Appendix A: Figures

- Figure 1: Site Investigation Plan
Appendix B: Field Investigations

- T+T Engineering Log Terminology
- Machine borehole logs and core photos
- Hand auger borehole logs
- Test pit logs
- Lugeon Test Results
Soil and rock descriptions follow the “Guidelines for the field classification and description of soil and rock for engineering purposes” by the New Zealand Geotechnical Society (2005). Refer to this document for methods of field determination.

### General

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

#### Core recovery
Expressed as percentage of the length of the core run recovered.

#### Drilling method/casing

<table>
<thead>
<tr>
<th>Common types:</th>
<th>OB</th>
<th>Open barrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>Wash</td>
<td></td>
</tr>
<tr>
<td>HQ3</td>
<td>HQ triple tube</td>
<td></td>
</tr>
<tr>
<td>PQ3</td>
<td>PQ triple tube</td>
<td></td>
</tr>
<tr>
<td>HSA</td>
<td>Hollow Stem Auger</td>
<td></td>
</tr>
<tr>
<td>WS</td>
<td>Window Sampler</td>
<td></td>
</tr>
<tr>
<td>HA</td>
<td>Hand Auger</td>
<td></td>
</tr>
<tr>
<td>HFS</td>
<td>High Frequency Sonic Drilling</td>
<td></td>
</tr>
<tr>
<td>LFS</td>
<td>Low Frequency Sonic Drilling</td>
<td></td>
</tr>
</tbody>
</table>

#### Graphic logs

**The graphic log shows soil and rock types. The defect log indicates the location, orientation and abundance of defects of all types.**

**Typical material symbols:**
- **Organic material**
- **Clay**
- **Silt**
- **Sand**
- **Gravel or Conglomerate**
- **Igneous rock**
- **Mudstone**
- **Siltstone**
- **Sandstone**
- **Metamorphic Rock**

#### Installation type

- **Standpipe**
- **Slotted screen**
- **Filter pack**
- **Bentonite seal**
- **VWP**

#### Tests
- N=22: SPT uncorrected blow count for 300 mm
- 75/12: Undrained shear strength (peak/residual) as measured by field vane.

**Laboratory test(s) carried out:**
- PMT: Pressuremeter test
- LT: Lugeon test
- LV: Laboratory vane
- AL: Atterburg limits
- UU: Undrained triaxial
- PSD: Particle size distribution
- c’^o^: Effective stress
- CONS: Consolidation
- DS: Direct shear
- COMP: Compaction
- UCS: Unconfined compression
- IS_o: Point load

#### Sample type

- SPT
- Thin-wall tube
- Core
- Other
- Bulk sample
- Core or Sample loss

### Soil description

**Moisture content**
- D: Dry, looks and feels dry
- M: Moist, no free water on hand when remoulding
- W: Wet, free water on hand when remoulding
- S: Saturated, free water present on sample

**Consistency/undrained shear strength**

<table>
<thead>
<tr>
<th>Term</th>
<th>VS</th>
<th>S</th>
<th>F</th>
<th>St</th>
<th>VSt</th>
<th>H</th>
<th>S_u(kPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very soft</td>
<td>&lt; 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft</td>
<td>12 to 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm</td>
<td>25 to 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stiff</td>
<td>50 to 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very stiff</td>
<td>100 to 200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard</td>
<td>&gt; 200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Density index**

<table>
<thead>
<tr>
<th>Sample type</th>
<th>SPT(N) - uncorrected</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL: Very loose</td>
<td>0 to 4</td>
</tr>
<tr>
<td>L: Loose</td>
<td>4 to 10</td>
</tr>
<tr>
<td>MD: Medium dense</td>
<td>10 to 30</td>
</tr>
<tr>
<td>D: Dense</td>
<td>30 to 50</td>
</tr>
<tr>
<td>VO: Very dense</td>
<td>&gt; 50</td>
</tr>
</tbody>
</table>

### Proportional terms definition (Coarse soils)

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Term</th>
<th>% of soil mass</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major (UPPER CASE)</td>
<td>Major constituent</td>
<td>GRAVEL</td>
<td></td>
</tr>
<tr>
<td>Subordinate (lower case)</td>
<td>&gt; 20</td>
<td>Sandy</td>
<td></td>
</tr>
<tr>
<td>Minor with some...</td>
<td>12 - 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with minor...</td>
<td>5 - 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with trace of... (or slightly)...</td>
<td>&lt; 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Grain size criteria

<table>
<thead>
<tr>
<th>Type</th>
<th>Size range (mm)</th>
</tr>
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<tbody>
<tr>
<td>Coarse</td>
<td>200</td>
</tr>
<tr>
<td>Boulders</td>
<td>60</td>
</tr>
<tr>
<td>Sand</td>
<td>20</td>
</tr>
<tr>
<td>Medium</td>
<td>6</td>
</tr>
<tr>
<td>Fine</td>
<td>2</td>
</tr>
<tr>
<td>Clay</td>
<td>0.06</td>
</tr>
<tr>
<td>gravel</td>
<td>0.002</td>
</tr>
</tbody>
</table>

#### Grain size criteria

<table>
<thead>
<tr>
<th>Size range (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>0.06</td>
</tr>
<tr>
<td>0.002</td>
</tr>
<tr>
<td>Defect shape</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>ST Stepped</td>
</tr>
<tr>
<td>UN Undulating</td>
</tr>
<tr>
<td>PL Planar</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
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<td></td>
</tr>
</tbody>
</table>

Defect Orientation: for vertical unoriented boreholes defect orientation is measured normal to core axis e.g. horizontal = 0˚ (see diagram). For angled boreholes defect orientation is measured relative to core axis e.g. parallel to core axis = 0˚.

Infillings and coatings:
- CG Clay gouge: Joints have openings between opposing faces of intact rock substance in excess of 1 mm filled with clay gouge. Clay is generally described in terms of soil properties.
- CV Clay veneers: Joints contain clay coating whose maximum thickness does not exceed 1 mm. Note: Describe clay in terms of soil properties.
- PL Penetrative limonite: Joint traces are marked in terms of well defined zones of slightly to moderately weathered ferruginised rock-substance within the adjacent rock.
- FeSt Limonite stained: Joint surfaces are stained or coated with limonite, although the rock substance immediately adjacent to the joints is fresh.
- CT, SC Coated: Joints exhibit coatings other than clay or limonite, e.g. Carbonate (CT) or Silica (SC).
- CL, CS, CC Cemented: Joints are cemented with limonite (CL), Silica (CS), or Carbonates (CC).
- CN Clean: Joint surface show no trace of clay, limonite, or other coatings.

Aperture:
- T Tight nil
- VN Very narrow 0 - 2
- N Narrow 2 - 6
- MN Moderately narrow 6 - 20
- MW Moderately wide 20 - 60
- W Wide 60 - 200
- VW Very wide > 200

Spacing:
- Term | Spacing
- Very wide | > 2 m
- Wide | 0.6 - 2 m
- Moderately wide | 200 - 600 mm
- Close | 60 - 200 mm
- Very close | 20 - 60 mm
- Extremely close | > 20 mm

Excavator penetration:
- Easy | 1
- Moderate | 2
- Difficult | 3

RQD: Rock Quality Designation – percentage of core run consisting of sound rock longer than 10 cm.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**COORDINATES:**  
NZTM2000  
R.L. GROUND: 148.00m  
R.L. COLLAR: 148.00m

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°

**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer site plan  
**JOB No.:** 1005069.1120  
**CO-ORDINATES:** (NZTM2000)

**DEPTH (m):** 0.0m  
**DESCRIPTION:** Fine to coarse GRAVEL; trace wood, trace light brown clay; grey. Loosely packed, wet [roading material]

**DEPTH (m):** 0.3m  
**DESCRIPTION:** No Recovery (core loss)

**DEPTH (m):** 1.5m  
**DESCRIPTION:** Push Tube

**DEPTH (m):** 2.0m  
**DESCRIPTION:** CLAY, some silt; orange brown mottled grey. Stiff, wet, high plasticity

**DEPTH (m):** 2.35m  
**DESCRIPTION:** No recovery (core loss)

**DEPTH (m):** 2.45m  
**DESCRIPTION:** CLAY, some silt; orange brown mottled light grey, trace light pink streaks. Stiff, wet, high plasticity

**DEPTH (m):** 2.8m  
**DESCRIPTION:** Sandy CLAY, some silt; light brown mottled orange brown. Firm, wet, moderate to high plasticity. Sand, fine

**DEPTH (m):** 3.0m  
**DESCRIPTION:** Silty CLAY; orange brown mottled grey. Firm, wet, high plasticity

**DEPTH (m):** 3.7m  
**DESCRIPTION:** Sandy CLAY, minor silt, with some thin (100mm) beds of CLAY minor silt; grey orange brown mottles. Firm to stiff, wet, moderate to high plasticity. Sand, fine

**DEPTH (m):** 4.0m  
**DESCRIPTION:** CLAY, minor silt some thin bands of sandy clay; reddish brown, mottled light grey. Stiff, wet, high plasticity

**DEPTH (m):** 4.15m  
**DESCRIPTION:** Minor fine to medium gravel, black staining

**DEPTH (m):** 4.15m  
**DESCRIPTION:** Sandy SILT, minor clay, reddish brown. Stiff, saturated, low plasticity. From 4.25m becoming silty fine SAND; reddish brown. Loose, wet

**DEPTH (m):** 4.5m  
**DESCRIPTION:** Push Tube

**COMMENTS:** 65mm I.D. piezometer installed on Mon 9 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.

**CONTRACTOR:** McMillan Drilling

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**GELOGICAL UNIT**

SOIL: Classification, colour, consistency / density, moisture, plasticity

ROCK: Weathering, colour, fabric, name, strength, cementation

**SOIL:** Classification, colour, consistency / density, moisture, plasticity

**ROCK:** Weathering, colour, fabric, name, strength, cementation

**SOIL:** Classification, colour, consistency / density, moisture, plasticity

**ROCK:** Weathering, colour, fabric, name, strength, cementation

---

**BOREHOLE No.:** BH1  
**DRILLED BY:** Craig & Peter  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**START DATE:** 19/03/2018  
**FINISH DATE:** 23/03/2018  
**CONTRACTOR:** McMillan Drilling
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**COORDINATES:**
- **R.L. GROUND:** 148.00m  
- **R.L. COLLAR:** 148.00m

**DIRECTION:** 0°  
**ANGLE FROM HORIZ:** -90°

**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer site plan  
**JOB No.:** 1005069.1120

**ROCK DEFECTS**

- **Type:**  
  - **200:**  
  - **600:**  
  - **200:**  
  - **60:**  
  - **20:**  
  - **UW:**  
  - **SW:**  
  - **MW:**  
  - **HW:**  
  - **CW:**  
  - **ES:**  
  - **VS:**  
  - **S:**  
  - **MS:**  
  - **W:**  
  - **VW:**  
  - **EW:**

**SOIL:** Classification, colour, consistency / density, moisture, plasticity

**ROCK:** Weathering, colour, fabric, name, strength, cementation

**DESCRIPTION OF CORE**

- **5.0m:** Fine SAND, trace silt; brown minor orange brown to reddish brown laminations, trace carbonaceous laminations. Medium dense, wet.
- **5.45-5.75m:** Reddish brown
- **6.0m:** Light brown, with reddish brown and black staining
- **6.45m:** Silty fine SAND; brown, with orange brown and reddish brown, and trace black staining. Medium dense, wet.
- **6.75m:** Fine SAND, minor medium to coarse SAND
- **6.75m:** Fine SAND, trace to minor silt; brown, minor orange brown and black (carbonaceous) laminations. Medium dense, wet
- **9.0m:** Silty fine SAND; brown, minor reddish brown and black staining. Loose, wet
- **9.60m:** Reddish brown staining along defect

**COMMENTS:**
- 65mm I.D. piezometer installed on Mon 9 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**BOREHOLE LOG**

**BOREHOLE No.:** BH1  
**R.L. GROUND:** 148.00m  
**R.L. COLLAR:** 148.00m  
**DATUM:** NZVD2016  
**SURVEY:** Total Station Surveyed

**CONTRACTOR:** McMillan Drilling

**START DATE:** 19/03/2018  
**FINISH DATE:** 23/03/2018  
**CO-ORDINATES:**  
**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°

**DEMOGRAPHIC DATA**

**SOIL:** Classification, colour, consistency / density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

**GEOLOGICAL UNIT**

**DESCRIPTION OF CORE**

**RQD (%)**  
**Water Level**  
**Fracture Spacing (mm)**  
**Depth (m)**  
**Graphic Log**  
**RL (m)**

**ROCK DEFECTS**

**2000**  
**600**  
**200**  
**60**  
**20**  
**UW**  
**SW**  
**MW**  
**HW**  
**CW**  
**ES**  
**VS**  
**S**  
**MS**  
**W**  
**VW**  
**EW**

**Defect Log**  
**Fluid Loss (%)**  
**25**  
**50**  
**75**

**Fluid Loss (%)**

**Casing Installation**

**Core Box No**

**Defect Log**

10.0m: Fine to medium SAND, trace silt, brown, minor orange brown and black (carbonaceous) laminations. Medium dense, wet

11.0m: Silty fine SAND; light brown, minor orange brown and black (carbonaceous) laminations. Medium dense, wet

11.3m: Highly weathered, light brown mottled orange brown SILTSTONE. Extremely weak. [SILT, minor fine sand. Very Stiff, wet, low plasticity]

11.65m: Highly weathered, light brown and orange brown, fine to medium SANDSTONE. Extremely weak. [Fine to medium SAND, trace silt. Tightly packed, wet]

11.8m: Highly weathered, light brown and orange brown, fine SANDSTONE, minor thin (50mm) to moderately thick (250mm) beds of highly weathered, grey, SILTSTONE. Extremely weak. [Interbedded fine SAND and SILT]

12.5m: Highly weathered fine to medium SANDSTONE. Extremely weak. [Fine to medium SAND, minor silt. Tightly packed, wet]

13.5m: Highly weathered fine to coarse SANDSTONE. Extremely weak to very weak. [Fine to coarse SAND, trace silt. Tightly packed, wet]

14.5m: Extremely weak. Recovered as fine to coarse SAND

14.6m: Highly weathered fine to coarse SANDSTONE. Extremely weak. Discontinuities very closely spaced. [Fine to coarse SAND, trace silt. Tightly packed, wet]

19.90m - 12.70m: 65mm I.D. piezometer installed on Mon 9 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.

**COMMENTS:** 65mm I.D. piezometer installed on Mon 9 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
DESCRIPTION OF CORE

15.0m: Highly weathered fine SANDSTONE. Extremely weak. [Fine SAND, minor silt. Tightly packed, wet]

15.1m: Moderately weathered, grey, SILTSTONE. Extremely weak. [SILT, hard, fissile]

15.2m: Moderately weathered, grey, fine SANDSTONE. Extremely weak. [Fine SAND, grading to fine to coarse sand. Tightly packed, wet]

16.2m: Moderately weathered, dark grey, SILTSTONE. Extremely weak

16.25m: Moderately weathered, brown, fine grading fine to coarse SANDSTONE from 16.5m. Extremely weak to very weak.

17.0m: Moderately weathered, brown, SILTSTONE. Extremely weak to very weak

17.3m: Moderately weathered brown fine SANDSTONE, minor very thin (10mm to 60mm) beds of dark grey SILTSTONE. Extremely weak to very weak

18.0m: No recovery (core loss)

19.1m: Highly weathered brown with minor reddish brown streaks fine to medium SANDSTONE. Extremely weak [rock disintegrates into fine to medium SAND, trace silt with light pressure]

19.5: No Recovery (core loss)
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill

**JOB No.:** 1005069.1120

**LOCATION:** Refer site plan

---

**DESCRIPTION OF CORE**

**GEOLOGICAL UNIT**

**SOIL:** Classification, colour, consistency / density, moisture, plasticity

**ROCK:** Weathering, colour, fabric, name, strength, cementation

**SOIL:** Classification, colour, consistency / density, moisture, plasticity

**ROCK:** Weathering, colour, fabric, name, strength, cementation

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**20.0m:** No recovery (core loss)

**20.6m:** Highly weathered brown fine to coarse SANDSTONE. Extremely weak. [Recovered as silty fine to coarse SAND. Wet]

**20.75 - 20.95m:** Brownish grey, fine to coarse SANDSTONE. Extremely weak. [Rock disintegrates easily by hand to a silty fine to coarse sand]

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**21.1m:** Highly weathered, brown with reddish brown staining, fine to medium SANDSTONE. Extremely weak

**21.45 - 21.55m:** Light greyish brown, fine to coarse SANDSTONE. Very weak.

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**21.55m:** Moderately weathered, brown, fine to coarse SANDSTONE. Very weak.

**21.75m-22.1m:** Slightly weathered, dark blue grey, fine to medium SANDSTONE

---

**22.3 - 22.32m:** SILTSTONE

---

**22.7-22.75m:** SILTSTONE

**22.8m-23.05m:** Slightly weathered blue-grey fine to coarse SANDSTONE

---

**23.26m-23.33m:** SILTSTONE

---

**24.82m-24.87m:** Fine SANDSTONE

**24.93m-24.95m:** SILTSTONE

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**COMMENTS:** 65mm I.D. piezometer installed on Mon 9 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
## BOREHOLE LOG

**BOREHOLE No.: BH1**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan  
**DRILLED BY:** Craig & Peter  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**START DATE:** 19/03/2018  
**FINISH DATE:** 23/03/2018  
**CONTRACTOR:** McMillan Drilling  
**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016  
**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer site plan  
**JOB No.:** 1005069.1120  
**COORDINATES:** NZTM2000  
**SHEET:** 6 OF 10  

### DESCRIPTION OF CORE

**GEOLOGICAL UNIT**  
SOIL: Classification, colour, consistency / density, moisture, plasticity  
ROCK: Weathering, colour, fabric, name, strength, cementation  

### ROCK DEFECTS

**26.45 - 26.47m:** SILTSTONE  
**26.47 - 26.52m:** Fine SANDSTONE  
**26.52m:** Moderately weathered brown fine to medium SANDSTONE. Extremely weak to very weak  
**27.0m - 27.1m:** Moderately weathered, brown, fine SANDSTONE  
**27.7m - 27.75m:** Moderately weathered, grey SILTSTONE. Very weak  
**27.75m - 27.79m:** Black carbonaceous laminations  

### COMMENTS:

- 65mm I.D. piezometer installed on Mon 9 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

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<table>
<thead>
<tr>
<th>GEOLOGICAL UNIT</th>
<th>DESCRIPTION OF CORE</th>
<th>ROCK STRENGTH</th>
<th>Rock Weathering</th>
<th>Sampling Method</th>
<th>Core Recovery (%)</th>
<th>RQD (%)</th>
<th>Rock Defects</th>
<th>Description &amp; Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.0m</td>
<td>Moderately weathered, light brownish grey, fine to medium SANDSTONE. Very weak.</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
</tr>
<tr>
<td>30.3-30.4m</td>
<td>Lense of brown, fine to medium, SANDSTONE</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
</tr>
<tr>
<td>30.4m</td>
<td>Light brown</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
</tr>
<tr>
<td>31.25m</td>
<td>Light brownish grey</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
</tr>
<tr>
<td>31.1m-31.12m</td>
<td>SILTSTONE</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
</tr>
<tr>
<td>31.99m-32.05m</td>
<td>Moderately weathered dark grey SILTSTONE. Very weak</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
</tr>
<tr>
<td>32.65-33.0m</td>
<td>Moderately weathered, light brown, fine SANDSTONE</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
</tr>
<tr>
<td>33.3m</td>
<td>Moderately weathered, brown, fine to coarse SANDSTONE. Extremely weak</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
</tr>
<tr>
<td>34.1-34.2m</td>
<td>Coarse SANDSTONE. Extremely weak</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
</tr>
<tr>
<td>34.2m-34.5m</td>
<td>Fine SANDSTONE. Extremely weak</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
</tr>
<tr>
<td>34.5-34.9m</td>
<td>Moderately weathered, light grey fine SANDSTONE. Very weak</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
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<tr>
<td>34.9m-35.1m</td>
<td>Moderately weathered, dark brown, fine SANDSTONE</td>
<td>HOTT</td>
<td>100</td>
<td></td>
<td>30.5</td>
<td>0.0</td>
<td>DD</td>
<td>J, 20° dip, UN, SM, T, black St, minor FeSt</td>
</tr>
</tbody>
</table>

---

**COMMENTS:** 65mm I.D. piezometer installed on Mon 9 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**
- **R.L. GROUND:** 148.00m  
- **SURVEY:** Total Station/Surveyed

**R.L. GROUND:** 148.00m  
**R.L. COLLAR:** 148.00m  
**DATUM:** NZVD2016

**SCALE:** 1:25

**LOCATION:** Refer site plan

### DESCRIPTION OF CORE

**SOIL:** Classification, colour, consistency / density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

### ROCK DEFECTS

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Fluid Loss (%)</th>
<th>Rock Quality Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.9 - 35.0m</td>
<td>0%</td>
<td>Un, SL to SM, brown silt</td>
</tr>
<tr>
<td>35.0 - 35.25m</td>
<td>0%</td>
<td>ExCS to VCS, UN, SM, VN to N, brown silty sand, FeSt</td>
</tr>
<tr>
<td>35.1 - 35.3m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>35.1 - 35.5m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>35.5 - 35.6m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>35.6 - 35.7m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>35.7 - 35.8m</td>
<td>0%</td>
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</tr>
<tr>
<td>35.8 - 35.9m</td>
<td>0%</td>
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</tr>
<tr>
<td>35.9 - 35.1m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>36.0 - 36.1m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>36.1 - 36.2m</td>
<td>0%</td>
<td></td>
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<tr>
<td>36.2 - 36.3m</td>
<td>0%</td>
<td></td>
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<tr>
<td>36.3 - 36.4m</td>
<td>0%</td>
<td></td>
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<tr>
<td>36.4 - 36.5m</td>
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<tr>
<td>36.5 - 36.6m</td>
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<tr>
<td>36.6 - 36.7m</td>
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<tr>
<td>36.7 - 36.8m</td>
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<tr>
<td>36.8 - 36.9m</td>
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<tr>
<td>36.9 - 37.0m</td>
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<tr>
<td>37.0 - 37.1m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>37.1 - 37.2m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>37.2 - 37.3m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>37.3 - 37.4m</td>
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<td></td>
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<tr>
<td>37.4 - 37.5m</td>
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<tr>
<td>37.5 - 37.6m</td>
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<tr>
<td>37.6 - 37.7m</td>
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<td>37.7 - 37.8m</td>
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<tr>
<td>37.8 - 37.9m</td>
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<tr>
<td>37.9 - 38.0m</td>
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<tr>
<td>38.0 - 38.1m</td>
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<tr>
<td>38.1 - 38.2m</td>
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<tr>
<td>38.2 - 38.3m</td>
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<td>38.3 - 38.4m</td>
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<td>38.4 - 38.5m</td>
<td>0%</td>
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<td>38.5 - 38.6m</td>
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<tr>
<td>38.6 - 38.7m</td>
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<td>38.7 - 38.8m</td>
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<td>38.8 - 38.9m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>38.9 - 39.0m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>39.0 - 39.1m</td>
<td>0%</td>
<td></td>
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<tr>
<td>39.1 - 39.2m</td>
<td>0%</td>
<td></td>
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<tr>
<td>39.2 - 39.3m</td>
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<tr>
<td>39.3 - 39.4m</td>
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<td>39.4 - 39.5m</td>
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<tr>
<td>39.7 - 39.8m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>39.8 - 39.9m</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>39.9 - 40.0m</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:** 65mm I.D. piezometer installed on Mon 9 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 5977896.86 mN 1741422.54 mE

DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 148.00m
R.L. COLLAR: 148.00m

DATUM: NZVD2016
SURVEY: Total Station/Surveyed

START DATE: 19/03/2018
FINISH DATE: 23/03/2018

CONTRACTOR: McMillan Drilling

LOCATION: Refer site plan
JOB No.: 1005069.1120
PROJECT: Auckland Regional Landfill

SW Pakiri
UW Pakiri

99

ROCK: Weathering, colour, fabric, name, strength, cementation
SOIL: Classification, colour, consistency / density, moisture, plasticity

DESCRIPTION OF CORE

40.0m: No recovery (core loss)

40.5m: Moderately weathered, light brown, fine SANDSTONE. Very weak

40.75m: Moderately weathered, brown, fine to medium SANDSTONE. Very weak

40.9m to 42.1m: Moderately weathered, interbedded grey SILTSTONE with thin light brown fine sandstone laminations and brown fine SANDSTONE. Very weak

42.1m: Slightly weathered, grey, minor orange brown staining, fine SANDSTONE. Very weak

42.3m: Unweathered, grey, fine SANDSTONE with thin black carbonaceous laminae. Weak

42.45m: Unweathered, dark grey SILTSTONE and fine grained SANDSTONE. Weak. Beds are moderately thin to moderately thick (100mm to 350mm)

40.50 - 40.65m: BZ, Rac f-c gvd

ROCK DEFECTS

Description & Additional Observations

Fluid Loss (%)
Vapor Level
Casing Installation
Core Box No

COMMENTS: 65mm I.D. piezometer installed on Mon 9 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

DESCRIPTION OF CORE

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

45.0m: Unweathered interbedded dark grey
SILTSTONE and fine grained SANDSTONE. Weak

49.99m: Target depth

49.00 - 49.20m: J, 90° dip, & orthog 90, PL, R, T, black
staining to 45.1m
45.25m: J, 0° dip, UN, SM, VN, CN
45.35m: J, 70° dip, UN, SM, T, FeSt
45.40m: J, 50° dip, UN, SM, T, CN
45.60m: DD, 0° dip
45.70m: J, 80° dip, Wavy PL, R, T, CN & orthog 80, ST, SM, T, CN

46.25m: J, 70° dip, UN, SM, VN, CN
46.30 - 46.40m: BZ, Orthog, 20 to 90, UN, SM, T, CN & PL, R, N, grey silt
46.40 - 46.70m: J

47.10m: J, 60° dip, UN, R, T, CN
47.40m: J, 80° dip, VCS, UN, SM, T, CN

48.40 - 49.10m: J, 80° dip, VCS, UN, SM, VN, CN minor grey silt
49.10m: J, 60° dip, UN, SL, T - VN, CN
49.25m: J, 30° dip, Wavy, PL, R, T, CN

R.L. GROUND: 148.00m
R.L. COLLAR: 148.00m
SURVEY: Total Station/Surveyed

LOCATION: Refer site plan
JOB No.: 1005069.1120
PROJECT: Auckland Regional Landfill

General Log - 5/04/2019 11:16:26 a.m. - Produced with Core-GS by GeRoc

Comments: 65mm I.D. piezometer installed on Mon 9 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
General Log - 5/04/2019 11:16:28 a.m. - Produced with Core-GS by GeRoc v3.2g

**PROJECT:** Auckland Regional Landfill

**JOB No.:** 1005069.1120

**LOCATION:** Refer site plan

---

**DESCRIPTION OF CORE**

- **0.0m:** Fine to coarse angular GRAVEL, some sand, minor silt. Brown. Tightly packed, wet.
- **0.1m:** BOULDER: brown. Boulder is moderately weathered, brown, fine to coarse SANDSTONE. Weak.
- **2.18m:** Silty fine SAND; light brown mottled orange brown. Loose, moist to wet
- **2.45m:** No recovery (core loss)
- **3.0m:** Silty fine SAND; brown. Loose to medium dense, moist to wet
- **4.05m:** Fine to medium SAND; light brown mottled orange brown. Loose to medium dense, moist to wet
- **4.1m:** No recovery (core loss)
- **4.5m:** Fine to medium SAND; light brown mottled orange brown. Medium, dense, moist to wet

---

**COMMENTS:** 65mm I.D. piezometer installed on Thurs 19 April 2018.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**COORDINATES:** 5977395.83 mN 1742110.99 mE

**DIRECTION:** 0°  
**ANGLE FROM HORIZ:** -90°

**R.L. GROUND:** 204.30m  
**R.L. COLLAR:** 204.30m  
**SURVEY:** Total Station Surveyed

**DATE:** NZVD2016

**START DATE:** 12/04/2018  
**FINISH DATE:** 16/04/2018

**CONTRACTOR:** McMillan Drilling

---

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>GEOL. UNIT</th>
<th>ROCK Weathering</th>
<th>SOIL: Classification, colour, consistency / density, moisture, plasticity</th>
<th>ROCK: Weathering, colour, fabric, name, strength, cementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.94m: fine SAND</td>
<td>Trace silt, light greyish brown to wet</td>
<td><strong>ROCK:</strong> Weathering, colour, fabric, name, strength, cementation</td>
<td></td>
</tr>
<tr>
<td>6.1m: Interbedded SILT</td>
<td>Light greyish brown mottled orange brown, stiff to very stiff, moist, low plasticity and fine SAND</td>
<td>Light greyish brown, loose to medium dense, moist. Moderately thinly bedded.</td>
<td></td>
</tr>
<tr>
<td>7.45m: Clayey SILT</td>
<td>Light greyish brown. Stiff to very stiff, moist, low to moderate plasticity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.95m: Moderately weathered to highly weathered, brown, SILTSTONE</td>
<td>Very weak to weak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.15m: Moderately weathered to highly weathered, brown, fine to coarse SANDSTONE</td>
<td>Very weak to weak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.3m: Becomes brown and grey</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.61m to 8.71m: Highly weathered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.74m to 9.40m: Moderately weathered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.4m: Slightly weathered, grey SILTSTONE</td>
<td>Weak</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**ROCK DEFECTS**

<table>
<thead>
<tr>
<th>DEFECT</th>
<th>DESCRIPTION</th>
<th>RQD (%)</th>
<th>Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLAY GOUGE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ROTATIONAL CRACKS</strong></td>
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</table>

**FLUID LOSS (%):**

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<tr>
<th>Station</th>
<th>Fluid Loss (%)</th>
<th>1/2</th>
<th>3/4</th>
<th>1/8</th>
</tr>
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<tbody>
<tr>
<td>1000</td>
<td>75</td>
<td>0.01</td>
<td>0.02</td>
<td>0.03</td>
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</table>

**WATER LEVEL:** 6.54m

**INSTALLATION:**

<table>
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<tr>
<th>BOX</th>
<th>INSTALLATION</th>
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</thead>
<tbody>
<tr>
<td>250</td>
<td>Box 2, 3.9-7.5m</td>
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**Core Recovery (%):**

<table>
<thead>
<tr>
<th>Station</th>
<th>Core Recovery (%)</th>
<th>1/2</th>
<th>3/4</th>
<th>1/8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>100</td>
<td>0.01</td>
<td>0.02</td>
<td>0.03</td>
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</table>

**JA: 10 April 2018**

**CONTRACTOR:** McMillan Drilling

**LOGGED BY:** DSA  
**CHECKED:** ALNA

**FINISH DATE:** 16/04/2018

---

**COMMENTS:** 65mm I.D. piezometer installed on Thurs 19 April 2018.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**R.L. GROUND:** 204.30m  
**R.L. COLLAR:** 204.30m  
**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°  
**CONTRACTOR:** McMillan Drilling

**BOREHOLE No.:** BH2  
**SHEET:** 3 OF 10

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>Soil/Classification</th>
<th>Core Description</th>
<th>Co-Ordination</th>
<th>Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siltstone grey</td>
<td>Slightly weathered, grey Siltstone. Weak</td>
<td>10.45m</td>
<td></td>
</tr>
<tr>
<td>Sandstone grey</td>
<td>Slightly weathered, grey, fine SANDSTONE. Weak</td>
<td>10.15m</td>
<td></td>
</tr>
<tr>
<td>Sandstone grey</td>
<td>Slightly weathered, grey fine to coarse SANDSTONE. Weak</td>
<td>10.50m</td>
<td></td>
</tr>
<tr>
<td>Sandstone grey</td>
<td>Slightly weathered, grey fine to medium SANDSTONE. Weak</td>
<td>10.70m</td>
<td></td>
</tr>
<tr>
<td>Sandstone grey</td>
<td>Slightly weathered, grey fine to coarse SANDSTONE. Weak</td>
<td>10.90m</td>
<td></td>
</tr>
<tr>
<td>Carbonaceous fine to medium SANDSTONE</td>
<td></td>
<td>11.90 - 12.00m: Brown, fine SANDSTONE. Very weak</td>
<td></td>
</tr>
<tr>
<td>Sandstone grey</td>
<td>12.00m: Slightly weathered, grey fine to medium SANDSTONE. Weak</td>
<td>11.05m</td>
<td></td>
</tr>
<tr>
<td>Sandstone grey</td>
<td>12.52m: Slightly weathered, grey, fine to medium SANDSTONE. Weak</td>
<td>11.30m</td>
<td></td>
</tr>
<tr>
<td>Sandstone grey</td>
<td>13.5m: Slightly weathered, grey fine to coarse SANDSTONE. Weak</td>
<td>12.00m</td>
<td></td>
</tr>
<tr>
<td>Sandstone grey</td>
<td>14.9m to 15.00m: Carbonaceous fine to medium SANDSTONE</td>
<td>12.50m</td>
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</tr>
</tbody>
</table>

