit, dark green, grey, fine to coarse grained gravel.</td>
</tr>
<tr>
<td>ML</td>
<td>Sandy SILT: medium liquid limit, dark green, grey, fine grained sand, with some gravel.</td>
</tr>
<tr>
<td></td>
<td>with some interbedded gravelly clay bands</td>
</tr>
<tr>
<td>SM</td>
<td>SILTY SAND: medium liquid limit, dark green, grey, coarse grained sand, with some fine grained gravel and shell fragments.</td>
</tr>
</tbody>
</table>

---

**Support**

- M: mud
- N: nil
- C: casing

---

**samples & field tests**

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

---

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

- VS: very stiff
- S: stiff
- F: firm
- M: moist
- W: wet
- WP: plastic limit
- WI: liquid limit
- VS: very soft
- S: soft
- F: firm
- M: moist
- W: wet
- WP: plastic limit
- WI: liquid limit

---

**fluid**

- Polymer

---

**penetration**

- 5 Oct -12 water level on date shown
- Water inflow
- Water outflow

---

**method & support**

- AD: auger drilling
- AS: auger screwing
- HA: hand auger
- W: wash boring
- NDD: non destructive drilling

---

**Consistency / relative density**

- very soft
- soft
- firm
- stiff
- very stiff
- hard
- friable
- very loose
- loose
- medium dense
- dense

**Location**

- E: 333.996.11; N: 5,788,333.77 (MGA94) 
- Surface elevation: 6.49 m (AHD)
- Angle from horizontal: 90°
- Hole diameter: 100 mm

---

**logging information**

<table>
<thead>
<tr>
<th>date started</th>
<th>date completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 Sep 2016</td>
<td>05 Oct 2016</td>
</tr>
</tbody>
</table>

---

**project:** LCRP-CTF

---

**client:** Metro Trains Melbourne

---

**principal:** Level Crossing Removal Authority

---

**location:** ID18 - Edithvale Road, Edithvale

---

**reference:** CDF_0_9_06_LIBRARY.GLB rev: AS  Log  COF BOREHOLE: NON CORED  GEOTABTF10294AA_ID18.GPJ  <<DrawingFile>>  02/06/2017 17:14
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Project:** Level Crossing Removal Authority  
**Location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Borehole ID</th>
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<tbody>
<tr>
<td>Sheet no.</td>
<td>6 of 6</td>
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<tr>
<td>Project no.</td>
<td>GEOTABTF10294AA</td>
</tr>
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</table>

**Drilling Information**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.0</td>
<td>SILTY SAND: medium liquid limit, dark green grey, coarse grained sand, with some fine grained gravel and shell fragments. (continued) grading to SANDY SILT</td>
</tr>
<tr>
<td>42.0</td>
<td></td>
</tr>
<tr>
<td>43.0</td>
<td></td>
</tr>
<tr>
<td>44.0</td>
<td></td>
</tr>
<tr>
<td>45.0</td>
<td></td>
</tr>
</tbody>
</table>

**Material Description**

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components.
- **Sample & Field Tests:** Water outflow, water inflow, penetration.

**Classification Symbol & Soil Description**

- **Classification Symbol:** SM
- **Soil Description:** GELLIBRAND MARL

**Consistency & Relative Density**

- **Moisture & Consistency:** Various values
- **Relative Density:** Various values

**Logging Information**

- **Method:** SPT
- **Support:** M (mud), N (nil)
- **Samples & Field Tests:** B (bulk disturbed sample), D (disturbed sample), E (environmental sample), SS (split spoon sample), U# (undisturbed sample, #10mm diameter), N (standard penetration test (SPT)), N* (SPT - sample recovered), Nc (SPT with solid cone), VS (vane shear; peak/remoulded (kPa)), R (refusal), HB (hammer bouncing)

**Logging Details**

- **Depth (m):** Various values
- **Drilling Fluid:** Polymer
- **Surface Elevation:** 6.49 m (AHD)
- **Angle from Horizontal:** 90°
- **Hole Diameter:** 100 mm

**Notes:**

- SPT terminated during second increment due to equipment failure. Recorded SPT blows 12, 11/10mm
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

### Drilling Information

- **Borehole ID:** ID18-BH06  
- **Date started:** 12 Oct 2016  
- **Date completed:** 14 Oct 2016  
- **Logged by:** OP  
- **Checked by:** KJ

### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components  
**material description**

- **FILL:** ASPHALT: 100mm.  
- **FILL:** Sandy GRAVEL: fine to coarse grained, angular, dark grey, trace of cobbles.  
- **SAND:** fine to medium grained, pale grey.

**penetration**

- becoming grey  
- becoming medium to coarse grained, brown to dark brown, with some gravel  
- becoming fine to medium grained, pale brown

### Consistency / Relative Density

- **moisture**
- **consistent / relative density**
  - **VS** very soft  
  - **S** soft  
  - **F** firm  
  - **ST** stiff  
  - **VSt** very stiff  
  - **H** hard  
  - **Fb** fissile  
  - **VL** very loose  
  - **L** loose  
  - **MD** medium dense  
  - **D** dense

### Additional Observations

- **wet**
- **plastic limit**
- **liquid limit**

---

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components  
**material description**

- **FILL:** ASPHALT: 100mm.  
- **FILL:** Sandy GRAVEL: fine to coarse grained, angular, dark grey, trace of cobbles.  
- **SAND:** fine to medium grained, pale grey.

**penetration**

- becoming grey  
- becoming medium to coarse grained, brown to dark brown, with some gravel  
- becoming fine to medium grained, pale brown

### Consistency / Relative Density

- **moisture**
- **consistent / relative density**
  - **VS** very soft  
  - **S** soft  
  - **F** firm  
  - **ST** stiff  
  - **VSt** very stiff  
  - **H** hard  
  - **Fb** fissile  
  - **VL** very loose  
  - **L** loose  
  - **MD** medium dense  
  - **D** dense

### Additional Observations

- **wet**
- **plastic limit**
- **liquid limit**
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

---

### Drilling Information

- **method:** NDD - non destructive drilling  
- **support:**  
  - M: mud  
  - C: casing  
  - N: nil  
- **penetration:**  
  - SPT: standard penetration test  
  - BSPT: blow count SPT  
  - T: auger drilling  
  - T: hammer  
  - V: hand auger  

### Material Substance

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components  
- **material description:**  
  - SAND: fine to medium grained, pale grey. (continued)  
  - becoming grey with a sulfuric odour, with some fines  
  - becoming brown  
  - becoming pale grey-brown  
  - sulfuric odour absent  
- **QUATERNARY SANDS**

### Soil Description

- **water samples & field tests:**  
  - samples & field tests:  
  - water:  
  - consistency / relative density:  
  - moisture condition:  
  - moisture:  
  - CDF_0_9_06_LIBRARY.GLB rev: AS  

---

**Borehole ID:** ID18-BH06  
**date started:** 12 Oct 2016  
**date completed:** 14 Oct 2016  
**logged by:** OP  
**checked by:** KJ  
**Drill model:** Explora 50, Truck mounted  
**drilling fluid:** Polymer

---

**Position:**  
**Surface elevation:** 6.58 m (AHD)  
**Angle from horizontal:** 90°  
**Hole diameter:** 100 mm

---

**samples & field tests:**  
**water:**  
**consistency / relative density:**  
**moisture condition:**  
**moisture:**  
**CDF_0_9_06_LIBRARY.GLB rev:** AS

---

**Drilling Fluid:**  
**polymer**

---

**Classification & Soil Description:**  
**SAND:**  
- fine to medium grained, pale grey.  
- becoming grey with a sulfuric odour, with some fines.  
- becoming brown  
- becoming pale grey-brown  
- sulfuric odour absent

---

**SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components  
**material description:**  
- SAND: fine to medium grained, pale grey.  
- becoming grey with a sulfuric odour, with some fines.
### Engineering Log - Borehole

#### client:
Metro Trains Melbourne

#### principal:
Level Crossing Removal Authority

#### project:
LCRP-CTF

#### location:
ID18 - Edithvale Road, Edithvale

#### Borehole ID:
ID18-BH06

#### date started:
12 Oct 2016

#### date completed:
14 Oct 2016

#### logged by:
OP

#### checked by:
KJ

---

### Table: Soil Descriptions

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>SOIL TYPE</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.0</td>
<td>Silty CLAY</td>
<td>high plasticity, dark grey. (continued)</td>
</tr>
<tr>
<td>19.0</td>
<td>SAND</td>
<td>fine to medium grained, grey, with some lines and cemented sand bands.</td>
</tr>
<tr>
<td>22.0</td>
<td>SILTY SAND</td>
<td>fine grained, pale grey, low liquid limit, trace of cemented sand bands.</td>
</tr>
</tbody>
</table>

---

### Method & Support

- **Method & Support:**
  - **Penetration:**
  - **Support:**
    - **M:** Mud
    - **N:** Nil

### Water

- **Volume and Flow:**
  - **Water outflow:**
  - **Water inflow:**

### Penetration

- **Penetration Method:**
  - **NDD:** Non destructive drilling

### Soil Classification

- **Classification Symbol:**
  - **CH:** Silty CLAY
  - **SP:** SAND
  - **SM:** SILTY SAND

### Material Substance

- **Moisture:**
  - **DM:** Dry
  - **WW:** Wet

- **Consistency / Relative Density:**
  - **VS:** Very stiff
  - **S:** Soft

---

### Soil Type

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

---

### Soil Structure and Additional Observations

---

### Additional Information

- **Borehole ID:** ID18-BH06
- **GEO TAB TF10294AA:**
- **Sheet:** 3 of 6
- **Logged by:** OP
- **Checked by:** KJ
- **Location:** ID18 - Edithvale Road, Edithvale
- **Surface Elevation:** 6.58 m (AHD)
- **Angle from Horizontal:** 90°
- **Drill Model:** Explora 50, Truck mounted
- **Drilling Fluid:** Polymer
- **Drill Fluid Consistency:**
  - **Dry:**
  - **Moist:**
  - **Wet:**
  - **Plastic:**
  - **Liquid:**
CLAYEY SAND: fine grained, brown, low plasticity, with some fine to medium grained gravel.

SILTY SAND: fine grained, brown-grey, low liquid limit, with some cemented bands.

Silty clay band, high plasticity, pale grey, 50mm thick.

TERTIARY BRIGHTON GROUP

GELLIBRAND MARL

No recovery in U63

SPT sunk 300mm under hammer weight.

Tertiary Brighton Group

Gellibrand Marls

No recovery in U63

SPT sunk 300mm under hammer weight.
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Samples &amp; Field Tests</th>
<th>Water</th>
<th>Material Substance</th>
<th>Soil Type: Plasticity or Particle Characteristic, Colour, Secondary and Minor Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>bulk disturbed sample</td>
<td>Silty Sand: Fine grained, brown-grey, low liquid limit, with some cemented bands. (Continued)</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>disturbed sample</td>
<td>Sandy Silty: Medium liquid limit, dark green-grey, fine grained sand, with some fine grained gravel.</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>environmental sample</td>
<td>Silty Gravel: Coarse grained, grey, low liquid limit, with some fine to medium grained gravel, and trace of shell fragments.</td>
<td></td>
</tr>
<tr>
<td>SS</td>
<td>split spoon sample</td>
<td>Silty Sand: Fine grained, green-grey, low liquid limit, with some fine to medium grained gravel, and trace of shell fragments.</td>
<td></td>
</tr>
</tbody>
</table>

**Method & Support**  
- AD: Auger drilling  
- AS: Auger screwing  
- HA: Hand auger  
- W: Washhole  
- NDD: Non-destructive drilling  

**Drilling Information**  
- Borehole ID: ID18-BH06  
- Sheet: 5 of 6  
- Project No: GEOTABTF10294AA  
- Date Started: 12 Oct 2016  
- Date Completed: 14 Oct 2016  
- Logged By: OP  
- Checked By: KJ

**Location:** E: 334,067.25; N: 5,788,173.57 (MGA94)  
**Surface Elevation:** 6.68 m (AHD)  
**Angle from Horizontal:** 90°  
**Drill Model:** Explora 50, Truck mounted  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 100 mm

**Material Description**  
- **Silty Sand:** Fine grained, brown-grey, low liquid limit, with some cemented bands. (Continued)  
- **Sandy Silty:** Medium liquid limit, dark green-grey, fine grained sand, with some fine grained gravel.  
- **Silty Gravel:** Coarse grained, grey, low liquid limit, with some fine to medium grained gravel, and trace of shell fragments.  
- **Silty Sand:** Fine grained, green-grey, low liquid limit, with some fine to medium grained gravel, and trace of shell fragments.
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**Borehole ID:** ID18-BH06  
**date started:** 12 Oct 2016  
**date completed:** 14 Oct 2016  
**logged by:** OP  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Borehole ID: ID18-BH06</th>
<th>sheet: 6 of 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>project no.: GEOTABTF10294AA</td>
<td></td>
</tr>
</tbody>
</table>

**position:** E: 334,067.25; N: 5,783,173.57  
**surface elevation:** 6.58 m (AHD)  
**drill model:** Explora 50, Truck mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm

<table>
<thead>
<tr>
<th>borehole ID</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID18-BH06</td>
<td>GELLIBRAND MARL</td>
</tr>
</tbody>
</table>

**SPT7, 11, 18:** N*=29  
**SPT10, 15, 21:** N*=36  
**SPT12, 14, 23:** N*=37  
**SPT11, 13, 18:** N*=31  
**SPT18, 28, 32:** N*=60

---

**SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>position (m)</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>34-35</td>
<td>SILTY SAND: fine grained, green-grey, low liquid limit, with some fine to medium grained gravel, and trace of shell fragments. (continued)</td>
</tr>
<tr>
<td>36-37</td>
<td>with some clay bands, medium plasticity, dark grey</td>
</tr>
<tr>
<td>38-39</td>
<td>with some cemented sand nodules</td>
</tr>
</tbody>
</table>

---

**method:** 
- SPT
- Auger drilling
- Non destructive drilling
- NDD
- TAG
- Hand auger

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

**penetration:** 
- no resistance
- mud refusal
- refusal

**material description:** 
- Hand penetrometer (kPa)
- Standard penetration test (SPT)
- SPT with solid cone
- SPT with solid coned (kPa)
- Vane shear; peak/remoulded (kPa)
- Hammer bounces

**structure and additional observations:**
- Standpipe installation
- Standpipe details
- End caps and flush mounted gatic cover

---

**graphic log:**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material symbol &amp; soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>34-35</td>
<td>SM SPT 7, 11, 18 N*=29</td>
</tr>
<tr>
<td>36-37</td>
<td>N*=36 with some clay bands, medium plasticity, dark grey</td>
</tr>
<tr>
<td>38-39</td>
<td>N*=31 with some cemented sand nodules</td>
</tr>
</tbody>
</table>

---

**graphic log classification symbol & soil description:**

<table>
<thead>
<tr>
<th>classification symbol &amp; soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 7, 11, 18 N*=29 SILTY SAND: fine grained, green-grey, low liquid limit, with some fine to medium grained gravel, and trace of shell fragments. (continued)</td>
</tr>
<tr>
<td>36-37 with some clay bands, medium plasticity, dark grey</td>
</tr>
<tr>
<td>38-39 with some cemented sand nodules</td>
</tr>
</tbody>
</table>

---

**property:**

- Moisture
- Support
- Classification System

**material substance:** 
- Water
- Volumetric moisture content (kPa)
- Hand penetrometer (kPa)
- SPT - sample recovered
- SPT with solid cone
- SPT with solid coned (kPa)
- Vane shear; peak/remoulded (kPa)
- Hammer bounces

**method & support:**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>auger drilling**</td>
<td>M mud</td>
</tr>
<tr>
<td>auger screwing*</td>
<td>C casing</td>
</tr>
<tr>
<td>NDD</td>
<td>N nil</td>
</tr>
<tr>
<td>AD/T</td>
<td>no resistance</td>
</tr>
<tr>
<td>B blank bit</td>
<td>mud refusal</td>
</tr>
<tr>
<td>T TC bit</td>
<td>refusal</td>
</tr>
<tr>
<td>V V bit</td>
<td>hammer bounces</td>
</tr>
</tbody>
</table>

---

**graphic log:**

- SPT 7, 11, 18 N*=29
- SPT 10, 15, 21 N*=36
- SPT 12, 14, 23 N*=37
- SPT 11, 13, 18 N*=31
- SPT 18, 28, 32 N*=60

---

**graphic log consistency / relative density:**

<table>
<thead>
<tr>
<th>consistency / relative density</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 7, 11, 18 N*=29</td>
<td>M mud</td>
</tr>
<tr>
<td>SPT 10, 15, 21 N*=36</td>
<td>C casing</td>
</tr>
<tr>
<td>SPT 12, 14, 23 N*=37</td>
<td>N nil</td>
</tr>
<tr>
<td>SPT 11, 13, 18 N*=31</td>
<td>no resistance</td>
</tr>
<tr>
<td>SPT 18, 28, 32 N*=60</td>
<td>mud refusal</td>
</tr>
<tr>
<td>Vane shear; peak/remoulded</td>
<td>refusal</td>
</tr>
<tr>
<td>Hammer bounces</td>
<td>hammer bounces</td>
</tr>
</tbody>
</table>

---

**graphic log moisture:**

<table>
<thead>
<tr>
<th>moisture</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>M mud</td>
</tr>
<tr>
<td>N</td>
<td>C casing</td>
</tr>
<tr>
<td>N*</td>
<td>N nil</td>
</tr>
</tbody>
</table>

---

**graphic log support:**

<table>
<thead>
<tr>
<th>support</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>M mud</td>
<td>M mud</td>
</tr>
<tr>
<td>C casing</td>
<td>C casing</td>
</tr>
<tr>
<td>N nil</td>
<td>N nil</td>
</tr>
</tbody>
</table>

---

**graphic log classification system:**

- **SPT 7, 11, 18 N*=29:** SILTY SAND: fine grained, green-grey, low liquid limit, with some fine to medium grained gravel, and trace of shell fragments. (continued)
- **SPT 10, 15, 21 N*=36:** with some clay bands, medium plasticity, dark grey
- **SPT 12, 14, 23 N*=37:** with some cemented sand nodules

---

**graphic log structure and additional observations:**

- Standpipe installation
- Standpipe details
- End caps and flush mounted gatic cover

---

**graphic log method & support:**

- SPT 7, 11, 18 N*=29
- SPT 10, 15, 21 N*=36
- SPT 12, 14, 23 N*=37
- SPT 11, 13, 18 N*=31
- SPT 18, 28, 32 N*=60

---

**graphic log classification symbol & soil description:**

- SPT 7, 11, 18 N*=29 SILTY SAND: fine grained, green-grey, low liquid limit, with some fine to medium grained gravel, and trace of shell fragments. (continued)
- SPT 10, 15, 21 N*=36 with some clay bands, medium plasticity, dark grey
- SPT 12, 14, 23 N*=37 with some cemented sand nodules

---

**graphic log method & support:**

- SPT 7, 11, 18 N*=29
- SPT 10, 15, 21 N*=36
- SPT 12, 14, 23 N*=37
- SPT 11, 13, 18 N*=31
- SPT 18, 28, 32 N*=60
client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH07
**Date Started:** 06 Oct 2016
**Date Completed:** 10 Oct 2016

**Drilling Information**

- **Drill Model:** Explora 50, Truck mounted
- **Angle from Horizontal:** 90°
- **Hole Diameter:** 100 mm
- **Drilling Fluid:** Polymer
- **Position:** E: 334,105.95; N: 5,788,246.20 (MGA94)
- **Surface Elevation:** 4.54 m (AHD)
- **Drilling Method:** Non-destructive drilling

**Material Substance**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **Material Description:**
  - **SAND:** fine to coarse grained, sub-rounded to sub-angular, grey, banded pale grey.
  - **Sandy CLAY:** low plasticity, dark grey, fine to medium grained sand.
  - **FILL:** ASPHALT: 150mm.
  - **FILL:** GRAVEL: fine to medium grained, sub-rounded to sub-angular, grey.
  - **QUATERNARY SANDS**: 0 ppm

**Additional Observations**

- **Consistency / Relative Density:**
  - **DFS** (very soft)
  - **VS** (very stiff)
  - **W** (wet)
  - **VL** (very loose)
  - **H** (hard)
  - **P** (pebble)
  - **D** (dense)
  - **V** (very dense)

- **Penetration Test:**
  - **SPT** (Standard Penetration Test)
  - **VD** (Vane Shear)
**Sandy CLAY**: low plasticity, dark grey, fine to medium grained sand. (continued)

- **SAND**: fine grained, pale grey, becoming dark brown
- **Sandy CLAY**: high plasticity, grey, mottled green, fine grained sand.
- **SAND**: fine grained, pale grey, grey, with green and orange-brown bands and some clay bands, high plasticity, dark grey.

### Engineering Log - Borehole

**client**: Metro Trains Melbourne  
**principal**: Level Crossing Removal Authority  
**project**: LCRP-CTF  
**location**: ID18 - Edithvale Road, Edithvale

**drilling information**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CL</strong></td>
<td><strong>SPT12, 6/20mmHBN</strong></td>
<td>Sandy CLAY: low plasticity, dark grey, fine to medium grained sand.</td>
</tr>
<tr>
<td><strong>SP</strong></td>
<td><strong>SPT17, 13/70mmHBN</strong></td>
<td>SAND: fine grained, pale grey.</td>
</tr>
<tr>
<td><strong>CH</strong></td>
<td><strong>SPT2, 5, 6N</strong></td>
<td>Sandy CLAY: high plasticity, grey, mottled green, fine grained sand.</td>
</tr>
<tr>
<td><strong>SP</strong></td>
<td><strong>SPT5, 8, 17N</strong></td>
<td>SAND: fine grained, pale grey, grey, with green and orange-brown bands and some clay bands, high plasticity, dark grey.</td>
</tr>
</tbody>
</table>

### Material Substance

**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>water</th>
<th>samples &amp; field tests</th>
<th>classification symbol &amp; soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>W</strong></td>
<td><strong>St</strong></td>
<td>QUATERINARY SANDS</td>
</tr>
<tr>
<td><strong>VD</strong></td>
<td></td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
</tbody>
</table>

### Drilling Information

- **Borehole ID**: ID18-BH07
- **Client**: Metro Trains Melbourne
- **Principal**: Level Crossing Removal Authority
- **Project**: LCRP-CTF
- **Location**: ID18 - Edithvale Road, Edithvale

**Drill Model**: Explora 50, Truck mounted
**Drilling Fluid**: Polymer
**Hole Diameter**: 100 mm
**Surface Elevation**: 4.54 m (AHD)
**Angle from Horizontal**: 90°

**Classification Symbol & Soil Description**

- Sandy CLAY: low plasticity, dark grey, fine to medium grained sand. (continued)
- SAND: fine grained, pale grey.
- Sandy CLAY: high plasticity, grey, mottled green, fine grained sand.
- SAND: fine grained, pale grey, grey, with green and orange-brown bands and some clay bands, high plasticity, dark grey.

**Material Substance**

- **Sample & Field Tests**
  - **W** - Water
  - **Dry**
  - **Moist**
  - **Wet**
  - **Plastic Limit**
  - **Liquid Limit**

**Method & Support**

- **AD**: auger drilling
- **AS**: auger screwing
- **HA**: hand auger
- **W**: wash boring
- **NDD**: non destructive drilling

**Samples & Field Tests**

- **B**: bulk disturbed sample
- **D**: disturbed sample
- **E**: environmental sample
- **SS**: split spoon sample
- **US**: undisturbed sample
- **N**: standard penetration test (SPT)
- **N***: SPT - sample recovered
- **HS**: hand penetrometer (kPa)
- **NC**: SPT with solid cone
- **VS**: vane shear; peak/remoulded (kPa)
- **R**: refusal
- **HB**: hammer bouncing

**Consistency / Relative Density**

- **VS**: very soft
- **S**: soft
- **F**: firm
- **ST**: stiff
- **VST**: very stiff
- **H**: hard
- **Fb**: failure
- **VL**: very loose
- **L**: loose
- **MD**: medium dense
- **D**: dense
- **VD**: very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**date started:** 06 Oct 2016  
**date completed:** 10 Oct 2016

<table>
<thead>
<tr>
<th>Borehole ID.</th>
<th>ID18-BH07</th>
</tr>
</thead>
<tbody>
<tr>
<td>sheet no.</td>
<td>3 of 6</td>
</tr>
<tr>
<td>project no.</td>
<td>GEOTABTF10294AA</td>
</tr>
</tbody>
</table>

**position:** E: 334,105.95; N: 5,788,246.20 (MGA94)  
**angle from horizontal:** 90°  
**drill model:** Explora 50, Truck mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm

### Borehole Log - Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Samples &amp; Field Tests</th>
<th>Method &amp; Support</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td>M Mud</td>
<td>Sand: fine grained, pale grey, grey, with green and orange-brown bands and some clay bands, high plasticity, dark grey. (Continued)</td>
</tr>
<tr>
<td>1.2</td>
<td></td>
<td>N Casing</td>
<td>Silty Clay: High plasticity, pale grey, green, mottled orange brown, with some clayey sand pockets, fine to medium grained.</td>
</tr>
<tr>
<td>13.0</td>
<td></td>
<td>N=8</td>
<td>Claysy Sand: Fine to medium grained, pale blue grey, low plasticity, with some clay pockets.</td>
</tr>
<tr>
<td>19.0</td>
<td></td>
<td>N=6</td>
<td>Sandy Clay: Medium plasticity, dark brown, fine grained sand.</td>
</tr>
</tbody>
</table>

### Borehole Log - Soil Description

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components  
- **material description:** structure and additional observations  
- **method & support:** non destructive drilling  
- **samples & field tests:** water inflow, water outflow  
- **consistency / relative density:** very soft, soft, firm, stiff, very stiff, hard, friable, very loose, loose, medium dense, dense, very dense  
- **classification symbol & soil description:** based on Unified Classification System

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>Sand: fine grained, pale grey, grey, with green and orange-brown bands and some clay bands, high plasticity, dark grey.</td>
</tr>
<tr>
<td>1.2</td>
<td>Silty Clay: High plasticity, pale grey, green, mottled orange brown, with some clayey sand pockets, fine to medium grained.</td>
</tr>
<tr>
<td>13.0</td>
<td>Claysy Sand: Fine to medium grained, pale blue grey, low plasticity, with some clay pockets.</td>
</tr>
<tr>
<td>19.0</td>
<td>Sandy Clay: Medium plasticity, dark brown, fine grained sand.</td>
</tr>
</tbody>
</table>

---

**Additional Observations:**
- Water level on date shown: 18.0
- Hammer bouncing: P
- Hand penetrometer (kPa): 200
- Standard penetration test (SPT): 3
- Vane shear: 100
- Liquid limit: 50
- Plastic limit: 20
- Moisture content: 10%
- 10-Oct-12 water level on date shown: 18.0

---

**Client:** Metro Trains Melbourne  
**Project No.:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale
# Engineering Log - Borehole

**Borehole ID:** ID18-BH07  
**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale  

**Position:** E: 334.10595; N: 5,788.24620 (MGA94)  
**Surface Elevation:** 4.54 m (AHD)  
**Angle from Horizontal:** 90°  
**Drill Model:** Explora 50, Truck mounted  
**Drilling Fluid:** Polymer

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td></td>
<td></td>
<td>moisture condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>consistency / relative density</td>
</tr>
<tr>
<td></td>
<td></td>
<td>soil description</td>
</tr>
</tbody>
</table>

**Sandy CLAY:** medium plasticity, dark brown, fine grained sand. (continued)

**Sandy SILT:** low liquid limit, dark grey, fine grained sand.

**SILT:** high liquid limit, grey, green grey, mottled dark green, with some pale brown and dark green clay bands.

**Sandy silt layer:** fine grained sand; 150mm thick with some shell fragments and gravel.

---

**Classification Symbol & Soil Description**

- **M:** mud  
- **C:** casing  
- **N:** nil  
- **B:** bulk disturbed sample  
- **D:** disturbed sample  
- **E:** environmental sample  
- **SS:** split spoon sample  
- **U#:** undisturbed sample 
- **HP:** hand penetrometer (kPa)  
- **N:** standard penetration test (SPT)  
- **N*:** SPT - sample recovered  
- **Nc:** SPT with solid core  
- **VS:** vane shear; peak/remoulded (kPa)  
- **R:** refusal  
- **HB:** hammer bouncing

**Consistency / Relative Density**

- **VS:** very soft  
- **S:** soft  
- **F:** firm  
- **ST:** stiff  
- **VST:** very stiff  
- **H:** hard  
- **P:** plastic  
- **V:** very loose  
- **L:** loose  
- **MD:** medium dense  
- **D:** dense  
- **VD:** very dense

---

**Graphic Log**

- **Cl:**  
- **ML:**  
- **MH:**

---

**Additional Observations**

- **GELLIBRAND MARL:** U63 attempted, no recovery
- **S:** U63 attempted, no recovery
- **VSt:** U63 attempted, no recovery

---

**Position:** E: 334.10595; N: 5,788.24620 (MGA94)  
**Surface Elevation:** 4.54 m (AHD)  
**Angle from Horizontal:** 90°  
**Drill Model:** Explora 50, Truck mounted  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 100 mm

---

**Drilling Fluid:**  
**Support:** M mud N nil  
**Samples & Field Tests:** B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U#: undisturbed sample HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid core VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing

**Classification Symbol & Soil Description**

- **M:** mud  
- **C:** casing  
- **N:** nil  
- **B:** bulk disturbed sample  
- **D:** disturbed sample  
- **E:** environmental sample  
- **SS:** split spoon sample  
- **U#:** undisturbed sample  
- **HP:** hand penetrometer (kPa)  
- **N:** standard penetration test (SPT)  
- **N*:** SPT - sample recovered  
- **Nc:** SPT with solid core  
- **VS:** vane shear; peak/remoulded (kPa)  
- **R:** refusal  
- **HB:** hammer bouncing

**Consistency / Relative Density**

- **VS:** very soft  
- **S:** soft  
- **F:** firm  
- **ST:** stiff  
- **VST:** very stiff  
- **H:** hard  
- **P:** plastic  
- **V:** very loose  
- **L:** loose  
- **MD:** medium dense  
- **D:** dense  
- **VD:** very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**date started:** 06 Oct 2016  
**date completed:** 10 Oct 2016  
**logged by:** OP  
**checked by:** KJ

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components  
**material description:**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Graphic Log</th>
<th>Classification Symbol</th>
<th>SOIL TYPE</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
<td>U63</td>
<td>CM</td>
<td>CL</td>
<td>Sandy CLAY: low plasticity, grey, green grey, mottled dark green, with fine grained sand, pale brown and dark green grey clay bands. with some gravelly clay pockets.</td>
</tr>
<tr>
<td>34.0</td>
<td>SPT 1, 2, 3</td>
<td>N=5</td>
<td>CH</td>
<td>Silty CLAY: high plasticity, grey, with some fine grained gravel and bands of silty sand, fine to medium grained and bands of coarse grained gravel.</td>
</tr>
<tr>
<td>35.0</td>
<td></td>
<td></td>
<td>SM</td>
<td>Silty Sand: fine grained, pale green grey, medium liquid limit silt, with some shell fragments.</td>
</tr>
</tbody>
</table>

**method & support:**
- AD: auger drilling
- AS: auger screwing
- HA: hand auger
- W: washhole
- NDD: non destructive drilling

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

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

**consistency / relative density:**
- VS: very soft
- S: soft
- F: firm
- ST: stiff
- VT: very stiff
- H: hard
- PB: plastic
- VL: very loose
- L: loose
- MD: medium dense
- D: dense
- VD: very dense
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
<th>classification symbol</th>
<th>consistency / relative density</th>
<th>structure and additional observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.0</td>
<td>SILTY SAND: fine grained, pale green grey, medium liquid limit silt, with some shell fragments. (continued)</td>
<td>SM</td>
<td>M</td>
<td>MD - D</td>
</tr>
<tr>
<td>42.0</td>
<td></td>
<td>SPT</td>
<td>MD - D</td>
<td>GELLIBRAND MARL</td>
</tr>
<tr>
<td>43.0</td>
<td>Borehole ID18-BH07 terminated at 43.45 m Target depth Standpipe installation Backfill details 0.0m-13.0m: grout 13.0m-14.0m: bentonite 14.0m-17.0m: sand Standpipe details 0.0m-14.0m: unsilted 50mm PVC, Class 18 14.0m-17.0m: machine slotted, filter sock covered, 50mm PVC, Class 18 End caps and flush mounted gatic cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**method & support**
- AD: auger drilling*  
- AS: auger screwing*  
- HA: hand auger  
- W: wash hole  
- NDD: non-destructive drilling  
- support: M: mud casing  
- C: casing  

**samples & field tests**
- B: bulk disturbed sample  
- D: disturbed sample  
- E: environmental sample  
- SS: split spoon sample  
- US#B: undisturbed sample  
- HP: hand penetrometer (kPa)  
- SPT: Standard penetration test (SPT)  
- Nc: SPT - sample recovered  
- VS: vane shear; peak/remoulded (kPa)  
- R: refusal  
- HB: hammer bouncing

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

**moisture**
- VS: very soft  
- S: soft  
- F: firm  
- St: stiff  
- VSf: very stiff  
- H: hard  
- Fb: fissile  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense  
- VD: very dense

---

* Borehole ID: ID18-BH07  
* project: GEOTABTF10294AA  
* date started: 06 Oct 2016  
* date completed: 10 Oct 2016  
* logged by: OP  
* checked by: KJ

---

* Borehole ID18-BH07: target depth, standpipe installation, backfill details, and end caps.
* Material description: Silty Sand with shell fragments.
* Moisture conditions: various limits and conditions as per Unified Classification System.
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH08  
**date started:** 18 Oct 2016  
**date completed:** 21 Oct 2016  
**logged by:** BK  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>RL (m)</th>
<th>method &amp; penetration</th>
<th>support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>D - M</td>
<td>M mud</td>
<td>N nil</td>
<td>soil type: plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>C casing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
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<tr>
<td>2</td>
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<tr>
<td>-1</td>
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<td></td>
</tr>
</tbody>
</table>

#### Drilling Fluid
- Polymer

#### Surface Elevation
- 6.37 m (AHD)

#### Angle from Horizontal
- 90°

#### Drilling Fluid
- Polymer

#### Material Substance
- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **classification symbol:**
  - SP
  - SPT
  - SPT3
  - SPT5
  - SPT6
  - SPT10
- **material description:**
  - FILL: ASPHALT: 100mm.
  - FILL: Sandy GRAVEL: fine to coarse grained, angular, dark grey.
  - SAND: fine to medium grained, grey.
  - becoming pale brown, pale grey, trace of fines
  - becoming fine to coarse grained, dark brown
  - becoming fine to medium grained, pale grey, trace of fines

#### Moisture Condition
- DMW
- WW
- p
- Wldry
- moist
- wet

#### Consistency / Relative Density
- VS
- dry
- S
- very soft
- F
- soft
- firm
- VSt
- very firm
- ST
- stiff
- VST
- very stiff
- H
- hard
- Fb
- friable
- VL
- very loose
- L
- loose
- MD
- medium dense
- D
- dense
- WD
- very dense

#### Additional Observations
- moisture
- dry
- W
- wet
- VS
- plastic limit
- WI
- liquid limit
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
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<th>ID18-BH08</th>
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<tr>
<td>project no.</td>
<td>GEOTABTF10294AA</td>
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</tbody>
</table>

- **Date started:** 18 Oct 2016  
- **Date completed:** 21 Oct 2016

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SAND: fine to medium grained, grey. (continued)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLAY: low to medium plasticity, dark grey, trace of shell fragments, distinct rotten egg odour.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAND: fine to coarse grained, pale grey, trace of fines.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLAY: fine to coarse grained, pale grey, low to medium plasticity, with some high plasticity clay bands.</td>
</tr>
</tbody>
</table>

### Material Description

- **Soil Type:** Plasticity or particle characteristic, colour, secondary and minor components

### Additional Observations

- **Drill Model:** Explora MK50, Truck mounted  
- **Angle from horizontal:** 90°  
- **Hole Diameter:** 100 mm

### Site Information

- **Position:** E: 334,096.95; N: 5,788,125.69 (MGA94)  
- **Surface Elevation:** 6.37 m (AHD)  
- **Angle from horizontal:** 90°  
- **Drilling Fluid:** Polymer

### Soil Types

- **Quaternary Sands**
- **Tertiary Brighton Group**

### Soil Classifications

- **SAND:** Fine to medium grained, grey.  
- **Silty CLAY:** Low to medium plasticity, dark grey, trace of shell fragments, distinct rotten egg odour.  
- **CLAYEY SAND:** Fine to coarse grained, pale grey, low to medium plasticity, with some high plasticity clay bands.

### Soil Properties

- **Consistency / Relative Density:**
  - **Moisture (kPa):**
    - Very Soft (VSSH)
    - Soft (SFC)
    - Firm (F)
    - Stiff (SI)
    - Very Stiff (VI)
    - Hard (H)
    - Very Hard (VH)
  - **Liquid Limit:**
    - Very Loose (VL)
    - Loose (L)
    - Medium Dense (MD)
    - Dense (D)
  - **Porousity:**
    - Very Dense (VD)

### Soil Penetration Tests

- **SPT:** Standard Penetration Test (SPT)
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

#### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>SP</td>
<td>SAND</td>
<td>fine to coarse grained, pale grey, trace of fines.</td>
</tr>
<tr>
<td>12.0</td>
<td>SC</td>
<td>CLAYEY SAND</td>
<td>fine to coarse grained, pale grey, mottled brown, high plasticity.</td>
</tr>
<tr>
<td>20.0</td>
<td>SM</td>
<td>SILTY SAND</td>
<td>fine to medium grained, pale grey mottled brown, low liquid limit.</td>
</tr>
</tbody>
</table>

#### Material Substance

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **Sample & Field Tests:** water, penetration
- **Classification Symbol & Soil Description:** based on Unified Classification System
- **Consistency / Relative Density:** moisture, dry, moist, wet

#### Additional Observations

- **Hand Penetrometer (kPa):** refusal, hammer bouncing
- **Sample Type:** bulk disturbed sample, disturbed sample, environmental sample, split spoon sample, undisturbed sample
- **Environment:** hand penetration test (SPT), SPT - sample recovered, SPT with solid cone

#### Positioning

- **Position:** E: 334,096.95; N: 5,788,125.69 (MGA94)  
- **Surface Elevation:** 6.37 m (AHD)  
- **Angle from Horizontal:** 90°

#### Drilling Details

- **Drill Model:** Explora MK50, Truck mounted  
- **Drilling Fluid:** Polymer  
- **Hole Diameter:** 100 mm

---

**Drilling Information:**  
**Samples & Field Tests:** water, penetration.  
**Classification Symbol:** SP, SC, SM.  
**Material Description:** SAND, CLAYEY SAND, SILTY SAND.
Silty Sand: fine to medium grained, pale grey mottled brown, low liquid limit. (continued)

With some cemented sand bands

Sandy Silty: non-plastic, dark grey dark brown, green, fine grained sand, with some weakly cemented zones, and bands of clay, low plasticity, dark grey.

Tertiary Brighton Group

Gellibrand Marl

First blow penetrated 300mm

Sunk 200mm under self-weight of rods. First blow penetrated 300mm

Note: due to sensitivity of soil, SPT N values indicate lower strength than observed in recorded materials

Sunk 200mm under self-weight of rods.
**Sandy SILT**: non-plastic, dark grey dark brown, green, fine grained sand, with some weakly cemented zones, and bands of clay, low plasticity, dark grey. (continued)

becoming fine to coarse grained sand, trace of fine grained gravel

**CLAYEY SAND**: fine to coarse grained, dark brown, green, medium plasticity, with some bands of clay, high plasticity, dark grey, trace of fine grained gravel.

with some fine grained gravel

**SILTY SAND**: fine grained, dark grey mottled brown, slight green tinge, low plasticity, trace of shell fragments.
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td>SM</td>
<td>SILTY SAND: fine grained, dark grey mottled brown, slight green tinge, low plasticity, trace of shell fragments. (continued)</td>
</tr>
<tr>
<td>SPT</td>
<td></td>
<td></td>
<td></td>
<td>M</td>
<td>M</td>
<td>GELLIBRAND MARL</td>
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</table>

**Material Substance**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>SM</td>
<td>SM</td>
<td>SILTY SAND: fine grained, dark grey mottled brown, slight green tinge, low plasticity, trace of shell fragments. (continued)</td>
</tr>
<tr>
<td>35</td>
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</tr>
<tr>
<td>36</td>
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</tr>
<tr>
<td>47</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Additional Observations**

- With some sand bands, coarse grained, dark grey
# Engineering Log - Borehole

**Borehole ID:** ID18-BH08  
**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Date Started:** 18 Oct 2016  
**Date Completed:** 21 Oct 2016  
**Logged by:** BK  
**Checked by:** KJ  

**Location:** ID18 - Edithvale Road, Edithvale  
**Drill Model:** Explora MK50, Truck mounted  
**Drilling Fluid:** Polymer  
**Angle from Horizontal:** 90°  
**Hole Diameter:** 100 mm  
**Surface Elevation:** 6.37 m (AHD)  
**Position:** E: 334,096.95; N: 5,788,125.69 (MGA94)  

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Soil Type</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-destructive</td>
<td></td>
<td></td>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
<td><strong>Silty Sand:</strong> fine grained, dark grey mottled brown, slight green tinge, low plasticity, trace of shell fragments. (continued)</td>
</tr>
</tbody>
</table>

### Material Substance

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Silty Sand</strong></td>
<td>fine grained, dark grey mottled brown, slight green tinge, low plasticity, trace of shell fragments. (continued)</td>
</tr>
</tbody>
</table>

### Penetration

- **49.35 m:** Borehole ID18-BH08 terminated at 49.35 m Target depth

### Additional Observations

- **Gellibrand Marl**

---

**Consistency / Relative Density**

- **Moisture:** Dry, Moist, Wet  
- **Penetration:** No resistance ranging to refusal  
- **Hand Penetrometer (kPa):** 100, 200, 300, 400  
- **SPT with solid cone:** Vane shear; peak/remoulded (kPa)  
- **SPT - Sample Recovered:** 10-Oct-12 water level on date shown  
- **Consistency / Relative Density:** Very soft, Soft, Firm, Stiff, Very Stiff, Hard, Frangible  
- **Moisture:** Very Loose, Loose, Medium Dense, Dense  
- **Penetration:** No resistance ranging to refusal  
- **Hand Penetrometer (kPa):** 100, 200, 300, 400  
- **SPT with solid cone:** Vane shear; peak/remoulded (kPa)  
- **SPT - Sample Recovered:** 10-Oct-12 water level on date shown  
- **Consistency / Relative Density:** Very soft, Soft, Firm, Stiff, Very Stiff, Hard, Frangible  
- **Moisture:** Very Loose, Loose, Medium Dense, Dense  

---

**Graphic Log**

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components  
- **MATERIAL DESCRIPTION:** Structure and additional observations

---

**Log:** CDF_0_9_06_LIBRARY.GLB rev:AS  
**Date:** 02/06/2017 17:15  
**Description:** DrawingFile

---

**Notes:**

- **Drill Model:** Explora MK50, Truck mounted  
- **Hole Diameter:** 100 mm  
- **Surface Elevation:** 6.37 m (AHD)  
- **Position:** E: 334,096.95; N: 5,788,125.69 (MGA94)  

---

**Logging Information**

- **Samples & Field Tests:**  
  - Bulk disturbed sample  
  - Disturbed sample  
  - Environmental sample  
  - Split spoon sample  
  - Undisturbed sample  
  - Standard penetration test (SPT)  
  - SPT with solid cone  
  - Vane shear; peak/remoulded (kPa)  

---

**Logging Symbol:**  
- **M:** Mud  
- **C:** Casing  
- **N:** Nil  
- **B:** Bed  
- **R:** Refusal  
- **V:** V-bit
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

#### Drilling Information

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<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 8.11.11 N^=22</td>
<td>SP</td>
<td>AD</td>
<td>SAND: fine to medium grained, sub-rounded to sub-angular, pale brown. (continued)</td>
<td>Becoming dark grey, distinct rotten egg odour</td>
<td></td>
</tr>
<tr>
<td>SPT 11.0 N^=1</td>
<td>CL-CI</td>
<td>VL</td>
<td>CLAY: low to medium plasticity, black, trace of shell fragments, distinct rotten egg odour.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 12.13.13 N^=36</td>
<td>SC</td>
<td>MD</td>
<td>CLAYEY SAND: fine to coarse grained, dark grey black, low plasticity, distinct rotten egg odour.</td>
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<tr>
<td>SPT 6.7.8 N^=15</td>
<td>SC</td>
<td>MD</td>
<td>CLAYEY SAND: fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components  
**Material Description:** structure and additional observations

<table>
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<td>VL</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SPT 12.13.13 N^=36</td>
<td>SC</td>
<td>MD</td>
<td>CLAYEY SAND: fine to coarse grained, dark grey black, low plasticity, distinct rotten egg odour.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 6.7.8 N^=15</td>
<td>SC</td>
<td>MD</td>
<td>CLAYEY SAND: fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Method & Support:**  
**Penetration:** water

**Samples & Field Tests:**  
**Borehole ID:** ID18-BH09  
**Date started:** 09 Sep 2016  
**Date completed:** 21 Sep 2016  
**Logged by:** BK  
**Checked by:** KJ

---

**Notes:**  
- Borehole information:  
  - Client: Metro Trains Melbourne  
  - Principal: Level Crossing Removal Authority  
  - Project: LCRP-CTF  
  - Location: ID18 - Edithvale Road, Edithvale
  
**Drilling Information:**  
- Method: SPT  
- Support: SP  
- Penetration: AD

**Material Substance:**  
- SOIL TYPE:  
  - SAND: fine to medium grained, sub-rounded to sub-angular, pale brown. (continued)  
  - CLAY: low to medium plasticity, black, trace of shell fragments, distinct rotten egg odour.  
  - CLAYEY SAND: fine to coarse grained, dark grey black, low plasticity, distinct rotten egg odour.  
  - CLAYEY SAND: fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity.

**Consistency / Relative Density:**  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense  

**Drilling Information:**  
- Method: SPT  
- Support: SP  
- Penetration: AD

**Material Substance:**  
- SOIL TYPE:  
  - SAND: fine to medium grained, sub-rounded to sub-angular, pale brown. (continued)  
  - CLAY: low to medium plasticity, black, trace of shell fragments, distinct rotten egg odour.  
  - CLAYEY SAND: fine to coarse grained, dark grey black, low plasticity, distinct rotten egg odour.  
  - CLAYEY SAND: fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity.

**Consistency / Relative Density:**  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense

---

**Notes:**  
- Borehole information:  
  - Client: Metro Trains Melbourne  
  - Principal: Level Crossing Removal Authority  
  - Project: LCRP-CTF  
  - Location: ID18 - Edithvale Road, Edithvale
  
**Drilling Information:**  
- Method: SPT  
- Support: SP  
- Penetration: AD

**Material Substance:**  
- SOIL TYPE:  
  - SAND: fine to medium grained, sub-rounded to sub-angular, pale brown. (continued)  
  - CLAY: low to medium plasticity, black, trace of shell fragments, distinct rotten egg odour.  
  - CLAYEY SAND: fine to coarse grained, dark grey black, low plasticity, distinct rotten egg odour.  
  - CLAYEY SAND: fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity.

**Consistency / Relative Density:**  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense

---

**Notes:**  
- Borehole information:  
  - Client: Metro Trains Melbourne  
  - Principal: Level Crossing Removal Authority  
  - Project: LCRP-CTF  
  - Location: ID18 - Edithvale Road, Edithvale
  
**Drilling Information:**  
- Method: SPT  
- Support: SP  
- Penetration: AD

**Material Substance:**  
- SOIL TYPE:  
  - SAND: fine to medium grained, sub-rounded to sub-angular, pale brown. (continued)  
  - CLAY: low to medium plasticity, black, trace of shell fragments, distinct rotten egg odour.  
  - CLAYEY SAND: fine to coarse grained, dark grey black, low plasticity, distinct rotten egg odour.  
  - CLAYEY SAND: fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity.

**Consistency / Relative Density:**  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense

---

**Notes:**  
- Borehole information:  
  - Client: Metro Trains Melbourne  
  - Principal: Level Crossing Removal Authority  
  - Project: LCRP-CTF  
  - Location: ID18 - Edithvale Road, Edithvale
  
**Drilling Information:**  
- Method: SPT  
- Support: SP  
- Penetration: AD

**Material Substance:**  
- SOIL TYPE:  
  - SAND: fine to medium grained, sub-rounded to sub-angular, pale brown. (continued)  
  - CLAY: low to medium plasticity, black, trace of shell fragments, distinct rotten egg odour.  
  - CLAYEY SAND: fine to coarse grained, dark grey black, low plasticity, distinct rotten egg odour.  
  - CLAYEY SAND: fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity.

**Consistency / Relative Density:**  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.0</td>
<td>SCL: Clay</td>
<td>Fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity.</td>
</tr>
<tr>
<td>18.0</td>
<td>SC: Clay</td>
<td>Fine grained, brown, pale brown, low plasticity.</td>
</tr>
<tr>
<td>19.0</td>
<td>CLAYEY SAND:</td>
<td>Fine to medium grained, pale grey mottled orange-brown, slight green tinge, trace of cemented sand nodules.</td>
</tr>
<tr>
<td>20.0</td>
<td>SAND: Sand</td>
<td>Fine to coarse grained, pale grey, greybrown, trace of fines.</td>
</tr>
<tr>
<td>21.0</td>
<td>CLAYEY SAND:</td>
<td>Fine to coarse grained, pale grey mottled orange-brown, slight green tinge, trace of cemented sand nodules.</td>
</tr>
<tr>
<td>22.0</td>
<td>CLAYEY SAND:</td>
<td>Fine to medium grained, pale grey mottled orange-brown, slight green tinge, trace of cemented sand nodules.</td>
</tr>
</tbody>
</table>

**Additional observations:**
- SPT5, 7, 10 N*=17
- SPT6, 15/80mm HBN*=R
- SPT8, 14, 18 N*=32
- SPT10, 21, 22 N*=43
- SPT8, 7, 27 N*=34

**Soil description based on Unified Classification System:**
- Very soft: clay, silt, sand, gravel
- Soft: clay, silt, sand, gravel
- Firm: clay, silt, sand, gravel
- Stiff: clay, silt, sand, gravel
- Very stiff: clay, silt, sand, gravel
- Hard: clay, silt, sand, gravel
- Friable: clay, silt, sand, gravel
- Very loose: clay, silt, sand, gravel
- Loose: clay, silt, sand, gravel
- Medium dense: clay, silt, sand, gravel
- Dense: clay, silt, sand, gravel
- Very dense: clay, silt, sand, gravel

**Consistency / Relative Density:**
- Liquid limit (LL): 50%
- Plastic limit (PL): 25%
- Consistency Index (CI): 25%
- Relative Density (DR): 70%
## Engineering Log - Borehole

**Borehole ID:** ID18-BH09  
**Project no.:** GEOTABTF10294AA

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

**Position:** E: 334.199.09; N: 5.787.923.56 (MGA94)  
**Surface Elevation:** 6.52 m (AHD)  
**Angle from Horizontal:** 90°  
**Drill Model:** Ausroc, Truck mounted  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 100 mm

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Classification</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-18</td>
<td>SPT 25, 25/120mm HB N=R</td>
<td>Sandy GRAVEL: fine grained, sub-rounded, pale grey, fine to coarse grained sand, trace of fines.</td>
</tr>
<tr>
<td>-19</td>
<td>SPT 5, 8, 11 N=19</td>
<td>becoming dark brown</td>
</tr>
<tr>
<td>-20</td>
<td>SPT 4, 3, 11 N=14</td>
<td></td>
</tr>
<tr>
<td>-21</td>
<td>SPT 2, 3, 9 N=12</td>
<td></td>
</tr>
<tr>
<td>-22</td>
<td>SPT 0, 1, 4 N=5</td>
<td></td>
</tr>
<tr>
<td>25.0</td>
<td>SPT - sample recovered</td>
<td></td>
</tr>
</tbody>
</table>
### SOIL TYPE

<table>
<thead>
<tr>
<th>Sequential No.</th>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SM</td>
<td>SILTY SAND: fine grained, dark grey black, low to medium plasticity. (continued)</td>
</tr>
<tr>
<td>2</td>
<td>SC</td>
<td>CLAYEY SAND: fine grained, dark grey black, low to medium plasticity. Trace of cemented sand bands.</td>
</tr>
</tbody>
</table>

### Additional Observations
- Trace of gravely clay pockets, medium plasticity, dark grey, fine-grained gravel.
- Becoming pale brown, dark brown, dark green, with some cemented sands.

### Borehole Information
- **Borehole ID:** ID18-BH09
- **Client:** Metro Trains Melbourne
- **Principal:** Level Crossing Removal Authority
- **Project:** LCRP-CTF
- **Location:** ID18 - Edithvale Road, Edithvale
- **Date Started:** 09 Sep 2016
- **Date Completed:** 21 Sep 2016
- **Logged By:** BK
- **Checked By:** KJ

### Drilling Information
- **Method:** Non-Destructive Drilling
- **Support:** M (mud)
- **Penetration:** N (ft)
- **Samples & Field Tests:** B (bulk disturbed sample), D (disturbed sample), E (environmental sample), SS (split spoon sample), US# (undisturbed sample #1 mm diameter), HP (hand penetrometer (kPa)), N (standard penetration test (SPT)), N* (SPT - sample recovered), Nc (SPT with solid cone), VS (vane shear; peak/remoulded (kPa)), R (refusal), HB (hammer bouncing)
- **Classification Symbol & Soil Description:** Based on Unified Classification System
- **Moisture:** C (moist), W (wet), VP (plastic limit), WI (liquid limit)
- **Consistency / Relative Density:** VS (very soft), S (soft), F (firm), ST (stiff), VST (very stiff), H (hard), Fb (fragile), VL (very loose), L (loose), MD (medium dense), D (dense)

### Material Substance
- **Classification Symbol:** SM, SC
- **Material Description:** M - W, MD
- **Structure and Additional Observations:**
  - First blow penetrated approximately 250 mm
  - First blow penetrated approximately 300 mm then hit a cemented band

### Positions and Elevations
- **Drill Model:** Ausroc, Truck mounted
- **Angle from Horizontal:** 90°
- **Hole Diameter:** 100 mm
- **Surface Elevation:** 6.52 m (AHD)
- **Angle from Horizontal:** 90°
- **Surface Elevation:** 6.52 m (AHD)
- **Drilling Fluid:** Polymer
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Position</th>
<th>Surface Elevation</th>
<th>Angle from Horizontal</th>
<th>Hole Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>E: 334.199; N: 5,787,923.56</td>
<td>6.52 m (AHD)</td>
<td>90°</td>
<td>100 mm</td>
</tr>
</tbody>
</table>

**Borehole ID:** ID18-BH09  
**Logged by:** BK  
**Checked by:** KJ

**Drilling Information**

- **Drill Model:** Ausroc, Truck mounted  
- **Drilling Fluid:** Polymer  
- **Surface Elevation:** 6.52 m (AHD)  
- **Hole Diameter:** 100 mm

**Material Substance**

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>Plasticity or Particle Characteristic, Colour, Secondary and Minor Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAYEY SAND</td>
<td>Fine grained, dark grey black, low to medium plasticity, trace of cemented sand bands. (continued)</td>
</tr>
<tr>
<td>SILTY SAND</td>
<td>Fine grained, pale brown, grey, low liquid limit, trace of shell fragments.</td>
</tr>
</tbody>
</table>

**Classification Symbol & Soil Description**

<table>
<thead>
<tr>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>CLAYEY SAND</td>
</tr>
<tr>
<td>SM</td>
<td>SILTY SAND</td>
</tr>
</tbody>
</table>

**Mud Sandston**

- **Method & Support:** D  
- **Penetration:**  
- **Material Substance:**  
- **Structure and Additional Observations:**  

**Consistency / Relative Density**

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Soil Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>Very Soft</td>
</tr>
<tr>
<td>S</td>
<td>Soft</td>
</tr>
<tr>
<td>Fl</td>
<td>Firm</td>
</tr>
<tr>
<td>H</td>
<td>Hard</td>
</tr>
<tr>
<td>VL</td>
<td>Very Loose</td>
</tr>
<tr>
<td>L</td>
<td>Loose</td>
</tr>
</tbody>
</table>

**Hand Penetrometer (kPa)**

<table>
<thead>
<tr>
<th>Hand Penetrometer (kPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
</tr>
</tbody>
</table>

**Soil Strength**

- **Penetration Test (SPT):**  
- **Sample Recovered:**  
- **Standard Penetration Test (SPT):**  
- **SPT with Solid Cone:**  
- **Vane Shear:**  
- **Peak Remoulded:**  
- **Hammer Bouncing:**

**Borehole ID18-BH09 Terminated at 46.45 m**

**Target Depth**

**Additional Observations**

- **Standpipe Installation:**  
- **Backfill Details:**  
- **0.0m-0.5m:** Concrete  
- **0.5-4.5m:** Grout  
- **4.5-5.0m:** Bentonite  
- **5.0-9.0m:** Sand  
- **End Caps and Flush Mounted Gatic Cover:**  
- **Borehole Details:**  
- **0.0m-6.0m:** Unslotted 50mm PVC, Class 18  
- **6.0m-9.0m:** Machine slotted, filter sock covered, 50mm PVC, Class 18  

---

**Graphic Log**

- **Classification Symbol:**  
- **Sample & Field Tests:**  
- **Water:**

<table>
<thead>
<tr>
<th>Water Outflow</th>
<th>Penetrator</th>
<th>Water Inflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-Oct-12</td>
<td>AD/T</td>
<td></td>
</tr>
<tr>
<td>20-Oct-12</td>
<td>TC bit</td>
<td></td>
</tr>
</tbody>
</table>

**Position:** E: 334.199; N: 5,787,923.56 (MGA94)

**Angle from Horizontal:** 90°

**Hole Diameter:** 100 mm

---

**Logging Information**

- **Client:** Metro Trains Melbourne  
- **Date Started:** 09 Sep 2016  
- **Date Completed:** 21 Sep 2016  
- **Logged By:** BK  
- **Checked By:** KJ
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**drilling information**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>graphic log</th>
<th>classification</th>
<th>symbol</th>
<th>samples &amp; field tests</th>
<th>material description</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1</td>
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<tr>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
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<td></td>
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<tr>
<td>5</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**material substance**

- **FILL:** ASPHALT: 50mm.
- **FILL:** GRAVEL: coarse grained, angular, dark grey, trace of cobbles.
- **SAND:** fine to medium grained, grey, trace of fines
- **becoming fine to coarse grained, pale brown-pale grey, trace of fines**
- **becoming brown, trace of medium to coarse grained gravel**
- **becoming fine to medium grained, pale grey, trace of fines**

**method & support**

- **AD** auger drilling
- **AS** auger screwing
- **HA** hand auger
- **W** washhoe
- **NDD** non destructive drilling

**penetration**

- **penetration**
  - **water**
  - **no resistance ranging to refusal**

**samples & field tests**

- **B** bulk disturbed sample
- **D** disturbed sample
- **E** environmental sample
- **SS** split spoon sample
- **U** undisturbed sample #8mm diameter
- **N** standard penetration test (SPT)
- **N*** SPT - sample recovered
- **Nc** SPT with solid cone
- **VS** vane shear; peak/remould (kPa)
- **R** refusal
- **HB** hammer bouncing

**classification symbol & soil description**

- **classification symbol**
  - **D** dry
  - **M** moist
  - **W** wet
  - **H** hard
  - **F** firm
  - **V** very firm
  - **L** stiff
  - **VS** very stiff
  - **M** medium dense
  - **D** dense

- **soil description**
  - **based on Unified Classification System**
  - **moisture**
  - **consistency / relative density**
  - **VS** very soft
  - **S** soft
  - **F** firm
  - **ST** stiff
  - **VST** very stiff
  - **H** hard
  - **Fb** firm
  - **VL** very loose
  - **L** loose
  - **MD** medium dense
  - **D** dense
  - **VD** very dense

**additional observations**

- **structure and additional observations**

---

**logging information**

**Borehole ID:** ID18-BH10  
**date started:** 24 Oct 2016  
**date completed:** 26 Oct 2016  
**logged by:** BK  
**checked by:** KJ

**drill model:** Explora MK50, Truck mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm

<table>
<thead>
<tr>
<th>position: E: 334.137.83; N: 5,788.047.82 (MGA94 )</th>
<th>surface elevation: 6.32 m (AHD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>angle from horizontal: 90°</td>
<td></td>
</tr>
</tbody>
</table>

**FILL QUATERNARY SANDS**

- **VD** very soft
- **MD** medium dense
- **D** dense
- **VD** very dense
Engineering Log - Borehole

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: ID18 - Edithvale Road, Edithvale

drilling information
method & support: NDD non destructive drilling
penetration: 100 mm
samples & field tests: 39
method & support: AD auger drilling
penetration: 100 mm
samples & field tests: 39

material substance
material description
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
SAND: fine to medium grained, grey, (continued) rotten egg odour present
Sandy CLAY: high plasticity, pale grey mottled orange-brown, fine to medium grained sand.
Silty CLAY: low to medium plasticity, dark grey,black, trace of roots, distinct rotten egg odour.
SAND: fine to coarse grained, black, dark brown, trace of fine grained gravel, trace of fines.
becoming grey-brown
becoming fine grained, brown, dark brown
SAND: fine to coarse grained, pale grey, with some fines and clay bands, high plasticity, 20mm-50mm thick.
SAND: fine to medium grained, grey, (continued) rotten egg odour present

structure and additional observations
W VD QUATERNARY SANDS
M H TERTIARY BRIGHTON GROUP

method & support
method: AD auger drilling
penetration: 100 mm
samples & field tests: 39

project ID: ID18-BH10
sheet: 2 of 6

ID18-BH10

24 Oct 2016
26 Oct 2016
BK
KJ

Metro Trains Melbourne
Level Crossing Removal Authority

ID18 - Edithvale Road, Edithvale

E: 334,137.83; N: 5,788,047.82 (MGA94)
surface elevation: 6.32 m (AHD)
angle from horizontal: 90°

drill model: Explora MK50, Truck mounted
drilling fluid: Polymer
hole diameter : 100 mm

confirmation

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

moisture
D dry
M moist
W wet
WP plastic limit
WI liquid limit

classification symbol & soil description based on Unified Classification System

method & support
method: AD auger drilling
penetration: 100 mm
samples & field tests: 39

CSDF_0_9_06_LIBRARY.GLB rev:AS  Log  COF BOREHOLE: NON CORED  GEOTABTF10294AA_ID18.GPJ  <<DrawingFile>>  02/06/2017 17:15
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>M M     C N N</td>
<td>N R</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Material Substance

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td>SAND: fine to coarse grained, pale grey, with some fines and clay bands, high plasticity, 20mm-50mm thick. (continued)</td>
</tr>
<tr>
<td>CH</td>
<td>Sandy CLAY: high plasticity, pale grey mottled orange-brown, fine to coarse grained sand.</td>
</tr>
<tr>
<td>SM</td>
<td>SILTY SAND: fine to medium grained, pale grey mottled brown, low liquid limit, trace of fine grained gravel.</td>
</tr>
</tbody>
</table>

#### SOIL CLASSIFICATION

<table>
<thead>
<tr>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Muddy</td>
</tr>
<tr>
<td>H</td>
<td>Hard</td>
</tr>
<tr>
<td>W</td>
<td>Wet</td>
</tr>
<tr>
<td>D</td>
<td>Dry</td>
</tr>
<tr>
<td>NS</td>
<td>Silty sand</td>
</tr>
<tr>
<td>SM</td>
<td>Silty sand</td>
</tr>
<tr>
<td>SP</td>
<td>Sand</td>
</tr>
</tbody>
</table>

#### Sample Description

<table>
<thead>
<tr>
<th>Consistency / Relative Density</th>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
<th>Moisture</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>Vs</td>
<td>VS</td>
<td>Vs</td>
</tr>
<tr>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>ST</td>
<td>ST</td>
<td>ST</td>
<td>ST</td>
</tr>
</tbody>
</table>

#### Additional Observations

- **TERTIARY BRIGHTON GROUP**
- Iron cemented sand layer
- Becoming brown, increasing silt content, with some weakly cemented zones