**ROCK DEFECTS**

<table>
<thead>
<tr>
<th>Rock Weathering</th>
<th>Description</th>
<th>Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.03m: J, 45° dip, UN, SM, VN, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.15m: J, 15° dip, UN, SM, VN, CN</td>
<td></td>
<td></td>
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<tr>
<td>10.27m: J, 15° dip, ST, SM, VN, to N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.39m: J, 20° dip, UN, SM, VN, to N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.50m: DD</td>
<td></td>
<td></td>
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<tr>
<td>10.61m: J, 10, UN, SM, VN, FeSt</td>
<td></td>
<td></td>
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<tr>
<td>10.70m: J, 10, UN, SM, VN, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.75 - 10.85m: BZ</td>
<td></td>
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<tr>
<td>10.95m: J, 15° dip, UN, SM, VN, to N, CN</td>
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<td></td>
</tr>
<tr>
<td>11.03 - 11.13m: BZ</td>
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<tr>
<td>11.25m: J, 15° dip, PL, VN, SM, VN, to N, CN</td>
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<tr>
<td>11.37m: J, 15° dip, UN, SM, VN, to N, CN</td>
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<tr>
<td>11.48m: J, 15° dip, PL, SM, VN, to N, CN</td>
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<tr>
<td>11.58m: J, 15° dip, UN, SM, VN, to N, CN</td>
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<tr>
<td>11.68m: J, 15° dip, UN, SM, VN, to N, CN</td>
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<tr>
<td>11.84m: J, 15° dip, PL, VN, SM, VN, to N, CN</td>
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<tr>
<td>11.90m: J, 15° dip, PL, SM, VN, FeSt</td>
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<tr>
<td>11.93 - 11.96m: BZ</td>
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</tr>
<tr>
<td>12.13m: J, 20° dip, UN, SM, VN, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.19m: J, 35° dip, UN, SM, VN, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.31m: J, 15° dip, UN, R, VN, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.52 - 12.84m: J, 10 to 15, UN, SM to R, VN, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.64m: J, 20° dip, UN, SM, VN, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.00m: J, 20° dip, UN, SM, VN, FeSt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.03m: J, 10° dip, UN, SM, VN, FeSt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.80m: J, 30° dip, VCS, UN, SM, VN, FeSt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.00 - 14.25m: J, 70° dip, UN, R, VN, FeSt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.50 - 14.55m: J, Orthog, 10 to 30, UN, SM, VN, Upper contact 30, UN, SM, VN, brown silt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower contact 30, UN, SM, VN, dark brown sandy silt, FeSt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.90m: BF, 20° dip, UN, SM, VN, grey sandy silt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.93m: BF, 20° dip, UN, SM, VN, trace grey silt</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:** 65mm I.D. piezometer installed on Thurs 19 April 2018.
15.0m: Unweathered to slightly weathered, grey, carbonaceous, fine to medium SANDSTONE. Weak to moderately strong
15.20 - 15.40m: 15.2m: Grey, fine to medium SANDSTONE
15.4: Unweathered to slightly weathered, grey SILTSTONE, grading to fine grained carbonaceous SANDSTONE from 15.45m. Weak to moderately strong
15.50 - 15.90m: grey, fine to medium SANDSTONE. Weak to moderately strong
15.9m: Grading to unweathered to slightly weathered, grey, fine to coarse SANDSTONE, trace fine gravel size clasts of dark grey siltstone. Weak to moderately strong
16.55m-16.61m: Slightly weathered, brown, fine to coarse SANDSTONE
18.4m: Fine to coarse SANDSTONE, trace fine to medium gravel clasts
19.15m: Unweathered grey fine to medium SANDSTONE. Weak to moderately strong
19.25 to 19.35m: Fine to coarse SANDSTONE
19.5m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong
19.5m to 19.7m: Trace fine to coarse gravel size clasts
19.86m-19.98m: Slightly weathered, brown, fine to coarse SANDSTONE
65mm I.D. piezometer installed on Thurs 19 April 2018.
BOREHOLE LOG

BOREHOLE No.: BH2
SHEET: 5 OF 10

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

R.L. GROUND: 204.30m
R.L. COLLAR: 204.30m
DATUM: NZVD2016
SURVEY: Total Station/Surveyed

START DATE: 12/04/2018
FINISH DATE: 16/04/2018

CONTRACTOR: McMillan Drilling

DESCRIPTION OF CORE

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

CO-ORDINATES:
CO-ORDINATES: 5977395.83 mN
1742110.99 mE

DIRECTION:
ANGLE FROM HORIZ.: -90°

BOREHOLE No.:
BH2

RQD (%)

Fluid Loss (%)

UW SW MW HW CW ES VS S MS W VW EW

Core Box No

ROCK DEFECTS

20.0m: Unweathered grey fine to coarse SANDSTONE. Weak to moderately strong
20.24 - 20.31m: Moderately thin (70mm) bed of grey, SILTSTONE
20.31m: Unweathered, grey, fine SANDSTONE. Weak to moderately strong
20.45m: Unweathered, grey to coarse SANDSTONE. Weak to moderately strong
21.35m: Unweathered, grey, coarse SANDSTONE. Weak to moderately strong
21.50 - 21.65m: Fine SANDSTONE
21.65m: Unweathered, dark grey, SILTSTONE, minor thin beds of fine SANDSTONE. Weak to moderately strong
21.75m: Unweathered fine SANDSTONE, grading to fine to coarse SANDSTONE from 22.15m. Weak to moderately strong
22.32m: Unweathered dark grey SILTSTONE, minor very thin to moderately thin (20mm to 100mm) beds of fine SANDSTONE. Weak to moderately strong
22.63m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong
22.75 - 22.85m: Trace fine to medium gravel size clasts
22.93m: CONGLOMERATE, some thin beds of fine to coarse SANDSTONE. Weak to moderately strong
23.63m: Unweathered, grey, fine to medium SANDSTONE. Weak
23.80 - 23.85m: Coarse SANDSTONE
23.92 - 23.95m: Coarse SANDSTONE
24.3m: Unweathered, grey, fine to coarse SANDSTONE. Weak
24.94m: Unweathered, grey, carbonaceous fine SANDSTONE. Weak

COMMENTS: 65mm I.D. piezometer installed on Thurs 19 April 2018.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:** 5973395.83m NN (N1720000)  
1742110.99m EB

**R.L. GROUND:** 204.30m  
**R.L. COLLAR:** 204.30m  
**DATE:** NZVD2016  
**SURVEY:** Total Station Surveyed

**DATUM:** NZVD2016

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer site plan  
**JOB No.:** 1005069.1120

**DATE:** 12/04/2018  
**FINISH DATE:** 16/04/2018  
**CONTRACTOR:** McMillan Drilling

**LOGGED BY:** DSA  
**CHECKED:** ALNA

---

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>GEOLOGICAL UNIT</th>
<th>DESCRIPTION</th>
<th>RQD (%)</th>
<th>Water Level</th>
<th>Fracture Spacing (mm)</th>
<th>Fluid Loss (%)</th>
</tr>
</thead>
</table>
| SOIL: Classification, colour, consistency / density, moisture, plasticity  
ROCK: Weathering, colour, fabric, name, strength, cementation |

25.0m: Unweathered, grey, fine SANDSTONE, grading to fine to coarse SANDSTONE from 25.45m. Weak to moderately strong

25.38m: Unweathered, dark grey, SILTSTONE. Weak to moderately strong

25.55m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

26.05m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

26.45m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

26.65m: Unweathered, grey, fine to coarse SANDSTONE. Some pockets of fine to medium SANDSTONE. Moderately strong

26.85m: Unweathered, dark grey, SILTSTONE. Weak to moderately strong

27.06m: Unweathered, grey, fine SANDSTONE. Weak to moderately strong

27.2m: Gradating to unweathered, grey, fine to coarse SANDSTONE minor fine gravel size clasts. Weak to moderately strong

29.45m: Unweathered, grey, fine to coarse SANDSTONE, trace fine gravel clasts. Weak to moderately strong

---

**COMMENTS:** 65mm I.D. piezometer installed on Thurs 19 April 2018.
### BOREHOLE LOG

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan  

**CO-ORDINATES:**  
- **R.L. GROUND:** 204.30m (NZTM2000)  
- **R.L. COLLAR:** 204.30m  
- **DATUM:** NZVD2016  
- **SURVEY:** Total Station Surveys  

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°  

**DATE:** 12/04/2018  
**FINISH DATE:** 16/04/2018  

**CONTRACTOR:** McMillan Drilling  

**SHEET:** 7 OF 10  

**BOREHOLE No.:** BH2  

**DESCRIPTION OF CORE**  
- **SOIL:** Classification, colour, consistency / density, moisture, plasticity  
- **ROCK:** Weathering, colour, fabric, name, strength, cementation  

**GEOLOGICAL UNIT**  

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Geological Unit</th>
<th>Description</th>
<th>Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.0m</td>
<td>SANDSTONE</td>
<td>Unweathered grey fine to coarse</td>
<td>Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td></td>
<td>some fine gravel size clasts. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>30.3m</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, carbonaceous fine</td>
<td>Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SANDSTONE</td>
<td></td>
</tr>
<tr>
<td>30.37m</td>
<td>SANDSTONE</td>
<td>Grading to unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>30.9m</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, carbonaceous fine</td>
<td>Weak to moderately strong</td>
</tr>
<tr>
<td>31.1m</td>
<td>SANDSTONE</td>
<td>Grading to fine to medium SANDSTONE</td>
<td></td>
</tr>
<tr>
<td>31.17m</td>
<td>CONGLOMERATE</td>
<td>Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine to medium gravel in fine to coarse sand matrix.</td>
<td></td>
</tr>
<tr>
<td>31.26m</td>
<td>SANDSTONE</td>
<td>Unweathered grey fine to medium SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>31.35m</td>
<td>SANDSTONE</td>
<td>Trace fine gravel size clasts</td>
<td></td>
</tr>
<tr>
<td>31.5m</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Minor fine to medium gravel size clasts. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>32.0m</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>32.88 - 32.89m</td>
<td>Siltstone</td>
<td>Very thin (10 mm) bed of dark grey Siltstone</td>
<td></td>
</tr>
<tr>
<td>32.89m</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>33.0m</td>
<td>SANDSTONE</td>
<td>Grading to unweathered, grey, fine to coarse SANDSTONE. Trace to minor fine gravel size clasts. Moderately strong</td>
<td></td>
</tr>
<tr>
<td>33.8m</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Moderately strong</td>
<td></td>
</tr>
<tr>
<td>34.34 - 34.35m</td>
<td>Carbonaceous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.35m</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. minor fine gravel size clasts. Moderately strong</td>
<td></td>
</tr>
</tbody>
</table>

### COMMENTS:  
65mm I.D. piezometer installed on Thurs 19 April 2018.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**  
R.L. GROUND: 204.30m  
R.L. COLLAR: 204.30m  
DATUM: NZVD2016

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°  
**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer site plan  
**JOB No.:** 1005069.1120

**CO-ORDINATES:**  
R.L. GROUND: 204.30m  
R.L. COLLAR: 204.30m  
DATUM: NZVD2016

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°  
**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016

**CONTRACTOR:** McMillan Drilling

**SHEET:** 8 OF 10

**BOREHOLE No.:** BH2

**DRILLED BY:** Craig  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**START DATE:** 12/04/2018  
**FINISH DATE:** 16/04/2018

**SOIL:** Classification, colour, consistency / density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil / Rock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.0m</td>
<td>Unweathered, interbedded dark grey SILTSTONE and grey fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>36.0m</td>
<td>Unweathered, dark grey, SILTSTONE, interbedded with some thin to moderately thin beds of fine grained SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>38.26m</td>
<td>Unweathered grey fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>38.68 - 38.78m</td>
<td>Interbedded dark grey SILTSTONE and grey, fine SANDSTONE</td>
</tr>
<tr>
<td>38.78m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>39.0m</td>
<td>Unweathered, dark grey, SILTSTONE, interbedded with some thin beds of fine grained SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>39.3m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
</tbody>
</table>

**COMMENTS:** 65mm I.D. piezometer installed on Thurs 19 April 2018.
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 5977395.83 mN 1742110.99 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 204.30m
R.L. COLLAR: 204.30m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

DATUM: NZVD2016
PROJECT: Auckland Regional Landfill
LOCATION: Refer site plan
JOB No.: 1005069.1120

CONTRACTOR: McMillan Drilling

SHEET: 9 OF 10

GEOLLOGICAL UNIT

39.3m [Cont’d]: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

41.1m: Unweathered, grey, CONGLOMERATE. Conglomerate is fine to medium gravel, in fine to coarse sand matrix, with rounded coarse gravel size siltstone lens at 41.35m. Moderately strong

41.4m: Unweathered grey fine to coarse SANDSTONE. Weak to moderately strong

42.6: Unweathered, grey, carbonaceous fine SANDSTONE. Weak to moderately strong

42.65m: Unweathered, grey, fine SANDSTONE, grading to fine to coarse SANDSTONE from 42.85m. Weak to moderately strong

43.09 - 43.10m: Very thin (10 mm) bed of SILTSTONE

43.1m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

43.4m: Unweathered, dark grey, SILTSTONE. Weak to moderately strong

43.5m: Unweathered, interbedded, dark grey SILTSTONE and grey fine SANDSTONE. Weak to moderately strong. Thinly bedded.

44.1m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

44.05m: J, 20° dip, PL, R, T-VN, CN

44.55m: J, 5° dip, UN, SM, T-VN, CN

44.56m: J, 75° dip, UN, SM, T-VN, CN

COMMENTS: 65mm I.D. piezometer installed on Thurs 19 April 2018.
BOREHOLE LOG

BH2

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

DRILLED BY: Craig
LOGGED BY: DSA
CHECKED: ALNA
START DATE: 12/04/2018
FINISH DATE: 16/04/2018
CONTRACTOR: McMillan Drilling

R.L. GROUND: 204.30m
R.L. COLLAR: 204.30m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

GEOLOGICAL UNIT
SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

DESCRIPTION OF CORE

45.0m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong
45.14m: Interbedded unweathered, grey SILTSTONE and fine SANDSTONE. Weak to moderately strong. Thinly bedded.
45.24m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong
45.98m: Unweathered grey SILTSTONE, interbedded with some very thin to thin beds of fine and medium grained SANDSTONE. Weak to moderately strong
47.0m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong
47.7m: Interbedded, unweathered, grey SILTSTONE and fine to medium SANDSTONE. Weak to moderately strong
47.7m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong
49.5m: END OF BOREHOLE

COMMENTS: 65mm I.D. piezometer installed on Thurs 19 April 2018.
### BOREHOLE LOG

**BOREHOLE No.:** BH3  
**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan  
**CONTRACTOR:** McMillan Drilling

<table>
<thead>
<tr>
<th>R.L.</th>
<th>GROUND</th>
<th>COLLAR</th>
<th>DATUM</th>
<th>DESCRIPTION OF CORE</th>
<th>ROCK DEFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>245.50m</td>
<td>245.50m</td>
<td>NZVD2016</td>
<td></td>
<td>SOIL: Classification, colour, consistency/density, moisture, plasticity</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ROCK: Weathering, colour, fabric, name, strength, cementation</td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTIVE CORE LOG:**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0m</td>
<td>No recovery (core loss)</td>
</tr>
<tr>
<td>0.1m</td>
<td>Clayey SILT, trace fine to medium gravel, trace rootlets; Light brown. Very stiff, wet, moderate plasticity</td>
</tr>
<tr>
<td>0.3m</td>
<td>SILT, minor fine sand, some thin beds of silty fine SAND; light brown and light grey mottled dark orange brown. Very stiff, wet, low plasticity to non plastic</td>
</tr>
<tr>
<td>1.1m</td>
<td>No recovery (core loss)</td>
</tr>
<tr>
<td>1.5m</td>
<td>Push Tube</td>
</tr>
<tr>
<td>2.0m</td>
<td>SILT, some fine sand, trace clay; light greyish brown mottled orange brown. Very stiff, wet, high plasticity</td>
</tr>
<tr>
<td>2.45m</td>
<td>SILT, some fine sand, trace clay, trace very thin beds of light grey sandy SILT; light brown mottled orange brown. Very stiff, wet, high plasticity</td>
</tr>
<tr>
<td>3.0m</td>
<td>Push Tube</td>
</tr>
<tr>
<td>3.5m</td>
<td>SILT, minor fine sand, trace clay, trace very thin beds of sandy SILT; light brown mottled orange brown. Very stiff, wet, low plasticity</td>
</tr>
<tr>
<td>4.65m-4.70m</td>
<td>Dark reddish brown limonite staining</td>
</tr>
<tr>
<td>4.7m</td>
<td>Orange brown minor light grey mottles</td>
</tr>
<tr>
<td>4.77m</td>
<td>SILT, some fine sand, some very thin to thin beds of silty fine SAND; light brown mottled orange brown. Very stiff, wet, low plasticity</td>
</tr>
</tbody>
</table>

**SOIL: Classification, colour, consistency/density, moisture, plasticity:**

- Clayey SILT
- Trace fine to medium gravel
- Trace rootlets
- Light brown

**ROCK: Weathering, colour, fabric, name, strength, cementation:**

- Light grey sandy SILT
- Light grey mottled dark orange brown
- Very stiff
- Wet
- Low plasticity to non plastic

**SOIL RQD:**

- No loss

**ROCK DEFECTS:**

- Water Level
- Fracture Spacing (mm)

**COMMENTS:**

- 65mm I.D. piezometer installed on 3 May 2018. Shear vane No. 111. Presented shear vane readings have been corrected.
5.0m: Highly weathered, light brown Siltstone, some thin to moderately thin beds of fine sandstone. Extremely weak, easily scratched by fingernail [Silt, some thin to moderately thin beds of silty fine sand; light brown. Very stiff to hard, low plasticity]

6.3m: No recovery (core loss)

6.45m: Highly weathered, light brown Siltstone, some thin to moderately thin beds of fine sandstone. Extremely weak, easily scratched by fingernail [Silt, some thin to moderately thin beds of silty fine sand; light brown. Very stiff to hard, low plasticity]

7.55m: Slightly weathered interbedded Siltstone and fine grained sandstone. Very weak to weak

8.1m: No recovery (core loss)

8.2m: Slightly weathered, grey, fine sandstone, minor thin to moderately thin beds of grey siltstone. Very weak to weak

8.62 - 8.70m: Carbonaceous

8.85 - 9.00m: Carbonaceous

9.25m: Slightly weathered, grey, Siltstone, some very thin beds of fine sandstone. Very weak to weak

9.75m: Slightly weathered, grey, fine sandstone, minor thin beds of grey siltstone. Very weak to weak

6.00 - 6.60m: J, Very closely spaced, orthogonal, 10 to 70 dip, UN, SM to R, VN, FeSt

6.45 - 6.60m: J, VCS, 70 to 90, UN, SM, VN, FeSt, some VCS, T to VN, UN, SM, CN to FeSt

9.70m: B, 20° dip, PL, R, T-VN, trace brown silt

9.82m: J, -15° dip, UN, SM, T-VN, trace brown silt

9.83m: J, -5° dip, ST, SM, T-VN, trace brown silt

65mm I.D. piezometer installed on 3 May 2018. Shear vane No. 111. Presented shear vane readings have been corrected.
10.0m: Slightly weathered, grey, fine SANDSTONE, minor thin to moderately thin beds of grey SILTSTONE. Very weak to weak

10.5m: Slightly weathered, grey, SILTSTONE, minor thin to moderately thin beds of grey fine SANDSTONE. Very weak to weak

11.7m: Slightly weathered, grey, fine SANDSTONE, minor moderately thin beds of grey SILTSTONE. Very weak to weak

12.31m: Slightly weathered, grey, fine SANDSTONE, some thin beds of grey SILTSTONE. Weak

13.94m: Unweathered to slightly weathered, grey fine SANDSTONE. Weak

14.15m: Unweathered to slightly weathered, grey fine to medium SANDSTONE. Weak

14.88m: Lense of grey SILTSTONE
14.15m [Cont'd]: Unweathered to slightly weathered, grey fine to medium SANDSTONE. Weak.

15.05 - 15.12m: Lenses of grey SILTSTONE

15.25m: Unweathered to slightly weathered, dark grey, SILTSTONE, minor thin to moderately thin (30mm to 120mm) beds of grey fine SANDSTONE. Weak.

15.51 - 15.58m: Lenses of grey SILTSTONE

15.94m: Unweathered to slightly weathered, grey, fine SANDSTONE. Weak

16.00 - 16.01m: Orthog, 5 to 10 dip, ST, SM, VN, SL to T, VN, FeSt

16.20m: J, 60° dip, PL, SM to VN, CN, grey clay

16.47m: J, 15° dip, UN, SM, VN, CLAY

16.60m: J, 60° dip, UN, SM, VN, brown clay veneer

16.92m: J, 60° dip, ST, SM, VN, FeSt

17.27 - 17.35m: Slightly weathered, brown. Very weak

17.70m: J, 40° dip, UN, SM, VN, CLAY

18.0m-18.13m: Carbonaceous

18.5m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

19.0m: Unweathered, grey, CONGLOMERATE. Conglomerate is fine to medium gravel in fine to coarse sand matrix. Matrix supported. Weak to moderately strong

19.33m: Conglomerate is fine gravel in fine to coarse sand matrix. Matrix supported

19.68m: Unweathered, grey, fine SANDSTONE. Weak to moderately strong

19.68: 19.90m: Slightly carbonaceous

19.92m: Grey, fine to coarse SANDSTONE
BOREHOLE LOG

BOREHOLE No.: BH3

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

DRILLED BY: Craig
LOGGED BY: DSA
CHECKED: ALNA
START DATE: 24/04/2018
FINISH DATE: 30/04/2018
CONTRACTOR: McMillan Drilling

R.L. GROUND: 245.50m
R.L. COLLAR: 245.50m
DATUM: NZVD2016
SURVEY: Total Station/Surveyed

GEOLOGICAL UNIT

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

DESCRIPTION OF CORE

19.92m [Cont’d]: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

21.15m: Unweathered, grey, fine SANDSTONE. Weak to moderately strong
21.34 - 21.37m: Carbonaceous

21.4m: Unweathered, dark grey, SILTSTONE, some thin beds of carbonaceous, fine SANDSTONE. Weak to moderately strong

21.65m: Unweathered, grey, fine SANDSTONE, grading to fine to coarse SANDSTONE from 21.75m. Minor thin to moderately thin (50mm to 80mm) beds of dark grey SILTSTONE. Weak to moderately strong
21.65 - 21.69m: Carbonaceous

23.83m: Unweathered, grey, fine SANDSTONE, becoming fine to medium SANDSTONE from 24.0m. Weak to moderately strong
23.93 - 24.00m: Carbonaceous

24.1m: Unweathered, grey, CONGLOMERATE. Conglomerate is minor fine gravel in fine to coarse SAND matrix. Matrix supported. Weak to moderately strong

24.8m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

65mm I.D. piezometer installed on 3 May 2018. Shear vane No. 111. Presented shear vane readings have been corrected.

COMMENTS: Scale 1:25
## BOREHOLE LOG

**BOREHOLE No.:** BH3  
**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan  
**DRILLED BY:** Craig  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**START DATE:** 24/04/2018  
**FINISH DATE:** 30/04/2018  
**CONTRACTOR:** McMillan Drilling  

### GEOLOGICAL UNIT

<table>
<thead>
<tr>
<th>BOREHOLE LOG</th>
<th>DESCRIPTION OF CORE</th>
<th>ROCK DEFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOIL:</strong> Classification, colour, consistency / density, moisture, plasticity</td>
<td><strong>ROCK:</strong> Weathering, colour, fabric, name, strength, cementation</td>
<td><strong>Description &amp; Additional Observations</strong></td>
</tr>
</tbody>
</table>

### DESCRIPTION OF CORE

- **SOIL:** Unweathered, grey, fine to medium SANDSTONE, grading to fine to coarse SANDSTONE from 25.2m. Weak to moderately strong  
- **24.8m [Cont'd]:** Unweathered, grey, fine to medium SANDSTONE, grading to fine to coarse SANDSTONE from 25.2m. Weak to moderately strong  
- **25.20 - 25.45m:** Trace fine gravel size clasts  
- **25.60 - 25.70m:** Trace fine gravel size clasts  
- **25.85 - 26.05m:** Trace fine to medium gravel size clasts of dark blackish grey and green SILTSTONE  
- **26.0m:** Unweathered, grey, fine to coarse SANDSTONE, trace fine to medium gravel size clasts. Weak to moderately strong  
- **26.9m:** Unweathered, grey, fine to coarse SANDSTONE, trace fine to medium gravel size clasts. Weak to moderately strong  
- **28.00 - 28.50m:** Trace fine gravel size clasts  
- **28.85m:** Lense (medium gravel size) of green SILTSTONE. Very weak, easily scratched by fingernail  
- **29.00 - 29.40m:** Trace fine gravel size clasts  

### ROCK DEFECTS

- **2000:** 600  
- **200:** 60  
- **20:**  
- **UW:**  
- **SW:**  
- **MW:**  
- **HW:**  
- **CW:**  
- **ES:**  
- **VS:**  
- **S:**  
- **MS:**  
- **W:**  
- **VW:**  
- **EW:**  

### COMMENTS:

- 65mm I.D. piezometer installed on 3 May 2018. Shear vane No. 111. Presented shear vane readings have been corrected.
BOREHOLE NO.: BH3

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 5977815.49 mN, 1742966.42 mE
DIRECTION: 0°
ANGLE FROM HORIZ: -90°

R.L. GROUND: 245.50m
R.L. COLLAR: 245.50m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

DATUM: NZVD2016

SURVEY: Total Station Surveyed

CONTRACTOR: McMillan Drilling
START DATE: 24/04/2018
FINISH DATE: 30/04/2018

Casing
Installation
Core Box No

GEOLOGICAL UNIT

SHEET: 7 OF 10

DESCRIPTION OF CORE

SOIL: Classification, colour, consistency / density, moisture, plasticity

ROCK: Weathering, colour, fabric, name, strength, cementation

ROCK DEFECTS

2000
600
200
60
20
UW
SW
MW
HW
CW
ES
VS
S
MS
W
VW
EW

Fluid Loss (%)
25
50
75

Defect Log

Core Box No

ROCK: Weathering, colour, fabric, name, strength, cementation

SOIL: Classification, colour, consistency / density, moisture, plasticity

30.0m: Unweathered, grey, fine SANDSTONE. Weak to moderately strong
30.25m to 30.7m: Carbonaceous laminae
30.8m: Grading to fine to medium SANDSTONE
31.05m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong
31.35m to 31.5m: Trace fine gravel size clasts
31.55m: Unweathered, grey, CONGLOMERATE. Conglomerate is fine to medium gravel in a matrix of fine to coarse sand. Matrix supported. Weak to moderately strong
32.5m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong
32.88m: Unweathered, grey, fine SANDSTONE. Weak to moderately strong
33.4m: Grading to fine to coarse SANDSTONE
33.80 - 34.15m: Calcite vein, VN, 70 deg dip.
34.0m: Grading to fine to coarse SANDSTONE, trace fine gravel size clasts
34.6m to 34.8m: Fine to medium SANDSTONE
34.92m: Grey SILTSTONE

COMMENTS: 65mm I.D. piezometer installed on 3 May 2018. Shear vane No. 111. Presented shear vane readings have been corrected.

Fluid Loss (%)
25
50
75

UW Pakiri
HQTT

HOLE DEPTH

30.5
31.0
31.5
32.0
32.5
33.0
33.5
34.0
34.5
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
39.5
40.0
40.5
41.0
41.5
42.0
42.5
43.0
43.5
44.0
44.5
45.0
45.5
46.0
46.5
47.0
47.5
48.0
48.5
49.0
49.5

Piezometer

Hammer break

Lugeon Test @ 33.0m

Presentation with CoreSlide Demo
BOREHOLE No.: BH3

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 5977815.49 mN
1742966.42 mE

R.L. GROUND: 245.50m
R.L. COLLAR: 245.50m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

CONTRACTOR: McMillan Drilling

START DATE: 24/04/2018
FINISH DATE: 30/04/2018

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cemenation

RQD (%)
Water Level
Fracture Spacing (mm)
Core Box No

1: 34.5-35.0m
2: 35.0-35.5m
3: 35.5-36.0m
4: 36.0-36.5m
5: 36.5-37.0m
6: 37.0-37.5m
7: 37.5-38.0m
8: 38.0-38.5m
9: 38.5-39.0m
10: 39.0-39.5m
11: 39.5-40.0m

Rock Weathering
Description & Additional Observations
Fluid Loss (%)

35.0m: Unweathered, grey, SILTSTONE. Weak to moderately strong
35.4m: Grading to unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong
35.9m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong
36.8m: Grading to fine to coarse SANDSTONE
37.25m - 37.27m: Unweathered, grey, CONGLOMERATE. Conglomerate is fine to medium gravel in a matrix of fine to coarse sand. Matrix supported
37.27m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong
38.75m: Grading to fine to coarse SANDSTONE
39.25m: Unweathered, grey CONGLOMERATE. Conglomerate is fine to medium gravel in a matrix to coarse sand matrix. Matrix supported
39.32m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong
39.7m to 39.9m: Fine to medium SANDSTONE
39.32m [Cont'd]: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

40.25m to 40.3m: Trace fine gravel size clasts

40.4m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

41.2m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

41.58m: Unweathered, grey, fine SANDSTONE, thin (50mm) bed of grey SILTSTONE at 41.71m. Weak to moderately strong

41.59 - 47.62m: Carbonaceous

41.90 - 42.00m: Carbonaceous

42.0m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

42.38 - 42.50m: Minor very thin to moderately thin (20mm to 80mm) beds of dark grey SILTSTONE

42.50 - 42.55m: Carbonaceous

42.8m: Unweathered, grey, SILTSTONE, some thin to moderately thin beds of carbonaceous fine to medium grained SANDSTONE. Weak to moderately strong

43.5m: Interbedded, unweathered, grey SILTSTONE & fine SANDSTONE. Weak.

65mm I.D. piezometer installed on 3 May 2018. Shear vane No. 111. Presented shear vane readings have been corrected.
BOREHOLE NO.: BH3

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES:
NZTM2000
R.L. GROUND: 245.50m
R.L. COLLAR: 245.50m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

CONTRACTOR: McMillan Drilling

BOREHOLE LOG

SOIL:
Classification, colour, consistency / density, moisture, plasticity

ROCK:
Weathering, colour, fabric, name, strength, cementation

DESCRIPTION OF CORE

45.0m: Unweathered, grey SILTSTONE, some thin to moderately thin beds of fine SANDSTONE. Weak

47.6m: Interbedded, unweathered, grey SILTSTONE & fine SANDSTONE. Weak. Beds are very thin to moderately thin

49.5m: Target depth

COMMENTS:
65mm I.D. piezometer installed on 3 May 2018. Shear vane No. 111. Presented shear vane readings have been corrected.
BOREHOLE NO.: BH4

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: (NZTM2000)
R.L. GROUND: 193.70m
R.L. COLLAR: 193.70m
DATUM: NZVD2016
SURVEY: Total Station/Surveyed

DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

DATE: 09/05/2018
START DATE: 09/05/2018
FINISH DATE: 14/05/2018

CONTRACTOR: McMillan Drilling

SHEET: 1 OF 10

Borehole: BH4

RQD (%): Water Level
Fracture Spacing (mm)
ROCK DEFECTS

GEOLOGICAL UNIT
SOIL: Classification, colour, consistency/density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

DESCRIPTION OF CORE

0.0m: Fine SAND, minor silt, some rootlets; reddish brown. Very loose, moist

0.7m: No recovery (core loss)

1.5m: Fine SAND, with minor silt, with trace rootlets; reddish brown with black streaks. Very loose; moist

2.3m: SILT, some fine sand, trace rootlets; light greyish brown with some black streaks. Firm, moist, low plasticity

2.65m: Silty fine SAND; light greyish brown and reddish brown, minor black streaks. Loose to medium dense, moist to wet.

3.6m: Fine to medium SAND, with minor silt; light greyish brown and orange brown, minor black streaks. Loose to medium dense, wet

4.00 - 4.10m: grades to some fine gravel

4.1m: SILT, some fine sand, trace clay; light grey, Soft to firm, moist, non-plastic to low plasticity

4.30m: Sand is absent, becomes firm to stiff

4.40m: Some yellowish brown staining, becomes low-plasticity

COMMENTS: 65mm I.D. piezometer installed on Thurs 17 May 2018. Shear vane No. 2204. Presented shear vane readings have been corrected.

COMMENTS:

Scale 1:25
Rev.: A
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan  

- **CO-ORDINATES:** 5977990.84 mN  
- **DATE:** 09/05/2018  
- **CONTRACTOR:** McMillan Drilling  

**R.L. GROUND:** 193.70m  
**R.L. COLLAR:** 193.70m  
**DATUM:** NZVD2016  
**SURVEY:** Total Station Surved

**BOREHOLE No.: BH4**  
**SHEET:** 2 OF 10  
**DRILLED BY:** Lei & Jaz  
**LOGGED BY:** DSAH  
**CHECKED:** ALNA  
**START DATE:** 09/05/2018  
**FINISH DATE:** 14/05/2018  

**SOIL:** Classification, color, consistency/density, moisture, plasticity  
**ROCK:** Weathering, color, fabric, name, strength, cementation  

**GEOLOGICAL UNIT**  
**DESCRIPTION OF CORE**  
**ROCK DEFECTS**

- **5.0m:** SILT, trace clay; light grey, with orange mottling. Firm to stiff, moist, low plasticity.  
- **5.2m:** Fine SAND, trace silt; greyish brown, some black streaks. Medium dense, moist.  
- **5.3-5.45m:** No recovery (core loss).  
- **5.6m:** Completely weathered, brown, fine to medium SANDSTONE. Extremely weak. [Fine to medium SAND, trace fine to medium gravel, brown some reddish brown bands]  
- **6.0m:** SILT, minor clay; light grey. Stiff, moist, low plasticity.  
- **6.15m:** Fine to medium SAND; greyish brown, with orange brown and black bands. Medium dense, moist.  
- **6.45m:** Highly weathered, brown, fine to medium SANDSTONE. Very weak.  
- **7.5m:** No recovery (core loss).  
- **7.75m:** Highly weathered, brown, fine to coarse SANDSTONE. Very weak.  
- **8.55m:** No Recovery (core loss).  
- **9.0m:** Highly weathered, brown, fine to coarse SANDSTONE. Extremely weak to very weak.  
- **9.5m:** Some grey silt through broken zone.  

**COMMENTS:** 65mm I.D. piezometer installed on Thurs 17 May 2018. Shear vane No. 2204. Presented shear vane readings have been corrected.
Borehole No.: BH4

R.L. GROUND: 193.70m
R.L. COLLAR: 193.70m

SURVEY: Total Station Surveyed
DATUM: NZVD2016

PROJECT: Auckland Regional Landfill
LOCATION: Refer site plan

SURVEY: Total Station Surveyed
DATUM: NZVD2016

SCALE 1:25
Rev.: A

65mm I.D. piezometer installed on Thurs 17 May 2018. Shear vane No. 2204. Presented shear vane readings have been corrected.

DESCRIPTION OF CORE

10.0m: Highly weathered, brown to coarse SANDSTONE. Extremely weak to very weak.

10.50 - 10.55m: Some grey, sandy silt. Non-plastic.

10.95m: Moderately weathered, light brown stained reddish brown, fine SANDSTONE. Very weak.

11.50m: Unweathered, grey to medium SANDSTONE. Some carbonaceous banding. Weak to moderately strong.

17.75m: 20mm banded grey siltstone.

12.11 - 12.30m: Thin to moderately thin (40mm to 80mm) beds of dark grey SILTSTONE and fine SANDSTONE.

12.50m: Gradates to fine to coarse SANDSTONE, trace fine gravel.

13.12m: Unweathered, grey, SILTSTONE. Weak, carbonaceous banding.

13.25m: Unweathered, grey, SANDSTONE. Weak to moderately strong. Carbonaceous banding.

13.30m: Becomes fine to medium grained, carbonaceous banding absent.

13.60m: Becomes fine to coarse grained, trace fine gravel.

14.20 - 14.60m: Some fine gravel.

14.60m: Grades to fine medium.

14.75m: Grades to fine to coarse grained.

14.90m: Calcite vein 1mm thick, 85°

14.50m: J, 75° dip, UN, R, N-VN, some FeSt, quartzite deposits

15.00m: J, 90° dip, UN, R, VN, FeSt gravel infill VN-N, VCS-CS

15.25m: J, 90° dip, UN, R, VN, FeSt gravel infill VN-N, VCS-CS

15.60m: J, 75° dip, UN, R, VN, FeSt gravel infill VN-N, VCS-CS

15.80m: J, 90° dip, UN, R, VN, FeSt gravel infill VN-N, VCS-CS

15.95m: J, 90° dip, UN, R, VN, FeSt gravel infill VN-N, VCS-CS

10.50 - 10.55m: Some grey, sandy silt. Non-plastic.

11.75m: 20mm banded grey siltstone.

12.11 - 12.30m: Thin to moderately thin (40mm to 80mm) beds of dark grey SILTSTONE and fine SANDSTONE.

12.50m: Grades to fine to coarse SANDSTONE, trace fine gravel.

13.12m: B, 30° dip, SM, VN, grey silt

13.25m: B, 10° dip, UN, R, VN

13.55m: DD, 5° dip, UN, R, VN, N-VN

13.70m: DD, 0° dip, UN, SM, VN, CL

13.83m: DD, 30° dip, UN, R, VN, CL

14.01m: DD, 20° dip, UN, R, VN, CL

14.04m: DD, 5° dip, UN, R, VN, CL

14.20m: Calcite vein 1mm thick, 85°

14.50m: J, 75° dip, UN, R, N-VN, some FeSt, quartzite deposits

14.60 - 15.00m: Calcite vein 2 mm thick, 85°

Coments: 65mm I.D. piezometer installed on Thurs 17 May 2018. Shear vane No. 2204. Presented shear vane readings have been corrected.
<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>DESCRIPTION OF CORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0m:</td>
<td>Slightly weathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.</td>
</tr>
<tr>
<td>15.30 - 15.40m:</td>
<td>trace fine gravel.</td>
</tr>
<tr>
<td>15.65 - 15.70m:</td>
<td>Slightly weathered, grey, SILTSTONE. Weak to moderately strong.</td>
</tr>
<tr>
<td>15.7m:</td>
<td>Slightly weathered, grey, fine to medium, SANDSTONE. Weak to moderately strong.</td>
</tr>
<tr>
<td>16.00m:</td>
<td>becomes fine to coarse grained, trace fine to medium gravel.</td>
</tr>
<tr>
<td>16.3m:</td>
<td>Slightly weathered, grey, CONGLOMERATE. Weak to moderately strong.</td>
</tr>
<tr>
<td>16.4m:</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.</td>
</tr>
<tr>
<td>16.72 - 16.78m:</td>
<td>layer of coarse grained sandstone.</td>
</tr>
<tr>
<td>16.95m:</td>
<td>becomes fine to medium grained.</td>
</tr>
<tr>
<td>17.1m:</td>
<td>fine to coarse grained.</td>
</tr>
<tr>
<td>18.55m:</td>
<td>Unweathered, grey, SILTSTONE. Weak to moderately strong.</td>
</tr>
<tr>
<td>18.75m:</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong. Carbonaceous from 18.75m to 18.85m.</td>
</tr>
<tr>
<td>19.20m:</td>
<td>becomes fine to coarse grained.</td>
</tr>
<tr>
<td>19.30m:</td>
<td>trace fine gravel.</td>
</tr>
<tr>
<td>19.50m:</td>
<td>gravel absent.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>GRAPHIC LOG</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.90 - 16.00m:</td>
<td>DD, 40° dip, UN, R, VN, along calcareous bedding, black staining</td>
</tr>
<tr>
<td>15.12 - 15.65m:</td>
<td>BZ, 70° dip, UN, R, MN (10 - 15 mm), infill is fine to coarse gravel, some black silt</td>
</tr>
<tr>
<td>15.30m:</td>
<td>DD, 0° dip, UN, R, VN, CL</td>
</tr>
<tr>
<td>16.13m:</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>16.27m:</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>16.40m:</td>
<td>DD, 0° dip, UN, R, VN, CL</td>
</tr>
<tr>
<td>16.65 - 16.80m:</td>
<td>J, 0° dip, UN, R, VN, CL, possible drilling break</td>
</tr>
<tr>
<td>17.00m:</td>
<td>J, 70° dip, UN, R, VN, CL, broken along calcite vein</td>
</tr>
<tr>
<td>17.20m:</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>17.50m:</td>
<td>DD, 0° dip, fracture</td>
</tr>
<tr>
<td>17.70 - 18.00m:</td>
<td>J, 90° dip, UN, R, VN, black staining, trace black silt</td>
</tr>
<tr>
<td>18.00m:</td>
<td>J, 60° dip, UN, R, VN, black staining</td>
</tr>
<tr>
<td>18.20m:</td>
<td>J, intersecting joints, 50° dip, UN, R, VN, black staining; J, 90° dip, 70° dip, UN, R, VN, black staining</td>
</tr>
<tr>
<td>18.55m:</td>
<td>B, 10° dip, ST, SM, VN, CL</td>
</tr>
<tr>
<td>19.05 - 19.35m:</td>
<td>J, 90° dip to 70° dip, UN, R, VN, black and greenish staining, DD around joint</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.90m:</td>
<td>Calcite vein 60°</td>
</tr>
</tbody>
</table>

65mm I.D. piezometer installed on Thurs 17 May 2018. Shear vane No. 2204. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**  
- R.L. GROUND: 193.70m  
- R.L. COLLAR: 193.70m  
- SURVEY: Total Station Surveyed  
- DATUM: NZVD2016

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°

**R.L. GROUND: 193.70m**  
**R.L. COLLAR: 193.70m**  
**SURVEY: Total Station Surveyed**  
**DATUM: NZVD2016**

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer site plan  
**JOB No.:** 1005069.1120

**GEOLOGICAL UNIT**

<table>
<thead>
<tr>
<th>DESCRIPTION OF CORE</th>
<th>ROCK DEFORMATIONS</th>
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<tbody>
<tr>
<td>SOIL: Classification, colour, consistency / density, moisture, plasticity</td>
<td>Fluid Loss (%)</td>
</tr>
<tr>
<td>ROCK: Weathering, colour, fabric, name, strength, cementation</td>
<td>Water Level Fracture Spacing (mm)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROCK DEFECTS</th>
<th>Description &amp; Additional Observations</th>
</tr>
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<tbody>
<tr>
<td>RQD (%)</td>
<td></td>
</tr>
<tr>
<td>Depth (m)</td>
<td></td>
</tr>
<tr>
<td>Graphic Log</td>
<td></td>
</tr>
</tbody>
</table>

**BOREHOLE No.: BH4**

**START DATE:** 09/05/2018  
**FINISH DATE:** 14/05/2018  
**CONTRACTOR:** McMillan Drilling

**SOIL: Classification, colour, consistency / density, moisture, plasticity**

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description</th>
<th>SOIL: Classification, Colour, Consistency / Density, Moisture, Plasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.0m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.</td>
<td></td>
</tr>
<tr>
<td>21.50m</td>
<td>Trace fine gravel.</td>
<td></td>
</tr>
<tr>
<td>22.0m</td>
<td>Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine to medium gravel in fine to coarse sand matrix. Matrix supported.</td>
<td></td>
</tr>
<tr>
<td>22.30m</td>
<td>Gravel becomes fine to coarse, gravel is green and black siltstone.</td>
<td></td>
</tr>
<tr>
<td>22.65m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong, trace fine gravel.</td>
<td></td>
</tr>
<tr>
<td>22.9m</td>
<td>Unweathered, grey, carbonaceous SILTSTONE. Weak to moderately strong.</td>
<td></td>
</tr>
<tr>
<td>23.05m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.</td>
<td></td>
</tr>
<tr>
<td>23.25m</td>
<td>Unweathered, grey, fine SANDSTONE. Weak to moderately strong.</td>
<td></td>
</tr>
<tr>
<td>23.5m</td>
<td>Unweathered, interbedded, grey, fine SANDSTONE and dark grey SILTSTONE. Weak to moderately strong. Beds are very thin to moderately thin (20mm to 100mm)</td>
<td></td>
</tr>
<tr>
<td>23.72m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.</td>
<td></td>
</tr>
<tr>
<td>24.06m</td>
<td>Unweathered interbedded, grey, fine SANDSTONE and SILTSTONE. Weak to moderately strong. Thinly laminated.</td>
<td></td>
</tr>
<tr>
<td>24.35m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.</td>
<td></td>
</tr>
<tr>
<td>24.5m</td>
<td>Unweathered, grey interbedded fine SANDSTONE and dark grey SILTSTONE. Thinly laminated up to 50mm.</td>
<td></td>
</tr>
</tbody>
</table>

**ROCK DEFORMATIONS**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Rock Strength</th>
<th>Sampling Method</th>
<th>Core Recovery (%)</th>
<th>Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.00m:</td>
<td>Calcite vein 60°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.10m:</td>
<td>DD, hammer break</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.50m:</td>
<td>Calcite vein 80°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.70m:</td>
<td>DD, hammer break</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.00m:</td>
<td>DD, broken with hammer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.20m:</td>
<td>DD, hammer break</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.50m:</td>
<td>DD, hammer break</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.30m:</td>
<td>J, 90° dip, 150 mm long, UN, R, VN, CL, fracturing along gravel surfaces. Broken after drilling through core.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.70m:</td>
<td>J, 70° dip to -70° dip, UN, R, VN, CL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.85m:</td>
<td>J, 80° dip, calcite vein</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.90m:</td>
<td>DD, hammer break</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.05m:</td>
<td>B, 0-46° dip, UN, R, VN, CL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.10 - 23.50m:</td>
<td>J, not fully broken, 70-90° dip, not open</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.50m:</td>
<td>DD, hammer break</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.70m:</td>
<td>DD, hammer break through siltstone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.00m:</td>
<td>DD, end of run break</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.25m:</td>
<td>B, 5° dip, PL, R, VN, CL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.30m:</td>
<td>B, 0° dip, PL, SM, VN, grey silt (ground during drilling)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.60m:</td>
<td>DD, hammer break</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.97m:</td>
<td>DD, hammer break</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:** 65mm I.D. piezometer installed on Thurs 17 May 2018. Shear vane No. 2204. Presented shear vane readings have been corrected.
# Borehole Log BH4

## Geologic Unit

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.0</td>
<td>Unweathered, grey interbedded SILTSTONE and fine SANDSTONE. Thinly laminated up to 20 mm.</td>
</tr>
<tr>
<td>25.2</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong.</td>
</tr>
<tr>
<td>25.65</td>
<td>Unweathered, interbedded SILTSTONE and fine SANDSTONE. Very thinly laminated.</td>
</tr>
<tr>
<td>26.15</td>
<td>Unweathered laminated, grey, fine to medium carbonaceous SANDSTONE. Weak to moderately strong.</td>
</tr>
<tr>
<td>26.65</td>
<td>Unweathered, interbedded, SILTSTONE and fine SANDSTONE. Weak to moderately strong.</td>
</tr>
<tr>
<td>26.75</td>
<td>Unweathered, grey, fine to medium SANDSTONE.</td>
</tr>
<tr>
<td>27.05</td>
<td>Carbonaceous band.</td>
</tr>
<tr>
<td>27.3</td>
<td>Unweathered, interbedded grey fine to medium SANDSTONE and SILTSTONE. Weak to moderately strong.</td>
</tr>
<tr>
<td>28.15</td>
<td>Unweathered, interbedded, grey, fine to medium SANDSTONE and SILTSTONE. Weak to moderately strong. Beds are moderately thin (80 mm to 200 mm).</td>
</tr>
<tr>
<td>28.75 - 28.85</td>
<td>Fine to coarse SANDSTONE</td>
</tr>
<tr>
<td>28.8</td>
<td>Unweathered, grey SILTSTONE. Weak to moderately strong.</td>
</tr>
<tr>
<td>28.95 - 29.00</td>
<td>Some lenses of fine to medium grained SANDSTONE.</td>
</tr>
<tr>
<td>29.35</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong. Minor carbonaceous laminae.</td>
</tr>
<tr>
<td>29.6</td>
<td>Unweathered, grey, SILTSTONE, minor thin (20 to 80 mm) beds of fine SANDSTONE. Weak to moderately strong.</td>
</tr>
</tbody>
</table>

## Rock Defects

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.22</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>25.40</td>
<td>DD, J 0° dip, UN, R, VN, CL</td>
</tr>
<tr>
<td>25.50</td>
<td>DD, end of run</td>
</tr>
<tr>
<td>25.65</td>
<td>B, 5° dip, ST, SM, VN, CL</td>
</tr>
<tr>
<td>26.05</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>26.40</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>26.50</td>
<td>DD, along B 0° dip, UN, R, VN, CL</td>
</tr>
<tr>
<td>26.67</td>
<td>J, 25° dip, UN, SM, VN, CL</td>
</tr>
<tr>
<td>26.97</td>
<td>DD, 0° dip</td>
</tr>
<tr>
<td>27.00</td>
<td>DD, end of run</td>
</tr>
<tr>
<td>27.32</td>
<td>DD, 0°-30° dip, ST, SM, VN, CL</td>
</tr>
<tr>
<td>27.40</td>
<td>J, 45° dip, UN, SM, VN, CL</td>
</tr>
<tr>
<td>27.50</td>
<td>Calcite vein 5-0mm thick</td>
</tr>
<tr>
<td>27.60 - 27.66</td>
<td>Calcite vein 45°</td>
</tr>
<tr>
<td>27.58</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>27.80</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>28.15</td>
<td>Calcite vein, &gt;1 mm</td>
</tr>
<tr>
<td>28.20</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>28.55</td>
<td>DD, 5° dip, UN, SM, VN, CL</td>
</tr>
<tr>
<td>28.69</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>28.75</td>
<td>J, 60° dip, UN, R, VN, calcite deposits along vein</td>
</tr>
<tr>
<td>28.95</td>
<td>J, 30° dip, UN, SM, VN, CL</td>
</tr>
<tr>
<td>29.20</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>29.30</td>
<td>J, 0-30° dip, UN, R, VN, CL</td>
</tr>
<tr>
<td>29.58</td>
<td>B, 5° dip, at top of siltstone, ST, SM, VN, CL</td>
</tr>
</tbody>
</table>

## Additional Observations

- Calcite vein, >1 mm
- Calcite vein, >1 mm
### General Log - 5/04/2019 11:16:35 a.m. - Produced with Core-GS by GeRoc

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**  
**R.L. GROUND:** 193.70m  
**R.L. COLLAR:** 193.70m  
**DATUM:** NZVD2016

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°

**SCALE:** 1:25

**HOLE DEPTH**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>34.50</td>
<td>34.50m: DD, end of run break</td>
</tr>
<tr>
<td>34.45</td>
<td>34.45m: DD, hammer break</td>
</tr>
<tr>
<td>34.40</td>
<td>34.40m: DD, hammer break</td>
</tr>
<tr>
<td>34.35</td>
<td>34.35m: DD, hammer break</td>
</tr>
<tr>
<td>34.30</td>
<td>34.30m: J, 10° dip, UN, SM, VN, CL</td>
</tr>
<tr>
<td>34.25</td>
<td>34.25m: DD, hammer break</td>
</tr>
<tr>
<td>34.20</td>
<td>34.20m: DD, hammer break</td>
</tr>
<tr>
<td>34.15</td>
<td>34.15m: DD, hammer break</td>
</tr>
<tr>
<td>34.10</td>
<td>34.10m: J, 10° dip, UN, SM, VN, CL</td>
</tr>
<tr>
<td>34.05</td>
<td>34.05m: DD, hammer break</td>
</tr>
<tr>
<td>34.00</td>
<td>34.00m: DD, end of run break</td>
</tr>
<tr>
<td>33.95</td>
<td>33.95m: B, 10° dip, UN, SM, VN, CL</td>
</tr>
<tr>
<td>33.90</td>
<td>33.90m: DD, hammer break</td>
</tr>
<tr>
<td>33.85</td>
<td>33.85m: DD, hammer break</td>
</tr>
<tr>
<td>33.80</td>
<td>33.80m: DD, hammer break</td>
</tr>
<tr>
<td>33.75</td>
<td>33.75m: J, 10° dip, UN, SM, VN, CL</td>
</tr>
<tr>
<td>33.70</td>
<td>33.70m: DD, hammer break</td>
</tr>
<tr>
<td>33.65</td>
<td>33.65m: DD, hammer break</td>
</tr>
<tr>
<td>33.60</td>
<td>33.60m: DD, hammer break</td>
</tr>
<tr>
<td>33.55</td>
<td>33.55m: DD, hammer break</td>
</tr>
<tr>
<td>33.50</td>
<td>33.50m: B, 10° dip, UN, SM, VN, CL</td>
</tr>
<tr>
<td>33.45</td>
<td>33.45m: DD, hammer break</td>
</tr>
<tr>
<td>33.40</td>
<td>33.40m: DD, hammer break</td>
</tr>
<tr>
<td>33.35</td>
<td>33.35m: DD, hammer break</td>
</tr>
<tr>
<td>33.30</td>
<td>33.30m: J, 10° dip, UN, SM, VN, CL</td>
</tr>
<tr>
<td>33.25</td>
<td>33.25m: DD, hammer break</td>
</tr>
<tr>
<td>33.20</td>
<td>33.20m: DD, hammer break</td>
</tr>
<tr>
<td>33.15</td>
<td>33.15m: DD, hammer break</td>
</tr>
<tr>
<td>33.10</td>
<td>33.10m: DD, hammer break</td>
</tr>
<tr>
<td>33.05</td>
<td>33.05m: DD, hammer break</td>
</tr>
<tr>
<td>33.00</td>
<td>33.00m: DD, end of run break</td>
</tr>
<tr>
<td>32.95</td>
<td>32.95m: DD, hammer break</td>
</tr>
<tr>
<td>32.90</td>
<td>32.90m: DD, hammer break</td>
</tr>
<tr>
<td>32.85</td>
<td>32.85m: DD, hammer break</td>
</tr>
<tr>
<td>32.80</td>
<td>32.80m: DD, hammer break</td>
</tr>
<tr>
<td>32.75</td>
<td>32.75m: DD, hammer break</td>
</tr>
<tr>
<td>32.70</td>
<td>32.70m: DD, hammer break</td>
</tr>
<tr>
<td>32.65</td>
<td>32.65m: DD, hammer break</td>
</tr>
<tr>
<td>32.60</td>
<td>32.60m: DD, hammer break</td>
</tr>
<tr>
<td>32.55</td>
<td>32.55m: DD, hammer break</td>
</tr>
<tr>
<td>32.50</td>
<td>32.50m: DD, hammer break</td>
</tr>
<tr>
<td>32.45</td>
<td>32.45m: DD, hammer break</td>
</tr>
<tr>
<td>32.40</td>
<td>32.40m: DD, hammer break</td>
</tr>
<tr>
<td>32.35</td>
<td>32.35m: DD, hammer break</td>
</tr>
<tr>
<td>32.30</td>
<td>32.30m: DD, hammer break</td>
</tr>
<tr>
<td>32.25</td>
<td>32.25m: DD, hammer break</td>
</tr>
<tr>
<td>32.20</td>
<td>32.20m: DD, hammer break</td>
</tr>
<tr>
<td>32.15</td>
<td>32.15m: DD, hammer break</td>
</tr>
<tr>
<td>32.10</td>
<td>32.10m: DD, hammer break</td>
</tr>
<tr>
<td>32.05</td>
<td>32.05m: DD, hammer break</td>
</tr>
<tr>
<td>32.00</td>
<td>32.00m: DD, end of run break</td>
</tr>
</tbody>
</table>

**COMMENTS:** 65mm I.D. piezometer installed on Thurs 17 May 2018. Shear vane No. 2204. Presented shear vane readings have been corrected.

**LOCATION:** Refer site plan  
**JOB No.:** 1005069.1120  
**PROJECT:** Auckland Regional Landfill

**REPORTED BY:** DSAH  
**CHECKED:** ALNA  
**LOGGED BY:** DSAH  
**DRILLED BY:** Lei & Jaz  
**CONTRACTOR:** McMillan Drilling  
**DATE OF JOB:** 09/05/2018  
**FINISH DATE:** 14/05/2018

**SCALE:** 1:25

**NOTES:**

- Rock Weathering:  
  - Weathering, colour, fabric, name, strength, cementation
- Soil Classification:  
  - Colour, consistency / density, moisture, plasticity
- Rock Strength:  
  - Rating: HQ, RQ, HQTT, RQTT
- Rock Defects:  
  - Defects: J, DD, B, VL, VM, SM, ST
- Core Recovery:  
  - Recovery (%)
- Fluid Loss:  
  - Fluid loss (%)
- Water Level:  
  - Water level (m)
- R.O.I.:  
  - Rock of Interest
- Shearing:  
  - Shear vane readings have been corrected

**Hole Box No.:** BH4

**BOREHOLE No.:** BH4

**SHEET:** 7 OF 10
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**DESCRIPTION OF CORE**

**GEOLOGICAL UNIT**

1. **SOIL:** Classification, colour, consistency/density, moisture, plasticity  
2. **ROCK:** Weathering, colour, fabric, name, strength, cementation

**SOIL:** Classification, colour, consistency/density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

**RQD (%):**

**Water Level:**

**Fracture Spacing (mm):**

**Casing Installation:**

**DSUCC Box No.:**

**FLUID LOSS (%):**

**Core Recovery (%):**

**Testing:**

**GEOLOGICAL UNIT**

34.83-35.0m: Unweathered, grey interbedded, fine to medium grained SANDSTONE and SILTSTONE. Weak to moderately strong. Very to moderately thin bedding.

35.0m: Unweathered, grey, interbedded, fine to medium grained SANDSTONE and SILTSTONE. Weak to moderately strong. Very to moderately thinly bedded (>100mm).

36.09m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong.

36.21m: Unweathered, grey SILTSTONE, with some very thin, fine grained SANDSTONE bedding. Weak to moderately strong.

36.4m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong.

36.82-37.0m: Some thin to very thin siltstone bedding.  
37.00m: becomes fine to coarse grained.  
37.20 - 37.30m: some calcareous streaks.  
37.40m: trace fine gravel.

37.72m: 100mm siltstone bed, becomes fine to medium grained sandstone.  
37.85 - 37.90m: carbonaceous streaks.  
38.00m: becomes fine to coarse grained.

38.30m: becomes fine to medium grained.

38.54 - 38.56m: siltstone bed, 10°.  
38.60m: becomes fine to coarse grained.  
38.64 - 38.76m: carbonaceous bands.  
38.80m: trace fine gravel.

39.00m: becomes fine to medium grained, gravel absent.

39.40m: becomes fine to coarse grained.

39.80m: trace fine gravel.

**DESCRIPTION OF CORE**

**RQD (%):**

**Water Level:**

**Fracture Spacing (mm):**

**Casing Installation:**

**DSUCC Box No.:**

**FLUID LOSS (%):**

**Core Recovery (%):**

**Testing:**

**GEOLOGICAL UNIT**

35.10m: DD, hammer break

35.50m: DD, hammer break

35.85m: DD, 0°-10°, ST, SM, VN

36.30m: B, 10° dip, UN, SM, VN, CL

36.42m: DD, hammer break

36.70m: DD, hammer break

36.85m: DD, hammer break

37.00m: B, 10° dip, UN, SM, VN, grey silt

37.79m: B, 5° dip, ST, SM, VN, CL

37.80m: B, 5° dip, UN, SM, VN, CL

37.90m: DD, hammer break

38.15m: DD, hammer break

38.56m: B, 10° dip, UN, SL, VN, CL

39.60m: DD, hammer break

**COMMENTS:** 65mm I.D. piezometer installed on Thurs 17 May 2018. Shear vane No. 2204. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**GEOLICAL UNIT**  
SOIL: Classification, colour, consistency / density, moisture, plasticity  
ROCK: Weathering, colour, fabric, name, strength, cementation

### DESCRIPTION OF CORE

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.0:</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.</td>
</tr>
<tr>
<td>40.8:</td>
<td>Trace fine gravel.</td>
</tr>
<tr>
<td>41.3:</td>
<td>Gravel absent.</td>
</tr>
<tr>
<td>42.0 - 42.20:</td>
<td>Trace fine gravel.</td>
</tr>
<tr>
<td>42.40 - 42.80:</td>
<td>Becomes more medium to coarse grained.</td>
</tr>
<tr>
<td>43.55:</td>
<td>Interbedded SILTSTONE and fine to coarse SANDSTONE. Thin to very thin bedding. Weak to moderately strong</td>
</tr>
<tr>
<td>43.9:</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>44.25:</td>
<td>Interbedded unweathered, grey, fine to medium SANDSTONE and grey and greenish grey SILTSTONE. Very thin to moderately thin bedding. Minor calcite veins</td>
</tr>
</tbody>
</table>

### ROCK DEFECTS

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Defect</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.20:</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>40.50:</td>
<td>DD, end of run break</td>
</tr>
<tr>
<td>40.75:</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>41.35:</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>41.55 - 41.90:</td>
<td>J, 80° dip, UN, R, VN, black and green staining</td>
</tr>
<tr>
<td>42.00 - 42.10:</td>
<td>J, 70° dip, UN, R, VN, black staining penetrates 1-2mm under rock</td>
</tr>
<tr>
<td>42.50:</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>43.10:</td>
<td>DD, hammer break</td>
</tr>
<tr>
<td>43.65 - 43.80:</td>
<td>BZ, possibly crushed during drilling, medium to coarse gravel</td>
</tr>
<tr>
<td>43.70:</td>
<td>J, main joint 75°, UN, R, VN, black staining</td>
</tr>
<tr>
<td>43.90:</td>
<td>DD, hammer break</td>
</tr>
</tbody>
</table>

**COMMENTS:** 65mm I.D. piezometer installed on Thurs 17 May 2018. Shear vane No. 2204. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**  
- **R.L. GROUND:** 193.70m  
- **R.L. COLLAR:** 193.70m  
- **SURVEY:** Total Station Surveyed  
- **DATUM:** NZVD2016  
- **DATUM:** NZTM2000

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>45.0m</td>
<td>Unweathered, grey, interbedded fine to medium SANDSTONE and dark grey SILTSTONE. Weak to moderately strong.</td>
</tr>
</tbody>
</table>
| 45.15m   | Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong.  
45.25 - 45.33m: some siltstone beds, >30mm thick.  
45.50m: 10mm carbonaceous bands. |
| 45.63m   | Unweathered, interbedded grey, fine to medium SANDSTONE and grey SILTSTONE. Weak to moderately strong. Very thin to moderately thin bedding (30mm to 240mm)  
45.90m: carbonaceous band. |
| 49.5m    | Target depth |

**SOIL:** Classification, colour, consistency / density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

**ROCK DEFECTS**

- **2000**  
- **600**  
- **200**  
- **60**  
- **20**  
- **UW**  
- **SW**  
- **MW**  
- **HW**  
- **CW**  
- **ES**  
- **VS**  
- **S**  
- **MS**  
- **W**  
- **VW**  
- **EW**

**Casing**  
**Installation**  
**Core Box No.**

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer site plan  
**JOB No.:** 1005069.1120  
**CONTRACTOR:** McMillan Drilling

**COMMENTS:** 65mm I.D. piezometer installed on Thurs 17 May 2018. Shear vane No. 2204. Presented shear vane readings have been corrected.
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer Site Plan

CO-ORDINATES: 5977990.27 mN
1742359.43 mE

R.L. GROUND: 161.20m
R.L. COLLAR: 161.20m
SURVEY: Total Station/Surveyed
DATUM: NZVD2016

PROJECT: Auckland Regional Landfill
LOCATION: Refer Site Plan
JOB No.: 1005069.1120

SURVEY: Total Station/Surveyed
DATUM: NZVD2016

DESCRIPTION OF CORE

SOIL: Classification, colour, consistency / density, moisture, plasticity

ROCK: Weathering, colour, fabric, name, strength, cementation

ROCK DEFECTS

Fluid Loss (%)
25
50
75

SPT
HQTT

RQD (%)

Depth (m)

Geological Unit

5.0m: Clayey SILT, minor fine sand, trace fine gravel size clasts of light grey silt; reddish brown mottled orange brown and grey. Firm, saturated, low plasticity

5.2-5.45m: SILT, minor fine sand, trace clay; Light brown mottled grey, trace pink mottles

5.45m: SILT, minor clay, trace fine sand; reddish brown mottled orange and grey. Firm, saturated, low plasticity

5.6m: SILT, some clay, some thin to moderately thin beds of sandy silt, light pink mottled grey, some very narrow beds of orange brown (limonite stained). Firm, saturated, low plasticity

7.08m: Silty fine SAND; light pink. Loose, saturated

7.2m: SILT, some clay, some thin to moderately thin beds of sandy silt, light pink mottled grey. Firm, saturated, low plasticity

7.65m: Silty fine SAND; pink. Loose, wet

7.8m: No recovery (core loss)

7.95m: SILT, some clay, light pink mottled grey. Firm, saturated, low plasticity

8.1m: Sandy silt, light pink mottled grey, minor orange brown bands. Firm, saturated, low plasticity. Sand is fine

8.7m: SILT, minor clay, pink mottled grey. Firm, wet, low plasticity

8.95m: SILT, minor fine sand; light pink mottled grey, minor orange brown and brown limonite staining. Firm, wet, low plasticity

9.1m-9.3m: SILT, some fine sand; reddish brown

9.3m-9.45m: SILT, trace fine sand; light pink

9.45m: SILT, minor clay, trace fine sand; reddish brown, becoming pink from 9.6m. Firm, wet, low plasticity

COMMENTS: 50mm I.D. piezometer. Shear Vane No. 111. Presented shear vane readings have been corrected.

Presented shear vane readings have been corrected.