#### Drilling Fluid

- Polymer

#### Drilling Model

- Explora MK50, Truck mounted

#### Angle from Horizontal

- 90°

#### Hole Diameter

- 100 mm
<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>SM</td>
<td>SILTY SAND: fine to medium grained, pale grey motiled brown, low liquid limit, trace of fine grained gravel, (continued) becoming brown</td>
</tr>
<tr>
<td>M</td>
<td>ML</td>
<td>Sandy SILT: medium liquid limit, dark grey, dark brown, slight green tinge, fine grained sand, with some weakly cemented zones.</td>
</tr>
<tr>
<td>SC</td>
<td>SM</td>
<td>SILTY SAND: fine to medium grained, grey, low plasticity, with some weakly cemented zones.</td>
</tr>
<tr>
<td></td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, dark grey, dark brown, green, low plasticity, with some weakly cemented zones.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Method</th>
<th>Support</th>
<th>Samples &amp; Field Tests</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>mud</td>
<td>B</td>
<td>bulk disturbed sample</td>
<td></td>
</tr>
<tr>
<td>AS</td>
<td>casing</td>
<td>D</td>
<td>disturbed sample</td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td>water</td>
<td>E</td>
<td>environmental sample</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>washwater</td>
<td>SS</td>
<td>split spoon sample</td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
<td>U#</td>
<td>undisturbed sample #1mm diameter</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>HP</td>
<td>hand penetrometer (kPa)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>standard penetration test (SPT)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N*</td>
<td>SPT - sample recovered</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nc</td>
<td>SPT with solid cone</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VS</td>
<td>vane shear; peak/remoulded (kPa)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VB</td>
<td>refusal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>HB</td>
<td>hammer bouncing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consistency / Relative Density</th>
<th>Moisture</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
<td>firm</td>
</tr>
<tr>
<td>ST</td>
<td>stiff</td>
<td>stiff</td>
</tr>
<tr>
<td>VST</td>
<td>very stiff</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
<td>very dense</td>
</tr>
</tbody>
</table>
# Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOIL TYPE:</strong> Plasticity or particle characteristic, colour, secondary and minor components</td>
<td><strong>Material Description</strong></td>
</tr>
<tr>
<td><strong>METHOD:</strong> non destructive drilling</td>
<td><strong>CLAYEY SAND:</strong> Fine to medium grained, dark grey, dark brown, green, low plasticity, with some weakly cemented zones. (continued)</td>
</tr>
<tr>
<td><strong>SAMPLES &amp; FIELD TESTS:</strong> water</td>
<td><strong>CLAYEY SAND:</strong> Fine to medium grained, dark grey, dark brown, green, low plasticity, with some weakly cemented zones. (continued)</td>
</tr>
<tr>
<td><strong>Hand Penetrometer (kPa):</strong> 100</td>
<td><strong>GELLIBRAND MARL</strong></td>
</tr>
<tr>
<td><strong>SPT - sample recovered</strong></td>
<td><strong>SANDY CLAY:</strong> High plasticity, dark brown, green, fine to coarse grained sand, trace of fine grained gravel, with some shell fragments.</td>
</tr>
<tr>
<td><strong>Penetration test (SPT)</strong></td>
<td><strong>SILTY SAND:</strong> Fine grained, dark grey, dark brown, low liquid limit.</td>
</tr>
<tr>
<td><strong>SPT with solid cone</strong></td>
<td><strong>METHOD &amp; SUPPORT:</strong> Non destructive drilling</td>
</tr>
<tr>
<td><strong>VANE SHEAR:</strong> refusal and SPT</td>
<td><strong>CLASSIFICATION SYMBOL:</strong> M</td>
</tr>
<tr>
<td><strong>CONSISTENCY / RELATIVE DENSITY:</strong> soil description</td>
<td><strong>SOIL TYPE:</strong> Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td><strong>SPT - sample recovered</strong></td>
<td><strong>CONSISTENCY / RELATIVE DENSITY:</strong> soil description</td>
</tr>
<tr>
<td><strong>Penetration test (SPT)</strong></td>
<td><strong>CONSISTENCY / RELATIVE DENSITY:</strong> soil description</td>
</tr>
<tr>
<td><strong>SPT with solid cone</strong></td>
<td><strong>CONSISTENCY / RELATIVE DENSITY:</strong> soil description</td>
</tr>
<tr>
<td><strong>VANE SHEAR:</strong> refusal and SPT</td>
<td><strong>CONSISTENCY / RELATIVE DENSITY:</strong> soil description</td>
</tr>
<tr>
<td><strong>METHOD &amp; SUPPORT:</strong> Non destructive drilling</td>
<td><strong>CONSISTENCY / RELATIVE DENSITY:</strong> soil description</td>
</tr>
<tr>
<td><strong>CLASSIFICATION SYMBOL:</strong> M</td>
<td><strong>CONSISTENCY / RELATIVE DENSITY:</strong> soil description</td>
</tr>
<tr>
<td><strong>CONSISTENCY / RELATIVE DENSITY:</strong> soil description</td>
<td><strong>CONSISTENCY / RELATIVE DENSITY:</strong> soil description</td>
</tr>
</tbody>
</table>

**Data:**  
- **Borehole ID:** ID18-BH10  
- **Date Started:** 24 Oct 2016  
- **Date Completed:** 26 Oct 2016  
- **Logged By:** BK  
- **Checked By:** KJ  
- **Client:** Metro Trains Melbourne  
- **Project:** LCRP-CTF  
- **Location:** ID18 - Edithvale Road, Edithvale
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**date started:** 24 Oct 2016  
**date completed:** 26 Oct 2016  
**logged by:** BK  
**checked by:** KJ

#### Borehole Information
- **Borehole ID:** ID18-BH10  
- **Drilling Fluid:** Polymer

#### Material Substance

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td>N=20</td>
<td></td>
<td></td>
<td>Sandy CLAY: high plasticity, dark brown, green, fine to coarse grained sand, trace of fine grained gravel, with some shell fragments. (continued)</td>
</tr>
<tr>
<td>SPT</td>
<td>N=138</td>
<td></td>
<td></td>
<td>SM SILTY SAND: fine grained, dark grey mottled brown, green, low plasticity silt, trace of shell fragments. with some pockets of fine to coarse grained sand</td>
</tr>
</tbody>
</table>

#### Soil Type
- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

#### Additional Observations
- **penetration:**
  - **depth (m):**
    - 41.0
    - 42.0
    - 43.0
    - 44.0
    - 45.0
    - 46.0
    - 47.0

#### Method & Support
- **method & support:**
  - auger drilling
  - auger screwing
  - hand auger
  - wash bore
  - NDD non destructive drilling

#### Classification Symbol & Soil Description
- **consistency / relative density:**
  - VS very soft
  - S soft
  - F firm
  - St stiff
  - VSt very stiff
  - H hard
  - Fo friable
  - W wet
  - WI liquid limit
  - D dense
  - VL very loose
  - L loose
  - MD medium dense
Piezometer Installation Log

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: ID18 - Edithvale Road, Edithvale

method & support: water
water pressure test result: see engineering log for details

material substance

| position: E: 333.705.93; N: 5.788.924.49 (MGA94) | surface elevation: 6.56 m (AHD) |
| equipment type: Explora E50, Truck mounted |
| drilling fluid: Polymer |
| hole diameter: 100 mm |

drilling information

<table>
<thead>
<tr>
<th>graphic log</th>
<th>material name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>FILL</td>
</tr>
<tr>
<td>1</td>
<td>QUATERNARY SANDS</td>
</tr>
</tbody>
</table>

material name

- Grout
- Bentonite
- Sand

piezometer construction details

- bore construction license: WRK057006
- drilling company: Earthcore Drilling
- driller: L. Adolphson
- driller's permit no.: 0738

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>graphic log / core recovery</th>
<th>material name</th>
<th>ID</th>
<th>type</th>
<th>installation date</th>
<th>stickup (m)</th>
<th>tip depth (m)</th>
<th>water level (m)</th>
<th>Relative Levels (AHD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>see engineering log for details</td>
<td></td>
<td>ID18-BH01</td>
<td>standpipe piezo.</td>
<td>9.10 m</td>
<td>9.10 m</td>
<td>-2.55</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Piezometer Installation Log

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Position:** E: 333,853.25; N: 5,788,624.58 (MGA94)  
**Surface Elevation:** 6.44 m (AHD)  
**Angle from Horizontal:** 90°  
**Equipment Type:** Explora E50, Truck mounted  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 100 mm

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>FILL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>QUATERNARY SANDS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TERTIARY BRIGHTON GROUP</td>
<td></td>
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</tbody>
</table>

**Material Name**

- Grout
- Bentonite
- Sand

**Piezometer Construction Details**

<table>
<thead>
<tr>
<th>ID</th>
<th>Type</th>
<th>Installation Date</th>
<th>Stickup (m)</th>
<th>Tip Depth (m)</th>
<th>Water Level (m)</th>
<th>Relative Levels (AHD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID18-BH02</td>
<td>Standpipe piezo.</td>
<td>10.50 m</td>
<td>-4.06</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Graphic Log / Core Recovery**

- Core recovered (graphic symbols indicate material)  
- No core recovered

**Additional Information**

- Bore construction license: WRK097007  
- Drilling Company: Earthcore Drilling  
- Driller: L. Adolphson  
- Driller's permit no.: 0738  
- Water inflow  
- Complete drilling fluid loss  
- Partial drilling fluid loss  
- Water pressure test result (lugeons) for depth interval shown

---

**Hole ID:** ID18-BH02  
**Sheet:** 1 of 1  
**Project No.:** GEOTABTF10294AA  
**Date Started:** 20 Sep 2016  
**Date Completed:** 23 Sep 2016  
**Logged By:** JLy  
**Checked By:** KJ
## Piezometer Installation Log

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material substance</th>
<th>piezometer construction details</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00</td>
<td>FILL</td>
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<tr>
<td>14.00</td>
<td>QUATERNARY SANDS</td>
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<tr>
<td>16.00</td>
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### Drilling Information

<table>
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<th>water</th>
<th>graphic log</th>
<th>material name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **method & support:** see engineering log for details  
- **water:** 10-Oct-12, water level on date shown  
- **water inflow:** partial drilling fluid loss  
- **water pressure test result:** (lugeons) for depth interval shown

### Piezometer Construction Details

- **material name:** hydrostatic pressure test result
- **material substance:** core recovered (graphic symbols indicate material)  
- **no core recovered**

### Drilling Fluids

- **drilling fluid:** Polymer  
- **drilling company:** Terratest  
- **driller:** D. Henry  
- **driller's permit no.:** 0284

### Casing Details

- **casing diameter:** HWT  
- **surface elevation:** 6.55 m (AHD)  
- **angle from horizontal:** 90°

### Water Levels

<table>
<thead>
<tr>
<th>ID18-BH04</th>
<th>water level</th>
<th>Relative Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00 m</td>
<td>-7.45</td>
<td></td>
</tr>
</tbody>
</table>

**Hole ID:** ID18-BH04  
**date started:** 22 Sep 2016  
**date completed:** 27 Sep 2016  
**logged by:** BK/LW  
**checked by:** KJ

---

**position:** E: 333,959.94; N: 5,788,425.73 (MGA94)  
**equipment type:** Ausroc 9000, Truck mounted  
**drilling fluid:** Polymer  
**casing diameter:** HWT  
**drilling fluid:** Polymer  
**driller:** D. Henry  
**driller's permit no.:** 0284  
**bore construction license:** WRK057008  
**drilling company:** Terratest  
**driller:** D. Henry  
**driller's permit no.:** 0284
# Piezometer Installation Log

**Hole ID:** ID18-BH06  
**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>position: E: 334,067.25; N: 5,788,173.57 (MGA94)</th>
<th>surface elevation: 6.58 m (AHD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>equipment type: Explora 50, Truck mounted</td>
<td>drilling fluid: Polymer</td>
</tr>
<tr>
<td>angle from horizontal: 90°</td>
<td>hole diameter: 100 mm</td>
</tr>
</tbody>
</table>

**Drilling Information:**
- **Method & Support:** water
- **Method & Support:** graphic log
- **Drilling Fluid:** Polymer
- **Driller:** L. Adolphson
- **Driller's Permit No.:** 0738
- **Position:** E: 334,067.25; N: 5,788,173.57 (MGA94)
- **Surface Elevation:** 6.58 m (AHD)
- **Hole Diameter:** 100 mm

**Bore Construction License:** WRK097010

**Drilling Company:** Earthcore Drilling

**Driller:** L. Adolphson

**Driller's Permit No.:** 0738

**Log Sheets:**
- **Sheet:** 1 of 1
- **Date Started:** 12 Oct 2016
- **Date Completed:** 14 Oct 2016
- **Logged By:** OP
- **Checked By:** KJ

## Drilling Information Table

<table>
<thead>
<tr>
<th>ID</th>
<th>Type</th>
<th>Installation Date</th>
<th>Stickup (m)</th>
<th>Tip Depth (m)</th>
<th>Water Level (m)</th>
<th>Relative Levels (AHD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID18-BH06</td>
<td>standpipe piezo.</td>
<td>20.00</td>
<td>-13.42</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Graphic Log

- **Material Name:**
  - Fill: Quaternary Sands
  - Bentonite
  - Grout
  - Sand
  - Tertiary Brighton Group

- **Stickup (m):**
  - 20.00

- **Tip Depth (m):**
  - 17.00

- **Relative Levels (AHD):**
  - -13.42

- **Water Level:**
  - -13.42

**Core Recovery:**
- No core recovered

**Drilling Fluid Loss:**
- Partial drilling fluid loss

**Water Pressure Test Result:**
- No water pressure test result

**Event Icon Legend:**
- Water flow rate on date shown
- Water inflow
- Complete drilling fluid loss
- Partial drilling fluid loss
- Water pressure test result (lugeons) for depth interval shown
Piezometer Installation Log

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: ID18 - Edithvale Road, Edithvale

position: E: 334,105.95; N: 5,788,246.20 (MGA94)
surface elevation: 4.54 m (AHD)
angle from horizontal: 90°
equipment type: Explora 50, Truck mounted
drilling fluid: Polymer
hole diameter: 100 mm

method & support
water

graphic log

material name
FILL
QUATERNARY SANDS

material substance

position: E: 334,105.95; N: 5,788,246.20 (MGA94)
angle from horizontal: 90°
hole diameter: 100 mm
drilling fluid: Polymer

material name
FILL
QUATERNARY SANDS

graphic log

material substance

Relative Levels (AHD)

installation date

ID type

17.00 m

-12.46
**Piezometer Installation Log**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>material substance</th>
<th>piezometer construction details</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>FILL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>QUATERNARY SANDS</td>
<td></td>
</tr>
</tbody>
</table>

**graphic log / core recovery**
- core recovered (graphic symbols indicate material)
- no core recovered

**Relative Levels (AHD)**
- ID18-BH09 standpipe piezo: 9.00 m, -2.48
Appendix I – Groundwater Bore Construction Licence
COPY OF RECORD IN THE VICTORIAN WATER REGISTER

LICENCE TO CONSTRUCT WORKS

under Section 67 of the Water Act 1989

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This licence authorises its holders to construct the described works, subject to the conditions.

Licence Holder(s)
METRO TRAINS MELBOURNE PTY LTD C/- COFFEY of LEVEL 1, 436 JOHNSTON STREET ABBOTSFORD VIC 3067

Licence Contact Details
METRO TRAINS MELBOURNE LEVEL 1, 436 JOHNSTON STREET
PTY LTD C/- COFFEY ABBOTSFORD VIC 3067

Licence Details
Expiry date 10 Nov 2017
Status Active
Authority Southern Rural Water
Name of waterway or aquifer NA for construct/decommission
Water system Unincorporated (GMU)

Summary of Licensed Works
The details in this section are a summary only. They are subject to the conditions specified in this licence.

<table>
<thead>
<tr>
<th>Works ID</th>
<th>Works type</th>
<th>Use of water</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRK097006</td>
<td>Bore</td>
<td>Observation</td>
</tr>
<tr>
<td>WRK097007</td>
<td>Bore</td>
<td>Observation</td>
</tr>
<tr>
<td>WRK097008</td>
<td>Bore</td>
<td>Observation</td>
</tr>
<tr>
<td>WRK097009</td>
<td>Bore</td>
<td>Observation</td>
</tr>
<tr>
<td>WRK097010</td>
<td>Bore</td>
<td>Observation</td>
</tr>
<tr>
<td>WRK097011</td>
<td>Bore</td>
<td>Observation</td>
</tr>
</tbody>
</table>
### Description of Licensed Works

<table>
<thead>
<tr>
<th>WORKS ID</th>
<th>WRK097006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works type</td>
<td>Bore</td>
</tr>
<tr>
<td>Works subtype</td>
<td>Drilled bore</td>
</tr>
<tr>
<td>Proposed maximum depth</td>
<td>Unrestricted</td>
</tr>
</tbody>
</table>

**Works location**

<table>
<thead>
<tr>
<th>Easting</th>
<th>Northing</th>
<th>Zone MGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>333696.521</td>
<td>5788939.664</td>
<td>Zone 55</td>
</tr>
</tbody>
</table>

**Other land description**

95 C2

**Property address**

Location(s) in or near ASPENDALE, Parish: Lyndhurst

### Description of Licensed Works

<table>
<thead>
<tr>
<th>WORKS ID</th>
<th>WRK097007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works type</td>
<td>Bore</td>
</tr>
<tr>
<td>Works subtype</td>
<td>Drilled bore</td>
</tr>
<tr>
<td>Proposed maximum depth</td>
<td>Unrestricted</td>
</tr>
</tbody>
</table>

**Works location**

<table>
<thead>
<tr>
<th>Easting</th>
<th>Northing</th>
<th>Zone MGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>333831.390</td>
<td>5788667.517</td>
<td>Zone 55</td>
</tr>
</tbody>
</table>

**Other land description**

95 C2

**Property address**

Location(s) in or near ASPENDALE, Parish: Lyndhurst

### Description of Licensed Works

<table>
<thead>
<tr>
<th>WORKS ID</th>
<th>WRK097008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works type</td>
<td>Bore</td>
</tr>
<tr>
<td>Works subtype</td>
<td>Drilled bore</td>
</tr>
<tr>
<td>Proposed maximum depth</td>
<td>Unrestricted</td>
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</tbody>
</table>

**Works location**

<table>
<thead>
<tr>
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<th>Northing</th>
<th>Zone MGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>333943.320</td>
<td>5788438.886</td>
<td>Zone 55</td>
</tr>
</tbody>
</table>

**Other land description**

95 C2
### Description of Licensed Works

**WORKS ID** WRK097009  
**Works type** Bore  
**Works subtype** Drilled bore  
**Proposed maximum depth** Unrestricted  

**Works location**  

<table>
<thead>
<tr>
<th>Easting</th>
<th>Northing</th>
<th>Zone MGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>334081.683</td>
<td>5788236.827</td>
<td>Zone 55</td>
</tr>
</tbody>
</table>

**Other land description**  
95 C2

---

**Property address**  
Location(s) in or near ASPENDALE, Parish: Lyndhurst

### Description of Licensed Works

**WORKS ID** WRK097010  
**Works type** Bore  
**Works subtype** Drilled bore  
**Proposed maximum depth** Unrestricted  

**Works location**  

<table>
<thead>
<tr>
<th>Easting</th>
<th>Northing</th>
<th>Zone MGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>334063.699</td>
<td>5788189.433</td>
<td>Zone 55</td>
</tr>
</tbody>
</table>

**Other land description**  
95 C2

---

**Property address**  
Location(s) in or near ASPENDALE, Parish: Lyndhurst

### Description of Licensed Works

**WORKS ID** WRK097011  
**Works type** Bore  
**Works subtype** Drilled bore  
**Proposed maximum depth** Unrestricted  

**Works location**  

<table>
<thead>
<tr>
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<th>Northing</th>
<th>Zone MGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>334212.165</td>
<td>5787889.576</td>
<td>Zone 55</td>
</tr>
</tbody>
</table>
Other land description
95 C2

Property address
Location(s) in or near ASPENDELA, Parish: Lyndhurst

Related Instruments
Related entitlements Nil
Related water-use entities Nil

Application History

<table>
<thead>
<tr>
<th>Reference</th>
<th>Type</th>
<th>Status</th>
<th>Lodged date</th>
<th>Approved date</th>
<th>Recorded date</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLI605047</td>
<td>Issue</td>
<td>Approved</td>
<td>10 Nov 2016</td>
<td>10 Nov 2016</td>
<td></td>
</tr>
</tbody>
</table>
Conditions
Licence WLE066924 is subject to the following conditions:

Siting and construction
1  The bore(s) must be drilled at the location specified in the application approved by the Authority.
2  If after drilling the bore is considered unsatisfactory a replacement bore may be drilled on the land specified in the licence.

Preventing pollution
3  All earthworks must be carried out, and all drilling fluids and waters produced during construction and development must be disposed of, in ways that avoid contaminating native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people’s property.
4  Construction must stop immediately if the Authority reasonably believes that fuel, lubricant, drilling fluid, soil or water produced during construction and development is at risk of being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people’s property.
5  The licence holder must construct and maintain bund walls, in accordance with the timeframe, specifications, guidelines or standards prescribed by the Authority, to prevent fuel, lubricant, drilling fluid, soil or water produced during construction and development from being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people’s property.

Construction standards
6  The bore(s) must be constructed, and where relevant decommissioned, in accordance with the Minimum Construction Requirements for Water Bores in Australia, Edition 3 or its successor.

Drilling licence and supervision requirements
7  The bore(s) must be constructed by, or under the direct supervision of, a driller licensed under the Water Act 1989 and endorsed as a Class 1, 2, or 3 driller, with appropriate endorsements.
8  If artesian pressure is expected or encountered, then a driller licensed under the Water Act 1989, and endorsed as a class 3 driller, must install casing in the bore(s) to a suitable depth, and in a suitable manner, to prevent its outbreak. A suitable valve must also be fitted to the bore.

Bore completion report
9  A Bore Completion Report must be submitted to the Authority within 28 working days of the bore(s) being completed.

Protecting water resources
10  No more than 6 bore(s) may be brought to final development under this licence.
11  At the completion of drilling and before the drilling rig leaves the site, all but 6 bore(s) must be decommissioned so as to eliminate physical hazards, conserve aquifer yield, prevent groundwater contamination and prevent the intermingling of desirable and undesirable waters.
12  The bore(s) must be located at least 30 metres from any authority's channel, reserve or easement unless authorised by the Authority.

Protecting water quality
13  Drilling must not exceed the maximum depth.
14  The bore(s) must be constructed so as to prevent aquifer contamination caused by vertical flow outside the casing.
15  If two or more aquifers are encountered, the bore(s) must be constructed to ensure that an impervious seal is made and maintained between each aquifer to prevent aquifer connection through vertical flow outside the casing; under no circumstances are two or more aquifers to be screened within the one bore or in any other manner to allow connection between them.
16  Boreheads must be constructed, to ensure that no flood water, surface runoff or potential
subsurface contaminated soakage can enter the bore or bore annulus.

**Protecting other water users**

17 The diameter of the drill casing must not exceed 130 millimetres.

18 The bore(s) must be constructed so that water levels in the bore(s) can be measured by an airline, a piezometer or a method approved in writing by the Authority.

**Fees and charges**

19 The licence holder must, when requested by the Authority, pay all fees, costs and other charges under the Water Act 1989 in respect of this licence.

END OF COPY OF RECORD
Figures
Geological boundaries are only known at the test site locations and have been inferred between the test sites. These geological boundaries have been provided to assist with the geological interpretation and should not be considered to represent actual boundaries that may vary from these lines.
Appendix B – Borehole Logs
Defininition:
In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

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

Particle Size Descriptive Terms

<table>
<thead>
<tr>
<th>NAME</th>
<th>SUBDIVISION</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
<td></td>
<td>&gt;200 mm</td>
</tr>
<tr>
<td>Cobbles</td>
<td></td>
<td>63 mm to 200 mm</td>
</tr>
<tr>
<td>Gravel</td>
<td>coarse</td>
<td>20 mm to 63 mm</td>
</tr>
<tr>
<td></td>
<td>medium</td>
<td>6 mm to 20 mm</td>
</tr>
<tr>
<td></td>
<td>fine</td>
<td>2.36 mm to 6 mm</td>
</tr>
<tr>
<td>Sand</td>
<td>coarse</td>
<td>600 μm to 2.36 mm</td>
</tr>
<tr>
<td></td>
<td>medium</td>
<td>200 μm to 600 μm</td>
</tr>
<tr>
<td></td>
<td>fine</td>
<td>75 μm to 200 μm</td>
</tr>
</tbody>
</table>

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

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

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

Consistency of Cohesive Soils

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

Note: Consistency/density has been provided for FILL material to assist site access and temporary works design. Near surface conditions may vary with time.

Density of Granular Soils

<table>
<thead>
<tr>
<th>TERM</th>
<th>DENSITY INDEX (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very loose</td>
<td>Less than 15</td>
</tr>
<tr>
<td>Loose</td>
<td>15 - 35</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>35 - 65</td>
</tr>
<tr>
<td>Dense</td>
<td>65 - 85</td>
</tr>
<tr>
<td>Very Dense</td>
<td>Greater than 85</td>
</tr>
</tbody>
</table>

Minor Components

<table>
<thead>
<tr>
<th>TERM</th>
<th>ASSESSMENT GUIDE</th>
<th>PROPORTION OF MINOR COMPONENT IN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace of</td>
<td>Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.</td>
<td></td>
</tr>
<tr>
<td>With some</td>
<td>Presence easily detected by feel or eye, soil properties little different to general properties of primary component.</td>
<td></td>
</tr>
</tbody>
</table>

Soil Structure

<table>
<thead>
<tr>
<th>ZONING</th>
<th>CEMENTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layers</td>
<td>Weakly cemented</td>
</tr>
<tr>
<td></td>
<td>Easily broken up by hand in air or water.</td>
</tr>
<tr>
<td>Lenses</td>
<td>Moderately cemented</td>
</tr>
<tr>
<td></td>
<td>Effort is required to break up the soil by hand in air or water.</td>
</tr>
<tr>
<td>Pockets</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Geological Origin

Weathered in Place Soils

| EXTREMELY WEATHERED MATERIAL                     | Structure and fabric of parent rock visible. |
| Residual soil                                   | Structure and fabric of parent rock not visible. |

Transported Soils

| AEOLIAN SOIL          | Deposited by wind. |
| Alluvial soil         | Deposited by streams and rivers. |
| Colluvial soil        | Deposited on slopes (transported downslope by gravity). |
| Fill                  | Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils. |
| Lacustrine soil       | Deposited by lakes. |
| Marine soil           | Deposited in ocean basins, bays, beaches and estuaries. |
Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES
(Excluding particles larger than 60 mm and basing fractions on estimated mass)  

<table>
<thead>
<tr>
<th>USC</th>
<th>PRIMARY NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>GW</td>
<td>GRAVEL</td>
</tr>
<tr>
<td>GM</td>
<td>SILTY GRAVEL</td>
</tr>
<tr>
<td>GC</td>
<td>CLAYEY GRAVEL</td>
</tr>
<tr>
<td>SW</td>
<td>SAND</td>
</tr>
<tr>
<td>SM</td>
<td>SILTY SAND</td>
</tr>
<tr>
<td>SC</td>
<td>CLAYEY SAND</td>
</tr>
<tr>
<td>ML</td>
<td>SILT</td>
</tr>
<tr>
<td>CL</td>
<td>CLAY</td>
</tr>
<tr>
<td>OL</td>
<td>ORGANIC SILT</td>
</tr>
<tr>
<td>MH</td>
<td>SILT</td>
</tr>
<tr>
<td>CH</td>
<td>CLAY</td>
</tr>
<tr>
<td>OH</td>
<td>ORGANIC CLAY</td>
</tr>
</tbody>
</table>

Common Defects in Soil

<table>
<thead>
<tr>
<th>TERM</th>
<th>DIAGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTING</td>
<td>A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.</td>
</tr>
<tr>
<td>JOINT</td>
<td>A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints &lt;0.2 m in length.</td>
</tr>
<tr>
<td>SHEARED ZONE</td>
<td>Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.</td>
</tr>
<tr>
<td>SHEARED SURFACE</td>
<td>A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.</td>
</tr>
<tr>
<td>SOFTENED ZONE</td>
<td>A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.</td>
</tr>
<tr>
<td>TUBE</td>
<td>Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter</td>
</tr>
<tr>
<td>TUBE CAST</td>
<td>Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.</td>
</tr>
<tr>
<td>INFILLED SEAM</td>
<td>Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.</td>
</tr>
</tbody>
</table>
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH01  
**date started:** 14 Sep 2016  
**date completed:** 20 Sep 2016  
**logged by:** JLy  
**checked by:** KJ

<table>
<thead>
<tr>
<th>position</th>
<th>surface elevation</th>
<th>angle from horizontal</th>
<th>drill model</th>
<th>drilling fluid</th>
<th>hole diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>E: 333,705.93; N: 5,788,924.49 (MGA94)</td>
<td>6.56 m (AHD)</td>
<td>90°</td>
<td>Explora E50, Truck mounted</td>
<td>Polymer</td>
<td>100 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDD</td>
<td>40mm.</td>
<td>FILL: ASPHALT:</td>
</tr>
<tr>
<td>AD</td>
<td>Fine to coarse grained, angular, brown, orange, fine to coarse grained sand, with some angular cobbles.</td>
<td></td>
</tr>
<tr>
<td>hand auger</td>
<td>becoming fine to coarse grained, pale grey, brown</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>water outflow</th>
<th>water inflow</th>
<th>penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>no resistance ranging to refusal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDD</td>
<td>40mm.</td>
<td>FILL: Sandy GRAVEL</td>
</tr>
<tr>
<td>AD</td>
<td>Fine to coarse grained sand, with some angular cobbles.</td>
<td></td>
</tr>
<tr>
<td>hand auger</td>
<td>becoming fine to coarse grained, pale grey, brown</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>water outflow</th>
<th>water inflow</th>
<th>penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>no resistance ranging to refusal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDD</td>
<td>40mm.</td>
<td>SAND:</td>
</tr>
<tr>
<td>AD</td>
<td>Fine to medium grained, sub-rounded to sub-angular, mottled pale grey and grey-brown.</td>
<td></td>
</tr>
<tr>
<td>hand auger</td>
<td>becoming fine to coarse grained, pale grey, brown</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>water outflow</th>
<th>water inflow</th>
<th>penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>no resistance ranging to refusal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDD</td>
<td>40mm.</td>
<td>QUATERNARY SANDS</td>
</tr>
<tr>
<td>AD</td>
<td>PID: 0 ppm</td>
<td></td>
</tr>
</tbody>
</table>

**graphic log:**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description:** based on Unified Classification System
- **consistency / relative density:**
  - VS: very soft
  - S: soft
  - F: firm
  - St: stiff
  - VSt: very stiff
  - H: hard
  - Pb: friable
  - V: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VD: very dense

---

**Additional information:**

- **client:** Metro Trains Melbourne  
- **principal:** Level Crossing Removal Authority  
- **project:** LCRP-CTF  
- **location:** ID18 - Edithvale Road, Edithvale

**Drilling information:**

- **position:** E: 333,705.93; N: 5,788,924.49 (MGA94)  
- **surface elevation:** 6.56 m (AHD)  
- **angle from horizontal:** 90°  
- **drill model:** Explora E50, Truck mounted  
- **drilling fluid:** Polymer  
- **hole diameter:** 100 mm

**Material description:**

- **FILL: ASPHALT:**
  - 40mm.  
  - Fine to coarse grained, angular, brown, orange, fine to coarse grained sand, with some angular cobbles.  
  - Becoming fine to coarse grained, pale grey, brown

- **SAND:**
  - Fine to medium grained, sub-rounded to sub-angular, mottled pale grey and grey-brown.  
  - Becoming fine to coarse grained, pale grey, brown

- **QUATERNARY SANDS:**
  - PID: 0 ppm
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Graphic Log</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>SPT</td>
<td>SP</td>
<td>SAND: fine to medium grained, sub-rounded to sub-angular, mottled pale grey and grey-brown. Becoming pale grey-brown, with some medium to coarse grained sand lenses.</td>
</tr>
<tr>
<td>3</td>
<td>SPT</td>
<td>SP</td>
<td>clay band, dark brown, grey, approximately 0.3m thick. Becoming dark brown, grey, brown.</td>
</tr>
<tr>
<td>4</td>
<td>SPT</td>
<td>SP</td>
<td>trace of dark brown clay bands.</td>
</tr>
<tr>
<td>8</td>
<td>CH</td>
<td>Silty CLAY: high plasticity, grey, with some fine grained sand, slightly organic odour.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>CH</td>
<td>Sandy CLAY: high plasticity, pale grey, mottled orange, fine to medium grained sand.</td>
<td></td>
</tr>
</tbody>
</table>

**Soil Type:** Plasticity or particle characteristic, colour, secondary and minor components.

- **Moisture:** Dry, Moist, Wet
- **Consistency / Relative Density:** VS (very soft), S (soft), F (firm), D (dense)
- **Penetrability:** SPT (Standard Penetration Test), HP (hand penetrometer), NC (SPT with solid cone)
# Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale  
**Borehole ID:** ID18-BH01  
**Date Started:** 14 Sep 2016  
**Date Completed:** 20 Sep 2016  
**Logged by:** JLy  
**Checked by:** KJ

## Materials Substance

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandy CLAY</td>
<td>High plasticity, pale grey, mottled orange, fine to medium grained sand. (continued) becoming pale grey, mottled orange-brown</td>
</tr>
<tr>
<td>CLAYEY SAND</td>
<td>Fine grained, red, orange, brown, medium plasticity, with some medium to coarse grained sand.</td>
</tr>
</tbody>
</table>

## Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Samples &amp; Field Tests</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

## Soil Type

- **Sandy CLAY:** High plasticity, pale grey, mottled orange, fine to medium grained sand. (continued) becoming pale grey, mottled orange-brown
- **CLAYEY SAND:** Fine grained, red, orange, brown, medium plasticity, with some medium to coarse grained sand.

## Soil Structure and Additional Observations

- **Sandy CLAY:** High plasticity, pale grey, mottled orange, fine to medium grained sand. (continued) becoming pale grey, mottled orange-brown
- **CLAYEY SAND:** Fine grained, red, orange, brown, medium plasticity, with some medium to coarse grained sand.

## Engineering Details

- **Borehole ID:** ID18-BH01  
- **Sheet:** 3 of 6  
- **Drill Model:** Explora E50, Truck mounted  
- **Drilling Fluid:** Polymer  
- **Hole Diameter:** 100 mm  
- **Surface Elevation:** 6.56 m (AHD)  
- **Angle from Horizontal:** 90°

## Method & Support

- **AD:** Auger drilling  
- **AS:** Auger crowning  
- **HA:** Hand auger  
- **W:** Wash bore  
- **NDD:** Non destructive drilling

## Samples & Field Tests

- **B:** Bulk disturbed sample  
- **D:** Disturbed sample  
- **E:** Environmental sample  
- **S:** Split spoon sample  
- **US:** Undisturbed sample

## Classification Symbol & Soil Description

- **Water**
- **Penetration**
- **Consistency / Relative Density**
- **Moisture**
- **Density**
- **Support**
- **Penetration**
- **Samples & Field Tests**
- **Classification System**

## Additional Notes

- **Note:** Information shown in the log is based on the Unified Soil Classification System.
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH01  
**date started:** 14 Sep 2016  
**date completed:** 20 Sep 2016  
**logged by:** JLy  
**checked by:** KJ

---

**Materials Description**

- **Sandy CLAY:** medium to high plasticity, red, orange-brown, fine grained sand.  
- **Silty CLAY:** low plasticity, dark brown to dark green-brown, with some fine grained sand.  

**SOIL TYPE**

- **CLAYEY SAND:** fine grained, red, orange, brown, medium plasticity, with some medium to coarse grained sand. (continued) cemented band approximately 200mm thick, dark brown, dark grey trace of weakly cemented bands, up to 20mm thick.

---

**Drilling Information**

**Method & Support**

- **M** mud  
- **C** casing  
- **N** nil  

**Samples & Field Tests**

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

**Classification Symbol & Soil Description**

- **CLAYEY SAND:**  
- **Sandy CLAY:**  
- **Silty CLAY:**

---

**Drilling Fluid**

- Polymer

---

**Additional Observations**

- **TERTIARY BRIGHTON GROUP**
- **SPT refusal on gravel layer**

---

**Position & Drilling Details**

- **E: 333,705.93; N: 5,786,924.49 (MGA94)**  
- **Drill model:** Explora E50, Truck mounted  
- **Angle from horizontal:** 90°  
- **Hole diameter:** 100 mm

---

**Drilling Support**

- **M** mud  
- **C** casing  
- **N** nil

---

**Consistency / Relative Density**

- **VS** very soft  
- **S** soft  
- **F** firm  
- **ST** stiff  
- **VSF** very stiff  
- **H** hard  
- **Fb** friable  
- **VL** very loose  
- **L** loose  
- **MD** medium dense  
- **D** dense  
- **VD** very dense

---

**Structure and Additional Observations**

- **SI**  
- **SCL**  
- **VSI - VS**

---

**Water Outflow**

- **NO WATER**

---

**Position & Elevation**

- **Surface elevation:** 6.56 m (AHD)

---

**Drill Model**

- **Explora E50, Truck mounted**  
- **Angle from horizontal:** 90°  
- **Hole diameter:** 100 mm

---

**Additional Observations**

- **SPT refusal on gravel layer**

---

**Support & Penetration**

- **M** mud  
- **C** casing  
- **N** nil  
- **NDR** non destructive drilling

---

**Diagram**

- **Continuous**
- **Interpretation**
- **Legend**

---

**Moisture Condition**

- **DM** dry  
- **WW** wet  
- **pW** plastic limit  
- **Wld** liquid limit

---

**Penetration**

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

---

**Classification System**

- **SPT** standard penetration test (SPT)
- **SPT - sample recovered**
- **SPT with solid cone**
- **vane shear; peak/remoulded (kPa)**
- **hammer bouncing**
- **refusal**
- **hand penetrometer (kPa)**
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH01  
**sheet:** 5 of 6  
**project no.:** GEOTABTF10294AA  
**date started:** 14 Sep 2016  
**date completed:** 20 Sep 2016  
**logged by:** JLy  
**checked by:** KJ

#### Drilling Information

<table>
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<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>33.0</td>
<td>Silty CLAY: medium to high plasticity, brown, red brown, with some fine grained sand, with some layers of gravel and cemented sand bands. (continued) hard band approximately 100mm thick</td>
<td></td>
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<tr>
<td>34.0</td>
<td>Silty CLAY: high plasticity, brown, dark green-brown, some lenses of fine to coarse grained sand and fine grained gravel, trace of shell fragments. soft band, approximately 300mm thick</td>
<td></td>
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<tr>
<td>35.0</td>
<td>Sandy CLAY band, grey, coarse grained sand</td>
<td></td>
</tr>
<tr>
<td>36.0</td>
<td>Sandy SILT: low liquid limit, green-brown, trace of shell fragments. becoming grey, green, brown</td>
<td></td>
</tr>
</tbody>
</table>

#### Soil Type

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
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</thead>
<tbody>
<tr>
<td>VS</td>
<td>Very Soft</td>
</tr>
<tr>
<td>C</td>
<td>Clay</td>
</tr>
<tr>
<td>S</td>
<td>Hard</td>
</tr>
</tbody>
</table>

#### Water

- **Inflow:** no detectable inflow
- **Outflow:** no detectable outflow

#### Method & Support

- **Method:** auger drilling
- **Support:** N, C

#### Samples & Field Tests

- **Samples:** bulk disturbed sample, disturbed sample, environmental sample
- **Field Tests:** standard penetration test (SPT)

#### Classification & Soil Description

- **Classification Symbol:** ML
- **Classification:** low plastic limit, green-brown, trace of shell fragments.

#### Drill Information

- **Drill Model:** Explora E50, Truck mounted
- **Angle from horizontal:** 90°
- **Hole Diameter:** 100 mm
- **Surface Elevation:** 6.56 m (AHD)
- **Drilling Fluid:** Polymer

#### Additional Observations

- **Moisture Condition:** dry, moist, wet, plastic limit, liquid limit
- **Penetration:** hand penetrometer (kPa)
- **Penetration Test:** SPT - sample recovered

---

*Bit shown by suffix e.g. AD/T black auger*
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Borehole ID.</th>
<th>ID18-BH01</th>
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<tr>
<td>sheet:</td>
<td>6 of 6</td>
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<tr>
<td>project no.</td>
<td>GEOTABTF10294AA</td>
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<tr>
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<td>14 Sep 2016</td>
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<td>date completed:</td>
<td>20 Sep 2016</td>
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<td>logged by:</td>
<td>JLy</td>
</tr>
<tr>
<td>checked by:</td>
<td>KJ</td>
</tr>
</tbody>
</table>

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td>M Sandy SILT: low liquid limit, green-brown, trace of shell fragments. (continued) grading to SILTY SAND, non-plastic</td>
<td></td>
</tr>
</tbody>
</table>

with some shells and shell fragments

Borehole ID18-BH01 terminated at 45.15 m

**Target depth**

**Standpipe installation**

**Backfill details**

- 0.0m-1.7m: grout
- 1.7m-5.4m: bentonite
- 5.4m-9.1m: sand

**Standpipe details**

- 0.0m-6.1m: machine slotted, filter sock covered, 50mm PVC, Class 18
- 6.1m-9.1m: machine slotted, filter sock covered, 50mm PVC, Class 18
- End caps and flush mounted gatic cover

**method & support**

- AD: auger drilling
- HA: hand auger
- W: washhole
- NDD: non-destructive drilling

**samples & field tests**

- B: bulk disturbed sample
- D: disturbed sample
- E: environmental sample
- SS: split spoon sample
- U#: undisturbed sample #3mm diameter
- HP: hand penetrometer (kPa)
- N: standard penetration test (SPT)
- N*: SPT - sample recovered
- NC: SPT with solid cone
- VS: vane shear, peak/remoulded (kPa)
- VB: hammer bouncing

**classification symbol & soil description**

Based on Unified Classification System

**consistency / relative density**

- VS: very soft
- S: soft
- F: firm
- ST: stiff
- VT: very stiff
- H: hard
- Fb: friable
- VL: very loose
- L: loose
- MD: medium dense
- D: dense
- VD: very dense
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>penetration</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
<th>material description</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>auger drilling</td>
<td>M mud</td>
<td>N nl</td>
<td>C casing</td>
<td>soil type: plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td>AS</td>
<td>auger screwing</td>
<td>D disturbed sample</td>
<td>E environmental sample</td>
<td>SS split spoon sample</td>
<td>classification symbol &amp; soil description based on Unified Classification System</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
<td>HP</td>
<td>hand penetrometer (kPa)</td>
<td>N standard penetration test (SPT)</td>
<td>moisture</td>
</tr>
<tr>
<td>W</td>
<td>wash boring</td>
<td>HP</td>
<td>hand penetrometer (kPa)</td>
<td>N standard penetration test (SPT)</td>
<td>consistency / relative density</td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
<td>U$$^*$$</td>
<td>undisturbed sample ($# mm$ diameter)</td>
<td>SPT - sample recovered</td>
<td>soil moisture</td>
</tr>
<tr>
<td>H</td>
<td>water outflow</td>
<td>NC</td>
<td>SPT with solid cone</td>
<td>Wp plastic limit</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>V bit</td>
<td>VS</td>
<td>vane shear; peak/reamouled (kPa)</td>
<td>Wp plastic limit</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>TC bit</td>
<td>R</td>
<td>refusal</td>
<td>Wp plastic limit</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>black bit</td>
<td>HB</td>
<td>hammer bouncing</td>
<td>Wp plastic limit</td>
<td></td>
</tr>
</tbody>
</table>

---

**SAND:** fine to medium grained, grey. (continued)  
becoming fine grained, dark grey, with some silt, organic odour  

**SANDY CLAY:** medium plasticity, green-grey, fine grained sand.  

**SAND:** fine to medium grained, pale grey to grey, with some fines.  

**SANDY CLAY:** clay is low plasticity, green-grey, mottled orange-brown, fine grained sand.  

**Silty CLAY:** high plasticity, green-grey, mottled orange and pale grey, with some lenses of sand.  

---

**QUATERINARY SANDS**

**TERTIARY BRIGHTON GROUP**

---

**Borehole ID:** ID18-BH02  
**date started:** 20 Sep 2016  
**date completed:** 23 Sep 2016  
**logged by:** JLy  
**checked by:** KJ
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH02  
**date started:** 20 Sep 2016  
**date completed:** 23 Sep 2016  
**logged by:** JLy  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Materials Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOIL TYPE:</strong></td>
<td>plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td><strong>material description</strong></td>
<td>Silty CLAY: high plasticity, green-grey, mottled orange and pale grey, with some lenses of sand. (continued) hard band approximately 150mm thick.</td>
</tr>
<tr>
<td><strong>graphic log</strong></td>
<td>CH</td>
</tr>
<tr>
<td><strong>classification symbol</strong></td>
<td>N=13</td>
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<tr>
<td><strong>samples &amp; field tests</strong></td>
<td>water, SPT, 4, 6, 7</td>
</tr>
<tr>
<td><strong>depth (m)</strong></td>
<td>-10</td>
</tr>
<tr>
<td><strong>penetration</strong></td>
<td>SPT 4, 6, 7, N=13</td>
</tr>
<tr>
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<td><strong>Penetration</strong></td>
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<td><strong>Penetration</strong></td>
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<td><strong>Penetration</strong></td>
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<td>99.0</td>
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<tr>
<td><strong>Penetration</strong></td>
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</tbody>
</table>

---

**Method & Support:**
- **AD:** auger drilling
- **AS:** auger screwing
- **HA:** hand auger
- **W:** washbore
- **NDD:** non destructive drilling

**Penetration:**
- no resistance ranging to refusal

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

**Consistency / Relative Density:**
- VS: very soft
- S: soft
- F: firm
- St: stiff
- VSt: very stiff
- H: hard
- P: plastic
- VL: very loose
- L: loose
- MD: medium dense
- D: dense
- VD: very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH02  
**project no.:** GEOTABTF10294AA  
**date started:** 20 Sep 2016  
**date completed:** 23 Sep 2016  
**logged by:** JLy  
**checked by:** KJ

---

#### Drilling Information

<table>
<thead>
<tr>
<th>ID</th>
<th>Borehole Model</th>
<th>Surface Elevation</th>
<th>Angle from Horizontal</th>
<th>Hole Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Explora E50, Truck mounted</td>
<td>6.44 m (AHD)</td>
<td>90°</td>
<td>100 mm</td>
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</tbody>
</table>

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#### Material Substance

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>SOIL TYPE</th>
<th>PENETRATION</th>
<th>WATER</th>
<th>PENETRATION</th>
<th>WATER</th>
<th>PENETRATION</th>
<th>WATER</th>
<th>PENETRATION</th>
<th>WATER</th>
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<th>WATER</th>
<th>PENETRATION</th>
<th>WATER</th>
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<tbody>
<tr>
<td>19.0</td>
<td>SC</td>
<td>SPT 5, 2, 6 N=8</td>
<td></td>
<td>SPT 6, 2, 6 N=8</td>
<td></td>
<td>SPT 7, 2, 6 N=8</td>
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<td>SPT 8, 2, 6 N=8</td>
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<td>20.0</td>
<td>SM</td>
<td>SPT 2, 3, 3 N=8</td>
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<td>SPT 2, 3, 3 N=8</td>
<td></td>
<td>SPT 2, 3, 3 N=8</td>
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<td>SPT 2, 3, 3 N=8</td>
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</tbody>
</table>

---

#### Classification Symbol & Soil Description

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling</td>
<td>B bulk disturbed sample</td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, brown, mottled red, low plasticity. (continued)</td>
</tr>
<tr>
<td>SAF auger screwing</td>
<td>C casing</td>
<td>SM</td>
<td>SILTY SAND: fine grained, green-brown, green-grey, low liquid limit, with some clay pockets, grey, dark grey, medium plasticity.</td>
</tr>
<tr>
<td>HA hand auger</td>
<td>D disturbed sample</td>
<td>L</td>
<td>cemented band up to 50mm thick with some dark green mottling</td>
</tr>
<tr>
<td>W washpipe</td>
<td>E environmental sample</td>
<td>H</td>
<td>with some shells</td>
</tr>
<tr>
<td>N non destructive drilling</td>
<td>F standard penetration test (SPT)</td>
<td>L</td>
<td>with some cemented bands</td>
</tr>
</tbody>
</table>

---

#### Additional Observations

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **MATERIAL SUBSTANCE:** structure and additional observations

---

#### Drilling Information

- **Method & Support:** AD auger drilling*  
  - * bit shown by suffix e.g. AD/T  
- **Samples & Field Tests:** B bulk disturbed sample  
  - **Consistency / Relative Density:** VS very soft S soft F firm ST stiff VST very stiff H hard Fb flakeable W very loose VL very loose  
- **Water & Penetration:**  
  - **Penetration Test (SPT):**  
  - **Refusal:**  
  - **Hammer Bouncing:**

---

#### Drilling Information

- **Position:** E: 333,853.25, N: 5,784,624.58 (MGA94)  
  - **Surface Elevation:** 6.44 m (AHD)  
  - **Angle from Horizontal:** 90°  
  - **Drilling Fluid:** Polymer  
  - **Hole Diameter:** 100 mm

---

#### Drilling Information

- **Depth (m):**
  - 19.0
  - 20.0
  - 21.0
  - 22.0
  - 23.0
  - 24.0
  - 25.0
  - 26.0
  - 27.0
  - 28.0
  - 29.0
  - 30.0
  - 31.0

---

#### Drilling Information

- **Support:** M mud C casing
- **Penetration:** no resistance ranging to refusal
- **Water:** 10-Oct-12 water level on date shown
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

---

**Position:** E: 333,853.25; N: 5,788,624.58  
**Surface elevation:** 6.44 m (AHD)  
**Angle from horizontal:** 90°

**Drill model:** Explora E50, Truck mounted  
**Drilling fluid:** Polymer  
**Hole diameter:** 100 mm

---

**Samples & Field Tests**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>classification symbol</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>SM</td>
<td>Silty sand: fine grained, green-brown, green-grey, low liquid limit, with some clay pockets, grey, dark grey, medium plasticity. (continued)</td>
</tr>
<tr>
<td>33.0</td>
<td></td>
<td>Cemented band approximately 200mm thick</td>
</tr>
<tr>
<td>34.0</td>
<td></td>
<td>Becoming grey-green, with some shells and sand pockets</td>
</tr>
<tr>
<td>36.0</td>
<td></td>
<td>Becoming pale green-grey</td>
</tr>
</tbody>
</table>

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**Classification symbol & soil description**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Consistency / Relative Density</th>
<th>Moisture</th>
<th>Penetration</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>Very soft</td>
<td>Dry</td>
<td>10-Oct-12</td>
<td>N</td>
</tr>
<tr>
<td>S</td>
<td>Soft</td>
<td>Moist</td>
<td></td>
<td>M</td>
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<tr>
<td>F</td>
<td>Firm</td>
<td>Wet</td>
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<td>E</td>
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<tr>
<td>ST</td>
<td>Stiff</td>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>VST</td>
<td>Very stiff</td>
<td></td>
<td></td>
<td>H</td>
</tr>
<tr>
<td>H</td>
<td>Hard</td>
<td></td>
<td></td>
<td>W</td>
</tr>
<tr>
<td>Fb</td>
<td>Fissile</td>
<td></td>
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<td>S</td>
</tr>
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<td>VL</td>
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<tr>
<td>D</td>
<td>Dense</td>
<td></td>
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<td>V</td>
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---

**Borehole ID:** ID18-BH02  
**Logged by:** JLy  
**Checked by:** KJ  
**Date Started:** 20 Sep 2016  
**Date Completed:** 23 Sep 2016

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Classification Symbol &amp; Soil Description</th>
<th>Consistency / Relative Density</th>
<th>Moisture</th>
<th>Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling</td>
<td>B bulk disturbed sample</td>
<td>VS very soft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AS auger screwing</td>
<td>C casing</td>
<td>S soft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td>D disturbed sample</td>
<td>F firm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W washbore</td>
<td>E environmental sample</td>
<td>ST stiff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td>SS split spoon sample</td>
<td>VST very stiff</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>VS very soft</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S soft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F firm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ST stiff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VST very stiff</td>
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<td>VS very soft</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>S soft</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F firm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ST stiff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VST very stiff</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

---

**Additional Observations**

- Cemented band approximately 200mm thick
- Becoming grey-green, with some shells and sand pockets
- Becoming pale green-grey

---

**Position:** E: 333,853.25; N: 5,788,624.58 (MGA94)  
**Angle from horizontal:** 90°

---

**Drill model:** Explora E50, Truck mounted  
**Drilling fluid:** Polymer  
**Hole diameter:** 100 mm
<table>
<thead>
<tr>
<th>position: E: 333,853.25; N: 5,788,624.58 (MGA94)</th>
<th>surface elevation: 6.44 m (AHD)</th>
<th>angle from horizontal: 90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>drill model: Explora E50, Truck mounted</td>
<td>drilling fluid: Polymer</td>
<td>hole diameter: 100 mm</td>
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</tbody>
</table>

**Drilling Information**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td>SM</td>
<td>SILTY SAND: fine grained, green-brown, green-grey, low liquid limit, with some clay pockets, grey, dark grey, medium plasticity. (continued)</td>
<td></td>
</tr>
</tbody>
</table>

**Borehole ID:** ID18-BH02 terminated at 45.05 m

**Target depth**

**Standpipe installation**

**Backfill details**

- 0.0m-1.3m: grout
- 1.3m-3.3m: bentonite
- 3.3m-10.5m: sand

**Standpipe details**

- 0.0m-7.0m: unslotted 50mm PVC, Class 18
- 7.0m-10.0m: machine slotted, filter sock covered, 50mm PVC, Class 18
- 10.0-10.5m: unslotted 50mm PVC, Class 18

**Backfill:**

- End caps and flush mounted gatic cover

**Soil Type:**

- Plasticity or particle characteristic, colour, secondary and minor components

- Structure and additional observations

**Classification System**

- Based on Unified Classification System

**Consistency / Relative Density**

- Moisture
- Hydrometer tests
- Wet unit weight

- Density
- Standard Proctor test
- Standard Penetration Test

**Hand Penetrometer (kPa)**

- Hard band approximately 250mm thick

**Location:** ID18 - Edithvale Road, Edithvale

**Client:** Metro Trains Melbourne

**Principal:** Level Crossing Removal Authority

**Project:** LCRP-CTF

**Date Started:** 20 Sep 2016

**Date Completed:** 23 Sep 2016

**Logged by:** JLy

**Checked by:** KJ
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale  

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Soil Type: plasticity or particle characteristic, colour, secondary and minor components</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Water Outflow</th>
<th>Water Inflow</th>
<th>Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>No resistance ranging to refusal</td>
<td>10-Oct-12 water level on date shown</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Casing Diameter</th>
<th>Environment Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>HWT</td>
<td>Disturbed sample</td>
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</tbody>
</table>

### Soil Type

- **FILL:** ASPHALT: 50mm.
- **FILL:** CONCRETE: 100mm.
- **FILL:** Sandy GRAVEL: fine to coarse grained, angular, grey, with pockets of high plasticity, orange clay.
- **SAND:** fine to coarse grained, pale grey becoming fine to medium grained sand, pale grey-brown
- **becoming brown, with some bands of dark brown**
- **trace of fine to medium grained gravel**
- **becoming pale brown**

### Additional Observations

- **PID:** 0.6 ppm
- **PID:** 0.2 ppm
- **PID:** 0.1 ppm

### Consistency / Relative Density

- **VS:** very soft
- **S:** soft
- **F:** firm
- **ST:** stiff
- **VST:** very stiff
- **H:** hard
- **Fb:** friable
- **VL:** very loose
- **L:** loose
- **MD:** medium dense
- **D:** dense
- **VD:** very dense
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

10-Oct-2012 water level on date shown

penetration test (SPT) SPT - sample recovered
SPT with solid cone Vane shear, peak/remoulded (kPa)

water inflow
water outflow

SPT 7, 12, 6 N=18

(continued)
with an organic odour

SPT 6, 12, 15 N=27

Sandy CLAY: medium plasticity, green-grey, fine to medium grained sand.

Sandy CLAY / Sandy Silty: clay is low plasticity, green-grey, fine grained sand, with some pockets of fine to medium grained sand.

Silty CLAY: high plasticity, brown-grey.

SAND: fine to coarse grained, pale grey.

SAND: fine to medium grained, green-grey, with some fines. becoming brown

Sandy CLAY: medium plasticity, green-grey, fine to medium grained sand.

QUATERNARY SANDS

TERTIARY BRIGHTON GROUP

Consistency / relative density
VS very soft
S soft
F firm
ST stiff
VST very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

Water

SPT 12, 19, 22 N=41

SPT 12, 19, 22 N=41

Moisture

Dry

Moist

Wet

Wp plastic limit

Wl liquid limit

Sample & field tests

Classification symbol & soil description based on Unified Classification System

Sample & field tests

Material description
Engineering Log - Borehole

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: ID18 - Edithvale Road, Edithvale

position: E: 333,883.62; N: 5,786,561.90 (MGA94)
surface elevation: 6.40 m (AHD)
age angle from horizontal: 90°
drill model: Explora E50, Truck mounted
drilling fluid: Polymer

material substance

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>soil description</th>
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</thead>
<tbody>
<tr>
<td>0-10</td>
<td>Silty CLAY: high plasticity, brown-grey.</td>
</tr>
<tr>
<td>10-11</td>
<td>CLAYEY SAND: fine to medium grained, brown-grey, low plasticity.</td>
</tr>
<tr>
<td>11-13</td>
<td>SAND: fine to coarse grained, grey, brown, trace of clay pockets.</td>
</tr>
<tr>
<td>13-15</td>
<td>CLAYEY SAND: fine grained, pale grey, low plasticity.</td>
</tr>
<tr>
<td>15-17</td>
<td>CLAYEY SAND: fine grained, grey, bands of dark brown, green-brown, low plasticity.</td>
</tr>
</tbody>
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structure and additional observations

<table>
<thead>
<tr>
<th>TERTIARY BRIGHTON GROUP</th>
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<table>
<thead>
<tr>
<th>GELLIBRAND MAHIL?</th>
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method & support

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<tr>
<th>method</th>
<th>support</th>
<th>samples &amp; field tests</th>
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<tr>
<td>AD</td>
<td>M</td>
<td>N</td>
</tr>
<tr>
<td>AS</td>
<td>auger screwing*</td>
<td>N</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
<td>N</td>
</tr>
<tr>
<td>W</td>
<td>washbore</td>
<td>N</td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
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classification symbol & soil description

<table>
<thead>
<tr>
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<tr>
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<td>VST</td>
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<tr>
<td>MD</td>
</tr>
<tr>
<td>D</td>
</tr>
<tr>
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moisture

<table>
<thead>
<tr>
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<th>consistency / relative density</th>
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<tr>
<td>D</td>
<td>dry</td>
</tr>
<tr>
<td>M</td>
<td>moist</td>
</tr>
<tr>
<td>W</td>
<td>wet</td>
</tr>
<tr>
<td>Wp</td>
<td>plastic limit</td>
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<tr>
<td>Wi</td>
<td>liquid limit</td>
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moisture conditions

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<td>DMWW</td>
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<td>pW</td>
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<tr>
<td>Wld</td>
</tr>
<tr>
<td>plastic limit</td>
</tr>
<tr>
<td>liquid limit</td>
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penetration

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<tbody>
<tr>
<td>10-Oct-12 water level on date shown</td>
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<tr>
<td>water inflow</td>
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<td>water outflow</td>
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penetration test

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<tr>
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penetration test (SPT) details

<table>
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<tr>
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</tr>
<tr>
<td>N*</td>
</tr>
<tr>
<td>Hp</td>
</tr>
<tr>
<td>Nc</td>
</tr>
<tr>
<td>Vs</td>
</tr>
<tr>
<td>R</td>
</tr>
<tr>
<td>HB</td>
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bulk disturbed sample

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<tbody>
<tr>
<td>VSSF</td>
</tr>
<tr>
<td>StVF</td>
</tr>
<tr>
<td>HFb</td>
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<tr>
<td>VLL</td>
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<tr>
<td>MD</td>
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<tr>
<td>D</td>
</tr>
<tr>
<td>VS</td>
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penetration details

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>123 water outflow water inflow</td>
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additional observations

<table>
<thead>
<tr>
<th>additional observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>with some red clay</td>
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soil type

SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
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<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
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</thead>
<tbody>
<tr>
<td>plasticity or particle characteristic, colour, secondary and minor components</td>
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logged by: JLy
checked by: KJ

Borehole ID: ID18-BH03

sheet: 3 of 6
project no. GEOTABTF10294AA

date started: 26 Sep 2016
date completed: 28 Sep 2016

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: ID18 - Edithvale Road, Edithvale

position: E: 333,883.62; N: 5,786,561.90 (MGA94)
surface elevation: 6.40 m (AHD)
age angle from horizontal: 90°
drill model: Explora E50, Truck mounted
drilling fluid: Polymer

drilling information

<table>
<thead>
<tr>
<th>method &amp; support</th>
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<tbody>
<tr>
<td>AD</td>
</tr>
<tr>
<td>AS</td>
</tr>
<tr>
<td>HA</td>
</tr>
<tr>
<td>W</td>
</tr>
<tr>
<td>NDD</td>
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classification symbol & soil description

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<tr>
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<tr>
<td>VS</td>
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moisture

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<tr>
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<td>dry</td>
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<tr>
<td>M</td>
<td>moist</td>
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penetration

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<tbody>
<tr>
<td>10-Oct-12 water level on date shown</td>
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<tr>
<td>water inflow</td>
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<td>water outflow</td>
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penetration test (SPT) details

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>N</td>
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<tr>
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bulk disturbed sample

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<tr>
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</tr>
<tr>
<td>D</td>
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<tr>
<td>VS</td>
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penetration details

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<thead>
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</thead>
<tbody>
<tr>
<td>123 water outflow water inflow</td>
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additional observations

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>with some red clay</td>
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</table>
**Engineering Log - Borehole**

<table>
<thead>
<tr>
<th>client: Metro Trains Melbourne</th>
</tr>
</thead>
<tbody>
<tr>
<td>principal: Level Crossing Removal Authority</td>
</tr>
<tr>
<td>project: LCRP-CTF</td>
</tr>
<tr>
<td>location: ID18 - Edithvale Road, Edithvale</td>
</tr>
</tbody>
</table>

**Position:**
- E: 333,883.62, N: 5,788,561.90 (MGA94 )
- Surface elevation: 6.40 m (AHD)
- Angle from horizontal: 90°

**Drilling Information**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>SC</th>
<th>U63</th>
<th>SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.0</td>
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<td></td>
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<tr>
<td>27.0</td>
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<td></td>
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<tr>
<td>28.0</td>
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<td></td>
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<td>29.0</td>
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<tr>
<td>30.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Soil Type:**
- **Clayey Sand:** fine grained, grey, bands of dark brown, green-brown, low plasticity. (continued)
  - becoming dark green-grey
  - with some red brown mottling
- **Silty Sand:** fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel.
  - gravel becoming cemented

**Classification Symbol & Soil Description:**
- **SC:** Plasticity or particle characteristic, colour, secondary and minor components
- **U63:** Moisture condition
- **SP:** Consistency / relative density
- **MD:** Soil description

**Classification System:**
- **C:** Casing
- **N:** Nil
- **M:** Mud
- **D:** Disturbed
- **E:** Environmental
- **S:** Spoon
- **U:** Undisturbed
- **N:** Sample recovered
- **H:** Hand penetrometer (kPa)
- **P:** Plastic limit (kPa)
- **L:** Hammer bouncing

**Sample & Field Tests:**
- **B:** Bulk disturbed sample
- **D:** Disturbed sample
- **E:** Environmental sample
- **S:** Spoon sample
- **U:** Undisturbed sample
- **N:** Sample recovered
- **H:** Hand penetrometer (kPa)
- **P:** Plastic limit (kPa)
- **L:** Hammer bouncing

**Additional Observations:**
- **Gellibrand Marl?**

---

**Material Substance:**
- **SC:** Plasticity or particle characteristic, colour, secondary and minor components
- **U63:** Moisture condition
- **SP:** Consistency / relative density
- **MD:** Soil description

**Method & Support:**
- **AD:** Auger drilling
- **AS:** Auger screwing
- **HA:** Hand auger
- **W:** Washhole
- **NDD:** Non destructive drilling
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Sample &amp; Field Tests</th>
<th>Material Substance</th>
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</thead>
<tbody>
<tr>
<td><strong>SPT</strong></td>
<td><strong>Material Description</strong></td>
<td></td>
</tr>
<tr>
<td>3, 4, 10 (N=14)</td>
<td><strong>SPT - Sample Recovered</strong></td>
<td></td>
</tr>
<tr>
<td>12, 19, 13 (N=32)</td>
<td><strong>SPT - Sample Recovered</strong></td>
<td></td>
</tr>
<tr>
<td>10, 14, 17 (N=31)</td>
<td><strong>SPT - Sample Recovered</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Material Substances:**  
- **Silty Sand:** Fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel.  
- **50mm cemented layer:** Becoming pale green grey, trace of shells

**Geotechnical Information:**  
- **Depth:**
  - 33.0 m  
  - 34.0 m  
  - 35.0 m  
  - 36.0 m  
  - 37.0 m  
  - 38.0 m  
  - 39.0 m

**Additional Observations:**  
- **Drill Model:** Explora E50, Truck mounted  
- **Surface Elevation:** 6.40 m (AHD)  
- **Angle from Horizontal:** 90°
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority

**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH03  
**date started:** 26 Sep 2016  
**date completed:** 28 Sep 2016

**drilling information**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>penetration</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>SPT 7, 9, 15 N=24</td>
<td>SP</td>
<td>SILTY SAND: fine to coarse grained, grey, brown, low liquid limit, trace of fine to coarse grained gravel.</td>
</tr>
<tr>
<td></td>
<td>SPT 12, 16, 23 N=39</td>
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<tr>
<td></td>
<td>SPT 14, 26, 20/80mm N=R</td>
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</tr>
</tbody>
</table>

**material substance**

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components
- **consistency / relative density:** Based on Unified Classification System
- **moisture:** Common hand penetrometer (kPa)

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>water outflow</th>
<th>water inflow</th>
<th>penetration</th>
<th>no resistance ranging to refusal</th>
<th>10-Oct-12 water level on date shown</th>
<th>water inflow</th>
<th>water outflow</th>
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<tbody>
<tr>
<td>41.0</td>
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**Borehole ID:** ID18-BH03 terminated at 47.85 m Target depth

---

**Casing:** HWT

**position:** E: 333,883.62; N: 5,786,561.90 (MGA94 )  
**surface elevation:** 6.40 m (AHD)  
**angle from horizontal:** 90°

**drill model:** Explora E50, Truck mounted  
**drilling fluid:** Polymer  
**casing diameter:** HWT

---

**Log sheet:** project no.: GEOTABTF10294AA  
**ID18-BH03:**  
**date:** 26 Sep 2016  
**date:** 28 Sep 2016  
**logged by:** JLy  
**checked by:** KJ

---

**samples & field tests**

- **water**
  - **method:** D dry
  - **consistency / relative density:** VS very soft
- **penetration**
  - **classifications:** M mud, N nil
  - **support:** C casing
  - **penetration:** N nil
  - **samples & field tests:** B bulk disturbed sample, D disturbed sample, E environmental sample, SS split spoon sample, U## undisturbed sample #mm diameter, HP hand penetrometer (kPa), N standard penetration test (SPT), N* SPT - sample recovered, NC SPT with solid cone, VS vane shear; peak/remoulded (kPa), RB refusal, HB hammer bouncing
  - **structure and additional observations:** GELLIBRAND MARL
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**Borehole ID:** ID18-BH04  
**date started:** 22 Sep 2016  
**date completed:** 27 Sep 2016  
**logged by:** BK/LW  
**checked by:** KJ

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Graphic Log</th>
<th>Classification Symbol</th>
<th>Soil Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>M</td>
<td>Sand</td>
<td>Fine to medium grained, pale grey.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>N</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>SP</td>
<td>Filled</td>
<td>ASPHALT: 50mm.</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>SPT 2, 3, 4 N=17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>SP</td>
<td></td>
<td>FILL: 50mm.</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>SPT 4, 6, 7 N=13</td>
<td></td>
<td>FILL: 50mm.</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>SPT 8, 13, 16 N=29</td>
<td></td>
<td>FILL: 200mm.</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>SPT 7, 13, 16 N=29</td>
<td></td>
<td>FILL: Concrete: 200mm.</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>SPT 7, 10, 11 N=21</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Samples & Field Tests:**  
- **Support:** Mud (M), Casing (C), Nil (N)  
- **Penetration:** No resistance ranging to refusal  
- **Consistency:** Wet (W), Dry (D)  
- **Penetration Test:** SPT - sample recovered  
- **Penetration Resistance:** Standard penetration test (SPT)  
- **Classification:** Very soft (VS), Very loose (VL)  
- **Soil Description:** Plasticity or particle characteristic, colour, secondary and minor components  

**Consistency / Relative Density:**  
- **Moisture:** Moist (M), Wet (W)  
- **Penetration Test (SPT):** Standard penetration test (SPT)  
- **Penetration Resistance:** Standard penetration test (SPT)  
- **Classification System:** Based on Unified Classification System  

**Other Observations:**  
- **Surface Level:** 6.55 m (AHD)  
- **Angle from Horizontal:** 90°  
- **Drilling Fluid:** Polymer  
- **Drill Model:** Ausroc 9000, Truck mounted  
- **Position:** E: 333,950.94; N: 5,788,425.73 (MGA94)
**Engineering Log - Borehole**

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Depth (m)</th>
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<tbody>
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<tr>
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<td>SPT</td>
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<tr>
<td>12.0</td>
<td>SPT</td>
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</tr>
<tr>
<td>14.0</td>
<td>SC</td>
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<tr>
<td>15.0</td>
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</table>

**Classification:**  
- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components  
- **Water:** Moisture, condition

**Drilling Information:**  
- **Method:** AD  
- **Support:** M mud  
- **Penetration:** N nil  
- **Samples & Field Tests:** B bulk disturbed sample  
- **Classification Symbol:** SP  
- **Material Description:** SP - fine to medium grained, pale grey.  
- **CLAYEY SAND:** fine to coarse grained, pale grey, medium plasticity.  
- **QUATERNARY SANDS:** fine to medium grained, pale grey.  
- **TERTIARY BRIGHTON GROUP:** fine to medium grained, dark brown.
### Engineering Log - Borehole

**Project Information**

- **Client:** Metro Trains Melbourne
- **Principal:** Level Crossing Removal Authority
- **Location:** ID18 - Edithvale Road, Edithvale
- **Borehole ID:** ID18-BH04
- **Date Started:** 22 Sep 2016
- **Date Completed:** 27 Sep 2016
- **Logged By:** BK/LW
- **Checked By:** KJ
- **Drill Model:** Ausroc 9000, Truck mounted
- **Casing Diameter:** HWT
- **Drilling Fluid:** Polymer
- **Surface Elevation:** 6.55 m (AHD)
- **Angle from Horizontal:** 90°

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borehole ID (ID18-BH04)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Sample</td>
<td>Field Test</td>
<td>Depth (m)</td>
<td>Graphic Log</td>
<td>Classification Symbol</td>
</tr>
<tr>
<td>SPT 8, 8, 12 N=20</td>
<td></td>
<td>-10</td>
<td>SC</td>
<td>CLAYEY SAND: fine to coarse grained, pale grey, medium plasticity. (continued)</td>
</tr>
<tr>
<td>SPT 19, 21, 20 N=41</td>
<td></td>
<td>-11</td>
<td>SC</td>
<td>CLAYEY SAND: fine to coarse grained, pale grey mottled brown, medium plasticity.</td>
</tr>
<tr>
<td>SPT 10, 13, 21 N=34</td>
<td></td>
<td>-12</td>
<td>SP</td>
<td>SAND: fine to coarse grained, pale grey mottled brown, trace of fines.</td>
</tr>
<tr>
<td>SPT 37 N=R</td>
<td></td>
<td>-13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 15, 31 N=R</td>
<td></td>
<td>-14</td>
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<tr>
<td>SPT 4, 13, 18 N=31</td>
<td></td>
<td>-15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Soil Type

- **Classification Symbol:** SC
- **Material Description:**
  - CLAYEY SAND: fine to coarse grained, pale grey, medium plasticity. (continued)
  - CLAYEY SAND: fine to coarse grained, pale grey mottled brown, medium plasticity.
  - SAND: fine to coarse grained, pale grey mottled brown, trace of fines.
  - becoming fine grained sand with some fines

### Additional Observations

- **Structure and Additional Observations:**
  - TERTIARY BRIGHTON GROUP

### Drilling Fluid

- **Type:** Polymer

### General Information

- **Position:** E: 333,950.94; N: 5,788,425.73 (MGA94)
SC-SM  

ML

SPT1, 0, 3  
N=3

SPT2, 11, 20  
N=31

SPT19, 6, 9  
N=15

SPT0, 0, 7  
N=7

U63

SILTY SAND / CLAYEY SAND: fine grained, dark grey - dark brown, low plasticity, with some dark grey clay bands, medium to high plasticity.