Geological Unit

5.0m: Clayey SILT, minor fine sand, trace fine gravel size clasts of light grey silt; reddish brown mottled orange brown and grey. Firm, saturated, low plasticity

5.2-5.45m: SILT, minor fine sand, trace clay; Light brown mottled grey, trace pink mottles

5.45m: SILT, minor clay, trace fine sand; reddish brown mottled orange and grey. Firm, saturated, low plasticity

5.6m: SILT, some clay, some thin to moderately thin beds of sandy silt, light pink mottled grey, some very narrow beds of orange brown (limonite stained). Firm, saturated, low plasticity

7.08m: Silty fine SAND; light pink. Loose, saturated

7.2m: SILT, some clay, some thin to moderately thin beds of sandy silt, light pink mottled grey. Firm, saturated, low plasticity

7.65m: Silty fine SAND; pink. Loose, wet

7.8m: No recovery (core loss)

7.95m: SILT, some clay, light pink mottled grey. Firm, saturated, low plasticity

8.1m: Sandy silt, light pink mottled grey, minor orange brown bands. Firm, saturated, low plasticity. Sand is fine

8.7m: SILT, minor clay, pink mottled grey. Firm, wet, low plasticity

8.95m: SILT, minor fine sand; light pink mottled grey, minor orange brown and brown limonite staining. Firm, wet, low plasticity
BOREHOLES No.: BH5

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer Site Plan

CO-ORDINATES: 5977990.27 mN 1742359.43 eE
R.L. GROUND: 161.20m
R.L. COLLAR: 161.20m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

DIRECTION: 0°
ANGLE FROM HORIZ: -90°

SURVEY: Total Station Surveyed
DATUM: NZVD2016

START DATE: 15/05/2018
FINISH DATE: 17/05/2018
CONTRACTOR: McMillan

DESCRIPTION OF CORE

10.0m: SILT, some fine sand; pink mottled reddish brown. Firm, wet, low plasticity

10.5m: Sandy SILT, light pink mottled reddish brown and orange brown, trace black staining. Firm, saturated, low plasticity. Sand is fine

11.50m: Becomes light pink mottled grey

12.0m: SILT, light grey, some dark orange brown streaks. Stiff, wet, low plasticity

12.1m: SILT, minor fine sand; light brown mottled orange brown, pink from 12.3m to 12.4m. Stiff, wet, low plasticity

12.5m: Sandy SILT; light brown, some dark orange brown and reddish brown staining. Stiff, wet, low plasticity

14.00 - 14.50m: Trace fine to medium gravel size (2mm to 10mm) clasts of stiff light grey silt

COMMENTS: 50mm I.D. piezometer. Shear Vane No. 111. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer Site Plan  
**SHEET:** 4 OF 10

**BOREHOLE No.: BH5**

**DRILLED BY:** Craig  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**START DATE:** 15/05/2018  
**FINISH DATE:** 17/05/2018  
**CONTRACTOR:** McMillan

**CO-ORDINATES:**  
R.L. GROUND: 161.20m  
R.L. COLLAR: 161.20m  
**DATUM:** NZVD2016  
**SURVEY:** Total Station/Surveyed

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer Site Plan  
**JOB No.:** 1005069.1120

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### DESCRIPTION OF CORE

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0m</td>
<td>SILT, minor fine sand and sandy SILT, light brown some dark orange brown streaks. Stiff, wet, low plasticity</td>
</tr>
<tr>
<td>15.60 - 15.70m</td>
<td>Trace fine gravel size clasts of light grey silt</td>
</tr>
<tr>
<td>16.00 - 16.10m</td>
<td>Mottled pink</td>
</tr>
<tr>
<td>16.50 - 17.00m</td>
<td>Becomes very stiff. Trace coarse sand to fine gravel size clasts of light grey silt</td>
</tr>
<tr>
<td>16.65m</td>
<td>Lense of brown fine SAND</td>
</tr>
<tr>
<td>16.95 - 17.10m</td>
<td>Minor light pink motting</td>
</tr>
<tr>
<td>18.0m</td>
<td>SILT; grey. Very stiff, wet, low plasticity</td>
</tr>
<tr>
<td>18.09m</td>
<td>Sandy SILT; light brown, some orange brown and dark orange brown streaks. Very stiff, wet, low plasticity. Sand is fine</td>
</tr>
<tr>
<td>18.50 - 18.55m</td>
<td>Light brown fine SAND</td>
</tr>
<tr>
<td>19.50m</td>
<td>Becomes light brown and grey, some orange brown streaks</td>
</tr>
</tbody>
</table>

---

**COMMENTS:**  
50mm I.D. piezometer. Shear Vane No. 111. Presented shear vane readings have been corrected.
### BOREHOLE LOG

**BH5**

**Project:** Auckland Regional Landfill  
**Job No.:** 1005069.1120  
**Location:** Refer Site Plan

**Coordinates:**  
- **North:** 5977990.27 mN  
- **East:** 1742359.43 mE  
- **Datum:** NZVD2016

**Drilled by:** Craig  
**Logged by:** DSA  
**Checked:** ALNA  
**Start Date:** 15/05/2018  
**Finish Date:** 17/05/2018  
**Contractor:** McMillan

**Borehole No.:** BH5  
**RL Ground:** 161.20m  
**RL Collar:** 161.20m  
**Survey:** Total Station Surveyed  
**Survey Datum:** NZVD2016

**Location:** Refer Site Plan  
**Job No.:** 1005069.1120

### Geological Units

**Geological Unit**  
- **SOIL:** Classification, colour, consistency/density, moisture, plasticity  
- **ROCK:** Weathering, colour, fabric, name, strength, cementation

**Description of Core**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.0m</td>
<td>SILT, minor to some fine sand, light brown and grey, some orange brown and dark brown streaks. Very stiff, wet, low plasticity</td>
</tr>
<tr>
<td>21.05m</td>
<td>Silty fine SAND; grey, minor brown and orange brown staining on defects. Medium dense to dense, wet</td>
</tr>
<tr>
<td>22.25 - 22.35m</td>
<td>Mottled greenish grey</td>
</tr>
<tr>
<td>23.20 - 23.50m</td>
<td>Grey mottled greenish grey</td>
</tr>
<tr>
<td>24.00 - 24.05m</td>
<td>Greenish grey</td>
</tr>
<tr>
<td>24.20 - 24.25m</td>
<td>Greenish grey</td>
</tr>
<tr>
<td>24.60 - 25.50m</td>
<td>Grey with orange brown and greenish grey staining</td>
</tr>
</tbody>
</table>

**Core Recovery (%):** 100

**Sampling Method:** HQTT  
**Core Recovery (L):**

**Testing:**
- **Defect Log:**
  - **Depth (m):**
    - 20.0  
    - 21.05  
    - 22.25 - 22.35  
    - 23.20 - 23.50  
    - 24.00 - 24.05  
    - 24.20 - 24.25  
    - 24.60 - 25.50

**ROCK DEFECTS**

- **UW:**
- **SW:**
- **MW:**
- **HW:**
- **CW:**
- **ES:**
- **VS:**
- **S:**
- **MS:**
- **W:**
- **VW:**
- **EW:**

**Fluid Loss (%):**

- **25:**
- **50:**
- **75:**

**Comments:**

- **50mm I.D. piezometer. Shear Vane No. 111. Presented shear vane readings have been corrected.**

**Additional Observations:**

- **Casing Installation:**
  - **Box 8, 19.7-22.3m**
  - **Box 9, 22.3-24.9m**

**Scale:** 1:25  
**Rev.: A**

**Comments:**

- **50mm I.D. piezometer. Shear Vane No. 111. Presented shear vane readings have been corrected.**
BOREHOLE NO.: BH5

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer Site Plan

CO-ORDINATES: 5977990.27mN 1742359.43mE (NZTM2000)

R.L. GROUND: 161.20m
R.L. COLLAR: 161.20m

DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

DATE: 15/05/2018
SURVEY: Total Station Surveyed
DATUM: NZVD2016

CONTRACTOR: McMillan

SHEET: 6 OF 10

BOREHOLE No.: BH5

R.L. GROUND: 161.20m
R.L. COLLAR: 161.20m

DRILLED BY: Craig
LOGGED BY: DSA
CHECKED: ALNA
START DATE: 15/05/2018
FINISH DATE: 17/05/2018

DESCRIPTION OF CORE

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

DESCRIPTION OF ROCK

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

ROCK DEFECTS

25.0m: Silty fine SAND; grey, minor brown and orange brown staining on defects. Medium dense to dense, wet

26.15m: SILT; grey. Very stiff to hard, moist to wet, low plasticity
26.18m: Lense of light grey fine sand

26.4m: Slightly weathered, grey, fine to coarse SANDSTONE. Very weak

26.55m: Grades to unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

27.31m-27.36m: Fine to medium SANDSTONE

27.75m-27.8m: Fine SANDSTONE

27.8m-27.8m: Dark brownish grey SILTSTONE

28.9m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

29.28 - 29.31m: Carbonaceous

29.31m-29.35m: SILTSTONE

29.35m: Unweathered, grey, fine to medium SANDSTONE, grading to fine to coarse SANDSTONE from 29.45m. Weak to moderately strong

29.68m: Fine to medium SANDSTONE

29.88 - 29.90m: Very thin lenses of grey SILTSTONE

COMMENTS: 50mm I.D. piezometer. Shear Vane No. 111. Presented shear vane readings have been corrected.
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer Site Plan

CO-ORDINATES: 5977990.27 mN 1742359.43 mE (NZT8000)
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 161.20m
R.L. COLLAR: 161.20m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

START DATE: 15/05/2018
FINISH DATE: 17/05/2018

DRILLED BY: Craig
LOGGED BY: DSA
CHECKED: ALNA
CONTRACTOR: McMillan

HOLE DEPTH: 49.5m

DESCRIPTION OF CORE

GEOLOGICAL UNIT
ROCK: Weathering, colour, fabric, name, strength, cementation
SOIL: Classification, colour, consistency / density, moisture, plasticity

LOCATION: Refer Site Plan
JOB No.: 1005069.1120

UW Pakiri

GEOLOGICAL UNIT
ROCK: Weathering, colour, fabric, name, strength, cementation
SOIL: Classification, colour, consistency / density, moisture, plasticity

from 34.75m.
34.75m: Trace dark grey coarse sand size clasts
SANDSTONE. Weak
34.5m: Grading to unweathered, grey, fine to medium moderately strong
33.73m: Unweathered, grey, fine SANDSTONE. Trace to moderately strong
33.6m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong
33.5m: Unweathered, grey, coarse SANDSTONE. weak to moderately strong
33.1m: Grading to fine to coarse SANDSTONE

32.81m: Unweathered, grey, fine to medium SANDSTONE. Weak
32.45m: Unweathered, grey, fine to coarse SANDSTONE. Weak
32.05m: Unweathered, grey, fine SANDSTONE. Weak

31.1m: Unweathered, dark grey, SILTSTONE some very thin beds of fine SANDSTONE. Weak
31.0m-31.1m: Fine SANDSTONE, carbonaceous from 30.08 to 30.1m.
30.72m: Unweathered, dark grey, SILTSTONE, some very thin beds of fine SANDSTONE. Weak
30.48 - 30.52 m: 50mm I.D. piezometer. Shear Vane No. 111. Presented shear vane readings have been corrected.
30.00 m: DD, 2° dip, UN, SM, T, CN
30.25 - 30.50m: J, 70° dip, UN, SM, VN, grey silt
30.73m: J, 40° dip, UN, SM, T-VN, CN
30.75m: BF, 5° dip, CS, UN, SL to SM, VN, grey silt
30.84m: J, 70° dip, UN, SM, T-VN, CN
30.85m: J, 15° dip, UN, SM, VN, grey silt
30.95m: J, 2° dip, UN, SM, VN, grey silt [Drilling polished]
31.10 - 31.4m: J, VCS, 0 to 90, UN, SL to SM, T to VN, CN to grey silt
31.40 - 31.60m: BZ, Rec as f-c UN, SL to SM, T to VN, CN to grey silt
31.99 m: B, 5° dip, UN, R, T, CN
31.71m: J, 10° dip, UN, SM, T-VN, CN
31.92m: J, 10° dip, UN, SM, T-VN, CN
31.99m: B, 5° dip, UN, R, T, CN
32.05 - 32.25m: J, 70° dip, UN, SM, R, VN, dark grey and greenish grey stained
32.10m: J, 40° dip, UN, SM, VN, dark brownish grey stained
32.40m: J, 0° dip, UN, R, T-VN, black CC
32.52m: J, 40° dip, UN, R, VN, dark green staining
32.55 - 32.85m: J, 40° dip, curved to 75, UN, R, VN, minor dark greenish grey stained
32.90m: J, 60° dip, UN to R, VN, minor dark green stained
32.92m: J, 40° dip, UN, SM, VN, minor dark green stained
32.95m: J, 40° dip, UN, SM, T to R, VN, minor dark green stained
33.00m: DD, 0° dip
33.5m: J, 50° dip, UN, R, T-VN, CN
33.5m: J, 40° dip, UN, R, VN, minor green at 75, UN, R, VN, minor dark green stained
33.53m: J, 30° dip, UN, R, VN, minor green stained
33.54m: J, 20° dip, UN, R, T-VN, CN
34.05m: J, 10° dip, UN, R, T-VN, CN
34.50m: DD, 5° dip
34.63 - 34.80m: J, 70° dip, UN, R, VN, dark grey to brown stained
34.72m: J, 40° dip, UN, R, VN, dark grey stained

34.5m: Grading to unweathered, grey, fine to medium SANDSTONE. Weak
34.575m: Trace dark grey coarse sand size clasts from 34.75m.
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer Site Plan

CO-ORDINATES: (NZTM2000) 5977990.27 mN 1742359.43 mE

DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 161.20m
R.L. COLLAR: 161.20m
DATE: NZVD2016
SURVEY: Total Station/Surveyed

LOCATION: Refer Site Plan
JOB No.: 1005069.1120
PROJECT: Auckland Regional Landfill

UW Pakiri

ROCK: Weathering, colour, fabric, name, strength, cementation
SOIL: Classification, colour, consistency / density, moisture, plasticity

DESCRIPTION OF CORE

35.0m: Unweathered, grey, fine to medium SANDSTONE. Trace dark grey coarse sand to fine gravel size clasts from 35.0m to 35.2m. Weak.

35.4m-35.62m: Minor fine to medium gravel size clasts

35.9m: Unweathered, grey, SILTSTONE, minor thin (40mm-60mm) beds of fine SANDSTONE. Weak

38.05m: Unweathered, grey, fine SANDSTONE, grading to fine to medium SANDSTONE from 38.12m. Weak. 38.19 - 38.20m: Carbonaceous laminae 38.20 - 38.23m: Fine SANDSTONE

38.46m-38.56m: SILTSTONE

38.56m: Unweathered, grey, fine SANDSTONE. Carbonaceous from 38.56m to 38.68m. Weak

38.8m: Unweathered, interbedded SILTSTONE and fine SANDSTONE. Weak. Beds are thin to moderately thin (20 to 120mm).

GEOLOGICAL UNIT

RQD (%)

35.00m: J, 70° dip, UN, R, T, CN
35.10m: J, 60° dip, UN, R, T, CN
35.18m: J, 30° dip, Wavy, UN, R, T-VN, CN
35.25m: J, 40° dip, PL, R, T-VN, CN
35.30m: J, 70° dip, UN, R, VN, dark greenish grey st
35.58m: J, 50° dip, UN, R, VN, dark grey st
35.70m: J, 50° dip, UN, SM, VN, dark grey silty fine sand
35.89m: B, 2° dip, UN, SL, T-VN, CN
36.00 - 36.06: DD, Rac-f-c-gvl
36.35m: J, 0 to 15 dip, UN, SM, T, CN
36.52m: J, 50° dip, to 0, UN, SM, T, CN
36.60 - 36.68m: B, Rac c gvl
36.72 - 36.85m: B, Rac m-c gvl with J, 60-90, UN SM to PL R. Upper contact is on orthogonal 70° dip & 0 deg, UN, SL, T-VN, CN, and -70°, UN, R
36.77 - 36.85m: B, Rac c gvl with J, 60-90, UN SM to PL R. Upper contact is on orthogonal 70° dip & 20 degree, UN SM to SL, T-VN, CN
37.00m: J, UN, SL, VN, CN
37.16m: J, 2° dip, UN, SL, VN, brown CS
37.20m: J, UN, SM, VN, CN
37.27m: J, 70° dip, UN, R, T-VN, CN to 0, UN, SL, T-VN, CN
37.34 - 37.50m: B, Rac-f-c-gvl.
37.50 - 37.60m: J, VCS, 0-90, UN, R, PL R, T-VN, CN
37.70m: J, UN, SM, VN, CN (DD)
37.85 - 37.95m: J, VCS, 50-70, UN, SL, VN, CN
38.30m: J, UN, SM, VN, CN
38.35m: J, 60° dip, UN, SM, VN, calcite
38.46m: B, 2° dip, UN, SM, VN, CN
38.72m: J, 60° dip, UN, SM, VN, CN
38.75m: J, 90° dip, PL, R, VN, CN
39.80m: B, 0 UN, R-T-VN, CN
39.85m: B, 0 UN, SL, VN, CS
39.09 - 39.22m: J, 0-40, UN, SM to ST, SM, T-VN, CN
39.40m: J, UN, SL, VN, CN
39.60m: J, 2-10 dip, UN, SM, T-VN, CN
39.70m: J, 5, UN, SM, T-VN, CN
39.77 - 39.90m: J, VCS, 5, UN, SL, T-VN, CN
39.90 - 40.00m: J, 80° dip, VCS, UN, SM, VN, grey silt and dark green staining
39.92m: J, 0° dip, UN, SL, VN, silty fine sand infil

DESCRIPTION & ADDITIONAL OBSERVATIONS

39.50m 39.55m 39.60m 39.65m 39.70m 39.75m 39.80m 39.85m 39.90m 39.95m

VALUES

DIP (°) : 0° 30° 60° 90°
DIRECTION: W E N S
R.L. COLLAR: 161.20m
R.L. GROUND: 161.20m
FINISH DATE: 17/05/2018
START DATE: 15/05/2018
CHECKED: ALNA
LOGGED BY: DSA
DRILLED BY: Craig
CONTRACTOR: McMillan

COMMENTS: 50mm I.D. piezometer. Shear Vane No. 111. Presented shear vane readings have been corrected.

Scale 1:25

REV. A

Sheet 8 of 10

Bore Hole No. BH5

5/05/2019 11:16:38 a.m. - Produced with Core-GS by GeRoc v3.2g
## BOREHOLE LOG

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer Site Plan

### GEOLOGICAL UNIT

**SOIL:** Classification, colour, consistency / density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

### DESCRIPTION OF CORE

<table>
<thead>
<tr>
<th>ROCK WEATHERING</th>
<th>ROCK STRENGTH</th>
<th>SAMPLING METHOD</th>
<th>ROCK DEFECTS</th>
<th>FLUID LOSS</th>
<th>WATER LEVEL</th>
<th>INSTALLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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### ROCK DEFECTS

<table>
<thead>
<tr>
<th>RQD (%)</th>
<th>Description &amp; Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Comments

- **50mm I.D. piezometer, Shear Vane No. 111.** Present shear vane readings have been corrected.
## BOREHOLE LOG

**BOREHOLE No.: BH5**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer Site Plan

- **Start Date:** 15/05/2018  
- **Finish Date:** 17/05/2018

### GEOLOGICAL UNIT

| SOIL: Classification, colour, consistency / density, moisture, plasticity |
| ROCK: Weathering, colour, fabric, name, strength, cementation |

### DESCRIPTION OF CORE

**SOIL:** Classification, colour, consistency / density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

45.0m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

45.14m-45.17m: Grey SILTSTONE

45.17m: Unweathered, grey, fine SANDSTONE, minor thin to moderately thin beds of fine to coarse SANDSTONE. Weak to moderately strong

45.7m-45.8m: Fine to coarse SANDSTONE

45.83m-45.86m: Fine to coarse SANDSTONE

45.95m: Unweathered, grey, fine to coarse SANDSTONE, trace fine gravel size clasts. Weak to moderately strong

46.22m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

47.1m: Unweathered, dark grey, fine to medium SANDSTONE. Very weak to weak

47.2m: Unweathered, grey, fine to coarse SANDSTONE, trace fine gravel size clasts. Weak to moderately strong

48.0m: Unweathered, grey, fine SANDSTONE. Weak to moderately strong

49.5m: Target depth

### ROCK DEFECTS

- **2000**  
- **600**  
- **200**  
- **60**  
- **20**  
- **UW**  
- **SW**  
- **MW**  
- **HW**  
- **CW**  
- **ES**  
- **VS**  
- **S**  
- **MS**  
- **W**  
- **VW**  
- **EW**

### COMMENTS:

- **50mm I.D. piezometer, Shear Vane No. 111.** Presented shear vane readings have been corrected.

---

**Scale:** 1:25  
**Date:** 5/04/2019  
**Produced with Core-GS by GeRoc v3.2g**

**DRILLED BY:** Craig  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**CONTRACTOR:** McMillan
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 5978241.11 mN 1741642.79 mE

R.L. GROUND: 127.00m
R.L. COLLAR: 128.00m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

DRILLED BY: Craig
LOGGED BY: DSA
CHECKED: ALNA
START DATE: 07/05/2018
FINISH DATE: 10/05/2018
CONTRACTOR: McMillan

BOREHOLE No.: BH6
SHEET: 1 OF 10

DESCRIPTION OF CORE

0.0m: No recovery (core loss)
0.1m: Highly weathered, brown, fine SANDSTONE. Extremely weak, some black carbonaceous staining on defects. [Fine SAND, brown. Tightly packed, wet]
0.3m: Fine SAND; brown, minor black carbonaceous staining on defects. Loosely packed, wet.
0.55m: SILT, some fine sand; brown. Firm, wet, non plastic to low plasticity
0.6m: No recovery (core loss)

1.5-2.0m: Push Tube

2.0m: Fine SAND, minor silt, some black carbonaceous streaks. Pinkish brown, becoming brown with black streaks from 2.04m. Loose, wet
2.20m: Brown mottled light brown

2.35m: No recovery (core loss)
2.45m: Fine SAND, minor to some silt; brown mottled light brown, some thin black carbonaceous streaks. Loose, wet

3.1m: Clayey SILT, minor to some fine sand; light brown becoming orange brown from 3.3m. Firm to stiff, wet, low plasticity. Minor limonite staining

3.65m: Fine SAND, trace silt; brown. Loose, wet

4.2m: Sandy SILT; brown mottled light grey and reddish brown. Firm to stiff, wet, low plasticity. Sand is fine
4.4m: Fine SAND; light brown. Loosely packed, wet

4.5m: Clayey SILT; orange brown. Stiff, wet, moderate to high plasticity
4.75m: Clayey SILT, minor fine sand; becoming light greyish brown from 4.85m

4.9m: SILT, some clay. Grey. Stiff, wet, low pl

COMMENTS: 65mm I.D. piezometer installed on Friday 18 May. Shear Vane No. 111. Presented shear vane readings have been corrected.
PROJECT: Auckland Regional Landfill

LOCATION: Refer site plan

COMMENTS:
- 9.96m [Cont’d]: Unweathered, grey fine carbonaceous SANDSTONE. Weak to moderately strong.
- 10.1m: Becomes unweathered, grey fine to medium SANDSTONE.
- 10.2m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong.
- 10.7m: Unweathered, dark grey, SILTSTONE, some thin to moderately thin beds of fine SANDSTONE. Weak.
- 11.55m: Unweathered, dark grey, fine to medium SANDSTONE. Weak to moderately strong.
- 11.88m: Unweathered, dark grey, SILTSTONE. Weak to moderately strong.
- 11.95m: Unweathered, grey, fine SANDSTONE; becoming fine to medium SANDSTONE from 12.05m. Weak to moderately strong.
- 12.17m: Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine to coarse gravel size clasts in a fine to coarse sand matrix. Matrix supported.
- 12.22m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.
- 12.95m: Unweathered, grey, fine carbonaceous SANDSTONE. Weak to moderately strong.
- 13.02m: Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine to coarse gravel in fine to coarse sand matrix. Matrix supported.
- 13.38m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.
- 13.7m - 13.8m: Fine SANDSTONE.
- 13.9m - 14.0m: Grades to CONGLOMERATE. Conglomerate is fine to medium gravel size clasts in fine to coarse sand matrix. Matrix supported.
- 14.0m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.
- 14.7m - 14.8m: Trace fine gravel size clasts.
- 14.82m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong. 14.82 - 14.84m: Carbonaceous.

Additional Observations:
- 10.10m: J, 20° dip, UN, SM, VN, CN.
- 10.50m: DD, 0° dip.
- 10.70m: B, 10° dip, UN, SM, VN, CN.
- 10.81m: J, 15° dip, UN, SM, VN, CN.
- 11.23m: J, 10° dip, ST, SL, VN, CN.
- 11.40m: J, 30° dip, ST, R, VN, CN.
- 11.50m: J, 10° dip, ST, R, VN, CN.
- 11.55 - 11.56m: BZ, Rec 5m qvl, upper & lower contacts are 10° UN, SM, VN, CN.
- 11.88m: B, 10° dip, UN, SM, VN, CN.
- 11.85m: B, 10° dip, UN, SM, VN, CN.
- 12.00m: DD, 0° dip.
- 12.20m: DD, 0° dip. Hammer break.
- 12.55m: DD, 0° dip. Hammer break.
- 12.80m: B, 5° dip, UN, SM, CN.
- 12.90m: B, 10° dip, UN, SM, CN.

Graphical Log

Fluid Loss (%)
- 10.10m: J, 20° dip, UN, SM, VN, CN.
- 10.50m: DD, 0° dip.
- 10.70m: B, 10° dip, UN, SM, VN, CN.
- 10.81m: J, 15° dip, UN, SM, VN, CN.
- 11.23m: J, 10° dip, ST, SL, VN, CN.
- 11.40m: J, 30° dip, ST, R, VN, CN.
- 11.50m: J, 10° dip, ST, R, VN, CN.
- 11.55 - 11.56m: BZ, Rec 5m qvl, upper & lower contacts are 10° UN, SM, VN, CN.
- 11.88m: B, 10° dip, UN, SM, VN, CN.
- 11.85m: B, 10° dip, UN, SM, VN, CN.
- 12.00m: DD, 0° dip.
- 12.20m: DD, 0° dip. Hammer break.
- 12.55m: DD, 0° dip. Hammer break.
- 12.80m: B, 5° dip, UN, SM, CN.
- 12.90m: B, 10° dip, UN, SM, CN.

CONTRACTOR: McMillan

FINISH DATE: 10/05/2018
START DATE: 07/05/2018
LOGGED BY: DSA
CHECKED: ALNA
DRILLED BY: Craig
PROJECT: Auckland Regional Landfill

LOCATION: Refer site plan

COMMENTS:
- 9.96m [Cont’d]: Unweathered, grey fine carbonaceous SANDSTONE. Weak to moderately strong.
- 10.1m: Becomes unweathered, grey, fine SANDSTONE.
- 10.2m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong.
- 10.7m: Unweathered, dark grey, SILTSTONE, some thin to moderately thin beds of fine SANDSTONE. Weak.
- 11.55m: Unweathered, dark grey, fine to medium SANDSTONE. Weak to moderately strong.
- 11.88m: Unweathered, dark grey, SILTSTONE. Weak to moderately strong.
- 11.95m: Unweathered, grey, fine SANDSTONE; becoming fine to medium SANDSTONE from 12.05m. Weak to moderately strong.
- 12.17m: Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine to coarse gravel size clasts in a fine to coarse sand matrix. Matrix supported.
- 12.22m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.
- 12.95m: Unweathered, grey, fine carbonaceous SANDSTONE. Weak to moderately strong.
- 13.02m: Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine to coarse gravel in fine to coarse sand matrix. Matrix supported.
- 13.38m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.
- 13.7m - 13.8m: Fine SANDSTONE.
- 13.9m - 14.0m: Grades to CONGLOMERATE. Conglomerate is fine to medium gravel size clasts in fine to coarse sand matrix. Matrix supported.
- 14.0m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong.
- 14.7m - 14.8m: Trace fine gravel size clasts.
- 14.82m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong. 14.82 - 14.84m: Carbonaceous.
**BOREHOLE NO.: BH6**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**
- **R.L. GROUND:** 127.00m  
- **R.L. COLLAR:** 128.00m  
- **DATUM:** NZVD2016  

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°  

**CONTRACTOR:** McMillan  
**SHEET:** 4 OF 10

---

**DESCRIPTION OF CORE**

**SOIL:** Classification, colour, consistency / density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>ROCK WEATHERING</th>
<th>DESCRIPTION &amp; ADDITIONAL OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.82m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Thin bed of SILTSTONE at 15.08m. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>15.11m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>15.50 - 15.56m</td>
<td>Thin bed of grey SILTSTONE</td>
<td></td>
</tr>
<tr>
<td>15.56 - 15.60m</td>
<td>Carbonaceous, fine to medium SANDSTONE</td>
<td></td>
</tr>
<tr>
<td>15.6m</td>
<td>Unweathered, grey, CONGLOMERATE. Conglomerate is fine to medium gravel in a fine to coarse sand matrix. Matrix supported. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>15.65m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>16.1m-16.2m</td>
<td>Minor fine to medium gravel size clasts</td>
<td></td>
</tr>
<tr>
<td>16.5m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to weakly to moderately strong</td>
<td></td>
</tr>
<tr>
<td>16.85m</td>
<td>Unweathered, grey, fine SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>17.22m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to weakly to moderately strong</td>
<td></td>
</tr>
<tr>
<td>17.28m-17.4m</td>
<td>Fine to coarse SANDSTONE, trace to minor fine gravel size clasts</td>
<td></td>
</tr>
<tr>
<td>17.4m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>17.55m</td>
<td>Grades to fine to coarse SANDSTONE</td>
<td></td>
</tr>
<tr>
<td>18.22m</td>
<td>Unweathered, dark grey, SILTSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>18.3m</td>
<td>Unweathered, grey, fine SANDSTONE. Weak to weakly to moderately strong</td>
<td></td>
</tr>
<tr>
<td>18.5m</td>
<td>Grades to fine to coarse SANDSTONE</td>
<td></td>
</tr>
<tr>
<td>19.05-19.08m</td>
<td>Carbonaceous</td>
<td></td>
</tr>
<tr>
<td>19.08-19.13m</td>
<td>Fine to coarse SANDSTONE with trace to minor fine gravel size clasts</td>
<td></td>
</tr>
<tr>
<td>19.5m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>19.75-19.82m</td>
<td>Fine SANDSTONE</td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:**
- 65mm I.D. piezometer installed on Friday 18 May. Shear Vane No. 111. Presently, sheared vane readings have been corrected.
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES:
- R.L. GROUND: 127.00m
- R.L. COLLAR: 128.00m
- SURVEY: Total Station Surveyed
- DATUM: NZVD2016

START DATE: 07/05/2018
FINISH DATE: 10/05/2018
CONTRACTOR: McMillan

DESCRIPTION OF CORE

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>SOIL: Classification, colour, consistency/density, moisture, plasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.0m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>21.45m</td>
<td>Unweathered, grey, fine carbonaceous SANDSTONE. Carbonaceous bands are very thin (up to 10mm), dipping approx. 40-50 deg. Weak</td>
</tr>
<tr>
<td>21.7m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>22.40 - 22.50m</td>
<td>Calcite vein, very narrow, approx 40 deg dip</td>
</tr>
<tr>
<td>22.5m</td>
<td>Grading to unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>22.53m</td>
<td>Unweathered, dark grey, SILTSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>23.6m</td>
<td>Unweathered, grey, fine SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>23.7m</td>
<td>Grading to fine to medium SANDSTONE</td>
</tr>
<tr>
<td>23.85m</td>
<td>Calcite vein, very narrow, approx 60 deg dip</td>
</tr>
<tr>
<td>24.25m</td>
<td>Grading to unweathered, grey, coarse SANDSTONE, trace to minor fine to medium gravel size clasts. Weak to moderately strong</td>
</tr>
</tbody>
</table>

COMMENTS:
- 65mm I.D. piezometer installed on Friday 18 May. Shear Vane No. 111. Presented shear vane readings have been corrected.

BOREHOLE No.: BH6
SHEET: 5 OF 10

DRILLED BY: Craig
LOGGED BY: DSA
CHECKED: ALNA

RQD (%)

<table>
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<tr>
<th>Water Level</th>
<th>Fracture Spacing (mm)</th>
<th>RQD (%)</th>
</tr>
</thead>
<tbody>
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SURVEY: Total Station Surveyed
DATUM: NZVD2016

CONTRACTOR: McMillan
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**  
- **(UTM2000):** 5978241.11 mN  
- **(NZTM2000):** 1741642.79 mE

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°

**R.L. GROUND:** 127.00 m  
**R.L. COLLAR:** 128.00 m

**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer site plan  
**JOB No.:** 1005069.1120

**CONTRACTOR:** McMillan

---

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>GEOLOGICAL UNIT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.0</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to coarse</td>
</tr>
<tr>
<td>25.33</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, CONGLOMERATE, weak to moderately strong</td>
</tr>
<tr>
<td>25.5</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to coarse</td>
</tr>
<tr>
<td>25.7</td>
<td>SANDSTONE</td>
<td>Grading to fine to medium</td>
</tr>
<tr>
<td>25.9</td>
<td>SANDSTONE</td>
<td>Grading to fine to coarse, trace fine gravel size clasts, weak to moderately strong</td>
</tr>
<tr>
<td>26.22</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to coarse</td>
</tr>
<tr>
<td>26.49 - 26.85</td>
<td>SANDSTONE</td>
<td>Very narrow, approx 70 dip calcite vein</td>
</tr>
<tr>
<td>26.8 - 26.9</td>
<td>SANDSTONE</td>
<td>Very narrow, approx 40 dip, calcite vein</td>
</tr>
<tr>
<td>26.95</td>
<td>SANDSTONE</td>
<td>Grades to fine to medium</td>
</tr>
<tr>
<td>27.5</td>
<td>SANDSTONE</td>
<td>Grades to fine to coarse</td>
</tr>
<tr>
<td>27.85</td>
<td>SANDSTONE</td>
<td>Unweathered, dark grey, fine carbonaceous, weak to moderately strong</td>
</tr>
<tr>
<td>28.02</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to coarse, grading to fine to medium from 28.1m, weak to moderately strong</td>
</tr>
<tr>
<td>28.25</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to coarse, grading to fine to coarse from 28.1m, weak to moderately strong</td>
</tr>
<tr>
<td>28.5</td>
<td>SANDSTONE</td>
<td>Becoming coarse from 28.5m</td>
</tr>
<tr>
<td>28.51</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine, weak to moderately strong</td>
</tr>
<tr>
<td>28.9</td>
<td>SANDSTONE</td>
<td>Grading fine to coarse</td>
</tr>
<tr>
<td>29.02</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, coarse, weak to moderately strong</td>
</tr>
<tr>
<td>29.23</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to coarse, grading to fine to coarse from 29.5m, weak to moderately strong</td>
</tr>
<tr>
<td>29.45</td>
<td>SANDSTONE</td>
<td>Narrow calcite vein, approx 60 dip</td>
</tr>
<tr>
<td>29.5</td>
<td>SANDSTONE</td>
<td>Coarse gravel size lens of</td>
</tr>
<tr>
<td>29.8</td>
<td>SANDSTONE</td>
<td>Unweathered, grey, CONGLOMERATE, weak to moderately strong, matrix supported</td>
</tr>
</tbody>
</table>

**ROCK DEFECTS**

**RQD (%):**

- 25.5: DD, 0° dip  
- 25.9: DD, 0° dip  
- 26.2: DD, 0° dip  
- 26.9: DD, 0° dip  
- 27.5: DD, 0° dip

**COMMENTS:** 65mm I.D. piezometer installed on Friday 18 May, Shear Vane No. 111. Presensitized shear vane readings have been corrected.


**BOREHOLE NO.: BH6**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**DRILLED BY:** Craig  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**START DATE:** 07/05/2018  
**FINISH DATE:** 10/05/2018

**CONTRACTOR:** McMillan

---

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>Geological Unit</th>
<th>Description of Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.8m [Cont'd]</td>
<td>Unweathered, grey, CONGLOMERATE. Conglomerate is fine to medium gravel in a fine to coarse sand matrix. Matrix supported. Weak to moderately strong</td>
</tr>
<tr>
<td>30.1m</td>
<td>Conglomerate grades to fine gravel in a fine to coarse sand matrix. Matrix supported</td>
</tr>
<tr>
<td>31.4m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>31.6m</td>
<td>Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine gravel, becoming fine to medium gravel from 32.0m in a fine to coarse sand matrix. Matrix supported</td>
</tr>
<tr>
<td>32.35m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Trace fine to medium gravel size clasts from 32.35m to 32.55m. Weak to moderately strong</td>
</tr>
<tr>
<td>32.85m</td>
<td>DD</td>
</tr>
<tr>
<td>33.00m</td>
<td>DD, 0° dip</td>
</tr>
<tr>
<td>33.25 - 33.4m</td>
<td>Fine to medium SANDSTONE</td>
</tr>
<tr>
<td>33.35m</td>
<td>DD</td>
</tr>
<tr>
<td>34.3m</td>
<td>Unweathered, interbedded, grey SILTSTONE and fine SANDSTONE. Weak. Beds are thin moderately thin (30mm to 120mm)</td>
</tr>
<tr>
<td>34.35m</td>
<td>Calcite Veins, VCS, very narrow (0.1 to 0.5mm)</td>
</tr>
<tr>
<td>34.8m</td>
<td>DD, 0° dip</td>
</tr>
</tbody>
</table>

**ROCK DEFECTS**

- **[Lugeon Test @ 28.5m](#)**
- **[Fluid Loss (%)](#)**
- **[Defect Log](#)**
- **[Testing](#)**

---

**COMMENTS:** 65mm I.D. piezometer installed on Friday 18 May. Shear Vane No. 111. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**BOREHOLE No.: BH6**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**
- **R.L. GROUND:** 127.00m  
- **R.L. COLLAR:** 128.00m  
- **SURVEY:** Total Station Surveyed  
- **DATUM:** NZVD2016

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°

**START DATE:** 07/05/2018  
**FINISH DATE:** 10/05/2018  
**CONTRACTOR:** McMillan

**GEOLOGICAL UNIT**

<table>
<thead>
<tr>
<th>Description</th>
<th>RQD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOIL: Classification, colour, consistency / density, moisture, plasticity</td>
<td>Rock Weathering, colour, fabric, name, strength, cementation</td>
</tr>
</tbody>
</table>

**DESCRIPTION OF CORE**

35.0m: Unweathered, interbedded, grey Siltstone and fine Sandstone. Weak. Bedding is thin to moderately thin.

37.60 - 37.80m: Calcite vein, very narrow, approx 90 deg dip.

37.95 - 38.75m: Very closely spaced, anastomotic very narrow to narrow calcite veins.