(continued)

Sandy SILT: low liquid limit, dark green, fine to coarse grained sand.

trace of medium to coarse grained, cemented sandy gravel

with some pockets of clayey sand

GELLIBRAND MARL

SPT sunk 300mm under hammer weight
### Engineering Log - Borehole

**Borehole ID:** ID18-BH04  
**Date:** 22 Sep 2016  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Logged by:** BK/LW  
**Checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td>ML</td>
<td>Sandy SILT: low liquid limit, dark green, fine grained sand, with some shell fragments and bands of coarse grained, clayey sand.</td>
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</tr>
</tbody>
</table>

**Geotechnical Information:**
- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **Material Description:**
  - **SPT:** Sandy SILT, low liquid limit, dark green, fine grained sand, with some shell fragments and bands of coarse grained, clayey sand.
- **Hand Penetrometer:**  
  - **Classification Symbol:** GELLIBRAND MARL
  - **U63 attempted, no penetration**

**Drill Model:** Ausroc 9000, Truck mounted  
**Drilling Fluid:** Polymer  
**Casing Diameter:** HWT

**Position:** E: 333,950.94; N: 5,788,425.73 (MGA94)  
**Surface Elevation:** 6.55 m (AHD)  
**Angle from Horizontal:** 90°  
**Drilling Fluid:** Polymer

**Logbook Information:**
- **Project No.:** LCRP-CTF
- **Date Started:** 22 Sep 2016  
**Date Completed:** 27 Sep 2016  
**Logged By:** BK/LW  
**Checked By:** KJ

**Position:** E: 333,950.94; N: 5,788,425.73 (MGA94)  
**Surface Elevation:** 6.55 m (AHD)  
**Angle from Horizontal:** 90°  
**Drilling Fluid:** Polymer

**Casing Diameter:** HWT

**Borehole ID18-BH04 terminated at 46.45 m**
- **Target Depth**
- **Standpipe Installation**
- **Backfill Details:**
  - 0.0m-9.5m: grout
  - 9.5m-10.5m: machine slotted, filter sock covered, 50mm PVC, Class 18
  - 11.0m-14.0m: machine slotted, filter sock covered, 50mm PVC, Class 18

**End Condition:**
- **Gated cover**
- **SPT:** Sandy SILT

**Classification Symbol & Soil Description:**
- **Based on Unified Classification System**

**Consistency / Relative Density:**
- **Clay:**
  - **Moisture:**
    - **Density:**
      - **Dry:**
      - **Wet:**

**Note:**
- **Density:**
  - **Core:**
  - **Soil:**
  - **Structure:**
  - **Additional Observations:**
# Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH05  
**date started:** 29 Sep 2016  
**date completed:** 05 Oct 2016  
**logged by:** OP  
**checked by:** KJ

### Drilling Information

<table>
<thead>
<tr>
<th>RL (m)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<td>samples &amp; field tests</td>
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<tr>
<td>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</td>
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<td>water penetration</td>
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<td>samples &amp; field tests</td>
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<td>graphic log classification symbol</td>
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<td>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</td>
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<td>hand penetration (kPa)</td>
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</tbody>
</table>

### Material Substance

- **ASPHALT:** 150mm.
- **FILL:** Sandy GRAVEL: fine to coarse grained, angular, grey brown, fine to coarse grained sand.  
  - SAND: fine to medium grained, pale grey.  
  - becoming pale grey, pale brown
  - becoming pale brown
  - becoming fine to medium grained, brown
  - becoming brown to dark brown, with some coarse grained quartz gravel

### Soil Type

- SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>moisture</th>
<th>VS</th>
<th>S</th>
<th>F</th>
<th>St</th>
<th>VSt</th>
<th>H</th>
<th>Fb</th>
<th>VL</th>
<th>L</th>
<th>MD</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>dry</td>
<td>VS</td>
<td>very soft</td>
<td>S</td>
<td>soft</td>
<td>F</td>
<td>firm</td>
<td>St</td>
<td>stiff</td>
<td>VSt</td>
<td>very stiff</td>
</tr>
</tbody>
</table>
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample Classification</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>SP</td>
<td>SAND: fine to medium grained, pale grey. (continued)</td>
</tr>
<tr>
<td>1.0</td>
<td>SM</td>
<td>SILTY SAND: fine to medium grained, dark grey, medium liquid limit.</td>
</tr>
<tr>
<td>2.0</td>
<td>CL</td>
<td>Silty CLAY: low plasticity, grey to dark grey, with some fine grained sand.</td>
</tr>
<tr>
<td>3.0</td>
<td>SM</td>
<td>SILTY SAND: fine grained, grey, medium liquid limit.</td>
</tr>
<tr>
<td>4.0</td>
<td>SP</td>
<td>SAND: fine to coarse grained, grey.</td>
</tr>
<tr>
<td>5.0</td>
<td></td>
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<tr>
<td>6.0</td>
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<tr>
<td>7.0</td>
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<tr>
<td>8.0</td>
<td></td>
<td></td>
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<tr>
<td>9.0</td>
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<tr>
<td>10.0</td>
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<tr>
<td>11.0</td>
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<tr>
<td>12.0</td>
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<tr>
<td>13.0</td>
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<tr>
<td>14.0</td>
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<tr>
<td>15.0</td>
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</tbody>
</table>

### Material Substance

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components
- **structure and additional observations:**

**Method & Support:**
- AD = auger drilling
- AS = auger screwing
- HA = hand auger
- W = washbore
- NDD = non-destructive drilling

**Samples & Field Tests:**
- B = bulk disturbed sample
- D = disturbed sample
- E = environmental sample
- SS = split spoon sample
- HP = hand penetrometer (kPa)
- HP = hand penetrometer (kPa)
- N = standard penetration test (SPT)
- N* = SPT - sample recovered
- NC = SPT with solid cone
- VS = vane shear, peak/remoulded (kPa)
- R = refusal
- HB = hammer bouncing

**Consistency / Relative Density:**
- VS = very soft
- S = soft
- F = firm
- ST = stiff
- VST = very stiff
- H = hard
- FB = friable
- VL = very loose
- L = loose
- MD = medium dense
- D = dense
- VD = very dense

---

**Borehole ID:** ID18-BH05  
**date started:** 29 Sep 2016  
**date completed:** 05 Oct 2016  
**logged by:** OP  
**checked by:** KJ
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Sample</th>
<th>Water</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI</td>
<td>Sandy CLAY: medium plasticity, grey, green, mottled brown, fine grained sand. (continued) becoming grey, green</td>
<td></td>
</tr>
<tr>
<td>CH</td>
<td>Sandy CLAY: high plasticity, pale grey blue, mottled green-brown, fine to medium grained sand. becoming brown, coarse grained sand, with some fine grained gravel</td>
<td></td>
</tr>
<tr>
<td>SM</td>
<td>SILTY SAND: fine grained, pale grey blue, low liquid limit. becoming red, brown, cemented</td>
<td></td>
</tr>
<tr>
<td>SM</td>
<td>SILTY SAND: fine grained, brown, low liquid limit.</td>
<td></td>
</tr>
</tbody>
</table>

**Method & Support:**  
- AD: auger drilling  
- HA: hand auger  
- W: washbore  
- NDD: non destructive drilling  

**Samples & Field Tests:**  
- B: bulk disturbed sample  
- D: disturbed sample  
- E: environmental sample  
- S: split spoon sample  

**Classification Symbol & Soil Description:**  
Based on Unified Classification System

**Moisture:**
- VS: very soft  
- S: soft  
- F: firm  
- ST: stiff  
- VST: very stiff  
- H: hard  
- Fb: firm  
- VL: very loose  
- MD: medium dense  
- D: dense  
- VD: very dense

**Consistency / Relative Density:**
- VST: very stiff  
- V: very dry  
- L: loose  
- MD: medium dense  
- D: dense  
- VD: very dense

**Drilling Information:**  
- ID18-BH05  
- Sheet: 3 of 6  
- Borehole ID: GEOTABTF10294AA

**Position:** E: 333,996.11; N: 5,788,333.77 (MGA94)  
- Surface elevation: 6.49 m (AHD)  
- Angle from horizontal: 90°

**Drill Model:** Explora E50, Truck mounted  
**Drilling Fluid:** Polymer

**Logging Information:**  
- ID18 - Edithvale Road, Edithvale  
- Metro Trains Melbourne  
- Level Crossing Removal Authority  
- LCRP-CTF  
- ID18-BH05  
- Date Started: 29 Sep 2016  
- Date Completed: 05 Oct 2016  
- Logged by: OP  
- Checked by: KJ
**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Water level</th>
<th>Support</th>
<th>Samples &amp; Tests</th>
<th>Classification Symbol</th>
<th>Material Description</th>
<th>Hand Penetrometer (kPa)</th>
<th>Moisture Condition</th>
<th>Material Substance</th>
<th>Structure and Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.0</td>
<td></td>
<td></td>
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<td>SM</td>
<td>SILTY SAND: fine grained, brown, low liquid limit. (continued)</td>
<td>W</td>
<td>MD</td>
<td>TERTIARY BRIGHTON GROUP</td>
<td></td>
</tr>
<tr>
<td>26.0</td>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td>with some fine to coarse grained cemented gravel layers</td>
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<td></td>
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<tr>
<td>27.0</td>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td>red brown cemented layer, 30mm thick</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>28.0</td>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td>Silty CLAY: high plasticity, grey, with some gravel.</td>
<td></td>
<td></td>
<td>GELLIBRAND MARL</td>
<td></td>
</tr>
<tr>
<td>29.0</td>
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<td>SM</td>
<td>SILTY SAND: fine grained, grey, low liquid limit.</td>
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<tr>
<td>30.0</td>
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<tr>
<td>31.0</td>
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<td>SM</td>
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</tbody>
</table>

**Drilling Information:**

- **Method & Support:**
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger

- **Samples & Tests:**
  - B: bulk disturbed sample
  - C: casing

- **Classification Symbol:**
  - SPT: standard penetration test

- **Material Description:**
  - SM: Silty Sand

- **Hand Penetrometer (kPa):**
  - 100, 200, 300, 400

- **Moisture Condition:**
  - Dry, Moist, Wet

- **Consistency / Relative Density:**
  - VS, S, F, St, VSt, H, VL, MD, D, VD

**Position:**

- E: 333,996.11; N: 5,788,333.77 (MGA94)

- **Surface Elevation:** 6.49 m (AHD)

- **Angle from Horizontal:** 90°

**Drill Model:** Explora E50, Truck mounted

**Drilling Fluid:** Polymer

**Casing Diameter:** HWT

**Angle from Horizontal:** 90°

**Surface Elevation:** 6.49 m (AHD)

**Drilling Fluid:** Polymer
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principle:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water Samples &amp; Field Tests</th>
<th>Material Classification</th>
<th>Material Description</th>
<th>Consistency / Relative Density</th>
<th>Moisture Condition</th>
<th>Hand Penetrometer (kPa)</th>
<th>Structure and Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td>SPT-5, 3N=8</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td>becoming grey, green</td>
<td>W MD</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ML</td>
<td>Gravelly SILT: medium liquid limit, dark green, grey, fine to coarse grained gravel.</td>
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<td></td>
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<td></td>
<td></td>
<td>ML</td>
<td>with some interbedded gravelly clay bands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td>becoming clayey gravel, with some shell fragments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SM</td>
<td>SILTY SAND: medium liquid limit, dark green, grey, coarse grained sand, with some fine grained gravel and shell fragments.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Material Substance

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **SPT:** samples & field tests
- **SPT:** soil description based on Unified Classification System
- **penetration:** water level on date shown
- **samples & field tests:** water inflow, water outflow
- **classification symbol:** soil description
- **method & support:** auger drilling*, auger screwing*, hand auger, wash bore, non-destructive drilling
- **method & support:** hand penetration
- **samples & field tests:** disturbed sample, soil description
- ** samples & field tests:** unit disturbed sample, standard penetration test (SPT)
- **samples & field tests:** SPT - sample recovered
- **samples & field tests:** SPT with solid cone
- **samples & field tests:** vane shear, peak/remoulded (kPa)
- **samples & field tests:** refusal
- **samples & field tests:** hammer bouncing

#### Drilling Information

- **Borehole ID:** ID18-BH05  
- **Date Started:** 29 Sep 2016  
- **Date Completed:** 05 Oct 2016  
- **Logged By:** OP  
- **Checked By:** KJ
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

---

### Borehole ID: ID18-BH05
- **Terminated at:** 44.76 m  
- **Target depth:**

<table>
<thead>
<tr>
<th>RL (m)</th>
<th>41.0</th>
<th>42.0</th>
<th>43.0</th>
<th>44.0</th>
<th>45.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>[\text{SPT} \text{11, 15, 19 N=34}]</td>
<td>[\text{SPT} \text{11, 17, 23 N=40}]</td>
<td>[\text{SPT} \text{10, 13, 23 N=34}]</td>
<td>[\text{SPT} \text{12, 16, 23 N=40}]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Borehole Description:**

- **SOIL TYPE:** Silty Sand  
- **Material Description:** Medium liquid limit, dark green/grey, coarse grained sand, with some fine grained gravel and shell fragments. (continued)  
- **Grading:** Grading to Sandy Silt

---

**Drilling Information**

- **Method & Support:** Auger drilling + Casing  
- **Penetration:** Non-destructive  
- **Samples & Field Tests:**
  - SPT
  - Water

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>34.0</th>
<th>35.0</th>
<th>36.0</th>
<th>37.0</th>
<th>38.0</th>
<th>39.0</th>
<th>40.0</th>
<th>41.0</th>
<th>42.0</th>
<th>43.0</th>
<th>44.0</th>
<th>45.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>[\text{SPT} \text{11, 15, 19 N=34}]</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>[\text{SPT} \text{11, 17, 23 N=40}]</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[\text{SPT} \text{10, 13, 23 N=34}]</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>[\text{SPT} \text{12, 16, 23 N=40}]</td>
<td></td>
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</tr>
</tbody>
</table>

**Remarks:**

- Borehole ID18-BH05 terminated at 44.76 m Target depth

---

**Consistency / Relative Density**

- **Moisture:**
  - VS = Very Soft  
  - S = Soft  
- **Consistency:**
  - F = Firm  
- **Relative Density:**
  - S = Stiff  
  - VS = Very Stiff
## Engineering Log - Borehole

### Client
Metro Trains Melbourne

### Principal
Level Crossing Removal Authority

### Project
LCRP-CTF

### Location
ID18 - Edithvale Road, Edithvale

### Position
E: 334,067.25, N: 5,788,173.57 (MGA94)

### Surface Elevation
6.58 m (AHD)

### Angle from Horizontal
90°

### Drilling Information
- **Method & Support**: Non-destructive drilling
- **Penetration**: No resistance ranging to refusal
- **Water**: 10-Oct-12 water level on date shown
- **Water Inflow**: Water inflow
- **Water Outflow**: Water outflow

### Materials Substance

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>FILL: ASPHALT 100mm.</td>
</tr>
<tr>
<td>3.0</td>
<td>SAND: fine to medium grained, pale grey.</td>
</tr>
<tr>
<td>6.0</td>
<td>QUATERNARY SANDS PID: 0.9 ppm</td>
</tr>
<tr>
<td>7.0</td>
<td>QUATERNARY SANDS PID: 0.3 ppm</td>
</tr>
</tbody>
</table>

### Soil Type
- **Plasticity or Particle Characteristic, Colour, Secondary and Minor Components**
- **Material Description**
- **Structure and Additional Observations**

### Moisture Condition
- **Consistency / Relative Density**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff
  - H: hard
  - Fb: friable
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VD: very dense

### Consistency
- **Penetration**
  - D: dry
  - M: moist
  - W: wet
  - Wp: plastic limit
  - Wf: plastic limit

### Graphical Log
- **Classification Symbol & Soil Description**
  - Based on Unified Classification System

### Diagram
- **Graphic Log**
- **Classification Symbol**
- **Support**
  - M: mud
  - C: casing
  - N: nil

### Samples & Field Tests
- **Samples & Field Tests**
  - B: bulk sample
  - D: disturbed sample
  - E: environmental sample
  - SS: split spoon sample
  - US: undisturbed sample #mm diameter
  - HP: hand penetrometer (kPa)
  - Nc: SPT with solid cone
  - VS: vane shear; peak/remoulded (kPa)
  - R: refusal
  - HB: hammer bouncing

### Additional Information
- **Drill Model**: Explora 50, Truck mounted
- **Angle from Horizontal**: 90°
- **Drill Fluid**: Polymer
- **Hole Diameter**: 100 mm
- **Surface Elevation**: 6.58 m (AHD)
- **Client**: Metro Trains Melbourne
- **Principal**: Level Crossing Removal Authority
- **Project**: LCRP-CTF
- **Location**: ID18 - Edithvale Road, Edithvale
- **Date Started**: 12 Oct 2016
- **Date Completed**: 14 Oct 2016
- **Logged By**: OP
- **Checked By**: KJ
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

---

SAND: fine to medium grained, pale grey. (continued)
becoming grey with a sulfuric odour, with some fines
becoming brown
becoming pale grey-brown
sulfuric odour absent

---

Silty CLAY: high plasticity, dark grey.

---

QUATERNARY SANDS
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Graphic Log</th>
<th>Classification Symbol</th>
<th>Material Description</th>
<th>Soil Type</th>
<th>Moisture Condition</th>
<th>Consistency / Relative Density</th>
<th>Consistency / Relative Density Comment</th>
<th>Hand Penetrometer (kPa)</th>
<th>Structure and Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td><strong>Classifications</strong></td>
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</tr>
<tr>
<td>Silty Clay: high plasticity, dark grey.</td>
<td>CH</td>
<td>SPT 13, 19, 30 N=49</td>
<td>CH</td>
<td>Silty Clay: high plasticity, dark grey. (continued)</td>
<td></td>
<td></td>
<td>QUATERNARY SANDS</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sand: fine to medium grained, grey, with some silt.</td>
<td>SP</td>
<td>SPT 13, 12, 11 N=23</td>
<td>SP</td>
<td>Sand: fine to medium grained, grey, with some silt.</td>
<td></td>
<td></td>
<td>TERTIARY BRIGHTON GROUP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silty Sand: fine grained, pale grey, low liquid limit.</td>
<td>SM</td>
<td>SPT 5, 5, 13 N=18</td>
<td>SM</td>
<td>Silty Sand: fine grained, pale grey, low liquid limit.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Method &amp; Support</strong></td>
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</tr>
<tr>
<td><strong>Addition</strong></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

**Note:**  
- CH: Silty Clay: high plasticity, dark grey. (continued)  
- SP: Sand: fine to medium grained, grey, with some silt.  
- SM: Silty Sand: fine grained, pale grey, low liquid limit.

**Additional Information:**  
- **Borehole ID:** ID18-BH06  
- **Sheet:** 3 of 6  
- **Date Started:** 12 Oct 2016  
- **Date Completed:** 14 Oct 2016  
- **Logged By:** OP  
- **Checked By:** KJ

---

**Further Details:**  
- **Position:** E: 334,067.25, N: 5,788,173.57 (MGA94)  
- **Surface Elevation:** 6.58 m (AHD)  
- **Angle from Horizontal:** 90°  
- **Drill Model:** Explora 50, Truck mounted  
- **Drilling Fluid:** Polymer

---

**Environmental Sampling:**  
- **Bulk Disturbed Sample**  
- **Disturbed Sample**

---

**Additional Observations:**  
- **Hand Penetrometer (kPa):**
- **Consistency / Relative Density:**
  - **Very Soft (VS):**
  - **Soft (S):**
  - **Firm (F):**
  - **Stiff (ST):**
  - **Very Stiff (VST):**

---

**Material Description:**  
- **Structure and Additional Observations:**
**Engineering Log - Borehole**

**Borehole ID:** ID18-BH06  
**Sheet:** 4 of 6  
**Project No:** GEOTABTF10294AA

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

**Date Started:** 12 Oct 2016  
**Date Completed:** 14 Oct 2016  
**Logged By:** OP  
**Checked By:** KJ

**Position:** E: 334,067.25; N: 5,788,173.57 (MGA94)  
**Surface Elevation:** 6.58 m (AHD)  
**Angle from Horizontal:** 90°

**Drill Model:** Explora 50, Truck mounted  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 100 mm

**Drilling Information**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.0</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>26.0</td>
<td>CLAYEY SAND: fine grained, brown, low plasticity, with some fine to medium grained gravel. (continued)</td>
</tr>
<tr>
<td>27.0</td>
<td>becoming grey</td>
</tr>
<tr>
<td>28.0</td>
<td>GELLIBRAND MARL</td>
</tr>
</tbody>
</table>

**Material Substances**

- **CLAYEY SAND**: fine grained, brown, low plasticity, with some fine to medium grained gravel.
- **Silty Clay Band**: high plasticity, pale grey, 50mm thick.
- **SILTY SAND**: fine grained, brown-grey, low liquid limit, with some cemented layers.

**Material Substances Continued**

- **SPT sunk 200mm under rod weight.**
- **SPT sunk 300mm under hammer weight.**

**Additional Observations**

- Push tube had no recovery.
- SPT sample recovered.
- Hammer bouncing.

**Graphical Log**

- **Classification Symbol:** SC, SM
- **Classification:** CLAYEY SAND, SILTY SAND
- **Samples & Field Tests:** No resistance ranging to refusal, B = bulk disturbed sample, C = casing, N = nil, D = disturbed sample, E = environmental sample, SS = split spoon sample, U# = undisturbed sample #1mm diameter, HP = hand penetrometer (kPa), N = standard penetration test (SPT), N* = SPT - sample recovered, NC = SPT with solid cone, VS = vane shear, peak/remoulded (kPa), R = refusal, HB = hammer bouncing.

**Consistency / Relative Density**

- **Moisture:** VS = very soft, S = soft, F = firm, St = stiff, VT = very stiff
- **Density:** H = hard, Fb = friable, VL = very loose, L = loose, MD = medium dense, D = dense, VD = very dense
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne

**principal:** Level Crossing Removal Authority

**project:** LCRP-CTF

**location:** ID18 - Edithvale Road, Edithvale

**date started:** 12 Oct 2016

**date completed:** 14 Oct 2016

**logged by:** OP

**checked by:** KJ

### SOIL TYPE

- **Silty Sand:** fine grained, brown-grey, low liquid limit, with some cemented layers. (continued)
- **Sandy Silt:** medium liquid limit, dark green-grey, fine grained sand, with some gravel.
- **Silty Gravel:** coarse grained, grey, low liquid limit.
- **Silty Sand:** fine grained, green-grey, low liquid limit, with some fine to medium grained gravel, and shells.

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
<th>graphic log</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td>SM</td>
<td>SILTY SAND: fine grained, brown-grey, low liquid limit, with some cemented layers. (continued)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ML</td>
<td>Sandy Silt: medium liquid limit, dark green-grey, fine grained sand, with some gravel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GM</td>
<td>SILTY GRAVEL: coarse grained, grey, low liquid limit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>SILTY SAND: fine grained, green-grey, low liquid limit, with some fine to medium grained gravel, and shells.</td>
<td></td>
</tr>
</tbody>
</table>

### Drill Information

- **Method & Support:**
  - **SPT:** Silty Sand
  - **ML:** Sandy Silt
  - **GM:** Silty Gravel
  - **SM:** Silty Sand

- **Samples & Field Tests:**
  - **SPT:** Standard Penetration Test (SPT)
  - **HP:** Hand Penetrometer (kPa)
  - **Nc:** SPT with solid cone
  - **VS:** Vane shear, peak/remoulded (kPa)
  - **R:** Refusal
  - **HB:** Hammer Bouncing

- **Classification Symbol & Soil Description:**
  - **Based on Unified Classification System**
  - **Consistency / Relative Density:**
    - **VS:** Very Soft
    - **S:** Soft
    - **F:** Firm
    - **St:** Stiff
    - **VS:** Very Stiff
    - **H:** Hard
    - **Fb:** Frangible
    - **VL:** Very Loose
    - **L:** Loose
    - **MD:** Medium Dense
    - **D:** Dense
    - **VD:** Very Dense
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**Borehole ID:** ID18-BH06

**logged by:** OP  
**checked by:** KJ

**date started:** 12 Oct 2016  
**date completed:** 14 Oct 2016

---

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Support</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Silty Sand</td>
</tr>
</tbody>
</table>

**Silty Sand:** fine grained, green-grey, low liquid limit, with some fine to medium sized gravel, and shells. (continued)

- With some clay bands, medium plasticity, dark grey
- With some cemented sand nodules

---

### Soil Type

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GELLIBRAND MARL</td>
<td>SM</td>
<td>Silty Sand: fine grained, green-grey, low liquid limit, with some fine to medium sized gravel, and shells. (continued)</td>
</tr>
</tbody>
</table>

---

### Drilling Fluid

- Polymer

---

### Borehole Details

- Borehole ID: ID18-BH06 terminated at 47.95 m
- Target depth: 47.95 m
- Standpipe installation: 0.0-0.2m asphalt
- Backfill details: 0.2m-15.9m: machine slotted, filter sock covered, 50mm PVC, Class 18
- End caps and flush mounted gatic cover
- Drilling Fluid: Polymer

---

### Additional Observations

- **Consistency / Relative Density:**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff
  - H: hard
  - Fb: friable
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VD: very dense
SPT2, 5, 6: $N^* = 11$

SPT2, 5, 5: $N^* = 10$

SPT3, 7, 18: $N^* = 25$

SPT16, 23, 23: $N^* = 46$

SPT0, 0, 0/250mm: $N^* = 0$

**Location:** ID18 - Edithvale Road, Edithvale

**Drilling Information:**
- Drilling fluid: polymer
- Hole diameter: 100 mm
- Surface elevation: 4.54 m (AHD)
- Angle from horizontal: 90°
- Position: E: 334,105.95; N: 5,788,246.20 (MGA94)

**Material Substance:**
- **FILL:** ASPHALT: 150mm.
- **FILL:** GRAVEL: fine to medium grained, sub-rounded to sub-angular, grey.
- SAND: fine to coarse grained, sub-rounded to sub-angular, grey, banded pale grey, becoming pale brown, white.
- becoming dark grey, brown.
- Sandy CLAY: low plasticity, dark grey, fine to medium grained sand, increasing sand content.

**Classification Symbol & Soil Description:**
Based on Unified Classification System

**Soil Moisture:**
- VS: Very soft
- S: Soft
- F: Firm
- Fb: Fissile
- VL: Very loose
- L: Loose
- MD: Medium dense
- D: Dense
- VD: Very dense

**Consistency / Relative Density:**
- VS: Very soft
- S: Soft
- F: Firm
- Fb: Fissile
- VL: Very loose
- L: Loose
- MD: Medium dense
- D: Dense
- VD: Very dense

**Graphical Log:**
- Soil type: plasticity or particle characteristic, colour, secondary and minor components
- Structure and additional observations

**Drill Information:**
- Method & Support:
  - AD: Auger drilling
  - AS: Auger screwing
  - HA: Hand auger
  - W: Washbore
  - NDD: Non destructive drilling

- Penetration:
  - No resistance ranging to refusal
  - 10-Oct-12 water level on date shown
  - Water inflow
  - Water outflow

- Samples & Field Tests:
  - B: Bulk disturbed sample
  - D: Disturbed sample
  - E: Environmental sample
  - SS: Split spoon sample
  - UM: Undisturbed sample #mm diameter
  - HP: Hand penetrometer (kPa)
  - NC: SPT with solid cone
  - VS: Vane shear; peak/remoulded (kPa)
  - R: Refusal
  - HB: Hammer bouncing

- Classification Symbol & Soil Description:
  Based on Unified Classification System

- Moisture:
  - VS: Very soft
  - S: Soft
  - F: Firm
  - Fb: Fissile
  - VL: Very loose
  - L: Loose
  - MD: Medium dense
  - D: Dense
  - VD: Very dense

- Consistency / Relative Density:
  - VS: Very soft
  - S: Soft
  - F: Firm
  - Fb: Fissile
  - VL: Very loose
  - L: Loose
  - MD: Medium dense
  - D: Dense
  - VD: Very dense

- Drilling fluid: polymer
- Hole diameter: 100 mm
- Surface elevation: 4.54 m (AHD)
- Angle from horizontal: 90°
- Position: E: 334,105.95; N: 5,788,246.20 (MGA94)
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale  
**Date Started:** 06 Oct 2016  
**Date Completed:** 10 Oct 2016  
**Logged By:** OP  
**Checked By:** KJ

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Graphic Log</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>SPT 12, 6/20mm N=R</td>
<td>CL</td>
<td>Sandy CLAY: low plasticity, dark grey, fine to medium grained sand. (continued)</td>
</tr>
<tr>
<td>5.0</td>
<td>SPT 17, 13/70mm N=R</td>
<td>SP</td>
<td>SAND: fine grained, pale grey.</td>
</tr>
<tr>
<td>10.0</td>
<td>SPT 2, 5, 6 N=11</td>
<td>CH</td>
<td>Sandy CLAY: high plasticity, grey, mottled green, fine grained sand.</td>
</tr>
<tr>
<td>15.0</td>
<td>SPT 5, 8, 17 N=25</td>
<td>SP</td>
<td>SAND: fine grained, pale grey, grey, with green and orange-brown bands and some clay bands, high plasticity, dark grey.</td>
</tr>
</tbody>
</table>

### Soil Type

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **structure and additional observations:**

### Moisture

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>Dry</td>
</tr>
<tr>
<td>M</td>
<td>Moist</td>
</tr>
<tr>
<td>S</td>
<td>Wet</td>
</tr>
<tr>
<td>D</td>
<td>Dry</td>
</tr>
<tr>
<td>VS</td>
<td>Very soft</td>
</tr>
<tr>
<td>V</td>
<td>Very loose</td>
</tr>
</tbody>
</table>

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>Consistency / Relative Density</th>
<th>VS</th>
<th>V</th>
<th>D</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFT</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
</tr>
</tbody>
</table>

### Support

<table>
<thead>
<tr>
<th>Support</th>
<th>Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Mud</td>
</tr>
<tr>
<td>N</td>
<td>Nl</td>
</tr>
</tbody>
</table>

### Samples & Field Tests

- **Borehole ID:** ID18-BH07
- **Sheet:** 2 of 6
- **Project No.:** GEOTABTF10294AA
- **Surface Elevation:** 4.54 m (AHD)
- **Angle from Horizontal:** 90°
- **Drill Model:** Explora 50, Truck mounted
- **Surface Elevation:** 4.54 m (AHD)
- **Drilling Fluid:** Polymer
- **Hole Diameter:** 100 mm
Engineering Log - Borehole

client: Metro Trains Melbourne
project: LCRP-CTF
location: ID18 - Edithvale Road, Edithvale

SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0</td>
<td>SAND: fine grained, pale grey, grey, with green and orange-brown bands and some clay bands, high plasticity, dark grey, (continued)</td>
</tr>
<tr>
<td>17.0</td>
<td>Silty CLAY: high plasticity, pale grey, green, mottled orange brown, with some clayey sand pockets, fine to medium grained.</td>
</tr>
<tr>
<td>18.0</td>
<td>CLAYEY SAND: fine to medium grained, pale blue grey, low plasticity, with some clay pockets.</td>
</tr>
<tr>
<td>19.0</td>
<td>Sandy CLAY: medium plasticity, dark brown, fine grained sand.</td>
</tr>
</tbody>
</table>

method & support
method: AD auger drilling*, AS auger screwing*, HA hand auger, W washbore
NDD non destructive drilling

samples & field tests
samples & field tests: B bulk disturbed sample, D disturbed sample, E environmental sample, SS split spoon sample
USS undisturbed sample #mm diameter
N SPT - sample recovered
Nc SPT with solid cone
V SPT with hollow cone
VST vane shear; peak/remoulded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
classification symbol: SP, CH, SC, CI
based on Unified Classification System

structural & additional observations
TERTIARY BRIGHTON GROUP
GELLIBRAND MARL

Borehole ID: ID18-BH07
date started: 06 Oct 2016
date completed: 10 Oct 2016
logged by: OP
checked by: KJ
# Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Position</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3.0 m</td>
<td><strong>Sandy CLAY:</strong> medium plasticity, dark brown, fine grained sand. (continued)</td>
</tr>
<tr>
<td>3.0-6.0 m</td>
<td><strong>Sandy SILT:</strong> low liquid limit, dark grey, fine grained sand.</td>
</tr>
</tbody>
</table>
| 6.0-9.0 m| **Silty:** high liquid limit, grey, green grey, mottled dark green, with some pale brown and dark green grey clay bands.  
Sandy silt layer, fine grained sand; 150mm thick  
with some shell fragments and gravel |
| 9.0-12.0 m| **GELLIBRAND MARL** push tube attempted; no recovery |

**table:**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Hand Penetrometer (kPa)</th>
<th>Classification Symbol &amp; Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0-3.0 m</td>
<td>CL</td>
<td>M</td>
<td>VSt</td>
<td>GELLIBRAND MARL push tube attempted; no recovery</td>
</tr>
<tr>
<td>3.0-6.0 m</td>
<td>ML</td>
<td>S</td>
<td>VSt</td>
<td>GELLIBRAND MARL push tube attempted; no recovery</td>
</tr>
<tr>
<td>6.0-9.0 m</td>
<td>SI</td>
<td></td>
<td></td>
<td>GELLIBRAND MARL push tube attempted; no recovery</td>
</tr>
</tbody>
</table>

**Additional Observations:**

- Sandy silt layer, fine grained sand; 150mm thick  
with some shell fragments and gravel

---

**Method & Support:**

- AD: auger drilling  
- AS: auger screwing  
- HA: hand auger  
- W: washbore  
- NDD: non-destructive drilling

**Samples & Field Tests:**

- M: mud  
- N: nil  
- C: casing  
- D: disturbed sample  
- E: environmental sample  
- SS: split spoon sample  
- U##: undisturbed sample #mm diameter  
- HP: hand penetrometer (kPa)  
- N: standard penetration test (SPT)  
- N*: SPT - sample recovered  
- Nc: SPT with solid cone  
- VS: vane shear; peak/remoulded (kPa)  
- R: refusal  
- HB: hammer bouncing

**Consistency / Relative Density:**

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

---

**Drilling Information:**

- Method: Explora 50, Truck mounted  
- Drilling Fluid: Polymer  
- Hole Diameter: 100 mm  
- Surface Elevation: 4.54 m (AHD)  
- Angle from Horizontal: 90°
# Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale  
**Borehole ID:** ID18-BH07

---

**Position:** E: 334.105.95; N: 5,788,246.20 (MGA94)  
**Surface Elevation:** 4.54 m (AHD)  
**Angle from Horizontal:** 90°  
**Drill Model:** Explora 50, Truck mounted  
**Drilling Fluid:** Polymer

---

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
<td>Sandy CLAY: low plasticity, grey, green grey, mottled dark green, with fine grained sand, pale brown and dark green grey clay bands. with some gravelly clay pockets</td>
</tr>
<tr>
<td>36.0</td>
<td>Silty CLAY: high plasticity, grey, with some fine grained gravel and bands of silty sand, fine to medium grained and bands of coarse grained gravel.</td>
</tr>
<tr>
<td>38.0</td>
<td>Silty SAND: fine grained, pale green grey, medium liquid limit silt, with some shell fragments.</td>
</tr>
</tbody>
</table>

### Classification Symbol

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Consistency</th>
<th>Relative Density</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk disturbed</td>
<td>Mo</td>
<td>St</td>
<td>C</td>
</tr>
<tr>
<td>Disturbed</td>
<td>Ph</td>
<td>N</td>
<td>M</td>
</tr>
<tr>
<td>Environmental</td>
<td>I</td>
<td>S</td>
<td>H</td>
</tr>
<tr>
<td>Split spoon</td>
<td>I</td>
<td>S</td>
<td>H</td>
</tr>
<tr>
<td>Undisturbed sample</td>
<td>Mo</td>
<td>St</td>
<td>C</td>
</tr>
<tr>
<td>#mm diameter</td>
<td>Mo</td>
<td>St</td>
<td>C</td>
</tr>
</tbody>
</table>

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>St</td>
<td>stiff</td>
</tr>
<tr>
<td>VSt</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
</tr>
</tbody>
</table>

---

**Additional Observations:**

- **Soil Type:** Plasticity or particle characteristic, colour, secondary and minor components
- **Material Description:** Structure and additional observations

---

**Method & Support:**

- **AD:** Auger drilling  
- **AS:** Auger screwing  
- **HA:** Hand auger  
- **W:** Washbore  
- **N:** Non-destructive drilling

---

**Samples & Field Tests:**

- **B:** Bulk disturbed sample  
- **D:** Disturbed sample  
- **E:** Environmental sample  
- **S:** Split spoon sample  
- **UH:** Undisturbed sample #mm diameter  
- **HP:** Hand penetrometer (kPa)  
- **N:** Standard penetration test (SPT)  
- **N+:** SPT - sample recovered  
- **Nc:** SPT with solid cone  
- **VS:** Vane shear; peak/remoulded (kPa)  
- **R:** Refusal  
- **HB:** Hammer bouncing

---

**Classification Symbol & Soil Description:**

- **Based on Unified Classification System**

---

**Drill Model:** Explora 50, Truck mounted  
**Angle from Horizontal:** 90°  
**Hole Diameter:** 100 mm  
**Surface Elevation:** 4.54 m (AHD)  
**Drilling Fluid:** Polymer

---

**Auxiliary Information:**

- **ID18-BH07**  
- **ID46.GPJ**

---

**Position:** E: 334.105.95; N: 5,788,246.20 (MGA94)  
**Surface Elevation:** 4.54 m (AHD)  
**Angle from Horizontal:** 90°  
**Drill Model:** Explora 50, Truck mounted  
**Drilling Fluid:** Polymer
<table>
<thead>
<tr>
<th>Method</th>
<th>Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Description</th>
<th>Classification Symbol &amp; Soil Description</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>M mud</td>
<td>B</td>
<td>GELLIBRAND MARL</td>
<td>VS</td>
<td></td>
</tr>
<tr>
<td>AS</td>
<td>C casing</td>
<td></td>
<td></td>
<td>S soft</td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td>D disturbed sample</td>
<td></td>
<td></td>
<td>F firm</td>
<td></td>
</tr>
<tr>
<td>W waterbar</td>
<td>E environmental sample</td>
<td></td>
<td></td>
<td>R stiff</td>
<td></td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td></td>
<td></td>
<td></td>
<td>VST very stiff</td>
<td></td>
</tr>
</tbody>
</table>

**Drilling Information**

- **ID18-BH07**
- **Surface Elevation**: 4.54 m (AHD)
- **Angle from Horizontal**: 90°
- **Drill Model**: Explora 50, Truck mounted
- **Drilling Fluid**: Polymer
- **Hole Diameter**: 100 mm

**Material Substance**

- **SOIL TYPE**: Plasticity or particle characteristic, colour, secondary and minor components
- **Moisture Condition**: Dry, Moist, Wet, Plastic Limit, Liquid Limit
- **Penetrometer (kPa)**: 100, 200, 300, 400

**Graphical Log**

- **Borehole ID18-BH07 terminated at 43.45 m**
- **Target Depth**
- **Standpipe Installation**
  - 0.0m-13.0m: grout
  - 13.0m-14.0m: PVC, Class 18
  - 14.0m-17.0m: machine slotted, filter sock covered, 50mm PVC, Class 18
- **End caps and flush mounted gatic cover**

**Engineering Log - Borehole**

- **Client**: Metro Trains Melbourne
- **Principal**: Level Crossing Removal Authority
- **Project**: LCRP-CTF
- **Location**: ID18 - Edithvale Road, Edithvale

**Position**: E: 334.105.95; N: 5,788.246.20 (MGA94)
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principals:** Level Crossing Removal Authority

**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**date started:** 18 Oct 2016  
**date completed:** 21 Oct 2016  
**logged by:** BK  
**checked by:** KJ

---

**samples & field tests**  
- **water**
- **soil description**
- **material description**

**classification symbol**
- SP
- SPT 3, 3, 4  
- N=7
- SPT 5, 6  
- N=11
- SPT 6, 13, 16  
- N=29
- SPT 9, 17, 13  
- N=30
- SPT 10, 16, 23  
- N=39

**material description**
- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**samples & field tests**
- **water outflow**
- **water inflow**
- **penetration**
- **no resistance ranging to refusal**

**method & support**
- sterilized method
- sterilized support

**results**
- **material substance**
- **material description**
- **graphic log**
- **penetration**
- **soil description**
- **classification symbol**
- **material description**

**material description**
- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

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

**support**
- M mud
- C casing

**penetration**
- no resistance ranging to refusal

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

**moisture**
- VS very soft
- S soft
- F firm
- ST stiff
- VSf very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Sample &amp; Field Tests</th>
<th>Water</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOIL TYPE</strong></td>
<td>plasticity or particle characteristic, colour, secondary and minor components</td>
<td></td>
</tr>
<tr>
<td><strong>CLAY</strong></td>
<td>low to medium plasticity, dark grey, trace of shells, distinct rotten egg odour present.</td>
<td></td>
</tr>
<tr>
<td><strong>SAND</strong></td>
<td>fine to medium grained, grey. (continued)</td>
<td></td>
</tr>
<tr>
<td><strong>SAND</strong></td>
<td>fine to coarse grained, pale grey, trace of fines.</td>
<td></td>
</tr>
<tr>
<td><strong>CLAYEY SAND</strong></td>
<td>fine to coarse grained, pale grey, low to medium plasticity, with some high plasticity clay bands.</td>
<td></td>
</tr>
</tbody>
</table>

**Borehole ID:** ID18-BH08  
**Date Started:** 18 Oct 2016  
**Date Completed:** 21 Oct 2016

**Log Data:**
- **ID18 - Edithvale Road, Edithvale**
- **Drill Model:** Explora MK50, Truck mounted
- **Drilling Fluid:** Polymer
- **Casing Diameter:** HWT
- **Angle from Horizontal:** 90°

**Material Description:**
- **SAND:** fine to medium grained, grey.
- **CLAY:** low to medium plasticity, dark grey, trace of shells, distinct rotten egg odour present.
- **SAND:** fine to coarse grained, pale grey, trace of fines.
- **CLAYEY SAND:** fine to coarse grained, pale grey, low to medium plasticity, with some high plasticity clay bands.

**Classifications:**
- **M:** mud
- **C:** casing
- **N:** nil
- **D:** disturbed sample
- **E:** environmental sample
- **SS:** split spoon sample
- **U:** undisturbed sample #1mm diameter
- **HP:** hand penetrometer (kPa)
- **N:** standard penetration test (SPT)
- **N*:** SPT - sample recovered
- **NC:** SPT with solid cone
- **VS:** vane shear; peak/remoulded (kPa)
- **R:** refusal
- **HB:** hammer bouncing

**Consistency / Relative Density:**
- **VS:** very soft
- **S:** soft
- **F:** firm
- **ST:** stiff
- **VST:** very stiff
- **H:** hard
- **V:** friable
- **VL:** very loose
- **L:** loose
- **MD:** medium dense
- **D:** dense
- **VD:** very dense
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale  
**Borehole ID:** ID18-BH08  
**Date Started:** 18 Oct 2016  
**Date Completed:** 21 Oct 2016  
**Logged By:** BK  
**Checked By:** KJ

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>SOIL TYPE:</strong> plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td></td>
<td><strong>material description</strong></td>
</tr>
<tr>
<td></td>
<td><strong>classification &amp; symbol</strong></td>
</tr>
<tr>
<td></td>
<td><strong>samples &amp; field tests</strong></td>
</tr>
<tr>
<td></td>
<td><strong>water</strong></td>
</tr>
<tr>
<td></td>
<td><strong>penetration</strong></td>
</tr>
<tr>
<td><strong>method &amp; support</strong></td>
<td><strong>samples &amp; field tests</strong></td>
</tr>
<tr>
<td>MUD</td>
<td>SPT 15, 26, 38 N=64</td>
</tr>
<tr>
<td></td>
<td>SPT 21, 31, 27 N=58</td>
</tr>
<tr>
<td></td>
<td>SPT 8, 8, 11 N=19</td>
</tr>
<tr>
<td></td>
<td>SPT 9, 14, 15 N=29</td>
</tr>
<tr>
<td></td>
<td>SPT 14, 25, 23 N=48</td>
</tr>
<tr>
<td></td>
<td>SPT 10, 20, 16 N=36</td>
</tr>
</tbody>
</table>

### Drilling Information

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<td>SPT 14, 25, 23 N=48</td>
</tr>
<tr>
<td></td>
<td>SPT 10, 20, 16 N=36</td>
</tr>
</tbody>
</table>

### Tertiary Brighton Group

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description**
- **classification & symbol**
- **samples & field tests**
- **water**
- **penetration**

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
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<tr>
<td><strong>method &amp; support</strong></td>
<td><strong>samples &amp; field tests</strong></td>
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<tr>
<td>MUD</td>
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</tbody>
</table>

### Tertiary Brighton Group

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description**
- **classification & symbol**
- **samples & field tests**
- **water**
- **penetration**

### Drilling Information

<table>
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<td>MUD</td>
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<tr>
<td></td>
<td>SPT 8, 8, 11 N=19</td>
</tr>
<tr>
<td></td>
<td>SPT 9, 14, 15 N=29</td>
</tr>
<tr>
<td></td>
<td>SPT 14, 25, 23 N=48</td>
</tr>
<tr>
<td></td>
<td>SPT 10, 20, 16 N=36</td>
</tr>
</tbody>
</table>

### Tertiary Brighton Group

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description**
- **classification & symbol**
- **samples & field tests**
- **water**
- **penetration**

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>method &amp; support</strong></td>
<td><strong>samples &amp; field tests</strong></td>
</tr>
<tr>
<td>MUD</td>
<td>SPT 15, 26, 38 N=64</td>
</tr>
<tr>
<td></td>
<td>SPT 21, 31, 27 N=58</td>
</tr>
<tr>
<td></td>
<td>SPT 8, 8, 11 N=19</td>
</tr>
<tr>
<td></td>
<td>SPT 9, 14, 15 N=29</td>
</tr>
<tr>
<td></td>
<td>SPT 14, 25, 23 N=48</td>
</tr>
<tr>
<td></td>
<td>SPT 10, 20, 16 N=36</td>
</tr>
</tbody>
</table>
# Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Description</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>auger drilling*</td>
<td>water</td>
<td>B - bulk disturbed sample</td>
<td>SM - SMILTY SAND: fine to medium grained, pale grey mottled brown, low liquid limit. (continued)</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>AS</td>
<td>auger screwing*</td>
<td>Casing</td>
<td>D - disturbed sample</td>
<td>MD - with some cemented sand bands</td>
<td>GELLIBRAND MARL</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
<td>N - nil</td>
<td>E - environmental sample</td>
<td></td>
<td>first blow penetrated 300mm</td>
</tr>
<tr>
<td>W</td>
<td>washbore</td>
<td>SS - split spoon sample</td>
<td>N - standard penetration test (SPT)</td>
<td></td>
<td>sunk 200mm under selfweight of rods. first blow penetrated 300mm</td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
<td>U - undisturbed sample</td>
<td>N* - SPT - sample recovered</td>
<td></td>
<td>sunk 200mm under selfweight of rods</td>
</tr>
</tbody>
</table>

**method & support**  
* bit shown by suffix  
**samples & field tests**  
* water: 10-Oct-12 water level on date shown

**material description**  
- SM: Silty Sand  
- ML: Sandy Silty  

**material substance**

<table>
<thead>
<tr>
<th>soil type</th>
<th>plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>fine to medium grained, pale grey mottled brown, low liquid limit. (continued)</td>
</tr>
<tr>
<td>ML</td>
<td>non-plastic, dark grey dark brown, green, fine grained sand, with some weakly cemented zones, and bands of clay, low plasticity, dark grey.</td>
</tr>
</tbody>
</table>

**drilling information**  
- Borehole ID: ID18-BH08  
- project no.: GEOTABTF10294AA  
- date started: 18 Oct 2016  
- date completed: 21 Oct 2016  
- logged by: BK  
- checked by: KJ  
- surface elevation: 6.37 m (AHD)  
- angle from horizontal: 90°  
- drill model: Explora MK50, Truck mounted  
- drilling fluid: Polymer  
- casing diameter: HWT  
- first blow penetrated 300mm  
- sunk 200mm under selfweight of rods. first blow penetrated 300mm  
- sunk 200mm under selfweight of rods  

**notes**

- SPT: standard penetration test  
- Vornado: cone penetrometer (kPa)  
- Vane shear: peak/remoulded (kPa)  
- Hammer bounces  

**additional observations**

- SPT: sample recovered  
- SPT with solid cone  
- Vane shear: peak/remoulded (kPa)  
- Refusal  
- Hammer bounces  

**consistency / relative density**

- VS: very soft  
- S: soft  
- F: firm  
- ST: stiff  
- VST: very stiff  
- H: hard  
- Fb: friable  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense  
- VD: very dense

**structure and additional observations**

- TERTIARY BRIGHTON GROUP  
- GELLIBRAND MARL  

**graphical log**

- Silty Sand  
- Sandy Silty  

**classification symbol**

- S - fine grained sand  
- F - fine grained sand  
- M - medium grained sand  
- W - medium grained sand  
- N - nil  

**graphic log**

- SPT: standard penetration test  
- HP: hammer penetrometer (kPa)  
- NC: SPT with solid cone  
- VS: vane shear: peak/remoulded (kPa)  
- R: refusal  
- HB: hammer bounces  

**material description**

- SM: Silty Sand  
- ML: Sandy Silty

**method & support**

- AD: auger drilling*  
- AS: auger screwing*  
- HA: hand auger  
- W: washbore  
- NDD: non destructive drilling

**samples & field tests**

- B: bulk disturbed sample  
- D: disturbed sample  
- E: environmental sample  
- SS: split spoon sample  
- U#: undisturbed sample #mm diameter  
- HP: hand penetrometer (kPa)  
- NC: SPT with solid cone  
- VS: vane shear: peak/remoulded (kPa)  
- R: refusal  
- HB: hammer bounces

**classification symbol & soil description**

- based on Unified Classification System

**moisture**

- VS: very soft  
- S: soft  
- F: firm  
- ST: stiff  
- VST: very stiff  
- H: hard  
- Fb: friable  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense  
- VD: very dense
Sandy SILT: non-plastic, dark grey, dark brown, green, fine grained sand, with some weakly cemented zones, and bands of clay, low plasticity, dark grey. (continued)

becoming fine to coarse grained sand, trace of fine grained gravel

Silty SAND: fine grained, dark grey mottled brown, slight green tinge, low plasticity, trace of shells.

CLAYEY SAND: fine to coarse grained, dark brown, green, medium plasticity, with some bands of clay, high plasticity, dark grey, trace of fine grained gravel.

with some fine grained gravel

GELLIBRAND MARL sunk 300mm under selfweight of rods and hammer.
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Material Description</th>
<th>Material Substance</th>
<th>Hand Penetrometer (kPa)</th>
<th>Consistency / Relative Density</th>
<th>Moisture Condition</th>
<th>Structure and Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td></td>
<td></td>
<td>SM</td>
<td>GELLIBRAND MARL</td>
<td>SILTY SAND: fine grained, dark grey mottled brown, slight green tinge, low plasticity, trace of shells. (continued)</td>
<td>M MD</td>
<td></td>
<td></td>
<td></td>
<td>GELLIBRAND MARL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>with some sand bands, coarse grained, dark grey</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Soil Type

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

### Drilling Fluid

- Polymer

### Surface Elevation

- 6.37 m (AHD)

### Angle from Horizontal

- 90°

### Position

- E: 334,096.95; N: 5,788,125.69 (MGA94)

### Drilling Fluid

- Polymer

### Water

- No water inflow

### Penetration

- N = 30

### Method

- NDD non destructive drilling

### Support

- M mud

### Classification Symbol

- SPT

### Samples & Field Tests

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

### Water

- No resistance ranging to refusal

### Moisture

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

---

* * bit shown by suffix  
  e.g. AD T
  B black bit
  T TC bit
  V V bit
### Engineering Log - Borehole

**Borehole ID:** ID18-BH08  
**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

**Drilling Information:**

<table>
<thead>
<tr>
<th>Sample &amp; Field Tests</th>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>SILTY SAND: fine grained, dark grey mottled brown, slight green tinge, low plasticity, trace of shells. (continued)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Borehole ID18-BH08 Terminated at 49.35 m Target depth |

**Material Substance:**

- **Consistency / Relative Density**
  - **SPT:** Sample recovered
  - **N:** Standard penetration test (SPT)
  - **HC:** Hand penetrometer (kPa)
  - **VD:** Very dense

- **Penetration Depth (m):**
  - 49.0
  - 50.0
  - 51.0
  - 52.0
  - 53.0
  - 54.0

- **Position:** E: 334,096.95; N: 5,788,125.69 (MGA94)  
  - Surface Elevation: 6.37 m (AHD)
  - Angle from horizontal: 90°
  - Drill Model: Explora MK50, Truck mounted
  - Drilling Fluid: Polymer

- **Casing Diameter:** HWT

- **Additional Observations:**
  - Borehole ID18-BH08 Terminated at 49.35 m Target depth
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Water</th>
<th>Graphic Log</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>B</td>
<td>M mud</td>
<td>SPT 4, 5, 6 N=11</td>
<td>SP</td>
<td>ASPHALT: 150mm.</td>
</tr>
<tr>
<td>AS</td>
<td>D</td>
<td>disturbed sample</td>
<td>SPT 8, 11, 13 N=24</td>
<td>FILL: GRAVEL: medium to coarse grained, sub-angular, grey, trace orange, trace of sand matrix.</td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td>E</td>
<td>environmental sample</td>
<td>SPT 5, 7, 10 N=17</td>
<td>SAND: fine to medium grained, sub-rounded to sub-angular, pale brown.</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>F</td>
<td>wash sample</td>
<td>SPT 6, 9, 11 N=20</td>
<td>becoming fine to coarse grained, trace of fines</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Water</th>
<th>Graphic Log</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>B</td>
<td>M mud</td>
<td>SPT 4, 5, 6 N=11</td>
<td>SP</td>
<td>ASPHALT: 150mm.</td>
</tr>
<tr>
<td>AS</td>
<td>D</td>
<td>disturbed sample</td>
<td>SPT 8, 11, 13 N=24</td>
<td>FILL: GRAVEL: medium to coarse grained, sub-angular, grey, trace orange, trace of sand matrix.</td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td>E</td>
<td>environmental sample</td>
<td>SPT 5, 7, 10 N=17</td>
<td>SAND: fine to medium grained, sub-rounded to sub-angular, pale brown.</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>F</td>
<td>wash sample</td>
<td>SPT 6, 9, 11 N=20</td>
<td>becoming fine to coarse grained, trace of fines</td>
<td></td>
</tr>
</tbody>
</table>

**Borehole ID:** ID18-BH09  
**Date started:** 09 Sep 2016  
**Date completed:** 21 Sep 2016  
**Logged by:** BK  
**Checked by:** KJ
<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
<th>soil type: plasticity or particle characteristic, colour, secondary and minor components</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 8, 11, 11 N=22</td>
<td>SP</td>
<td>SAND: fine to medium grained, sub-rounded to sub-angular, pale brown. (continued)</td>
<td>QUATERNARY SANDS</td>
<td></td>
</tr>
<tr>
<td>SPT 1, 1, 0 N=1</td>
<td>CL - CI</td>
<td>CLAY: low to medium plasticity, black, trace of shells, distinct rotten egg odour present.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 17, 15/50mm N=R</td>
<td>SC</td>
<td>CLAYEY SAND: fine to coarse grained, dark grey black, low plasticity, distinct rotten egg odour present.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 12, 23, 13 N=36</td>
<td>SP</td>
<td>SAND: fine to coarse grained, dark brown, trace of fines.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 8, 7, 8 N=15</td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- SAND: fine to medium grained, sub-rounded to sub-angular, pale brown. (continued)
- Becoming dark grey, distinct rotten egg odour present.
- CLAYEY SAND: fine to coarse grained, dark grey black, low plasticity, distinct rotten egg odour present.
- SAND: fine to coarse grained, dark brown, trace of fines.
- CLAYEY SAND: fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity.

**Other Details:**
- ID18-BH09
- Metro Trains Melbourne
- Level Crossing Removal Authority
- ID18 - Edithvale Road, Edithvale
- Client: Metro Trains Melbourne
- Project: LCRP-CTF
- Location: ID18 - Edithvale Road, Edithvale
- Sheet: 2 of 6
- Date started: 09 Sep 2016
- Date completed: 21 Sep 2016
- Logged by: BK
- Checked by: KJ
- Borehole ID: ID18-BH09
- Engineering Log - Borehole
- Drilling Information
- Material Substance
- Sample & Field Tests
- Water
- Water outflow
- Water inflow
- Water level on date shown
- Water table

**Classification Symbol & Soil Description:**
- Based on Unified Classification System

**Soil Moisture:**
- D: dry
- M: moist
- W: wet

**Soil Consistency:**
- VS: very soft
- S: soft
- F: firm
- St: stiff
- VSt: very stiff
- H: hard
- Fb: friable
- VL: very loose
- L: loose
- MD: medium dense
- D: dense
- VD: very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**position:** E: 334.199.09; N: 5,787,923.56 (MGA94)  
**surface elevation:** 6.52 m (AHD)  
**angle from horizontal:** 90°

**drill model:** Ausroc, Truck mounted  
**drilling fluid:** Polymer  
**casing diameter:** HWT

### Drilling Information

<table>
<thead>
<tr>
<th>Sample &amp; Field Tests</th>
<th>Water</th>
<th>Soil Type</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 5, 7, 10</td>
<td></td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity. (continued)</td>
</tr>
<tr>
<td>SPT 6, 10/90mm</td>
<td></td>
<td>CH</td>
<td>Silty CLAY: high plasticity, pale grey mottled orange-brown, slight green tinge, trace of fine to medium grained sand.</td>
</tr>
<tr>
<td>SPT 8, 14, 18</td>
<td></td>
<td>SP</td>
<td>SAND: fine to coarse grained, pale grey, grey brown, trace of fines.</td>
</tr>
<tr>
<td>SPT 10, 21, 22</td>
<td></td>
<td>CI</td>
<td>Sandy CLAY: medium plasticity, pale grey mottled orange-brown, green, fine to coarse grained sand, trace of cemented sand nodules.</td>
</tr>
</tbody>
</table>

### Material Substance

<table>
<thead>
<tr>
<th>Water</th>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DM</td>
<td>VS very soft, S soft, F firm, ST stiff, VST very stiff</td>
</tr>
</tbody>
</table>

### Soil Type

- **Plasticity or Particle Characteristic, Colour, Secondary and Minor Components:**
  - **SC:** CLAYEY SAND: fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity.
  - **CH:** Silty CLAY: high plasticity, pale grey mottled orange-brown, slight green tinge, trace of fine to medium grained sand.
  - **SP:** SAND: fine to coarse grained, pale grey, grey brown, trace of fines.
  - **CI:** Sandy CLAY: medium plasticity, pale grey mottled orange-brown, green, fine to coarse grained sand, trace of cemented sand nodules.

### Additional Observations

- **CLAYEY SAND:** fine to medium grained, pale grey mottled orange-brown, slight green tinge, medium plasticity. (continued)
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
<th>Classification Symbol</th>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-18</td>
<td>SP</td>
<td>SAND</td>
<td>fine to medium grained, brown, pale brown, trace of fines. (continued)</td>
<td></td>
</tr>
<tr>
<td>-19</td>
<td>GP</td>
<td>Sandy GRAVEL</td>
<td>fine grained, sub-rounded, pale grey, fine to coarse grained sand, trace of fines.</td>
<td></td>
</tr>
<tr>
<td>-20</td>
<td>GM</td>
<td>SILTY SAND</td>
<td>fine grained, dark grey black, low to medium plasticity.</td>
<td></td>
</tr>
<tr>
<td>-21</td>
<td></td>
<td></td>
<td></td>
<td>becoming dark brown</td>
</tr>
<tr>
<td>-22</td>
<td></td>
<td></td>
<td></td>
<td>sunk 150mm under selfweight of SPT hammer</td>
</tr>
<tr>
<td>-23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
<td>SILTY SAND: fine grained, dark grey black, low to medium plasticity. (continued)</td>
</tr>
<tr>
<td>34.0</td>
<td>becoming pale brown, dark brown, dark green, with some cemented sands</td>
</tr>
<tr>
<td>35.0</td>
<td>trace of fine grained quartz gravel</td>
</tr>
<tr>
<td>36.0</td>
<td>CLAYEY SAND: fine grained, dark grey black, low to medium plasticity.</td>
</tr>
</tbody>
</table>

**GELLIBRAND MARL**

- first blow penetrated approximately 250mm
- first blow penetrated approximately 300mm then hit a cemented band

**METHOD & SUPPORT**

- AD: auger drilling
- AS: auger screwing
- HA: hand auger
- W: washbore
- NDD: non-destructive drilling

**SAMPLES & FIELD TESTS**

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

**CONSISTENCY / RELATIVE DENSITY**

- VS: very soft
- S: soft
- F: firm
- ST: stiff
- VST: very stiff
- H: hard
- Fb: friable
- VL: very loose
- L: loose
- MD: medium dense
- D: dense
- VD: very dense

**MOISTURE**

- M: moist
- W: wet
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH09  
**Date Started:** 09 Sep 2016  
**Date Completed:** 21 Sep 2016  
**Logged by:** BK  
**Checked by:** KJ

---

**Material Substance**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>SOIL TYPE</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>CLAYEY SAND</td>
<td>fine grained, dark grey black, low to medium plasticity. (continued)</td>
</tr>
<tr>
<td>35</td>
<td>becoming fine to coarse grained sand, with some fine grained gravel</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>SILTY SAND</td>
<td>fine grained, pale brown pale, grey, low liquid limit, trace of shells.</td>
</tr>
</tbody>
</table>

**Consistency / Relative Density**

- M - mud
- C - casing
- N - nil
- V - very

**Support**

- M - mud
- N - nil

**Classification Symbol & Soil Description**

- VS - very soft
- S - soft
- F - firm
- ST - stiff
- VSII - very stiff
- H - hard
- Fb - faintly
- VL - very loose
- L - loose
- MD - medium dense
- D - dense
- VD - very dense

---

**Drilling Information**

- **method:**
  - AD - auger drilling
  - AS - auger screwing
  - HA - hand auger
  - W - washbore
  - NDD - non destructive drilling

- **support:**
  - M - mud
  - N - nil

**Additional Observations**

- **Hand penetrometer (kPa):**
  - M - W
  - MD - D

**Structure and Additional Observations**

- M - W
  - MD - D

---

**Position:**

- E: 334.199.09; N: 5,787,923.56 (MGA94)  
- Surface elevation: 6.52 m (AHD)  
- Angle from horizontal: 90°

**Drill Model:** Ausroc, Truck mounted

**Drilling Fluid:** Polymer

**Casing Diameter:** HWT

**Surface Elevation:** 6.52 m (AHD)

**Drilling Fluid:** Polymer

---

**Borehole ID:** ID18-BH09 terminated at 46.45 m

**Target Depth:**

- Standpipe installation
- Backfill details
- 0.0-0.5m: concrete
- 0.5-4.5m: grout
- 4.5-9.0m: bentonite
- 5.0-9.0m: sand

**Standpipe Details:**

- 0.0-6.0m: unsolicited 50mm PVC, Class 18
- 6.0-9.0m: machine slotted, filter sock covered

---

**Method:**

- 10-Oct-12 water level on date shown

**Support:**

- 10-Oct-12 water level on date shown

**Penetration:**

- 10-Oct-12 water level on date shown

**Consistency / Relative Density:**

- M - W
  - MD - D

**Structure and Additional Observations:**

- M - W
  - MD - D

---

**Soil Type:**

- plasticity or particle characteristic, colour, secondary and minor components

**Material Description:**

- structure and additional observations

---

**Material Substance:**

- graphic log
classificationsymbol

---

**Samples & Field Tests:**

- water

---

**Penetration:**

- no resistance ranging to refusal

---

**Hand Penetro-meter:**

- M - W
  - MD - D
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principals:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling*</td>
<td>B bulk disturbed sample</td>
<td>FILL: ASPHALT: 50mm.</td>
</tr>
<tr>
<td>AS auger screwing*</td>
<td>D disturbed sample</td>
<td>FILL: GRAVEL: coarse grained, angular, dark grey, trace of cobbles.</td>
</tr>
<tr>
<td>HA hand auger</td>
<td>E environmental sample</td>
<td>SAND: fine to medium grained, pale grey, trace of fines</td>
</tr>
<tr>
<td>W wash boring</td>
<td>SS split spoon sample</td>
<td>becoming fine to coarse grained, pale brown-pale grey, trace of fines</td>
</tr>
<tr>
<td>N non destructive drilling</td>
<td>U unconsolidated sample</td>
<td>becoming brown, trace of medium to coarse grained gravel</td>
</tr>
<tr>
<td>* bit shown by suffix</td>
<td>Hp hand penetrometer (kPa)</td>
<td>becoming fine to medium grained, pale grey, trace of fines</td>
</tr>
</tbody>
</table>

### Soil Type

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>soil description</th>
<th>classification symbol &amp; soil description based on Unified Classification System</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL plastic</td>
<td>very soft (VS)</td>
</tr>
<tr>
<td>CL clay</td>
<td>soft (S)</td>
</tr>
<tr>
<td>ML mud</td>
<td>firm (F)</td>
</tr>
<tr>
<td>CH chalk</td>
<td>stiff (ST)</td>
</tr>
<tr>
<td>PL plastic</td>
<td>very stiff (VST)</td>
</tr>
<tr>
<td>CL clay</td>
<td>hard (H)</td>
</tr>
<tr>
<td>ML mud</td>
<td>friable (Fb)</td>
</tr>
<tr>
<td>CH chalk</td>
<td>loose (VL)</td>
</tr>
<tr>
<td>CL clay</td>
<td>medium dense (MD)</td>
</tr>
<tr>
<td>ML mud</td>
<td>dense (D)</td>
</tr>
<tr>
<td>CH chalk</td>
<td>very dense (VD)</td>
</tr>
</tbody>
</table>

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>dry (D)</td>
<td>very soft (VS)</td>
</tr>
<tr>
<td>moist (M)</td>
<td>soft (S)</td>
</tr>
<tr>
<td>wet (W)</td>
<td>firm (F)</td>
</tr>
<tr>
<td>very wet (Wp)</td>
<td>stiff (ST)</td>
</tr>
<tr>
<td>plastic limit (Wp)</td>
<td>very stiff (VST)</td>
</tr>
</tbody>
</table>

### Additional Observations

- **Casing:** Diameter: HWT, Surface elevation: 6.32 m (AHD)
- **Drilling Fluid:** Polymer
- **Angle from horizontal:** 90°
- **Drill model:** Explora MK50, Truck mounted

---

*NOTE: The image contains a detailed geological log with various entries and observations, including water levels, soil properties, and test results. The log is rich with technical data and diagrams that outline the borehole's characteristics and findings. Each layer is described in detail, from the surface to depths of 7 meters, indicating the type of material and its properties. The log is structured to provide a comprehensive overview of the geological conditions encountered during drilling.*
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Borehole ID:** ID18-BH10  
**date started:** 24 Oct 2016  
**date completed:** 26 Oct 2016  
**logged by:** BK  
**checked by:** KJ

**position:** E: 334,137.83; N: 5,768,047.82 (MGA94)  
**surface elevation:** 6.32 m (AHD)  
**angle from horizontal:** 90°  
**drill model:** Explora MK50, Truck mounted  
**drilling fluid:** Polymer  
**casing diameter:** HWT

**drilling information**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SOIL TYPE: Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td></td>
<td>classification symbol &amp; soil description based on Unified Classification System</td>
</tr>
<tr>
<td></td>
<td>method &amp; support penetration</td>
</tr>
<tr>
<td>8.0</td>
<td>SP SAND: fine to medium grained, grey. (continued)</td>
</tr>
<tr>
<td>9.0</td>
<td>Silty CLAY: low to medium plasticity, dark grey, black, trace of roots, distinct rotten egg odour present.</td>
</tr>
</tbody>
</table>

---

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

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

**method & support penetration:**

- AD auger drilling
- AS auger screwing
- HA hand auger
- W washbore
- NDD non-destructive drilling

**samples & field tests:*

- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- N SPT split spoon sample
- U## undisturbed sample #1mm diameter
- HP hand penetrometer (kPa)
- N SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remoulded (kPa)
- R refusal
- HB hammer bouncing

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

**consistency / relative density:**

- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Pb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**Position:**  
- 

**Surficial Conditions:**  
- **SAND:**  
  - Fine to coarse grained, pale grey, with some fines and clay bands, high plasticity, 20mm-50mm thick.  
- **SANDY CLAY:**  
  - High plasticity, pale grey mottled orange-brown, fine to coarse grained sand.  
- **SILTY SAND:**  
  - Fine to medium grained, pale grey mottled brown, low liquid limit, trace of fine grained gravel.  
  - Becoming brown, increasing silt content, with some weakly cemented zones.

**SOIL TYPE:**  
- Plasticity or particle characteristic, colour, secondary and minor components

**Graphic Log:**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Graphic Log</th>
<th>Classification Symbol</th>
<th>Material Description</th>
<th>Hand Penetrometer (kPa)</th>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
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<tbody>
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<td>23.0</td>
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</tr>
</tbody>
</table>

**Notes:**  
- TERTIARY BRIGHTON GROUP
- Iron cemented sand layer

**Method & Support:**
- **AD** auger drilling
- **AS** auger screwing
- **HA** hand auger
- **W** washbore
- **NDD** non destructive drilling

**Samples & Field Tests:**
- **B** bulk disturbed sample
- **D** disturbed sample
- **E** environmental sample
- **SS** split spoon sample

**Classification Symbol & Soil Description:**
- **VS** very soft
- **S** soft
- **F** firm
- **ST** stiff
- **VST** very stiff
- **H** hard
- **P** plastic
- **VL** very loose
- **L** loose

**Consistency / Relative Density:**
- **MD** medium dense
- **D** dense
- **VD** very dense
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

**drilling information**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>water</strong></td>
<td></td>
<td>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M - W MD TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GELLIBRAND MARL</td>
</tr>
</tbody>
</table>

**material substance**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>graphic log</th>
<th>classification symbol</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-18</td>
<td></td>
<td>SM</td>
<td>SILTY SAND: fine to medium grained, pale grey mottled brown, low liquid limit, trace of fine grained gravel, (continued) becoming brown</td>
</tr>
<tr>
<td>25.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-19</td>
<td>SPT 13, 12, 8 N=220</td>
<td>ML</td>
<td>Sandy SILT: medium liquid limit, dark grey, dark brown, slight green tinge, fine grained sand, with some weakly cemented zones.</td>
</tr>
<tr>
<td>26.0</td>
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<td></td>
<td></td>
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<tr>
<td>-20</td>
<td>SPT 8, 7, 1 N=9</td>
<td>SM</td>
<td>SILTY SAND: fine to medium grained, grey, low plasticity, with some weakly cemented zones.</td>
</tr>
<tr>
<td>26.0</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>-22</td>
<td>SPT 5, 5, 4 N=9</td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, dark grey, dark brown, green, low plasticity, with some weakly cemented zones.</td>
</tr>
<tr>
<td>26.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-23</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>26.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**soil description**

- **SILTY SAND:** fine to medium grained, pale grey mottled brown, low liquid limit, trace of fine grained gravel, (continued) becoming brown
- **Sandy SILT:** medium liquid limit, dark grey, dark brown, slight green tinge, fine grained sand, with some weakly cemented zones.
- **SILTY SAND:** fine to medium grained, grey, low plasticity, with some weakly cemented zones.
- **CLAYEY SAND:** fine to medium grained, dark grey, dark brown, green, low plasticity, with some weakly cemented zones.

**classification symbol & soil description**

- **based on Unified Classification System**
- **moisture:** VS = very soft, S = soft, F = firm, St = stiff, VSt = very stiff, H = hard, Fb = friable, VL = very loose, L = loose, MD = medium dense, D = dense, VD = very dense

**drilling information**

- **method:** auger drilling, auger screwing, hand auger
- **support:** mud, casing, nil
- **penetration:** no resistance ranging to refusal
- **water:** level on date shown, water inflow, water outflow
- **samples & field tests:** bulk disturbed sample, disturbed sample, environmental sample, split spoon sample, undisturbed sample #mm diameter, hand penetrometer (kPa), standard penetration test (SPT), SPT - sample recovered, SPT with solid cone, vane shear; peak/remoulded (kPa), refusal, hammer bouncing
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID18 - Edithvale Road, Edithvale

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
<td>SC CLAYEY SAND: fine to medium grained, dark grey, dark brown, green, low plasticity, with some weakly cemented zones. (continued)</td>
</tr>
<tr>
<td>35.0</td>
<td>SM SILTY SAND: fine grained, dark grey, dark brown, low liquid limit.</td>
</tr>
<tr>
<td>38.0</td>
<td>CH Sandy CLAY: high plasticity, dark brown, green, fine to coarse grained sand, trace of fine grained gravel and shells.</td>
</tr>
</tbody>
</table>

**method & support**  
- AD auger drilling  
- HA hand auger  
- W washhoe  
- N non destructive drilling  
- C casing  
- M mud  
- N nil  
- D disturbed sample  
- E environmental sample  
- SS split spoon sample  
- UU undisturbed sample  
- N* SPT - sample recovered  
- NC SPT with solid cone  
- VS vane shear; peak/remoulded (kPa)  
- R refusal  
- HB hammer bashing  

**samples & tests**  
- moisture: VS very soft, S soft, F firm, ST stiff, VST very stiff  
- consistency: H hard, Fb friable, VL very loose, L loose, MD medium dense, D dense, VD very dense  

**Borehole ID:** ID18-BH10  
**date started:** 24 Oct 2016  
**date completed:** 26 Oct 2016  
**logged by:** BK  
**checked by:** KJ
# Engineering Log - Borehole

**Borehole ID:** ID18-BH10  
**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID18 - Edithvale Road, Edithvale  
**Date Started:** 24 Oct 2016  
**Date Completed:** 26 Oct 2016  
**Logged By:** BK  
**Checked By:** KJ

<table>
<thead>
<tr>
<th>Position (m)</th>
<th>Soil Type</th>
<th>Classification</th>
<th>Consistency / Relative Density</th>
<th>Moisture Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.0</td>
<td>Sandy CLAY</td>
<td>high plasticity, dark brown, green, fine to coarse grained sand, trace of fine grained gravel and shells. (continued)</td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>42.0</td>
<td>SILTY SAND</td>
<td>fine grained, dark grey mottled brown, green, low plasticity silt, trace of shells. with some pockets of fine to coarse grained sand</td>
<td>MD</td>
<td>D</td>
</tr>
</tbody>
</table>

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Sample &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPT</strong></td>
<td><strong>9, 8, 12 N=20</strong></td>
<td><strong>CH</strong></td>
</tr>
<tr>
<td><strong>SPT</strong></td>
<td><strong>12, 16, 22 N=38</strong></td>
<td><strong>SM</strong></td>
</tr>
<tr>
<td><strong>SPT</strong></td>
<td><strong>12, 23, 23 N=46</strong></td>
<td><strong>GELLIBRAND MARL</strong></td>
</tr>
<tr>
<td><strong>SPT</strong></td>
<td><strong>14, 23, 28 N=51</strong></td>
<td><strong>-</strong></td>
</tr>
<tr>
<td><strong>SPT</strong></td>
<td><strong>12, 18, 24 N=42</strong></td>
<td><strong>-</strong></td>
</tr>
<tr>
<td><strong>SPT</strong></td>
<td><strong>15, 23, 37 N=60</strong></td>
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</tbody>
</table>

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**Material Substance**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Classification</th>
<th>Consistency / Relative Density</th>
<th>Moisture Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandy CLAY</td>
<td>high plasticity, dark brown, green, fine to coarse grained sand, trace of fine grained gravel and shells. (continued)</td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>SILTY SAND</td>
<td>fine grained, dark grey mottled brown, green, low plasticity silt, trace of shells. with some pockets of fine to coarse grained sand</td>
<td>MD</td>
<td>D</td>
</tr>
</tbody>
</table>

---

**Borehole Details**

- **Position:** E: 334.137.83; N: 5,788,047.82 (MGA94)  
- **Surface Elevation:** 6.32 m (AHD)  
- **Angle from Horizontal:** 90°  
- **Drill Model:** Explora MK50, Truck mounted  
- **Drilling Fluid:** Polymer  
- **Casing Diameter:** HWT  
- **Drill penetration:** 47.75 m  
- **Target Depth:** 47.75 m

---

**Penetration Method & Support**

- **Method:** auger drilling  
- **Support:** M mud, N nil  
- **Penetration:** no resistance ranging to refusal  
- **Water:** 10-Oct-12 water level on date shown  
- **Consistency / Relative Density:** VS very soft  
- **Moisture Condition:** VS very stiff

---

**Classification Symbol & Soil Description**

- **SMP:** 90°  
- **SPT:** sample recovered  
- **N:** SPT  
- **V:** refusal  
- **H:** hammer bouncing  
- **V:** very soft  
- **S:** soft  
- **F:** firm  
- **P:** hard  
- **L:** loose  
- **D:** dense  
- **MD:** medium dense
**Borehole ID:** ID46-BH01  
**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Location:** ID46 - Bondi Road, Bonbeach  
**Date Started:** 07 Sep 2016  
**Date Completed:** 13 Sep 2016

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>N.D.</td>
<td>MUD</td>
</tr>
<tr>
<td>FILL: ASPHALT: 150mm.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FILL: GRAVEL: fine to medium grained, grey, (trace of sand.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAND: fine grained, grey.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>becoming pale grey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAND: fine to coarse grained, brown, orange-brown.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pale grey, trace of shells</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QUATERNARY SANDS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>Water</th>
<th>Moisture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outflow</td>
<td>Condition</td>
</tr>
<tr>
<td>Inflow</td>
<td></td>
</tr>
</tbody>
</table>

### Additional Observations

- **Penetration:** no resistance ranging to refusal
- **Penetration:** 10-Oct-12 water level on date shown
- **Water:** inflow
- **Water:** outflow
- **Hand Penetro-meter:** (kPa)
- **Hand Penetro-meter:** (kPa)
- **Hand Penetro-meter:** (kPa)
- **Hand Penetro-meter:** (kPa)
- **Hand Penetro-meter:** (kPa)

###SOIL TYPE:

Plasticity or particle characteristic, colour, secondary and minor components.

- **Consistency / Relative Density:**
  - VS: Very soft
  - S: Soft
  - F: Firm
  - St: Stiff
  - VSt: Very Stiff
  - H: Hard
  - Fb: Frangible
  - VL: Very Loose
  - L: Loose
  - MD: Medium Dense
  - D: Dense
  - VD: Very Dense
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

**Borehole ID:** ID46-BH01  
**Sheet:** 2 of 6  
**Project No.:** GEOTABTF10294AA  
**Date Started:** 07 Sep 2016  
**Date Completed:** 13 Sep 2016  
**Logged By:** RL  
**Checked By:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>SP</td>
<td>SAND: fine to coarse grained, brown, orange-brown. (continued) pale grey, trace of fines</td>
</tr>
<tr>
<td>3.0</td>
<td>CH</td>
<td>Sandy CLAY: high plasticity, grey, fine to coarse grained sand.</td>
</tr>
<tr>
<td>8.0</td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, pale grey, medium plasticity.</td>
</tr>
<tr>
<td>10.0</td>
<td>CH</td>
<td>Sandy CLAY: high plasticity, pale grey, mottled orange-brown, fine to medium grained sand.</td>
</tr>
</tbody>
</table>

#### Material Substance

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components.
- **SOIL TYPE:** Material description.
- **SOIL TYPE:** Structure and additional observations.

#### Soil Type:

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components.
- **SOIL TYPE:** Material description.
- **SOIL TYPE:** Structure and additional observations.

#### Drilling Method & Support

- **Method:** AD - auger drilling
- **Support:** M - mud casing
- **Penetration:** N - nil

#### Samples & Field Tests

- **Samples:** B - bulk disturbed sample
- **Field Tests:** E - environmental sample
- **Test:** SPT - standard penetration test (SPT)

#### Classification Symbol & Soil Description

- **Classification Symbol:** VS - very soft
- **Soil Description:** VS - very stiff

#### Moisture

- **Moisture:** D - dry
- **Measurement:** M - moist

#### Consistency / Relative Density

- **Consistency:** S - soft
- **Density:** VL - very loose

#### Additional Observations

- **Depth:** 3.0 meters
- **Level:** 10.0 meters
- **Position:** E: 334,969.69; N: 5,786,088.23 (MGA94)
- **Drill Model:** Comacchio 450P, Track mounted
- **Angle from Horizontal:** 90°
- **Hole Diameter:** 100 mm
- **Consistency:** W - very loose
- **Relative Density:** VL - very loose
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Position:</strong> E: 334.969; N: 5,786,008.23 (MGA94)</td>
<td><strong>SOIL TYPE:</strong> plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td><strong>Surface Elevation:</strong> 5.84 m (AHD)</td>
<td><strong>CONSISTENCY / RELATIVE DENSITY:</strong> moisture, condition</td>
</tr>
<tr>
<td><strong>Angle from Horizontal:</strong> 90°</td>
<td><strong>MOISTURE:</strong> dry, moist, wet, plastic limit, liquid limit</td>
</tr>
<tr>
<td><strong>Drill Model:</strong> Comacchio 450P, Track mounted</td>
<td><strong>Classification Symbol:</strong> fine to medium grained, pale grey, medium plasticity. (continued)</td>
</tr>
<tr>
<td><strong>Drilling Fluid:</strong> Polymer</td>
<td><strong>Penetrometer:</strong> hand penetrometer (kPa)</td>
</tr>
<tr>
<td><strong>Diameter:</strong> 100 mm</td>
<td><strong>Soil Classification:</strong> soft, firm, stiff, very stiff, friable, very loose, loose, medium dense, dense, very dense</td>
</tr>
</tbody>
</table>

**Graphic Log:**
- **Soil Type:** Clayey Sand
- **Consistency:** fine to medium grained, pale grey, medium plasticity.
- **Description:** (continued)

- **Classification:** fine to medium grained, pale grey, medium plasticity.

**Samples & Field Tests:**
- **Classification Symbol:** fine to medium grained, pale grey, medium plasticity.
- **Soil Description:** medium plasticity, pale grey, mottled orange-brown, with some clayey sand bands, fine to medium grained.

**Tertiary Brighton Group**

### Additional Observations:
- **Sandy Silt:** medium liquid limit, pale grey, fine grained sand.
- **Sandy Clay:** medium plasticity, pale grey, mottled yellow-brown, fine to medium grained sand, with some high plasticity clay bands, grey.

---

**Borehole ID:** ID46-BH01  
**Logged by:** RL  
**Checked by:** KJ  
**Date Started:** 07 Sep 2016  
**Date Completed:** 13 Sep 2016  
**Sheet:** 3 of 6  
**Project No.:** GEOTABTF10294AA
# Engineering Log - Borehole

### Client: Metro Trains Melbourne
### Project: LCRP-CTF
### Location: ID46 - Bondi Road, Bonbeach
### Borehole ID: ID46-BH01
### Project no.: GEOTABTF10294AA
### Date Started: 07 Sep 2016
### Date Completed: 13 Sep 2016
### Logged by: RL
### Checked by: KJ

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>classification symbol &amp; soil description</td>
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<tr>
<td></td>
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<td>support</td>
</tr>
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<td>samples &amp; field tests</td>
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<td></td>
<td>classification symbol &amp; field tests</td>
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<td></td>
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<td></td>
<td>moisture</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>penetrometer (kPa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>liquid limit</td>
</tr>
<tr>
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<td></td>
<td></td>
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<tr>
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<td></td>
<td>firm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>stiff</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>very stiff</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>hard</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>friable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>very loose</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>loose</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>medium dense</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>dense</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>very dense</td>
</tr>
</tbody>
</table>

### Geological Log

- **CLAYEY SAND**: fine to coarse grained, pale grey, medium plasticity. Becoming pale grey, mottled pale orange-brown.
- **Sandy GRAVEL**: fine to coarse grained, pale brown, fine to coarse grained sand, with some pale grey clay bands.
- **SILTY SAND**: fine grained, pale grey, low liquid limit. Becoming brown.
- **TERTIARY BRIGHTON GROUP**

### Material Description

- **Clayey Sand**: Fine to coarse grained, pale grey, medium plasticity. Becoming pale grey, mottled pale orange-brown.
- **Sandy Gravel**: Fine to coarse grained, pale brown, fine to coarse grained sand, with some pale grey clay bands.
- **Silty Sand**: Fine grained, pale grey, low liquid limit. Becoming brown.

### Soil Properties

- **Penetration**: SPT, N, R
- **Depth (m)**: 25.0, 26.0, 27.0, 28.0, 29.0, 30.0
- **Position**: E: 334,969.69; N: 5,786,008.23 (MGA94)
- **Drill Model**: Comacchio 450P, Track mounted
- **Angle from Horizontal**: 90°
- **Hole Diameter**: 100 mm
- **Drilling Fluid**: Polymer

### Other Notes

- **Graphical Log**: Classifications, Sample Collection, Methods & Support, Consistency & Relative Density, Moisture, Penetro-meter.
### Soil Types

- **Silty Sand**: fine grained, pale grey, low liquid limit.
- **Silt**: low liquid limit, grey-dark grey, with some fine grained sand.
- **Clay**: high plasticity, dark grey.
- **Clayey Silt**: low liquid limit, grey, with some fine grained sand.
- **Clayey Sand**: fine to coarse grained, grey, dark grey, medium plasticity.

### Soil Descriptions

- **Silty Sand**: fine grained, pale grey, low liquid limit. (continued)
- **Silt**: low liquid limit, grey-dark grey, with some fine grained sand.
- **Clay**: high plasticity, dark grey.
- **Clayey Silt**: low liquid limit, grey, with some fine grained sand.
- **Clayey Sand**: fine to coarse grained, grey, dark grey, medium plasticity.

### Logging Information

- **Method & Support**: auger drilling, casing
- **Penetration**: samples & field tests
- **Water**: samples & field tests
- **Classification**: soil type, plasticity or particle characteristic, colour, secondary and minor components
- **Sample & Soil Description**: based on Unified Classification System
- **Water Outflow**: water inflow, water outflow
- **Penetration**: ranging to refusal
- **Consistency / Relative Density**: moist, wet, liquid, plastic limit
- **Hand penetrometer (kPa)**: standard penetration test (SPT), SPT - sample recovered
- **Environmental Samples**: split spoon sample, undisturbed sample
- **Structural & Additional Observations**: hand penetrometer, structure & additional observations

### Drilling Details

- **Borehole ID**: ID46-BH01
- **Client**: Metro Trains Melbourne
- **Principal**: Level Crossing Removal Authority
- **Project**: LCRP-CTF
- **Location**: ID46 - Bondi Road, Bonbeach
- **Surface Elevation**: 5.84 m (AHD)
- **Angle from Horizontal**: 90°
- **Drill Model**: Comacchio 450P, Track mounted
- **Drilling Fluid**: Polymer
- **Consistency / Relative Density**: moisture, dry, firm, soft, very soft
- **Hand Penetrometer (kPa)**: standard penetration test (SPT), SPT - sample recovered
- **Soil Description**: very soft, soft, firm, stiff, very stiff, hard, friable, very loose, loose, medium dense, dense, very dense

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
<td>SM</td>
</tr>
<tr>
<td>34.0</td>
<td>ML</td>
</tr>
<tr>
<td>35.0</td>
<td>CH</td>
</tr>
<tr>
<td>36.0</td>
<td>SC</td>
</tr>
<tr>
<td>37.0</td>
<td></td>
</tr>
<tr>
<td>38.0</td>
<td></td>
</tr>
<tr>
<td>39.0</td>
<td></td>
</tr>
</tbody>
</table>

**Samples & Field Tests**

- **B**: bulk disturbed sample
- **D**: disturbed sample
- **E**: environmental sample
- **N**: standard penetration test (SPT)
- **N***: SPT - sample recovered
- **NC**: SPT with solid cone
- **VS**: vane shear, peak/remoulded (kPa)
- **W**: plastic limit
- **WI**: liquid limit

**Hand Penetrometer (kPa)**

- **VSS**: soft
- **F**: firm
- **ST**: stiff
- **VST**: very stiff
- **H**: hard
- **FL**: friable
- **VL**: very loose
- **MD**: medium dense
- **D**: dense
- **VD**: very dense
Borehole ID: ID46-BH01

**Engineering Log - Borehole**

**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Sample &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>method &amp; support</strong></td>
<td><strong>samples &amp; field tests</strong></td>
<td><strong>material description</strong></td>
</tr>
<tr>
<td><strong>depth (m)</strong></td>
<td><strong>graphic log</strong></td>
<td><strong>SOIL TYPE:</strong> plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td>SPT 6, 14, 25 N=39</td>
<td>ML</td>
<td>SILT: low liquid limit, pale grey, with some fine grained sand. (continued)</td>
</tr>
<tr>
<td>39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 8, 14, 23 N=37</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td></td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>SPT 17, 25, 30 N=55</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td></td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>SPT 9, 30, 39/90mm</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>92</td>
<td></td>
</tr>
</tbody>
</table>

---

**Water**

- Water outflow: 10-Oct-21
- Water inflow: level on date shown

---

**Other Information**

- **Borehole ID:** ID46-BH01 terminated at 44.89 m
- **Target depth:** Standpipe installation
- **Backfill details:**
  - 0.0m-5.5m: grout
  - 5.5m-6.0m: bentonite
  - 6.0m-10.5m: sand
  - 10.5-11.5m: bentonite
  - 11.5-44.89m: grout

---

**Material Substance**

- **Consistency / Relative Density:**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff
  - H: hard
  - Fb: friable
  - V: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - WD: very dense

---

**Notes:**

- **Location:** E: 334.96969; N: 5,786,008.23 (MGA94)
- **Angle from horizontal:** 90°
- **Obstruciton:**
  - 10-Oct-21 water level on date shown
  - Water infall: level on date shown
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

**Borehole ID:** ID46-BH02  
**Logged by:** LP/BP  
**Checked by:** KJ  
**Date Started:** 07 Sep 2016  
**Date Completed:** 15 Sep 2016

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Soil Classification &amp; Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td>bulk disturbed sample</td>
</tr>
<tr>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>disturbed sample</td>
</tr>
<tr>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td>environmental sample</td>
</tr>
<tr>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
<td>S</td>
<td>standard penetration test (SPT)</td>
</tr>
<tr>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td>U</td>
<td>undisturbed sample #6mm diameter</td>
</tr>
<tr>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>SPT - sample recovered</td>
</tr>
<tr>
<td>6.0</td>
<td></td>
<td></td>
<td></td>
<td>N*</td>
<td>SPT - sample recovered</td>
</tr>
<tr>
<td>7.0</td>
<td></td>
<td></td>
<td></td>
<td>HP</td>
<td>hand penetrometer (kPa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nc</td>
<td>SPT with solid cone</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VS</td>
<td>vane shear, peak/remoulded (kPa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R</td>
<td>refusal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HB</td>
<td>hammer bouncing</td>
</tr>
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### Material Substance

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Plasticity or Particle Characteristic, Colour, Secondary and Minor Components</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>SOIL TYPE: Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
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</table>

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>D dry</td>
<td>VS very soft</td>
</tr>
<tr>
<td>W wet</td>
<td>VL very loose</td>
</tr>
<tr>
<td>Wp plastic limit</td>
<td>MD medium dense</td>
</tr>
</tbody>
</table>

### Additional Observations

- **SP:** FILL: ASPHALT: 200mm.  
- **FILL:** GRAVEL: fine to medium grained, sub-angular to angular, grey, with some sand, orange.
- **SAND:** fine to medium grained, pale grey, trace of rootlets. Rootlets absent.
- Becoming fine grained.
- Becoming brown.
- Becoming fine to medium grained, brown.
- With some cemented sand nodules.
- Becoming fine to medium grained sand, dark brown, red.
- Trace of shell fragments.
- Becoming fine to medium grained.
- With some coarse grained sand.

---

**Notes:** 
- ID46-BH02 - Bondi Road, Bonbeach  
- Surface elevation: 5.84 m (AHD)  
- Angle from horizontal: 90°  
- Hole diameter: 100 mm  
- Drilling fluid: Polymer  
- Drilling model: Comacchio GEO 305, Track mounted  
- Angle from horizontal: 90°

---
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

### Drilling Information

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3.0</td>
<td>SAND: fine to medium grained, pale grey, trace of rootlets. (continued)</td>
</tr>
<tr>
<td>-4.0</td>
<td>CLAY: high plasticity, dark brown, trace of shell fragments.</td>
</tr>
<tr>
<td>-6.0</td>
<td>SAND: fine to coarse grained, grey, with some shell fragments.</td>
</tr>
<tr>
<td>-8.0</td>
<td>CLAYEY SAND: fine to medium grained, grey, low plasticity clay.</td>
</tr>
<tr>
<td>-9.0</td>
<td>Silty CLAY: medium plasticity, grey, green grey, mottled brown and dark grey, with some fine grained sand.</td>
</tr>
</tbody>
</table>

### Material Substance

<table>
<thead>
<tr>
<th>soil type</th>
<th>classification symbol &amp; soil description based on Unified Classification System</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUATERNARY SANDS</td>
<td>WVD</td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td>MD</td>
</tr>
</tbody>
</table>

### Support & Penetration

<table>
<thead>
<tr>
<th>support</th>
<th>penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>M mud</td>
<td>N nil</td>
</tr>
</tbody>
</table>

### Samples & Field Tests

<table>
<thead>
<tr>
<th>method</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>auger drilling*</td>
</tr>
<tr>
<td>AS</td>
<td>auger screwing*</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
</tr>
<tr>
<td>W</td>
<td>wash boring</td>
</tr>
<tr>
<td>NDD</td>
<td>non destructive drilling</td>
</tr>
</tbody>
</table>

### Classification Symbol

<table>
<thead>
<tr>
<th>classification symbol</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>ST</td>
<td>stiff</td>
</tr>
<tr>
<td>VS</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
</tr>
</tbody>
</table>

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>very soft</td>
</tr>
<tr>
<td>M</td>
<td>soft</td>
</tr>
<tr>
<td>W</td>
<td>firm</td>
</tr>
<tr>
<td>Wp</td>
<td>stiff</td>
</tr>
<tr>
<td>Wp</td>
<td>very stiff</td>
</tr>
<tr>
<td>VS</td>
<td>hard</td>
</tr>
<tr>
<td>FC</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
</tr>
</tbody>
</table>

### Drilling Fluid

- Polymer

### Other Information

- Method & Support: ID46-BH02, ID46-BH03, ID46-BH04, ID46-BH05, ID46-BH06
- Date Started: 07 Sep 2016
- Date Completed: 15 Sep 2016
- Logged By: LP/BP
- Checked By: KJ
- Borehole ID: ID46-BH02
- Project: Metro Trains Melbourne
- Client: Level Crossing Removal Authority
- Location: ID46 - Bondi Road, Bonbeach
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

**Borehole ID:** ID46-BH02  
**date started:** 07 Sep 2016  
**date completed:** 15 Sep 2016  
**logged by:** LP/BP  
**checked by:** KJ

<table>
<thead>
<tr>
<th>method</th>
<th>support</th>
<th>penetration</th>
<th>samples &amp; field tests</th>
<th>material description</th>
<th>soil type</th>
<th>classification symbol</th>
<th>description</th>
<th>water</th>
<th>moisture</th>
<th>density</th>
<th>additional observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>M mud</td>
<td>N nil</td>
<td>B bulk disturbed sample</td>
<td>Silty CLAY: medium plasticity, grey, green grey, mottled brown and dark grey, with some fine to medium grained sand. (continued) black pockets of organic matter</td>
<td>CI</td>
<td>SPT 5, 9, 17 N=26</td>
<td></td>
<td>M</td>
<td>St</td>
<td></td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>AS</td>
<td>C casing</td>
<td></td>
<td>D disturbed sample</td>
<td></td>
<td></td>
<td>SPT 4, 5, 6 N=11</td>
<td></td>
<td>M</td>
<td>W VSt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td></td>
<td></td>
<td>E environmental sample</td>
<td></td>
<td></td>
<td>SPT 7, 9, 11 N=20</td>
<td></td>
<td>M</td>
<td>VSt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
<td></td>
<td>SS split spoon sample</td>
<td></td>
<td></td>
<td>N* SPT - sample recovered</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HP hand penetrometer (kPa)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nc SPT with solid cone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VS vane shear; peak/remoulded (kPa)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R refusal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HB hammer bouncing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**samples & field tests:**
- **water:**
  - 10-Oct-12
  - level on date shown
  - water inflow
  - water outflow

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

**material description:**
- **CI:** Silty CLAY: medium plasticity, grey, green grey, mottled brown and dark grey, with some fine to medium grained sand. (continued) black pockets of organic matter
- **SP:** SAND: fine to coarse grained, sub-rounded to sub-angular, brown-grey, with some pockets of green-grey sandy clay; low to medium plasticity, fine grained sand becoming brown-grey, grey
- **CH:** CLAY: high plasticity, grey
- **SC:** CLAYEY SAND: fine grained, pale grey, low plasticity, trace of pockets of dark grey medium plasticity clay

**additional observations:**
- TERTIARY BRIGHTON GROUP
- M - W
- VSt

**drilling information:**
- **position:** E: 335,005.02; N: 5,785,887.46 (MGA94 )
- **angle from horizontal:** 90°
- **drill model:** Comacchio GEO 305, Track mounted
- **drilling fluid:** Polymer
- **hole diameter:** 100 mm
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

**material substance**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAYEY SAND</td>
<td>Fine grained, pale grey, low plasticity, trace of pockets of dark grey medium plasticity clay. (continued)</td>
</tr>
<tr>
<td>Sandy SILT</td>
<td>Low to medium liquid limit, pale grey, mottled brown, fine grained sand.</td>
</tr>
<tr>
<td>Clayey SILT</td>
<td>Low liquid limit, brown, mottled red and white, trace of fine grained sand.</td>
</tr>
<tr>
<td>Sandy SILT</td>
<td>Low liquid limit, brown, trace of black organic material.</td>
</tr>
<tr>
<td>Sandy SILT</td>
<td>Becoming pale grey, pockets of grey, medium plasticity clay</td>
</tr>
</tbody>
</table>

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**structure and additional observations**

<table>
<thead>
<tr>
<th>TERTIARY BRIGHTON GROUP</th>
</tr>
</thead>
</table>

---

**method & support**

<table>
<thead>
<tr>
<th>method</th>
<th>support</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>M mud</td>
</tr>
<tr>
<td>AS</td>
<td>N nil</td>
</tr>
<tr>
<td>HA</td>
<td>C casing</td>
</tr>
<tr>
<td>W</td>
<td>U## undisturbed sample #1mm diameter</td>
</tr>
<tr>
<td>NDD</td>
<td>S split spoon sample</td>
</tr>
<tr>
<td>N</td>
<td>HP hand penetrometer (kPa)</td>
</tr>
<tr>
<td></td>
<td>Nc SPT with solid cone</td>
</tr>
<tr>
<td></td>
<td>VS vane shear, peak/remoulded (kPa)</td>
</tr>
<tr>
<td></td>
<td>R refusal</td>
</tr>
<tr>
<td></td>
<td>HB hammer bouncing</td>
</tr>
</tbody>
</table>

**samples & field tests**

<table>
<thead>
<tr>
<th>classification symbol</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>CLAYEY SAND: fine grained, pale grey, low plasticity, trace of pockets of dark grey medium plasticity clay. (continued)</td>
</tr>
<tr>
<td>ML</td>
<td>Sandy SILT: low to medium liquid limit, pale grey, mottled brown, fine grained sand.</td>
</tr>
<tr>
<td>ML</td>
<td>Clayey SILT: low liquid limit, brown, mottled red and white, trace of fine grained sand.</td>
</tr>
<tr>
<td>ML</td>
<td>Sandy SILT: low liquid limit, brown, trace of black organic material.</td>
</tr>
<tr>
<td>SI</td>
<td>Sandy SILT: low liquid limit, brown, trace of black organic material.</td>
</tr>
</tbody>
</table>

---

**material description**

- **CLAYEY SAND**: fine grained, pale grey, low plasticity, trace of pockets of dark grey medium plasticity clay. (continued)
- **Sandy SILT**: low to medium liquid limit, pale grey, mottled brown, fine grained sand.
- **Clayey SILT**: low liquid limit, brown, mottled red and white, trace of fine grained sand.
- **Sandy SILT**: low liquid limit, brown, trace of black organic material.
- **Sandy SILT**: low liquid limit, brown, trace of black organic material.
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

**Position:** E: 335,005.02; N: 5,785,887.46  
**Surface elevation:** 5.84 m (AHD)  
**Angle from horizontal:** 90°  
**Drill model:** Comacchio GEO 305, Track mounted  
**Drilling fluid:** Polymer  
**Hole diameter:** 100 mm

**Drilling Information**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
<td>SPT 6, 5, 9 N=14</td>
<td>Sandy CLAY: medium plasticity, dark grey, trace of pockets of coarse grained sand.</td>
</tr>
<tr>
<td>34.0</td>
<td>SPT 2, 5, 6 N=11</td>
<td>Clayey SILT: low to medium liquid limit, dark green, brown, with some pockets of fine grained gravel in yellow-brown clay matrix.</td>
</tr>
<tr>
<td>35.0</td>
<td>SPT 7, 14, 18 N=32</td>
<td>SILT: low liquid limit, green-grey mottled brown, with some clay, with some fine to coarse grained sand bands, dark grey.</td>
</tr>
</tbody>
</table>

**Method & Support**

- **AD:** auger drilling  
- **AS:** auger screwing  
- **HA:** hand auger  
- **W:** washbore  
- **NDD:** non destructive drilling

**Samples & Test Results**

- **N:** nil  
- **M:** mud  
- **C:** casing  
- **D:** disturbed sample  
- **E:** environmental sample  
- **SS:** split spoon sample  
- **US:** undisturbed sample #mm diameter  
- **HP:** hand penetrometer (kPa)  
- **N:** standard penetration test (SPT)  
- **N:** SPT - sample recovered  
- **NC:** SPT with solid cone  
- **VS:** vane shear; peak/remoulded (kPa)  
- **R:** refusal  
- **HB:** hammer bouncing

**Soil Type**

- **ML:** plasticity or particle characteristic, colour, secondary and minor components

**Consistency / Relative Density**

- **VS:** very soft  
- **S:** soft  
- **F:** firm  
- **ST:** stiff  
- **VT:** very stiff  
- **H:** hard  
- **Fb:** friable  
- **VL:** very loose  
- **L:** loose  
- **MD:** medium dense  
- **D:** dense  
- **VD:** very dense

**Additional Observations**

- **trace of wood fragments observed in washbore return at interface**
# Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

---

**Borehole ID:** ID46-BH02  
**date started:** 07 Sep 2016  
**date completed:** 15 Sep 2016  
**logged by:** LP/BP  
**checked by:** KJ

---

### Drilling Information

- **method & support:**
  - AD auger drilling
  - AS auger screwing
  - HA hand auger
  - W washhoe
  - NDD non destructive drilling

- **samples & field tests:**
  - SPT (Standard Penetration Test)
  - HP hand penetrometer
  - SS split spoon sample
  - US undisturbed sample
  - MC SPT with solid cone
  - VS vane shear, peak/remoulded (kPa)
  - R refusal
  - HB hammer bouncing

- **classification symbol:**
  - M mud
  - C casing
  - N nil

- **material description:**
  - SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

### Material Substance

- **moisture:**
  - DM dry
  - W wet

- **penetration:**
  - no resistance ranging to refusal

- **consistency / relative density:**
  - VSt very stiff
  - VST very stiff
  - ST stiff

- **structure and additional observations:**
  - very soft
  - soft

---

**Borehole ID46-BH02 terminated at 44.98 m Target depth**

---

**position:** E: 335,005.02; N: 5,785,887.46 (MGA94)  
**surface elevation:** 5.84 m (AHD)  
**angle from horizontal:** 90°

**drill model:** Comacchio GEO 305, Track mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm

---

**graphic log:**

- **graphic log classification symbol:**
  - ML SILT: low liquid limit, green-grey mottled brown, with some clay, with some fine to coarse grained sand bands, dark grey. (continued)

---

**samples & field tests consistency / relative density:**

<table>
<thead>
<tr>
<th>water</th>
<th>soil type</th>
<th>method &amp; support</th>
<th>classification symbol</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML</td>
<td>GELIBRAND MARL</td>
<td>AD auger drilling</td>
<td>HP</td>
<td>SPT N=41, 14, 27</td>
<td>SILT: low liquid limit, green-grey mottled brown, with some clay, with some fine to coarse grained sand bands, dark grey. (continued)</td>
</tr>
</tbody>
</table>

---

**material substance:**

- **Soil Type:** plasticity or particle characteristic, colour, secondary and minor components
- **structure and additional observations:**
  - very soft
  - soft

---

**Borehole Log:**

- **ID46-BH02:**
  - **logged by:** LP/BP
  - **checked by:** KJ
  - **date started:** 07 Sep 2016
  - **date completed:** 15 Sep 2016
  - **location:** ID46 - Bondi Road, Bonbeach
  - **client:** Metro Trains Melbourne
  - **principal:** Level Crossing Removal Authority
  - **project:** LCRP-CTF

---

**graphic log:**

- **graphic log classification symbol:**
  - ML SILT: low liquid limit, green-grey mottled brown, with some clay, with some fine to coarse grained sand bands, dark grey. (continued)

---

**material description:**

- **Soil Type:** plasticity or particle characteristic, colour, secondary and minor components
- **structure and additional observations:**
  - very soft
  - soft
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

<table>
<thead>
<tr>
<th>position: E: 335,037.77; N: 5,786,712.89 (MGA94)</th>
<th>surface elevation: 5.93 m (AHD)</th>
<th>angle from horizontal: 90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>drill model: Comacchio 450P, Track mounted</td>
<td>drilling fluid: Polymer</td>
<td>hole diameter: 100 mm</td>
</tr>
</tbody>
</table>

### Drilling Information

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>FILL: SILTY SAND: fine to coarse grained, brown, mottled grey-brown, with some fines, trace of fine grained quartz gravel, sub-rounded.</td>
</tr>
<tr>
<td>1.0</td>
<td>SAND: fine to medium grained, pale brown to grey.</td>
</tr>
<tr>
<td>2.0</td>
<td>SAND: fine to medium grained, grey-brown, with some fines, trace of fine grained quartz gravel, sub-rounded.</td>
</tr>
<tr>
<td>3.0</td>
<td>SAND: fine to coarse grained, sub-rounded to sub-angular, grey, mottled pale grey.</td>
</tr>
<tr>
<td>4.0</td>
<td>SAND: fine to coarse grained, brown, mottled grey-brown, with some fines, trace of fine grained quartz gravel, sub-rounded.</td>
</tr>
<tr>
<td>5.0</td>
<td>SAND: fine to medium grained, grey mottled pale brown, trace of shell fragments.</td>
</tr>
</tbody>
</table>

### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components  
**structure and additional observations:**

- **FILL:** fine to coarse grained, brown, mottled grey-brown, with some fines, trace of fine grained quartz gravel, sub-rounded.
- **SAND:** fine to medium grained, pale brown to grey.
- **SAND:** fine to medium grained, grey mottled pale brown, trace of shell fragments.
- **SAND:** fine to coarse grained, sub-rounded to sub-angular, grey, mottled pale grey.

### Water

- **water penetration:** no resistance ranging to refusal  

### Moisture

- **moisture:** no resistance ranging to refusal  

### Density

- **consistency / relative density:** very soft

### Drilling Equipment

- **drill model:** Comacchio 450P
- **angle from horizontal:** 90°
- **hole diameter:** 100 mm

### Other Information

- **drilling fluid:** Polymer
- **surface elevation:** 5.93 m (AHD)
- **surface elevation:** 5.93 m (AHD)
- **angle from horizontal:** 90°
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach  
**Borehole ID:** ID46-BH03  
**date started:** 06 Sep 2016  
**date completed:** 15 Sep 2016  
**logged by:** JL  
**checked by:** KJ

### Material Substance

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>plasticity or particle characteristic, colour, secondary and minor components</th>
<th>structure and additional observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAND</td>
<td>fine to medium grained, grey mottled pale brown, trace of shell fragments. (continued)</td>
<td></td>
</tr>
<tr>
<td>CL-CL</td>
<td>Silty CLAY: low to medium plasticity, dark grey, black, with some shell fragments.</td>
<td></td>
</tr>
<tr>
<td>SM</td>
<td>SILTY SAND: fine to coarse grained, dark grey to dark brown, mottled white.</td>
<td></td>
</tr>
<tr>
<td>CL</td>
<td>Sandy CLAY: low plasticity, grey mottled brown, to medium grained sand, with some sand lenses, trace of coarse grained cemented gravel, sub-angular.</td>
<td></td>
</tr>
<tr>
<td>CL</td>
<td>Sandy CLAY: low plasticity, green mottled grey, white, fine grained sand, with some fine to medium grained sand lenses.</td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, pale grey, medium plasticity.</td>
<td></td>
</tr>
</tbody>
</table>

### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>depth (m)</th>
<th>material description</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 10, 26, 26</td>
<td>N=32</td>
<td>SAND</td>
<td>W VD</td>
</tr>
<tr>
<td>SPT 1, 0, 0</td>
<td>N=10</td>
<td>CL-CL</td>
<td>M VS</td>
</tr>
<tr>
<td>SPT 4, 4, 8</td>
<td>N=12</td>
<td>SM</td>
<td>W L - MD</td>
</tr>
<tr>
<td>SPT 6, 0, 6</td>
<td>N=16</td>
<td>CL</td>
<td>M SI</td>
</tr>
<tr>
<td>SPT 32/130mm,</td>
<td>HB N=1R</td>
<td>CL</td>
<td>S</td>
</tr>
</tbody>
</table>

**graphic log**  
**samples & field tests**  
**water outflow**  
**water inflow**  
**penetration**  
**no resistance ranging to refusal**

**method & support**  
**penetration**  
**samples & field tests**  
**classification symbol & soil description**

**consistency / relative density**

**moisture**

<table>
<thead>
<tr>
<th>soil description</th>
<th>based on Unified Classification System</th>
</tr>
</thead>
</table>

**moisture**

<table>
<thead>
<tr>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
</table>

**drill model:** Comacchio 450P, Track mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach  
**Borehole ID:** ID46-BH03  
**date started:** 06 Sep 2016  
**date completed:** 15 Sep 2016  
**logged by:** JL  
**checked by:** KJ  

**method & support**  
<table>
<thead>
<tr>
<th>method</th>
<th>support</th>
<th>penetration</th>
<th>water</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>M mud</td>
<td>N nil</td>
<td>SPT</td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, pale grey, medium plasticity.</td>
</tr>
<tr>
<td>AS</td>
<td>C casing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**graphic log**  
- SPT 8, 11, 13/70mm HB N=R
- SPT 19, 17, 26 N=43
- SPT 20/100mm HB N=R
- SPT 30, 16, 15 N=31

**samples & field tests**  
- water outflow
- water inflow
- 10-Oct-12 water level on date shown
- no resistance ranging to refusal

**material description**  
- SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
- water
- moisture
- soil description
- classification symbol & soil description based on Unified Classification System

**structure and additional observations**  
- TERTIARY BRIGHTON GROUP
- VSI - H

**drilling information**  

<table>
<thead>
<tr>
<th>position</th>
<th>surface elevation: 5.93 m (AHD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E: 335,037.77; N: 5,786,712.89 (MGA94)</td>
<td>angle from horizontal: 90°</td>
</tr>
</tbody>
</table>

**drill model:** Comacchio 450P, Track mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm  

**additional information**  
- Metro Trains Melbourne  
- Level Crossing Removal Authority  
- LCRP-CTF  
- ID46 - Bondi Road, Bonbeach  
- ID46-BH03  
- 06 Sep 2016  
- 15 Sep 2016  
- JL  
- KJ  

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

**material substance**  
- CLAYEY SAND: fine to coarse grained, pale grey, medium plasticity.
- SAND: fine to medium grained, pale brown, with some fines.
- CLAY: medium plasticity, grey.
- (continued)
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOIL TYPE:</strong> plasticity or particle characteristic, colour, secondary and minor components</td>
<td><strong>structure and additional observations</strong></td>
</tr>
<tr>
<td>Sandy CLAY: high plasticity, pale brown to pale grey.</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>CLAYEY SAND: fine to coarse grained, yellow, red-brown, low plasticity.</td>
<td></td>
</tr>
<tr>
<td>becoming pale grey, mottled orange-brown</td>
<td></td>
</tr>
<tr>
<td>with some clay bands, pale brown</td>
<td></td>
</tr>
<tr>
<td>becoming pale grey, mottled dark brown</td>
<td></td>
</tr>
<tr>
<td>becoming mottled pale brown and red brown</td>
<td></td>
</tr>
<tr>
<td>Sandy CLAY: medium plasticity, pale grey, fine grained sand, with some pale brown bands of high plasticity.</td>
<td></td>
</tr>
<tr>
<td>CLAYEY SAND: fine grained, pale brown, high plasticity.</td>
<td></td>
</tr>
<tr>
<td>bands of red and red brown</td>
<td></td>
</tr>
</tbody>
</table>
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

#### Borehole ID: ID46-BH03  
**sheet:** 5 of 7  
**project no.:** GEOTABTF10294AA  
**date started:** 06 Sep 2016  
**date completed:** 15 Sep 2016  
**logged by:** JL  
**checked by:** KJ

**Position:** E: 335,037.77; N: 5,785,712.89 (MGA94)  
**Surface elevation:** 5.93 m (AHD)  
**Angle from horizontal:** 90°  
**Drill model:** Comacchio 450P, Track mounted  
**Drilling fluid:** Polymer  
**Hole diameter:** 100 mm

#### Drilling Information & Material Substance

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Type</th>
<th>Consistency / Relative Density</th>
<th>Moisture Condition</th>
<th>Hand Penetrometer (kPa)</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
<td>SC</td>
<td>W</td>
<td>DMW</td>
<td>100</td>
<td>CLAYEY SAND: fine grained, pale brown, high plasticity.</td>
</tr>
<tr>
<td>34.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(continued)</td>
</tr>
<tr>
<td>35.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bands of red, red-brown</td>
</tr>
<tr>
<td>36.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inferred gravel layer, 200mm</td>
</tr>
<tr>
<td>38.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components  
**Material Description:**

- **CLAYEY SAND:** fine grained, pale brown, high plasticity. (continued)
- Inferred gravel layer, 200mm

**Structure and Additional Observations:**

- TERTIARY BRIGHTON GROUP
- GELLIBRAND MARL

**SPT Penetrated 400mm with second blow**
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.0</td>
<td>Sandy SILT: low liquid limit, brown, fine grained sand. (continued)</td>
</tr>
<tr>
<td>42.0</td>
<td>trace of clay, pale grey and pale brown</td>
</tr>
<tr>
<td>43.0</td>
<td>SILTY SAND: fine grained, grey, with some shell fragments.</td>
</tr>
<tr>
<td>44.0</td>
<td>Sandy SILT: low liquid limit, pale grey, fine grained sand.</td>
</tr>
<tr>
<td>45.0</td>
<td>SILT: low liquid limit, pale grey.</td>
</tr>
</tbody>
</table>

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**material description:**

- **Sandy SILT:** low liquid limit, brown, fine grained sand.
- **Silty SAND:** fine grained, grey, with some shell fragments.
- **Sandy SILT:** low liquid limit, pale grey, fine grained sand.
- **SILT:** low liquid limit, pale grey.

**structure and additional observations:**

- SPT sunk under hammer weight, inferred disturbance of sensitive soils during drilling

**method & support:**
- AD: auger drilling  
- AS: auger screwing  
- HA: hand auger  
- W: washbore  
- NDD: non destructive drilling

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.0</td>
<td>SPT 0, 3, 4 N=7</td>
</tr>
<tr>
<td>42.0</td>
<td>SPT 0, 0, 0 N=0</td>
</tr>
<tr>
<td>43.0</td>
<td>SPT 1, 3, 16 N=19</td>
</tr>
<tr>
<td>44.0</td>
<td>SPT 9, 15, 26 N=41</td>
</tr>
<tr>
<td>45.0</td>
<td>SPT 20, 23, 23 N=46</td>
</tr>
</tbody>
</table>

**material description:**

- **Sandy SILT:** low liquid limit, brown, fine grained sand.
- **Silty SAND:** fine grained, grey, with some shell fragments.
- **Sandy SILT:** low liquid limit, pale grey, fine grained sand.
- **SILT:** low liquid limit, pale grey.
Borehole ID: **ID46-BH03**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

**date started:** 06 Sep 2016  
**date completed:** 15 Sep 2016

**description:**

**SPT: SPT10, 25, 30N*=55**

**Casing:**
- ML: low liquid limit, pale grey.

**GELLIBRAND MARL**

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

**Support:**
- M mud
- N nil
- C casing
- penetration

**Method & Support:**
- AD: auger drilling
- AS: auger screwing
- HA: hand auger
- W: washbore
- NDD: non destructive drilling

**Samples & Field Tests:**
- B: bulk disturbed sample
- D: disturbed sample
- E: environmental sample
- S: split spoon sample
- U#: undisturbed sample #mm diameter
- HP: hand penetrometer (kPa)
- N: standard penetration test (SPT)
- N*: SPT - sample recovered

**Classification Symbol:**
- M: mud
- V: very soft
- S: soft
- F: firm
- ST: stiff
- VST: very stiff

**Moisture:**
- VS: very soft
- S: soft
- F: firm

**Structure and Additional Observations:**

**Material Substance:**
- SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

**Consistency / Relative Density:**
- VS: very soft
- S: soft

**Hand Penetrometer (kPa):**
- 100
- 200
- 300
- 400

**Penetration Test:**
- Hammer Bouncing

**Surface Elevation:** 5.93 m (AHD)

**Angle from Horizontal:** 90°

**Drilling Fluid:** Polymer
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

**Borehole ID:** ID46-BH04  
**date started:** 14 Oct 2016  
**date completed:** 14 Oct 2016  
**logged by:** BK  
**checked by:** KJ

**Position:** E: 335,057.67; N: 5,785,621.94 (MGA94)  
**Surface elevation:** 5.93 m (AHD)  
**Angle from horizontal:** 90°  
**Drill model:** Explora E50, Truck mounted  
**Drilling fluid:** Polymer  
**Hole diameter:** 100 mm

### Drilling Information

<table>
<thead>
<tr>
<th>RL (m)</th>
<th>method &amp; penetration</th>
<th>samples &amp; field tests</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>D - M MD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>T</td>
<td>stiff</td>
</tr>
<tr>
<td>VST</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>KD</td>
<td>very dense</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>T</td>
<td>stiff</td>
</tr>
<tr>
<td>VST</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>KD</td>
<td>very dense</td>
</tr>
</tbody>
</table>

**Samples & Field Tests**

- B: bulk disturbed sample
- D: disturbed sample
- E: environmental sample
- SS: split spoon sample
- U#: undisturbed sample #mm diameter
- HP: hand penetrometer (kPa)
- Nc: SPT with solid cone
- VS: vane shear; peak/remoulded (kPa)
- R: refusal
- HB: hammer bouncing
- V: V bit

**Classification Symbol & Soil Description**

- CL: very soft
- ML: soft
- HW: firm
- WS: stiff
- HS: very stiff
- FL: hard
- LS: friable
- VL: very loose
- LS: loose
- MH: medium dense
- D: dense
- KD: very dense

**FILL:** ASPHALT: 200mm.

**FILL:** GRAVEL: coarse grained, angular, dark grey.

**SAND:** fine to medium grained, grey.

becoming pale brown

becoming brown

**QUATERNARY SANDS**

P: 1.2 ppm

P: 0.8 ppm
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>SAND</td>
<td>Fine to medium grained, pale grey, trace of fines, trace of shells. (continued)</td>
</tr>
<tr>
<td>3-4</td>
<td>CLAY</td>
<td>Low to medium plasticity, dark grey, trace of sand, trace of shells.</td>
</tr>
<tr>
<td>4-5</td>
<td>SAND</td>
<td>Fine to medium grained, pale grey, trace of fines, trace of shells.</td>
</tr>
<tr>
<td>5-10</td>
<td>SAND</td>
<td>Fine to medium grained, pale grey, brown, green, trace of clay pockets, medium to high plasticity, grey, green-grey.</td>
</tr>
</tbody>
</table>

**SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components

**material description:**
- **M:** Mud
- **C:** Casing
- **N:** Nil
- **S:** Split spoon sample
- **U:** Undisturbed sample
- **N:** SPT - sample recovered
- **P:** SPT with solid cone
- **V:** Vane shear; peak remoulded (kPa)
- **R:** Refusal
- **HB:** Hammer bouncing

**method & support:**
- **AD:** Auger drilling
- **AS:** Auger screwing
- **HA:** Hand auger
- **W:** Wash boring
- **NDD:** Non destructive drilling

**samples & field tests:**
- **B:** Bulk disturbed sample
- **D:** Disturbed sample
- **E:** Environmental sample
- **SS:** Split spoon sample
- **U:** Undisturbed sample
- **N:** SPT - sample recovered
- **P:** SPT with solid cone
- **V:** Vane shear; peak remoulded (kPa)
- **R:** Refusal
- **HB:** Hammer bouncing

**classification symbol:**
- **SP:** Sandy
- **CL:** Clay

**tube refused, sand in tube**

**pockets of clay present**

**consistency / relative density:**
- **VS:** Very soft
- **S:** Soft
- **F:** Firm
- **St:** Stiff
- **VT:** Very stiff
- **H:** Hard
- **Fb:** Fragile
- **VL:** Very loose
- **L:** Loose
- **MD:** Medium dense
- **D:** Dense
- **VD:** Very dense
Engineering Log - Borehole

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: ID46 - Bondi Road, Bonbeach

Borehole ID: ID46-BH04
date started: 14 Oct 2016
date completed: 14 Oct 2016
logged by: BK
checked by: KJ

position: E: 335,057.67; N: 5,785,621.94 (MGA94)
surface elevation: 5.93 m (AHD)
angle from horizontal: 90°
drill model: Explora E50, Truck mounted
drilling fluid: Polymer
hole diameter: 100 mm

SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
material description

- SAND: fine to medium grained, pale grey, brown, green, trace of clay pockets, medium to high plasticity, grey, green-grey. (continued)
- Silty CLAY: low to medium plasticity, dark grey, trace of sand.
- Sandy CLAY: high plasticity, grey, fine to medium grained sand.
- CLAYEY SAND: fine to coarse grained, pale grey, medium plasticity.
- Silty CLAY: high plasticity, pale grey with green tinge, with some fine to coarse grained sand.
- SAND: fine to coarse grained, pale grey, trace of fines, trace of shells.
- CLAYEY SAND: fine to coarse grained, brown, high plasticity clay.