**ROCK DEFECTS**

- **Depth (m):**
  - 35.00m: DD, 15° dip, UN, R, & orthog 40 deg, UN, SM, T, CN
  - 35.10m: J, -20° dip, PL, SL, VN-N, trace grey silt. Faint striations
  - 35.60m: J, 40° dip, ST, R to UN, SM, VN, CN
  - 35.76m: J, 40° dip, UN, SM to ST, SM, VN, CN
  - 35.94m: J, 50° dip, UN, R, VN, CN
  - 36.00m: DD, -10° dip
  - 36.08m: J, 40° dip, UN, R, Moderately narrow to VN, dark grey silt
  - 36.20m: J, 70° dip, ST, R, VN, trace grey silt
  - 36.25m: J, 40° dip, UN, VN, trace silt
  - 36.55m: J, 50° dip, UN, T, VN, CN
  - 36.60m: J, 40° dip, UN, SM, VN, CN
  - 36.70m: J, 60° dip, UN to SM, T-VN, CN
  - 37.05m: J, 5° dip, UN, SM, T-VN, CN
  - 37.12m: J, 10° dip, UN, SM, T-VN, CN
  - 37.18 - 37.20m: BZ, Rec f-c gvl, upper contact 60, PL, SM, VN, CS & orthog UN, SM, T-VN, CN, lower contact is 10, UN, SM, T-VN, CN
  - 37.25m: J, 50° dip, UN, SM, T, CN
  - 37.37m: J, 10° dip, UN, SM, VN, CN, faint striations
  - 37.50m: DD
  - 38.05m: DD
  - 38.23m: B, 10° dip, Hammer break on bedding, 10, UN, SM, T, CN
  - 38.53m: DD, 5° dip, Hammer break on bedding, UN, R, T-CN

**Lugeon Test @ 34.5m:**
- **Depth (m):** 35.50, 36.00, 36.50, 37.00, 37.50, 38.00, 38.50, 39.00, 39.50
- **Fluid Loss (%):** 25, 50, 75

**COMMENTS:** 65mm I.D. piezometer installed on Friday 18 May. Shear Vane No. 111. Presented shear vane readings have been corrected.

**HOLE DEPTH:** 49.5m  
**Scale 1:25**
**DESCRIPTION OF CORE**

- **SOIL:** Classification, colour, consistency / density, moisture, plasticity
- **ROCK:** Weathering, colour, fabric, name, strength, cementation

**ROCK:** Weathering, colour, fabric, name, strength, cementation

40.0m: Unweathered, interbedded, grey Siltstone and fine Sandstone. Weak

43.5m: Unweathered, grey, fine Sandstone, grading to fine to medium Sandstone from 43.5m. Weak to moderately strong

43.9m: Siltstone, some thin to moderately thin (20mm to 70mm) beds of fine Sandstone. Weak to moderately strong

**ROCK DEFECTS**

- DD: Deformation
- UN: Unusual
- CN: Calcite
- SM: Silt
- VN: Viscous
- RR: Recess
- T: Tangential
- ST: Shear
- R: Radial

**Additional Observations**

- **40.10m:** DD
- **40.50m:** DD
- **40.63m:** B, 10° dip, UN, SL, VN, greyish brown CC
- **40.88m:** B, 10° dip, UN, SM, T, CN
- **41.02m:** DD, Hammer break on calcite vein. Orthog 80 and 90 deg. UN, R, VN, calcite
- **41.25m:** DD, 0° dip
- **41.35m:** DD, 10° dip, UN, SM, T, CN
- **41.52m:** DD, 0, ST, R, T, CN
- **41.84m:** B, 10° dip, UN, SM, VN, trace grey silt
- **41.98m:** B, 10° dip, UN, SM, T, VN, CN
- **42.00m:** DD, 0° dip
- **42.13m:** B, 10° dip, UN, SM, T, VN, CN
- **42.68m:** J, 20° dip, UN, R, VN, minor CC
- **43.00m:** J, 60° dip, UN, R to ST, SM, VN, CN
- **43.19m:** J, 10° dip, UN, SM, T, VN, CN
- **43.50m:** DD, 0° dip
- **44.10m:** DD, 2° dip, Hammer break on bedding: UN, SM, T, CN
- **44.23m:** DD, 0° dip, Hammer break on calcite vein?: PL, R, T, CN curved to 80, UN, SM, T, CN
- **44.58m:** DD, 0° dip, Hammer break: UN, SL, T, CN
- **45.00m:** DD, 0° dip

**COMMENTS:** 65mm I.D. piezometer installed on Friday 18 May. Shear Vane No. 111. Presented shear vane readings have been corrected.
45.0m: Unweathered, dark grey, SILTSTONE. Weak
45.1m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong
45.5m: Unweathered, dark grey, SILTSTONE. Weak to moderately strong
45.7m: Unweathered, grey, fine SANDSTONE. Weak to moderately strong
45.82m: Grades to fine to medium SANDSTONE
46.26m: Unweathered, dark grey SILTSTONE, some very thin beds of fine to medium SANDSTONE from 46.33m. Weak to moderately strong
46.4m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong
46.75m: Calcite vein, very narrow, approx 60 deg dip
47.7m: Grades to fine to coarse SANDSTONE
47.70m: Calcite vein, very narrow, approx 40 deg dip
47.92 - 47.94m: Fine to coarse SANDSTONE with minor fine gravel size clasts
48.05m: Calcite vein, very narrow, approx 40 deg dip
48.1m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong
48.4 - 48.42m: Carbonaceous
48.85m: Grades to fine to coarse SANDSTONE
48.95m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong
49.15m: Grading to fine to coarse SANDSTONE
49.28 - 49.32m: CONGLOMERATE. Conglomerate is fine gravel, with trace medium gravel. Matrix supported
49.32m: Unweathered, grey, fine SANDSTONE, grading to fine to medium SANDSTONE from 49.45m. Weak to moderately strong
49.40m: Very narrow calcite vein, approx 50 deg dip
49.5m: Target depth

COMMENTS: 65mm I.D. piezometer installed on Friday 18 May. Shear Vane No. 111. Presented shear vane readings have been corrected.
BOREHOLE NO.: BH7

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Wayby Valley

CO-ORDINATES: 5978541.84 mN 1741380.43 mE
R.L. GROUND: 74.42m
R.L. COLLAR: 74.42m
SURVEY: Total Station/Surveyed
DATUM: NZVD2016
PROJECT: Auckland Regional Landfill
LOCATION: Wayby Valley
JOB No.: 1005069.1120

DESCRIPTION OF CORE

GEOLOGICAL UNIT

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

R.L. GROUND: 74.42m
R.L. COLLAR: 74.42m
SURVEY: Total Station/Surveyed
DATUM: NZVD2016
PROJECT: Auckland Regional Landfill
LOCATION: Wayby Valley
JOB No.: 1005069.1120

DESCRIPTION OF CORE

RQD (%)

Water Level
Fracture
Spacing (mm)

GEOLOCAL UNIT

Top

0.0m: Clayey SILT with some rootlets; brown. Soft to firm, wet, low to moderate plasticity.

0.2m: Silty CLAY; dark orange brown. Firm, moist, moderate plasticity.

0.56m: Clayey SILT, minor fine sand, trace organics; reddish brown. Firm, moist, low to moderate plasticity

0.95m: Clayey SILT, some fine sand, some organics; reddish brown with black streaks. Firm, moist, low to moderate plasticity.

1.05m: Sandy SILT, trace clay, some organics; reddish brown. Firm, moist, low plasticity. Sand is fine to medium.

2.0m: Silty fine to medium SAND with minor fine gravel. Light brownish orange. Medium dense, moist

2.7m: Silty fine to medium SAND minor fine to medium gravel; light to reddish orange. Medium dense, moist

1.05m: Sandy SILT, trace clay, some organics; reddish brown. Firm, moist, low plasticity. Sand is fine to medium.

3.0m: Fine to medium SAND, minor silt; brown. Tightly packed, moist

3.4m: Highly weathered, brown, fine to medium SANDSTONE. Very weak

4.50m - 4.90m: No recovery (core loss)

COMMENTS: 50mm I.D. piezometer.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Wayby Valley

**CO-ORDINATES:**  
- NORTHINGS: 5978541.84 mN  
- EASTINGS: 1741380.43 mE

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°

**R.L. GROUND:** 74.42m  
**R.L. COLLAR:**  
**SURVEY:** Total Station Surveyed

**LOCATION:** Wayby Valley  
**PROJECT:** Auckland Regional Landfill

**GEOLOGICAL UNIT**

- **SOIL:** Classification, colour, consistency / density, moisture, plasticity  
- **ROCK:** Weathering, colour, fabric, name, strength, cementation  
- **SOIL:** Classification, colour, consistency / density, moisture, plasticity

### Core Description:

#### 5.0m:
- **Description:** Highly weathered, brown, fine to coarse SANDSTONE. Very weak to weak
- **Sampling Method:** Lugeon Test @ 7.5m

#### 6.2m:
- **Description:** Slightly weathered, grey, fine SANDSTONE. Weak

#### 7.5m:
- **Description:** Slightly weathered, grey, fine to coarse SANDSTONE. Weak

**R.L. COLLAR:**  
**DATE:** NZVD2016

**LOGGED BY:** OPRI  
**FINISH DATE:** 29/03/2018  
**START DATE:** 26/03/2018  
**CHECKED:** ALNA  
**LOGGED BY:** OPRI

**CONTRACTOR:** McMillan Drilling

**Sample Box No.**

- **Box 1:** 2.8-6.2m  
- **Box 2:** 6.2-9.0m  
- **Box 3:** 9.0-12.0m

**Fluid Loss (%):**

- **Box 1:** 2.8-6.2m
- **Box 2:** 6.2-9.0m
- **Box 3:** 9.0-12.0m

**Rock Defects**

- **Description & Additional Observations**

**Comments:** 50mm I.D. piezometer.
7.5m [Cont'd]: Slightly weathered, grey, fine to coarse SANDSTONE. Weak

10.72m: Slightly weathered, grey, fine SANDSTONE. Weak

20.8m: Slightly weathered, grey, fine to coarse SANDSTONE. Weak

10.95m: Unweathered, grey, fine SANDSTONE. Weak

12.28m: Unweathered, grey, fine to medium SANDSTONE. Weak

12.5m: Unweathered, grey, fine to coarse SANDSTONE. Weak

13.2m: Unweathered, grey, fine SANDSTONE. Weak

10.28m: J, 75° dip, PL, SM, W, MN-T, CN

10.74m: J, 20° dip, UN, SM, W, MN, CN

11.12m: J, 60° dip, UN, SM, W, MN, CN

11.32m: J, 40° dip, UN, SM, W, MN, CN

11.76m: J, 35° dip, UN, SM, W, MN, CN

11.89m: J, 35° dip, UN, SM, W, MN, CN

12.65m: J, 20° dip, UN, SM, W, MN, CN

12.85m: J, 30° dip, UN, SM, W, MN-MW, CN

12.95 - 13.05m: BZ

13.09m: J, 30° dip, UN, SM, W, MN, CN

13.96m: J, 25° dip, PL, SM, W, MN, CN

COMMENTS: 50mm I.D. piezometer.
**BOREHOLE LOG**

**BOREHOLE No.:** BH7

**PROJECT:** Auckland Regional Landfill

**JOB No.:** 1005069.1120

**LOCATION:** Wayby Valley

**CO-ORDINATES:** 5978541.84mN
1741380.43 mE

**R.L. GROUND:** 74.42m

**R.L. COLLAR:**

**SURVEY:** Total Station Surveyed

**DATUM:** NZVD2016

**PROJECT:** Auckland Regional Landfill

**LOCATION:** Wayby Valley

**JOB No.:** 1005069.1120

**SURVEY:** Total Station Surveyed

**DATUM:** NZVD2016

**CO-ORDINATES:**

**DIRECTION:** 0°

**ANGLE FROM HORIZ.:** -90°

**CONTRACTOR:** McMillan Drilling

---

### DESCRIPTION OF CORE

**GEOLOGICAL UNIT**

**SOIL**: Classification, colour, consistency/density, moisture, plasticity

**ROCK**: Weathering, colour, fabric, name, strength, cementation

### ROCK DEFECTS

- Defect Log
- Fluid Loss (%)
- Rock Strength
- Sampling Method
- Core Recovery (%)
- Testing
- Additional Observations

### COMMENTS:

- Scale 1:25
- Rev.: A

---

**13.2m [Cont’d]:** Unweathered, grey, fine SANDSTONE. Weak

**15.3m:** Unweathered, grey, fine to coarse SANDSTONE. Weak

**18.7m:** Unweathered, grey, fine SANDSTONE. Weak

**19.15m:** Unweathered, grey, fine to coarse SANDSTONE. Weak

**18.72m:** J, 30° dip, UN, SM, W, MN, CN

**15.25m:** J, 75° dip, UN, SM, R, W, MN, CN

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**Lugeon Test @ 16.5m**

**Box 6, 14.6-17.1m**

**Box 7, 17.1-20.0m**

---

**50mm I.D. piezometer.**
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Wayby Valley

CO-ORDINATES: 5978541.84 mN
1741380.43 mE

R.L. GROUND: 74.42m
SURVEY: Total Station Surveyed

Borehole No.: BH7

DRILLED BY: Malcolm and Jaz
LOGGED BY: OPRI
CHECKED: ALNA
START DATE: 26/03/2018
FINISH DATE: 29/03/2018
CONTRACTOR: McMillan Drilling

SOIL: Classification, colour, consistency / density, moisture, plasticity

DESCRIPTION OF CORE

20.0m: Unweathered, grey, fine SANDSTONE. Weak

21.53m: Unweathered, grey, fine to medium SANDSTONE. Weak

21.9m: Unweathered, grey, fine to coarse SANDSTONE. Weak

22.16m: Unweathered, grey, fine SANDSTONE. Weak

COMMENTS: 50mm I.D. piezometer.
### Description of Core

**Geological Unit**

- **SOIL:** Classification, colour, consistency / density, moisture, plasticity
- **ROCK:** Weathering, colour, fabric, name, strength, cementation

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>ROCK WEATHERING</th>
<th>DESCRIPTION &amp; ADDITIONAL OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.16m</td>
<td>Unweathered, grey, fine SANDSTONE. Weak</td>
<td></td>
</tr>
</tbody>
</table>

#### Rock Strength
- Pakiri Formation
  - **Depth:** 25.5m
  - **Description:** DRY
  - **Sampling Method:** HQTT
  - **Core Recovery (%):** 100
  - **Rock Defects:**
    - **Defect Log:**
    - **Depth:** 25.5m
    - **Description & Additional Observations:**
      - **Defect Type:** UW
      - **Defect Size:** 2000
      - **Defect Spacing:** 600
      - **RQD (%):** 20%
      - **Fluid Loss (%):** 25
      - **Rock Strength:** 18

#### Rock Defects

<table>
<thead>
<tr>
<th>DEFECT</th>
<th>DESCRIPTION &amp; ADDITIONAL OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UW</td>
<td>2000, 600, 20, 60, 20, 200, 600, 200</td>
</tr>
</tbody>
</table>

**Comments:** 50mm I.D. piezometer.
BH8 Log
BOREHOLE LOG

BH8

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 5978251.58 mN 1742801.78 mE
R.L. GROUND: 208.20m
R.L. COLLAR: 208.20m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

RQD (%)
Water Level
Fracture Spacing (mm)
Rock Weathering
Description
& Additional Observations
Casing
Installation
Core Box No

0.0m: Fine to coarse GRAVEL; Grey. Loose, moist. Gravel is sub rounded to sub angular.
0.30m: No Recovery (core loss)
1.1m: Clayey SILT, trace gravel; dark red with orange mottling. Firm, moist, moderate plasticity. Gravel, fine-medium, sub rounded to sub angular
1.2m: Sandy SILT; dark red with black mottling. Firm, moist, low plasticity. Sand is fine to medium
1.80 - 2.00m: No Recovery (core loss)
2.45m: SILT, some clay; light red with orange mottling. Soft to firm, moist, low to moderate plasticity
2.7m: Clayey SILT; light pink with orange mottling. Soft-firm, moist, moderate plasticity
3.30 - 3.50m: No Recovery (core loss)
3.95m: Fine to medium SAND, some silt, dark red with orange mottling and some black streaks. Loose, moist to wet.

COMMENTS: 65mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.

65mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.
## BOREHOLE LOG

**BOREHOLE No.:** BH8  
**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan  
**DRILLED BY:** Lei  
**LOGGED BY:** OPRI  
**CHECKED:** ALNA  
**START DATE:** 24/04/2018  
**FINISH DATE:** 30/04/2018  
**CONTRACTOR:** McMillan  

### DESCRIPTION OF CORE

| Depth (m) | Description | Soil Classification | Colour | Consistency | Density | Moisture | Plasticity | Co-Ordinates | Rock Weathering | Sampling Method | Core Recovery (%) | Testing |
|----------|-------------|---------------------|--------|-------------|---------|----------|------------|--------------|-----------------|-----------------|-------------------|-----------------|---------|
| 3.95m    | Fine to medium SAND, some silt; dark red with orange mottling and some black streaks. Loose, moist to wet. | | | | | | | CO-ORDINATES: 5978251.58 mN 1742801.78 mE | | | | |
| 5.55m    | Becomes light orange brown | | | | | | | | | | | |
| 6.00m    | Becomes loose to medium dense | | | | | | | | | | | |
| 6.45m    | Fine SAND, minor silt; light brown stained dark orange brown. Loose to medium dense, moist to wet | | | | | | | | | | | |
| 9.0m     | Fine to coarse SAND; light brown. Loose, moist to wet | | | | | | | | | | | |
| 9.1m     | Fine SAND, minor silt; light orange brown. Loose, moist to wet | | | | | | | | | | | |
| 9.45m    | Fine to medium SAND, trace silt; light orange brown. Loose, moist to wet | | | | | | | | | | | |
| 9.50m    | Becomes fine to coarse SAND, trace silt | | | | | | | | | | | |
| 9.6m     | Fine to medium SAND, trace silt; light greyish brown with minor iron staining. Loose, moist to wet | | | | | | | | | | | |

### ROCK DEFECTS

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Defect Log</th>
<th>Description &amp; Additional Observations</th>
<th>Fluid Loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.00m</td>
<td>1/2</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>9.50m</td>
<td>1/2</td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

### SURVEY: Total Station Surveyed

- **R.L. GROUND:** 208.20m  
- **R.L. COLLAR:** 208.20m  
- **DATUM:** NZVD2016  

### COMMENTS:

- 65mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.
BOREHOLE LOG

BOREHOLE No.: BH8

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 5978251.58 mN
1742801.78 mE

R.L. GROUND: 208.20m
R.L. COLLAR: 208.20m

DIRECTION: 0°
ANGLE FROM HORIZ: -90°

SURVEY: Total Station Surveyed
DATUM: NZVD2016

PROJECT: Auckland Regional Landfill
LOCATION: Refer site plan
JOB No.: 1005069.1120

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

DESCRIPTION OF CORE

9.6m [Cont'd]: Fine to medium SAND, trace silt, light greyish brown with minor iron staining. Loose, moist to wet

10.4m: CLAY with minor silt, light greyish brown with trace iron staining. Firm, moist, moderate to high plasticity

10.95m: Fine to medium SAND with trace silt; light greyish brown with minor iron staining. Loose, moist to wet

11.62m: Clayey SILT; light greyish brown. Firm, moist, moderate to high plasticity

11.77m: Silty fine to medium SAND with trace clay. Light greyish brown with minor iron staining. Loose, moist to wet

12.45m: No recovery (core loss)

12.95m: Fine to coarse SAND; light greyish brown. Loose, moist to wet

13.0m: Fine to medium SAND with some gravel and minor silt; light greyish brown with some iron staining. Loose, moist to wet. Gravel, fine-medium, sub rounded to sub angular

13.35m: Fine to medium SAND with minor silt; light brown with orange mottling. Medium dense, moist to wet

13.95m: CLAY with some gravel. Light brown. Firm, moist, moderate plasticity. Gravel, fine to medium grained, sub angular

14.05m: Moderately weathered, grey stained orange brown, fine to medium SANDSTONE. Weak

14.5m: Slightly weathered, grey with minor zones of brown staining and orange brown stained defects, fine to medium SANDSTONE. Weak

14.80 - 14.85m: brown

COMMENTS: 65mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.

600 900 1200

SW-MW Pakiri

MW Pakiri

CW Pakiri

SWV-MWV Pakiri

HQTT

SPT

HQTT

SPT

HQTT

SPT

HQTT
14.5m [Contd]: Slightly weathered, grey with minor zones of brown staining and orange brown stained defects, fine to medium SANDSTONE. Weak

15.95m: Slightly weathered, grey, fine to medium SANDSTONE. Weak.

16.03m: Slightly weathered, grey, fine to medium SANDSTONE. Weak.

17.2m: Moderately weathered, light brown, fine to medium SANDSTONE. Weak.

18.2m: Slightly weathered, grey, fine to medium SANDSTONE. Weak to moderately strong.

DESCRIPTION OF CORE

ROCK: Weathering, colour, fabric, name, strength, cementation

SOIL: Classification, colour, consistency / density, moisture, plasticity

ROCK DEFECTS

Description & Additional Observations

Fluid Loss (%)

Vane Test

Installation

Core Box No.
DESCRIPTION OF CORE

SOIL: Classification, colour, consistency / density, moisture, plasticity

ROCK: Weathering, colour, fabric, name, strength, cementation

GEOLICAL UNIT

18.2m [Cont’d]: Slightly weathered, grey, fine to medium SANDSTONE. Weak to moderately strong

22.7m: Grades to fine to coarse SANDSTONE

ROCK DEFECTS

Defect Log

Fluid Loss (%)

25, 50, 75

Depth (m)

24.48m: J, 40° dip, PL, R, W-MS, N, FaII

24.87 - 25.00m: J, 85° dip, UN, SM, W-MS, T, CN

COMMENTS:

65mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.
**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.7m</td>
<td>Cont'd: Slightly weathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>25.24m</td>
<td>Moderately weathered, brown, fine coarse SANDSTONE. Weak</td>
</tr>
<tr>
<td>25.5m</td>
<td>Slightly weathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>27.62m</td>
<td>Slightly weathered, grey, SILTSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>27.68m</td>
<td>Slightly weathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>28.1m-28.3m</td>
<td>Moderately weathered, grey with brown staining, fine to coarse SANDSTONE. Weak</td>
</tr>
<tr>
<td>28.6m</td>
<td>Interbedded, slightly weathered, grey SILTSTONE and fine SANDSTONE. Weak. Thin to moderately thin beds. Shallow dipping bedding planes</td>
</tr>
</tbody>
</table>

**ROCK DEFECTS**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.03m</td>
<td>J. 15° dip, UN, R, W, MS, N, FasSt</td>
</tr>
<tr>
<td>25.05m</td>
<td>J. 15° dip, UN, R, W, MS, N, FasSt</td>
</tr>
<tr>
<td>25.24m</td>
<td>J. 20° dip, UN, SM, W, MS, N, FasSt</td>
</tr>
<tr>
<td>25.30 - 25.38m BZ</td>
<td></td>
</tr>
<tr>
<td>25.64m</td>
<td>J. 35° dip, UN, R, W, MS, N, FasSt</td>
</tr>
<tr>
<td>25.78m</td>
<td>J. 10° dip, UN, R, W, MS, N, FasSt</td>
</tr>
<tr>
<td>25.88m</td>
<td>J. 20° dip, UN, R, W, MS, N, FasSt</td>
</tr>
<tr>
<td>25.96m</td>
<td>J. 30° dip, UN, R, W, MS, N, FasSt</td>
</tr>
<tr>
<td>26.03m</td>
<td>J. 10° dip, UN, R, W, MS, N, CN</td>
</tr>
<tr>
<td>26.14m</td>
<td>J</td>
</tr>
<tr>
<td>26.24m</td>
<td>J</td>
</tr>
<tr>
<td>26.37m</td>
<td>J. 35° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>26.38m</td>
<td>J. 35° dip, UN, SM, W, MS, N, CN</td>
</tr>
</tbody>
</table>

** COMMENTS:**

- 65mm I.D. piezometer, Shear Vane No. 2204. Presented shear vane readings have been corrected.
LOCATION: Refer site plan

GEOLOGICAL UNIT

ROCK: Weathering, colour, fabric, name, strength, cementation

SOIL: Classification, colour, consistency / density, moisture, plasticity

DESCRIPTION OF CORE

DRAPE: Depth (m)

Table:

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.6m</td>
<td>Interbedded, slightly weathered, grey SILTSTONE and fine SANDSTONE. Weak to moderately strong. Thin to moderately thin beds. Shallow dipping bedding planes</td>
</tr>
<tr>
<td>31.4m</td>
<td>Unweathered, interbedded, grey SILTSTONE and fine SANDSTONE. Weak to moderately strong. Bedding is thin to moderately thick</td>
</tr>
<tr>
<td>33.08m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>33.77m</td>
<td>Unweathered, grey, SILTSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>33.84m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>34.6m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
</tbody>
</table>

FLUID LOSS (%)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Fluid Loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.10m</td>
<td>J, 30° dip, PL, R, W, MS, N, Falt</td>
</tr>
<tr>
<td>30.18</td>
<td>30.24m: BZ</td>
</tr>
<tr>
<td>30.31</td>
<td>30.40m: BZ</td>
</tr>
<tr>
<td>30.44m</td>
<td>J, 20° dip, UN, R, W, MS, N, CN</td>
</tr>
<tr>
<td>30.52m</td>
<td>J, 20° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>30.58</td>
<td>30.62m: BZ</td>
</tr>
<tr>
<td>30.68m</td>
<td>J, 20° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>30.73</td>
<td>30.83m: BZ</td>
</tr>
<tr>
<td>30.92m</td>
<td>J, 15° dip, PL, R, W, MS, N, CN</td>
</tr>
<tr>
<td>31.01m</td>
<td>J, 15° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>31.04m</td>
<td>J, 15° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>31.08m</td>
<td>J, 15° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>31.60m</td>
<td>J, 15° dip, UN,SM, W, MS, N, CN</td>
</tr>
<tr>
<td>31.93m</td>
<td>J, 30° dip, UN, R, W, MS, N, CN</td>
</tr>
<tr>
<td>31.97m</td>
<td>J, 10° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>32.79m</td>
<td>J, 20° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>32.83m</td>
<td>J, 20° dip, PL, R, W, MS, N, CN</td>
</tr>
<tr>
<td>33.08m</td>
<td>J, 30° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>33.76m</td>
<td>J, 5° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>33.81m</td>
<td>J, 5° dip, UN, R, W, MS, N, CN</td>
</tr>
<tr>
<td>34.31m</td>
<td>J, 15° dip, UN, R, W, MS, N, CN</td>
</tr>
</tbody>
</table>

RISK LOG

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Risk Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>45</td>
<td>45</td>
</tr>
</tbody>
</table>

RQD (%)

<table>
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<th>Depth (m)</th>
<th>RQD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.10m</td>
<td>J, 30° dip, PL, R, W, MS, N, Falt</td>
</tr>
<tr>
<td>30.18</td>
<td>30.24m: BZ</td>
</tr>
<tr>
<td>30.31</td>
<td>30.40m: BZ</td>
</tr>
<tr>
<td>30.44m</td>
<td>J, 20° dip, UN, R, W, MS, N, CN</td>
</tr>
<tr>
<td>30.52m</td>
<td>J, 20° dip, UN, SM, W, MS, N, CN</td>
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<td>30.62m: BZ</td>
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<tr>
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<td>J, 20° dip, UN, SM, W, MS, N, CN</td>
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<td>J, 15° dip, PL, R, W, MS, N, CN</td>
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<td>31.01m</td>
<td>J, 15° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>31.04m</td>
<td>J, 15° dip, UN, SM, W, MS, N, CN</td>
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<tr>
<td>31.08m</td>
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<td>J, 15° dip, UN,SM, W, MS, N, CN</td>
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<td>J, 30° dip, UN, R, W, MS, N, CN</td>
</tr>
<tr>
<td>31.97m</td>
<td>J, 10° dip, UN, SM, W, MS, N, CN</td>
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</tr>
<tr>
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<td>J, 20° dip, PL, R, W, MS, N, CN</td>
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<tr>
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<td>J, 30° dip, UN, SM, W, MS, N, CN</td>
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<tr>
<td>33.76m</td>
<td>J, 5° dip, UN, SM, W, MS, N, CN</td>
</tr>
<tr>
<td>33.81m</td>
<td>J, 5° dip, UN, R, W, MS, N, CN</td>
</tr>
<tr>
<td>34.31m</td>
<td>J, 15° dip, UN, R, W, MS, N, CN</td>
</tr>
</tbody>
</table>

DESCRIPTION & ADDITIONAL OBSERVATIONS

<table>
<thead>
<tr>
<th>Description</th>
<th>Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COMMENTS: 65mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.
## BOREHOLE LOG

### General Information
- **Project:** Auckland Regional Landfill
- **Job No.:** 1005069.1120
- **Location:** Refer site plan
- **Drilled By:** Lei
- **Logged By:** OPRI
- **Checked:** ALNA
- **Start Date:** 24/04/2018
- **Finish Date:** 30/04/2018
- **Contractor:** McMillan
- **Survey:** Total Station Surveyed
- **Datum:** NZVD2016
- **Project:** Auckland Regional Landfill
- **Location:** Refer site plan
- **Job No.:** 1005069.1120

### Coordinates
- **R.L. Ground:** 208.20m
- **R.L. Collar:** 208.20m
- **Co-ordinates:** (NZTM2000) 5978251.58 mN 1742801.78 mE

### Geotechnical Data
- **Rock Weathering:**
- **Description & Additional Observations:**
- **Rock Strength:**
- **Sampling Method:**
- **Depth:**
- **Casing Installation:**
- **Core Box No:**
- **Hole Depth:** 49.5 m
- **Fluid Loss (%):**
- **Defect Log:**
- **Testing:**

### Geological Unit
- **Soil:**
- **Rock:**

### Rock Defects
- **Description & Additional Observations**
- **Casing Installation**
- **Core Box No**

### BOREHOLE Log
- **49.5m:** Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

### Comments
- **Scale 1:25**
- **Rev.: A**

### Additional Observations
- 34.6m [Cont'd]: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong
- 36.1m: Interbedded, unweathered, grey SILTSTONE and fine SANDSTONE. Weak to moderately strong. Thin to moderately thin beds. Shallow and dipping bedding planes.
- 37.15m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong
- 37.65m: Interbedded, unweathered, grey SILTSTONE and fine to coarse SANDSTONE. Weak to moderately strong. Thin to moderately thin beds. Shallow and dipping bedding planes.
- 39.53m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

### Scale
- **65mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.**
## Project Information
- **Project**: Auckland Regional Landfill
- **Job No.**: 1005069.1120
- **Location**: Refer site plan

## Borehole Log Details
- **Borehole No.**: BH8
- **Start Date**: 24/04/2018
- **Finish Date**: 30/04/2018
- **Contractor**: McMillan
- **Log Sheet**: 9 of 10
- **Datum**: NZVD2016

### Geographical Details
- **R.L. Ground**: 208.20m
- **R.L. Collar**: 208.20m

### Coordinates
- **Survey**: Total Station Surveyed
- **UW**: Pakiri
- **Date**: 18/05/2018; 11:00 am

### Description of Core
- **SOIL**: Classification, colour, consistency / density, moisture, plasticity
- **ROCK**: Weathering, colour, fabric, name, strength, cementation

### Geological Unit

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>39.53m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>41.5m</td>
<td>Interbedded, unweathered, grey SILTSTONE and fine to coarse SANDSTONE. Weak to moderately thin beds. Shallow dipping bedding planes.</td>
<td></td>
</tr>
<tr>
<td>43.4m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
</tbody>
</table>

### Rock Defects

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Rock Defects</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.34m</td>
<td>J, 60° dip, UN, R, W-MS, N, CN</td>
</tr>
<tr>
<td>41.76m</td>
<td>J, 25° dip, UN, R, W-MS, N, CV</td>
</tr>
<tr>
<td>42.36m</td>
<td>J, 20° dip, UN, SM, W-MS, N, CN</td>
</tr>
<tr>
<td>42.67m</td>
<td>J, 10° dip, UN, SM, W-MS, N, CN</td>
</tr>
<tr>
<td>42.78m</td>
<td>J, 10° dip, UN, SM, W-MS, N, CN</td>
</tr>
<tr>
<td>42.95m</td>
<td>J, 20° dip, UN, SM, W-MS, N, CN</td>
</tr>
<tr>
<td>43.12m</td>
<td>J, 20° dip, UN, SM, W-MS, VN- N, CN</td>
</tr>
</tbody>
</table>

### Comments
- 65mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**  
R.L. GROUND: 208.20m  
R.L. COLLAR: 208.20m  
DATUM: NZVD2016  
SURVEY: Total Station/Surveyed

**CONTRACTOR:** McMillan

**SHEET:** 10 OF 10

**BOREHOLE No.:** BH8

**START DATE:** 24/04/2018  
**FINISH DATE:** 30/04/2018

**DRILLED BY:** Lei  
**LOGGED BY:** OPRI  
**CHECKED:** ALNA

**ANGLE FROM HORIZ.:** -90°  
**SURVEY:** Total Station/Surveyed

---

<table>
<thead>
<tr>
<th>GEOLOGICAL UNIT</th>
<th>DESCRIPTION OF CORE</th>
<th>SOIL: Classification, colour, consistency / density, moisture, plasticity</th>
<th>ROCK: Weathering, colour, fabric, name, strength, cementation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**43.4m [Cont'd]:** Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

**46.4m:** Unweathered, grey CONGLOMERATE. Conglomerate is fine to medium gravel in fine to coarse sand matrix. Matrix supported. Weak to moderately strong

**46.9m:** Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

**47.56m:** Unweathered, grey CONGLOMERATE. Conglomerate is fine to medium gravel in fine to coarse sand matrix. Matrix supported. Weak to moderately strong

**49.2m:** Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

**49.5m:** END OF BOREHOLE

**COMMENTS:** 65mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.

---

**NOTE:** The presented shear vane readings have been corrected.
BH9 Log
**BOREHOLE LOG**

**BOREHOLE No.:** BH9

**PROJECT:** Auckland Regional Landfill

**JOB No.:** 1005069.1120

**LOCATION:** Wayby Valley

**DRILLED BY:** Lei

**LOGGED BY:** OPRI

**CHECKED:** ALNA

**START DATE:** 13/04/2018

**FINISH DATE:** 20/04/2018

**CONTRACTOR:** McMillan Drilling

**R.L. GROUND:** 240.50m

**R.L. COLLAR:** 240.50m

**SURVEY:** Total Station Surveyed

**DATUM:** NZVD2016

**PROJECT:** Auckland Regional Landfill

**LOCATION:** Wayby Valley

**JOB No.:** 1005069.1120

**CO-ORDINATES:**
- Plan: 5978793.64 mN 1742573.68 mE
- Elev: 240.50m
- Angle: -90°
- Datum: NZVD2016

**SURVEYED FROM:** Total Station Surveyed

**GEOLOGICAL UNIT**

**SOIL:** Classification, colour, consistency/density, moisture, plasticity

**ROCK:** Weathering, colour, fabric, name, strength, cementation

**DESCRIPTION OF CORE**

0.0m: SILT, with some gravel, some rootlets; brown. Firm, wet, low plasticity

0.15m: Silty CLAY; light orange brown mottled dark orange brown. Stiff, moist, moderate plasticity

0.25m: pink mottling appears.