TERTIARY BRIGHTON GROUP
Attempted U63 push tube, pushed 200mm with no sample recovery (Sand)
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.0</td>
<td>CLAYEY SAND: fine to coarse grained, brown, high plasticity clay. (continued)</td>
</tr>
<tr>
<td>26.0</td>
<td>SAND: fine to medium grained, pale grey, trace of fines.</td>
</tr>
<tr>
<td>27.0</td>
<td>SILTY SAND: fine grained, brown, low liquid limit, with some clay pockets, pale grey.</td>
</tr>
</tbody>
</table>

**Material Substance:**

<table>
<thead>
<tr>
<th>Moisture Condition</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry</td>
<td>S very soft</td>
</tr>
<tr>
<td>Moist</td>
<td>F firm</td>
</tr>
<tr>
<td>Wet</td>
<td>V very stiff</td>
</tr>
<tr>
<td>Plastic</td>
<td>S very stiff</td>
</tr>
<tr>
<td>Liquid</td>
<td>V very loose</td>
</tr>
</tbody>
</table>

**Additional Observations:**

- Becoming pale brown

**Position:** E: 335,057.67; N: 5,785,621.94 (MGA94)

- **Surface Elevation:** 5.93 m (AHD)
- **Angle from Horizontal:** 90°

**Drilling Information:**

- **Drill Model:** Explora E50, Truck mounted
- **Drilling Fluid:** Polymer
- **Surface Elevation:** 5.93 m (AHD)
- **Hole Diameter:** 100 mm

**Classification Symbol:**

- SC
- SP
- SM

**Support:**

- M mud
- N nil
- C casing

**Samples & Field Tests:**

- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U unsaturated sample #1mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- NC SPT with solid cone
- VS vane shear, peak/remoulded (kPa)
- R refusal
- HB hammer bouncing

**Consistency / Relative Density:**

- VS very soft
- S very stiff
- F firm
- V very loose
- H hard
- Fb flakey
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense
# Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

## Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Classification Symbol</th>
<th>Soil Type</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>CI</td>
<td>Sandy CLAY</td>
<td>medium to high plasticity, brown grey.</td>
</tr>
<tr>
<td>28</td>
<td>CL</td>
<td>Silty CLAY</td>
<td>low plasticity, brown, with green tinge, trace of fine grained gravel.</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td>with some bands of fine to coarse grained sand</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td>100mm cemented band, becoming brown-grey, lenses of coarse grained sand and fine grained gravel</td>
</tr>
<tr>
<td>31</td>
<td></td>
<td></td>
<td>becoming brown, mottled red becoming grey-green</td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>ML</td>
<td>Sandy SILT</td>
<td>low liquid limit, brown, grey, fine grained sand.</td>
</tr>
</tbody>
</table>

## Soil Type

- **Plasticity or Particle Characteristic:** plasticity or particle characteristic, colour, secondary and minor components
- **Material Description:** structure and additional observations

## Drilling Method & Support

<table>
<thead>
<tr>
<th>Drilling Method &amp; Support</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>method &amp; support</td>
<td>water</td>
<td>samples &amp; field tests</td>
<td>material description</td>
</tr>
</tbody>
</table>

## Drilling Fluid

- **Type:** Polymer

## Additional Observations

- **Surface Elevation:** 5.93 m (AHD)
- **Angle from Horizontal:** 90°
- **Drill Model:** Explora E50, Truck mounted
- **Angle from Horizontal:** 90°
- **Hole Diameter:** 100 mm

---

**SOIL TYPE**

- **Plasticity or Particle Characteristic:** plasticity or particle characteristic, colour, secondary and minor components
- **Material Description:** structure and additional observations

---

**MOISTURE**

- **Classification System:** based on Unified Classification System
- **Consistency / Relative Density:** very soft, soft, firm, stiff, very stiff, hard, friable, very loose, loose, medium dense, dense, very dense
**Engineering Log - Borehole**

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

**Borehole ID:** ID46-BH04  
**Date Started:** 14 Oct 2016  
**Date Completed:** 14 Oct 2016  
**Logged by:** BK  
**Checked by:** KJ

**Position:** E: 335,057.67; N: 5,785,621.94 (MGA94)  
**Surface Elevation:** 5.93 m (AHD)  
**Angle from Horizontal:** 90°  
**Drill Model:** Explora E50, Truck mounted  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 100 mm

### Drilling Information

| Depth (m) | Graphic Log | Classification Symbol | Material Description | Support | Penetration | Water | Moisture | Sample & Field Tests | Consistency / Relative Density | Consistency / Relative Density
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 38</td>
<td>VSt</td>
<td>SM</td>
<td>SILTY SAND: fine grained, brown grey, trace of shells.</td>
<td>N</td>
<td>nil</td>
<td>C</td>
<td>dry</td>
<td>water</td>
<td>VSt</td>
<td>VSt</td>
</tr>
<tr>
<td>38 - 47</td>
<td>SPT</td>
<td>N*</td>
<td>SPT - sample recovered</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>water</td>
<td>VSt</td>
<td>VSt</td>
</tr>
<tr>
<td>38 - 52</td>
<td>SPT</td>
<td>N*</td>
<td>SPT with solid cone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>water</td>
<td>VSt</td>
<td>VSt</td>
</tr>
<tr>
<td>38 - 54</td>
<td>SPT</td>
<td>N*</td>
<td>VSt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>water</td>
<td>VSt</td>
<td>VSt</td>
</tr>
<tr>
<td>40 - 58</td>
<td>SPT</td>
<td>N*</td>
<td>VS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>water</td>
<td>VSt</td>
<td>VSt</td>
</tr>
<tr>
<td>41 - 67</td>
<td>SPT</td>
<td>N*</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>water</td>
<td>VSt</td>
<td>VSt</td>
</tr>
<tr>
<td>41 - 68</td>
<td>SPT</td>
<td>N*</td>
<td>refusal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>water</td>
<td>VSt</td>
<td>VSt</td>
</tr>
<tr>
<td>42 - 74</td>
<td>SPT</td>
<td>N*</td>
<td>HB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>water</td>
<td>VSt</td>
<td>VSt</td>
</tr>
</tbody>
</table>

### Material Substance

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **Classification Symbol:** based on Unified Classification System
- **Method & Support:**
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger
  - W: washbore
  - NDD: non destructive drilling
- **Penetration:**
  - no resistance
  - ranging to refusal
- **Water:**
  - 10-Oct-12 water level on date shown
  - Refusal
  - Hammer Bouncing
- **Moisture:**
  - VS: very soft
  - S: soft
  - F: firm
  - St: stiff
  - VSt: very stiff
  - H: hard
  - Fa: friable
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VD: very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

**Borehole ID:** ID46-BH04  
**date started:** 14 Oct 2016  
**date completed:** 14 Oct 2016  
**logged by:** BK  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOIL TYPE:</strong> Plasticity or particle characteristic, colour, secondary and minor components</td>
<td><strong>material description</strong></td>
<td><strong>structure and additional observations</strong></td>
</tr>
</tbody>
</table>

**graphic log:**

- **samples & field tests**: water, soil test, Borehole ID46-BH04 terminated at 49.45 m, Target depth

**material description**

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

**penetration**

- **method & support**: mud, casing, undisturbed sample, diameter

**water**

- **moisture**: dry, wet, plastic limit, liquid limit

**Hand penetrometer (kPa)**

- **classifications**: very soft, soft, firm, stiff, very stiff

**Borehole ID46-BH04 terminated at 49.45 m**

<table>
<thead>
<tr>
<th>ID46-BH04</th>
<th>49.0</th>
<th>50.0</th>
<th>51.0</th>
<th>52.0</th>
<th>53.0</th>
<th>54.0</th>
<th>55.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>GELLIBRAND MARL</td>
<td>M</td>
<td>MD</td>
<td>GELLIBRAND MARL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Position:** E: 335,057.67; N: 5,785,621.94 (MGA94)  
**Surface elevation:** 5.93 m (AHD)  
**Angle from horizontal:** 90°  
**Drill model:** Explora E50, Truck mounted  
**Drilling fluid:** Polymer  
**Drill model:** Explora E50, Truck mounted  
**Angle from horizontal:** 90°  
**Drilling fluid:** Polymer

**Consistency / Relative Density**

- **VS** very soft  
- **S** soft  
- **F** firm  
- **ST** stiff  
- **VST** very stiff  
- **H** hard  
- **Fb** friable  
- **VL** very loose  
- **L** loose  
- **MD** medium dense  
- **D** dense  
- **VD** very dense
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Sample &amp; Field Tests</th>
<th>Soil Type</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>FILL</td>
<td>ASPHALT: 200mm.</td>
</tr>
<tr>
<td>E</td>
<td>SM</td>
<td>SANDY GRAVEL: fine to coarse grained, angular, dark brown.</td>
</tr>
<tr>
<td>SP</td>
<td>SAND</td>
<td>fine to medium grained, pale brown, brown, mottled black.</td>
</tr>
</tbody>
</table>

**Material Substance**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description:** soil description based on Unified Classification System

**Drill Model:** Comacchio GEO 305, Track mounted
**Surface Elevation:** 5.91 m (AHD)
**Angle from Horizontal:** 90°
**Hole Diameter:** 100 mm

---

**Site Information**

- **ID:** ID46-BH05
- **Type:** GEOTABTF10294AA
- **Sheet:** 1 of 6
- **Project:** LCRP-CTF
- **Date Started:** 08 Nov 2016
- **Date Completed:** 09 Nov 2016
- **Logged By:** JJ
- **Checked By:** KJ

---

**Additional Observations**

- **trace of fine to coarse grained gravel**
- **becoming fine to coarse grained, red, dark brown, iron stained**
- **becoming grey**
- **becoming fine to medium grained, grey, trace of shell fragments**

---

**Water Outflow/Water Inflow**

**penetration**
- 10-Oct-12 water level on date shown
- water influx
- water outflow

**Classification Symbol & Soil Description**

- **moisture:** moisture content
- **consistency/relative density:** VS = very soft, S = soft, F = firm, St = stiff, VSt = very stiff, H = hard, Fb = brittle, VL = very loose, L = loose, MD = medium dense, D = dense, VD = very dense
### Engineering Log - Borehole

#### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 3</td>
<td>SP</td>
<td>SAND: fine to medium grained, pale brown, brown, mottled black. (continued)</td>
<td></td>
</tr>
<tr>
<td>3 - 9</td>
<td>CL</td>
<td>Sandy CLAY: low plasticity, dark brown, black, fine to medium grained sand.</td>
<td></td>
</tr>
<tr>
<td>9 - 13</td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, green, grey, medium plasticity.</td>
<td></td>
</tr>
<tr>
<td>13 - 15</td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, green, dark grey, medium plasticity.</td>
<td></td>
</tr>
</tbody>
</table>

#### Material Substance

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Plasticity or Particle Characteristic, Colour, Secondary and Minor Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAND</td>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td>CLAY</td>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td>SAND</td>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
</tbody>
</table>

#### Additional Observations

- **SOIL TYPE**: Plasticity or particle characteristic, colour, secondary and minor components
- **Material Description**: Plasticity or particle characteristic, colour, secondary and minor components
- **Structure and Additional Observations**: Plasticity or particle characteristic, colour, secondary and minor components

---

**Borehole ID**: ID46-BH05

**Client**: Metro Trains Melbourne

**Principal**: Level Crossing Removal Authority

**Project**: LCRP-CTF

**Location**: ID46 - Bondi Road, Bonbeach

**Position**: E: 335,104.90; N: 5,785,474.70 (MGA94)

**Surface Elevation**: 5.91 m (AHD)

**Angle from Horizontal**: 90°

**Drill Model**: Comacchio GEO 305, Track mounted

**Drilling Fluid**: Polymer
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.0</td>
<td>CLAYEY SAND: fine to medium grained, green, dark grey, medium plasticity.</td>
</tr>
<tr>
<td>18.0</td>
<td>SAND: fine to medium grained, dark grey, yellow, trace of fines.</td>
</tr>
<tr>
<td>20.0</td>
<td>CLAY: medium plasticity, orange, brown, grey, mottled black, trace of fine to coarse grained sand.</td>
</tr>
</tbody>
</table>

### Material Substance

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **Structure and Additional Observations:**

### Method & Support

- **Method:** auger drilling, auger screwing, hand auger, wash hole
- **Support:** M mud, C casing

### Samples & Field Tests

- **Classification Symbol:**
  - SC: clayey sand
  - SP: sand
  - CI: clay

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>Moisture</th>
<th>VS</th>
<th>S</th>
<th>F</th>
<th>ST</th>
<th>VST</th>
<th>H</th>
<th>Fb</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>M</td>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Drilling Fluid

- **Type:** Polymer
- **Consistency:**
  - dry
  - wet
- **Relative Density:**
  - very soft
  - soft
  - firm
  - stiff
  - very stiff

---

**Borehole ID:** ID46-BH05  
**Date Started:** 08 Nov 2016  
**Date Completed:** 09 Nov 2016  
**Logged by:** JJ  
**Checked by:** KJ

---

**Notes:**

- **Surface Elevation:** 5.91 m (AHD)
- **Angle from Horizontal:** 90°
- **Hole Diameter:** 100 mm

---

**Location:** E: 335,104.90; N: 5,785,474.70 (MGA94)
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

**drilling information**

<table>
<thead>
<tr>
<th>Sample &amp; Field Tests</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI</td>
<td>CLAY: medium plasticity, orange, brown, grey, mottled black, trace of fine to coarse grained sand. (continued)</td>
</tr>
<tr>
<td>SP</td>
<td>SAND: fine to coarse grained, pale brown, grey, with some fines.</td>
</tr>
<tr>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, grey, low plasticity.</td>
</tr>
<tr>
<td>CL-CL</td>
<td>Sandy CLAY: low to medium plasticity, brown, dark orange, fine to medium grained sand.</td>
</tr>
</tbody>
</table>

**material substance**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Plasticity or Particle Characteristic, Colour, Secondary and Minor Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasticity</td>
<td>Plasticity or Particle Characteristic, Colour, Secondary and Minor Components</td>
</tr>
<tr>
<td>Clays</td>
<td>Clays: medium plasticity, orange, brown, grey, mottled black, trace of fine to coarse grained sand.</td>
</tr>
<tr>
<td>Sandy sands</td>
<td>Sandy sands: fine to coarse grained, pale brown, grey, with some fines.</td>
</tr>
<tr>
<td>Clayey sands</td>
<td>Clayey sands: fine to medium grained, grey, low plasticity.</td>
</tr>
<tr>
<td>Sandy clays</td>
<td>Sandy clays: low to medium plasticity, brown, dark orange, fine to medium grained sand.</td>
</tr>
</tbody>
</table>

**graphic log**

- CI: CLAY: medium plasticity, orange, brown, grey, mottled black, trace of fine to coarse grained sand. (continued)
- SP: SAND: fine to coarse grained, pale brown, grey, with some fines.
- SC: CLAYEY SAND: fine to medium grained, grey, low plasticity.
- CL-CL: Sandy CLAY: low to medium plasticity, brown, dark orange, fine to medium grained sand.

**additional observations**

- TERTIARY BRIGHTON GROUP: band of organic matter in top of SPT

**position:** E: 335.104.90; N: 5,785.474.70 (MGA94)  
**surface elevation:** 5.91 m (AHD)  
**angle from horizontal:** 90°

**drill model:** Comacchio GEO 305, Track mounted  
**drilling fluid:** Polymer

**drilling information**

- **method & support:** NDE non-destructive drilling
- **penetration:** 10-12 water level on date shown
- **samples & field tests:** no resistance ranging to refusal
- **classification symbol:** U63
- **material description:** CI
- **sample & field tests:** bulk disturbed sample
- **classification symbol:** SPT, 26, 38/145mm
- **material description:** SP
- **sample & field tests:** standard penetration test (SPT)
- **classification symbol:** SPT, 29, 25, 26
- **material description:** SC
- **sample & field tests:** SPT - sample recovered
- **classification symbol:** SPT, 6, 10, 9
- **material description:** CL-CL
- **sample & field tests:** hammer bouncing

**method & support**

- **method:** auger drilling
- **support:** M mud
- **penetration:** N nil
- **samples & field tests:** B bulk disturbed sample
- **classification symbol:** HP
- **material description:** CI
- **sample & field tests:** N standard penetration test (SPT)
- **classification symbol:** N
- **material description:** SP
- **sample & field tests:** N* SPT - sample recovered
- **classification symbol:** NC
- **material description:** SC
- **sample & field tests:** VS
- **classification symbol:** VS
- **material description:** CL-CL
- **sample & field tests:** HB

**classification symbol & soil description**

- **based on Unified Classification System**
- **moisture:** VS
- **consistency / relative density:** VS
- **dry:** VS
- **very soft:** VS
- **soil:** VS
- **soft:** VS
- **firm:** VS
- **stiff:** VS
- **very stiff:** VS
- **hard:** VS
- **fragile:** VS
- **very loose:** VS
- **loose:** VS
- **medium dense:** VS
- **D:** VS
- **dense:** VS
- **VD:** VS

**location:** ID46 - Bondi Road, Bonbeach

**project no.:** GEOTABTF10294AA

**Borehole ID:** ID46-BH05

**date started:** 08 Nov 2016

**date completed:** 09 Nov 2016

**logged by:** JJ

**checked by:** KJ

**drill model:** Comacchio GEO 305, Track mounted

**drilling fluid:** Polymer

**hole diameter:** 100 mm

**material description:**

- **CLAYEY SAND:** fine to medium grained, grey, low plasticity.
- **Sandy CLAY:** low to medium plasticity, brown, dark orange, fine to medium grained sand.

**structure and additional observations:**

- **TERTIARY BRIGHTON GROUP:** band of organic matter in top of SPT
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach  
**Borehole ID:** ID46-BH05  
**date started:** 08 Nov 2016  
**date completed:** 09 Nov 2016  
**logged by:** JJ  
**checked by:** KJ

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>General Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td>2, 3, 6</td>
<td>CL-CI</td>
<td>Sandy Clay</td>
<td>CL-CI</td>
<td>Low to medium plasticity, brown, dark orange, fine to medium grained sand.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N=9</td>
<td></td>
<td></td>
<td></td>
<td>(continued)</td>
<td></td>
</tr>
<tr>
<td>SPT</td>
<td>0, 0, 2</td>
<td>ML</td>
<td>Clayey Silt</td>
<td>ML</td>
<td>High liquid limit, grey, brown, orange, mottled black.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N=2</td>
<td></td>
<td></td>
<td></td>
<td>with some fine to coarse grained sand.</td>
<td></td>
</tr>
</tbody>
</table>

### Material Substance

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Consistency / Relative Density</th>
<th>Soil Description</th>
<th>Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandy Clay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clayey Silt</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Drilling Information

- **Method:** SPT  
- **Support:** M mud  
- **Penetration:** 34.0 m  
- **Samples & Tests:** SPT sunk 50mm on second blow  
- **Soil Type:** Sandy Clay  
- **Classification Symbol:** CL-CI  
- **General Description:** Low to medium plasticity, brown, dark orange, fine to medium grained sand.

### Material Substance

- **Material Description:** Sandy Clay, low to medium plasticity, brown, dark orange, fine to medium grained sand. (continued)
- **Consistency / Relative Density:** M
- **Soil Description:** Sandy Clay
- **Additional Observations:** Sandy CLAY: low to medium plasticity, brown, dark orange, fine to medium grained sand. (continued)
<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>method &amp; support</td>
<td>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td>water</td>
<td>material description</td>
</tr>
<tr>
<td>samples &amp; field tests</td>
<td>hand penetrometer (kPa)</td>
</tr>
<tr>
<td>graphic log</td>
<td>consistency / relative density</td>
</tr>
<tr>
<td>classification symbol</td>
<td>soil description</td>
</tr>
<tr>
<td>SPT 6, 11, 10 N°=21</td>
<td>ML Clayey SILT: high liquid limit, grey, brown, orange, mottled black. (continued) becoming green, grey, with some fine to coarse grained gravel</td>
</tr>
<tr>
<td>SPT 6, 14, 22 N°=36</td>
<td>Sandy SILT: low liquid limit, green, grey, fine to coarse grained sand, with some shell fragments and sand bands.</td>
</tr>
<tr>
<td>SPT 11, 20, 36 N°=56</td>
<td>layer of dark green, coarse grained gravel</td>
</tr>
<tr>
<td>SPT 9, 18, 28 N°=46</td>
<td>SILTY SAND: fine to medium grained, green, grey, with some clay.</td>
</tr>
</tbody>
</table>

Borehole ID46-BH05 terminated at 45.40 m
Target depth
Standpipe installation
Backfill details
0.0m-10.5m: grout
10.5m-11.5m: bentonite
11.5m-14.7m: sand
14.7-45.4m: grout
Standpipe details
0.0m-11.7m: unslotted 50mm PVC, Class 18
11.7m-14.7m: machine slotted, filter sock covered, 50mm PVC, Class 18
End caps and flush mounted gatic cover
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SM</strong></td>
<td>0.5</td>
<td>0</td>
<td><strong>FILL:</strong> SILTY SAND: fine to coarse grained, dark grey, with some fine grained gravels, trace of rootlets.</td>
<td></td>
</tr>
<tr>
<td><strong>SP</strong></td>
<td>3.3</td>
<td>2</td>
<td><strong>SM</strong></td>
<td>2.0</td>
</tr>
<tr>
<td><strong>SPT</strong></td>
<td>2.3</td>
<td>3</td>
<td><strong>SPT</strong></td>
<td>2.6</td>
</tr>
</tbody>
</table>

### Material Substance

<table>
<thead>
<tr>
<th>Soil Type: Plasticity or Particle Characteristic, Colour, Secondary and Minor Components</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOIL TYPE:</strong> Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
</tbody>
</table>

### Additional Observations

- MATERIAL SUBSTANCE: FILL: SILTY SAND: fine to coarse grained, dark grey, with some fine grained gravels, trace of rootlets.
- **SAND:** fine to medium grained, pale brown.
- becoming orange-brown, banded pale brown

---

**ID46-BH06**

- **Borehole ID:** ID46-BH06
- **Date Started:** 14 Nov 2016
- **Date Completed:** 18 Nov 2016
- **Logged By:** BK
- **Checked By:** KJ

---

**Metro Trains Melbourne**

**Level Crossing Removal Authority**

**LCRP-CTF**

**ID46 - Bondi Road, Bonbeach**

**Borehole ID:** ID46-BH06

**Date Started:** 14 Nov 2016

**Date Completed:** 18 Nov 2016

**Logged By:** BK

**Checked By:** KJ

**Client:** Metro Trains Melbourne

**Principal:** Level Crossing Removal Authority

**Project:** LCRP-CTF

**Location:** ID46 - Bondi Road, Bonbeach
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach  
**position:** E: 335,059.37; N: 5,785,415.79 (MGA94)

**date started:** 14 Nov 2016  
**date completed:** 18 Nov 2016  
**logged by:** BK  
**checked by:** KJ

**Soil Type:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 11, 19, 18 N=37</td>
<td>SP: fine to medium grained, pale grey brown, trace of fines, trace of shells.</td>
</tr>
<tr>
<td>SPT 8, 2, 2 N=44</td>
<td>CL-CI: low to medium plasticity, dark grey, trace of sand, trace of shells.</td>
</tr>
<tr>
<td>SPT 8, 13, 11 N=22</td>
<td>SP: fine to medium grained, pale grey grey, trace of fines, with some shells.</td>
</tr>
<tr>
<td>SPT 13, 11, 11 N=22</td>
<td>SC: CLAYEY SAND: fine to medium grained, pale grey grey, low plasticity, trace of clay pockets, medium to high plasticity, grey, green-grey.</td>
</tr>
</tbody>
</table>

**Drilling Information:**

- **method & support:** auger drilling, auger screwing, hand auger, washbore, non-destructive drilling
- **samples & field tests:** water, muddy, casings, disturbed sample, environmental sample, split spoon sample, undisturbed sample, diameters, standard penetration test (SPT), SPT - sample recovered, SPT with solid cone, vane shear, peak/reamoulded (kPa), refusal, hammer bouncing
- **classification symbol & soil description:** based on Unified Classification System
- **moisture:** VS very soft, S soft, F firm, SI stiff, VSf very stiff, H hard, Fb friable, VL very loose, LL loose, MD medium dense, D dense, VD very dense
- **moisture condition:** dry, moist, wet

**Material Substance:**

- **material description:** structure and additional observations

**Material Substance:**

- **material description:** structure and additional observations

**Drilling Information:**

- **method:** auger drilling, auger screwing, hand auger, washbore, non-destructive drilling
- **samples & field tests:** water, muddy, casings, disturbed sample, environmental sample, split spoon sample, undisturbed sample, diameters, standard penetration test (SPT), SPT - sample recovered, SPT with solid cone, vane shear, peak/reamoulded (kPa), refusal, hammer bouncing
- **classification symbol & soil description:** based on Unified Classification System
- **moisture:** VS very soft, S soft, F firm, SI stiff, VSf very stiff, H hard, Fb friable, VL very loose, LL loose, MD medium dense, D dense, VD very dense
- **moisture condition:** dry, moist, wet
# Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

<table>
<thead>
<tr>
<th>Position</th>
<th>Surface Elevation</th>
<th>Angle from Horizontal</th>
<th>Hole Diameter</th>
<th>Drilling Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>E: 335,059.37; N: 5,785,415.79</td>
<td>6.17 m (AHD)</td>
<td>90°</td>
<td>100 mm</td>
<td>Explora MK50, Truck mounted</td>
</tr>
</tbody>
</table>

### Soil Type

<table>
<thead>
<tr>
<th>SC</th>
<th>CLAYEY SAND: fine to medium grained, pale grey, grey, low plasticity, trace of clay pockets, medium to high plasticity, grey, green-grey. (continued)</th>
</tr>
</thead>
</table>

| CH | Sandy CLAY: high plasticity, pale grey, grey, fine to coarse grained sand, trace of shell fragments. |

| SP | SAND: fine to coarse grained, grey brown, trace of fines, trace of shell fragments. |

| CH | Sandy CLAY: high plasticity, grey brown, fine to medium grained sand, trace of sand pockets, fine to medium grained, orange-brown. |

### Drilling Information

- **Method & Support:**
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger
  - W: wash bore
  - NDD: non destructive drilling

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

- **Consistency & Relative Density:**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff
  - H: hard
  - Fb: friable
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - TD: very dense

- **Moisture:**
  - M: moist
  - W: wet

- **Water:**
  - Water inflow
  - Water outflow

### Material Substance

- **SOIL TYPE:**
  - Plasticity or particle characteristic, colour, secondary and minor components

- **Material Description:**
  - Structure and additional observations

### Additional Observations

- **Borehole ID:** ID46-BH06
- **Date Started:** 14 Nov 2016
- **Date Completed:** 18 Nov 2016
- **Logged By:** BK
- **Checked By:** KJ

---

**Position:** E: 335,059.37; N: 5,785,415.79  
**Surface Elevation:** 6.17 m (AHD)  
**Angle from Horizontal:** 90°  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 100 mm
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 18</td>
<td>Sandy CLAY: high plasticity, grey brown, fine to medium grained sand, trace of sand pockets, fine to medium grained, orange-brown, (continued)</td>
</tr>
<tr>
<td>19 - 25</td>
<td>SAND: fine to coarse grained, grey brown, with some fines and pockets of clay, low plasticity, dark grey, trace of fine grained gravel.</td>
</tr>
<tr>
<td>25 - 32</td>
<td>CLAYEY SAND: fine to coarse grained, brown, medium to high plasticity.</td>
</tr>
</tbody>
</table>

**Table: SOIL TYPE**

<table>
<thead>
<tr>
<th>Plasticity or Particle Characteristic</th>
<th>Colour</th>
<th>Secondary and Minor Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>plasticity or particle characteristic</td>
<td>colour</td>
<td>secondary and minor components</td>
</tr>
</tbody>
</table>

**Table: MATERIAL SUBSTANCE**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling</td>
<td>C casing</td>
<td>M mud</td>
</tr>
<tr>
<td>AS auger screwing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W washbore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table: CONSISTENCY / RELATIVE DENSITY**

<table>
<thead>
<tr>
<th>Moisture</th>
<th>VS very soft</th>
<th>S soft</th>
<th>F firm</th>
<th>ST stiff</th>
</tr>
</thead>
</table>

**Table: PENETRATION**

<table>
<thead>
<tr>
<th>Sample &amp; Field Tests</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>hand penetrometer (kPa)</td>
</tr>
<tr>
<td>N*</td>
<td>SPT - sample recovered</td>
</tr>
</tbody>
</table>

**Table: SOIL TYPE**

<table>
<thead>
<tr>
<th>Classification Symbol &amp; Soil Description</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>based on Unified Classification System</td>
<td>VS very soft</td>
</tr>
</tbody>
</table>

**Table: PENETRATION**

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<td>N*</td>
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<td>hand penetrometer (kPa)</td>
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<tr>
<td>N*</td>
<td>SPT - sample recovered</td>
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<th>Sample &amp; Field Tests</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>hand penetrometer (kPa)</td>
</tr>
<tr>
<td>N*</td>
<td>SPT - sample recovered</td>
</tr>
</tbody>
</table>
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach  

**Position:** E: 335,059.37; N: 5,785,415.79 (MGA94)  
**Surface Elevation:** 6.17 m (AHD)  
**Angle from Horizontal:** 90°  

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Graphic Log</th>
<th>Classification Symbol</th>
<th>Soil Type</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>non destructive drilling</td>
<td>no resistance ranging to refusal</td>
<td>water</td>
<td>10-Oct-12 water level on date shown</td>
<td>SC</td>
<td>CLAYEY SAND: fine to coarse grained, brown, medium to high plasticity. (continued)</td>
<td>M</td>
</tr>
<tr>
<td>AS</td>
<td>auger drilling*</td>
<td>M muddy</td>
<td>N nil</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
<td>C casing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>wash bore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Classification Symbol & Soil Description**

- **CLAYEY SAND: fine to coarse grained, brown, medium to high plasticity.**

**Additional Observations:**

- Coarse grained sand band, approximately 50mm, very dense

**Other Notes:**

- TERTIARY BRIGHTON GROUP

---

**SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components

**MATERIAL DESCRIPTION:** Structure and additional observations

**MATERIAL SUBSTANCE:**

- **classification symbol:** based on Unified Classification System

**CONSISTENCY / RELATIVE DENSITY:**

- **moisture:** D dry, M moist, W wet
- **liquid limit:** VS plastic limit
- **plasticity:** very soft, firm, very stiff
- **plasticity:** soft, firm, very stiff
- **cohesion:** hard, frail, very loose
- **cohesion:** medium dense, dense, very dense

---

**Borehole ID:** ID46-BH06  
**Date Started:** 14 Nov 2016  
**Date Completed:** 18 Nov 2016  
**Logged By:** BK  
**Checked By:** KJ
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

**Borehole ID:** ID46-BH06  
**date started:** 14 Nov 2016  
**date completed:** 18 Nov 2016

**position:** E: 335,059.37; N: 5,785,415.79 (MGA94)  
**surface elevation:** 6.17 m (AHD)  
**angle from horizontal:** 90°  
**drill model:** Explora MK50, Truck mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Material Substance</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>method &amp; support</strong></td>
<td><strong>penetration</strong></td>
<td><strong>water</strong></td>
</tr>
<tr>
<td>SPT 6, 8, 9 N°=17</td>
<td>34</td>
<td>CL</td>
</tr>
<tr>
<td>SPT 8, 10, 15 N°=25</td>
<td>36</td>
<td>SC</td>
</tr>
<tr>
<td>SPT 12, 11, 19 N°=30</td>
<td>39</td>
<td>SM</td>
</tr>
<tr>
<td>SPT 7, 11, 14 N°=25</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

**Borehole ID46-BH06 terminated at 46.45 m Target depth**

**Material Substance**

- **SANDY CLAY**: low plasticity, brown, fine grained sand.
- **CLAYEY SAND**: fine to coarse grained, grey dark green, medium plasticity, trace of shells.
- **SILTY SAND**: fine grained, grey brown, low to medium liquid limit, trace of shells.

**Classification Symbol & soil description based on Unified Classification System**

- **moisture**: VS - very soft, S - soft, F - firm, ST - stiff, VST - very stiff
- **hardness**: H - hard, Fb - friable
- **density**: L - loose, VL - very loose, MD - medium dense, D - dense
- **penetration**: HB - hammer bouncing, VB - very dense

**Other Details**

- **Borehole ID**: ID46-BH06
- **Date started**: 14 Nov 2016
- **Date completed**: 18 Nov 2016
- **Drill model**: Explora MK50, Truck mounted
- **Drilling fluid**: Polymer
- **Hole diameter**: 100 mm

**Drilling Fluid**

- **Consistency / Relative Density**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff
  - H: hard
  - Fb: friable
  - L: loose
  - VL: very loose
  - MD: medium dense
  - D: dense
  - VD: very dense
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

**Borehole ID:** ID46-BH07  
**Logged by:** BP  
**Checked by:** KJ  
**Project No.:** GEOTABTF10294AA  
**Date Started:** 08 Nov 2016  
**Date Completed:** 09 Nov 2016

**Surface Elevation:** 5.93 m (AHD)  
**Angle from Horizontal:** 90°

**Drill Model:** Comacchio GEO 305, Track mounted  
**Drilling Fluid:** Polymer  
**Hole Diameter:** 100 mm

---

**SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components

**Classification Symbol:** based on Unified Classification System

**Consistency / Relative Density:**
- **Water:**
  - Moisture: D, dry  
  - S, soft  
  - Fb, fissile  
  - VL, very loose  
  - MD, medium dense  
  - D, dense  
  - LD, loose  
- **Penetration:**
  - No resistance ranging to refusal

**Classification Symbol & Soil Description:**

- **B:** Bulk disturbed sample  
- **D:** Disturbed sample  
- **E:** Environmental sample  
- **SS:** Split spoon sample  
- **U:** Undisturbed sample (mm diameter)  
- **N:** Standard penetration test (SPT)  
- **Nc:** SPT with solid cone  
- **VS:** Vane shear, peak/reduced (kPa)  
- **R:** Refusal  
- **HB:** Hammer bashing

---

**Fill:**
- **SPT 2, 3, 3 N=6:**  
  - Fine to coarse grained, dark grey, with some fine to coarse grained gravel and rootlets.
- **SPT 4, 5, 6 N=11:**  
  - Fine to coarse grained, dark grey, becoming pale grey.
- **SPT 6, 8, 8 N=16:**  
  - Fine to medium grained, pale brown, becoming pale grey.
- **SPT 8, 13, 16 N=29:**  
  - Fine to medium grained, pale brown, grey.
- **SPT 14, 22, 5/20mm N=R:**  
  - Trace of shells.

---

**Material Substance:**
- **Fill:**
  - SPT: Sample recovered
  - HP: Hand penetrometer (kPa)
  - NC: SPT with solid cone
  - VS: Vane shear, peak/reduced (kPa)
  - R: Refusal
  - HB: Hammer bashing

---

**Drilling Information:**
- **Method:** Non destructive drilling
- **Support:** N = nil

---

**Graphic Log:**
- **Method:** Auger drilling"  
- **Support:** M = mud  
- **Penetration:** C = casing

---

**Material Description:**
- **Fill:** Silty sand: Fine to coarse grained, dark grey, with some fine to coarse grained gravel and rootlets.
- **SPT:** Fine to coarse grained, dark grey, becoming pale grey.
- **SPT:** Fine to medium grained, pale brown, becoming pale grey.
- **SPT:** Trace of shells.

---

**Additional Observations:**
- No resistance ranging to refusal.

---

**Drill Model Information:**
- **Model:** Comacchio GEO 305, Track mounted  
- **Angle from Horizontal:** 90°  
- **Surface Elevation:** 5.93 m (AHD)  
- **Hole Diameter:** 100 mm

---

**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

---

**Copyright:** Coffey A TETRA TECH COMPANY

---

**Drawing File:** CDF_0_9_06_LIBRARY.GLB rev:AS  Log  COF BOREHOLE: NON CORED  GEOTABTF10294AA_ID46.GPJ  <<DrawingFile>>  08/06/2017 15:44
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach  

**Borehole ID:** ID46-BH07  
**project no.:** GEOTABTF10294AA  
**date started:** 08 Nov 2016  
**date completed:** 09 Nov 2016  
**logged by:** BP  
**checked by:** KJ

---

### Drilling Information

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>CAIY SAND: fine to medium grained, pale grey, low plasticity.</td>
</tr>
<tr>
<td>9.0</td>
<td>CLAY: medium plasticity, black, trace of shells, trace of sand pockets, fine to medium grained, grey.</td>
</tr>
<tr>
<td>12.0</td>
<td>SAND: medium to coarse grained, grey, with some fines, trace of shells.</td>
</tr>
<tr>
<td>15.0</td>
<td>SANDY CLAY: medium to high plasticity, grey, blue-grey mottled orange-brown, fine to medium grained.</td>
</tr>
</tbody>
</table>

---

### Material Substance

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>CLAYEY SAND: fine to medium grained, pale grey, low plasticity.</td>
</tr>
<tr>
<td>12.0</td>
<td>SAND: medium to coarse grained, grey, with some fines, trace of shells.</td>
</tr>
<tr>
<td>15.0</td>
<td>SANDY CLAY: medium to high plasticity, grey, blue-grey mottled orange-brown, fine to medium grained.</td>
</tr>
</tbody>
</table>

---

### Soil Type

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description:** structure and additional observations

---

### Drilling Method & Support

- **method & penetration:** auger drilling, non destructive drilling
- **support:** M mud, N nil, C casing, T TC bit, V V bit

---

### Water Analysis

- **water samples & field tests:**
  - no resistance ranging to refusal
  - 10-Oct-12 water level on date shown
  - water inflow
  - water outflow

---

### Classification Symbol & Soil Description

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

---

### Moisture Analysis

- **moisture:** VS very soft, S soft, F firm, ST stiff, VST very stiff, H hard, Pb friable, VL very loose, L loose, MD medium dense, D dense, VD very dense
# Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>water</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SPT</strong> 16.16/50mm HBN=N=R</td>
<td>SP</td>
<td>SAND: medium to coarse grained, grey, with some fine grained gravel.</td>
</tr>
<tr>
<td><strong>SPT</strong> 0,3,4 N=N=7</td>
<td>CH</td>
<td>Sandy CLAY: high plasticity, grey, dark grey, with some pockets of clayey sand.</td>
</tr>
<tr>
<td><strong>SPT</strong> 5,16/80mm HBN=N=R</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SPT</strong> 0,4,4 N=N=8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Technical Details:**
- **depth (m):** 17.0, 18.0, 19.0, 20.0, 21.0, 22.0, 23.0
- **material:** SAND, CLAY

**Additional Observations:**
- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **structure and additional observations:**
  - **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
  - **material:** SAND, CLAY

**Drilling Details:**
- **method:** AD  - auger drilling
- **water:** C - casing
- **samples & field tests:** B - bulk disturbed sample
- **classification symbol:** SP  - standard penetration test (SPT)
- **material:** SAND: medium to coarse grained, grey, with some fine grained gravel.
- **SPT:** 16.16/50mm HBN=N=R
- **CLAY:** high plasticity, grey, dark grey.
- **penetration:** no resistance ranging to refusal
- **water inflow:** water inflow
- **water outflow:** water outflow
- **consistency / relative density:** very soft
- **moisture:** dry
- **penetrometer:** hand penetrometer (kPa)
- **VSSF:** very soft
- **S:** soil
- **H:** hard
- **D:** dry
- **M:** moist
- **W:** wet
- **Vp:** plastic limit
- **VR:** liquid limit
- **DR:** dense
- **N:** SPT - sample recovered
- **Vs:** vane shear; peak/remoulded (kPa)
- **R:** refusal
- **HB:** hammer bounces
- **s:** soft
- **S:** stiff
- **VSt:** very stiff
- **VS:** very soft
- **H:** hard
- **V:** very loose
- **L:** loose
- **MD:** medium dense
- **D:** dense

**Other Details:**
- **position:** E: 335,066.97; N: 5,785,362.79 (MGA94)
- **angle from horizontal:** 90°
- **drill model:** Comacchio GEO 305, Track mounted
- **drilling fluid:** Polymer
- **hole diameter:** 100 mm
- **surface elevation:** 5.93 m (AHD)
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
<th>Soil Type: Plasticity or Particle Characteristic, Colour, Secondary and Minor Components</th>
<th>Consistency / Relative Density</th>
<th>Moisture Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Material Substance

- **Clay:** medium plasticity, grey, dark grey mottled orange brown, with some pockets of fine to coarse grained sand.
- **Sand:** fine to coarse grained, grey.
- **Sandy Clay:** high plasticity, blue-grey, green-grey, fine to medium grained sand.
- **Gravelly Clay:** high plasticity, green, brown, with some fine to coarse grained sand, fine grained gravel.

#### Soil Type

- **Tertiary Brighton Group**
- **Gellibrand Marl**

#### Tertiary Brighton Group

<table>
<thead>
<tr>
<th>Sands &amp; Clay</th>
<th>Depth (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAND</td>
<td>25.0</td>
<td>Fine to coarse grained, grey.</td>
</tr>
<tr>
<td>CLAY</td>
<td>26.0</td>
<td>High plasticity, grey, dark grey. (continued)</td>
</tr>
<tr>
<td>SAND</td>
<td>27.0</td>
<td>Medium to coarse grained, grey.</td>
</tr>
<tr>
<td>CLAY</td>
<td>28.0</td>
<td>Medium plasticity, grey, dark grey mottled orange brown, with some pockets of fine to coarse grained sand.</td>
</tr>
<tr>
<td>SAND</td>
<td>29.0</td>
<td>Fine to coarse grained, grey.</td>
</tr>
<tr>
<td>CLAY</td>
<td>30.0</td>
<td>High plasticity, grey, dark grey mottled orange brown, with some pockets of fine to coarse grained sand.</td>
</tr>
</tbody>
</table>

#### Gellibrand Marl

<table>
<thead>
<tr>
<th>Sands &amp; Clay</th>
<th>Depth (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAND</td>
<td>31.0</td>
<td>Medium to coarse grained, grey.</td>
</tr>
<tr>
<td>CLAY</td>
<td>32.0</td>
<td>Medium plasticity, grey, dark grey mottled orange brown, with some pockets of fine to coarse grained sand.</td>
</tr>
</tbody>
</table>

---

**Drill Model:** Comacchio GEO 305, Track mounted  
**Angle from Horizontal:** 90°  
**Drilling Fluid:** Polymer

---

**Drilling Information**

- **Depth:** 25.0 - 30.0 m
- **Consistency:** Moisture Condition
- **Penetration:** 10-Oct-12 water level on date shown
- **Support:** Mud, N, N
- **Method:** Auger drilling, non-destructive drilling
- **Sample:** Bulk disturbed sample, disturbed sample, environmental sample, no resistance ranging to refusal, hammer pounding
- **Consistency:** VS, very soft, S, soft, F, firm, ST, stiff, VST, very stiff
- **Moisture:** VS, very soft, S, soft, F, firm, ST, stiff, VST, very stiff
- **Penetration:** 10-Oct-12 water level on date shown
- **Support:** Mud, N, N
- **Method:** Auger drilling, non-destructive drilling
- **Sample:** Bulk disturbed sample, disturbed sample, environmental sample, no resistance ranging to refusal, hammer pounding
- **Consistency:** VS, very soft, S, soft, F, firm, ST, stiff, VST, very stiff
- **Moisture:** VS, very soft, S, soft, F, firm, ST, stiff, VST, very stiff

---

**Graphic Log**

- **Classification Symbols:**
  - CH: Clay
  - SP: Sand
  - CI: Clay

---

**Consistency / Relative Density**

- **Material Description:**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff

---

**Moisture Condition**

- **Material Description:**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff

---

**Borehole ID:** ID46-BH07

---

**Borehole Information**

- **Position:** E: 335,066.97; N: 5,786,362.79 (MGA94)
- **Surface Elevation:** 5.93 m (AHD)
- **Angle from Horizontal:** 90°
- **Drill Model:** Comacchio GEO 305, Track mounted
- **Drilling Fluid:** Polymer
- **Hole Diameter:** 100 mm
- **Date Started:** 08 Nov 2016
- **Date Completed:** 09 Nov 2016
- **Logged By:** BP
- **Checked By:** KJ
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach  
**Date Started:** 08 Nov 2016  
**Date Completed:** 09 Nov 2016  
**Logged By:** BP  
**Checked By:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Borehole ID.</th>
<th>ID46-BH07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet No.</td>
<td>5 of 7</td>
</tr>
<tr>
<td>Borehole ID.</td>
<td>ID46-BH07</td>
</tr>
<tr>
<td>Engineer</td>
<td>LEOTABTF10294AA</td>
</tr>
<tr>
<td>Date Started</td>
<td>08 Nov 2016</td>
</tr>
<tr>
<td>Date Completed</td>
<td>09 Nov 2016</td>
</tr>
<tr>
<td>Logged By</td>
<td>BP</td>
</tr>
<tr>
<td>Checked By</td>
<td>KJ</td>
</tr>
</tbody>
</table>

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>D</th>
<th>A</th>
<th>S</th>
<th>H</th>
<th>W</th>
<th>NDD</th>
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<tr>
<td></td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
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<td></td>
<td>32</td>
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<td>34</td>
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<td>36</td>
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<td>37</td>
<td>38</td>
<td>39</td>
<td>40</td>
<td>41</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water outflow</th>
<th>M</th>
<th>C</th>
<th>N</th>
<th>H</th>
<th>W</th>
<th>NDD</th>
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<td></td>
</tr>
</tbody>
</table>

#### Soil Type

- **Gravelly CLAY**
  - Low to medium plasticity, green, brown, fine to medium grained gravel, with some fine to coarse grained sand.
  - Becoming yellow, green, brown.

- **Silty Sand**
  - Fine to coarse grained, green-brown, low liquid limit, with some fine grained gravel.
  - Becoming yellow, green, brown.

- **Gellibrand Marl**
  - Firm, low to medium plasticity, green-brown, fine to medium grained gravel, with some fine to coarse grained sand.
  - Becoming yellow-brown, with some pockets of green-brown fine grained gravel.

#### Moisture Condition

- **W** (wet)
- **V** (very wet)
- **D** (dry)
- **S** (soil)
- **F** (friable)
- **L** (loose)
- **Vd** (very dense)
- **M** (medium dense)
- **D** (dense)
- **V** (very loose)

#### Classification Symbol & Soil Description

- **CL-CI**
- **SM**
- **SPT**
- **ND**
- **D** (dry)
- **W** (wet)
- **HS** (hand penetration (kPa))
- **N** (standard penetration test (SPT))
- **V** (very soft)
- **S** (soft)
- **F** (firm)
- **V** (very firm)
- **H** (hard)
- **M** (medium hard)
- **D** (dense)

#### Additional Observations

- **Water Inflow**
- **Water Outflow**
- **Hammer Bouncing**
- **Hand Penetrometer (kPa)**
- **Peak Shear (kPa)**
- **Remoulded (kPa)**

#### Consistency / Relative Density

<table>
<thead>
<tr>
<th>Consistency / Relative Density</th>
<th>VS</th>
<th>S</th>
<th>F</th>
<th>V</th>
<th>L</th>
<th>MD</th>
<th>D</th>
<th>VD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V</td>
<td>S</td>
<td>F</td>
<td>V</td>
<td>L</td>
<td>MD</td>
<td>D</td>
<td>VD</td>
</tr>
</tbody>
</table>
Engineering Log - Borehole

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: ID46 - Bondi Road, Bonbeach

position: E: 335,066.97; N: 5,785,362.79 (MGA94 )
surface elevation: 5.93 m (AHD)
angle from horizontal: 90°
drill model: Comacchio GEO 305, Track mounted
drilling fluid: Polymer
hole diameter : 100 mm

method &support: auger drilling
penetration: N

water: SPT 22, 6, 5
N=11

SPT refusal on gravel

SPT 5, 10, 18
N=28

SPT refusal on gravel

SPT 8, 21, 27
N=48

SPT refusal on gravel

SPT 13, 24, HB
N=R

SPT refusal on gravel

SPT 5, 13, 20
N=33

SPT refusal on gravel

material description:

SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

water:

penetration:

moisture:

silt, clayey silt band, approximately 400mm, stiff

clayey silt band, approximately 400mm, stiff

with some pockets of dark green-grey sandy clay, high plasticity, trace of fine grained gravel

becoming green-grey, mottled yellow-brown

SPT refusal on gravel

GELLIBRAND MARL

very loose

very dense

very soft

loose

dense

friable

hard

firm

very stiff

soft

stiff
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach  
**Borehole ID:** ID46-BH07  
**date started:** 08 Nov 2016  
**date completed:** 09 Nov 2016  
**logged by:** BP  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>49.0</td>
<td>GELLIBRAND MARL</td>
</tr>
</tbody>
</table>

#### Material Substance

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components
- **water:** presence of water
- **penetration:** SPT refusal on gravel

#### Soil Description

- **SPT:** Standard penetration test (SPT) with solid cone
- **VS:** Very soft
- **S:** Soft
- **F:** Firm
- **H:** Hard
- **V:** Very stiff
- **Fb:** Frangible
- **VL:** Very loose
- **MD:** Medium dense
- **D:** Dense
- **VD:** Very dense

#### Drilling Fluid

- **Polymer**

#### Drilling Support

- **M:** Mud
- **C:** Casing
- **N:** Nil
- **TC:** Track mounted

#### Additional Observations

- **10-Oct-12 water level on date shown**
- **water inflow**
- **water outflow**
- **no resistance ranging to refusal**

---

**graphic log**

- **classification symbol:** SM
- **material description:** SILTY SAND: fine grained, green grey, low liquid limit, trace of shells.

**Borehole ID46-BH07 terminated at 49.83 m Target depth**
# Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

---

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling</td>
<td>M mud</td>
<td></td>
</tr>
<tr>
<td>AS auger screwing*</td>
<td>N nil</td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td>C casing</td>
<td></td>
</tr>
<tr>
<td>W washback</td>
<td>N nil</td>
<td></td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td>M mud</td>
<td></td>
</tr>
</tbody>
</table>

---

### Material Description

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>Samples &amp; Field Tests</th>
<th>Water</th>
<th>Consistency / Relative Density</th>
<th>Moisture Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B bulk disturbed sample</td>
<td>D disturbed sample</td>
<td>E environmental sample</td>
<td>SS split spoon sample</td>
</tr>
<tr>
<td>U# undisturbed sample #6mm diameter</td>
<td>HP hand penetrometer (kPa)</td>
<td>N standard penetration test (SPT)</td>
<td>N* SPT - sample recovered</td>
</tr>
<tr>
<td>Nc SPT with solid cone</td>
<td>VS vane shear; peak/remoulded (kPa)</td>
<td>VS FV refusal</td>
<td>HB hammer bouncing</td>
</tr>
<tr>
<td>V liquid limit</td>
<td>Wp plastic limit</td>
<td>W moist</td>
<td>M moisture</td>
</tr>
</tbody>
</table>

### Consistency / Relative Density

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

---

### Additional Observations

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

- **Material Substance:** structure and additional observations

---

### Drilling Fluids

- Polymer

---

### Drilling Fluids

- Water outflow
- Water inflow

---

### SPT Values

<table>
<thead>
<tr>
<th>SPT</th>
<th>N*</th>
<th>N(\text{adj})</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,4,4</td>
<td><strong>N</strong>=8</td>
<td></td>
</tr>
<tr>
<td>4,7,8</td>
<td><strong>N</strong>=15</td>
<td></td>
</tr>
<tr>
<td>8,17,23</td>
<td><strong>N</strong>=40</td>
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</tr>
<tr>
<td>21,30,39</td>
<td><strong>N</strong>=69</td>
<td></td>
</tr>
<tr>
<td>14,27,38</td>
<td><strong>N</strong>=65</td>
<td></td>
</tr>
</tbody>
</table>
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** Bondi Road, Bonbeach

**surface elevation:** 4.82 m (AHD)  
**angle from horizontal:** 90°  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td></td>
<td>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td></td>
<td></td>
<td>material description</td>
</tr>
<tr>
<td></td>
<td></td>
<td>soil description based on Unified Classification System</td>
</tr>
</tbody>
</table>

### Material Substance

<table>
<thead>
<tr>
<th>soil type</th>
<th>consistency / relative density</th>
<th>structure and additional observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUATERNARY SANDS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SOIL TYPE:

- **SAND:** fine to medium grained, grey, becoming fine to medium grained sand, grey, trace of fines and organics
- **CLAY:** high plasticity, dark grey, with some sandbands, fine to medium grained, up to 100mm thick, trace of shells.
- **SAND:** fine to coarse grained, black dark brown, trace of fine grained gravel and fines.
- **SAND:** fine to coarse grained, grey, with some fines, trace of fine to medium grained gravel, trace of clay pockets, high plasticity, grey.

---

**Borehole ID:** ID46-BH08  
**date started:** 02 Nov 2016  
**date completed:** 04 Nov 2016  
**logged by:** BK  
**checked by:** KJ
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

**Position:** E: 335,134.26; N: 5,765,316.19 (MGA94)  
**Surface Elevation:** 4.82 m (AHD)  
**Angle from Horizontal:** 90°

**Drill Model:** Explora MK50, Truck mounted  
**Drilling Fluid:** Polymer

---

**TERTIARY BRIGHTON GROUP**

**Consistency / Relative Density**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
<th>SOIL TYPE: Plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>water</td>
<td></td>
</tr>
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</table>

**Classification Symbol & Soil Description**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>based on Unified Classification System</td>
</tr>
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</table>

**Samples & Field Tests**

<table>
<thead>
<tr>
<th>Samples &amp; Field Tests</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Penetration Depth (m)**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Graphic Log</th>
</tr>
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<tbody>
<tr>
<td>17.0</td>
<td>SC</td>
</tr>
<tr>
<td>18.0</td>
<td>CH</td>
</tr>
<tr>
<td>19.0</td>
<td>SP</td>
</tr>
<tr>
<td>20.0</td>
<td>CH</td>
</tr>
</tbody>
</table>

**Additional Observations**

- With some bands of sand, fine to coarse grained, orange-brown
- Band of high plasticity clay, 150mm becoming pale brown

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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**Material Substance**

<table>
<thead>
<tr>
<th>Description</th>
<th>Symbol</th>
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**Geotechnical Data**

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
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<tbody>
<tr>
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**Logging Information**

- Borehole ID: ID46-BH08  
- Sheet: 3 of 7  
- Project No: GEOTABTF10294AA  
- Date Started: 02 Nov 2016  
- Date Completed: 04 Nov 2016  
- Logged By: BK  
- Checked By: KJ

---

**Position & Drilling Details**

- Position: E: 335,134.26; N: 5,785,315.19 (MGA94)  
- Surface Elevation: 4.82 m (AHD)  
- Angle from Horizontal: 90°

- Drill Model: Explora MK50, Truck mounted  
- Drilling Fluid: Polymer  
- Hole Diameter: 100 mm

---

**Drawn by:** coffey  
**A TETRA TECH COMPANY**

---

**Copyright:** 0 9 12, So: binary, Subtitle  
**ID46-BH08**  
**08/06/2017 15:44**

---

**Notes:**

- No resistance ranging to refusal
- 10-Oct-12 water level on date shown
- Water inflow
- Water outflow

---

**Logging Symbols:**

- AD auger drilling  
- AS auger screwing  
- HA hand auger  
- W wash boring  
- NDD non destructive drilling

---

**Logging Symbols:**

- C casing  
- M mud  
- N nil

---

**Logging Symbols:**

- NDD non destructive drilling

---

**Logging Symbols:**

- V V bit

---

**Logging Symbols:**

- CDF_0_9_06_LIBRARY.GLB rev:  
  CDF_LOGS.ID46_BOREHOLE: NON CORED: GEOTABTF10294AA_ID46.GPJ  
  <<DrawingFile>>  
  08/06/2017 15:44
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

### Drilling Information

- **Borehole ID:** ID46-BH08  
- **Date Started:** 02 Nov 2016  
- **Date Completed:** 04 Nov 2016  
- **Logged By:** BK  
- **Checked By:** KJ

### Material Substances

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Classification</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.0</td>
<td>CLAYEY SAND</td>
<td>low plasticity, fine to medium grained, pale grey, becoming pale grey, brown, red, trace of cemented sand bands.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.0</td>
<td>Sandy CLAY</td>
<td>high plasticity, pale grey mottled orange-brown, fine grained sand.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.0</td>
<td>CLAYEY SAND</td>
<td>fine to medium grained, pale grey white, low plasticity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.0</td>
<td>Sandy CLAY</td>
<td>high plasticity, brown, fine to medium grained, with some cemented sand bands of 50mm-150mm thick.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.0</td>
<td>GELLIBRAND MARL</td>
<td>very loose, very dense.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Soil Type

- Plasticity or particle characteristic, colour, secondary and minor components.

### Additional Observations

- **Consistency / Relative Density:**
  - Very soft
  - Soft
  - Firm
  - Stiff
  - Very stiff
  - Hard
  - Very loose
  - Loose
  - Medium dense
  - Dense

- **Moisture:**
  - Dry
  - Wet

- **Penetration Resistance:**
  - Hand penetrometer (kPa)
  - Standard penetration test (SPT)
  - Hand penetrometer with solid cone

- **Classification Basis:**
  - Unified Classification System

### Drilling Support Material

- **Method & Support:**
  - Auger drilling
  - Drilling fluid: Polymer

- **Drill Model:** Explora MK50, Truck mounted
- **Angle from Horizontal:** 90°
- **Drill Diameter:** 100 mm
- **Surface Elevation:** 4.82 m (AHD)

### Position

- **E: 335,134.26; N: 5,785,315.19 (MGA94)**
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach  

**Surface Elevation:** 4.82 m (AHD)  
**Drill model:** Explora MK50, Truck mounted  
**Drilling Fluid:** Polymer  
**Angle from horizontal:** 90°  
**Hole Diameter:** 100 mm

### Drilling Information

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>graphic log</th>
<th>classification symbol</th>
<th>material description</th>
<th>consistency / relative density</th>
<th>moisture condition</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
<td>SPT 12, 22, 12 N=34</td>
<td>ML</td>
<td>Sandy SILT: medium liquid limit, brown, fine to medium grained sand, with some cemented sand bands, 50mm-150mm thick.</td>
<td>M</td>
<td>H</td>
<td>GELLIBRAND MARL</td>
</tr>
<tr>
<td>34.0</td>
<td>SPT 14, 18, 20 N=38</td>
<td>SC</td>
<td>CLAYEY SAND: fine to coarse grained, brown, medium plasticity, with some cemented sand bands.</td>
<td>MD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.0</td>
<td>SPT 4, 12, 12 N=24</td>
<td>CL-CL</td>
<td>Sandy CLAY: low to medium plasticity, grey - brown, fine to medium grained sand.</td>
<td>St</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.0</td>
<td>SPT 13, 15, 13 N=28</td>
<td>SC</td>
<td>CLAYEY SAND: fine to coarse grained, dark brown, dark green, low plasticity, trace of shells.</td>
<td>MD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.0</td>
<td>SPT 15, 15, 15 N=24</td>
<td>SM</td>
<td>SILTY SAND: fine grained, grey mottled brown, green, low liquid limit, trace of shell fragments and organics.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Soil Type

- **ML:** Sandy SILT: medium liquid limit, brown, fine to medium grained sand, with some cemented sand bands, 50mm-150mm thick.
- **SC:** CLAYEY SAND: fine to coarse grained, brown, medium plasticity, with some cemented sand bands.
- **CL-CL:** Sandy CLAY: low to medium plasticity, grey - brown, fine to medium grained sand.
- **SC:** CLAYEY SAND: fine to coarse grained, dark brown, dark green, low plasticity, trace of shells.
- **SM:** SILTY SAND: fine grained, grey mottled brown, green, low liquid limit, trace of shell fragments and organics.

### Drilling Method

- **AD:** Auger drilling
- **AS:** Auger screwing
- **HA:** Hand auger
- **W:** Washhoe
- **NDD:** Non destructive drilling

### Additional Observations

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

---

**Borehole ID:** ID46-BH08  
**Date Started:** 02 Nov 2016  
**Date Completed:** 04 Nov 2016  
**Logged by:** BK  
**Checked by:** KJ
### Engineering Log - Borehole

**Borehole ID:** ID46-BH08  
**Client:** Metro Trains Melbourne  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach  
**Date Started:** 02 Nov 2016  
**Date Completed:** 04 Nov 2016  
**Logged by:** BK  
**Checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>M mud</td>
<td>SPT11, 16, 23 N°=39</td>
<td>SM SILTY SAND: fine grained, grey mottled brown, green, low liquid limit, trace of shell fragments and organics.</td>
</tr>
<tr>
<td>11.0</td>
<td>C casing</td>
<td>SPT11, 16, 19 N°=35</td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>N nil</td>
<td>SPT16, 21, 23 N°=44</td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td></td>
<td>SPT15, 17, 23 N°=40</td>
<td></td>
</tr>
<tr>
<td>14.0</td>
<td></td>
<td>SPT9, 14, 19 N°=33</td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td></td>
<td>SPT12,18/120mmHB</td>
<td></td>
</tr>
</tbody>
</table>

#### Material Substance

<table>
<thead>
<tr>
<th>Material Description</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM SILTY SAND</td>
<td>fine grained, grey mottled brown, green, low liquid limit, trace of shell fragments and organics.</td>
</tr>
</tbody>
</table>

#### Additional Observations

- **Consistency / Relative Density:**
  - VS = very soft
  - S = soft
  - F = firm
  - ST = stiff
  - VST = very stiff
  - H = hard
  - FA = flat
  - VL = very loose
  - L = loose
  - MD = medium dense
  - D = dense
  - VD = very dense

- **Hand Penetrometer (kPa):**
  - P = refusal
  - HB = hammer bashing

- **Drilling Method:**
  - AD = auger drilling
  - AS = auger screwing
  - HA = hand auger
  - W = wash hole
  - NDD = non destructive drilling

- **Penetration Depth (m):**
  - 10.0
  - 11.0
  - 12.0
  - 13.0
  - 14.0
  - 15.0
  - 16.0
  - 17.0
  - 18.0
  - 19.0
  - 20.0
  - 21.0
  - 22.0
  - 23.0

- **Drill Model:** Explora MK50, Truck mounted
- **Angle from Horizontal:** 90°
- **Drilling Fluid:** Polymer

**Position:** E: 335,134.26; N: 5,785,315.19 (MGA94)

**Surface Elevation:** 4.82 m (AHD)

**Hole Diameter:** 100 mm

---

*Note: The table includes detailed information about the drilling process, material description, and additional observations.*
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach  

**Borehole ID:** ID46-BH08  
**date started:** 02 Nov 2016  
**date completed:** 04 Nov 2016  
**logged by:** BK  
**checked by:** KJ

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Support</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>49.0</td>
<td>N</td>
<td>Silty Sand: fine grained, grey mottled brown, green, low liquid limit, trace of shell fragments and organics. (continued)</td>
</tr>
</tbody>
</table>

Borehole ID46-BH08 terminated at 49.45 m

Target depth
Standpipe
Backfill details
0.0m-10.4m: bentonite
10.4m-14.0m: sand
14.0-49.45m: grout

Standpipe details
0.0m-11.0m: unslotted 50mm PVC, Class 18
11.0m-14.0m: machine slotted, filter sock covered, 50mm PVC, Class 18
End caps and flush mounted gatic cover

### Material Substance

<table>
<thead>
<tr>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silty Sand: fine grained, grey mottled brown, green, low liquid limit, trace of shell fragments and organics. (continued)</td>
</tr>
</tbody>
</table>

### Moisture Condition

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry</td>
<td>VS very soft</td>
</tr>
<tr>
<td>Moist</td>
<td>S soft</td>
</tr>
<tr>
<td>Wet</td>
<td>F firm</td>
</tr>
<tr>
<td>Hard</td>
<td>H very stiff</td>
</tr>
<tr>
<td>Friable</td>
<td>VLL very loose</td>
</tr>
<tr>
<td>Loose</td>
<td>VLH very dense</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>MD medium dense</td>
</tr>
<tr>
<td>Dense</td>
<td>VD very dense</td>
</tr>
</tbody>
</table>

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry</td>
<td>VS very soft</td>
</tr>
<tr>
<td>Moist</td>
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<tr>
<td>Wet</td>
<td>F firm</td>
</tr>
<tr>
<td>Hard</td>
<td>H very stiff</td>
</tr>
<tr>
<td>Friable</td>
<td>VLL very loose</td>
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<td>VLH very dense</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>MD medium dense</td>
</tr>
<tr>
<td>Dense</td>
<td>VD very dense</td>
</tr>
</tbody>
</table>
# Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
<th>SOIL TYPE: Plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDD non destructive drilling</td>
<td>E</td>
<td></td>
<td></td>
<td>FILL: ASPHALT: 50mm.</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td></td>
<td></td>
<td>FILL: CONCRETE: 100mm.</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td></td>
<td></td>
<td>FILL: Sandy GRAVEL: fine to coarse grained, angular, dark brown.</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td></td>
<td></td>
<td>SAND: fine to medium grained, grey.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>becoming pale brown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>becoming orange-brown, trace of fines</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>becoming pale grey, pale brown, trace of shell fragments</td>
</tr>
</tbody>
</table>

### Material Substance

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components
- **SOIL DESCRIPTION:** Structure and additional observations

### Water

- **Penetrometer:** (kPa)
- **Penetration:** ranges to refusal
- **Consistency:** dry, moist, wet
- **Liquid Limit:**
- **Plastic Limit:**
- **Consistency / relative density:**

---

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

---

**Technical Details:**
- **Drill model:** Explora MK50, Truck mounted
- **Drilling Fluid:** Polymer
- **Surface Elevation:** 5.95 m (AHD)
- **Angle from Horizontal:** 90°
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

#### Drilling Information

<table>
<thead>
<tr>
<th>Borehole ID.</th>
<th>ID46-BH09</th>
</tr>
</thead>
<tbody>
<tr>
<td>sheet.</td>
<td>2 of 7</td>
</tr>
<tr>
<td>project no.</td>
<td>GEOTABTF10294AA</td>
</tr>
<tr>
<td>date started:</td>
<td>07 Nov 2016</td>
</tr>
<tr>
<td>date completed:</td>
<td>09 Nov 2016</td>
</tr>
<tr>
<td>logged by:</td>
<td>BK</td>
</tr>
<tr>
<td>checked by:</td>
<td>KJ</td>
</tr>
</tbody>
</table>

**Position:** E: 335,131.21; N: 5,785,213.77 (MGA94)  
**Surface Elevation:** 5.95 m (AHD)  
**Angle from Horizontal:** 90°

**Drill Model:** Explora MK50, Truck mounted  
**Drilling Fluid:** Polymer

#### Material Substance

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAND</td>
<td>Fine to medium grained, grey, (continued) becoming fine to coarse grained sand, pale grey with some shell fragments, trace of organics</td>
</tr>
<tr>
<td>CLAY</td>
<td>Medium plasticity, dark grey, fine grained sand, trace of shells.</td>
</tr>
<tr>
<td>SAND</td>
<td>Fine to medium grained, black dark brown, trace of fines.</td>
</tr>
<tr>
<td>CLAYEY SAND</td>
<td>Fine to medium grained, grey, medium plasticity.</td>
</tr>
</tbody>
</table>

#### Soil Type & Classification Symbol

- **SAND:** fine to medium grained, grey, (continued) becoming fine to coarse grained sand, pale grey with some shell fragments, trace of organics
- **SAND:** fine to medium grained, black dark brown, trace of fines.
- **CLAYEY SAND:** fine to medium grained, grey, medium plasticity.

**Consistency / Relative Density**

- **Moisture:** DRY, MOIST, WET
- **Consistency / Relative Density:** SOFT, FIRM, STIFF, VERY STIFF

**Consistency / Relative Density**

- **Hand Penetrometer (kPa):** Hand penetrometer (kPa)
- **Penetration Test:** SPT - sample recovered
- **SPT:** SPT with solid cone
- **Vane Shear:** Vane shear, peak/remoulded (kPa)

**Environmental Samples:**

- **Samples & Field Tests:** 10-Oct-12 water level on date shown, hammer bouncing

**Additional Observations:**

- **Structure and Additional Observations:**
  - QUATERNARY SANDS
  - TERTIARY BRIGHTON GROUP
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

**Borehole Information**
- **ID:** ID46-BH09  
- **Sheet:** 3 of 7  
- **Date Started:** 07 Nov 2016  
- **Date Completed:** 09 Nov 2016  
- **Logged by:** BK  
- **Checked by:** KJ

**Drilling Information**
- **Drill Model:** Explora MK50, Truck mounted  
- **Drilling Fluid:** Polymer  
- **Hole Diameter:** 100 mm

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 - 12</td>
<td>Clayey Sand</td>
<td>Fine to coarse grained, pale grey, medium plasticity, trace of shell fragments.</td>
</tr>
<tr>
<td>13 - 15</td>
<td>Sandy Clay</td>
<td>High plasticity, pale grey, fine to medium grained sand.</td>
</tr>
<tr>
<td>16 - 18</td>
<td>Sand</td>
<td>Fine to coarse grained, pale grey, trace of fines.</td>
</tr>
<tr>
<td>19 - 21</td>
<td>Clay</td>
<td>High plasticity, dark grey.</td>
</tr>
</tbody>
</table>

**Material Substance**
- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components
- **MATERIAL DESCRIPTION:** Structure and additional observations

**Classification Symbol & Soil Description**
- **Based on Unified Classification System**

**Method & Support**
- **AE:** Auger drilling
- **C:** Casing
- **E:** Environmental sample
- **F:** Moisture
- **H:** Hard
- **L:** Loose
- **M:** Moist
- **V:** Very loose
- **W:** Wet
- **D:** Dry
- **R:** Refusal
- **HL:** Hammer Bouncing

**Samples & Field Tests**
- **N:** Nil
- **SS:** Split spoon sample
- **NC:** SPT with solid cone
- **VS:** Vane shear, peak/remoulded (kPa)
- **VB:** Vertical boring

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample &amp; Field Tests</th>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 - 12</td>
<td>SPT 8, 10, 11</td>
<td>SC</td>
<td>Clayey Sand</td>
</tr>
<tr>
<td>13 - 15</td>
<td>SPT 7, 12</td>
<td>CH</td>
<td>Sandy Clay</td>
</tr>
<tr>
<td>16 - 18</td>
<td>SPT 3, 5, 19</td>
<td>SP</td>
<td>Sand</td>
</tr>
<tr>
<td>19 - 21</td>
<td>SPT 2, 4</td>
<td>CW</td>
<td>Clay</td>
</tr>
</tbody>
</table>

**Additional Observations**
- **Surface Elevation:** 5.95 m (AHD)
- **Angle from Horizontal:** 90°
- **Method:** Non destructive drilling
- **Consistency/Relative Density:** Very soft
- **Penetration:** No resistance ranging to refusal
- **Water:** 10-Oct-12 water level on date shown

**Position:** E: 335,131.21; N: 5,785,213.77 (MGA94)
graphic log

classification symbol

samples & field tests

water

material description

material substance

method & support

penetration

SPT 16, 27, 22 N*=45

SP

SPT: find to medium grained, pale grey mottled orange-brown, trace of fines. (continued)

SPT: fine to coarse grained, grey, with some fine grained gravel.

Sandy CLAY: low to medium plasticity, pale grey, fine grained sand.

CL-CI

SAND: fine to medium grained, pale grey mottled orange-brown, trace of fines.

SAND: fine to medium grained, pale grey mottled orange-brown, trace of fines.

Sandy CLAY: low to medium plasticity, pale grey, fine grained sand.

SAND: fine to medium grained, pale grey mottled orange-brown, trace of fines.

Sandy CLAY: low to medium plasticity, pale grey, fine grained sand.

Sandy CLAY: low to medium plasticity, pale grey, fine grained sand.

SAND: fine to medium grained, pale grey mottled orange-brown, trace of fines.

SAND: fine to medium grained, pale grey mottled orange-brown, trace of fines.

Sandy CLAY: low to medium plasticity, pale grey, fine grained sand.

SAND: fine to medium grained, pale grey mottled orange-brown, trace of fines.

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SAND: fine to medium grained, pale grey mottled orange-brown, trace of fines.

Sandy CLAY: low to medium plasticity, pale grey, fine grained sand.

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SAND: fine to medium grained, pale grey mottled orange-brown, trace of fines.

Sandy CLAY: low to medium plasticity, pale grey, fine grained sand.

SAND: fine to medium grained, pale grey mottled orange-brown, trace of fines.

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SAND: fine to medium grained, pale grey mottled orange-brown, trace of fines.
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

---

### Soil Type

**Sandy CLAY:** low to medium plasticity, brown, fine to medium grained sand, with some cemented sand bands and iron cemented sand fragments.

**Sandy SILT:** high liquid limit, brown, grey, fine to medium grained sand, becoming bands grey, brown, dark grey

**Silty SAND:** fine grained, grey, low liquid limit, trace of shell fragments.

---

### Drilling Information

- **method & support:** auger drilling  
- **water:** no penetration
- **samples & field tests:**
  - **method:** SPT  
  - **support:** M mud  
  - **penetration:** no resistance ranging to refusal

### Classification Symbol & Soil Description

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

---

TERTIARY BRIGHTON GROUP

- **GELLIBRAND MARL**
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.0</td>
<td>SM</td>
</tr>
<tr>
<td>36.0</td>
<td>Becoming grey, mottled brown, dark green, with bands of fine to coarse grained sand</td>
</tr>
</tbody>
</table>

**method & support**  
**samples & field tests**  
**classification symbol**  
**material description**  
**consistency / relative density**  
**soil description**

**method & support**
- AD: Auger drilling
- AS: Auger screwing
- HA: Hand auger
- W: Wash bore
- NDD: Non destructive drilling

**samples & field tests**
- SPT: Standard penetration test
- B: bulk disturbed sample
- D: Drilled sample
- E: Environmental sample
- SS: Split spoon sample
- U1: Undisturbed sample
- HP: Hand penetrometer (kPa)
- Nc: SPT with solid cone
- VS: Vane shear; peak/remoulded (kPa)
- R: refusal
- HB: Hammer bouncing

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

**moisture**
- VS: very soft
- S: soft
- F: firm
- St: stiff
- VSt: very stiff
- H: hard
- Fb: firm
- L: loose
- MD: medium dense
- D: dense
- VD: very dense

**Borehole ID:** ID46-BH09  
**date started:** 07 Nov 2016  
**date completed:** 09 Nov 2016  
**logged by:** BK  
**checked by:** KJ
### Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach  
**Borehole ID:** ID46-BH09  
**date started:** 07 Nov 2016  
**date completed:** 09 Nov 2016  
**logged by:** BK  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
<th>Sample Type</th>
<th>Water</th>
<th>Consistency / Relative Density</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.0</td>
<td>GELLIBRAND MARL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49.45</td>
<td>SILTY SAND: fine grained, grey, low liquid limit, trace of shell fragments. (continued)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Borehole ID46-BH09 terminated at 49.45 m  
Target depth

#### Material Substance

<table>
<thead>
<tr>
<th>Moisture</th>
<th>CDF_0_9_06_LIBRARY.GLB rev: AS  Log  COF BOREHOLE: NON CORED  GEOTABTF10294AA_ID46.GPJ  &lt;&lt;DrawingFile&gt;&gt;  08/06/2017 15:44</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>friable</td>
</tr>
<tr>
<td>ST</td>
<td>stiff</td>
</tr>
<tr>
<td>VST</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
</tr>
</tbody>
</table>

#### Method & Support

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Method &amp; Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.0</td>
<td>M mud N nil C casing</td>
</tr>
<tr>
<td>49.45</td>
<td>N DD non destructive drilling</td>
</tr>
</tbody>
</table>

#### Material Description

- Geotechnical properties
  - Soil Type: GELLIBRAND MARL
  - Silty Sand: Fine grained, grey, low liquid limit, trace of shell fragments.

#### Additional Observations

- Moisture: VS - Very Soft
- CDF_0_9_06_LIBRARY.GLB rev: AS  Log  COF BOREHOLE: NON CORED  GEOTABTF10294AA_ID46.GPJ  08/06/2017 15:44

---

**<coffey logo>**

**A TETRA TECH COMPANY**

**CDF_0_9_06_LIBRARY.GLB rev: AS  Log  COF BOREHOLE: NON CORED  GEOTABTF10294AA_ID46.GPJ  08/06/2017 15:44**
## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach  
**date started:** 17 Oct 2016  
**date completed:** 17 Oct 2016  
**logged by:** BP  
**checked by:** KJ  

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling</td>
<td>Casing</td>
<td>E</td>
<td>N</td>
<td>FILL: CONCRETE: 100mm.</td>
<td></td>
</tr>
<tr>
<td>AS auger screwing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W washbore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Material Substance

<table>
<thead>
<tr>
<th>Water outflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-Oct-12 water level on date shown</td>
</tr>
<tr>
<td>Water inflow</td>
</tr>
</tbody>
</table>

### Classification Symbol & Soil Description

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components
- **Hand Penetrometer (kPa):**
  - ID46-BH10
  - ID46-BH10
  - ID46-BH10
- **Consistency / Relative Density:**
  - VS very soft
  - S soft
  - F firm
  - ST stiff
  - VST very stiff
  - H hard
  - Fb friable
  - VL very loose
  - L loose
  - MD medium dense
  - D dense
  - VD very dense
- **Moisture:**
  - M moist
  - W wet
- **Liquid Limit:**
  - Wp plastic limit

### Soil Test Information

- **Consistency / Relative Density:**
  - VS very soft
  - S soft
  - F firm
  - ST stiff
  - VST very stiff
  - H hard
  - Fb friable
  - VL very loose
  - L loose
  - MD medium dense
  - D dense
  - VD very dense
- **Moisture:**
  - M moist
  - W wet

### Soil Type

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components
- **Material Description:**
  - Structure and additional observations
  - Samples & Field Tests
  - Water
  - Consistency / Relative Density
  - Hand Penetrometer (kPa)
  - Moisture
  - Liquid Limit

### Borehole Information

- **Borehole ID:** ID46-BH10
- **Drill model:** Comacchio GEO 305, Track mounted
- **Drilling Fluid:** Polymer
- **Surface Elevation:** 3.99 m (AHD)
- **Angle from Horizontal:** 90°
## Engineering Log - Borehole

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Road, Bonbeach

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>SAND: fine to medium grained, pale grey. (continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>CLAYEY SAND: fine to medium grained, dark grey, medium plasticity, with some shells and clay pockets, high plasticity, black.</td>
</tr>
<tr>
<td>10.0</td>
<td>SAND: fine to coarse grained, grey mottled orange brown, trace of fines.</td>
</tr>
<tr>
<td>12.0</td>
<td>SAND: medium grained, grey, brown, trace of fines.</td>
</tr>
</tbody>
</table>

### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Soil Type</th>
<th>Classification Symbol &amp; Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAND</td>
<td>CLAYEY</td>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td>SAND</td>
<td>CLAYEY</td>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td>SAND</td>
<td>CLAYEY</td>
<td>Plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
</tbody>
</table>

### Structure and Additional Observations

- **QUATERNARY SANDS SWAMP DEPOSITS**
- **TERTIARY BRIGHTON GROUP**

### Water

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

### Classification Symbol & Soil Description

- **Moisture:** CDF_0_9_06_LIBRARY.GLB rev:AS  Log  COF BOREHOLE: NON CORED  GEOTABTF10294AA_ID46.GPJ  <<DrawingFile>>  08/06/2017 15:45
- **Consistency / Relative Density:** Moisture limit: VS very soft, S soft, F firm, St stiff, VSt very stiff, H hard, Fb friable, VL very loose, MD medium dense, D dense, VD very dense
- **Penetration:** SPT sunk 400 mm under weight
- **Drill Fluid:** Polymer
- **Drill Model:** Comacchio GEO 305, Track mounted


**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.0</td>
<td>Sandy CLAY: medium to high plasticity, pale grey, fine grained sand. (continued)</td>
</tr>
<tr>
<td>18.0</td>
<td>CLAYEY SAND: medium to coarse grained, grey.</td>
</tr>
<tr>
<td>19.0</td>
<td>CLAY: high plasticity, dark grey mottled black.</td>
</tr>
</tbody>
</table>

- **becoming grey, mottled orange-brown**
- **with some fine grained sand and pockets of dark grey, high plasticity clay**
- **CLAYEY SAND**: fine to coarse grained, grey, mottled orange-brown, dark grey, medium plasticity.

### Material Substance

<table>
<thead>
<tr>
<th>Borehole ID.</th>
<th>ID46-BH10</th>
</tr>
</thead>
<tbody>
<tr>
<td>project no.</td>
<td>GEOTABTF10294AA</td>
</tr>
<tr>
<td>client</td>
<td>Metro Trains Melbourne</td>
</tr>
<tr>
<td>principal</td>
<td>Level Crossing Removal Authority</td>
</tr>
<tr>
<td>project</td>
<td>LCRP-CTF</td>
</tr>
<tr>
<td>location</td>
<td>ID46 - Bondi Road, Bonbeach</td>
</tr>
<tr>
<td>date started</td>
<td>17 Oct 2016</td>
</tr>
<tr>
<td>date completed</td>
<td>17 Oct 2016</td>
</tr>
<tr>
<td>logged by</td>
<td>BP</td>
</tr>
<tr>
<td>checked by</td>
<td>KJ</td>
</tr>
</tbody>
</table>

### Drilling Information

- **ID46 - Bondi Road, Bonbeach**
- **drill model**: Comacchio GEO 305, Track mounted
- **drilling fluid**: Polymer
- **angle from horizontal**: 90°
- **hole diameter**: 100 mm

### Sample & Field Tests

- **method**: auger drilling
- **penetration**: C casing
- **samples & field tests**: SPT, U63
- **water outflow**: no resistance ranging to refusal

### Classification Symbol & Soil Description

- **classification symbol**: CI-CH
- **soil description**: Sandy CLAY

### Moisture

- **moisture condition**: dry, moist, wet, plastic limit, liquid limit

### Consistency / Relative Density

- **VS**: very soft
- **S**: soft
- **F**: firm
- **ST**: stiff
- **VST**: very stiff
- **H**: hard
- **Fb**: friable
- **VL**: very loose
- **L**: loose
- **MD**: medium dense
- **D**: dense
- **VD**: very dense

### Additional Observations

- **CLAYEY SAND**: fine to coarse grained, grey mottled orange-brown, dark grey, medium plasticity.
SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components

123

penetration
depth (m)
33.0
34.0
35.0
36.0
37.0
38.0
39.0

335,048.22; N: 5,785,051.19 (MGA94)
drill model: Comacchio GEO 305, Track mounted
drilling fluid: Polymer
hole diameter: 100 mm

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## Engineering Log - Borehole

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Road, Bonbeach

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>37.0</td>
<td>GC</td>
<td>Clayey Gravel: fine to medium grained, blue-grey, medium plasticity, clay is green-brown. (continued)</td>
</tr>
<tr>
<td>38.0</td>
<td>ML</td>
<td>Sandy Silt: low liquid limit, green brown, green-grey, fine grained sand, trace of fine to medium gravel.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with some pockets of shell fragments, no gravel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>becoming green-grey, mottled green</td>
</tr>
</tbody>
</table>

### Material Substance

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **consistency / relative density**
- **moisture condition**
- **structure and additional observations**

### Samples & Field Tests

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SPT 18, 19, 13 N=32</td>
</tr>
<tr>
<td></td>
<td>SPT 12/120mm HB N=R</td>
</tr>
<tr>
<td></td>
<td>SPT 9, 16, 23 N=39</td>
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<tr>
<td></td>
<td>SPT 7, 9, 13 N=22</td>
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<tr>
<td></td>
<td>SPT 4, 11, 30 N=41</td>
</tr>
<tr>
<td></td>
<td>SPT 6, 11, 15</td>
</tr>
</tbody>
</table>

### Classification Symbol & Soil Description

- **classification symbol & soil description** based on Unified Classification System
- **consistency / relative density**

### Drilling Fluid

- **polymer**

---

**Borehole ID:** ID46-BH10  
**sheet no.:** 6 of 7  
**project no.:** GEOTABTF10294AA  
**date started:** 17 Oct 2016  
**date completed:** 17 Oct 2016  
**logged by:** BP  
**checked by:** KJ
Sandy SILT: low liquid limit, green brown, fine grained sand, trace of fine to medium gravel. (continued)

Borehole ID46-BH10 terminated at 49.65 m
Target depth
Standpipe
Backfill details
0.0m-5.5m: grout
5.5m-6.3m: bentonite
6.3m-7.3m: sand

Standpipe details
0.0m-6.7m: unslotted 50mm PVC, Class 18
6.7m-9.7m: machine slotted, filter sock covered, 50mm PVC, Class 18
End caps and flush mounted gatic cover
Piezometer Installation Log

client: Metro Trains Melbourne
principal: Level Crossing Removal Authority
project: LCRP-CTF
location: ID46 - Bondi Street, Bonbeach

position: E: 334,969.69; N: 5,786,088.23 (MGA94)  surface elevation: 5.84 m (AHD)
equipment type: Comacchio 450P, Track mounted  drilling fluid: Polymer
casing diameter: 100 mm

material substance

method & support
water

material name
GROUT
Bentonite
Sand
Bentonite

Relative Levels (AHD)

<table>
<thead>
<tr>
<th>ID</th>
<th>type</th>
<th>installation date</th>
<th>stickup (m)</th>
<th>tip depth (m)</th>
<th>water level (m)</th>
<th>water pressure test result (lugeons) for depth interval shown</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID46-BH01</td>
<td>standpipe piezo.</td>
<td>10.00 m</td>
<td>-4.17</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Piezometer Installation Log

**client:** Metro Trains Melbourne  
**principal:** Level Crossing Removal Authority  
**project:** LCRP-CTF  
**location:** ID46 - Bondi Street, Bonbeach

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>material substance</th>
<th>piezometer construction details</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>graphic log</td>
<td>Grout</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bentomite</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FILL QUATERINARY SANDS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
</tbody>
</table>

### Drilling Information
- **Position:** E: 335,037.77; N: 5,785,712.89 (MGA94)  
- **Surface Elevation:** 5.93 m (AHD)  
- **Angle from Horizontal:** 90°  
- **Equipment Type:** Comacchio 455P, Track mounted  
- **Drilling Fluid:** Polymer  
- **Casing Diameter:** 100 mm

### Drilling Fluid Loss
- **Partial Drilling Fluid Loss:** 10-Oct-12, Water Level on Date Shown
- **Complete Drilling Fluid Loss:** Water Inflow

### Water Level
- **Type:** Installation Date  
- **Stickup (m):** 16.00 m  
- **Tip Depth (m):** 13.00 m  
- **Water Level (m):** -10.08

### Material Recovered
- **ID46 - Bondi Street, Bonbeach**  
- **Driller:** JL  
- **Driller's Permit No.:** KJ  
- **Drilling Fluid:** Polymer

---

**Hole ID:** ID46-BH03  
**Sheet:** 1 of 1  
**Project No.:** GEOTABTF10294AA

---

**Note:** See engineering log for details.
## Piezometer Installation Log

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Street, Bonbeach

### Drilling Information
- **Position:** E: 335,104.90; N: 5,785,474.70 (MGA94)  
- **Surface Elevation:** 5.91 m (AHD)  
- **Angle from Vertical:** 90°  
- **Equipment Type:** Comacchio GEO 305, Track mounted  
- **Drilling Fluid:** Polymer  
- **Casing Diameter:** 100 mm

### Material Substances
<table>
<thead>
<tr>
<th>Material Name</th>
<th>Drift Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quaternary Sands</td>
<td></td>
</tr>
<tr>
<td>Tertiary Brighton Group</td>
<td></td>
</tr>
<tr>
<td>Bentonite</td>
<td></td>
</tr>
<tr>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>Grout</td>
<td></td>
</tr>
</tbody>
</table>

### Piezometer Construction Details
- **ID:** ID46-BH05
- **Drilling Company:** EARTHCORE  
- **Driller:** Luke  
- **Driller’s Permit No.:**
- **Water Level:** -9.09 m  
- **Relative Levels (AHD):** -6.09

### Method & Support
- **Method & Support:**
  - Water Pressure Test Result (Lugeons) for Depth Interval Shown
  - 10-Oct-12, Water Level on Date Shown
  - Water Inflow
  - Complete Drilling Fluid Loss
  - Partial Drilling Fluid Loss

### Core Recovery
- **Core Recovered:** No Core Recovered

### Water Test Result
- **ID:** ID46-BH05
- **Type:** Standpipe Piezo.
- **Stickup (m):** 15.00 m
- **Tip Depth (m):**
- **Water Level (m):**
- **Relative Levels (AHD):** -6.09

---

**Checked by:** KJ  
**Logged by:** JJ
# Piezometer Installation Log

**Hole ID:** ID46-BH06  
**Project:** LCRP-CTF  
**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Location:** ID46 - Bondi Street, Bonbeach  
**Date Started:** 14 Nov 2016  
**Date Completed:** 18 Nov 2016  
**Logged by:** BK  
**Checked by:** KJ

## Drilling Information
- **Method & Support:** Water
- **Material Substance:** FILL QUATERNARY SANDS
- **Material Name:** Bentonite, Sand
- **RL (m):**
  - 0
  - -4
  - -8
  - -12
  - -16
- **Depth (m):**
  - 4
  - 8
  - 12
  - 16
  - 14.50
  - 17.50

## Piezometer Construction Details
- **Bore Construction License:**
- **Drilling Company:** Earthcore Drilling
- **Driller:** Alex
- **Driller's Permit No.:**

## Graphic Log / Core Recovery
- **Material:** Bentonite, Sand
- **Relative Levels (AHD):**
  - 17.50 m
  - -11.33

## Piezometer Installation Data
- **ID:** ID46-BH06
- **Type:** Standpipe piezo.
- **Date:** 14 Nov 2016
- **Tip Depth (m):** 17.50
- **Water Level (m):** 14.50
- **Relative Levels (AHD):** -11.33
- **Log:** ID46-BH06 standpipe piezo.
## Piezometer Installation Log

### Client
Metro Trains Melbourne

### Principal
Level Crossing Removal Authority

### Project
LCRP-CTF

### Location
ID46 - Bondi Street, Bonbeach

### Position
E: 335,134.26; N: 5,785,315.19 (MGA94)

### Surface Elevation
4.82 m (AHD)

### Angle from Horizontal
90°

### Equipment Type
Explora Mk50, Truck mounted

### Drilling Company
Earthcore Drilling

### Driller
Alex

### Driller’s Permit No.

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
<th>Piezometer Construction Details</th>
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</thead>
<tbody>
<tr>
<td>Water</td>
<td>FILL</td>
<td>Material name: ID46-BH08</td>
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<tr>
<td></td>
<td>QUATERNARY SANDS</td>
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</tr>
</tbody>
</table>

### Drilling Fluid
Polymer

### Surface Elevation
4.82 m (AHD)

### Diagram
- FILL
- QUATERNARY SANDS
- TERTIARY BRIGHTON GROUP
- Bentonite
- Sand

### Piezometer Construction Details

<table>
<thead>
<tr>
<th>ID</th>
<th>Type</th>
<th>Installation Date</th>
<th>Stickup</th>
<th>Tip Depth</th>
<th>Water Level</th>
<th>Relative Levels (AHD)</th>
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</thead>
<tbody>
<tr>
<td>ID46-BH08</td>
<td>Standpipe piezo.</td>
<td>13.90 m</td>
<td></td>
<td>-9.08</td>
<td></td>
<td>-6.08</td>
</tr>
</tbody>
</table>
## Piezometer Installation Log

**Client:** Metro Trains Melbourne  
**Principal:** Level Crossing Removal Authority  
**Project:** LCRP-CTF  
**Location:** ID46 - Bondi Street, Bonbeach  
**Hole ID:** ID46-BH10

**Position:** E: 335,048.22, N: 5,785,051.19 (MGA94)  
**Surface Elevation:** 3.99 m (AHD)  
**Angle from Horizontal:** 90°  
**Equipment Type:** Comacchio GEO 305, Track mounted  
**Drilling Fluid:** Polymer  
**Casing Diameter:** 100 mm

### Drilling Information
- **Method & Support:** Water
- **Material Substance:** FILL QUATERNARY SANDS
- **Piezometer Construction Details:** No core recovered

### Material Substance

<table>
<thead>
<tr>
<th>Position</th>
<th>Graphic Log</th>
<th>Material Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>FILL QUATERNARY SANDS</td>
</tr>
</tbody>
</table>

### Core Recovery

- **Core Recovered:** (graphic symbols indicate materials)  
- **No Core Recovered**

### Water Level

<table>
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<th>Installation Date</th>
<th>Water Level</th>
</tr>
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<tbody>
<tr>
<td>10-Oct-12</td>
<td>-6.01</td>
</tr>
</tbody>
</table>

### Piezometer Information

- **ID:** ID46-BH10  
- **Type:** Standpipe piezo.
Appendix I – Groundwater Bore Construction Licence
COPY OF RECORD IN THE VICTORIAN WATER REGISTER

Licence to Construct Works

under Section 67 of the Water Act 1989

The information in this copy of record is as recorded at the time of printing. Current information should be obtained by a search of the register. The State of Victoria does not warrant the accuracy or completeness of this information and accepts no responsibility for any subsequent release, publication or reproduction of this information.

This licence does not remove the need to apply for any authorisation or permission necessary under any other Act of Parliament with respect to anything authorised by the works licence.

Water used under this licence is not fit for any use that may involve human consumption, directly or indirectly, without first being properly treated.

This licence is not to be interpreted as an endorsement of the design and/or construction of any works (including dams). The Authority does not accept any responsibility or liability for any suits or actions arising from injury, loss, damage or death to person or property which may arise from the maintenance, existence or use of the works.

Each person named as a licence holder is responsible for ensuring all the conditions of this licence are complied with.

This licence authorises its holders to construct the described works, subject to the conditions.

Licence Holder(s)

COFFEY of LEVEL 1, 436 JOHNSTON STREET ABBOTSFORD VIC 3067

Licence Contact Details

COFFEY

LEVEL 1, 436 JOHNSTON STREET

ABBOTSFORD VIC 3067

Licence Details

<table>
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<th>Field</th>
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<td>Status</td>
<td>Active</td>
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<td>Authority</td>
<td>Southern Rural Water</td>
</tr>
<tr>
<td>Name of waterway or aquifer</td>
<td>NA for construct/decommission</td>
</tr>
<tr>
<td>Water system</td>
<td>Unincorporated (GMU)</td>
</tr>
</tbody>
</table>
Summary of Licensed Works
The details in this section are a summary only. They are subject to the conditions specified in this licence.

<table>
<thead>
<tr>
<th>Works ID</th>
<th>Works type</th>
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<tr>
<td>WRK095996</td>
<td>Bore</td>
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<td>WRK096003</td>
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Description of Licensed Works

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<td>Works subtype</td>
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Works location

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<tr>
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<th>Zone MGA</th>
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<td>334768.106</td>
<td>5786593.323</td>
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Land description

Property address

STATION STREET CHELSEA 3196

Description of Licensed Works

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Works location

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<td>334684.425</td>
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Land description
### Property address

STATION STREET CHELSEA 3196

### Description of Licensed Works

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#### Works location

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<td>334963.727</td>
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#### Land description

### Property address

STATION STREET BONBEACH 3196

### Description of Licensed Works

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#### Works location

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<td>334855.527</td>
<td>5786295.158</td>
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#### Other land description

95 C2

### Property address

Location(s) in or near CHELSEA, Parish: Lyndhurst

### Description of Licensed Works

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#### Works location

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Description of Licensed Works

**WORKS ID** WRK096000

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**Works location**

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<td>335074.215</td>
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Description of Licensed Works

**WORKS ID** WRK096001

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<td>Proposed maximum depth</td>
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**Works location**

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Description of Licensed Works

**WORKS ID** WRK096002

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Property address

Location(s) in or near CHELSEA, Parish: Lyndhurst
### Description of Licensed Works

**WORKS ID** WRK096003

- **Works type**: Bore
- **Works subtype**: Drilled bore
- **Proposed maximum depth**: Unrestricted

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<th><strong>Zone MGA</strong></th>
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**Other land description**

95 C2

**Property address**

Location(s) in or near CHELSEA, Parish: Lyndhurst

---

### Description of Licensed Works

**WORKS ID** WRK096004

- **Works type**: Bore
- **Works subtype**: Drilled bore
- **Proposed maximum depth**: Unrestricted

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**Land description**

**Property address**

STATION STREET BONBEACH 3196
Related Instruments

Related entitlements  Nil
Related water-use entities  Nil

Application History

<table>
<thead>
<tr>
<th>Reference</th>
<th>Type</th>
<th>Status</th>
<th>Lodged date</th>
<th>Approved date</th>
<th>Recorded date</th>
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<tr>
<td>WLI604829</td>
<td>Issue</td>
<td>Approved</td>
<td>13 Sep 2016</td>
<td>13 Sep 2016</td>
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Conditions
Licence WLE066560 is subject to the following conditions:

Siting and construction
1 The bore(s) must be drilled at the location specified in the application approved by the Authority.
2 If after drilling the bore is considered unsatisfactory a replacement bore may be drilled on the land specified in the licence.

Preventing pollution
3 All earthworks must be carried out, and all drilling fluids and waters produced during construction and development must be disposed of, in ways that avoid contaminating native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people’s property.
4 Construction must stop immediately if the Authority reasonably believes that fuel, lubricant, drilling fluid, soil or water produced during construction and development is at risk of being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people’s property.
5 The licence holder must construct and maintain bund walls, in accordance with the timeframe, specifications, guidelines or standards prescribed by the Authority, to prevent fuel, lubricant, drilling fluid, soil or water produced during construction and development from being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people’s property.

Construction standards
6 The bore(s) must be constructed, and where relevant decommissioned, in accordance with the Minimum Construction Requirements for Water Bores in Australia, Edition 3 or its successor.

Drilling licence and supervision requirements
7 The bore(s) must be constructed by, or under the direct supervision of, a driller licensed under the Water Act 1989 and endorsed as a Class 1, 2, or 3 driller, with appropriate endorsements.
8 If artesian pressure is expected or encountered, then a driller licensed under the Water Act 1989, and endorsed as a class 3 driller, must install casing in the bore(s) to a suitable depth, and in a suitable manner, to prevent its outbreak. A suitable valve must also be fitted to the bore.

Bore completion report
9 A Bore Completion Report must be submitted to the Authority within 28 working days of the bore(s) being completed.

Protecting water resources
10 No more than 10 bore(s) may be brought to final development under this licence.
11 At the completion of drilling and before the drilling rig leaves the site, all but 10 bore(s) must be decommissioned so as to eliminate physical hazards, conserve aquifer yield, prevent groundwater contamination and prevent the intermingling of desirable and undesirable waters.
12 The bore(s) must be located at least 30 metres from any authority's channel, reserve or easement unless authorised by the Authority.

Protecting water quality
13 Drilling must not exceed the maximum depth.
14 The bore(s) must be constructed so as to prevent aquifer contamination caused by vertical flow outside the casing.
15 If two or more aquifers are encountered, the bore(s) must be constructed to ensure that an impervious seal is made and maintained between each aquifer to prevent aquifer connection through vertical flow outside the casing; under no circumstances are two or more aquifers to be screened within the one bore or in any other manner to allow connection between them.
16 Boreheads must be constructed, to ensure that no flood water, surface runoff or potential
subsurface contaminated soakage can enter the bore or bore annulus.

**Protecting other water users**

17 The diameter of the drill casing must not exceed 130 millimetres.

18 The bore(s) must be constructed so that water levels in the bore(s) can be measured by an airline, a piezometer or a method approved in writing by the Authority.

**Fees and charges**

19 The licence holder must, when requested by the Authority, pay all fees, costs and other charges under the Water Act 1989 in respect of this licence.

---

END OF COPY OF RECORD
Figures
Geological boundaries are only known at the test site locations and have been inferred between the test sites. These geological boundaries have been provided to assist with the geological interpretation and should not be considered to represent actual boundaries that may vary from these lines.
Geological boundaries are only known at the test site locations and have been inferred between the test sites. These geological boundaries have been provided to assist with the geological interpretation and should not be considered to represent actual boundaries that may vary from these lines.
Appendix A – Bore Construction Licences
COPY OF RECORD IN THE VICTORIAN WATER REGISTER

LICENCE TO CONSTRUCT WORKS

under Section 67 of the Water Act 1989

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Each person named as a licence holder is responsible for ensuring all the conditions of this licence are complied with.

This licence authorises its holders to construct the described works, subject to the conditions.

Licence Holder(s)
DALE SCOTT MCKENZIE of LEVEL 1, 436 JOHNSTON STREET ABBOTSFORD VIC 3067

Licence Contact Details
DS MCKENZIE
LEVEL 1, 436 JOHNSTON STREET
ABBOTSFORD VIC 3067

Licence Details

Expiry date 10 Feb 2018
Status Active
Authority Southern Rural Water
Name of waterway or aquifer NA for construct/decommission
Water system Unincorporated (GMU)

Summary of Licensed Works
The details in this section are a summary only. They are subject to the conditions specified in this licence.

<table>
<thead>
<tr>
<th>Works ID</th>
<th>Works type</th>
<th>Use of water</th>
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## Description of Licensed Works

**WORKS ID** WRK098877  
**Works type** Bore  
**Works subtype** Drilled bore  
**Proposed maximum depth** Unrestricted  

**Works location**  

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<tbody>
<tr>
<td>334853.420</td>
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**Other land description**  
95 C2  

**Property address**  
Location(s) in or near CHELSEA, Parish: Lyndhurst

## Description of Licensed Works

**WORKS ID** WRK098878  
**Works type** Bore  
**Works subtype** Drilled bore  
**Proposed maximum depth** Unrestricted  

**Works location**  

<table>
<thead>
<tr>
<th>Easting</th>
<th>Northing</th>
<th>Zone MGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>334786.573</td>
<td>5786571.717</td>
<td>Zone 55</td>
</tr>
</tbody>
</table>

**Land description**

**Property address**  
STATION STREET CHELSEA 3196

## Description of Licensed Works

**WORKS ID** WRK098879  
**Works type** Bore  
**Works subtype** Drilled bore  
**Proposed maximum depth** Unrestricted  

**Works location**  

<table>
<thead>
<tr>
<th>Easting</th>
<th>Northing</th>
<th>Zone MGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>334691.810</td>
<td>5786792.714</td>
<td>Zone 55</td>
</tr>
</tbody>
</table>

**Land description**
<table>
<thead>
<tr>
<th>Property address</th>
<th>STATION STREET CHELSEA 3196</th>
</tr>
</thead>
</table>

### Description of Licensed Works

<table>
<thead>
<tr>
<th>WORKS ID</th>
<th>WRK098880</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works type</td>
<td>Bore</td>
</tr>
<tr>
<td>Works subtype</td>
<td>Drilled bore</td>
</tr>
<tr>
<td>Proposed maximum depth</td>
<td>Unrestricted</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Works location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Easting</strong></td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td><strong>Northing</strong></td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Zone MGA</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Easting</td>
</tr>
<tr>
<td>Northing</td>
</tr>
<tr>
<td>Zone MGA</td>
</tr>
<tr>
<td>334523.899</td>
</tr>
<tr>
<td>5787206.168</td>
</tr>
<tr>
<td>Zone 55</td>
</tr>
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</table>

### Land description

<table>
<thead>
<tr>
<th>Property address</th>
<th>STATION STREET CHELSEA 3196</th>
</tr>
</thead>
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### Description of Licensed Works

<table>
<thead>
<tr>
<th>WORKS ID</th>
<th>WRK098881</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works type</td>
<td>Bore</td>
</tr>
<tr>
<td>Works subtype</td>
<td>Drilled bore</td>
</tr>
<tr>
<td>Proposed maximum depth</td>
<td>Unrestricted</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Works location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Easting</strong></td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td><strong>Northing</strong></td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Zone MGA</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Easting</td>
</tr>
<tr>
<td>Northing</td>
</tr>
<tr>
<td>Zone MGA</td>
</tr>
<tr>
<td>333463.556</td>
</tr>
<tr>
<td>5789401.734</td>
</tr>
<tr>
<td>Zone 55</td>
</tr>
</tbody>
</table>

### Land description

<table>
<thead>
<tr>
<th>Property address</th>
<th>STATION STREET ASPENDALE 3195</th>
</tr>
</thead>
</table>

### Description of Licensed Works

<table>
<thead>
<tr>
<th>WORKS ID</th>
<th>WRK098882</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works type</td>
<td>Bore</td>
</tr>
<tr>
<td>Works subtype</td>
<td>Drilled bore</td>
</tr>
<tr>
<td>Proposed maximum depth</td>
<td>Unrestricted</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Works location</th>
</tr>
</thead>
<tbody>
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<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td><strong>Northing</strong></td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Zone MGA</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Easting</td>
</tr>
<tr>
<td>Northing</td>
</tr>
<tr>
<td>Zone MGA</td>
</tr>
<tr>
<td>333370.330</td>
</tr>
<tr>
<td>5789597.763</td>
</tr>
<tr>
<td>Zone 55</td>
</tr>
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</table>
Land description

Property address
STATION STREET ASPENDALE 3195

Description of Licensed Works

WORKS ID WRK098883

<table>
<thead>
<tr>
<th>Works type</th>
<th>Bore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works subtype</td>
<td>Drilled bore</td>
</tr>
<tr>
<td>Proposed maximum depth</td>
<td>Unrestricted</td>
</tr>
</tbody>
</table>

Works location

<table>
<thead>
<tr>
<th>Easting</th>
<th>333582.506</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northing</td>
<td>5789172.252</td>
</tr>
<tr>
<td>Zone MGA</td>
<td>Zone 55</td>
</tr>
</tbody>
</table>

Other land description
95 C2

Property address
Location(s) in or near CHELSEA, Parish: Lyndhurst

Related Instruments

<table>
<thead>
<tr>
<th>Related entitlements</th>
<th>Nil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related water-use entities</td>
<td>Nil</td>
</tr>
</tbody>
</table>

Application History

<table>
<thead>
<tr>
<th>Reference</th>
<th>Type</th>
<th>Status</th>
<th>Lodged date</th>
<th>Approved date</th>
<th>Recorded date</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLI605559</td>
<td>Issue</td>
<td>Approved</td>
<td>10 Feb 2017</td>
<td>10 Feb 2017</td>
<td></td>
</tr>
</tbody>
</table>
Conditions
Licence WLE067645 is subject to the following conditions:

Siting and construction
1. The bore(s) must be drilled at the location specified in the application approved by the Authority.
2. If after drilling the bore is considered unsatisfactory a replacement bore may be drilled on the land specified in the licence.

Preventing pollution
3. All earthworks must be carried out, and all drilling fluids and waters produced during construction and development must be disposed of, in ways that avoid contaminating native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people’s property.
4. Construction must stop immediately if the Authority reasonably believes that fuel, lubricant, drilling fluid, soil or water produced during construction and development is at risk of being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people’s property.
5. The licence holder must construct and maintain bund walls, in accordance with the timeframe, specifications, guidelines or standards prescribed by the Authority, to prevent fuel, lubricant, drilling fluid, soil or water produced during construction and development from being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people’s property.

Construction standards
6. The bore(s) must be constructed, and where relevant decommissioned, in accordance with the Minimum Construction Requirements for Water Bores in Australia, Edition 3 or its successor.

Drilling licence and supervision requirements
7. The bore(s) must be constructed by, or under the direct supervision of, a driller licensed under the Water Act 1989 and endorsed as a Class 1, 2, or 3 driller, with appropriate endorsements.
8. If artesian pressure is expected or encountered, then a driller licensed under the Water Act 1989, and endorsed as a class 3 driller, must install casing in the bore(s) to a suitable depth, and in a suitable manner, to prevent its outbreak. A suitable valve must also be fitted to the bore.

Bore completion report
9. A Bore Completion Report must be submitted to the Authority within 28 working days of the bore(s) being completed.

Protecting water resources
10. At the completion of drilling, and before the drilling rig leaves the site, all bore(s) must be decommissioned so as to eliminate physical hazards, conserve aquifer yield, prevent groundwater contamination and prevent the intermingling of desirable and undesirable waters.
11. The bore(s) must be located at least 30 metres from any authority's channel, reserve or easement unless authorised by the Authority.

Protecting water quality
12. Drilling must not exceed the maximum depth.
13. The bore(s) must be constructed so as to prevent aquifer contamination caused by vertical flow outside the casing.
14. If two or more aquifers are encountered, the bore(s) must be constructed to ensure that an impervious seal is made and maintained between each aquifer to prevent aquifer connection through vertical flow outside the casing; under no circumstances are two or more aquifers to be screened within the one bore or in any other manner to allow connection between them.
15. Boreheads must be constructed, to ensure that no flood water, surface runoff or potential subsurface contaminated soakage can enter the bore or bore annulus.
**Fees and charges**

16 The licence holder must, when requested by the Authority, pay all fees, costs and other charges under the Water Act 1989 in respect of this licence.

---

END OF COPY OF RECORD
Appendix B – Borehole Logs
Soil Description Explanation Sheet (1 of 2)

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

CLASSIFICATION SYMBOL & SOIL NAME
Soils are described in accordance with the Unified Soil Classification (USC) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

<table>
<thead>
<tr>
<th>NAME</th>
<th>SUBDIVISION</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
<td></td>
<td>&gt;200 mm</td>
</tr>
<tr>
<td>Cobble</td>
<td></td>
<td>63 mm to 200 mm</td>
</tr>
<tr>
<td>Gravel</td>
<td>coarse</td>
<td>20 mm to 63 mm</td>
</tr>
<tr>
<td></td>
<td>medium</td>
<td>6 mm to 20 mm</td>
</tr>
<tr>
<td></td>
<td>fine</td>
<td>2.36 mm to 6 mm</td>
</tr>
<tr>
<td>Sand</td>
<td>coarse</td>
<td>600 μm to 2.36 mm</td>
</tr>
<tr>
<td></td>
<td>medium</td>
<td>200 μm to 600 μm</td>
</tr>
<tr>
<td></td>
<td>fine</td>
<td>75 μm to 200 μm</td>
</tr>
</tbody>
</table>

MOISTURE CONDITION

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

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

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

CONSISTENCY OF COHESIVE SOILS

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

NOTE: Consistency/density has been provided for FILL material to assist site access and temporary works design. Near surface conditions may vary with time.

DENSITY OF GRANULAR SOILS

<table>
<thead>
<tr>
<th>TERM</th>
<th>DENSITY INDEX (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very loose</td>
<td>Less than 15</td>
</tr>
<tr>
<td>Loose</td>
<td>15 - 35</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>35 - 65</td>
</tr>
<tr>
<td>Dense</td>
<td>65 - 85</td>
</tr>
<tr>
<td>Very Dense</td>
<td>Greater than 85</td>
</tr>
</tbody>
</table>

MINOR COMPONENTS

<table>
<thead>
<tr>
<th>TERM</th>
<th>ASSESSMENT GUIDE</th>
<th>PROPORTION OF MINOR COMPONENT IN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace of</td>
<td>Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.</td>
<td>Coarse grained soils: &lt;5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fine grained soils: &lt;15%</td>
</tr>
<tr>
<td>With some Trace</td>
<td>Presence easily detected by feel or eye, soil properties little different to general properties of primary component.</td>
<td>Coarse grained soils: 5 - 12%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fine grained soils: 15 - 30%</td>
</tr>
</tbody>
</table>

SOIL STRUCTURE

<table>
<thead>
<tr>
<th>ZONING</th>
<th>CEMENTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layers</td>
<td>Continuous across exposure or sample.</td>
</tr>
<tr>
<td>Lenses</td>
<td>Discontinuous layers of lenticular shape.</td>
</tr>
<tr>
<td>Pockets</td>
<td>Irregular inclusions of different material.</td>
</tr>
</tbody>
</table>

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS
Extremely weathered material
Residual soil Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeolian soil</td>
<td>Deposited by wind.</td>
</tr>
<tr>
<td>Alluvial soil</td>
<td>Deposited by streams and rivers.</td>
</tr>
<tr>
<td>Colluvial soil</td>
<td>Deposited on slopes (transported downslope by gravity).</td>
</tr>
<tr>
<td>Fill</td>
<td>Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.</td>
</tr>
<tr>
<td>Lacustrine soil</td>
<td>Deposited by lakes.</td>
</tr>
<tr>
<td>Marine soil</td>
<td>Deposited in ocean basins, bays, beaches and estuaries.</td>
</tr>
</tbody>
</table>

NOTE: Consistency/density has been provided for FILL material to assist site access and temporary works design. Near surface conditions may vary with time.
### Soil Description Explanation Sheet (2 of 2)

#### SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

<table>
<thead>
<tr>
<th>FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)</th>
<th>USC</th>
<th>PRIMARY NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide range in grain size and substantial amounts of all intermediate particle sizes.</td>
<td>GW</td>
<td>GRAVEL</td>
</tr>
<tr>
<td>Predominantly one size or a range of sizes with more intermediate sizes missing.</td>
<td>GP</td>
<td>GRAVEL</td>
</tr>
<tr>
<td>Non-plastic fines (for identification procedures see ML below).</td>
<td>GM</td>
<td>SILTY GRAVEL</td>
</tr>
<tr>
<td>Plastic fines (for identification procedures see CL below).</td>
<td>GC</td>
<td>CLAYEY GRAVEL</td>
</tr>
<tr>
<td>Wide range in grain sizes and substantial amounts of all intermediate sizes.</td>
<td>SW</td>
<td>SAND</td>
</tr>
<tr>
<td>Predominantly one size or a range of sizes with some intermediate sizes missing.</td>
<td>SP</td>
<td>SAND</td>
</tr>
<tr>
<td>Non-plastic fines (for identification procedures see ML below).</td>
<td>SM</td>
<td>SILTY SAND</td>
</tr>
<tr>
<td>Plastic fines (for identification procedures see CL below).</td>
<td>SC</td>
<td>CLAYEY SAND</td>
</tr>
</tbody>
</table>

#### IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.

<table>
<thead>
<tr>
<th>DRY STRENGTH</th>
<th>DILATANCY</th>
<th>TOUGHNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>None to Low</td>
<td>Quick to slow</td>
<td>None</td>
</tr>
<tr>
<td>Medium to High</td>
<td>None</td>
<td>Medium</td>
</tr>
<tr>
<td>Low to medium</td>
<td>Slow to very slow</td>
<td>Low</td>
</tr>
<tr>
<td>Low to medium</td>
<td>Slow to very slow</td>
<td>Low to medium</td>
</tr>
<tr>
<td>High</td>
<td>None</td>
<td>High</td>
</tr>
<tr>
<td>Medium to High</td>
<td>None</td>
<td>Low to medium</td>
</tr>
</tbody>
</table>

#### HIGHLY ORGANIC SOILS

Readily identified by colour, odour, spongy feel and frequently by fibrous texture. Pt PEAT

### COMMON DEFECTS IN SOIL

<table>
<thead>
<tr>
<th>TERM</th>
<th>DEFINITION</th>
<th>DIAGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTING</td>
<td>A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.</td>
<td><img src="https://example.com/softened-zone.png" alt="SOFTENED ZONE" /></td>
</tr>
<tr>
<td>JOINT</td>
<td>A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term ‘fracture’ may be used for irregular joints &lt;0.2 m in length.</td>
<td><img src="https://example.com/tube.png" alt="TUBE" /></td>
</tr>
<tr>
<td>SHEARED ZONE</td>
<td>Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.</td>
<td><img src="https://example.com/tube-cast.png" alt="TUBE CAST" /></td>
</tr>
<tr>
<td>SHEARED SURFACE</td>
<td>A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.</td>
<td><img src="https://example.com/infilled-seam.png" alt="INFLLED SEAM" /></td>
</tr>
</tbody>
</table>

- Low plasticity – Liquid Limit w_L less than 35%.
- Medium plasticity – w_L between 35% and 50%.
- High plasticity – w_L greater than 50%.
### Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Aspendale

**date started:** 20 Feb 2017

**date completed:** 22 Feb 2017

**logged by:** BP

**checked by:** KJ

---

#### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Water</th>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>E</td>
<td>FILL: ASPHALT</td>
<td>E</td>
<td>100mm.</td>
</tr>
<tr>
<td>0.5</td>
<td>E</td>
<td>FILL: CLAYEY GRAVEL</td>
<td>M</td>
<td>medium to coarse grained, dark grey, orange.</td>
</tr>
<tr>
<td>1.0</td>
<td>SP</td>
<td>SAND: fine to coarse grained, grey, becoming pale grey</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td></td>
<td>becoming brown, pale brown, grey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td></td>
<td>becoming brown, orange-brown, trace of fines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td></td>
<td>becoming grey, trace of quartz gravel, fine to coarse grained</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

#### Material Substance

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **SOIL CLASSIFICATIONSymbol:** based on Unified Classification System
- **SOIL DESCRIPTION:**
  - FILL: ASPHALT: 100mm.
  - FILL: CLAYEY GRAVEL: medium to coarse grained, dark grey, orange.
  - SAND: fine to coarse grained, grey, becoming pale grey.
  - becoming brown, pale brown, grey.
  - becoming brown, orange-brown, trace of fines.
  - becoming grey, trace of quartz gravel, fine to coarse grained.

---

#### Technical Details

- **Drill model:** Xplora 50, Truck mounted
- **Casing diameter:** HW
- **Surface elevation:** 6.56 m (AHD)
- **Angle from horizontal:** 90°

---

#### Drilling Support

- **Support:** M mud, N nil, C casing
- **Penetration:** no resistance ranging to refusal

---

#### Water Levels

- **Water level on date shown:**
  - 10-Oct-12 water level on date shown

---

#### Classification Symbol & Consistency / Relative Density

- **Classification:** based on Unified Classification System
- **Consistency / Relative Density:**
  - VS very soft
  - S soft
  - F firm
  - ST stiff
  - VST very stiff
  - H hard
  - Fb friable
  - VL very loose
  - L loose
  - MD medium dense
  - D dense
  - VD very dense

---

#### Additional Observations

- **Drill model:** Xplora 50, Truck mounted
- **Angle from horizontal:** 90°
- **Casing diameter:** HW
- **Surface elevation:** 6.56 m (AHD)
- **Drilling fluid:** Polymer

---

#### Soil Type

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **Material description:** structure and additional observations

---

#### Soil Samples & Field Tests

- **Samples & Field Tests:**
  - water outflow
  - water inflow
  - penetration
  - no resistanceranging to refusal

---

#### Moisture Conditions

- **Moisture:**
  - DM dry
  - WW wet
  - Wp liquid limit
  - VLS very loose
  - L loose
  - MD medium dense
  - D dense
  - VD very dense

---

#### Specifications

- **Drilling Fluid:** Polymer
**Engineering Log - Borehole**


principal: *Level Crossing Removal Authority*

project: *Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea*

location: *Station Street, Aspendale*

**Borehole ID:** ASPEN-BH01

**date started:** 20 Feb 2017

**date completed:** 22 Feb 2017

**logged by:** BP

**checked by:** KJ

**drilling information**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
<th>graphic log</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>water</td>
<td>SPT 14, 12, 10</td>
<td>SAND: fine to coarse grained, grey. (continued)</td>
</tr>
<tr>
<td>AS</td>
<td>samples &amp; field tests</td>
<td>SPT 12, 21, 29</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>water</td>
<td>SPT 10, 11/50</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>water</td>
<td>SPT 4, 3, 4</td>
<td></td>
</tr>
</tbody>
</table>

**material substance**

| SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components |
|-------------------------------------|-----------------------------|
| SAND: fine to coarse grained, grey. (continued) |

**CLAY:** high plasticity, green, grey, trace of sand.

**CLAYEY SAND:** fine to coarse grained, green-grey, mottled orange-brown, medium plasticity.

**QUATERNARY SANDS**

**TERTIARY BRIGHTON GROUP**

**method & support**

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>classification symbol &amp; soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>water</td>
<td>SPT 14, 12, 10</td>
</tr>
<tr>
<td>AS</td>
<td>samples &amp; field tests</td>
<td>SPT 12, 21, 29</td>
</tr>
<tr>
<td>W</td>
<td>water</td>
<td>SPT 10, 11/50</td>
</tr>
<tr>
<td>V</td>
<td>water</td>
<td>SPT 4, 3, 4</td>
</tr>
</tbody>
</table>

**graphic log**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>SAND: fine to coarse grained, grey. (continued)</td>
</tr>
<tr>
<td>-3</td>
<td>SAND: fine to coarse grained, grey. (continued)</td>
</tr>
<tr>
<td>-4</td>
<td>SAND: fine to coarse grained, grey. (continued)</td>
</tr>
<tr>
<td>-5</td>
<td>SAND: fine to coarse grained, grey. (continued)</td>
</tr>
<tr>
<td>-6</td>
<td>SAND: fine to coarse grained, grey. (continued)</td>
</tr>
<tr>
<td>-7</td>
<td>SAND: fine to coarse grained, grey. (continued)</td>
</tr>
<tr>
<td>-8</td>
<td>SAND: fine to coarse grained, grey. (continued)</td>
</tr>
<tr>
<td>-9</td>
<td>SAND: fine to coarse grained, grey. (continued)</td>
</tr>
</tbody>
</table>

**material substance**

<table>
<thead>
<tr>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>ST</td>
<td>stiff</td>
</tr>
<tr>
<td>VST</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
</tr>
<tr>
<td>Depth (m)</td>
<td>Classification</td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
</tr>
<tr>
<td>17.0</td>
<td>SPT</td>
</tr>
<tr>
<td>18.0</td>
<td></td>
</tr>
<tr>
<td>19.0</td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td></td>
</tr>
<tr>
<td>21.0</td>
<td></td>
</tr>
</tbody>
</table>

**TERTIARY BRIGHTON GROUP**

**HP 350 - 450 kPa**

**HAND DRILLING**

**METHOD & SUPPORT**

- **M** mud
- **C** casing
- **N** nil
- **D** disturbed sample
- **E** environmental sample
- **SS** split spoon sample
- **U#** undisturbed sample, #mm diameter
- **HP** hand penetrometer (kPa)
- **N** standard penetration test (SPT)
- **N*** SPT - sample recovered
- **Nc** SPT with solid cone
- **VS** vane shear, peak/remoulded (kPa)
- **R** refusal
- **HB** hammer bouncing

**CONSISTENCY / RELATIVE DENSITY**

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

**MOISTURE**

- **V** dry
- **M** moist
- **W** wet
- **Wp** plastic limit
- **Wi** liquid limit

**MOISTURE CONDITION**

- **DM** dry
- **WW** moist
- **Wld** wet
- **plastic limit**
- **liquid limit**

**WATER**

- **water inflow**
- **water outflow**

**DRILLING INFORMATION**

- **Station Street, Aspendale**
- **Surface elevation:** 6.56 m (AHD)
- **Angle from horizontal:** 90°
- **Method:** HAND DRILLING

**MATERIAL SUBSTANCE**

<table>
<thead>
<tr>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CLASSIFICATION SYMBOL & SOIL DESCRIPTION**

- **M** mud
- **C** casing
- **N** nil
- **D** disturbed sample
- **E** environmental sample
- **SS** split spoon sample
- **U#** undisturbed sample, #mm diameter
- **HP** hand penetrometer (kPa)
- **N** standard penetration test (SPT)
- **N*** SPT - sample recovered
- **Nc** SPT with solid cone
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- **VD** very dense

**MOISTURE**

- **V** dry
- **M** moist
- **W** wet
- **Wp** plastic limit
- **Wi** liquid limit

**MOISTURE CONDITION**

- **DM** dry
- **WW** moist
- **Wld** wet
- **plastic limit**
- **liquid limit**

**WATER**

- **water inflow**
- **water outflow**

**DRILLING INFORMATION**

- **Station Street, Aspendale**
- **Surface elevation:** 6.56 m (AHD)
- **Angle from horizontal:** 90°
- **Method:** HAND DRILLING
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne Pty. Ltd.  
**principal:** Level Crossing Removal Authority  
**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**location:** Station Street, Aspendale  
**date started:** 20 Feb 2017  
**date completed:** 22 Feb 2017  
**logged by:** BP  
**checked by:** KJ

---

**SOIL DESCRIPTION:**

### CLAYEY SAND
fine to medium grained, pale grey, mottled green-grey, brown, low plasticity, with some pockets of fine to medium grained gravel.

(continued)

### SILTY SAND
fine grained, brown, mottled orange-brown, with some pockets of fine to coarse grained gravel, trace of high plasticity clay pockets.

becoming dark green-grey

### TERTIARY BRIGHTON GROUP
GELIBRAND MARL

SPT refusal on gravel band

---

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**material description**

**CLAYEY SAND**

- fine to medium grained, pale grey, mottled green-grey, brown, low plasticity, with some pockets of fine to medium grained gravel.

(continued)

**SILTY SAND**

- fine grained, brown, mottled orange-brown, with some pockets of fine to coarse grained gravel, trace of high plasticity clay pockets.

becoming dark green-grey

---

**graphic log**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>SC</th>
<th>SM</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**material description**

**CLAYEY SAND:** fine to medium grained, pale grey, mottled green-grey, brown, low plasticity, with some pockets of fine to medium grained gravel.

(continued)

**SILTY SAND:** fine grained, brown, mottled orange-brown, with some pockets of fine to coarse grained gravel, trace of high plasticity clay pockets.

becoming dark green-grey

---

**structure and additional observations**

**TERTIARY BRIGHTON GROUP**

**GELIBRAND MARL**

SPT refusal on gravel band

---

**method & support**

- AD: auger drilling
- AS: auger screwing
- HA: hand auger
- W: washbore
- HDD: non-destructive drilling

**penetration**

- no resistance
- ranging to refusal

**water**

- 15-Oct-12 water level on date shown
- water inflow
- water outflow

---

**classification symbol & soil description**

- based on Unified Classification System

**moisture**

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

---

**coffey**

A TETRA TECH COMPANY
### Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.  
**principal:** Level Crossing Removal Authority  
**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**location:** Station Street, Aspendale  
**date started:** 20 Feb 2017  
**date completed:** 22 Feb 2017  
**logged by:** BP  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Method &amp; Support</th>
<th>Water</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.0</td>
<td>SPT 12, 14, 17</td>
<td>GM</td>
<td>SM</td>
<td>SILTY SAND: fine grained, brown, mottled orange-brown, with some pockets of fine to coarse grained gravel, trace of high plasticity clay pockets. (continued)</td>
</tr>
<tr>
<td>28.0</td>
<td>SPT 11, 20, 18</td>
<td>GM</td>
<td>MD</td>
<td>becoming green-grey, mottled dark green</td>
</tr>
<tr>
<td>30.0</td>
<td>SPT 20, 26, 23</td>
<td>GM</td>
<td>MD</td>
<td>GELLIBRAND MARL</td>
</tr>
</tbody>
</table>

#### Material Substance

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Consistency / Relative Density</th>
<th>Moisture Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.0</td>
<td>100</td>
<td>DM</td>
</tr>
<tr>
<td>28.0</td>
<td>200</td>
<td>WW</td>
</tr>
<tr>
<td>30.0</td>
<td>300</td>
<td>WP</td>
</tr>
<tr>
<td>32.0</td>
<td>400</td>
<td>LD</td>
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</tbody>
</table>

#### Soil Type

- plasticity or particle characteristic, colour, secondary and minor components
- material description
- structure and additional observations

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>SOIL TYPE</th>
<th>Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
<td>SAND</td>
<td>10-Oct-12</td>
</tr>
<tr>
<td>34.0</td>
<td></td>
<td>water level on date shown</td>
</tr>
<tr>
<td>35.0</td>
<td></td>
<td>water inflow</td>
</tr>
<tr>
<td>37.0</td>
<td></td>
<td>water outflow</td>
</tr>
</tbody>
</table>

#### Notes

- Drilling fluid: Polymer
- Casing diameter: HW
- Surface elevation: 6.56 m (AHD)
- Angle from horizontal: 90°
### Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Aspendale

**Borehole ID:** ASPEN-BH01

**date started:** 20 Feb 2017

**date completed:** 22 Feb 2017

**logged by:** BP

**checked by:** KJ

---

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 8.5</td>
<td>grout</td>
</tr>
<tr>
<td>8.5 - 9.5</td>
<td>50mm PVC, Class 18, unslotted</td>
</tr>
<tr>
<td>10.0 - 13.0</td>
<td>50mm PVC, Class 18, machine slotted</td>
</tr>
<tr>
<td>13.0 - 40.45</td>
<td>grout</td>
</tr>
</tbody>
</table>

**GELLIBRAND MARL**

**SILTY SAND:** fine grained, brown, mottled orange-brown, with some pockets of fine to coarse grained gravel, trace of high plasticity clay pockets.