0.55m: Clayey SILT; brownish pink with light grey streaks. Firm to stiff, moist to wet, low to moderate plasticity

0.75m: SILT, with minor clay and trace fine sand; brownish pink with trace black streaks. Firm to stiff, moist to wet, high plasticity

0.96m: becomes trace clay, with some black carbonaceous streaks.

2.80m: becomes greyish brown with some black streaks.

3.95m: Silty CLAY; light brown. Firm to stiff, moist to wet, moderate plasticity

4.0m: Fine to medium SAND, some silt; brown, with black streaks. Medium dense, wet

**ROCK DEFECTS**

- **UW** (Under Water)
- **SW** (Sub Water)
- **MW** (Main Water)
- **HW** (High Water)
- **CW** (Critical Water)
- **ES** (Ejner Sorensen)
- **VS** (Vesicant Streak)
- **S** (Silt)
- **MS** (Minor Silt)
- **W** (Water)
- **VW** (Vacuum Water)
- **EW** (Ejner Water)

**Fluid Loss (%):**
- 25%
- 50%
- 75%

**Depth (m):**
- 0.0m
- 0.15m
- 0.55m
- 0.75m
- 3.95m
- 4.0m

**ROCK STRENGTH**

- **Sampling Method:** Core Recovery (%)
- **Testing**
- **Defect Log**

**DESCRIPTION & ADDITIONAL OBSERVATIONS**

**COMMENTS:** 50mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.
BOREHOLE LOG

BOREHOLE No.: BH9

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Wayby Valley

R.L. GROUND: 240.50m
R.L. COLLAR: 240.50m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

CONTRACTOR: McMillan Drilling

DESCRIPTION OF CORE

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

RQD (%)
Water Level
Fracture
Spacing (mm)

ROCK DEFECTS

Casing
Installation
Core Box No

GEOLOGICAL UNIT

5.0m: Fine to medium SAND, with some silt, brown with black streaks. Medium dense, wet

6.00m: Becomes dense

6.55m: Fine to medium SAND, minor silt; light brown to brown mottled orange brown. Dense, moist

7.1m: Sandy SILT; light brown. Very stiff, moist, low plasticity; Sand is fine

7.22m: Fine to medium SAND, trace silt; brown. Dense, moist

7.4m: Highly weathered to completely weathered, brown, fine to medium SANDSTONE. Extremely weak [Fine to medium SAND; brown. Very dense, moist]

7.8m: Highly weathered, brown-grey, fine to medium SANDSTONE. Extremely weak to weak

8.5m: Slightly weathered to moderately weathered, grey with bands of brown staining, fine to coarse grained SANDSTONE. Weak

8.75m: becomes brown.

9.8m: Highly weathered to moderately weathered, brown, fine SANDSTONE. Weak to very weak

COMMENTS:
50mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Wayby Valley

CO-ORDINATES: (NZTM2000) 5978793.64 mN 1742573.68 mE
DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 240.50m
R.L. COLLAR: 240.50m
DATUM: NZVD2016
SURVEY: Total Station/Surveyed

RQD (%)

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

GEOLOGICAL UNIT

DESCRIPTION OF CORE

RQD (%)

Water Level
Fracture
Spacing (mm)

Lugeon

RQD (%)

Fluid Loss (%)

Depth (m)

RQD (%)

Testing

Defect Log

COMMENTS: 50mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.

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50mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Wayby Valley

**CO-ORDINATES:**  
- **R.L. GROUND:** 240.50m  
- **R.L. COLLAR:** 240.50m  
- **SURVEY:** Total Station Surveyed  
- **DATUM:** NZVD2016

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°

**CONTRACTOR:** McMillan Drilling  
**SHEET:** 4 OF 10

**BOREHOLE No.:** BH9  
**START DATE:** 13/04/2018  
**FINISH DATE:** 20/04/2018

**DESCRIPTION OF CORE**

15.0m: Unweathered, grey Siltstone and fine Sandstone. Weak to moderately strong. Bedding is very thin to moderately thin, shallow dipping bedding planes.

16.6m: Unweathered, grey, fine to coarse Sandstone. Weak to moderately strong.

18.15m: Becomes slightly weathered, brown fine to medium Sandstone. Weak.

18.9m: Unweathered, grey, fine to coarse Sandstone. Weak to moderately strong.

**COMMENTS:** 50mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**BOREHOLE No.: BH9**

**PROJECT:** Auckland Regional Landfill

**JOB No.:** 1005069.1120

**LOCATION:** Wayby Valley

**COORDINATES:**
- R.L. GROUND: 240.50m
- R.L. COLLAR: 240.50m
- DATUM: NZVD2016

**SURVEY:** Total Station Surveys

**CONTRACTOR:** McMillan Drilling

**DATE:** 13/04/2018

**START DATE:** 13/04/2018

**FINISH DATE:** 20/04/2018

**SHEET:** 5 OF 10

**LOGGED BY:** OPRI

**CHECKED:** ALNA

**DRILLED BY:** Lei

### GEOLOGICAL UNIT

**SOIL:** Classification, colour, consistency / density, moisture, plasticity

**ROCK:** Weathering, colour, fabric, name, strength, cementation

### DESCRIPTION OF CORE

<table>
<thead>
<tr>
<th>Hole Depth</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.6m</td>
<td>Unweathered to slightly weathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>20.3m</td>
<td>Unweathered, grey, SILTSTONE, interbedded with some very thin to thin beds of fine to coarse SANDSTONE. Weak to moderately strong, shallow dipping bedding</td>
</tr>
<tr>
<td>20.7m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>23.7m</td>
<td>Unweathered, grey SILTSTONE, interbedded with some thin to moderately thin beds of fine to medium SANDSTONE. Weak to moderately strong, shallow dipping beds</td>
</tr>
</tbody>
</table>

### COMMENTS:

- 50mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.

---

**SCALE 1:25**

**REV. A**
23.7m [Cont’d]: Unweathered, grey Siltstone, interbedded with some thin to moderately thick beds of fine to medium Sandstone. Weak to moderately strong, shallow dipping beds.

25.6m: Unweathered, grey, fine to coarse Sandstone. Weak to moderately strong
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Wayby Valley

CO-ORDINATES:
R.L. GROUND: 240.50m
R.L. COLLAR: 240.50m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

DIRECTION:
ANGLE FROM HORIZ: 0°

ANGLE FROM HORIZ: -90°

ROCK DEFECTS

600
200
60
20
UW
SW
MW
HW
CW
ES
VS
S
MS
W
VW
EW

FLUID LOSS (%)

25
50
75

DESCRIPTION OF CORE

SOIL: Classification, colour, consistency/density, moisture, plasticity

ROCK: Weathering, colour, fabric, name, strength, cementation

DESCRIPTION & ADDITIONAL OBSERVATIONS

Casing Installation Core Box No.

Water Level Fracture Spacing (mm)

RQD (%) Testing

Core Box No.

Rock Weathering

Sampling Method Core Recovery (%)

Description

Testing

Defect Log

Core Recovery (%)

Rock Strength

Testing

Defect Log

Core Box No.

Lugeon

Shear Vane No. 2204. Presented shear vane readings have been corrected.

COMMENTS: 50mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.

50.6m [Cont'd]: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

30.30m: with minor gravel size clasts of SILTSTONE. Clasts are fine to medium gravel, sub-angular to sub-rounded.

30.9m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

31.00m: becomes fine to medium grained.

32.76m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

33.10m: with minor SILTSTONE clasts, clasts gravel sized, fine to medium, sub-angular to sub-rounded.

33.6m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

33.90m: fine to coarse grained.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Wayby Valley

**COORDINATES:** 5978793.64mN    1742573.68mE  
**R.L. GROUND:** 240.50m  
**R.L. COLLAR:** 240.50m  
**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Wayby Valley

**CONTRACTOR:** McMillan Drilling

**START DATE:** 13/04/2018  
**FINISH DATE:** 20/04/2018

---

### GEOLOGICAL UNIT

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Classification/colour</th>
<th>Rock Weathering</th>
<th>Core Box No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.9m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.01m</td>
<td>J, 10° dip, PL, R, W-M5, VN-N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.41m</td>
<td>J, 25° dip, UN, SM, W-M5, N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.70m</td>
<td>J, 75° dip, PL, R, W-M5, VN-N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.28m</td>
<td>J, 15° dip, UN, SM, W-M5, N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.51m</td>
<td>J, 20° dip, UN, R, W-M5, VN-N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.02m</td>
<td>J, 20° dip, UN, SL, W-M5, VN-N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.41m</td>
<td>J, 75° dip, PL, R, W-M5, VN-N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.80m</td>
<td>J, 10° dip, PL, R, W-M5, VN-N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.20m</td>
<td>J, 20° dip, UN, R, W-M5, VN-N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.98m</td>
<td>J, 10° dip, PL, R, W-M5, VN-N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39.02m</td>
<td>J, 20° dip, UN, SL, W-M5, VN-N, CV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39.30m</td>
<td>J, 75° dip, PL, R, W-M5, VN-N, CN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39.76m</td>
<td>J, 10° dip, UN, SL, W-M5, VN-N, CN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DESRIPTION OF CORE**

**SOIL:** Classification, colour, consistency / density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

**ROCK DEFECTS**

- **Casing Installation:**
  - Box 12, 35.6-38.1m
  - Box 13, 35.6-38.1m

**COMMENTS:** 50mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.

---

**SCALE:** 1:25  
**REV.:** A  
**NOTES:**

- 43.5mm I.D. piezometer, Shear Vane No. 2204.
- Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**BOREHOLE No.:** BH9

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Wayby Valley

**CO-ORDINATES:**
- NZTM2000
  - R.L. GROUND: 240.50m
  - R.L. COLLAR: 240.50m

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°

**R.L. GROUND:**  240.50m  
**R.L. COLLAR:** 240.50m  
**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Wayby Valley  
**JOB No.:** 1005069.1120

**CONTRACTOR:** McMillan Drilling

**SHEET:** 9 OF 10

**DRILLED BY:** Lei  
**LOGGED BY:** OPRI  
**CHECKED:** ALNA  
**START DATE:** 13/04/2018  
**FINISH DATE:** 20/04/2018

---

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>39.88m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>40.36m</td>
<td>Fine to coarse grained.</td>
</tr>
<tr>
<td>40.65m</td>
<td>Unweathered, interbedded grey SILTSTONE and grey, fine to coarse SANDSTONE. Weak to moderately strong, thin to moderately thin bedding, shallow dipping beds</td>
</tr>
<tr>
<td>42.44m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE, with minor fine to medium gravel size clasts of SILTSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>43.25m</td>
<td>Unweathered, interbedded grey SILTSTONE and grey, fine to coarse SANDSTONE. Weak to moderately strong, thin to moderately thin bedding, shallow dipping beds</td>
</tr>
</tbody>
</table>

**ROCK DEFECTS**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.16m</td>
<td>J, 20° dip, UN, SM, W-M, VN-N, CN</td>
</tr>
<tr>
<td>40.95m</td>
<td>J, 5° dip, UN, SM, W-M, N, CN (potentially drilling induced)</td>
</tr>
<tr>
<td>41.45m</td>
<td>DD, (Lot of fractures induced here from breaking into splits. All joints logged before breaking)</td>
</tr>
<tr>
<td>43.25m</td>
<td>J, 45° dip, UN, SL, W-M, VN-N, CV</td>
</tr>
<tr>
<td>43.84m</td>
<td>J, 10° dip, UN, SM, W-M, VN-N, CN</td>
</tr>
<tr>
<td>44.16m</td>
<td>J, 35° dip, UN, SL, W-M, VN-N, CN</td>
</tr>
</tbody>
</table>

**COMMENTS:**
- 50mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.
- Fluid Loss (%)
  - 25
  - 50
  - 75
PROJECT: Auckland Regional Landfill  
JOB No.: 1005069.1120  
LOCATION: Wayby Valley

CO-ORDINATES: 5978793.64 mN  
1742573.68 mE  

R.L. GROUND: 240.50m  
R.L. COLLAR: 240.50m  

DATUM: NZVD2016  
SURVEY: Total Station Surveyed

DIRECTION: 0°  
ANGLE FROM HORIZ.: -90°

PROJECT: Auckland Regional Landfill  
LOCATION: Wayby Valley  
JOB No.: 1005069.1120  

SOIL: Classification, colour, consistency/density, moisture, plasticity  
ROCK: Weathering, colour, fabric, name, strength, cementation

DESCRIPTION OF CORE

43.25m [Cont'd]: Unweathered, interbedded grey SILTSTONE and grey, fine to coarse SANDSTONE. Weak to moderately strong, thin to moderately thin bedding, shallow dipping beds

45.33m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

46.88m: with minor fine to medium gravel size clasts of SILTSTONE. Clasts are sub-angular to sub-rounded

47.3m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

49.5m: END OF BOREHOLE

COMMENTS: 50mm I.D. piezometer. Shear Vane No. 2204. Presented shear vane readings have been corrected.

CONTRACTOR: McMillan Drilling
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

BOREHOLE No.: BH10

DRILLED BY: Lei
LOGGED BY: DSA
CHECKED: ALNA
START DATE: 21/05/2018
FINISH DATE: 24/05/2018
CONTRACTOR: McMillan

CO-ORDINATES: 5978416.83 mN 1742247.40 mE

DIRECTION: 0°
ANGLE FROM HORIZ: -90°

R.L. GROUND: 183.50m
R.L. COLLAR: 183.50m

SURVEY: Total Station Surveyed
DATUM: NZVD2016

PROJECT: Auckland Regional Landfill
LOCATION: Refer site plan
JOB No.: 1005069.1120

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

GEOLOGICAL UNIT

DESCRIPTION OF CORE

0.0m: Silty fine SAND; brown minor black streaks and reddish brown and yellowish brown mottles. Loose, wet

1.0m: Sandy SILT; reddish brown, minor yellow brown and black streaks. Stiff to very stiff, wet, low plasticity. Sand is fine to medium

1.0m: No Recovery (core loss)

1.5m-2.0m: Push Tube

2.0m: Silty fine to medium SAND, trace fine gravel size pockets of whitish grey silt, minor reddish brown sandy SILT laminae from 2.35m; reddish pink. Loose, wet

2.4m: No Recovery (core loss)

2.45m: Sandy SILT; reddish brown and pink; minor black and light brownish grey mottles. Firm, saturated, low plasticity. Sand is fine to medium

3.0m-3.5m: Push Tube

3.5m: Sandy SILT; pinkish brown. Stiff, wet, low plasticity. Sand is fine.

3.7m: Fine SAND, minor silt; pinkish brown, minor black streaks. Loose, wet

3.95m: Sandy SILT; pinkish brown, black and light brownish grey mottles from 4.1m to 4.25m. Stiff, wet, low plasticity. Sand is fine

4.5m: Silty fine SAND; pinkish brown, some narrow to very narrow black streaks. Loose, wet

4.8m: Fine SAND, trace silt; light brown, minor black streaks. Loose, moist

3.52m: Narrow (4mm), black carbonaceous laminae, striated

COMMENTS: Shear vane No 111. Presented shear vane readings have been corrected. 50mm dia piezo installed on 25/5/2018
## BOREHOLE LOG

**BOREHOLE No.: BH10**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**  
(NZTM2000) 5978416.83 mN  
1742247.40 mE

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°

**R.L. GROUND:** 183.50m  
**R.L. COLLAR:** 183.50m

**SURVEY:** Total Station/Surveyed  
**DATE:** 21/05/2018

**CONTRACTOR:** McMillan

### DESCRIPTION OF CORE

**SOIL:** Classification, colour, consistency / density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0m</td>
<td>Fine SAND, trace to minor silt; light grey to light brown, minor black carbonaceous laminae and orange brown limonite staining. Medium dense, moist to wet</td>
</tr>
<tr>
<td>5.8 - 5.9m</td>
<td>Silty fine SAND</td>
</tr>
<tr>
<td>6.45m</td>
<td>No recovery (core loss)</td>
</tr>
<tr>
<td>6.8m</td>
<td>Fine SAND, minor silt; grey and light brown. Medium dense, wet</td>
</tr>
<tr>
<td>6.9m</td>
<td>Completely weathered, light brown, fine SANDSTONE. Extremely weak. Minor very narrow black carbonaceous streaks. [Fine SAND, trace silt; light brown, minor black streaks. Tightly packed, wet]</td>
</tr>
<tr>
<td>7.5m</td>
<td>No recovery (core loss)</td>
</tr>
<tr>
<td>7.7m</td>
<td>Recovered as fine SAND; light brown</td>
</tr>
<tr>
<td>7.8m</td>
<td>Completely weathered, light brown, fine to medium SANDSTONE. Extremely weak. Minor very narrow black carbonaceous streaks. [Fine SAND, trace silt; light brown, minor black streaks. Tightly packed, wet]</td>
</tr>
<tr>
<td>9.6m</td>
<td>Highly weathered, brown, fine to coarse SANDSTONE. Very weak</td>
</tr>
</tbody>
</table>

### DESCRIPTION OF ROCK DEFECTS

<table>
<thead>
<tr>
<th>Spacing (mm)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 36</td>
<td>Curved to Unusual</td>
</tr>
<tr>
<td>30 - 60</td>
<td>Unusual to RSL</td>
</tr>
<tr>
<td>60 - 120</td>
<td>RSL to SM</td>
</tr>
<tr>
<td>120 - 200</td>
<td>SM to R</td>
</tr>
<tr>
<td>200 - 400</td>
<td>R to VN</td>
</tr>
<tr>
<td>400 - 800</td>
<td>VN to UN</td>
</tr>
<tr>
<td>800 - 1600</td>
<td>UN to FeSt</td>
</tr>
<tr>
<td>1600 - 3200</td>
<td>FeSt</td>
</tr>
</tbody>
</table>

### COMMENTS

Shear vane No 111. Presented shear vane readings have been corrected. 50mm dia. piezo installed on 25/5/2018
## Borehole Log

### Geographical Data
- **PROJECT:** Auckland Regional Landfill
- **JOB No.:** 1005069.1120
- **LOCATION:** Refer site plan
- **Co-ordinates:**
  - (UTM Zone 50S)
  - NAD83
- **R.L. GROUND:** 183.50m
- **R.L. COLLAR:** 183.50m
- **DATUM:** NZVD2016
- **SURVEY:** Total Station Surveyed
- **DATUM:** NZVD2016
- ** prohibitively long header**

### Survey Details
- **DATE:** 21/05/2018
- **FINISH DATE:** 24/05/2018
- **CONTRACTOR:** McMillan

### Borehole Details
- **BOREHOLE No.:** BH10
- **SHEET:** 3 of 10
- **DRILLED BY:** Lei
- **LOGGED BY:** DSA
- **CHECKED:** ALNA
- **START DATE:** 21/05/2018
- **FINISH DATE:** 24/05/2018

### Geological Unit

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0m</td>
<td>No recovery (core loss)</td>
</tr>
<tr>
<td>10.5m</td>
<td>Highly weathered, brown, fine to coarse SANDSTONE. Very weak</td>
</tr>
<tr>
<td>11.95m</td>
<td>Moderately weathered, dark brown, fine to coarse SANDSTONE. Very weak to weak</td>
</tr>
<tr>
<td>12.8m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>13.22m</td>
<td>Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine gravel size clasts in fine to coarse sand matrix. Matrix supported</td>
</tr>
</tbody>
</table>

### Rock Defects

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.60m</td>
<td>J, 30° dip, UN, R, VN, yellowish br FeSt</td>
</tr>
<tr>
<td>10.62m</td>
<td>J, 55° dip, UN, SM, VN, yellowish br FeSt</td>
</tr>
<tr>
<td>10.72m</td>
<td>J, 5° dip, UN, R, VN, FeSt</td>
</tr>
<tr>
<td>10.80m</td>
<td>J, 20° dip, UN, R, VN, dark reddish brown FeSt</td>
</tr>
<tr>
<td>11.50m</td>
<td>J, 7° dip, to 85, curved to 90° dip from 11.1m, VCS, UN, R, VN, FeSt</td>
</tr>
<tr>
<td>11.55m</td>
<td>J, 10° dip, UN, R, VN, dark reddish brown FeSt</td>
</tr>
<tr>
<td>11.56m</td>
<td>J, 30° dip, UN, R, VN, FeSt</td>
</tr>
<tr>
<td>11.72m</td>
<td>J, 1.75m, BZ, Rec sandy f, &lt;s.p., lower contact 40, UN, SM, black st, FeSt</td>
</tr>
<tr>
<td>11.82m</td>
<td>J, 12.20m, J, VCS, 20-30° dip, UN, R, VN to N, FeSt, some infilled with brown sandy silt</td>
</tr>
<tr>
<td>12.00m</td>
<td>J, 20° dip, VCS, UN, SM to R, VN, FeSt, black specs</td>
</tr>
<tr>
<td>12.02m</td>
<td>J, 12.60m, J, VCS, 20-23° dip, UN, SM to R, VN, FeSt, black specs</td>
</tr>
<tr>
<td>12.06m</td>
<td>J, 20° dip, ExCS, UN, SM to R, VN, FeSt, FeSt &amp; ortho 70, UN, R, VN, FeSt</td>
</tr>
</tbody>
</table>

### Comments
- Shear vane No 111. Presented shear vane readings have been corrected. 50mm dia. piezo installed on 25/5/2018

### Rock Classification

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0m</td>
<td>To coarse SANDSTONE</td>
</tr>
<tr>
<td>10.5m</td>
<td>Fine to coarse SANDSTONE</td>
</tr>
<tr>
<td>11.95m</td>
<td>Fine to coarse SANDSTONE</td>
</tr>
<tr>
<td>12.8m</td>
<td>Fine to coarse SANDSTONE</td>
</tr>
<tr>
<td>13.22m</td>
<td>Fine to coarse SANDSTONE</td>
</tr>
<tr>
<td>14.10 - 14.14m</td>
<td>Fine to coarse SANDSTONE, minor fine gravel size clasts</td>
</tr>
<tr>
<td>14.08m</td>
<td>Fine to coarse SANDSTONE, minor fine gravel size clasts</td>
</tr>
<tr>
<td>14.60 - 14.70m</td>
<td>Fine to coarse SANDSTONE, minor fine gravel size clasts</td>
</tr>
</tbody>
</table>

### Additional Observations

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.5m</td>
<td>Highly weathered, brown, fine to coarse SANDSTONE. Very weak</td>
</tr>
<tr>
<td>11.95m</td>
<td>Moderately weathered, dark brown, fine to coarse SANDSTONE. Very weak to weak</td>
</tr>
<tr>
<td>12.8m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>13.22m</td>
<td>Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine gravel size clasts in fine to coarse sand matrix. Matrix supported</td>
</tr>
<tr>
<td>14.10 - 14.14m</td>
<td>Fine to coarse SANDSTONE, minor fine gravel size clasts</td>
</tr>
<tr>
<td>14.08m</td>
<td>Fine to coarse SANDSTONE, minor fine gravel size clasts</td>
</tr>
<tr>
<td>14.60 - 14.70m</td>
<td>Fine to coarse SANDSTONE, minor fine gravel size clasts</td>
</tr>
</tbody>
</table>

### Rock Strength

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Rock Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.60m</td>
<td>J, 30° dip, UN, R, VN, yellowish br FeSt</td>
</tr>
<tr>
<td>10.62m</td>
<td>J, 55° dip, UN, SM, VN, yellowish br FeSt</td>
</tr>
<tr>
<td>10.72m</td>
<td>J, 5° dip, UN, R, VN, FeSt</td>
</tr>
<tr>
<td>10.80m</td>
<td>J, 20° dip, UN, R, VN, dark reddish brown FeSt</td>
</tr>
<tr>
<td>11.50m</td>
<td>J, 7° dip, to 85, curved to 90° dip from 11.1m, VCS, UN, R, VN, FeSt</td>
</tr>
<tr>
<td>11.55m</td>
<td>J, 10° dip, UN, R, VN, dark reddish brown FeSt</td>
</tr>
<tr>
<td>11.56m</td>
<td>J, 30° dip, UN, R, VN, FeSt</td>
</tr>
<tr>
<td>11.72m</td>
<td>J, 1.75m, BZ, Rec sandy f, &lt;s.p., lower contact 40, UN, SM, black st, FeSt</td>
</tr>
<tr>
<td>11.82m</td>
<td>J, 12.20m, J, VCS, 20-30° dip, UN, R, VN to N, FeSt, some infilled with brown sandy silt</td>
</tr>
<tr>
<td>12.00m</td>
<td>J, 20° dip, VCS, UN, SM to R, VN, FeSt, black specs</td>
</tr>
<tr>
<td>12.02m</td>
<td>J, 12.60m, J, VCS, 20-23° dip, UN, SM to R, VN, FeSt, black specs</td>
</tr>
<tr>
<td>12.06m</td>
<td>J, 20° dip, ExCS, UN, SM to R, VN, FeSt, FeSt &amp; ortho 70, UN, R, VN, FeSt</td>
</tr>
</tbody>
</table>

### Testing

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Testing Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0m</td>
<td>No recovery (core loss)</td>
</tr>
<tr>
<td>10.5m</td>
<td>Highly weathered, brown, fine to coarse SANDSTONE</td>
</tr>
<tr>
<td>11.95m</td>
<td>Moderately weathered, dark brown, fine to coarse SANDSTONE</td>
</tr>
<tr>
<td>12.8m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE</td>
</tr>
<tr>
<td>13.22m</td>
<td>Unweathered, grey, CONGLOMERATE</td>
</tr>
<tr>
<td>14.10 - 14.14m</td>
<td>Fine to coarse SANDSTONE, minor fine gravel size clasts</td>
</tr>
<tr>
<td>14.08m</td>
<td>Fine to coarse SANDSTONE, minor fine gravel size clasts</td>
</tr>
<tr>
<td>14.60 - 14.70m</td>
<td>Fine to coarse SANDSTONE, minor fine gravel size clasts</td>
</tr>
</tbody>
</table>

### Core Box Details

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Core Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0m</td>
<td>Box 3, 8.0-11.2m</td>
</tr>
<tr>
<td>10.5m</td>
<td>Box 4, 11.2-14.1m</td>
</tr>
<tr>
<td>11.95m</td>
<td>Box 5, 14.1-17.0m</td>
</tr>
<tr>
<td>12.8m</td>
<td>Box 6, 17.0-20.0m</td>
</tr>
<tr>
<td>13.22m</td>
<td>Box 7, 20.0-23.0m</td>
</tr>
<tr>
<td>14.10 - 14.14m</td>
<td>Box 8, 23.0-26.0m</td>
</tr>
<tr>
<td>14.08m</td>
<td>Box 9, 26.0-29.0m</td>
</tr>
<tr>
<td>14.60 - 14.70m</td>
<td>Box 10, 29.0-32.0m</td>
</tr>
</tbody>
</table>

### Scale

- **Scale 1:25**
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

R.L. GROUND: 183.50m
R.L. COLLAR: 183.50m
DATUM: NZVD2016
SURVEY: Total Station

CONTRACTOR: McMillan

DESCRIPTION OF CORE

15.0m: Slightly weathered, grey and brown, fine to coarse SANDSTONE. Weak

15.76m: Lense of grey SILTSTONE

15.65m to 16.2m: Trace fine gravel size clasts

16.7m: Slightly weathered, grey and brown, fine to medium SANDSTONE. Weak

17.4m: Grades to slightly weathered, grey and brown, fine to coarse SANDSTONE. Weak

18.0m-18.35m: Minor fine to medium gravel size clasts

19.03 - 19.05m: Grey, SILTSTONE. Weak

19.05m: Unweathered, grey, fine to medium SANDSTONE, grading to fine carbonaceous SANDSTONE from 19.16m. Weak to moderately strong

19.25m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

19.40 - 19.50m: Trace fine gravel size clasts

19.5m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

COMMENTS:
Shear vane No 111. Presented shear vane readings have been corrected. 50mm dia. piezo installed on 25/5/2018
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>DESCRIPTION</th>
<th>ROCK WEATHERING</th>
<th>STRENGTH</th>
<th>SHEAR VANE</th>
<th>CEMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.5m</td>
<td>Unweathered, grey, fine to medium SANDSTONE, some pockets of fine to coarse SANDSTONE. Weak to moderately strong.</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20.21 - 20.22m: Carbonaceous fine SANDSTONE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20.22 - 20.25m: Calcite vein, VN, approx 90 deg dip</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.40m</td>
<td>Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine gravel size clasts in fine to coarse sand matrix. Matrix supported</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.65m</td>
<td>Grading to unweathered, grey to medium SANDSTONE. Weak to moderately strong</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.11m</td>
<td>Unweathered, grey, carbonaceous fine SANDSTONE, some thin (20mm to 50mm) beds of dark grey SILTSTONE. Weak to moderately strong</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.25 - 21.55m</td>
<td>Calcite vein, VN, approx 90 deg dip</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.50 - 22.02m</td>
<td>Calcite veins, VCS, VN, approx 70 to 90 deg dip</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.62m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.92 - 21.97m</td>
<td>Unweathered, grey, SILTSTONE</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.97m</td>
<td>Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine gravel size clasts in fine to coarse sand matrix. Matrix supported</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.10 - 22.50m</td>
<td>Calcite vein, VN, approx 80 deg dip</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.5m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.45 - 22.50m</td>
<td>Lense of SILTSTONE</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.5m</td>
<td>Unweathered interbedded grey fine SANDSTONE and dark grey SILTSTONE. Weak to moderately strong. Bedding is very thin to moderately thin (15mm to 110mm)</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.0m</td>
<td>Unweathered grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine gravel in fine to coarse sand matrix. Matrix supported.</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.13m</td>
<td>Grades to fine to coarse SANDSTONE.</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.18m</td>
<td>Unweathered, interbedded; grey, fine SANDSTONE and dark grey SILTSTONE. Weak to moderately strong. Beds are very thin (10mm) to moderately thin (140mm)</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.20 - 23.28m</td>
<td>Carbonaceous</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.53 - 23.65m</td>
<td>Fine to coarse SANDSTONE</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.0m</td>
<td>Unweathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine gravel in fine to coarse sand matrix</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.12m</td>
<td>SILTSTONE, some lenses of fine SANDSTONE and fine to coarse SANDSTONE. Weak to moderately strong</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.2m</td>
<td>Unweathered, grey, fine SANDSTONE. Weak to moderately strong</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.24 - 24.28m</td>
<td>Carbonaceous</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.64m</td>
<td>Unweathered, interbedded, grey carbonaceous fine SANDSTONE and dark grey SILTSTONE. Weak to moderately strong</td>
<td>CW</td>
<td>W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R.L. GROUND: 183.50m</th>
<th>R.L. COLLAR: 183.50m</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATUM: NZVD2016</td>
<td>SURVEY: Total Station/Surveyed</td>
</tr>
</tbody>
</table>

**COMMENTS:** Shear vane No 111. Presented shear vane readings have been corrected. 50mm dia. piezo installed on 25/05/2018

**DATE:** 25/05/2018

**CONTRACTOR:** McMillan
### BOREHOLE LOG

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**  
R.L. GROUND: 183.50m  
R.L. COLLAR: 183.50m  
SURVEY: Total Station Surveyed  
DATUM: NZVD2016

**DIRECTION:**  
ANGLE FROM HORIZ.: 0°

**DRILLED BY:** Lei  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**START DATE:** 21/05/2018  
**FINISH DATE:** 24/05/2018  
**CONTRACTOR:** McMillan

**BOREHOLE No.:** BH10

**SHEET:** 6 OF 10

**GEOLGICAL UNIT**

<table>
<thead>
<tr>
<th>Description of Core</th>
<th>RQD (%)</th>
<th>Water Level</th>
<th>Fracture Spacing (mm)</th>
<th>Fluid Loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOIL: Classification, colour, consistency / density, moisture, plasticity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROCK: Weathering, colour, fabric, name, strength, cementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**GEOLOGICAL SECTION**

- **25.0m:** Unweathered, interbedded grey fine SANDSTONE and dark grey SILTSTONE. Weak to moderately strong
- **25.35m:** Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong
- **25.5m:** Unweathered, interbedded, grey fine SANDSTONE and dark grey SILTSTONE. Weak to moderately strong. Siltstone beds are moderately thin (c. 80mm), sandstone beds are very thin (c. 20mm-60mm)
- **25.58m:** Unweathered, interbedded, grey fine SANDSTONE and dark grey SILTSTONE. Weak to moderately strong. Siltstone beds are moderately thin (c. 80mm), sandstone beds are very thin (c. 20mm-60mm)
- **26.50m:** J, 10° dip, UN, SM T-VN, CN
- **26.58m:** J, 15° dip, UN, SM T-VN, CN
- **26.88 - 26.90m:** Calcite vein, very narrow, approx 70 deg dip, stepped to 80 deg dip
- **27.1m:** J, 50° dip, UN, SL, VN, minor calcite
- **27.82m:** J, 10° dip, UN, SM, VN, faint striations [DD]

**COMMENTS:** Shear vane No 111. Presented shear vane readings have been corrected. 50mm dia. piezo installed on 25/5/2018

**Hole Depth**  
49.5m

**Scale 1:25**
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**GEOLOGICAL UNIT**

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>GEOLOGICAL UNIT</th>
<th>DESCRIPTION OF CORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SANDSTONE</td>
<td>Unweathered, grey, fine to coarse. Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td>30.0m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td>30.00m: DD, 0° dip</td>
</tr>
<tr>
<td></td>
<td>30.50m: Calcite vein, very narrow, approx 60 deg dip</td>
</tr>
<tr>
<td></td>
<td>30.88m: Unweathered, dark grey SILTSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td>31.06m: Unweathered, grey, fine SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td>31.06m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td>31.65 - 31.85m: Carbonaceous (minor black carbonaceous specs)</td>
</tr>
<tr>
<td></td>
<td>32.6m: Grading to fine to medium SANDSTONE</td>
</tr>
<tr>
<td></td>
<td>32.76m: Unweathered, grey, fine SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td>33.3m: Grades to unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td>33.81m: Unweathered, interbedded fine SANDSTONE and dark grey SILTSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td>34.05 - 34.50m: Calcite vein, very narrow, 50 deg dip</td>
</tr>
<tr>
<td></td>
<td>34.38m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td>34.55m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td></td>
<td>34.78m: Fine SANDSTONE</td>
</tr>
</tbody>
</table>