Borehole ASPEN-BH01 terminated at 40.45 m

Target depth: Standpipe installation

Backfill details:
- 0.0m-8.5m: grout
- 8.5m-9.5m: bentonite
- 9.5m-13.0m: sand
- 13.0-40.45m: grout

Standpipe details:
- 0.0m-10.0m: unslotted 50mm PVC, Class 18
- 10.0m-13.0m: machine slotted, 50mm PVC, Class 18

End caps and flush mounted gatic cover

---

**Method & Support: SPT (15, 18, 25 N=43)**

**Material Substance:**

- **Classification Symbol:** SM
- **Material Description:** SILTY SAND

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**Water:**
- **Method:** 123
- **Support:** B
- **Penetration:** 15-Oct-12 water level on date shown
- **Consistency / Relative Density:**
  - **Moisture:** dry
  - **Density:** very soft

**Support & Field Tests:**
- **Samples:** bulk disturbed sample
- **Environmental Sample:** disturbed sample
- **SPT Sample:** standard penetration test (SPT)
- **Penetration:** refusal
- **Consistency / Relative Density:**
  - **Moisture:** very soft
  - **Density:** very soft
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Aspendale

**Borehole ID:** ASPEN-BH02

**date started:** 02 Mar 2017

**date completed:** 08 Mar 2017

**logged by:** BP

**checked by:** KJ

**material description**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description**
- **structure and additional observations**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>FILL: ASPHALT: 150mm.</td>
</tr>
<tr>
<td>2.0</td>
<td>FILL: Sandy GRAVEL: fine to coarse grained, orange-brown.</td>
</tr>
</tbody>
</table>
| 3.0       | SAND: fine to medium grained, dark grey, grey.
| 4.0       | becoming pale grey |
| 5.0       | becoming pale brown |
| 6.0       | becoming fine to coarse grained, brown, trace of fines |
| 7.0       | becoming grey, pale grey, trace of fine grained quartz gravel |

**method & support**

- **AD:** auger drilling
- **AS:** auger screwing
- **HA:** hand auger
- **W:** wash core
- **H:** hand hammer
- **NDD:** non destructive drilling

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>method &amp; support</th>
</tr>
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<tbody>
<tr>
<td>1.0</td>
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</table>
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| 4.0       | becoming pale grey |
| 5.0       | becoming pale brown |
| 6.0       | becoming fine to coarse grained, brown, trace of fines |
| 7.0       | becoming grey, pale grey, trace of fine grained quartz gravel |

**classification symbol & soil description**

- **based on Unified Classification System**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>classification symbol &amp; soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>MVD</td>
</tr>
<tr>
<td>2.0</td>
<td>L - MD</td>
</tr>
<tr>
<td>3.0</td>
<td>MD</td>
</tr>
<tr>
<td>4.0</td>
<td>D</td>
</tr>
<tr>
<td>5.0</td>
<td>W</td>
</tr>
<tr>
<td>6.0</td>
<td>VD</td>
</tr>
</tbody>
</table>

**water**

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

**samples & field tests**

- **B:** bulk disturbed sample
- **D:** disturbed sample
- **E:** environmental sample
- **SS:** split spoon sample
- **UH:** undisturbed sample #8mm diameter
- **HP:** hand penetrometer (kPa)
- **N:** standard penetration test (SPT)
- **Nc:** SPT with solid cone
- **VS:** vane shear; peak/remoulded (kPa)
- **R:** refusal
- **HB:** hammer bouncing

**classification symbol & soil description**

- **based on Unified Classification System**

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<thead>
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<tr>
<td>1.0</td>
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<td>D</td>
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<tr>
<td>5.0</td>
<td>W</td>
</tr>
<tr>
<td>6.0</td>
<td>VD</td>
</tr>
</tbody>
</table>

**moisture**

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

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### Engineering Log - Borehole

**Client:** Metro Trains Melbourne Pty. Ltd.  
**Principal:** Level Crossing Removal Authority  
**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**Location:** Station Street, Aspendale  
**Borehole ID.:** ASPEN-BH02  
**Date Started:** 02 Mar 2017  
**Date Completed:** 08 Mar 2017  
**Logged By:** BP  
**Checked By:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>M mud</td>
<td>N nil</td>
<td>SAND: fine to medium grained, dark grey, grey.</td>
</tr>
<tr>
<td>C casing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Material Substance

<table>
<thead>
<tr>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water:</strong></td>
</tr>
<tr>
<td>Surface elevation: 6.72 m (AHD)</td>
</tr>
<tr>
<td>Angle from horizontal: 90°</td>
</tr>
<tr>
<td>Hole diameter: 150 mm</td>
</tr>
</tbody>
</table>

**SOIL TYPE:**

- **QUATERNARY SANDS**
  - Sandy CLAY: high plasticity, dark grey, fine to coarse grained sand, grading to clayey sand, sulfuric odour.
  - SAND: fine to medium grained, brown, dark brown, with some fines.
  - Sandy CLAY: high plasticity, grey, mottled orange-brown, fine to medium grained sand.
  - becoming grey, mottled dark grey

**TERTIARY BRIGHTON GROUP**

- SAND: fine to medium grained, dark grey, grey. (continued)

**Consistency / Relative Density**

- VS: very soft
- S: soft
- F: firm
- ST: stiff
- VST: very stiff
- H: hard
- Fb: friable
- VL: very loose
- L: loose
- MD: medium dense
- D: dense
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## Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Aspendale

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sandy CLAY: high plasticity, grey, mottled orange-brown, fine to medium grained sand. (continued)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clayey Sand: fine grained, pale grey, mottled green-brown, low plasticity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>becoming mottled green-brown and pale grey</td>
</tr>
</tbody>
</table>

### Material Substance

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Plasticity or Particle Characteristic, Colour, Secondary and Minor Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>SANDY CLAY</td>
<td>high plasticity, grey, mottled orange-brown, fine to medium grained sand.</td>
</tr>
<tr>
<td>CLAYEY SAND</td>
<td>fine grained, pale grey, mottled green-brown, low plasticity.</td>
</tr>
</tbody>
</table>

### Soil Type

- **Sandy CLAY:** high plasticity, grey, mottled orange-brown, fine to medium grained sand.
- **CLAYEY SAND:** fine grained, pale grey, mottled green-brown, low plasticity.

### Drilling Details

- **Position:** E: 333586; N: 5789170 (MGA94)
- **Surface Elevation:** 6.72 m (AHD)
- **Angle from Horizontal:** 90°
- **Drill Model:** Xplora 50, Truck mounted
- **Drilling Fluid:** Polymer
- **Hole Diameter:** 150 mm
- **Drilling Fluid:** Polymer

### Drilling Method

- **Method:** Hand auger
- **Penetration:** SPT 2, 6, 7 N=10

### Additional Observations

- **Structural:** TERTIARY BRIGHTON GROUP
- **Penetration Test:** HP 200 - 300 kPa
**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
<th>classification symbol &amp; soil description based on Unified Classification System</th>
<th>consistency / relative density</th>
<th>soil moisture</th>
<th>water inflow</th>
<th>water outflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling</td>
<td>B bulk disturbed sample</td>
<td>ML Sandy SILT: medium liquid limit, pale brown, fine to coarse grained sand.</td>
<td>M VSt - H</td>
<td>very dense</td>
<td>D dry</td>
<td>very soft</td>
<td></td>
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<tr>
<td>AS auger screwing</td>
<td>C casing</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td>N nil</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>W washower</td>
<td>E environmental sample</td>
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</tr>
<tr>
<td>HA hand auger</td>
<td>SS split spoon sample</td>
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</tr>
<tr>
<td>NDD non destructive drilling</td>
<td>U# undisturbed sample #mm diameter</td>
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<td></td>
<td>HP hand penetrometer (kPa)</td>
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<tr>
<td></td>
<td>N standard penetration test (SPT)</td>
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<td>N* SPT - sample recovered</td>
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<tr>
<td></td>
<td>Nc SPT with solid cone</td>
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<tr>
<td></td>
<td>VS vane shear; peak/remoulded (kPa)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>R refusal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HB hammer bouncing</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>water inflow</td>
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<td></td>
<td>water outflow</td>
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</tr>
<tr>
<td></td>
<td>water level on date shown</td>
<td></td>
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</tbody>
</table>

**Material Substance:**

- **TERTIARY BRIGHTON GROUP**
  - HP >600 kPa

- **GELLIBRAND MARL**
  - VD

**Sandy SILT:** medium liquid limit, pale brown, fine to coarse grained sand.

- Becoming fine grained, dark green-grey

**CLAYEY SAND:** fine to coarse grained, brown, low plasticity, with some pockets of fine to medium grained gravel.

**SILTY SAND:** fine grained, green-grey, with some pockets of sandy clay and fine grained gravel, trace of shell fragments.
## Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.  
**principal:** Level Crossing Removal Authority  
**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**location:** Station Street, Aspendale  
**date:** 02 Mar 2017  
**date completed:** 08 Mar 2017  
**logged by:** BP  
**checked by:** KJ

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<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
<th>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</th>
<th>material description</th>
<th>classification symbol</th>
<th>SOIL TYPE (Unified System)</th>
<th>consistency / relative density</th>
<th>SOIL TYPE soil description</th>
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<tbody>
<tr>
<td>HANDD</td>
<td>N*</td>
<td>SM</td>
<td>GELLIBRAND MARL</td>
<td></td>
<td>GELLIBRAND MARL</td>
<td></td>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>washbore</td>
<td>N*</td>
<td>SM</td>
<td>GELLIBRAND MARL</td>
<td></td>
<td>GELLIBRAND MARL</td>
<td></td>
<td>S</td>
<td>very soft</td>
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<tr>
<td>non destructive</td>
<td>N*</td>
<td>SM</td>
<td>GELLIBRAND MARL</td>
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<td>GELLIBRAND MARL</td>
<td></td>
<td>F</td>
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<td></td>
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<td></td>
<td></td>
<td>ST</td>
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<tr>
<td>fluid</td>
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<td>VST</td>
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<td>support</td>
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<td>classification symbol</td>
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<td>consistency / relative density</td>
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<tr>
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<td>consistency / relative density</td>
<td>SOIL TYPE soil description</td>
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</tr>
<tr>
<td>hand auger</td>
<td>N*</td>
<td>SM</td>
<td>GELLIBRAND MARL</td>
<td></td>
<td>GELLIBRAND MARL</td>
<td></td>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>washbore</td>
<td>N*</td>
<td>SM</td>
<td>GELLIBRAND MARL</td>
<td></td>
<td>GELLIBRAND MARL</td>
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<td>S</td>
<td>very soft</td>
</tr>
<tr>
<td>non destructive</td>
<td>N*</td>
<td>SM</td>
<td>GELLIBRAND MARL</td>
<td></td>
<td>GELLIBRAND MARL</td>
<td></td>
<td>F</td>
<td>very stiff</td>
</tr>
<tr>
<td>drilling</td>
<td>fluid</td>
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<td></td>
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<td></td>
<td>VST</td>
<td>very stiff</td>
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<td>penetration</td>
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<td></td>
<td></td>
<td></td>
<td>H</td>
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<td></td>
<td></td>
<td></td>
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<td>W</td>
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</tbody>
</table>

**SOIL TYPE:**  
- Plasticity or particle characteristic, colour, secondary and minor components.

**material description:**  
- SM: Silty Sand, fine to coarse grained, green-grey, mottled yellow-brown, low plasticity.
- GELLIBRAND MARL: becoming grey, mottled yellow-brown, with some pockets of sandy clay, medium plasticity.

**SOIL TYPE (Unified System):**  
- VS: very soft
- S: soft
- F: firm
- ST: stiff
- VST: very stiff
- H: hard
- W: wet
- L: loose
- MD: medium dense
- D: dense

**Hand Penetrometer (kPa):**  
- HP: hand penetrometer
- Nc: SPT with solid cone
- Vs: vane shear, peak remoulded (kPa)
- R: refusal
- HB: hammer bouncing
# Engineering Log - Borehole

**Borehole ID.** ASPEN-BH02

**Location:** Station Street, Aspendale

**Client:** Metro Trains Melbourne Pty. Ltd.

**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**Date started:** 08 Mar 2017

**Date completed:** 08 Mar 2017

**Log sheet:** 6 of 6

## Borehole Log Details

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample &amp; Field Tests</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0-9.5</td>
<td>Grout</td>
<td></td>
</tr>
<tr>
<td>9.5-10.5</td>
<td>Machine slotted, 50mm PVC, Class 18</td>
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</tr>
<tr>
<td>11.0-14.0</td>
<td>Machine slotted, 50mm PVC, Class 18</td>
<td></td>
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</tbody>
</table>

**End caps and flush mounted gatic cover**

## Soil Types

- **GelliBRAND MARL**

<table>
<thead>
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<th>RL (m)</th>
<th>Description</th>
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<td>-35</td>
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<td>-41</td>
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<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
</tr>
</tbody>
</table>

**Drilling Information**

- **Method:** Hand auger
- **Support:** Non destructive drilling
- **Drill model:** Xplora 50, Truck mounted
- **Angle from horizontal:** 90°
- **Depth (m):** 41.0

**Logging Information**

- **Location:** E: 333586; N: 5789170 (MGA94)
- **Surface elevation:** 6.72 m (AHD)
- **Drilling fluid:** Polymer

**Consistency / Relative Density**

<table>
<thead>
<tr>
<th>Moisture Condition</th>
<th>Wet</th>
<th>Mois</th>
<th>Plastic</th>
<th>Liquid</th>
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<tbody>
<tr>
<td>Moisture</td>
<td>WET</td>
<td>MOIS</td>
<td>PLASTIC</td>
<td>LIFL.E</td>
</tr>
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</table>

**Soil Type:**

- **GelliBRAND MARL**

**Graphic Log:**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Symbol</th>
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</thead>
<tbody>
<tr>
<td>GelliBRAND MARL</td>
<td>GLM</td>
</tr>
</tbody>
</table>

## Additional Observations

- **Samples & Field Tests:**
  - **Consistency / Relative Density:**
  - **Moisture:**
  - **Penetration:**

## Diagram

- **Graph:**
  - **Depth (m):** 41.0
  - **Penetration:**
  - **Method:** Hand auger
  - **Support:** Non destructive drilling
  - **Drill model:** Xplora 50, Truck mounted
  - **Angle from horizontal:** 90°
  - **Depth (m):** 41.0

**Additional Details:**

- **Material Substances:**
  - **Soil Type:**
  - **Classification Symbol:**
  - **Samples & Field Tests:**

**Engineering Log - Borehole**

**Sheet:** 6 of 6

**Drawing File:** CDF_0_9_06_LIBRARY.GLB rev:AU Log  COF BOREHOLE: NON CORED  GEOTABTF10294AA CHELSPEN.GPJ  <<DrawingFile>> 05-07-2017 14:40
### Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Geological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Aspendale

---

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **method & support:**
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger
  - W: wash bore
  - HA: hand auger
  - NDD: non-destructive drilling

- **penetration:**
  - no resistance ranging to refusal

- **water:**
  - 10-Oct-12 water level on date shown

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

---

### Material Substance

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

- **material description:**
  - FILL: SAND: fine to coarse grained, black, brown, with some fines, with some rootlets, with some bark, traces of fine-grained gravel.
  - SAND: fine to coarse grained, grey, dark grey, traces of fine-grained gravel.
  - SAND: fine to coarse grained, pale grey, becoming pale brown.
  - SAND: fine to coarse grained, dark-brown, traces of fine
  - becoming brown, dark-brown, traces of fine
  - becoming pale-brown, loss of fines
  - with some shell fragments
  - becoming grey, fine to medium grained

---

### Consistency / Relative Density

- **moisture:**
  - VS: very soft
  - S: soft
  - F: firm
  - St: stiff
  - VSt: very stiff

- **density:**
  - H: hard
  - Fb: flakey
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VD: very dense

---

### Additional Observations

- **structure and additional observations:**
  - fill, yellow, fine to coarse grained, black, brown, with some fines, with some rootlets, with some bark, traces of fine-grained gravel.
  - SAND: fine to coarse grained, grey, dark grey, traces of fine-grained gravel.
  - SAND: fine to coarse grained, pale grey, becoming pale brown.
  - SAND: fine to coarse grained, dark-brown, traces of fine
  - becoming brown, dark-brown, traces of fine
  - becoming pale-brown, loss of fines
  - with some shell fragments
  - becoming grey, fine to medium grained

---

### Sheet Details

- **Borehole ID:** ASPEN-BH03
- **Date started:** 23 Feb 2017
- **Date completed:** 01 Mar 2017
- **Logged by:** BP
- **Checked by:** KJ
## Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.  
**principal:** Level Crossing Removal Authority  
**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**location:** Station Street, Aspendale

**date started:** 23 Feb 2017  
**date completed:** 01 Mar 2017  
**logged by:** BP  
**checked by:** KJ

### Materials Substance

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>graphic log</th>
<th>classification symbol</th>
<th>material description</th>
<th>support</th>
<th>samples &amp; field tests</th>
<th>water</th>
<th>material description</th>
<th>classification symbol</th>
<th>soil description</th>
<th>soil description</th>
<th>moisture</th>
<th>consistency / relative density</th>
</tr>
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<tbody>
<tr>
<td>2.0</td>
<td>SPT</td>
<td>SP</td>
<td>SAND: fine to coarse grained, dark grey, with some pockets of high plasticity clay.</td>
<td>M</td>
<td>mud</td>
<td>water</td>
<td>W</td>
<td>VL</td>
<td>QUATERNARY SANDS</td>
<td>TERTIARY BRIGHTON GROUP</td>
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<td></td>
</tr>
<tr>
<td>2.5</td>
<td>SPT</td>
<td>SP</td>
<td>SAND: fine to coarse grained, grey, brown-grey.</td>
<td>C</td>
<td>casing</td>
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<td>M</td>
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<tr>
<td>12.0</td>
<td>SPT</td>
<td>CH</td>
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<td>mud</td>
<td>water</td>
<td>W</td>
<td>VL</td>
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<td>M</td>
<td>VS</td>
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<tr>
<td>13.0</td>
<td>SPT</td>
<td>SC</td>
<td>CLAYEY SAND: fine grained, pale grey, high plasticity clay.</td>
<td>R</td>
<td>refusal</td>
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<td></td>
<td>M</td>
<td>VS</td>
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</table>

### Drilling Information

- **method & support:** AD auger drilling*, AS auger screwing*, HA hand auger, W washbore, HA hand auger, NDD non destructive drilling
- **samples & field tests:** B bulk disturbed sample, D disturbed sample, E environmental sample, SS split spoon sample, U# undisturbed sample, HP hand penetrometer (kPa), N SPT - sample recovered, Nc SPT with solid cone, VS vane shear, peak/remoulded (kPa), R refusal, HB hammer bouncing
- **classification symbol & soil description:** based on Unified Classification System
- **method & support:** AD auger drilling*, AS auger screwing*, HA hand auger, W washbore, HA hand auger, NDD non destructive drilling
- **samples & field tests:** B bulk disturbed sample, D disturbed sample, E environmental sample, SS split spoon sample, U# undisturbed sample, HP hand penetrometer (kPa), N SPT - sample recovered, Nc SPT with solid cone, VS vane shear, peak/remoulded (kPa), R refusal, HB hammer bouncing
- **classification symbol & soil description:** based on Unified Classification System
- **method & support:** AD auger drilling*, AS auger screwing*, HA hand auger, W washbore, HA hand auger, NDD non destructive drilling
- **samples & field tests:** B bulk disturbed sample, D disturbed sample, E environmental sample, SS split spoon sample, U# undisturbed sample, HP hand penetrometer (kPa), N SPT - sample recovered, Nc SPT with solid cone, VS vane shear, peak/remoulded (kPa), R refusal, HB hammer bouncing
- **classification symbol & soil description:** based on Unified Classification System
- **method & support:** AD auger drilling*, AS auger screwing*, HA hand auger, W washbore, HA hand auger, NDD non destructive drilling
- **samples & field tests:** B bulk disturbed sample, D disturbed sample, E environmental sample, SS split spoon sample, U# undisturbed sample, HP hand penetrometer (kPa), N SPT - sample recovered, Nc SPT with solid cone, VS vane shear, peak/remoulded (kPa), R refusal, HB hammer bouncing
- **classification symbol & soil description:** based on Unified Classification System
- **method & support:** AD auger drilling*, AS auger screwing*, HA hand auger, W washbore, HA hand auger, NDD non destructive drilling
- **samples & field tests:** B bulk disturbed sample, D disturbed sample, E environmental sample, SS split spoon sample, U# undisturbed sample, HP hand penetrometer (kPa), N SPT - sample recovered, Nc SPT with solid cone, VS vane shear, peak/remoulded (kPa), R refusal, HB hammer bouncing
- **classification symbol & soil description:** based on Unified Classification System
### Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Aspendale

**Borehole ID:** ASPEN-BH03

**date started:** 23 Feb 2017

**date completed:** 01 Mar 2017

**logged by:** BP

**checked by:** KJ

---

### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>penetration</th>
<th>samples &amp; field tests</th>
<th>soil type</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>physical properties</td>
<td></td>
</tr>
</tbody>
</table>

---

### Material Substance

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>penetration</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>M</td>
</tr>
</tbody>
</table>

---

### Soil Type

<table>
<thead>
<tr>
<th>soil type</th>
<th>soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>CLAYEY SAND: fine grained, pale grey, low plasticity. (continued)</td>
</tr>
<tr>
<td>SM</td>
<td>SILTY SAND: fine grained, green-brown, mottled pale grey, low plasticity, with some pockets of fine grained gravel.</td>
</tr>
<tr>
<td>ML</td>
<td>Sandy SILT: medium liquid limit, grey-brown, fine grained sand.</td>
</tr>
</tbody>
</table>

---

### Additional Observations

- CLAYEY SAND: fine grained, pale grey, low plasticity. (continued)
- SILTY SAND: fine grained, green-brown, mottled pale grey, low plasticity, with some pockets of fine grained gravel.
- Sandy SILT: medium liquid limit, grey-brown, fine grained sand.
<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>material substance</th>
<th>drilling information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOIL TYPE</strong>: plasticity or particle characteristic, colour, secondary and minor components</td>
<td><strong>material description</strong></td>
<td><strong>SPT sank 350mm under self weight</strong></td>
</tr>
<tr>
<td><strong>graphic log</strong></td>
<td><strong>classification symbol</strong></td>
<td><strong>No recovery in U63</strong></td>
</tr>
<tr>
<td><strong>samples &amp; field tests</strong></td>
<td><strong>water</strong></td>
<td><strong>GELLIBRAND MARL</strong></td>
</tr>
<tr>
<td><strong>water outflow</strong></td>
<td><strong>water inflow</strong></td>
<td><strong>SPT sank 350mm under own weight</strong></td>
</tr>
<tr>
<td><strong>penetration</strong></td>
<td><strong>no resistance</strong></td>
<td><strong>No recovery in U63</strong></td>
</tr>
<tr>
<td><strong>penetration level</strong></td>
<td><strong>penetration range</strong></td>
<td><strong>No recovery in U63</strong></td>
</tr>
<tr>
<td><strong>water outflow</strong></td>
<td><strong>water level shown</strong></td>
<td><strong>No recovery in U63</strong></td>
</tr>
</tbody>
</table>

**Sandy SILT**: medium liquid limit, grey-brown, fine-grained sand.

**CLAYEY SAND**: fine to medium grained, grey-green-grey, medium plasticity, with some pockets of high plasticity sandy clay.

**Sandy CLAY**: high plasticity, green-grey, fine-grained sand.

**CLAYEY SAND**: fine grained, green-grey, low plasticity, trace of fine grained gravel.

**CLAYEY SAND**: fine grained, green-grey, low plasticity, trace of fine grained gravel.
<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>material substance</th>
<th>samples &amp; field tests</th>
<th>material description</th>
<th>soil type: plasticity or particle characteristic, colour, secondary and minor components</th>
</tr>
</thead>
<tbody>
<tr>
<td>method</td>
<td>classification symbol</td>
<td>water</td>
<td>clayey sand</td>
<td>fine grained, green-grey, low plasticity, trace of fine grained gravel, (continued)</td>
</tr>
<tr>
<td>SPT 1, 9, 8</td>
<td>SC</td>
<td>12</td>
<td>becoming grey-brown, mottled pale green-grey, low to medium plasticity</td>
<td></td>
</tr>
<tr>
<td>N* = 17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 8, 11, 12</td>
<td>CL</td>
<td>20</td>
<td>sandy clay</td>
<td>low plasticity, pale grey, fine grained sand, trace of shell fragments.</td>
</tr>
<tr>
<td>N* = 23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPT 12, 12, 13</td>
<td>SPT</td>
<td>25</td>
<td>clayey sand</td>
<td>fine to medium grained, grey-brown, mottled pale green-grey, low plasticity.</td>
</tr>
<tr>
<td>N* = 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CLAYEY SAND:** fine to medium grained, grey-brown, mottled pale green-grey, low plasticity.
### Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Aspendale

**Borehole ID:** ASPEN-BH03

**date started:** 23 Feb 2017

**date completed:** 01 Mar 2017

**logged by:** BP

**checked by:** KJ

---

**Position:**

-34
-35
-36
-37
-38
-39
-40
-41

**Drilling Information**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0-7.5m</td>
<td>grout</td>
</tr>
<tr>
<td>7.5m-8.5m</td>
<td>bentonite</td>
</tr>
<tr>
<td>8.5m-12.0m</td>
<td>sand</td>
</tr>
<tr>
<td>12.0-40.05m</td>
<td>grout</td>
</tr>
</tbody>
</table>

**Backfill Details**

- 0.0m-7.5m: grout
- 7.5m-8.5m: bentonite
- 8.5m-12.0m: sand
- 12.0-40.05m: grout

**Standpipe Details**

- 0.0m-9.0m: unslotted 50mm PVC, Class 18
- 9.0m-12.0m: machine slotted, 50mm PVC, Class 18

**End caps and flush mounted gatic cover**

---

**Drilling Information**

- **Method:** HANDD
- **Support:** M mud
- **Penetration:** N nil
- **Samples & Field Tests:** B bulk disturbed sample
- **Classification Symbol:** SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components
- **Material Description:** Based on Unified Classification System
- **Consistency / Relative Density:** VS very soft
- **Moisture:** S very soft
- **Penetration Resistance:** F firm
- **Soil Description:** N stiff
- **SPT:** V very stiff
- **Hard:** H hard
- **Wet:** Fb friable
- **Drill Fluid:** VL very loose
- **Surface Elevation:** MD medium dense
- **Depth (m):** 40.05

---

**Graphic Log**

- * bit shown by suffix
- 10-Oct-12 water
- water inflow
- water outflow
- 19-Oct-12 water
- level on date shown
- no resistance ranging to refusal
- hand penetrometer (kPa)
- SPT - sample recovered
- SPT with solid cone
- SPT - standard penetration test (SPT)
- density, secondary and minor components
- hammer bouncing
- refusal
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne Pty. Ltd.  
**principal:** Level Crossing Removal Authority  
**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**location:** Station Street, Chelsea

---

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>E</td>
</tr>
<tr>
<td>1</td>
<td>SP</td>
</tr>
<tr>
<td>2</td>
<td>E</td>
</tr>
<tr>
<td>3</td>
<td>SP</td>
</tr>
<tr>
<td>4</td>
<td>E</td>
</tr>
<tr>
<td>5</td>
<td>SP</td>
</tr>
<tr>
<td>6</td>
<td>E</td>
</tr>
<tr>
<td>7</td>
<td>SP</td>
</tr>
<tr>
<td>8</td>
<td>E</td>
</tr>
<tr>
<td>9</td>
<td>SP</td>
</tr>
</tbody>
</table>

---

### Material Description

**SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components

**structure and additional observations:**

- **SPT:** Sample recovered
- **SPT with solid cone:** Vane shear; peak/remoulded (kPa)
- **refusal:** Hammer bouncing

---

### Consistency / Relative Density

<table>
<thead>
<tr>
<th>Consistency</th>
<th>Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>ST</td>
<td>stiff</td>
</tr>
<tr>
<td>VST</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>Pb</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
</tbody>
</table>

---

### Moisture

- **penetration:** 19-Oct-12 water level on date shown
- **water:** in/flow
- **water infiltration:** 10-Oct-12 water level on date shown
- **water outflow:**

---

### Support

- **M:** mud
- **C:** casing
- **N:** nil

---

### Soil Description

- **FILL:** ASPHALT: 100mm.
- **FILL:** Sandy GRAVEL: medium to coarse grained, sub-angular to angular, grey.
- **FILL:** CLAYEY SAND: medium to coarse grained, grey, mottled orange.
- **SAND:** fine to coarse grained, grey, dark grey, mottled dark brown, becoming pale grey, pale brown
- **becoming pale brown, mottled dark brown
- **becoming dark brown, trace of fines
- **becoming brown, grey, fine to medium grained
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Chelsea

**date started:** 06 Feb 2017

**date completed:** 08 Feb 2017

**logged by:** BP

**checked by:** KJ

---

**soil type:** plasticity or particle characteristic, colour, secondary and minor components

**material description:**

<table>
<thead>
<tr>
<th>depth (m)</th>
<th>soil type</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>SP</td>
<td>fine to coarse grained, grey, dark grey, (continued) becoming grey, mottled black</td>
</tr>
<tr>
<td>-3</td>
<td>SP</td>
<td>fine to coarse grained, grey, trace of shell fragments</td>
</tr>
<tr>
<td>-4</td>
<td>SP</td>
<td>fine to coarse grained, grey, trace of fine grained gravel.</td>
</tr>
<tr>
<td>-5</td>
<td>CL</td>
<td>medium to high plasticity, grey, with some sand, with some pockets of sandy clay.</td>
</tr>
</tbody>
</table>

---

**sandy clay:** low plasticity, grey, fine to coarse grained sand, trace of sand pockets.

---

**CLAY:** medium to high plasticity, dark grey, with some sand, with some pockets of sandy clay.

---

**graphic log:**

- **method & support:**
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger
  - W: washboat
  - HDD: non-destructive drilling
- **samples & field tests:**
  - B: bulk disturbed sample
  - D: disturbed sample
  - E: environmental sample
  - SS: split spoon sample
  - Ud: undisturbed sample #mm diameter
  - HP: hand penetrometer (kPa)
  - N: standard penetration test (SPT)
  - N*: SPT - sample recovered
  - Nc: SPT with solid cone
  - VS: vane shear; peak/remoulded (kPa)
  - R: refusal
  - HB: hammer bouncing
- **water:**
  - 10-Oct-12 water level on date shown
  - water inflow
  - water outflow

---

**classification symbol & soil description:**

- **moisture:**
  - D: dry
  - M: moist
  - W: wet
- **consistency/relative density:**
  - VS: very soft
  - S: soft
  - F: firm
  - FF: stiff
  - VST: very stiff
  - H: hard
  - Fb: friable
  - VL: very loose
  - LM: loose
  - MD: medium dense
  - D: dense
  - VD: very dense

---

**structure and additional observations:**

- QUATERNARY SANDS
- TERTIARY BRIGHTON GROUP

---

**additional information:**

- drill model: Xplora 50, Truck mounted
- drilling fluid: Polymer
- hole diameter: 100 mm
- surface elevation: 6.63 m (AHD)
- angle from horizontal: 90°
## Engineering Log - Borehole

### client:
Metro Trains Melbourne Pty. Ltd.

### principal:
Level Crossing Removal Authority

### project:
Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

### location:
Station Street, Chelsea

### date started:
06 Feb 2017

### date completed:
08 Feb 2017

### logged by:
BP

### checked by:
KJ

---

### Drilling Information

<table>
<thead>
<tr>
<th>Support</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>M mud</td>
<td>C casing</td>
<td>SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
</tbody>
</table>

### Material Description

<table>
<thead>
<tr>
<th>Deeper</th>
<th>CI-CH</th>
<th>CLAY: medium to high plasticity, dark grey, with some sand, with some pockets of sandy clay. (continued) becoming pale grey, with some pockets of green, low plasticity fines</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0</td>
<td>SP</td>
<td>SAND: medium to coarse grained, grey, with some fines.</td>
</tr>
<tr>
<td>12.0</td>
<td>CH</td>
<td>CLAY: high plasticity, grey, trace of fine to medium grained sand. becoming grey, mottled orange-brown, trace of fine to medium grained cemented sand gravels</td>
</tr>
<tr>
<td>16.0</td>
<td>CI-CH</td>
<td>CLAY: medium to high plasticity, pale grey, with some fine grained sand.</td>
</tr>
<tr>
<td>17.0</td>
<td>SP</td>
<td>SAND: medium to coarse grained, brown, trace of shell fragments. layer of iron cemented sand</td>
</tr>
</tbody>
</table>

### Borehole ID:
CHEL-BH01

### Surface Elevation:
6.63 m (AHD)

### Angle from Horizontal:
90°

### Drilling Fluid:
Polymer

---

### Soil Type:
Plasticity or particle characteristic, colour, secondary and minor components

---

### Moisture Condition:
DM (dry), Wp (wet)

### Consistency / Relative Density:
VS (very soft), S (soft)

---

### Water Level:
10-Oct-12 water level on date shown

---

### Additional Observations:
Inferred clay band, 300mm thick
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne Pty. Ltd.  
**Principal:** Level Crossing Removal Authority  
**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**Location:** Station Street, Chelsea

**Position:** E: 334777; N: 5786594 (MGA94)  
**Drill Model:** Xplora 50, Truck mounted  
**Drilling Fluid:** Polymer  
**Surface Elevation:** 6.63 m (AHD)  
**Angle from Horizontal:** 90°  
**Hole Diameter:** 100 mm  
**Depth:** 31.0 m

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Auger</td>
<td>CLAYEY SAND</td>
<td>Fine to medium grained, pale grey, pale red, brown, low plasticity, with some cemented sand recovered as medium to coarse grained gravel. (continued)</td>
</tr>
<tr>
<td></td>
<td>becoming pale green-brown, mottled pale red, trace of fine grained gravel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SILTY SAND</td>
<td>Fine to coarse grained, green-grey, low plasticity, with some pockets of fine to medium grained gravel &amp; high plasticity clay.</td>
</tr>
<tr>
<td></td>
<td>becoming pale green-brown, bands of pale grey, mottled pale red</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No recovery in U63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TERTIARY BRIGHTON GROUP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GELLIBRAND MARL</td>
<td></td>
</tr>
</tbody>
</table>

**Method & Support:**  
- AD: auger drilling  
- AS: auger screwing  
- HA: hand auger  
- W: wash hose  
- HDD: non destructive drilling

**Method & Support:**  
- M: mud  
- N: nil  
- S: sample  
- C: casing  
- U: undisturbed  
- D: disturbed  
- E: environmental  
- SS: split spoon  
- HP: hand penetrometer (kPa)  
- Nc: SPT with solid cone  
- VS: vane shear; peak/remoulded (kPa)  
- R: refusal  
- HB: hammer bouncing  
- V: V-bit

**Material Substance:**  
- SC: Clayey Sand  
- SM: Silty Sand

**Support:**  
- AD: auger drilling  
- HA: hand auger  
- W: wash hose  
- HDD: non destructive drilling

**Samples & Field Tests:**  
- B: bulk disturbed sample  
- D: disturbed sample  
- E: environmental sample  
- SS: split spoon sample  
- U#: undisturbed sample #3mm diameter  
- N: SPT - sample recovered  
- NC: SPT with solid cone  
- VS: vane shear; peak/remoulded (kPa)  
- R: refusal  
- HB: hammer bouncing  
- W: wash hose

**Classification Symbol & Soil Description:**  
- Based on Unified Classification System

**Consistency / Relative Density:**  
- VS: very soft  
- S: soft  
- F: firm  
- ST: stiff  
- VST: very stiff  
- H: hard  
- Fb: friable  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense  
- VD: very dense

**Moisture:**  
- M: moist  
- W: wet  
- L: lossy

**Penetration:**  
- 10-Oct-12 water level on date shown

**Additional Observations:**  
- 10-Oct-12 water level on date shown

**Structure and Additional Observations:**  
- Tertiary Brighton Group

**Gellibrand Marl**

**Geological and Geotechnical Investigation, Aspendale and Chelsea**

**Drilling Information:**  
- Position: E: 334777; N: 5786594 (MGA94)  
- Surface Elevation: 6.63 m (AHD)  
- Angle from horizontal: 90°  
- Hole Diameter: 100 mm  
- Depth: 31.0 m  
- Drilling Fluid: Polymer

**Logging Information:**  
- Method: Hand Auger  
- Support: M: mud  
- Samples & Field Tests: B: bulk disturbed sample  
- Classification Symbol & Soil Description: based on Unified Classification System

**Consistency / Relative Density:**  
- VS: very soft  
- S: soft  
- F: firm  
- ST: stiff  
- VST: very stiff  
- H: hard  
- Fb: friable  
- VL: very loose  
- L: loose  
- MD: medium dense  
- D: dense  
- VD: very dense

**Moisture:**  
- M: moist  
- W: wet  
- L: lossy

**Additional Observations:**  
- 10-Oct-12 water level on date shown

**Structure and Additional Observations:**  
- Tertiary Brighton Group

**Gellibrand Marl**
### SOIL TYPE

| Depth (m) | Soil Type | Classification | Color | Plasticity
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>33.0</td>
<td>SM</td>
<td>Silty Sand</td>
<td>Green-grey</td>
<td>Medium plasticity</td>
</tr>
<tr>
<td>34.0</td>
<td>SC</td>
<td>Clayey Sand</td>
<td>Grey</td>
<td>Low plasticity</td>
</tr>
<tr>
<td>35.0</td>
<td>SM</td>
<td>Silty Sand</td>
<td>Green-grey</td>
<td>Medium plasticity</td>
</tr>
</tbody>
</table>

### Soil Description

- **SM**: Fine to coarse grained, green-grey, low plasticity, with some pockets of fine to medium grained gravel & high plasticity clay.
- **SC**: Fine to coarse grained, grey, low plasticity, with some pockets of fine to medium grained gravel.
- **SM**: Fine to coarse grained, green-grey, medium plasticity.

### Drilling Information

- **Method**: Hand auger
- **Support**: M - mud, C - casing
- **Samples & Field Tests**: N - nil
- **Consistency / Relative Density**: Moisture content, density
- **Classification Symbol & Soil Description**: Based on Unified Classification System
- **Consistency / Relative Density**: Moisture content, density

### Additional Observations

- **Environment**: Samples & field tests
- **Penetration**: No resistance ranging to refusal
- **Depth**: 10-Oct-12 water level on date shown
- **Water**: Level in borehole
  - Water inflow
  - Water outflow

---

**Client**: Metro Trains Melbourne Pty. Ltd.

**Project**: Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**Location**: Station Street, Chelsea

---

**Borehole ID**: CHEL-BH01

**Date Started**: 06 Feb 2017

**Date Completed**: 08 Feb 2017

---

**Logged By**: BP

**Checked By**: KJ
### Engineering Log - Borehole

**Borehole ID.** CHEL-BH01  
**Client:** Metro Trains Melbourne Pty. Ltd.  
**Principal:** Level Crossing Removal Authority  
**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**Location:** Station Street, Chelsea  
**Date Started:** 06 Feb 2017  
**Date Completed:** 08 Feb 2017  
**Logged By:** BP  
**Checked By:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Classification Symbol</th>
<th>Material Description</th>
<th>Consistency / Relative Density</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td></td>
<td></td>
<td>SM</td>
<td>SILTY SAND: fine to coarse grained, green-grey, medium plasticity. becoming green-grey, mottled green-brown</td>
<td>M</td>
<td>GELLIBRAND MARL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MD</td>
<td></td>
</tr>
</tbody>
</table>

#### Borehole Details

- **Drill Model:** Xplora 50, Truck mounted  
- **Drilling Fluid:** Polymer  
- **Surface Elevation:** 6.63 m (AHD)  
- **Angle from Horizontal:** 90°  
- **Hole Diameter:** 100 mm

#### SOIL TYPE

- **Material Description:** Plasticity or particle characteristic, colour, secondary and minor components

#### Drilling Observation

- **Borehole CHEL-BH01 terminated at 40.75 m**
- **Standpipe installation**
- **Backfill details:**
  - 0.0m-3.5m: grout
  - 3.5m-10.5m: bentonite
  - 10.5m-14.0m: sand
  - 14.0-40.75m: grout
- **Standpipe details:**
  - 0.0m-11.0m: unslotted 50mm PVC, Class 18
  - 11.0m-14.0m: machine slotted, 50mm PVC, Class 18
- **End caps and flush mounted gatic cover**
### Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Chelsea

**position:** E: 334685, N: 5786111 (MGA94)

**drill model:** XploRa 50, Truck mounted

**drilling fluid:** Polymer

**angle from horizontal:** 90°

**hole diameter:** 100 mm

---

#### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support penetration</th>
<th>samples &amp; field tests</th>
<th>material substance</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>method &amp; support penetration</td>
<td>water</td>
<td>SAND:</td>
<td>fine to medium grained, brown, grey. becoming grey-brown</td>
</tr>
<tr>
<td>method &amp; support penetration</td>
<td>water</td>
<td>SAND:</td>
<td>fine to medium grained, yellow-brown.</td>
</tr>
<tr>
<td>method &amp; support penetration</td>
<td>water</td>
<td>Sandy CLAY:</td>
<td>medium plasticity, grey, fine grained sand.</td>
</tr>
<tr>
<td>method &amp; support penetration</td>
<td>water</td>
<td>Sandy CLAY:</td>
<td>medium plasticity, grey, fine grained sand.</td>
</tr>
<tr>
<td>method &amp; support penetration</td>
<td>water</td>
<td>CLAY:</td>
<td>high plasticity, grey-green.</td>
</tr>
</tbody>
</table>

---

#### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**material description:**

- **SAND:** fine to medium grained, brown, grey. becoming grey-brown
- **SAND:** fine to medium grained, yellow-brown.
- **Sandy CLAY:** low plasticity, grey-green, fine grained sand.
- **Sandy CLAY:** medium plasticity, grey, fine grained sand.
- **CLAY:** high plasticity, grey-green.

---

#### Drilling Information

- **Borehole ID:** CHEL-BH02
- **client:** Metro Trains Melbourne Pty. Ltd.
- **principal:** Level Crossing Removal Authority
- **project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea
- **location:** Station Street, Chelsea
- **position:** E: 334685, N: 5786111 (MGA94)
- **drill model:** XploRa 50, Truck mounted
- **drilling fluid:** Polymer
- **angle from horizontal:** 90°
- **hole diameter:** 100 mm
- **surface elevation:** 6.58 m (AHD)
- **water level on date shown:** 10-Oct-12
- **10-Oct-12 water level on date shown:** 10-Oct-12

---

#### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

- **material description:**
  - **SAND:** fine to medium grained, brown, grey. becoming grey-brown
  - **SAND:** fine to medium grained, yellow-brown.
  - **Sandy CLAY:** low plasticity, grey-green, fine grained sand.
  - **Sandy CLAY:** medium plasticity, grey, fine grained sand.
  - **CLAY:** high plasticity, grey-green.

---

#### Drilling Information

- **Borehole ID:** CHEL-BH02
- **client:** Metro Trains Melbourne Pty. Ltd.
- **principal:** Level Crossing Removal Authority
- **project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea
- **location:** Station Street, Chelsea
- **position:** E: 334685, N: 5786111 (MGA94)
- **drill model:** XploRa 50, Truck mounted
- **drilling fluid:** Polymer
- **angle from horizontal:** 90°
- **hole diameter:** 100 mm
- **surface elevation:** 6.58 m (AHD)

---

#### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

- **material description:**
  - **SAND:** fine to medium grained, brown, grey. becoming grey-brown
  - **SAND:** fine to medium grained, yellow-brown.
  - **Sandy CLAY:** low plasticity, grey-green, fine grained sand.
  - **Sandy CLAY:** medium plasticity, grey, fine grained sand.
  - **CLAY:** high plasticity, grey-green.

---

#### Drilling Information

- **Borehole ID:** CHEL-BH02
- **client:** Metro Trains Melbourne Pty. Ltd.
- **principal:** Level Crossing Removal Authority
- **project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea
- **location:** Station Street, Chelsea
- **position:** E: 334685, N: 5786111 (MGA94)
- **drill model:** XploRa 50, Truck mounted
- **drilling fluid:** Polymer
- **angle from horizontal:** 90°
- **hole diameter:** 100 mm
- **surface elevation:** 6.58 m (AHD)

---

#### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

- **material description:**
  - **SAND:** fine to medium grained, brown, grey. becoming grey-brown
  - **SAND:** fine to medium grained, yellow-brown.
  - **Sandy CLAY:** low plasticity, grey-green, fine grained sand.
  - **Sandy CLAY:** medium plasticity, grey, fine grained sand.
  - **CLAY:** high plasticity, grey-green.
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne Pty. Ltd.
**principal:** Level Crossing Removal Authority
**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea
**location:** Station Street, Chelsea

---

**position:** E: 334685; N: 576811 (MGA94)  
surface elevation: 6.58 m (AHD)  
angle from horizontal: 90°

**drill model:** Xplora 50, Truck mounted  
drilling fluid: Polymer  
hole diameter: 100 mm

---

### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**CLAY:** high plasticity, grey-green.

**SAND:** fine to medium grained, pale brown.

**CLAYEY SAND:** fine to coarse grained, pale grey, mottled orange-brown, medium plasticity.

---

**SPT sank 370mm under self weight**

**TERTIARY BRIGHTON GROUP**

**HP 150 - 200 kPa**

---

**method & support:**
- AD: auger drilling
- AS: auger screwing
- HA: hand auger
- W: washbore
- NH: non-destructive drilling

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

---

**material description**

**CLAY:** high plasticity, grey-green. (continued)

**SAND:** fine to medium grained, pale brown.

**CLAYEY SAND:** fine to coarse grained, pale grey, mottled orange-brown, medium plasticity.

---

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

**moisture:**
- VS: very soft
- V: soft
- F: firm
- St: stiff
- VSf: very stiff
- H: hard
- Fb: friable
- VL: very loose
- L: loose
- MD: medium dense
- D: dense
- VD: very dense
# Engineering Log - Borehole

**Client:** Metro Trains Melbourne Pty. Ltd.

**Principal:** Level Crossing Removal Authority

**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**Location:** Station Street, Chelsea

**Borehole ID:** CHEL-BH02

**Date started:** 16 Mar 2017

**Date completed:** 20 Mar 2017

**Logged by:** SS/LW

**Checked by:** KJ

## Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Classification Symbol</td>
</tr>
<tr>
<td></td>
<td>Soil Type: plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td></td>
<td>water samples &amp; field tests</td>
</tr>
<tr>
<td></td>
<td>material description</td>
</tr>
<tr>
<td></td>
<td>drilling method &amp; support</td>
</tr>
</tbody>
</table>

## Material Substance

- **SOIL TYPE:** Plasticity or particle characteristic, Colour, secondary and minor components
- **structure and additional observations**

## Water

- **water outflow**
- **water inflow**

## Consistency / Relative Density

- **Moisture Condition**
- **Moisture**
  - dry
  - moist
  - wet
  - very loose
  - loose
  - medium dense
  - dense
  - very dense

## Notes

- **Additional observations**
- **Hand augmented increment**
- **Hammer bouncing**
- **Penetration test (SPT)**
- **SPT with solid cone**
- **Vane shear; peak/remoulded (kPa)**
- **Refusal**
- **Sampling methods**
- **Samples & Field Tests**
- **SPT refusal on gravel band**
- **SPT sank 500mm under self weight, possibly disturbed during drilling**
- **Band of fragmented cemented sands**
- **CLAYEY SAND:** Fine to medium grained, pale grey, with some brown, low plasticity. Becoming fine grained, orange-brown gravel band, fine to coarse grained
- **SILTY SAND:** Fine to medium grained, grey, green, low plasticity. With some cemented sand nodules
- **TERTIARY BRIGHTON GROUP**
- **GELLIBRAND MARL**
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Chelsea

**project no.:** GEOTABTF10294AA

<table>
<thead>
<tr>
<th>position: E: 334685; N: 5786811 (MGA94)</th>
<th>surface elevation: 6.58 m (AHD)</th>
<th>angle from horizontal: 90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>drill model: Xplora 50, Truck mounted</td>
<td>drilling fluid: Polymer</td>
<td>hole diameter: 100 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>samples &amp; field tests</th>
<th>material description</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>SPT 8, 6, 12 N=18</td>
<td>SILTY SAND: fine to medium grained, grey, green, low plasticity. (continued)</td>
<td>W MD GELLIBRAND MARL</td>
</tr>
<tr>
<td></td>
<td>SPT 8, 6, 6 N=12</td>
<td>with some medium grained gravel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPT 8, 0, 4 N=14</td>
<td>CLAYEY SAND: dark green-grey, medium plasticity, trace of fine grained gravel &amp; shell fragments.</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>SPT 8, 9, 22 N=31</td>
<td>with some cemented sand nodules</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPT 8, 8, 10</td>
<td>SILTY SAND: fine to medium grained, dark green, grey, green-brown, low plasticity, trace of shell fragments and bands of cemented sand.</td>
<td>M MD</td>
</tr>
</tbody>
</table>

**structure and additional observations**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description**
- **CONSISTENCY / RELATIVE DENSITY**
- **moisture**
- **consistency / relative density**
- **moisture**

**drilling information**

- **method & support**
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger
  - W: washhoe
  - HA: hand auger
- **samples & field tests**
  - B: bulk disturbed sample
  - D: disturbed sample
  - E: environmental sample
  - SS: split spoon sample
  - U##: undisturbed sample #mm diameter
  - HP: hand penetrometer (kPa)
  - N: standard penetration test (SPT)
  - N*: SPT - sample recovered
  - Nc: SPT with solid cone
  - VS: vane shear, peak/remoulded (kPa)
  - R: refusal
  - HB: hammer bouncing
- **classification symbol & soil description**
  - based on Unified Classification System
  - **mucorosity**
  - **consistency / relative density**
  - **moisture**

**drilling fluid:** Polymer

**logging information:**

- **method:** HAND/ASHAW AGDrilling/Auger/Drill
- **method:** BDESSU###HPNN*NcVSRHB
- **consistency / relative density:**
  - VS: very soft
  - S: soft
  - F: firm
  - SF: stiff
  - VSF: very stiff
- **moisture:**
  - W: wet
  - M: moist
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VD: very dense

**graphic log**

- **samples & field tests**
  - water outflow
  - water inflow
- **hand penetrometer (kPa)**
  - 100
  - 200
  - 300
  - 400
- **vane shear; peak/remoulded (kPa)**
  - 100
  - 200
  - 300
  - 400

**additional observations**

- **Borehole ID.: CHEL-BH02**
- **date started:** 16 Mar 2017
- **date completed:** 20 Mar 2017
- **logged by:** SS/LW
- **checked by:** KJ

<table>
<thead>
<tr>
<th>method</th>
<th>E: 334685; N: 5786811 (MGA94)</th>
<th>surface elevation: 6.58 m (AHD)</th>
<th>angle from horizontal: 90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>support</td>
<td>samples &amp; field tests</td>
<td>material description</td>
<td>material substance</td>
</tr>
<tr>
<td>water</td>
<td>SPT 8, 6, 12 N=18</td>
<td>SILTY SAND: fine to medium grained, grey, green, low plasticity. (continued)</td>
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</tr>
</tbody>
</table>

**structure and additional observations**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **material description**
- **CONSISTENCY / RELATIVE DENSITY**
- **moisture**
- **consistency / relative density**
- **moisture**

**drilling information**

- **method & support**
  - AD: auger drilling
  - AS: auger screwing
  - HA: hand auger
  - W: washhoe
  - HA: hand auger
- **samples & field tests**
  - B: bulk disturbed sample
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  - U##: undisturbed sample #mm diameter
  - HP: hand penetrometer (kPa)
  - N: standard penetration test (SPT)
  - N*: SPT - sample recovered
  - Nc: SPT with solid cone
  - VS: vane shear, peak/remoulded (kPa)
  - R: refusal
  - HB: hammer bouncing
- **classification symbol & soil description**
  - based on Unified Classification System
  - **mucorosity**
  - **consistency / relative density**
  - **moisture**

**drilling fluid:** Polymer

**logging information:**

- **method:** HAND/ASHAW AGDrilling/Auger/Drill
- **method:** BDESSU###HPNN*NcVSRHB
- **consistency / relative density:**
  - VS: very soft
  - S: soft
  - F: firm
  - SF: stiff
  - VSF: very stiff
- **moisture:**
  - W: wet
  - M: moist
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VD: very dense

**graphic log**

- **samples & field tests**
  - water outflow
  - water inflow
- **hand penetrometer (kPa)**
  - 100
  - 200
  - 300
  - 400
- **vane shear; peak/remoulded (kPa)**
  - 100
  - 200
  - 300
  - 400

**additional observations**

- **Borehole ID.: CHEL-BH02**
- **date started:** 16 Mar 2017
- **date completed:** 20 Mar 2017
- **logged by:** SS/LW
- **checked by:** KJ
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne Pty. Ltd.

**Principal:** Level Crossing Removal Authority

**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**Location:** Station Street, Chelsea

**Borehole ID:** CHEL-BH02

**Date started:** 16 Mar 2017

**Date completed:** 20 Mar 2017

**Logged by:** SS/LW

**Checked by:** KJ

**Position:** E: 334685, N: 5786811 (MGA94)

**Surface elevation:** 6.58 m (AHD)

**Angle from horizontal:** 90°

**Drill model:** Xplora 50, Truck mounted

**Drilling fluid:** Polymer

**Hole diameter:** 100 mm

**Depths and Logs:**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Water</th>
<th>Classification</th>
<th>Support</th>
<th>Soil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.0</td>
<td></td>
<td>Borehole CHEL-BH02 terminated at 40.15 m</td>
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<td></td>
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<tr>
<td>34</td>
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<tr>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Support:**

- **M:** Mud
- **N:** Nil

**Soil Type:**

- **N:** Nil

**Method & Support:**

- **AD:** Auger drilling
- **AS:** Auger screwing
- **HA:** Hand auger
- **W:** Wash boring
- **H:** Hand auger
- **NDD:** Non-destructive drilling

**Classification:**

- **B:** Bulk disturbed sample
- **D:** Disturbed sample
- **E:** Environmental sample
- **SS:** Split spoon sample
- **U#:** Undisturbed sample #1mm diameter
- **HP:** Hand penetrometer (kPa)
- **N:** Standard penetration test (SPT)
- **N#:** SPT - sample recovered
- **NC:** SPT with solid cone
- **VS:** Vane shear; peak/remoulded (kPa)
- **R:** Refusal
- **HB:** Hammer bouncing

**Consistency & Relative Density:**

- **VS:** Very soft
- **S:** Soft
- **F:** Firm
- **ST:** Stiff
- **VST:** Very stiff
- **H:** Hard
- **Fb:** Frangible
- **VL:** Very loose
- **L:** Loose
- **MD:** Medium dense
- **D:** Dense
- **VD:** Very dense

**Soil Description:**

- **VS:** Very soft
- **S:** Soft
- **F:** Firm
- **ST:** Stiff
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### Engineering Log - Borehole

**Client:** Metro Trains Melbourne Pty. Ltd.

**Principal:** Level Crossing Removal Authority

**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**Location:** Station Street, Chelsea

**Borehole ID:** CHEL-BH03

**Date Started:** 10 Mar 2017

**Date Completed:** 15 Mar 2017

**Logged By:** BP

**Checked By:** KJ

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Sample &amp; Field Tests</th>
<th>Water</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FILL</strong></td>
<td>SAND: fine to coarse grained, dark brown, with some fines, trace of concrete, trace of rootlets.</td>
<td></td>
</tr>
<tr>
<td><strong>SP</strong></td>
<td>SAND: fine to coarse grained, pale grey, grey.</td>
<td></td>
</tr>
<tr>
<td><strong>SPT</strong></td>
<td>1, 2, 3</td>
<td>becoming pale brown, pale grey</td>
</tr>
<tr>
<td><strong>SPT</strong></td>
<td>2, 4, 6</td>
<td>becoming fine to medium grained, brown, mottled orange-brown</td>
</tr>
<tr>
<td><strong>SPT</strong></td>
<td>5, 11, 8</td>
<td>becoming dark brown, trace of fines</td>
</tr>
<tr>
<td><strong>SPT</strong></td>
<td>3, 6, 9</td>
<td></td>
</tr>
<tr>
<td><strong>SPT</strong></td>
<td>4, 4, 12</td>
<td></td>
</tr>
</tbody>
</table>

**Classification Symbol & Soil Description**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **Material Description:** structure and additional observations

**Method & Support**

- **Penetration:**
  - M: mud
  - C: casing

**Samples & Field Tests**

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

**Consistency / Relative Density**

- **Moisture:**
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff

**Hand Penetrometer (kPa)**

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>Very soft</td>
</tr>
<tr>
<td>S</td>
<td>Soft</td>
</tr>
<tr>
<td>F</td>
<td>Firm</td>
</tr>
<tr>
<td>ST</td>
<td>Stiff</td>
</tr>
<tr>
<td>VST</td>
<td>Very Stiff</td>
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<td>H</td>
<td>Hard</td>
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<tr>
<td>Fb</td>
<td>Frangible</td>
</tr>
<tr>
<td>VL</td>
<td>Very Loose</td>
</tr>
<tr>
<td>L</td>
<td>Loose</td>
</tr>
<tr>
<td>MD</td>
<td>Medium Dense</td>
</tr>
<tr>
<td>D</td>
<td>Dense</td>
</tr>
</tbody>
</table>

---

**Additional Observations**

- **Classification Symbol:**
  - Based on Unified Classification System
  - VS: very soft
  - S: soft
  - F: firm
  - ST: stiff
  - VST: very stiff
  - H: hard
  - Fb: frangible
  - VL: very loose
  - L: loose
  - MD: medium dense
  - D: dense
  - VD: very dense
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne Pty. Ltd.  
**Principal:** Level Crossing Removal Authority  
**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**Location:** Station Street, Chelsea

| Position (E, N): 334538, 5787182 (MGA94) | Surface Elevation: 6.42 m (AHD) | Angle from horizontal: 90° |
| Sample: 10-Oct-12 water level on date shown | Drilling Fluid: Polymer |

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method &amp; Support</strong></td>
<td><strong>Classification &amp; Symbol</strong></td>
</tr>
<tr>
<td>SPT, 7, 9, 4 N=13</td>
<td>SAND: fine to coarse grained, grey, with some pockets of clayey sand. (continued)</td>
</tr>
<tr>
<td>SPT, 3, 2, 5 N=7</td>
<td>becoming fine to medium grained</td>
</tr>
<tr>
<td>SPT, 1, 1, 3 N=4</td>
<td>CLAYEY SAND: fine to medium grained, grey, low plasticity.</td>
</tr>
<tr>
<td>SPT, 11, 21, 26 N=47</td>
<td>SAND: fine to coarse grained, grey, with some fines.</td>
</tr>
</tbody>
</table>

**Soil Type:** Plasticity or particle characteristic, colour, secondary and minor components

**Material Description:** Structure and additional observations

**Support:** M mud  C casing  N nil

**Samples & Field Tests:**
- B bulk disturbed sample  
- D disturbed sample  
- E environmental sample  
- SS split spoon sample  
- U$$^\#$$ undisturbed sample #rmm diameter  
- HP hand penetrometer (kPa)  
- N standard penetration test (SPT)  
- N$$^*$$ SPT - sample recovered  
- Nc SPT with solid cone  
- VS vane shear; peak/remoulded (kPa)  
- R refusal  
- HB hammer bouncing

**Classification Symbol & Soil Description:**
- based on Unified Classification System
- moisure: D dry  M moist  W wet  
- consistency / relative density: VS very soft  S soft  
- penetration: no resistance ranging to refusal  
- water: 10-Oct-12 water level on date shown  
- sample recovery: 100 mm diameter  
- lab test: hand penetrometer (kPa)  
- refusal: hammer bouncing  
- density: MD very dense  D dense  
- coarse to fine grained: grey  
- coarse to fine grained: grey, with some pockets of clayey sand. (continued)  
- fine to medium grained: grey, low plasticity.  
- fine to coarse grained: grey, with some fines.
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Chelsea

---

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2, 5, 9</td>
<td>N=14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5, 19, 15</td>
<td>N=19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10, 12, 11</td>
<td>N=23</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2, 5, 14</td>
<td>N=19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16, 24, 25</td>
<td>N=49</td>
<td></td>
</tr>
</tbody>
</table>

---

### Material Substance

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10</td>
<td>SC CLAYEY SAND: fine to coarse grained, grey. (continued)</td>
</tr>
<tr>
<td>-11</td>
<td>SP SAND: fine to medium grained, brown-grey, with some fines.</td>
</tr>
<tr>
<td>-12</td>
<td>with some pockets of grey, high plasticity clay</td>
</tr>
<tr>
<td>-13</td>
<td>CLAY: high plasticity, grey, mottled brown.</td>
</tr>
<tr>
<td>-14</td>
<td>trace of sand</td>
</tr>
<tr>
<td>-15</td>
<td>CLAYEY SAND: medium to coarse grained, orange-brown.</td>
</tr>
<tr>
<td>-16</td>
<td>CLAYEY SAND: fine to medium grained, pale grey, orange-brown, bands of red, low plasticity.</td>
</tr>
</tbody>
</table>

---

### Drilling Location

- E: 334538; N: 5787182 (MGA94)
- Surface elevation: 6.42 m (AHD)
- Angle from horizontal: 90°
- Hole diameter: 100 mm

---

### Additional Observations

- **CLAYEY SAND:** fine to coarse grained, grey.
- **SAND:** fine to medium grained, brown-grey, with some fines.
- **CLAY:** high plasticity, grey, mottled brown.
- **CLAYEY SAND:** medium to coarse grained, orange-brown.
- **CLAYEY SAND:** fine to medium grained, pale grey, orange-brown, bands of red, low plasticity.

---

### Notes

- Hand penetrometer (kPa)
- Tertiary Brighton Group
- HP 350 - 400 kPa

---

**Consistency / Relative Density**

- **VS:** very soft
- **S:** soft
- **F:** firm
- **St:** stiff
- **VSt:** very stiff
- **H:** hard
- **V:** very loose
- **L:** loose
- **MD:** medium dense
- **D:** dense
- **VD:** very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Chelsea

**date started:** 10 Mar 2017

**date completed:** 15 Mar 2017

**logged by:** BP

**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Sample &amp; Field Tests</th>
<th>Water</th>
<th>Material Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>CLAYEY SAND:</td>
<td>fine to medium grained, pale grey, orange-brown, bands of red, low plasticity. (continued) becoming mottled red, mottled orange-brown</td>
</tr>
<tr>
<td>SM</td>
<td>SILTY SAND:</td>
<td>fine to coarse grained, dark green-grey, medium plasticity, grading to clayey sand in parts. becoming dark grey, dark green-grey</td>
</tr>
</tbody>
</table>

#### Material Substances

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**Structure and Additional Observations:**

- **TERTIARY BRIGHTON GROUP**
  - no recovery in U63

- **GELLIBRAND MARL**
  - VL - L

#### Consistency & Relative Density

- **moisture:**
  - VS = very soft
  - S = soft
  - F = firm
  - St = stiff
  - VSt = very stiff
  - H = hard
  - Fb = flaky
  - VL = very loose
  - L = loose
  - MD = medium dense
  - D = dense
  - VD = very dense

- **penetration:**
  - 10-Oct-12 water level on date shown
  - Water inflow
  - Water outflow
  - hammer bouncing

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

- **classification symbol:**
  - M = mud
  - C = casing
  - N = nil
  - D = disturbed sample
  - E = environmental sample
  - SS = split spoon sample
  - U = undisturbed sample
  - HP = hand penetrometer (kPa)
  - N = standard penetration test (SPT)
  - NC = SPT with solid cone
  - VS = vane shear, peak/remoulded (kPa)
  - R = refusal
  - N* = SPT - sample recovered
  - Wp = plastic limit

- **support:**
  - AD = auger drilling
  - HA = hand auger
  - W = washhole
  - NDD = non-destructive drilling

- **mechanical properties:**
  - no resistance ranging to refusal

- **method & support:**
  - AD = auger drilling
  - HA = hand auger
  - W = washhole
  - NDD = non-destructive drilling

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

- **classification symbol:**
  - M = mud
  - C = casing
  - N = nil
  - D = disturbed sample
  - E = environmental sample
  - SS = split spoon sample
  - U = undisturbed sample
  - HP = hand penetrometer (kPa)
  - N = standard penetration test (SPT)
  - NC = SPT with solid cone
  - VS = vane shear, peak/remoulded (kPa)
  - R = refusal
  - N* = SPT - sample recovered
  - Wp = plastic limit

- **moisture:**
  - VS = very soft
  - S = soft
  - F = firm
  - St = stiff
  - VSt = very stiff
  - H = hard
  - Fb = flaky
  - VL = very loose
  - L = loose
  - MD = medium dense
  - D = dense
  - VD = very dense

- **consistency / relative density:**
  - VS = very soft
  - S = soft
  - F = firm
  - St = stiff
  - VSt = very stiff
  - H = hard
  - Fb = flaky
  - VL = very loose
  - L = loose
  - MD = medium dense
  - D = dense
  - VD = very dense
Silty Sand: fine to coarse grained, dark green-grey, medium plasticity, grading to clayey sand in parts. (continued) with some pockets of fine to coarse grained gravel becoming green-grey with some pockets of clayey sand

Clayey Sand: fine to medium grained, dark green-grey, medium plasticity becoming dark green-grey

with some pockets of gravel

Gellibrand Marl

No recovery in U63

No recovery in U63

Structure and additional observations:

Moisture

Dense

Wet

Moist

Hard

Very stiff

Soft

Stiff

Very soft

VFS

VS

VB

Hand penetrometer (kPa)

Soil description

Classification based on Unified Classification System

Consistency / relative density

Moisture

Dry

Wet

Dense
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne Pty. Ltd.  
**Principal:** Level Crossing Removal Authority  
**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**Location:** Station Street, Chelsea

---

**Borehole ID:** CHEL-BH03  
**Date started:** 10 Mar 2017  
**Date completed:** 15 Mar 2017  
**Logged by:** BP  
**Checked by:** KJ

---

**Position:** E: 334538; N: 5787182 (MGA94)  
**Surface elevation:** 6.42 m (AHD)  
**Angle from horizontal:** 90°  
**Drill model:** Xplora 50, Truck mounted  
**Drilling fluid:** Polymer  
**Hole diameter:** 100 mm

### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Water</th>
<th>Depth (m)</th>
<th>Samples &amp; Field Tests</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling</td>
<td></td>
<td>0.0-5.5m</td>
<td>0.0-5.5m: grout</td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td></td>
<td>5.5-6.5m</td>
<td>5.5m-6.5m: bentonite</td>
<td></td>
</tr>
<tr>
<td>W wash bore</td>
<td></td>
<td>6.5-10.0m</td>
<td>6.5m-10.0m: sand</td>
<td></td>
</tr>
<tr>
<td>N non destructive drilling</td>
<td></td>
<td>10.0-40.35m: grout</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Geological Log**

| SC | 0.0-40.35m | CLAYEY SAND: fine to medium grained, dark green-grey, medium plasticity. (continued) |

**Borehole CHEL-BH03 terminated at 40.35 m**
- Target depth
- Standpipe installation
- Backfill details
  - 0.0m-5.5m: grout
  - 5.5m-6.5m: bentonite
  - 6.5m-10.0m: sand
  - 10.0-40.35m: grout
- Standpipe details
  - 0.0m-7.0m: unslotted 50mm PVC, Class 18
  - 7.0m-10.0m: machine slotted, 50mm PVC, Class 18
- End caps and flush mounted galvanic cover

---

**Drill position:** E: 334538; N: 5787182 (MGA94)  
**Drill model:** Xplora 50, Truck mounted  
**Angle from horizontal:** 0°  
**Surface elevation:** 6.42 m (AHD)  
**Drilling fluid:** Polymer

---

**Consistency/Relative Density**

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency</th>
<th>Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
<td></td>
</tr>
<tr>
<td>St</td>
<td>stiff</td>
<td></td>
</tr>
<tr>
<td>VSt</td>
<td>very stiff</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
<td></td>
</tr>
<tr>
<td>Fb</td>
<td>friable</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>very loose</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
<td></td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
<td></td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
<td></td>
</tr>
</tbody>
</table>

---

**Classification System**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Soil Description</th>
<th>Classification Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>mud</td>
<td>M</td>
</tr>
<tr>
<td>C</td>
<td>casing</td>
<td>C</td>
</tr>
<tr>
<td>N</td>
<td>nil</td>
<td>N</td>
</tr>
</tbody>
</table>

---

**Additional Observations**

- 10-Oct-12 water level on date shown
- No resistance ranging to refusal
- 10-12 water level on date shown
**Engineering Log - Borehole**

**Client:** Metro Trains Melbourne Pty. Ltd.

**Principal:** Level Crossing Removal Authority

**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**Location:** Station Street, Chelsea

**Borehole ID:** CHEL-BH04

**Date started:** 09 Feb 2017

**Date completed:** 14 Feb 2017

**Logged by:** AO/BP

**Checked by:** KJ

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method &amp; Support</td>
<td>Material Description</td>
</tr>
<tr>
<td><strong>Depth (m)</strong></td>
<td><strong>SOIL TYPE:</strong> plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td><strong>Graphic Log</strong></td>
<td><strong>Classification symbol &amp; soil description</strong> based on Unified Classification System</td>
</tr>
<tr>
<td><strong>Classification symbol</strong></td>
<td><strong>Consistency / Relative Density</strong></td>
</tr>
<tr>
<td><strong>Samples &amp; Field Tests</strong></td>
<td><strong>Confidence</strong></td>
</tr>
<tr>
<td><strong>FILL:</strong> ASPHALT: 50mm.</td>
<td><strong>DM</strong> dry, <strong>S</strong> soft, <strong>F</strong> firm, <strong>V</strong> very firm, <strong>VL</strong> very soft, <strong>H</strong> hard, <strong>Fb</strong> friable, <strong>V</strong> very loose, <strong>L</strong> loose, <strong>MD</strong> medium dense, <strong>D</strong> dense, <strong>VD</strong> very dense</td>
</tr>
<tr>
<td><strong>FILL:</strong> Sandy GRAVEL: fine to coarse grained, angular, grey, brown, fine grained sand.</td>
<td><strong>ND</strong> non-destructive drilling, <strong>N</strong> native, <strong>M</strong> mud, <strong>p</strong> plastic limit, <strong>W</strong> water, <strong>L</strong> liquid limit</td>
</tr>
<tr>
<td><strong>SAND:</strong> fine to medium grained, grey, pale grey, brown, pale brown-grey.</td>
<td><strong>W</strong> water, <strong>I</strong> water inflow, <strong>O</strong> water outflow</td>
</tr>
<tr>
<td>Becoming fine to coarse grained, brown, pale brown.</td>
<td><strong>pW</strong> dry, <strong>m</strong> moist, <strong>w</strong> wet</td>
</tr>
<tr>
<td>Becoming brown, trace of shell fragments.</td>
<td><strong>cm</strong> coarse, <strong>f</strong> fine, <strong>m</strong> medium</td>
</tr>
<tr>
<td><strong>SAND:</strong> fine grained, pale grey, trace of fines, trace of shell fragments.</td>
<td><strong>mm</strong> medium, <strong>d</strong> dense</td>
</tr>
<tr>
<td><strong>SAND:</strong> fine to medium grained, pale grey, mottled pale brown, trace of fines, trace of shell fragments.</td>
<td><strong>mm</strong> medium, <strong>d</strong> dense</td>
</tr>
</tbody>
</table>

**Additional Observations:**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components.
- **Material Description:** soil description based on Unified Classification System.
- **Consistency / Relative Density:** dry, soft, firm, very firm, very soft, hard, friable, very loose, loose, medium dense, dense, very dense.

**Drilling Information:**

- **Drilling Fluid:** Polymer
- **Hole Diameter:** 100 mm
- **Surface Elevation:** 5.80 m (AHD)
- **Angle from Horizontal:** 90°
- **Drill Model:** XploRa 50, Truck mounted
- **Position:** E: 334853, N: 5786206 (MGA94)
- **Drill Fluid:** Polymer
- **Angle from Horizontal:** 90°
- **Hole Diameter:** 100 mm
- **Surface Elevation:** 5.80 m (AHD)
- **Drilling Fluid:** Polymer

**Classification Symbol:**

- **FILL:** ASPHALT: 50mm.
- **FILL:** Sandy GRAVEL: fine to coarse grained, angular, grey, brown, fine grained sand.
- **SAND:** fine to medium grained, grey, pale grey, brown, pale brown-grey.

**Material Description:**

- **B:** bulk disturbed sample
- **D:** disturbed sample
- **M:** mud
- **N:** native
- **E:** environmental sample
- **SS:** split spoon sample
- **U:** undisturbed sample, #4mm diameter
- **Hp:** hand penetrometer (kPa)
- **N:** standard penetration test (SPT)
- **Np:** SPT - sample recovered
- **Cc:** SPT with solid cone
- **Vs:** vane shear, peak remoulded (kPa)
- **R:** refusal
- **Hb:** hammer bouncing

**Consistency / Relative Density:**

- **VS:** very soft
- **S:** soft
- **F:** firm
- **V:** very firm
- **VL:** very soft
- **H:** hard
- **Fb:** friable
- **V:** very loose
- **L:** loose
- **MD:** medium dense
- **D:** dense
- **VD:** very dense
### Engineering Log - Borehole

**client:** Metro Trains Melbourne Pty. Ltd.  
**principal:** Level Crossing Removal Authority  
**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**location:** Station Street, Chelsea  
**date started:** 09 Feb 2017  
**date completed:** 14 Feb 2017  
**logged by:** AO/BP  
**checked by:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>support</td>
<td>samples &amp; field tests</td>
<td>water</td>
<td>consistency / relative density</td>
<td>structure and additional observations</td>
</tr>
<tr>
<td>method</td>
<td>samples &amp; field tests</td>
<td>water</td>
<td>soil description</td>
<td>material description</td>
</tr>
<tr>
<td>water</td>
<td>samples &amp; field tests</td>
<td>water</td>
<td>soil type</td>
<td>plasticity or particle characteristic, colour, secondary and minor components</td>
</tr>
<tr>
<td>samples &amp; field tests</td>
<td>water</td>
<td>samples &amp; field tests</td>
<td>soil classification symbol</td>
<td>soil description</td>
</tr>
<tr>
<td>water</td>
<td>samples &amp; field tests</td>
<td>water</td>
<td>soil consistency / relative density</td>
<td>soil description</td>
</tr>
</tbody>
</table>

#### Drilling Information

<table>
<thead>
<tr>
<th>Position (m)</th>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>QUATERNARY SANDS</td>
<td>SAND: fine to medium grained, pale grey, mottled pale brown, trace of fines, trace of shell fragments. (continued)</td>
</tr>
<tr>
<td>4.0</td>
<td>QUATERNARY SANDS</td>
<td>CLAYEY SAND: fine to medium grained, dark grey, high plasticity, trace of shell fragments.</td>
</tr>
<tr>
<td>5.0</td>
<td>QUATERNARY SANDS</td>
<td>CLAY: high plasticity, dark grey, black, trace of shell fragments.</td>
</tr>
<tr>
<td>6.0</td>
<td>QUATERNARY SANDS</td>
<td>CLAYEY SILT: low liquid limit, dark grey, black, with some fine grained sand, trace of shell fragments.</td>
</tr>
<tr>
<td>7.0</td>
<td>QUATERNARY SANDS</td>
<td>SILTY SAND: fine to medium grained, grey, trace of fine to coarse grained, sub-angular gravel.</td>
</tr>
<tr>
<td>8.0</td>
<td>QUATERNARY SANDS</td>
<td>SAND: fine to coarse grained, sub-rounded to sub-angular, pale grey.</td>
</tr>
<tr>
<td>9.0</td>
<td>QUATERNARY SANDS</td>
<td>CLAY: high plasticity, pale grey, with some coarse grained sand.</td>
</tr>
<tr>
<td>10.0</td>
<td>TERTIARY BRIGHTON GROUP</td>
<td>CLAYEY SAND: fine to medium grained, dark grey, high plasticity, trace of shell fragments.</td>
</tr>
<tr>
<td>11.0</td>
<td>TERTIARY BRIGHTON GROUP</td>
<td>CLAYEY SILT: low liquid limit, dark grey, black, with some fine grained sand, trace of shell fragments.</td>
</tr>
<tr>
<td>12.0</td>
<td>TERTIARY BRIGHTON GROUP</td>
<td>SILTY SAND: fine to medium grained, grey, trace of fine to coarse grained, sub-angular gravel.</td>
</tr>
<tr>
<td>13.0</td>
<td>TERTIARY BRIGHTON GROUP</td>
<td>SAND: fine to coarse grained, sub-rounded to sub-angular, pale grey.</td>
</tr>
<tr>
<td>14.0</td>
<td>TERTIARY BRIGHTON GROUP</td>
<td>CLAY: high plasticity, pale grey, with some coarse grained sand.</td>
</tr>
<tr>
<td>15.0</td>
<td>TERTIARY BRIGHTON GROUP</td>
<td>becoming grey, mottled orange</td>
</tr>
</tbody>
</table>

#### Material Substance

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Classification Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUATERNARY SANDS</td>
<td>SP</td>
<td>SAND: fine to medium grained, pale grey, mottled pale brown, trace of fines, trace of shell fragments. (continued)</td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td>SC</td>
<td>CLAYEY SAND: fine to medium grained, dark grey, high plasticity, trace of shell fragments.</td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td>CH</td>
<td>CLAY: high plasticity, dark grey, black, trace of shell fragments.</td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td>ML</td>
<td>CLAYEY SILT: low liquid limit, dark grey, black, with some fine grained sand, trace of shell fragments.</td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td>SM</td>
<td>SILTY SAND: fine to medium grained, grey, trace of fine to coarse grained, sub-angular gravel.</td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td>SP</td>
<td>SAND: fine to coarse grained, sub-rounded to sub-angular, pale grey.</td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td>CH</td>
<td>CLAY: high plasticity, pale grey, with some coarse grained sand.</td>
</tr>
</tbody>
</table>

#### Drilling Information

- **Drill Model:** Xplora 50, Truck mounted  
- **Angle from horizontal:** 90°  
- **Hole Diameter:** 100 mm  
- **Surface Elevation:** 5.80 m (AHD)  
- **Drilling Fluid:** Polymer  
- **Consistency / Relative Density:** Moisture condition  
- **Hand Penetrometer:** (kPa)  
- **Structure and Additional Observations:**
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne Pty. Ltd.

**Principal:** Level Crossing Removal Authority

**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**Location:** Station Street, Chelsea

**Borehole ID:** CHEL-BH04

**Date Started:** 09 Feb 2017

**Date Completed:** 14 Feb 2017

**Logged by:** AO/BP

**Checked by:** KJ

---

**Drilling Information**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>10-15</td>
<td>SAND: fine to medium grained, grey, pale grey, with some fines.</td>
</tr>
<tr>
<td>15-20</td>
<td>CLAY: high plasticity, grey, mottled orange, with some pockets of coarse grained sand.</td>
</tr>
<tr>
<td>20-25</td>
<td>SAND: fine grained, pale grey, mottled brown, low, with some pockets of fine to medium grained gravel.</td>
</tr>
<tr>
<td>25-30</td>
<td>CLAYEY SAND: fine grained, grey, medium to high plasticity, trace of coarse grained sand</td>
</tr>
<tr>
<td>30-35</td>
<td>becoming grey, medium to high plasticity, trace of coarse grained sand</td>
</tr>
<tr>
<td>35-40</td>
<td>becoming grey, mottled orange</td>
</tr>
<tr>
<td>40-45</td>
<td>becoming medium plasticity</td>
</tr>
</tbody>
</table>

**Classification Symbol & Soil Description**

<table>
<thead>
<tr>
<th>Classification Symbol &amp; Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
</tr>
<tr>
<td>SAND</td>
</tr>
<tr>
<td>CLAY</td>
</tr>
<tr>
<td>CLAYEY SAND</td>
</tr>
</tbody>
</table>

**Samples & Field Tests**

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>bulk disturbed sample</td>
</tr>
<tr>
<td>D</td>
<td>disturbed sample</td>
</tr>
<tr>
<td>E</td>
<td>environmental sample</td>
</tr>
<tr>
<td>SS</td>
<td>split spoon sample</td>
</tr>
<tr>
<td>U**##</td>
<td>undisturbed sample #1mm diameter</td>
</tr>
<tr>
<td>HP</td>
<td>hand penetrometer (kPa)</td>
</tr>
<tr>
<td>N</td>
<td>standard penetration test (SPT)</td>
</tr>
<tr>
<td>N*</td>
<td>SPT - sample recovered</td>
</tr>
<tr>
<td>Nc</td>
<td>SPT with solid cone</td>
</tr>
<tr>
<td>VS</td>
<td>vane shear, peak/remoulded (kPa)</td>
</tr>
<tr>
<td>R</td>
<td>refusal</td>
</tr>
<tr>
<td>HB</td>
<td>hammer bouncing</td>
</tr>
</tbody>
</table>

**Classification System**

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Consistency / Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>very soft</td>
</tr>
<tr>
<td>S</td>
<td>soft</td>
</tr>
<tr>
<td>F</td>
<td>firm</td>
</tr>
<tr>
<td>St</td>
<td>stiff</td>
</tr>
<tr>
<td>VSt</td>
<td>very stiff</td>
</tr>
<tr>
<td>H</td>
<td>hard</td>
</tr>
<tr>
<td>V</td>
<td>friable</td>
</tr>
<tr>
<td>VL</td>
<td>very loose</td>
</tr>
<tr>
<td>L</td>
<td>loose</td>
</tr>
<tr>
<td>MD</td>
<td>medium dense</td>
</tr>
<tr>
<td>D</td>
<td>dense</td>
</tr>
<tr>
<td>VD</td>
<td>very dense</td>
</tr>
</tbody>
</table>
**Engineering Log - Borehole**

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Chelsea

---

**Borehole ID.:** CHEL-BH04  
**date started:** 09 Feb 2017  
**date completed:** 14 Feb 2017  
**logged by:** AO/BP  
**checked by:** KJ

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**material description:**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>penetration</th>
<th>samples &amp; field tests</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD auger drilling*</td>
<td>M mud</td>
<td>N nil</td>
<td>SC CLAYEY SAND: fine grained, pale grey, mottled brown, low, with some pockets of fine to medium grained gravel. (continued)</td>
</tr>
<tr>
<td>AS auger screwing*</td>
<td>C casing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA hand auger</td>
<td>W washbore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD non destructive drilling</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**384853; N: 5786206 (MGA94)  
**surface elevation:** 5.80 m (AHD)  
**angle from horizontal:** 90°

**drill model:** Xplora 50, Truck mounted  
**drilling fluid:** Polymer  
**hole diameter:** 100 mm

**TERTIARY BRIGHTON GROUP**

---

**CLAYEY SAND:** fine grained, pale grey, mottled brown, low, with some pockets of fine to medium grained gravel.

- with some bands of cemented sand, up to 300mm thick, recovered as fine to coarse grained gravel
- becoming mottled brown, mottled red, with some cemented sand, recovered as fine to medium grained gravel

**CLAYEY SAND:** fine to medium grained, grey, green-grey, pale grey, low plasticity, trace of fine grained gravel.

- becoming green-brown, brown

---

**GELLIBRAND MARL**

---

**bulk disturbed sample**

**disturbed sample**

**environmental sample**

**split spoon sample**

**undisturbed sample #1mm diameter**

**hand penetrometer (kPa)**

**standard penetration test (SPT)**

**SPT - sample recovered**

**SPT with solid core**

**vane shear; peak/remoulded (kPa)**

**refusal**

**hammer bouncing**

---

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

---

**TERTIARY BRIGHTON GROUP**

---

**CLAYEY SAND:** fine grained, pale grey, mottled brown, low, with some pockets of fine to medium grained gravel. (continued)
### Engineering Log - Borehole

**Client:** Metro Trains Melbourne Pty. Ltd.  
**Principal:** Level Crossing Removal Authority  
**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**Location:** Station Street, Chelsea

**Borehole ID:** CHEL-BH04  
**Date Started:** 09 Feb 2017  
**Date Completed:** 14 Feb 2017  
**Logged By:** AO/BP  
**Checked By:** KJ

#### Drilling Information

<table>
<thead>
<tr>
<th>Method</th>
<th>Support</th>
<th>Penetration</th>
<th>Water</th>
<th>Soil</th>
<th>Graphic Log</th>
<th>Classification Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>M, mud</td>
<td>N nil</td>
<td></td>
<td>SM</td>
<td>SILTY SAND</td>
<td>fine to coarse grained, dark grey, low plasticity.</td>
<td></td>
</tr>
<tr>
<td>AS</td>
<td>C casing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Material Substance

- **SOIL TYPE:** Plasticity or particle characteristic, colour, secondary and minor components  
- **Material Description:** Structure and additional observations

- **123 Penetration:**  
  - **Depth (m):** 33.0, 34.0, 35.0, 36.0, 37.0, 38.0, 39.0

- **Classification Symbol & Soil Description:** B based on Unified Classification System

- **Consistency / Relative Density:**  
  - **Moisture:** VS (very soft), S (soft), F (firm), ST (stiff), VST (very stiff)  
  - **Hardness:** H (hard), Fb (flatable), VL (very loose)  
  - **Density:** MD (medium dense), D (dense), VD (very dense)

---

**Note:** The image contains detailed geological data and a table with various parameters such as depth, support, penetration, water levels, and soil classification. The content is formatted in a structured manner to provide comprehensive information about the borehole's geotechnical properties.
# Engineering Log - Borehole

**Client:** Metro Trains Melbourne Pty. Ltd.  
**Principal:** Level Crossing Removal Authority  
**Project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**Location:** Station Street, Chelsea  

**Borehole ID:** CHEL-BH04  
**Date started:** 09 Feb 2017  
**Date completed:** 14 Feb 2017  
**Logged by:** AO/BP  
**Checked by:** KJ

## Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0-3.5m</td>
<td>Grout</td>
</tr>
<tr>
<td>3.5-4.5m</td>
<td>50mm PVC, Class 18</td>
</tr>
<tr>
<td>5.0-8.0m</td>
<td>Machine slotted, 50mm PVC, Class 18</td>
</tr>
</tbody>
</table>

## Soil Type

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.0-42.0</td>
<td>GELLIBRAND MARL</td>
</tr>
</tbody>
</table>

## Soil Description

- **Classification Symbol:** SM  
- **Soil Description:** Silty Sand: fine to coarse grained, dark grey, low plasticity. (continued)

## Drilling Method & Support

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Water</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 1, 7, 20 N=27</td>
<td>SM</td>
<td>Silty Sand: fine to coarse grained, dark grey, low plasticity. (continued)</td>
</tr>
</tbody>
</table>

## Additional Observations

- Borehole CHEL-BH04 terminated at 40.75 m  
- Target depth
- Standpipe installation  
- Backfill details  
- 0.0m-3.5m: grout  
- 3.5m-4.5m: bentonite  
- 4.5m-8.0m: sand  
- 8.0-40.75m: grout  
- Standpipe details  
- 0.0m-9.5m: unslotted 50mm PVC, Class 18  
- 5.0m-8.0m: machine slotted, 50mm PVC, Class 18  
- End caps and flush mounted galvic cover
## Piezometer Installation Log

### Client:
Metro Trains Melbourne Pty. Ltd.

### Principal:
Level Crossing Removal Authority

### Project:
Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

### Location:
Station Street, Aspendale

### Hole ID:
ASPEN-BH01

### Sheet No:
1 of 1

### Date Started:
20 Feb 2017

### Date Completed:
22 Feb 2017

### Logged By:
BP

### Checked By:
KJ

### Drilling Information
- **Material Name:**
  - Fill
  - Quaternary Sands
  - Tertiary Brighton Group

### Piezometer Construction Details
- **Drilling Fluid:**
  - Polymer

### Core Recovery
- **Core Recovered:**
  - No core recovered

### Graphic Log / Core Recovery

<table>
<thead>
<tr>
<th>ID</th>
<th>Type</th>
<th>Installation Date</th>
<th>Stick Up (m)</th>
<th>Tip Depth (m)</th>
<th>Water Level (m)</th>
<th>Relative Levels (m)</th>
<th>Water Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASPEN-BH01</td>
<td>Standpipe Piezo.</td>
<td>13.00 m</td>
<td>-6.44</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Drilling Fluid Loss
- **Partial Drilling Fluid Loss:**
  - 10-Oct-12, water inflow

### Graphic Symbols
- **FILL:**
  - Water pressure test result
- **QUATERNARY SANDS:**
  - Drillers permit no.
- **TERTIARY BRIGHTON GROUP:**
  - Driller's permit no.

### Equipment Information
- **Equipment Type:**
  - Xplora 50, Truck mounted

### Drilling Fluid Information
- **Drilling Fluid:**
  - Polymer

### Driller Information
- **Driller:**
  - L. Adolphson
  - Driller's permit no.: 738
# Piezometer Installation Log

**client:** Metro Trains Melbourne Pty. Ltd.  
**principal:** Level Crossing Removal Authority  
**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**location:** Station Street, Aspendale

<table>
<thead>
<tr>
<th>position: E: 333586; N: 5789170 (MGA94)</th>
<th>surface elevation: 6.72 m (AHD)</th>
<th>angle from horizontal: 90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>equipment type: Xplora 50, Truck mounted</td>
<td>drilling fluid: Polymer</td>
<td>hole diameter: 150 mm</td>
</tr>
</tbody>
</table>

## Drilling Information
- **method & support:** water
- **RL (m):** 6, 4, 2, 0, -2, -4, -6, -8
- **depth (m):** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

## Material Substance
- **material name:**
  - FILL
  - QUATERNARY SANDS
  - TERTIARY BRIGHTON GROUP

## Piezometer Construction Details
- **material substance:**
  - Grout
  - Bentonite
  - Gravel

## Drilling Fluid Information
- **drilling fluid:** Polymer

## Engineering Log
- **ID:** ASPEN-BH02
- **type:** standpipe piezo.
- **installation date:** 0.00 m
- **tip depth:** 14.00 m
- **water level:** 6.72
- **Relative Levels (AHD):** 6.72 - 7.28

## Equipment Log
- **bore construction license:** WRK098883
- **drilling company:** EARTHCORE
- **driller:** L. Adolphson
- **driller's permit no.:** 738

## Drilling Fluid Information
- **drilling fluid:** Polymer

## Drill Information
- **driller's permit no.:** 738

## Client Information
- **client:** Metro Trains Melbourne Pty. Ltd.
- **principal:** Level Crossing Removal Authority
- **project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea
- **location:** Station Street, Aspendale
Piezometer Installation Log

client: Metro Trains Melbourne Pty. Ltd.
principal: Level Crossing Removal Authority
project: Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea
location: Station Street, Aspendale

Hole ID: ASPEN-BH03
Date started: 23 Feb 2017
Date completed: 01 Mar 2017
Logged by: BP
Checked by: KJ

Drilling Information
- Method & Support: Water
- Graphic Log: FILL QUERNARY SANDS
- Material Name: Bentonite, Gravel
- Piezometer Construction Details:
  - Bore Construction License: WRK098882
  - Drilling Company: EARTHCORE
  - Driller: L. Adolphson
  - Driller's Permit No.: 738

Drilling Information
- Bore ID: ASPEN-BH03
- Standpipe Piezo.
- Installation Date: 00.00 m 12.00 m
- Tip Depth: Water Level
- Relative Levels (AHD): 6.41 -5.59

Material Substance
- Water Pressure Test Result
- Core Recovered
- No Core Recovered

Graphic Log / Core Recovery
- Core Recovered (graphic symbols indicate material)

Position: E: 333363; N: 5789619 (MGA94)
Equipment Type: Xplora 50, Truck mounted
Angle from Horizontal: 90°
Surface Elevation: 6.41 m (AHD)
Drilling Fluid: Polymer
Hole Diameter: 100 mm
**Piezometer Installation Log**

**client:** Metro Trains Melbourne Pty. Ltd.  
**principal:** Level Crossing Removal Authority  
**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea  
**location:** Station Street, Chelsea

---

<table>
<thead>
<tr>
<th>Position: E: 334777; N: 5786594 (MGA94)</th>
<th>Surface elevation: 6.63 m (AHD)</th>
<th>Angle from horizontal: 90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment type: Xplora 50, Truck mounted</td>
<td>Drilling fluid: Polymer</td>
<td>Hole diameter: 100 mm</td>
</tr>
</tbody>
</table>

**Drilling Information**

<table>
<thead>
<tr>
<th>Method &amp; Support</th>
<th>Material Substance</th>
<th>Piezometer Construction Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Graphic Log</td>
<td>Material Name</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>FILL</td>
<td>QUATERNARY SANDS</td>
<td>Grout</td>
</tr>
<tr>
<td>TERTIARY BRIGHTON GROUP</td>
<td>Bentonite</td>
<td>Gravel</td>
</tr>
</tbody>
</table>

**Logging Details**

- **Hole ID:** CHEL-BH01  
- **Date started:** 06 Feb 2017  
- **Date completed:** 08 Feb 2017  
- **Logged by:** BP  
- **Checked by:** KJ

**Piezometer Construction Details**

- **Bore construction license:** WRK069978  
- **Drilling company:** EARTHCORE  
- **Driller:** L. Adolphson  
- **Driller's permit no.:** 738

**Piezometer Installation Log**

- **ID:** CHEL-BH01  
- **Type:** Standpipe piezo.  
- **Installation date:**  
- **Stickup:** 0.00 m  
- **Tip depth:** 14.00 m  
- **Water level:** 6.63 m  
- **Relative Levels:** -7.37 m

**Legend**

- Water pressure test result (lugeons) for depth interval shown  
- Water inflow  
- Partial drilling fluid loss  
- No core recovered  
- Core recovered (graphic symbols indicate material)  
- Complete drilling fluid loss  
- Water inflow  
- Drilling fluid loss

---

**Notes:**

- See engineering log for details.
Piezometer Installation Log

client: Metro Trains Melbourne Pty. Ltd.
principal: Level Crossing Removal Authority
project: Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea
location: Station Street, Chelsea

material substance

method & support
water

material name
Quaternary Sands
Grout
Bentonite
Sand

graphic log

piezometer construction details

method & support

graphic log / core recovery

ID
CHEL-BH02

installation date
0.00 m

stickup (m)
11.00 m

tip depth (m)

water level (m)

Relative Levels (AHD)

stickup (m)

water level (m)

Hole ID: CHEL-BH02
sheet: 1 of 1
project no. GEOTABTF10294AA
date started: 16 Mar 2017
date completed: 20 Mar 2017
logged by: SS/LW
checked by: KJ

position: E: 334685; N: 5786811 (MGA94)
surface elevation: 6.58 m (AHD)
angle from horizontal: 90°
equipment type: Xplore 50, Truck mounted
drilling fluid: Polymer
hole diameter: 100 mm
driller: L. Adolphson
driller's permit no.: 738

bore construction license: WRK098879
drilling company: EARTHCORE
date started: 10-Oct-12

Drilling information

Tertiary Brighton Group

Drilling fluid loss

Water inflow

Partial drilling fluid loss

Drilling fluid loss

Complete drilling fluid loss

Water inflow

Surface elevation

Site plan

Relative Levels (AHD)

Standpipe Piezo.
Piezometer Installation Log

client: Metro Trains Melbourne Pty. Ltd.
principal: Level Crossing Removal Authority
project: Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea
location: Station Street, Chelsea

Hole ID: CHEL-BH03
sheet: 1 of 1
project no. GEOTABTF10294AA

date started: 10 Mar 2017
date completed: 15 Mar 2017
logged by: BP
checked by: KJ

position: E: 334538; N: 5787182 (MGA94)
equipment type: Xplora 50, Truck mounted
drilling fluid: Polymer
hole diameter: 100 mm

method & support
water

material substance
FILL
QUATERNARY SANDS
Grout
Bentonite
Sand

piezometer construction details
bore construction license: WRK096880
drilling company: EARTHCORE
driller: L. Adolphson
driller's permit no.: 738

water pressure test result (lugeons) for depth interval shown
25
see engineering log for details

drilling information
material name
position: E: 334538; N: 5787182 (MGA94)
equipment type: Xplora 50, Truck mounted
drilling fluid: Polymer
hole diameter: 100 mm

method & support
see engineering log for details
water

graphic log / core recovery
10-Oct-12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
water pressure test result (lugeons) for depth
interval shown

core recovered
(graphic symbols indicate materials)
no core recovered

ID
CHEL-BH03

installation date
0.00 m

pickup (m)
tip depth (m)
water level (m)
Relative Levels (AHD)

CHEL-BH03 standpipe piezo.
0.00 m 10.00 m
6.42 -3.58
# Piezometer Installation Log

**client:** Metro Trains Melbourne Pty. Ltd.

**principal:** Level Crossing Removal Authority

**project:** Hydrogeological and Geotechnical Investigation, Aspendale and Chelsea

**location:** Station Street, Chelsea

**Hole ID:** CHEL-BH04

**date started:** 09 Feb 2017

**date completed:** 14 Feb 2017

**logged by:** AO/BP

**checked by:** KJ

### Drilling Information

- **Position:** E: 334853; N: 5786206 (MGA94)
- **Equipment:** Xplore 50, Truck mounted
- **Drilling Fluid:** Polymer
- **Hole Diameter:** 100 mm
- **Surface Elevation:** 5.80 m (AHD)
- **Angle from Horizontal:** 90°

### Material Substance

- **Method & Support:**
  - Water
  - Bentonite
  - Gravel
  - Grout

- **Material Name:**
  - FILL
  - QUATERNARY SANDS

- **Relative Levels (AHD):**
  - 5.80
  - -2.20

### Piezometer Construction Details

- **ID:** CHEL-BH04
- **Type:** Standpipe piezo.
- **Installation Date:**
  - **Stickup:** 0.00 m
  - **Tip Depth:** 8.00 m
  - **Water Level:** 5.80
  - **Relative Levels:** -2.20

---

### Graphical Log / Core Recovery

- **Core Recovered:**
  - Graphic symbols indicate materials
  - No core recovered

- **Drilling Fluid Loss:**
  - Complete drilling fluid loss
  - Partial drilling fluid loss

- **Drilling Pressure Test Results:**
  - Water inflow

---

### Material Construction

- **Construction License:** WRK098877
- **Drilling Company:** EARTHCORE
- **Driller:** L. Adolphson
- **Driller's Permit No.:** 738

---

### Drilling Information

- **Drilling Information:**
  - **Graphic Log:**
  - **Material Substance:**
  - **Piezometer Construction Details:**
  - **Bore Construction License:** WRK098877
  - **Drilling Company:** EARTHCORE
  - **Driller:** L. Adolphson
  - **Driller's Permit No.:** 738
Appendix F – Salinity Profiling Data
### Appendix F - Salinity Profiling Data

**Borehole:** ASPEN-BH01  
**Date:** 8/05/2017  
**Logger ID:** 1072388  
**Initial SWL (mbGS):** 5.635  
**Total Depth (mbGS):** 12.67  
**Screen Interval (mbGS):** 10 to 13

*Note:* Well gauged with total depth of 12.67 mbGS. Some sedimentation at the base of the well.

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<th>Electrical Conductivity (mS/cm)</th>
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*Note: Well gauged with total depth of 12.67 mbGS. Some sedimentation at the base of the well.*
### Appendix F - Salinity Profiling Data

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Note: All gauges with total depth of 13.90 mbGS. Some sedimentation at the base of the well.
### Appendix F - Salinity Profiling Data

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**Note:** Well gauged with total depth of 13.90 mGS. Some sedimentation at the base of the well.
## Appendix F - Salinity Profiling Data

Borehole: APEN BH03  
Date: 8/05/2017  
Logger ID: 1070289A  
Initial SWL (mbGSS): 5.973  
Total Depth (mbGSS): 11.82  
Screen Interval (mbGSS): 9 to 12  

Note: Well gauged with total depth of 11.82 mbGSS. Some sedimentation at the base of the well.

### Electrical Conductivity and Temperature

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<th>Water Temperature (°C)</th>
<th>Electrical Conductivity (mS/cm)</th>
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#### Graphical Representation

- **x-axis**: Electrical Conductivity (mS/cm)  
- **y-axis**: Temperature (°C)
### Appendix F - Salinity Profiling Data

**Borehole:** APEN-BH03  
**Date:** 8/05/2017  
**Logger ID:** 1072388  
**Initial SWL (m bGS):** 5.873  
**Total Depth (m bGS):** 11.82  
**Screen Interval (m bGS):** 9 to 12

*Note: Well gauged with total depth of 11.82 m bGS. Some sedimentation at the base of the well.*

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9/06/2017
Appendix F - Salinity Profiling Data

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Note: Well gauged with total depth of 11.82 mbGS. Some sedimentation at the base of the well.
**Appendix F - Salinity Profiling Data**

**Date:** 8/05/2017

**Logger ID:** 1072388

**Initial SWL (mGSS):** 5.438

**Total Depth (mGSS):** 13.73

**Screen Interval (mGSS):** 11 to 14

**Note:** Well gauged with total depth of 13.73 mGSS. Some sedimentation at the base of the well.

**Borehole:** CHEL-BH01

**Depth (m):** 1072388

**11 to 14:** 13.73

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**Diagram:**

- **Electrical Conductivity (mS/cm)** vs **Temperature (°C)**
- **16 to 20**
- **0 to 3**
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Note: Well guaged with total depth of 13.73 mtdGS. Some sedimentation at the base of the well.
**Appendix F - Salinity Profiling Data**

**Borehole:** CHEL-BH01  
**Date:** 8/05/2017  
**Logger ID:** 1072388  
**Initial SWL (mbGS):** 5.438  
**Total Depth (mbGS):** 13.73  
**Screen Interval (mbGS):** 11 to 14  

*Note: Well gauged with total depth of 13.73 mbGS. Some sedimentation at the base of the well.*

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**Electrical Conductivity**

**Temperature**

- Electrical Conductivity (mS/cm)
- Temperature (°C)
**Appendix F - Salinity Profiling Data**

**Borehole:** CHEL-BH01  
**Date:** 10/07/2017  
**Logger ID:** 1070510  
**Initial SWL (mbgs):** 5.514  
**Total Depth (mbgs):** 14.00  
**Screen Interval (mbgs):** 11 to 14

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14/07/2017
### Appendix F - Salinity Profiling Data

**Borehole:** CHEL-BH02  
**Date:** 8/05/2017  
**Logger ID:** 1072388  
**Initial SWL (mBGs):** 5.263  
**Total Depth (mBGs):** 10.77  
**Screen Interval (mBGs):** 8 to 11  

**Note:** Well gauged with total depth of 10.77 mBGs. Indicating some sedimentation at the base of the well.

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### Diagram

- **X-Axis:** Electrical Conductivity (mS/cm)  
- **Y-Axis:** Temperature (°C)
### Appendix F - Salinity Profiling Data

**Borehole:** CHEL-BH02  
**Date:** 8/05/2017  
**Logger ID:** 1072388  
**Initial SWL (mbGS):** 5.263  
**Total Depth (mbGS):** 10.77  
**Screen Interval (mbGS):** 8 to 11

**Note:** Well gauged with total depth of 10.77 mbGS, indicating some sedimentation at the base of the well.

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**Note:** Well gauged with total depth of 9.07 mbGS. Some sedimentation at the base of the well.
Appendix F - Salinity Profiling Data

Borehole: CHEL-BH03
Date: 8/05/2017
Logger ID: 1072388
Initial SWL (mbGS): 5.073
Total Depth (mbGS): 9.07
Screen Interval (mbGS): 7 to 10

Note: Well guaged with total depth of 9.07 mbGS. Some sedimentation at the base of the well.

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## Appendix F - Salinity Profiling Data

**Borehole:** CHEL-BH04  
**Date:** 8/05/2017  
**Logger ID:** 1072388  
**Initial SWL (mbGS):** 4.566  
**Total Depth (mbGS):** 9.07  
**Screen Interval (mbGS):** 7 to 10

Note: Well guaged with total depth of 9.07 mbGS. Indicating sedimentation at the base of the well.

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**Diagram:**

- **Electrical Conductivity** vs **Temperature**

- **Legend:**
  - **Electrical Conductivity** (mS/cm)
  - **Temperature** (°C)

---

**Note:**

- Well guaged with total depth of 9.07 mbGS. Indicating sedimentation at the base of the well.
Appendix F - Salinity Profiling Data

ENAUABTF10294AA-BV

Borehole:
CHEL-BH04
Date:
8/05/2017
Logger ID:
1072388
Initial SWL (mbGS):
4.566
Total Depth (mbGS):
9.07
Screen Interval (mbGS):
7 to 10
Note: Well guaged with total depth of 9.07 mbGS. Indicating sedimentation at the base of
the well.
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8/05/2017 12:31
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8/05/2017 12:34
7.750
19.9
0.47
8/05/2017 12:34
7.978
19.9
0.47
8/05/2017 12:34
7.996
19.9
0.469
8/05/2017 12:34
7.996
19.9
0.47
8/05/2017 12:34
7.990
19.9
0.47
8/05/2017 12:34
7.996
19.9
0.47
8/05/2017 12:34
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19.9
0.47
8/05/2017 12:34
8.002
19.9
0.47
8/05/2017 12:34
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19.9
0.47
8/05/2017 12:34
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19.9
0.47
8/05/2017 12:34
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19.9
0.453
8/05/2017 12:34
8.134
19.9
0.43
8/05/2017 12:35
8.134
19.9
0.431
8/05/2017 12:35
8.146
19.8
0.407
8/05/2017 12:35
8.146
19.8
0.385
8/05/2017 12:35
8.146
19.8
0.383
8/05/2017 12:35
8.146
19.8
0.38
8/05/2017 12:35
8.212
19.8
0.362

9/06/2017

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Appendix G – Hydraulic Conductivity Tables and Recovery Curves
### Appendix G - Hydraulic Conductivity Results

<table>
<thead>
<tr>
<th>Monitoring Zone</th>
<th>Well ID</th>
<th>Screen Interval</th>
<th>Initial Standing Water Level</th>
<th>Falling-Head Test 01 Bouwer-Rice (1976)</th>
<th>Falling-Head Test 01 Hvorslev (1951)</th>
<th>Falling-Head Test 02 Bouwer-Rice (1976)</th>
<th>Falling-Head Test 02 Hvorslev (1951)</th>
<th>Rising-Head Test 01 Bouwer-Rice (1976)</th>
<th>Rising-Head Test 01 Hvorslev (1951)</th>
<th>Geometric Mean Bouwer-Rice</th>
<th>Geometric Mean Hvorslev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheltenham (KS1)</td>
<td>ASPEN-GWBH01</td>
<td>10 to 13</td>
<td>5.62</td>
<td>1.09</td>
<td>0.95</td>
<td>1.25</td>
<td>0.90</td>
<td>1.14</td>
<td>0.85</td>
<td>1.12</td>
<td>1.36</td>
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<tr>
<td></td>
<td>ASPEN-GWBH02</td>
<td>11 to 14</td>
<td>5.31</td>
<td>1.16</td>
<td>0.98</td>
<td>1.23</td>
<td>0.90</td>
<td>1.16</td>
<td>0.85</td>
<td>1.12</td>
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<td>ASPEN-GWBH03</td>
<td>9 to 12</td>
<td>5.46</td>
<td>2.18</td>
<td>2.00</td>
<td>2.37</td>
<td>2.03</td>
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<td>2.60</td>
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<tr>
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<td>ASPEN-GWBH04</td>
<td>11 to 14</td>
<td>5.46</td>
<td>1.56</td>
<td>1.84</td>
<td>1.86</td>
<td>1.84</td>
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<tr>
<td></td>
<td>CHIL-GWBH01</td>
<td>8 to 11</td>
<td>5.27</td>
<td>1.74</td>
<td>2.16</td>
<td>2.57</td>
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<td>CHIL-GWBH02</td>
<td>7 to 10</td>
<td>5.27</td>
<td>2.02</td>
<td>2.76</td>
<td>2.01</td>
<td>4.11</td>
<td>4.11</td>
<td>4.08</td>
<td>3.92</td>
<td>3.89</td>
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<td>CHIL-GWBH03</td>
<td>6 to 8</td>
<td>4.57</td>
<td>1.54</td>
<td>1.76</td>
<td>1.72</td>
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<td></td>
<td>CHIL-GWBH04</td>
<td>5 to 8</td>
<td>4.57</td>
<td>1.54</td>
<td>1.76</td>
<td>1.72</td>
<td>1.72</td>
<td>1.72</td>
<td>1.72</td>
<td>1.72</td>
<td>1.72</td>
</tr>
</tbody>
</table>

**Note:**
- ASP = Aspen, PM = Prince, BD = Breckenridge, and GD = Golden.
- mbgs = metres below ground surface.
- Vertical to horizontal hydraulic conductivity anisotropy ratio (Kz/Kr) = 0.2
- Applied correction for effective casing radius (n(e)) = 0.3
- Due to rapid recovery in many wells, the initial displacement was taken from the logger data, not the manual gauging data.

**Assumptions:**
- Vertical to horizontal hydraulic conductivity anisotropy ratio (Kz/Kr) = 0.2
- Applied correction for effective casing radius (n(e)) = 0.3
- Due to rapid recovery in many wells, the initial displacement was taken from the logger data, not the manual gauging data.

**Geometric Mean:**
- Bouwer-Rice
- Hvorslev
FALLING-HEAD 01

Data Set: `\ASPEN-BH01_FH01_BR.aqt`
Date: 05/24/17  Time: 13:25:02

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-BH01
Test Date: 04.04.17

AQUIFER DATA

Saturated Thickness: 12.18 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-BH01)

Initial Displacement: 0.707 m
Total Well Penetration Depth: 7.182 m
Casing Radius: 0.025 m
Static Water Column Height: 7.182 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

\[ K = 1.001 \text{ m/day} \]
\[ y_0 = 0.507 \text{ m} \]
FALLING-HEAD 01

Data Set: \ASPEN-BH01_FH01_Hv.aqt
Date: 05/24/17
Time: 13:24:52

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-BH01
Test Date: 04.04.17

AQUIFER DATA

Saturated Thickness: 12.18 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-BH01)

Initial Displacement: 0.707 m
Total Well Penetration Depth: 7.182 m
Casing Radius: 0.025 m
Static Water Column Height: 7.182 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.191 m/day
y0 = 0.4381 m
FALLING-HEAD 02

Data Set: \..\ASPEN-BH01_FH02_BR.aqt
Date: 05/24/17  Time: 13:26:47

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-BH02
Test Date: 04.04.17

AQUIFER DATA
Saturated Thickness: 12.18 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-BH01)
Initial Displacement: 0.6198 m
Total Well Penetration Depth: 7.182 m
Casing Radius: 0.025 m
Static Water Column Height: 7.182 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.9778 m/day
y0 = 0.4343 m
FALLING-HEAD 02
Data Set: ASPEN-BH01_FH02_Hv.aqt
Date: 05/24/17 Time: 13:26:21

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-BH02
Test Date: 04.04.17

AQUIFER DATA
Saturated Thickness: 12.18 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-BH01)
Initial Displacement: 0.6198 m
Total Well Penetration Depth: 7.182 m
Casing Radius: 0.025 m
Static Water Column Height: 7.182 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.199 m/day
y0 = 0.4283 m
RISING-HEAD 01
Data Set: \ASPEN-BH01_RH01_BR.aqt
Date: 05/24/17 Time: 13:28:44

PROJECT INFORMATION
Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-BH02
Test Date: 04.04.17

AQUIFER DATA
Saturated Thickness: 12.18 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-BH01)
Initial Displacement: 0.7141 m
Total Well Penetration Depth: 7.182 m
Casing Radius: 0.025 m
Static Water Column Height: 7.182 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.919 m/day
y0 = 0.5355 m
RISING-HEAD 01

Data Set: `\..\ASPEN-BH01_RH01_Hv.aqt`
Date: 05/24/17  Time: 13:29:12

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-BH02
Test Date: 04.04.17

AQUIFER DATA

Saturated Thickness: 12.18 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-BH01)

Initial Displacement: 0.7141 m
Total Well Penetration Depth: 7.182 m
Casing Radius: 0.025 m
Static Water Column Height: 7.182 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.156 m/day
y0 = 0.5199 m
RISING-HEAD 02

Data Set: \..\ASPEN-BH01_RH02_BR.aqt
Date: 05/24/17
Time: 13:30:35

PROJECT INFORMATION

Company: Coffey
Client: MTM
Project: GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-BH02
Test Date: 04.04.17

AQUIFER DATA

Saturated Thickness: 12.18 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-BH01)

Initial Displacement: 0.7067 m
Total Well Penetration Depth: 7.182 m
Casing Radius: 0.025 m
Static Water Column Height: 7.182 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.8995 m/day
y0 = 0.5092 m
**RISING-HEAD 02**

Data Set: `\..\ASPEN-BH01_RH02_Hv.aqt`
Date: 05/24/17  
Time: 13:30:13

**PROJECT INFORMATION**

Company: Coffey  
Client: MTM  
Project: GEOTABTF10294AA  
Location: CTF  
Test Well: ASPEN-BH02  
Test Date: 04.04.17

**AQUIFER DATA**

Saturated Thickness: 12.18 m  
Anisotropy Ratio (Kz/Kr): 0.2

**WELL DATA (ASPEN-BH01)**

Initial Displacement: 0.7067 m  
Total Well Penetration Depth: 7.182 m  
Casing Radius: 0.025 m  
Static Water Column Height: 7.182 m  
Screen Length: 3. m  
Well Radius: 0.1 m  
Gravel Pack Porosity: 0.3

**SOLUTION**

Aquifer Model: Unconfined  
Solution Method: Hvorslev  
K = 1.121 m/day  
y0 = 0.4756 m
FALLING HEAD 01

Data Set: Z:\...\ASPEN-GWBH03_FH01_BR.aqt
Date: 05/24/17
Time: 13:47:41

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-GWBH03
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 11.55 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-GWBH03)

Initial Displacement: 0.509 m
Total Well Penetration Depth: 6.551 m
Casing Radius: 0.025 m
Static Water Column Height: 6.551 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.095 m/day
y0 = 0.3089 m
FALLING HEAD 01

Data Set: F:\...\ASPEN-GWBH03_FH01_Hv.aqt
Date: 05/31/17  Time: 13:21:33

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-GWBH03
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 11.55 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-GWBH03)

Initial Displacement: 0.509 m  Static Water Column Height: 6.551 m
Total Well Penetration Depth: 6.551 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev

\( K = 3.017 \text{ m/day} \)

\( y_0 = 0.3356 \text{ m} \)
FALLING HEAD 02

Data Set: `Z:\...\ASPEN-GWBH03_FH02_BR.aqt`
Date: 05/24/17
Time: 13:46:57

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-GWBH03
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 11.55 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-GWBH03)

Initial Displacement: 0.4055 m
Total Well Penetration Depth: 6.551 m
Casing Radius: 0.025 m
Static Water Column Height: 6.551 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

\( K = 1.955 \text{ m/day} \)
\( y_0 = 0.3313 \text{ m} \)
FALLING HEAD 02

Data Set: Z:\\...\ASPEN-GWBH03_FH02_Hv.aqt
Date: 05/24/17
Time: 13:45:14

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-GWBH03
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 11.55 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-GWBH03)

Initial Displacement: 0.4055 m
Total Well Penetration Depth: 6.551 m
Casing Radius: 0.025 m
Static Water Column Height: 6.551 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 2.373 m/day
y0 = 0.302 m
RISING HEAD 01

Data Set: Z:\...\ASPEN-GWBH03_RH01_BR.aqt
Date: 05/24/17 Time: 13:44:57

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-GWBH03
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 11.55 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-GWBH03)

Initial Displacement: 0.7205 m
Total Well Penetration Depth: 6.551 m
Casing Radius: 0.025 m
Static Water Column Height: 6.551 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.08 m/day
y0 = 0.6659 m
RISING HEAD 01

Data Set: Z:\...\ASPEN-GWBH03_RH01_Hv.aqt
Date: 05/24/17  Time: 13:44:35

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-GWBH03
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 11.55 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-GWBH03)

Initial Displacement: 0.7205 m  Static Water Column Height: 6.551 m
Total Well Penetration Depth: 6.551 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev

K = 2.749 m/day  y0 = 0.6659 m
RISING HEAD 02

Data Set: Z:\...\ASPEN-GWBH03_RH02_BR.aqt
Date: 05/24/17
Time: 13:44:08

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-GWBH03
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 11.55 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-GWBH03)

Initial Displacement: 0.717 m
Total Well Penetration Depth: 6.551 m
Casing Radius: 0.025 m
Static Water Column Height: 6.551 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.027 m/day
y0 = 0.6492 m
RISING HEAD 02
Data Set: Z:\...\ASPEN-GWBH03_RH02_Hv.aqt
Date: 05/24/17 Time: 13:43:51

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: ASPEN-GWBH03
Test Date: 04/04/2017

AQUIFER DATA
Saturated Thickness: 11.55 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (ASPEN-GWBH03)
Initial Displacement: 0.717 m
Total Well Penetration Depth: 6.551 m
Casing Radius: 0.025 m
Static Water Column Height: 0.651 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 2.678 m/day
y0 = 0.6492 m
FALLING HEAD 01

Data Set: Z:\...\CHEL-GWBH01_FH01_BR.aqt
Date: 05/24/17
Time: 13:49:44

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH01
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 13.54 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH01)

Initial Displacement: 0.4477 m
Total Well Penetration Depth: 8.544 m
Casing Radius: 0.025 m
Static Water Column Height: 8.544 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.497 m/day
y0 = 0.3226 m
FALLING HEAD 01

Data Set: Z:\...\CHEL-GWBH01_FH01_Hv.aqt
Date: 05/24/17  Time: 13:49:39

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH01
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 13.54 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH01)

Initial Displacement: 0.4477 m  Static Water Column Height: 8.544 m
Total Well Penetration Depth: 8.544 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 1.847 m/day  y0 = 0.3078 m
### FALLING HEAD 02

Data Set: Z:\...\CHEL-GWBH01_FH02_BR.aqt  
Date: 05/24/17  
Time: 13:49:33

### PROJECT INFORMATION

Company: Coffey  
Client: Metro  
Project: 754-GEOTABTF10294AA  
Location: CTF  
Test Well: CHEL-GWBH01  
Test Date: 04/04/2017

### AQUIFER DATA

Saturated Thickness: 13.54 m  
Anisotropy Ratio (Kz/Kr): 0.2

### WELL DATA (CHEL-GWBH01)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Displacement</td>
<td>0.3872 m</td>
</tr>
<tr>
<td>Total Well Penetration Depth</td>
<td>8.544 m</td>
</tr>
<tr>
<td>Casing Radius</td>
<td>0.025 m</td>
</tr>
<tr>
<td>Static Water Column Height</td>
<td>8.544 m</td>
</tr>
<tr>
<td>Screen Length</td>
<td>3. m</td>
</tr>
<tr>
<td>Well Radius</td>
<td>0.1 m</td>
</tr>
<tr>
<td>Gravel Pack Porosity</td>
<td>0.3</td>
</tr>
</tbody>
</table>

### SOLUTION

Aquifer Model: Unconfined  
Solution Method: Bouwer-Rice  
$K = 1.514$ m/day  
$y_0 = 0.3058$ m
FALLING HEAD 02
Data Set: Z:\...\CHEL-GWBH01_FH02_Hv.aqt
Date: 05/24/17  Time: 13:49:26

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH01
Test Date: 04/04/2017

AQUIFER DATA
Saturated Thickness: 13.54 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH01)
Initial Displacement: 0.3872 m  Static Water Column Height: 8.544 m
Total Well Penetration Depth: 8.544 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 1.953 m/day  y0 = 0.3086 m
RISING HEAD 01

Data Set: Z:\...\CHEL-GWBH01_RH01_BR.aqt
Date: 05/24/17
Time: 13:49:15

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH01
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 13.54 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH01)

Initial Displacement: 0.4792 m
Total Well Penetration Depth: 8.544 m
Casing Radius: 0.025 m
Static Water Column Height: 8.544 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.628 m/day
y0 = 0.4198 m
RISING HEAD 01

Data Set: Z:\...\CHEL-GWBH01_RH01_Hv.aqt
Date: 05/24/17 Time: 13:49:08

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH01
Test Date: 04/04/2017

AQUIFER DATA
Saturated Thickness: 13.54 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH01)
Initial Displacement: 0.4792 m
Total Well Penetration Depth: 8.544 m
Casing Radius: 0.025 m
Static Water Column Height: 8.544 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 2.075 m/day
y0 = 0.4199 m
RISING HEAD 02

Data Set: Z:\...\CHEL-GWBH01_RH02_BR.aqt
Date: 05/24/17  Time: 13:49:01

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH01
Test Date: 04/04/2017

AQUIFER DATA

Saturated Thickness: 13.54 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH01)

Initial Displacement: 0.3872 m
Total Well Penetration Depth: 8.544 m
Casing Radius: 0.025 m
Static Water Column Height: 8.544 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

\[ K = 1.467 \text{ m/day} \]
\[ y_0 = 0.2945 \text{ m} \]
## AQUIFER DATA

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated Thickness</td>
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</tr>
<tr>
<td>Anisotropy Ratio (Kz/Kr)</td>
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</tr>
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## WELL DATA (CHEL-GWBH01)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>Initial Displacement</td>
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<td>Total Well Penetration Depth</td>
<td>8.544 m</td>
</tr>
<tr>
<td>Casing Radius</td>
<td>0.025 m</td>
</tr>
<tr>
<td>Static Water Column Height</td>
<td>8.544 m</td>
</tr>
<tr>
<td>Screen Length</td>
<td>3. m</td>
</tr>
<tr>
<td>Well Radius</td>
<td>0.1 m</td>
</tr>
<tr>
<td>Gravel Pack Porosity</td>
<td>0.3</td>
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## SOLUTION

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tr>
<td>Aquifer Model</td>
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<tr>
<td>Solution Method</td>
<td>Hvorslev</td>
</tr>
<tr>
<td>$K$</td>
<td>1.84 m/day</td>
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<tr>
<td>$y_0$</td>
<td>0.29 m</td>
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FALLING HEAD 01

Data Set: F:\...\CHEL-GWBH02_FH01_BR.aqt
Date: 05/31/17  Time: 10:49:34

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH02
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 10.69 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH02)

Initial Displacement: 0.312 m  Static Water Column Height: 5.694 m
Total Well Penetration Depth: 5.694 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 1.757 m/day  y0 = 0.2195 m
FALLING HEAD 01

Data Set: F:\...\CHEL-GWBH02_FH01_Hv.aqt
Date: 05/31/17  Time: 10:49:55

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH02
Test Date: 03/04/2017

AQUIFER DATA
Saturated Thickness: 10.69 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH02)
Initial Displacement: 0.312 m  Static Water Column Height: 5.694 m
Total Well Penetration Depth: 5.694 m  Screen Length: 3.0 m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined  Solution Method: Hvorslev
K = 2.163 m/day  y0 = 0.198 m
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<th>Parameter</th>
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<tr>
<td>Saturated Thickness</td>
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<tr>
<td>Anisotropy Ratio (Kz/Kr)</td>
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</tr>
<tr>
<td>Initial Displacement</td>
<td>0.716 m</td>
</tr>
<tr>
<td>Total Well Penetration Depth</td>
<td>5.694 m</td>
</tr>
<tr>
<td>Casing Radius</td>
<td>0.025 m</td>
</tr>
<tr>
<td>Static Water Column Height</td>
<td>5.694 m</td>
</tr>
<tr>
<td>Screen Length</td>
<td>3. m</td>
</tr>
<tr>
<td>Well Radius</td>
<td>0.1 m</td>
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<tr>
<td>Gravel Pack Porosity</td>
<td>0.3</td>
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<tr>
<td>Aquifer Model</td>
<td>Unconfined</td>
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<tr>
<td>Solution Method</td>
<td>Bouwer-Rice</td>
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<tr>
<td>K</td>
<td>2.432 m/day</td>
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<tr>
<td>y0</td>
<td>0.6739 m</td>
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</tbody>
</table>
RISING HEAD 01

Data Set: F:\...\CHEL-GWBH02_RH01_Hv.aqt
Date: 05/31/17  Time: 10:50:57

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH02
Test Date: 03/04/2017

AQUIFER DATA
Saturated Thickness: 10.69 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH02)
Initial Displacement: 0.716 m
Total Well Penetration Depth: 5.694 m
Casing Radius: 0.025 m
Static Water Column Height: 5.694 m
Screen Length: 3.0 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 3.278 m/day
y0 = 0.6738 m
### RISING HEAD 02

- **Data Set:** `F:\...\CHEL-GWBH02_RH02_BR.aqt`
- **Date:** 05/31/17  
  **Time:** 10:51:39

### PROJECT INFORMATION

- **Company:** Coffey
- **Client:** Metro
- **Project:** 754-GEOTABTF10294AA
- **Location:** CTF
- **Test Well:** CHEL-GWBH02
- **Test Date:** 03/04/2017

### AQUIFER DATA

- **Saturated Thickness:** 10.69 m
- **Anisotropy Ratio (Kz/Kr):** 0.2

### WELL DATA (CHEL-GWBH02)

- **Initial Displacement:** 0.716 m
- **Total Well Penetration Depth:** 5.694 m
- **Casing Radius:** 0.025 m
- **Static Water Column Height:** 5.694 m
- **Screen Length:** 3. m
- **Well Radius:** 0.1 m
- **Gravel Pack Porosity:** 0.3

### SOLUTION

- **Aquifer Model:** Unconfined
- **Solution Method:** Bouwer-Rice
- **K:** 2.141 m/day
- **y0:** 0.5775 m
RISING HEAD 02

Data Set: F:\...\CHEL-GWBH02_RH02_Hv.aqt
Date: 05/31/17  Time: 10:52:05

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH02
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 10.69 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH02)

Initial Displacement: 0.716 m  Static Water Column Height: 5.694 m
Total Well Penetration Depth: 5.694 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Hvorslev
\( K = 2.886 \text{ m/day} \)
\( y_0 = 0.5775 \text{ m} \)
FALLING HEAD 01
Data Set: F:\...\CHEL-GWBH03_FH01_BR.aqt
Date: 05/31/17
Time: 10:53:32

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH03
Test Date: 03/04/2017

AQUIFER DATA
Saturated Thickness: 9.789 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH03)
Initial Displacement: 0.318 m
Total Well Penetration Depth: 4.789 m
Casing Radius: 0.025 m
Static Water Column Height: 4.789 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.995 m/day
y0 = 0.2856 m
FALLING HEAD 01

Data Set: F:\...\CHEL-GWBH03_FH01_Hv.aqt
Date: 05/31/17
Time: 10:54:02

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH03
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 9.789 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH03)

Initial Displacement: 0.318 m
Total Well Penetration Depth: 4.789 m
Casing Radius: 0.025 m
Static Water Column Height: 4.789 m
Screen Length: 3.0 m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

$K = 2.759 \text{ m/day}$
$y_0 = 0.2856 \text{ m}$
### FALLING HEAD 02

Data Set: F:\...\CHEL-GWBH03_FH02_BR.aqt  
Date: 05/31/17  Time: 10:55:56

### PROJECT INFORMATION

- **Company:** Coffey  
- **Client:** Metro  
- **Project:** 754-GEOTABTF10294AA  
- **Location:** CTF  
- **Test Well:** CHEL-GWBH03  
- **Test Date:** 03/04/2017

### AQUIFER DATA

- **Saturated Thickness:** 9.789 m  
- **Anisotropy Ratio (Kz/Kr):** 0.2

### WELL DATA (CHEL-GWBH03)

- **Initial Displacement:** 0.4605 m  
- **Total Well Penetration Depth:** 4.789 m  
- **Casing Radius:** 0.025 m  
- **Static Water Column Height:** 4.789 m  
- **Screen Length:** 3. m  
- **Well Radius:** 0.1 m  
- **Gravel Pack Porosity:** 0.3

### SOLUTION

- **Aquifer Model:** Unconfined  
- **Solution Method:** Bouwer-Rice  
- **K:** 1.718 m/day  
- **y0:** 0.3007 m
FALLING HEAD 02
Data Set: F:\...\CHEL-GWBH03_FH02_Hv.aqt
Date: 05/31/17 Time: 10:55:20

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH03
Test Date: 03/04/2017

AQUIFER DATA
Saturated Thickness: 9.789 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH03)
Initial Displacement: 0.4605 m Static Water Column Height: 4.789 m
Total Well Penetration Depth: 4.789 m Screen Length: 3. m
Casing Radius: 0.025 m Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined Solution Method: Hvorslev
K = 2.308 m/day y0 = 0.2945 m
RISING HEAD 01

Data Set: F:\...\CHEL-GWBH03_RH01_BR.aqt
Date: 05/31/17  Time: 10:56:27

PROJECT INFORMATION
Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH03
Test Date: 03/04/2017

AQUIFER DATA
Saturated Thickness: 9.789 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH03)
Initial Displacement: 0.5615 m
Total Well Penetration Depth: 4.789 m
Casing Radius: 0.025 m
Static Water Column Height: 4.789 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.105 m/day
y0 = 0.5607 m
RISING HEAD 01

Data Set: F:\...\CHEL-GWBH03_RH01_Hv.aqt
Date: 05/31/17 Time: 10:56:54

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH03
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 9.789 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH03)

Initial Displacement: 0.5615 m
Total Well Penetration Depth: 4.789 m
Casing Radius: 0.025 m
Static Water Column Height: 4.789 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 5.678 m/day
y0 = 0.5607 m
RISING HEAD 02

Data Set: F:\\...\\CHEL-GWBH03_RH02_BR.aqt
Date: 05/31/17  Time: 10:57:26

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH03
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 9.789 m  Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH03)

Initial Displacement: 0.5615 m  Static Water Column Height: 4.789 m
Total Well Penetration Depth: 4.789 m  Screen Length: 3. m
Casing Radius: 0.025 m  Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined  Solution Method: Bouwer-Rice
K = 5.417 m/day  y0 = 0.5491 m
RISING HEAD 02

Data Set: F:\...\CHEL-GWBH03_RH02_Hv.aqt
Date: 05/31/17               Time: 10:57:52

PROJECT INFORMATION

Company: Coffey
Client: Metro
Project: 754-GEOTABTF10294AA
Location: CTF
Test Well: CHEL-GWBH03
Test Date: 03/04/2017

AQUIFER DATA

Saturated Thickness: 9.789 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (CHEL-GWBH03)

Initial Displacement: 0.5615 m
Total Well Penetration Depth: 4.789 m
Casing Radius: 0.025 m
Static Water Column Height: 4.789 m
Screen Length: 3. m
Well Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 7.495 m/day
y0 = 0.5491 m
**Sample Details**

<table>
<thead>
<tr>
<th>GHD Sample No</th>
<th>TRA17-0770-02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampled By</td>
<td>Sampled by GHD</td>
</tr>
<tr>
<td>Location</td>
<td>Edithvale and Bonbeach EES</td>
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<tr>
<td>BH / TP No.</td>
<td>ID18 - BH12</td>
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<tr>
<td>Depth (m)</td>
<td>4.2-4.6m</td>
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**Test Results**

<table>
<thead>
<tr>
<th>Description</th>
<th>Method</th>
<th>Result</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coef of Permeability (m/sec)</td>
<td>AS 1289.6.7.3</td>
<td>1.0E-10</td>
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<td>Mean Stress Level (kPa)</td>
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<td>Permeant Used</td>
<td>Tap Water</td>
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<td>Length (mm)</td>
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<td>Diameter (mm)</td>
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<td>Length/Diameter Ratio</td>
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<tr>
<td>Laboratory Moisture Ratio (%)</td>
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<tr>
<td>Laboratory Density Ratio (%)</td>
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<tr>
<td>Compactive Effort</td>
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<td>Method of Compaction</td>
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<td>Surcharge Applied (Kg)</td>
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<td>Pressure Applied (Kpa)</td>
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<td>Oversize Sieve (mm)</td>
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<tr>
<td>Percentage Oversize (%)</td>
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<td>Moisture Content (%)</td>
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**Comments**

N/A
## Aggregate/Soil Test Report

**Client:** Level Crossing Removal Authority  
**Project:** Level Crossing Removal Project

### Sample Details

<table>
<thead>
<tr>
<th>GHD Sample No</th>
<th>TRA17-0770-01</th>
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<tr>
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<td>BH / TP No.</td>
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### Test Results

<table>
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<tr>
<th>Description</th>
<th>Method</th>
<th>Result</th>
<th>Limits</th>
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<tr>
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<td>Laboratory Density Ratio (%)</td>
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<td>Compactive Effort</td>
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<td>Surcharge Applied (Kg)</td>
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<td>Pressure Applied (Kpa)</td>
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<td>Oversize Sieve (mm)</td>
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<td>Percentage Oversize (%)</td>
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<td>Moisture Content (%)</td>
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### Comments

N/A