**COMMENTS:** Shear vane No 111. Presented shear vane readings have been corrected. 50mm dia. piezo installed on 25/5/2018
### GEOLOGICAL UNIT

#### DESCRIPTION OF CORE

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>SOIL: Classification, colour, consistency / density, moisture, plasticity</th>
<th>ROCK: Weathering, colour, fabric, name, strength, cementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>34.87m</td>
<td>Unweathered, grey, fine SANDSTONE. Weak to moderately strong.</td>
<td>35.05m: Lens of SILTSTONE</td>
</tr>
<tr>
<td>35.1m</td>
<td>Grades to fine to coarse SANDSTONE</td>
<td></td>
</tr>
<tr>
<td>35.3m</td>
<td>Unweathered, grey, fine to medium SANDSTONE, some lenses of fine to coarse SANDSTONE and dark grey siltstone. Weak to moderately strong</td>
<td>35.64 - 35.65m: Very thin bed of dark grey SILTSTONE</td>
</tr>
<tr>
<td>35.7m</td>
<td>Unweathered, grey to medium SANDSTONE, some lenses of fine to coarse SANDSTONE and dark grey siltstone. Weak to moderately strong</td>
<td>35.72 - 35.73m: Carbonaceous</td>
</tr>
<tr>
<td>35.8m</td>
<td>Grades to fine to coarse SANDSTONE, Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>36.0m</td>
<td>Calcite vein, very narrow, approx 50 deg dip</td>
<td></td>
</tr>
<tr>
<td>36.1m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE, minor fine to medium gravel size clasts. Weak to moderately strong</td>
<td>38.25 - 38.60m: Calcite vein, very narrow, approx 70 deg dip</td>
</tr>
<tr>
<td></td>
<td></td>
<td>38.60m: 60mm lense of dark grey to greenish grey SILTSTONE and smaller lense of dark grey SILTSTONE</td>
</tr>
</tbody>
</table>

#### COMMENTS:
Shear vane No 111. Presented shear vane readings have been corrected. 50mm dia. piezo installed on 25/5/2018
**DRILLED BY:** Lei  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**START DATE:** 21/05/2018  
**FINISH DATE:** 24/05/2018  
**CONTRACTOR:** McMillan

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

---

### BOREHOLE LOG

- **BH10**
- **R.L. GROUND:** 183.50m
- **R.L. COLLAR:** 183.50m
- **SURVEY:** Total Station/Surveyed
- **DATUM:** NZVD2016
- **PROJECT:** Auckland Regional Landfill
- **LOCATION:** Refer site plan
- **JOB No.:** 1005069.1120

### GEOLOGICAL UNIT

- **SOIL:** Classification, colour, consistency/density, moisture, plasticity
- **ROCK:** Weathering, colour, fabric, name, strength, cementation

### DESCRIPTION OF CORE

- **80.6m [Cont'd]:** Unweathered, grey, fine to coarse SANDSTONE, minor fine gravel size clasts, trace medium gravel size clasts. Weak to moderately strong

### ROCK DEFECTS

- **UW:** Unweathered
- **SW:** Slightly weathered
- **MW:** Moderately weathered
- **HW:** Heavily weathered
- **CW:** Completely weathered
- **ES:** Eruptive stock
- **VS:** Volcaniclastic sandstone
- **S:** Sandstone
- **MS:** Muddy sandstone
- **W:** Wavy sandstone
- **VW:** Very wavy sandstone
- **EW:** Extremely wavy sandstone

### Core Box No

- **Box 14, 38.6-41.2m**
- **Box 15, 41.2-43.9m**

### COMMENTS

- Shear vane No 111. Presented shear vane readings have been corrected. 50mm dia. piezo installed on 25/5/2018

---

**COMMENTS:** 50mm piezo installed on 25/5/2018
**BOREHOLE LOG**

**BOREHOLE No.: BH10**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**
- R.L. GROUND: 183.50m
- R.L. COLLAR: 183.50m
- SURVEY: Total Station
- DATUM: NZVD2016

**DRILLED BY:** Lei  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**START DATE:** 21/05/2018  
**FINISH DATE:** 24/05/2018  
**CONTRACTOR:** McMillan

**CO-ORDINATES:**
- 5978416.83 mN
- 1742247.40 mE

**DESCRIPTION OF CORE**

**SOIL:** Classification, colour, consistency / density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

**RQD (%)**

**Water Level**

**Fracture Spacing (mm)**

**Casing Installation**

**Core Box No.**

**ROCK DEFECTS**

- **UW**
- **SW**
- **MW**
- **HW**
- **CW**
- **ES**
- **VS**
- **S**
- **MS**
- **W**
- **VW**
- **EW**

**Fluid Loss (%)**

**Depth (m)**

**Graphical Log**

**RL (m)**

**Rock Strength**

**Testing**

**Defect Log**

**Sampling Method**

**Core Recovery (%)**

**Shear vane No 111. Presented shear vane readings have been corrected. 50mm dia. piezo installed on 25/5/2018**

**45.0m:** Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

**45.17m:** Unweathered, grey, fine SANDSTONE, grading to fine to medium SANDSTONE from 45.25m. Weak to moderately strong

**45.35:** Radius of gray SILTSTONE

**45.4m:** Grading to unweathered, grey, fine to coarse SANDSTONE, trace fine gravel size clasts of dark grey and green siltstone. Weak to moderately strong

**45.53m:** DD, 0° dip, Hammer break

**46.13m:** DD, 0° dip, to 10, Hammer break

**46.50m:** DD, 0° dip, to 5, Hammer break

**46.63m:** DD, 0° dip, to 20, Hammer break

**47.25m:** DD, 0° dip, Hammer break

**47.75m:** Calcite vein, very narrow, approx 50 deg dip

**47.85m:** DD, 0° dip, Hammer break

**47.95:** DD, 0° dip, to 20

**48.00m:** DD, 0° dip, to 20, Wavy, UN, SM, T, CN

**48.20m:** DD, 0° dip, to 20, Hammer break

**49.00m:** DD, 0° dip, to 10, Hammer break

**49.5m:** Target depth

**COMMENTS:** Scale 1:25  
**REV.: A**

Shear vane No 111. Presented shear vane readings have been corrected. 50mm dia. piezo installed on 25/5/2018
Borehole No.: BH11

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

R.L. GROUND: 129.23m
R.L. COLLAR: 129.23m
DATUM: NZVD2016
SURVEY: Total Station/Surveyed

START DATE: 27/03/2018
FINISH DATE: 04/04/2018
CONTRACTOR: McMillan Drilling

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

RQD (%)
Water Level
Fracture Spacing (mm)

Fluod Loss (%)

Depth (m)

Tortion
Core Recovery (%)
Testing
Defect Log

0.0m: Sandy SILT, some roots; brown mottled dark brown. Stiff, moist, low plasticity

0.2m: SILT, trace fine sand, trace clay, minor roots; yellowish brown, minor black specs, trace orange brown mottles. Stiff, moist, moderate plasticity
0.35m: Minor to some black specs

0.9m: Becomes yellowish brown mottled light pinkish red. Very stiff, moist, high plasticity

1.2m: SILT, minor fine sand, trace rootlets, light red, minor yellowish brown and white mottles. Very stiff, moist, high plasticity

1.6m: Light pink mottled yellowish brown and greyish white, trace light red mottles. Stiff, wet, high plasticity

2.1m: Silty fine SAND, becoming fine SAND, minor silt from 2.2m, trace rootlets; light pink to reddish pink, trace orange brown mottles. Loose, saturated.
2.45m: Silty fine SAND, wet

2.65m: No recovery (core loss)

3.0m: Silty fine SAND, trace rootlets; light pink to reddish pink, some orange brown mottles. Loose, wet

3.35m: No recovery (core loss)

3.45m: Silty fine SAND, some pockets of fine SAND, minor silt, trace roots; pink, minor whitish grey, orange brown and reddish brown mottles. Loose, wet

3.6m-3.65: Yellowish brown, black and whitish grey mottles

3.6m: No recovery (core loss)

4.35m: No recovery (core loss)

4.5m: Silty fine SAND, trace roots; light pink, minor orange brown, whitish grey and reddish brown mottles, trace black specs. Loose, wet
4.50 - 4.65m: Sandy SILT

4.8m: No recovery (core loss)

Comments: 50mm diameter piezometer installed on Fri 6 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES:
NZTM2000
E: 1741185.81m
N: 597561.53m

DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 129.23m
R.L. COLLAR:

SURVEY: Total Station Surveyed
DATUM: NZVD2016

PROJECT: Auckland Regional Landfill
LOCATION: Refer site plan
JOB No.: 1005069.1120

LOGGED BY: DSA
CHECKED: ALNA
START DATE: 27/03/2018
FINISH DATE: 04/04/2018
CONTRACTOR: McMillan Drilling

SHEET: 2 OF 10

BOREHOLE No.: BH11

DESCRIPTION OF CORE

5.0m: Silty fine SAND, trace rootlets; light pink, trace orange brown and greyish white mottles. Loose, saturated

5.2m: No recovery (core loss)

5.7m: Sandy SILT, trace rootlets; pinkish red, trace orange brown and greyish white mottles. Firm, wet to saturated, low plasticity

5.95m: Orange brown, minor pink and light grey mottles

6.5m: Push Tube

6.5m: Sandy SILT, trace rootlets; orange brown. Stiff, wet, non plastic to low plasticity

6.7m: Becomes SILT, minor fine sand; light grey, minor light pink and orange brown mottles, trace black specs

6.95m: Sandy SILT; dark brown mottled black. Firm, saturated, non plastic to low plasticity

7.15m: SILT, minor fine sand, trace rootlets; orange brown, mottled light pink. Stiff, wet, low plasticity

7.25m: Silty fine SAND; light pink. Loose, wet

7.35m Sandy SILT; light brownish grey mottled orange brown. Very stiff, wet, low plasticity

7.5m-8.0m: Push Tube

8.0m: Silty fine SAND; light yellowish brown mottled black. Loose, wet

8.35m: SILT, minor fine sand; orange brown mottled light grey. Stiff to very stiff, low plasticity

8.45m: Sandy SILT; brown minor orange brown and black mottles. Firm, saturated, low plasticity

8.6m: SILT, some fine sand, light brown mottled light grey and dark reddish brown. Stiff to very stiff, moist to wet, non plastic to low plasticity

8.80 - 8.85m: Sandy SILT; brown minor black mottles

8.95 - 9.05m: Sandy SILT; Orange brown

9.12m: Fine SAND; trace to minor silt; grey, minor orange brown mottles. Medium dense, wet

9.10m: Pocket of SILT; light whitish grey

9.45m: No recovery (core loss)

COMMENTS: 50mm diameter piezometer installed on Fri 6 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
### General Log - 5/04/2019 11:16:52 a.m. - Produced with Core-GS by GeRoc v3.2g

**DRILLED BY:** Craig & Peter  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**START DATE:** 27/03/2018  
**FINISH DATE:** 04/04/2018  
**CONTRACTOR:** McMillan Drilling  
**SHEET:** 3 OF 10  

**BOREHOLE No.:** BH11  
**R.L. GROUND:** 129.23m  
**R.L. COLLAR:** 129.65m  
**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016  
**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer site plan  
**JOB No.:** 1005069.1120  

#### Geographical Limit

- **SOIL:** Classification, colour, consistency / density, moisture, plasticity  
- **ROCK:** Weathering, colour, fabric, name, strength, cementation

#### Description of Core

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0m</td>
<td>No recovery (core loss)</td>
</tr>
<tr>
<td>10.5m</td>
<td>Fine SAND, trace to minor silt; grey minor brown and orange brown mottles. Medium dense, wet</td>
</tr>
<tr>
<td>11m</td>
<td>Fine SAND, minor silt; brownish grey, mottled brown and orange brown. Medium dense, wet</td>
</tr>
<tr>
<td>11.95m</td>
<td>SILT, minor clay, trace fine sand; orange brown, becoming grey mottled light brownish grey from 11.98m. Stiff, wet, low to moderate plasticity</td>
</tr>
<tr>
<td>12.4m</td>
<td>SILT, minor fine sand; orange brown. Very stiff to hard, wet, non plastic [fissile]</td>
</tr>
<tr>
<td>12.5m</td>
<td>Highly weathered, light grey, SILTSTONE. Extremely weak [SILT, minor fine sand, very stiff to hard, moist, low plasticity]</td>
</tr>
<tr>
<td>12.61m</td>
<td>Grey becoming brown from 12.68m</td>
</tr>
<tr>
<td>12.72 - 12.80m</td>
<td>Fine SANDSTONE</td>
</tr>
<tr>
<td>12.9m</td>
<td>Moderately weathered, brown, fine SANDSTONE. Very weak</td>
</tr>
<tr>
<td>13.03 - 13.07m</td>
<td>Trace black specs</td>
</tr>
<tr>
<td>13.18 - 13.25m</td>
<td>Fine to medium SANDSTONE</td>
</tr>
<tr>
<td>13.25m</td>
<td>Moderately weathered grey SILTSTONE. Very weak, strongly cemented</td>
</tr>
<tr>
<td>13.5m</td>
<td>Moderately weathered, brown fine SANDSTONE. Extremely weak to very weak</td>
</tr>
<tr>
<td>13.75m</td>
<td>Brown, fine to medium SANDSTONE</td>
</tr>
<tr>
<td>13.9m</td>
<td>Moderately weathered, grey SILTSTONE. Very weak</td>
</tr>
<tr>
<td>13.96m</td>
<td>Moderately weathered, brown, fine SANDSTONE, grading to fine to coarse SANDSTONE from 14.1m. Very weak</td>
</tr>
<tr>
<td>14.7m</td>
<td>Slightly weathered, grey and brown, fine to medium SANDSTONE. Very weak to weak</td>
</tr>
</tbody>
</table>

#### Geological Unit

- **SOIL: Classification, colour, consistency / density, moisture, plasticity**
- **ROCK: Weathering, colour, fabric, name, strength, cementation**

#### Rock Weathering

- Description & Additional Observations

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description &amp; Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.93 - 11.95m</td>
<td>J, Limonite cemented, dark reddish brown mottled orange brown and black</td>
</tr>
<tr>
<td>12.40m</td>
<td>J, 2° dip, UN, SL, VN, Black st</td>
</tr>
<tr>
<td>12.45m</td>
<td>J, 60° dip, UN, SL, VN, Black st, faint striations</td>
</tr>
<tr>
<td>12.45 - 12.50m</td>
<td>J, 60° dip, UN, SL, VN, Black st, faint striations</td>
</tr>
<tr>
<td>12.72 - 12.80m</td>
<td>Box 3, 7.1-11.1m</td>
</tr>
<tr>
<td>13.05 - 13.07m</td>
<td>J, VCS, 0 to 20, UN, SM, VN, FeSt</td>
</tr>
<tr>
<td>13.25m</td>
<td>B, 5° dip, UN, SM, VN, FeSt, reddish brown fine sand</td>
</tr>
<tr>
<td>13.40m</td>
<td>J, Orthog, 40, UN, SM, VN, FeSt</td>
</tr>
<tr>
<td>13.45 - 13.50m</td>
<td>J, Orthog, 10 and 90, UN, SM, VN, FeSt</td>
</tr>
<tr>
<td>13.75m</td>
<td>Box 4, 11.1-13.5m</td>
</tr>
<tr>
<td>13.90m</td>
<td>B, 8° dip, UN, SM, VN, FeSt</td>
</tr>
<tr>
<td>13.93 m</td>
<td>J, Orthog, 10 and 90, UN, SM, VN, FeSt</td>
</tr>
<tr>
<td>14.00 - 14.10m</td>
<td>J, 0° dip, UN, SM to R, VN, FeSt</td>
</tr>
<tr>
<td>14.05m</td>
<td>J, 90° dip, UN, SM, VN, FeSt</td>
</tr>
<tr>
<td>14.05m</td>
<td>DD</td>
</tr>
<tr>
<td>14.10m</td>
<td>J, Orthog, 10 and 90, UN, SM, VN, FeSt</td>
</tr>
<tr>
<td>14.33m</td>
<td>J, Orthog, 10 and 90, UN, SM, VN, FeSt</td>
</tr>
<tr>
<td>14.35m</td>
<td>J, 75° dip, PL, R, T - VN, Black st</td>
</tr>
<tr>
<td>14.70m</td>
<td>J, UN, SL, N, FeSt</td>
</tr>
<tr>
<td>14.80 - 14.90m</td>
<td>J, 10° dip, VCS, UN, SM, VN, FeSt</td>
</tr>
</tbody>
</table>

#### Rock Defects

- **Type:** Fluid Loss (%)
- **Description:**
- **Additional Observations:**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Type</th>
<th>Description</th>
<th>Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.5m</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.0m</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.5m</td>
<td>75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Hole Depth

- **SPT @ 10.5m:**
- **SPT @ 11.0m:**
- **SPT @ 11.5m:**
- **SPT @ 12.0m:**
- **SPT @ 12.5m:**
- **SPT @ 13.0m:**
- **SPT @ 13.5m:**
- **SPT @ 14.0m:**
- **SPT @ 14.5m:**
- **SPT @ 15.0m:**

#### Comments

- **50mm diameter piezometer installed on Fri 6 April 2018.**
- **Shear Vane No. 649.**
- **Presented shear vane readings have been corrected.**

---

**Scale:** 1:25

**Hole Depth:** 49.5m

**Rev.: A**
Borehole No.: BH11

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

DESCRIPTION OF CORE

20.0m. Slightly weathered, grey, CONGLOMERATE. Weak to moderately strong. Conglomerate is fine to medium gravel in a fine to coarse sand matrix. Matrix supported.

20.2m. Slightly weathered grey fine to medium SANDSTONE. Weak to moderately strong

20.8m. Slightly weathered, grey, fine to medium SANDSTONE. Weak to moderately strong

21.6m. Grading to CONGLOMERATE. Conglomerate is fine to medium gravel in a fine to coarse sand matrix. Matrix supported.

21.75m. Slightly weathered, grey, fine to medium SANDSTONE. Weak to moderately strong

22.7m. Unweathered to slightly weathered, dark grey, fine to medium SANDSTONE. Very weak to weak

22.75m. Unweathered to slightly weathered, grey, fine to medium SANDSTONE. Weak

23.47 - 23.50m: Dark grey, fine grained carbonaceous SANDSTONE. Weak to moderately strong

23.50 - 23.55m: Dark grey, fine to medium SANDSTONE. Minor small (1cm) lenses of grey SILTSTONE. Very weak to weak

24.00 - 24.20m: Grey, fine to coarse SANDSTONE

24.6 - 25.0m: Grey, fine to coarse SANDSTONE

COMMENTS: 50mm diameter piezometer installed on Fri 6 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 5977561.53 mN 1741185.81 mE

R.L. GROUND: 129.23m
R.L. COLLAR:

DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

SURVEY: Total Station Surveyed
DATUM: NZVD2016

CONTRACTOR: McMillan Drilling

BOREHOLE No.: BH11
SHEET: 6 OF 10

START DATE: 27/03/2018
FINISH DATE: 04/04/2018

DESCRIPTION OF CORE

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

GEOLOGICAL UNIT

ROCK DEFECTS

25.0m: Unweathered grey, fine to medium SANDSTONE. Weak to moderately strong

26.05-26.1m: Grey, fine to medium, carbonaceous SANDSTONE

26.1m: Grading to grey fine to coarse SANDSTONE

27.0m: Unweathered, grey, fine to coarse Sandstone. Weak to moderately strong.

27.50 - 27.55m: Dark grey

26.55m: Unweathered, dark grey, SILTSTONE. Weak to moderately strong

27.65m: Unweathered, fine grading from 27.75m to fine to medium, grey SANDSTONE

27.85m: Unweathered dark grey SILTSTONE. Weak to moderately strong

28.05m: Unweathered grey fine SANDSTONE, becoming fine to coarse from 28.2m Weak to moderately strong

28.10 - 28.16m: carbonaceous

29.0m: Unweathered grey fine to coarse SANDSTONE. Weak to moderately strong

COMMENTS:
50mm diameter piezometer installed on Fri 6 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
### BOREHOLE LOG

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**LOCATION:**  
**SCALE:** 1:25

**CO-ORDINATES:**  
Natural Grid (NZTM2000)  
X: 5977561.53 mN  
Y: 1741186.81 mE

**DIRECTION:**  
0°  
**ANGLE FROM HORIZ.:** -90°

**R.L. GROUND:** 129.23m  
**R.L. COLLAR:** 129.23m  
**DATUM:** NZVD2016  
**SURVEY:** Total Station Surveyed

**START DATE:** 27/03/2018  
**FINISH DATE:** 04/04/2018  
**CONTRACTOR:** McMillan Drilling

### DESCRIPTION OF CORE

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Rock Weathering</th>
<th>Sampling Method</th>
<th>Core Recovery (%)</th>
<th>Rock Strength</th>
<th>Tearing</th>
<th>R.L. (m)</th>
<th>Core Box No.</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.0m</td>
<td>Unweathered grey fine to coarse SANDSTONE. Weak to moderately strong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.5m</td>
<td>Unweathered grey fine to medium SANDSTONE. Weak to moderately strong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.4m</td>
<td>Slightly weathered , grey and brown fine to medium SANDSTONE. Very weak</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.5m</td>
<td>No recovery (core loss)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.5m</td>
<td>Unweathered grey fine to coarse SANDSTONE. Weak to moderately strong</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### ROCK DEFECTS

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description &amp; Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.0m</td>
<td>J, 15° dip, UN, SM, T, minor FeSt</td>
</tr>
<tr>
<td>31.0m</td>
<td>J, 70° dip, VCS, 70 to 90, UN, SM to SL, VN, dark brown and black FeSt</td>
</tr>
<tr>
<td>31.45m</td>
<td>J, 70° dip, PL, R, T-VN, CN</td>
</tr>
<tr>
<td>31.62m</td>
<td>J, 0° dip, UN, SM, T-VN, minor FeSt</td>
</tr>
<tr>
<td>31.90m</td>
<td>J, 70° dip, PL, R, T-CN</td>
</tr>
<tr>
<td>32.00m</td>
<td>J, 90° dip, UN, SM, T-VN, FeSt</td>
</tr>
<tr>
<td>32.00m</td>
<td>J, VCS, Orthogonal, 40-60, UN, SM-R, T-VN, FeSt</td>
</tr>
<tr>
<td>32.20m</td>
<td>J, VCS, 60-90, orthog, PL, R, to UN, R, T-VN, FeSt</td>
</tr>
<tr>
<td>32.40m</td>
<td>J, ExCS, 60-90, orthog, PL, R, to UN, R, T-VN, FeSt</td>
</tr>
<tr>
<td>32.65m</td>
<td>J, 75° dip, BZ, Rec f-c ang gvl</td>
</tr>
<tr>
<td>32.75m</td>
<td>J, 33.00m, J, VCS, 40-90, orthog, PL, R, to UN, R, T-VN, FeSt</td>
</tr>
<tr>
<td>33.10m</td>
<td>J, 80° dip, UN, SM, VN, FeSt</td>
</tr>
<tr>
<td>33.12m</td>
<td>J, 80° dip, UN, SM, VN, FeSt</td>
</tr>
<tr>
<td>33.40m</td>
<td>J, VCS to ExCS, 60-90, UN, SM to SL, VN to N, brown silt infill, FeSt, trace stratiations</td>
</tr>
<tr>
<td>33.95m</td>
<td>J, 90° dip, UN, SM, VN, FeSt</td>
</tr>
<tr>
<td>34.05m</td>
<td>J, 80° dip, UN, SM, VN, orthog 50, UN, SM, VN, straited</td>
</tr>
<tr>
<td>34.10m</td>
<td>J, 24.5m, BZ, ExCS, UN, SM to SL, FeSt, Rec as f-c gvl</td>
</tr>
<tr>
<td>34.30m</td>
<td>J, 70° dip, ExCS, UN, SM, VN-N, grey silty clay, FeSt</td>
</tr>
<tr>
<td>34.35m</td>
<td>J, 70° dip, ExCS, UN, SM, VN, brown silt, FeSt</td>
</tr>
</tbody>
</table>

**DATUM:** NZVD2016  
**R.L. COLLAR:** 129.23m  
**SURVEY:** Total Station Surveyed

**LOCATION:** Refer site plan  
**PROJECT:** Auckland Regional Landfill  
**UW Pakiri**

**CONTRACTOR:** McMillan Drilling  
**DRILLED BY:** Craig & Peter  
**LOGGED BY:** DSA  
**CHECKED:** ALNA  
**START DATE:** 27/03/2018  
**FINISH DATE:** 04/04/2018

**SHEET:** 7 OF 10

**REMARKS:** Shear Vane No. 649. Presented shear vane readings have been corrected.
## BOREHOLE LOG

### DESCRIPTION OF CORE

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Feature Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.0m</td>
<td>Unweathered grey fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>35.1m</td>
<td>No recovery (core loss) (Inferred shear zone)</td>
</tr>
<tr>
<td>36.0m</td>
<td>Unweathered grey fine to coarse SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>37.5m-37.80m</td>
<td>Carbonaceous</td>
</tr>
<tr>
<td>37.9m</td>
<td>Interbedded grey fine to medium SANDSTONE and SILTSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>38.5m</td>
<td>Unweathered grey fine to medium SANDSTONE. Minor thin to moderately thin beds of dark grey SILTSTONE. Weak to moderately strong</td>
</tr>
</tbody>
</table>

### ROCK DEFECTS

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Defect</th>
<th>RQD (%)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.00 - 35.10m</td>
<td>J, 70° dip</td>
<td>39</td>
<td>BZ, Rec f-c Gale</td>
</tr>
<tr>
<td>35.60 - 36.20m</td>
<td>J, 70° dip, ExCS, UN, SM to ST, SM, VN, Feil, minor striations</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>36.20 - 36.50m</td>
<td>J, -80° dip, UN, R, T, CN</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>36.50m</td>
<td>DD, 10° dip</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>36.70m</td>
<td>DD, 30° dip</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>36.80 - 37.50m</td>
<td>J, 80° dip, UN, SM, T, CN</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>37.45m</td>
<td>J, Orthog, 40 to 80, PL, R to UN, SM, T, CN</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>37.50m</td>
<td>B, 15° dip, UN, SM, VN</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>37.65m</td>
<td>J, 60° dip, UN, R, T, CN</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>37.64m</td>
<td>J, -60° dip, UN, R, T, CN</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>37.70m</td>
<td>J, 5° dip, UN, SM, T-VN, grey fine sand</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>37.90m</td>
<td>B, 2° dip, UN, SM, T-VN, CN</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>38.05 - 38.96m</td>
<td>BZ, Upper &amp; lower contact is PL, SL, VN, grey silty clay and dark grey sandy silt</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>38.06m</td>
<td>B, 0° dip, UN, SL to SM, T-VN, CN</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>38.14 - 38.22m</td>
<td>ExCS, UN, SL to SM, VN, CN</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>38.22 - 38.38m</td>
<td>J, 90° dip, VCS &amp; Orthog, 50, UN, SM, T, CN</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>38.42m</td>
<td>J, 90° dip, UN, SM, T, CN</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>38.45m</td>
<td>J, 70° dip, UN, SM, T, CN</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>38.50 - 38.80m</td>
<td>J, 70° dip, VCS, PL, R to UN, SL, T-VN, CN</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>38.80m</td>
<td>J, 0° dip, UN, SL to ST, SL, T, CN &amp; Orthog, 20, UN, SM, VN, grey silt</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>38.82m</td>
<td>J, 0° dip, UN, R, T, CN</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>38.82 - 39.00m</td>
<td>J, 80° dip, UN, SL, T-VN, CN</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>38.90m</td>
<td>J, 5° dip, UN, SM, VN, grey silt</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>39.10m</td>
<td>J, 0° dip, UN, SM, VN, grey silt</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>39.22 - 39.27m</td>
<td>BZ, Rec f-c Gale, upper contact UN, SM, VN, brown FeSt</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>39.75m</td>
<td>J, 0°, PL, R, T, VN, CN</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>39.85m</td>
<td>DD, 0° dip, UN, R, T, CN</td>
<td>39</td>
<td></td>
</tr>
</tbody>
</table>

### COMMENTS

- Scale: 0.25mm
- Hole Depth: 45.9m
- Start Date: 27/03/2018
- Drilled By: Craig & Peter
- Job No.: 1005069.1120
- Location: Refer site plan

Shear Vane No. 649. Presented shear vane readings have been corrected.
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description of Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.0m</td>
<td>Unweathered fine to coarse grained SANDSTONE, some thin beds of dark grey SILTSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>40.6m</td>
<td>Interbedded grey fine to medium SANDSTONE and dark grey SILTSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>41.1m</td>
<td>Unweathered grey fine to medium SANDSTONE, minor thin beds of dark grey SILTSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>42.5-42.55m</td>
<td>Fine to coarse SANDSTONE</td>
</tr>
<tr>
<td>42.9m</td>
<td>Unweathered dark grey SILTSTONE, some thin beds of fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>43.22m</td>
<td>Unweathered grey fine to medium SANDSTONE, minor thin beds of dark grey SILTSTONE. Weak to moderately strong</td>
</tr>
</tbody>
</table>

**Rock Weathering**
- UW Pakiri
- 49.5m

**Geological Unit**
- Soil: Classification, colour, consistency / density, moisture, plasticity
- Rock: Weathering, colour, fabric, name, strength, cementation

**Rock Defects**
- RQD (%)
- Defect Log
- Additional Observations

**Co-ordinates**
- NZTM2000
- Scale 1:25

**R.L. Ground:** 129.23m

**Notes:**
- Sampling Method
- Core Box No
- Core Recovery (%)
- Fluid Loss (%)
- Testing
- Corrected Shear Vane readings

**Contractor:** McMillan Drilling
BOREHOLE NO.: BH11

DESCRIPTION OF CORE

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

43.22m (Cont’d): Unweathered grey fine to medium SANDSTONE, minor thin beds of dark grey SILTSTONE. Weak to moderately strong

45.65m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

46.75m: Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong

49.5m: Target depth

COMMENTS: 50mm diameter piezometer installed on Fri 6 April 2018. Shear Vane No. 649. Presented shear vane readings have been corrected.
### BOREHOLE LOG

**BOREHOLE No.:** BH12  
**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**
- R.L. GROUND: 106.44m  
- R.L. COLLAR: 106.44m  
- DATUM: NZVD2016

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°  
**SURVEY:** Total Station Surveyed

**START DATE:** 13/03/2018  
**FINISH DATE:** 20/03/2018  
**CONTRACTOR:** McMillan Drilling

#### GEOLOGICAL UNIT

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
<th>Core Recovery</th>
<th>Fluid Loss</th>
<th>Core Box No</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0m</td>
<td>Sandy SILT, some roots; brown. Firm, moist, moderate plasticity</td>
<td>100%</td>
<td>25%</td>
<td>1/1</td>
</tr>
<tr>
<td>0.05m</td>
<td>Silty CLAY; brownish grey. Firm, moist, high plasticity</td>
<td>100%</td>
<td>50%</td>
<td>1/1</td>
</tr>
<tr>
<td>0.3m</td>
<td>CLAY, some silt, light grey mottled orange brown. Firm, moist, high plasticity</td>
<td>100%</td>
<td>75%</td>
<td>1/1</td>
</tr>
<tr>
<td>1.3m</td>
<td>No recovery (core loss)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5m</td>
<td>CLAY, some silt, light grey mottled orange brown. Firm, moist, high plasticity</td>
<td>100%</td>
<td>25%</td>
<td>1/1</td>
</tr>
<tr>
<td>2.45m</td>
<td>Silty CLAY, trace gravel; red and brown. Firm, moist, high plasticity. Gravel, fine, angular</td>
<td>100%</td>
<td>50%</td>
<td>1/1</td>
</tr>
<tr>
<td>2.85m</td>
<td>No Recovery (core loss)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0m</td>
<td>Silty CLAY, some fine sand, trace gravel; dark reddish brown. Gravel, fine, angular</td>
<td>100%</td>
<td>75%</td>
<td>1/1</td>
</tr>
<tr>
<td>3.30m</td>
<td>Orange brown. Wet</td>
<td>100%</td>
<td>25%</td>
<td>1/1</td>
</tr>
<tr>
<td>3.9m</td>
<td>Sandy SILT, some clay; light pink mottled light grey. Soft to firm, moist, low to moderate plasticity. Sand, fine</td>
<td>100%</td>
<td>50%</td>
<td>1/1</td>
</tr>
<tr>
<td>4.45m</td>
<td>Sandy SILT, minor gravel; reddish grey. Soft to firm, moist, low plasticity. Sand, fine. Gravel, fine to medium, sub angular</td>
<td>100%</td>
<td>25%</td>
<td>1/1</td>
</tr>
</tbody>
</table>

**SOIL:** Classification, colour, consistency / density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>Core Box No</th>
<th>Description &amp; Additional Observations</th>
<th>Fluid Loss (%)</th>
<th>Water Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/1</td>
<td></td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>1/1</td>
<td></td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>1/1</td>
<td></td>
<td>75</td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:** 50mm I.D. piezometer. Shear vane No. 2204. Presented shear vane readings have been corrected

**Piezometer Measurements:**
- 2.70 m: Orange brown. Wet
- 3.9 m: Orange brown. Wet

**Testing:**
- Residual Soil
- HQTT
- SPT
- PT

**Rock Weathering:**
- 0% to 90%

**Water Level:**
- 0.0 m: Sandy SILT, some roots; brown. Firm, moist, moderate plasticity
- 0.05 m: Silty CLAY; brownish grey. Firm, moist, high plasticity
- 0.3 m: CLAY, some silt, light grey mottled orange brown. Firm, moist, high plasticity
- 1.3 m: No recovery (core loss)
- 1.5 m: CLAY, some silt, light grey mottled orange brown. Firm, moist, high plasticity
- 2.45 m: Silty CLAY, trace gravel; red and brown. Firm, moist, high plasticity. Gravel, fine, angular
- 2.85 m: No Recovery (core loss)
- 3.0 m: Silty CLAY, some fine sand, trace gravel; dark reddish brown. Gravel, fine, angular
- 3.3 m: Orange brown. Wet
- 3.9 m: Sandy SILT, some clay; light pink mottled light grey. Soft to firm, moist, low to moderate plasticity. Sand, fine
- 4.45 m: Sandy SILT, minor gravel; reddish grey. Soft to firm, moist, low plasticity. Sand, fine. Gravel, fine to medium, sub angular

**Defects:**
- HW
- SW
- ES
- W
- VW
- EW

**RQD (%):**
- Water Level
- Fracture Spacing (mm)
- Rock Strength

**Sampling Method:**
- Core Recovery (%)

**Testing:**
- Residual Soil
- HQTT
- SPT
- PT

**PIEZOMETERS:**
- Tsoil Residual Soil

**Scale:** 1:25

**Rev.: A**
## BOREHOLE LOG

### BH12

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan  
**DRILLED BY:** Malcolm and Jaz  
**LOGGED BY:** OPRI  
**CHECKED:** ALNA  
**START DATE:** 13/03/2018  
**FINISH DATE:** 20/03/2018  
**CONTRACTOR:** McMillan Drilling

### Coordinates
- **R.L. GROUND:** 106.44m  
- **R.L. COLLAR:** 106.44m  
- **SURVEY:** Total Station/Surveyed  
- **DATUM:** NZVD2016  
- **PROJECT:** Auckland Regional Landfill  
- **LOCATION:** Refer site plan  
- **JOB No.:** 1005069.1120  
- **COORDINATES:**  
  - **DIRECTION:** 0°  
  - **ANGLE FROM HORIZ.:** -90°  
  - **(NZTM2000)**

### Geographical Unit
- **SOIL:** Classification, colour, consistency / density, moisture, plasticity  
- **ROCK:** Weathering, colour, fabric, name, strength, cementation

### Description of Core

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0m</td>
<td>Silty fine SAND, minor organics; light brown, minor black clasts. Loose, moist</td>
</tr>
<tr>
<td>5.9m</td>
<td>No recovery (core loss)</td>
</tr>
<tr>
<td>6.0m</td>
<td>Silty fine SAND, minor organics; light brown, minor black clasts. Loose, moist</td>
</tr>
<tr>
<td>6.45m</td>
<td>Silty fine SAND, trace gravel; light brown. Loose, moist. Gravel, black, fine, sub angular</td>
</tr>
<tr>
<td>7.85m</td>
<td>No recovery (core loss)</td>
</tr>
<tr>
<td>7.95m</td>
<td>Silty fine SAND, trace gravel; light brown. Loose, moist. Gravel, black, fine, sub angular</td>
</tr>
<tr>
<td>8.2m</td>
<td>Silty fine SAND, trace gravel; light brown stained orange brown. Loose, moist. Gravel, black, fine, sub angular</td>
</tr>
<tr>
<td>8.8m</td>
<td>Sandy CLAY, some silt, light brown stained orange brown. Firm, moist, moderate to high plasticity</td>
</tr>
<tr>
<td>9.0m</td>
<td>Silty fine SAND, trace gravel; light brown stained orange brown. Loose, moist. Gravel, black, fine, sub angular</td>
</tr>
<tr>
<td>9.5m</td>
<td>Unweathered, grey, interbedded, fine SANDSTONE with very closely spaced, thinly laminated SILTSTONE. Weak</td>
</tr>
<tr>
<td>9.85m</td>
<td>J, 10° dip, PL, SM, VN, CN</td>
</tr>
</tbody>
</table>

### Rock Defects
- **Defects Log**

### Rock Strength
- **Sampling Method:** Core Recovery (%)  
- **Testing:** SPT

### Water Level
- **Fracture Spacing (mm):**  
- **Fluid Loss (%):** 25, 50, 75

### Comments
- **COMMENTS:** 50mm I.D. piezometer. Shear vane No. 2204. Presented shear vane readings have been corrected

---

**General Log - 5/04/2019 11:16:54 a.m. - Produced with Core-GS by GeRoc v3.2g**

**DRILLED BY:** Malcolm and Jaz  
**LOGGED BY:** OPRI  
**CHECKED:** ALNA  
**START DATE:** 13/03/2018  
**FINISH DATE:** 20/03/2018  
**CONTRACTOR:** McMillan Drilling
BOREHOLE LOG

BOREHOLE No.: BH12

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 5977250.56 mN
1740969.47 mE

R.L. GROUND: 106.44m
R.L. COLLAR:

DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

SURVEY: Total Station Surveyed
DATUM: NZVD2016

PROJECT: Auckland Regional Landfill
LOCATION: Refer site plan
JOB No.: 1005069.1120

CONTRACTOR: McMillan Drilling

SHEET: 3 OF 7

DESCRIPTION OF CORE

SOIL: Classification, colour, consistency / density, moisture, plasticity

ROCK: Weathering, colour, fabric, name, strength, cementation

GEOLOGICAL UNIT

RQD (%)

Water Level
Fracture
Spacing (mm)

Casing
Installation
Core Box No

ROCK DEFECTS

Description
& Additional Observations

Fluid Loss (%)

Depth (m)

Graph Log

RL (m)

Rock Strength

Sampling Method
Core Recovery (%)

Testing

Defect Log

SOIL: Classification, colour, consistency / density, moisture, plasticity

ROCK: Weathering, colour, fabric, name, strength, cementation

GEOLOGICAL UNIT

RQD (%)

Water Level
Fracture
Spacing (mm)

Casing
Installation
Core Box No

ROCK DEFECTS

Description
& Additional Observations

Fluid Loss (%)

Depth (m)

Graph Log

RL (m)

Rock Strength

Sampling Method
Core Recovery (%)

Testing

Defect Log

9.5m [Cont’d]: Unweathered, grey, interbedded, fine SANDSTONE with very closely spaced, thinly laminated SILTSTONE. Weak

11.6m: Unweathered, grey, fine SANDSTONE. Weak

12.8m: Unweathered, grey, fine to coarse SANDSTONE. Weak

13.5m: Unweathered, grey, CONGLOMERATE. Conglomerate is fine to medium gravel in fine to coarse SAND matrix. Matrix supported. Weak

14.4m: Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong

14.80 - 14.90m: Trace fine gravel size clasts

COMMENTS: 50mm I.D. piezometer. Shear vane No. 2204. Presented shear vane readings have been corrected

50mm I.D. piezometer. Shear vane No. 2204. Presented shear vane readings have been corrected

50mm I.D. piezometer. Shear vane No. 2204. Presented shear vane readings have been corrected

50mm I.D. piezometer. Shear vane No. 2204. Presented shear vane readings have been corrected

50mm I.D. piezometer. Shear vane No. 2204. Presented shear vane readings have been corrected
**BOREHOLE LOG**

**BOREHOLE No.:** BH12

**PROJECT:** Auckland Regional Landfill

**JOB No.:** 1005069.1120

**LOCATION:** Refer site plan

**CO-ORDINATES:**
- R.L. GROUND: 106.44m
- R.L. COLLAR: 106.44m
- SURVEY: Total Station/Surveyed
- DATUM: NZVD2016

**DIRECTION:** 0°

**ANGLE FROM HORIZ.:** -90°

**START DATE:** 13/03/2018

**FINISH DATE:** 20/03/2018

**CONTRACTOR:** McMillan Drilling

**RQD (%):**

**Water Level:**

**Fracture Spacing (mm):**

**ROCK DEFECTS**

**SOIL:** Classification, colour, consistency / density, moisture, plasticity

**ROCK:** Weathering, colour, fabric, name, strength, cementation

---

**SOIL:** Classification, colour, consistency / density, moisture, plasticity

**ROCK:** Weathering, colour, fabric, name, strength, cementation

---

**GEOLOGICAL UNIT**

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Geological Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.4m</td>
<td>Unweathered, grey, fine to coarse SANDSTONE. Weak to moderately strong</td>
<td></td>
</tr>
<tr>
<td>15.12 - 15.15m</td>
<td>Some fine to medium gravel size clasts</td>
<td></td>
</tr>
<tr>
<td>15.20 - 15.21m</td>
<td>Some fine gravel size clasts</td>
<td></td>
</tr>
<tr>
<td>15.9m</td>
<td>Unweathered, grey, CONGLOMERATE. Conglomerate is fine to medium gravel in fine to coarse SAND matrix. Matrix supported. Weak</td>
<td></td>
</tr>
<tr>
<td>16.4m</td>
<td>Unweathered, grey, fine SANDSTONE. Weak</td>
<td></td>
</tr>
<tr>
<td>19.75m</td>
<td>Unweathered, grey, CONGLOMERATE. Conglomerate is fine to medium gravel in fine to coarse SAND matrix. Matrix supported. Weak</td>
<td></td>
</tr>
</tbody>
</table>

---

**COMMENTS:**
- 50mm I.D. piezometer. Shear vane No. 2204. Presented shear vane readings have been corrected

---

**UW Pakiri 18/05/2018 ; 2:10pm 17.37m**

---

**Scale 1:25**

**Rev.: A**
19.75m [Cont'd]: Unweathered, grey, CONGLOMERATE. Conglomerate is fine to medium gravel in fine to coarse SAND matrix. Matrix supported. Weak

20.3m: Unweathered, grey, fine SANDSTONE. Weak

22.15m: Unweathered, grey, interbedded, fine SANDSTONE and dark grey, closely-very closely spaced, thinly to moderately thin SILTSTONE. Weak

23.55m: J, 10° dip, UN, SM, VN, CN

23.55m: J, 10° dip, UN, SM, VN, CN

COMMENTS: 50mm I.D. piezometer. Shear vane No. 2204. Presented shear vane readings have been corrected
### DESCRIPTION OF CORE

<table>
<thead>
<tr>
<th>Geological Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOIL</strong></td>
<td>Classification, colour, consistency / density, moisture, plasticity</td>
</tr>
<tr>
<td><strong>ROCK</strong></td>
<td>Weathering, colour, fabric, name, strength, cementation</td>
</tr>
</tbody>
</table>

#### 22.15m [Cont’d]:
Unweathered, grey, interbedded, fine SANDSTONE and dark grey, closely-very closely spaced, thinly to moderately thin SILTSTONE. Weak

#### 27.85m:
Unweathered, grey, fine SANDSTONE. Weak

### ROCK DEFECTS

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Rock Weathering</th>
<th>Sampling Method</th>
<th>Core Recovery (%)</th>
<th>Testing</th>
<th>Defect Log</th>
<th>Density (kg/m³)</th>
<th>Fracture Spacing (mm)</th>
<th>RQD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.5</td>
<td>J</td>
<td>HQTT</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>26.0</td>
<td>J</td>
<td>HQTT</td>
<td>100</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.5</td>
<td>J</td>
<td>HQTT</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.0</td>
<td>J, 10° dip, PL, SM, VN, CN</td>
<td></td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.5</td>
<td>J</td>
<td>HQTT</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.0</td>
<td>J, 15° dip, UN, R, VN, CN</td>
<td></td>
<td>100</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### COMMENTS:
50mm I.D. piezometer. Shear vane No. 2204. Presented shear vane readings have been corrected.
General Log - 5/04/2019 11:16:54 a.m. - Produced with Core-GS by GeRoc v3.2g

DRILLED BY: Malcolm and Jaz
LOGGED BY: OPRI
CHECKED: ALNA
START DATE: 13/03/2018
FINISH DATE: 20/03/2018
CONTRACTOR: McMillan Drilling

SHEET: 7 OF 7

BOREHOLE No.: BH12

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 5977250.56 mN
1740969.47 mE
(R.NZTM2000)

R.L. GROUND: 106.44m
R.L. COLLAR: 106.44m

SURVEY: Total Station Surveyed
DATUM: NZVD2016

SCALE: 1:25

50mm I.D. piezometer. Shear vane No. 2204. Presented shear vane readings have been corrected

33m: END OF BOREHOLE
**BOREHOLE NO.: BH13**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**
- **R.L. GROUND:** 60.12m  
- **R.L. COLLAR:**  
- **SURVEY:** Total Station/Surveyed  
- **DATUM:** NZVD2016  
- **PROJECT:** Auckland Regional Landfill  
- **LOCATION:** Refer site plan  
- **JOB No.:** 1005069.1120

**DIRECTION:**  
- **ANGLE FROM HORIZ.:** -90°

**LOGGED BY:** OPRI  
**CHECKED:** ALNA  
**START DATE:** 28/02/2018  
**FINISH DATE:** 07/03/2018  
**CONTRACTOR:** McMillan Drilling

---

### DESCRIPTION OF CORE

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0m</td>
<td>No recovery (core loss - tree stump)</td>
<td></td>
</tr>
<tr>
<td>0.6m</td>
<td>Silty CLAY, some rootlets; brown. Firm, moist, moderate plasticity.</td>
<td></td>
</tr>
<tr>
<td>0.7m</td>
<td>Silty CLAY, trace rootlets; orange brown. Firm, moist, high plasticity</td>
<td></td>
</tr>
<tr>
<td>1.30m</td>
<td>Grades reddish brown.</td>
<td></td>
</tr>
<tr>
<td>1.4m</td>
<td>Clayey SILT, trace fine sand; reddish brown. Firm, moist, high plasticity</td>
<td></td>
</tr>
<tr>
<td>1.95m</td>
<td>Silty, fine SAND, with minor gravel; light brown. Loose, moist. Gravel, fine, angular</td>
<td></td>
</tr>
<tr>
<td>3.0m</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>3.45m</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>3.65m</td>
<td>Silty, fine SAND, some gravel; brown. Loose, moist. Gravel, fine to medium, angular</td>
<td></td>
</tr>
<tr>
<td>4.4m</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>4.5m</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:** 50mm I.D. piezometer. Shear vane No 2204. Presented shear vane readings have been corrected

---

### GEOLOGICAL UNIT

- **SOIL:** Classification, colour, consistency / density, moisture, plasticity
- **ROCK:** Weathering, colour, fabric, name, strength, cementation

---

### ROCK DEFECTS

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Type</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0m</td>
<td>UW</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>0.6m</td>
<td>UW</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>0.7m</td>
<td>UW</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>1.30m</td>
<td>UV</td>
<td>Grades reddish brown.</td>
<td></td>
</tr>
<tr>
<td>1.4m</td>
<td>UV</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>1.95m</td>
<td>UW</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>3.0m</td>
<td>UV</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>3.45m</td>
<td>UW</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>3.65m</td>
<td>UV</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>4.4m</td>
<td>UW</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>4.5m</td>
<td>UW</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
</tbody>
</table>

---

### GRAPHIC LOG

- **RL (m):** 60.12m  
- **Depth (m):** 34.99m  

---

### SCALE 1:25

- **Column:** 34.99m  
- **Piezometer:** 50mm I.D.
PROJECT: Auckland Regional Landfill

LOCATION: Refer site plan

DRILLED BY: Paul and Jaz
LOGGED BY: OPRI
CHECKED: ALNA
START DATE: 28/02/2018
FINISH DATE: 07/03/2018
CONTRACTOR: McMillan Drilling

BOREHOLE No.: BH13
Sheet: 2 OF 7

BOREHOLE LOG

SOIL: Classification, colour, consistency / density, moisture, plasticity

DESCRIPTION OF CORE

ROCK: Weathering, colour, fabric, name, strength, cementation

SOIL: Classification, colour, consistency / density, moisture, plasticity

ROCK: Weathering, colour, fabric, name, strength, cementation

5.0m: No recovery (core loss)
5.3m: Silty, fine SAND, some gravel; brown. Loose, moist. Gravel, fine to medium, angular
5.45m: Silty, fine SAND, minor gravel; light brown. Loose, moist. Gravel, fine, angular
5.55m: Black staining
5.65m: Silty, fine SAND, minor gravel; light brown. Loose, moist. Gravel, fine, angular

6.85m: Gravelly SAND, some silt; grey and brown. Loose, moist. Gravel, fine to medium, angular
7.0m: Silty SAND, some gravel; brown. Loose, moist. Gravel, fine to medium, angular
7.2m: No recovery (core loss)
7.5m: Silty SAND, some gravel; brown. Loose, moist. Gravel, fine to medium, angular
7.8m: No recovery (core loss)
7.95m: Silty SAND, minor gravel; light brown. Soft to firm, moist, moderate to high plasticity
8.15m: Clayey SILT, minor fine sand; light brown. Very stiff, moist, low plasticity. Sand, fine
8.45m: Highly weathered, orange brown, fine SANDSTONE. Extremely weak, thinly laminated, sub-horizontal bedding
8.85m: Highly weathered, brown, fine SANDSTONE. Very weak
9.35m: Slightly weathered to moderately weathered, grey and brown, fine SANDSTONE. Weak to very weak
9.55m: Slightly weathered to moderately weathered, grey and brown, fine SANDSTONE. Weak to very weak

COMMENTS: 50mm I.D. piezometer. Shear vane No 2204. Presented shear vane readings have been corrected

General: 5/04/2019 11:16:56 a.m. - Produced with Core-GS by GeRoc v3.2g

Page: 595.3 x 841.9

Scale 1:25

 Hole Depth 34.99m

Rev.: A
BOREHOLE NO.: BH13

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 597169.67 mN 1740471.80 mE
NZTM2000

DIRECTION: 0°
ANGLE FROM HORIZ: -90°

R.L. GROUND: 60.12 m
R.L. COLLAR: 60.12 m

SURVEY: Total Station Surveyed
DATUM: NZVD2016

PROJECT: Auckland Regional Landfill
LOCATION: Refer site plan
JOB No.: 1005069.1120

CONTRACTOR: McMillan Drilling

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

GEOLOGICAL UNIT

DESCRIPTION OF CORE

10.0m: Slightly weathered to moderately weathered, grey and brown, fine SANDSTONE. Weak to very weak
10.25 - 10.35m: Moderately weathered, brown
10.35m: Highly weathered, orange brown, fine SANDSTONE. Extremely weak. Sub-horizontal, laminated bedding [possible basal landslide shear zone]
10.5m: Slightly weathered, grey, fine SANDSTONE. Weak
10.50 - 10.60m: thinly laminated carbonaceous beds

12.15m: Slightly weathered, grey to medium SANDSTONE. Very weak

12.50m: J, 65° dip, UN, SM, W, N, FeSt
12.70m: 50% of core highly fractured
12.75m: J, 70° dip, UN, W, N, FeSt
13.00m: J, 85° dip, UN, SM, W, N, FeSt, closed joint
13.25m: J, 85° dip, UN, SM, W, MN, CG
13.40 - 13.50m: Broken zone

COMMENTS: 50mm I.D. piezometer, Shear vane No 2204. Presented shear vane readings have been corrected
**BOREHOLE LOG**

**BOREHOLE No.: BH13**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**  
NZTM2000 coordinates:  
R.L. GROUND: 60.12m  
R.L. COLLAR:  

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°  
**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016

**SURVEY:**  
**CONTRACTOR:** McMillan Drilling

**SHEET:** 4 OF 7  
**DRILLED BY:** Paul and Jaz  
**LOGGED BY:** OPRI  
**CHECKED:** ALNA  
**START DATE:** 28/02/2018  
**FINISH DATE:** 07/03/2018

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer site plan  
**JOB No.:** 1005069.1120

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>GEOLOGICAL UNIT</th>
<th>DESCRIPTION OF CORE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOIL:</strong></td>
<td>Classification, colour, consistency / density, moisture, plasticity</td>
</tr>
<tr>
<td><strong>ROCK:</strong></td>
<td>Weathering, colour, fabric, name, strength, cementation</td>
</tr>
</tbody>
</table>

**ROCK DEFECTS**

<table>
<thead>
<tr>
<th>FLUID LOSS (%)</th>
<th>25</th>
<th>50</th>
<th>75</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>15.00m</th>
<th>15.15m</th>
<th>18.30m</th>
<th>19.00m</th>
<th>19.30m</th>
<th>19.45m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description &amp; Additional Observations</td>
<td></td>
<td></td>
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</tbody>
</table>

**HOLE DEPTH:** 34.99m  
**COMMENTS:** 50mm I.D. piezometer. Shear vane No 2204. Presented shear vane readings have been corrected

**GRAPHIC LOG**

- 15.0m: Unweathered, grey, fine to coarse SANDSTONE. Weak
- 15.15m: Unweathered, grey, fine SANDSTONE. Weak
- 18.3m: Unweathered, dark grey SILTSTONE. Very weak
- 19.0m: Grades to unweathered, grey, fine to medium SANDSTONE. Weak
- 19.3m: Unweathered, dark grey, SILTSTONE. Very weak
- 19.45m: Unweathered, grey, fine SANDSTONE, with thin (20mm) layers of dark grey, SILTSTONE. Weak
### BOREHOLE LOG

**BOREHOLE No.: BH13**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:** 597169.87 mN  
1740471.80 mE  
**R.L. GROUND:** 60.12m  
**R.L. COLLAR:** 60.24m  
**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°  
**SURVEY:** Total Station Surveyed  
**DATUM:** NZVD2016

**PROJECT:** Auckland Regional Landfill  
**LOCATION:** Refer site plan  
**START DATE:** 28/02/2018  
**FINISH DATE:** 07/03/2018  
**CONTRACTOR:** McMillan Drilling  
**LOGGED BY:** OPRI  
**CHECKED:** ALNA  
**DRILLED BY:** Paul and Jaz

<table>
<thead>
<tr>
<th>GEOLOGICAL UNIT</th>
<th>DESCRIPTION OF CORE</th>
<th>RQD (%)</th>
<th>Water Level</th>
<th>Fracture Spacing (mm)</th>
<th>Fluid Loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOIL: Classification, colour, consistency / density, moisture, plasticity</td>
<td>19.9-23.15m: Unweathered, grey, SANDSTONE, interbedded with 20mm-60mm thick beds of dark grey, SILTSTONE. Weak</td>
<td></td>
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<tr>
<td>ROCK: Weathering, colour, fabric, name, strength, cementation</td>
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</tr>
<tr>
<td>ROCK WEATHERING</td>
<td>SAMPLE LOG</td>
<td>ROCK STRENGTH</td>
<td>SAMPLING METHOD</td>
<td>CORE RECOVERY (%)</td>
<td>TESTING</td>
</tr>
<tr>
<td>20.05m: J, 10° dip, PL, SM, W, MN, CN</td>
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<tr>
<td>20.30m: J, 10° dip, PL, SM, W, MN, CN</td>
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<tr>
<td>20.50m: J, 10° dip, PL, R, W, MN, CN</td>
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<tr>
<td>20.85m: J, 25° dip, UN, R, W, MN, CN</td>
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<tr>
<td>21.00m: J, 15° dip, UN, SM, W, MN, CN</td>
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<tr>
<td>21.40m: J, 30° dip, ST, SM, W, MN, CN</td>
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<tr>
<td>21.55m: J, 25° dip, UN, SM, W, N, CN</td>
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<tr>
<td>21.75m: J, 15° dip, UN, R, W, MN, CN</td>
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<tr>
<td>22.35m: J, 10° dip, UN, SM, W, MN, CN</td>
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<td>22.92m: J, 20° dip, ST, SM, W, MN, CN</td>
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<td>22.98m: J, 10° dip, UN, SM, W, MN, CN</td>
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<tr>
<td>23.00 - 24.00m: Broken zone</td>
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<tr>
<td>23.55m: J, 40° dip, UN, SM-R, W, MN, CN</td>
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<tr>
<td>24.00 - 24.10m: Broken zone</td>
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</tr>
<tr>
<td>24.20m: J, 15° dip, PL, SM, W, MN, CN</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>24.30m: J, 10° dip, PL, R, W, MN, CN</td>
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</tr>
<tr>
<td>24.52m: J, 40° dip, UN, SM, W, MN, CN</td>
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<tr>
<td>24.90m: J, 20° dip, PL, SM, W, MN, CN</td>
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<td></td>
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</tr>
<tr>
<td>24.95m: J, 20° dip, PL, SM, W, MN, CN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:** 50mm I.D. piezometer. Shear vane No 2204. Presented shear vane readings have been corrected

**SCALE:** 1:25  
**HOLE DEPTH:** 34.59m
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Geological Unit</th>
<th>Description of Core</th>
<th>RQD (%)</th>
<th>Water Level</th>
<th>Fracture Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.15m</td>
<td>Unweathered, grey, fine to medium SANDSTONE</td>
<td>Weak</td>
<td>25.10</td>
<td>J, 10° dip, UN, SM, W, MN, CN</td>
<td></td>
</tr>
<tr>
<td>25.3m</td>
<td>Unweathered, dark grey SILTSTONE</td>
<td>Weak</td>
<td>25.35 - 25.50m: Crushed zone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.5m</td>
<td>Unweathered, grey, fine to medium SANDSTONE</td>
<td>Weak</td>
<td>25.55 - 25.92m: Multiple fractures generally J's orientated at 40°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.3m</td>
<td>Unweathered, dark grey SILTSTONE</td>
<td>Weak</td>
<td>28.20 - 28.25m: Broken zone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.55m</td>
<td>Unweathered, grey, fine SANDSTONE</td>
<td>Weak</td>
<td>28.50</td>
<td>J, 15° dip, PL, SL, W, N, CN</td>
<td></td>
</tr>
<tr>
<td>29.15m</td>
<td>Unweathered, dark grey SILTSTONE</td>
<td>Weak</td>
<td>29.03</td>
<td>J, 15° dip, UN, SM, W, MN, CN</td>
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</tr>
<tr>
<td>29.4m</td>
<td>Unweathered, grey, fine SANDSTONE</td>
<td>Weak</td>
<td>29.90</td>
<td>J, 15° dip, UN, SM, W, MN, CN</td>
<td></td>
</tr>
</tbody>
</table>
**BOREHOLE LOG**

**BOREHOLE No.: BH13**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

**CO-ORDINATES:**  5977169.67 mN  
1740471.80 mE

**SURVEY:** Total Station/Surveyed

**DATUM:** NZVD2016

**R.L. GROUND:** 60.12m  
**R.L. COLLAR:**

**DIRECTION:** 0°  
**ANGLE FROM HORIZ.:** -90°

**START DATE:** 28/02/2018  
**FINISH DATE:** 07/03/2018

**CONTRACTOR:** McMillan Drilling

**SHEET:** 7 OF 7

**BOREHOLE No.:** BH13

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>ROCK WEATHERING</th>
<th>DESCRIPTION &amp; ADDITIONAL OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOIL:** Classification, colour, consistency / density, moisture, plasticity

**ROCK:** Weathering, colour, fabric, name, strength, cementation

**DETECTION:**

<table>
<thead>
<tr>
<th>ROCK WEATHERING</th>
<th>DESCRIPTION &amp; ADDITIONAL OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RQD (%):**

<table>
<thead>
<tr>
<th>RQD (%)</th>
<th>Water Level</th>
<th>Fracture Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

**ANGLE FROM HORIZ.:** -90°

**SCALE:** 1:25

**COMMENTS:** 50mm I.D. piezometer. Shear vane No 2204. Presented shear vane readings have been corrected

**34.99m: END OF BOREHOLE**

**50mm I.D. piezometer. Shear vane No 2204. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**BOREHOLE No.:** BH14

**PROJECT:** Auckland Regional Landfill

**JOB No.:** 1005069.1120

**LOCATION:** Refer site plan

**COORDINATES:**
- **R.L. GROUND:** 28.00m
- **R.L. COLLAR:** 28.00m
- **DATUM:** NZVD2016

**DIRECTION:** 0°

**ANGLE FROM HORIZ.:** -90°

**CONTRACTOR:** McMillan

**CHECKED:** ALNA

**START DATE:** 29/05/2018

**FINISH DATE:** 30/05/2018

**SURVEY:** Total Station Surveyed

---

**DESCRIPTION OF CORE**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0m</td>
<td>SILT</td>
<td>some fine sand, some roots; brown. Firm, saturated, low plasticity</td>
</tr>
<tr>
<td>0.2m</td>
<td>SILT</td>
<td>some clay, trace fine sand, trace rootlets, trace pockets of silty fine sand; brown mottled orange brown and reddish brown. Stiff, wet, low plasticity</td>
</tr>
<tr>
<td>0.5m</td>
<td>Sandy SILT</td>
<td>some pockets of silty fine SAND; brown mottled orange brown and reddish brown. Stiff, wet, low plasticity</td>
</tr>
<tr>
<td>0.68m</td>
<td>Clayey SILT</td>
<td>orange brown mottled pink</td>
</tr>
<tr>
<td>0.8m</td>
<td>Sandy SILT</td>
<td>some pockets of silty fine to medium SAND; brown mottled orange brown and reddish brown. Stiff, wet, low plasticity.</td>
</tr>
<tr>
<td>1.1m</td>
<td>SILT</td>
<td>minor fine sand, trace rootlets; brown, minor orange brown and grey mottles. Stiff, wet, low plasticity</td>
</tr>
<tr>
<td>1.3m</td>
<td>No recovery (core loss)</td>
<td></td>
</tr>
<tr>
<td>1.5m-2.0m</td>
<td>Push Tube</td>
<td></td>
</tr>
<tr>
<td>2.5m</td>
<td>Silty CLAY</td>
<td>minor fine sand; bluish grey, Firm, wet, moderate to high plasticity</td>
</tr>
<tr>
<td>2.75m</td>
<td>Saturated</td>
<td></td>
</tr>
<tr>
<td>2.50m</td>
<td>Becoming Sandy silty CLAY. Sand, fine</td>
<td></td>
</tr>
<tr>
<td>3.0m-3.5m</td>
<td>Push Tube attempted (No recovery)</td>
<td></td>
</tr>
<tr>
<td>3.5m</td>
<td>Clayey SILT</td>
<td>some fine sand; grey. Firm, saturated, low plasticity</td>
</tr>
<tr>
<td>3.6m</td>
<td>Becoming sandy SILT</td>
<td>minor clay; brown, Firm, saturated, low plasticity. Sand, fine</td>
</tr>
<tr>
<td>4.5m</td>
<td>Sandy SILT</td>
<td>grey. Firm, saturated, low plasticity. Sand, fine</td>
</tr>
</tbody>
</table>

**ROCK DEFECTS**

- **Rock Weathering:**
  - 0/0
  - 0/0
  - 0/0
  - N=0
  - 0/0
  - 0/0
  - 0/0
  - N=0
  - 0/0
  - 0/0

**Sampling Method:**
- Core Box No

**Testing:**
- Defect Log

**COMMENTS:** 50mm I.D. piezometer. Shear vane No. 111. Presented shear vane readings have been corrected.

---

**Sheet:** 1 OF 6

**Scale:** 1:25
BOREHOLE LOG

BH14

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 5977379.60 mN
1739925.24 mE

DIRECTION: 0°
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 28.00m
R.L. COLLAR: 28.00m
DATUM: NZVD2016
SURVEY: Total Station Surveyed

START DATE: 29/05/2018
FINISH DATE: 30/05/2018
CONTRACTOR: McMillan

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

DESCRIPTION OF CORE

- 5.0m: Sandy SILT; grey. Firm, saturated, low plasticity. Sand, fine
- 6.3m: Silty CLAY, some pockets of sandy silt; grey. Firm, wet, moderate to high plasticity
- 7.5-8.0m: Push Tube
- 8.0m: Silty CLAY, minor fine sand; grey. Firm, wet, moderate plasticity
- 8.1m: Sandy SILT, minor clay; grey. Firm, wet, low plasticity. Sand, fine
- 8.55m: No recovery (core loss)
- 9.0m: Sandy SILT; grey. Firm, wet, low plasticity. Sand, fine
- 9.3m: Silty fine to medium SAND; grey. Loose, wet
- 9.6m: Sandy SILT; grey. Firm, wet, low plasticity. Sand, fine to medium

COMMENTS: 50mm I.D. piezometer. Shear vane No. 111. Presented shear vane readings have been corrected
PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

**BOREHOLE LOG**

**BOREHOLE No.:** BH14
**DRILLED BY:** Lei
**LOGGED BY:** DSA
**CHECKED:** ALNA
**START DATE:** 29/05/2018
**FINISH DATE:** 30/05/2018
**CONTRACTOR:** McMillan

**PROJECT:** Auckland Regional Landfill
**LOCATION:** Refer site plan

**SOIL:** Classification, colour, consistency/density, moisture, plasticity
**ROCK:** Weathering, colour, fabric, name, strength, cementation

**GEOLOGICAL UNIT**

**DESCRIPTION OF CORE**

**SOIL:** Classification, colour, consistency/density, moisture, plasticity
**ROCK:** Weathering, colour, fabric, name, strength, cementation

**ROCK DEFECTS**

**SCALE:** 1:25

**COMMENTS:**
50mm I.D. piezometer. Shear vane No. 111. Presented shear vane readings have been corrected.
**BOREHOLE LOG**

**PROJECT:** Auckland Regional Landfill  
**JOB No.:** 1005069.1120  
**LOCATION:** Refer site plan

---

**DESCRIPTION OF CORE**

**SOIL:** Classification, colour, consistency/density, moisture, plasticity  
**ROCK:** Weathering, colour, fabric, name, strength, cementation

---

**ROCK DEFECTS**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description &amp; Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.6m</td>
<td>Unweathered, grey, fine to medium SANDSTONE. Weak to moderately strong</td>
</tr>
<tr>
<td>16.75m</td>
<td>Unweathered, interbedded, fine SANDSTONE and SILTSTONE. Weak. Beds are thin (50mm) to moderately thin (160mm)</td>
</tr>
<tr>
<td>18.7m</td>
<td>Unweathered, dark grey SILTSTONE, interbedded with some thin to moderately thin beds of fine and fine to medium SANDSTONE. Weak.</td>
</tr>
</tbody>
</table>

---

**COMMENTS:** 50mm I.D. piezometer. Shear vane No. 111. Presented shear vane readings have been corrected.
20.0m: Unweathered, dark grey Siltstone, interbedded with some thin to moderately thin beds of fine and fine to medium Sandstone. Weak.

22.5m: Unweathered, grey, fine Sandstone. Weak.

23.0m: Unweathered, dark grey, Siltstone, minor very thin beds of fine Sandstone. Weak.

23.78m: Unweathered, grey, fine to medium Sandstone. Weak to moderately strong.

24.00 - 24.10m: Fine to coarse Sandstone

24.32m: Grades to unweathered, grey, fine to coarse Sandstone. Weak to moderately strong.

24.75m: Unweathered, grey, fine to coarse Sandstone, minor fine to medium gravel size clasts. Weak to moderately strong.
BOREHOLE LOG

PROJECT: Auckland Regional Landfill
JOB No.: 1005069.1120
LOCATION: Refer site plan

CO-ORDINATES: 
- R.L. GROUND: 28.00m
- R.L. COLLAR: 28.00m

DIRECTION: 
- ANGLE FROM HORIZ: 0°

SURVEY: Total Station Surveyed

DATUM: NZVD2016

CONTRACTOR: McMillan

Borehole Log

DESCRIPTION OF CORE

SOIL: Classification, colour, consistency / density, moisture, plasticity
ROCK: Weathering, colour, fabric, name, strength, cementation

ROCK WEATHERING

Rock Weathering | Description & Additional Observations
--- | ---
24.75m | Unweathered, grey, fine to coarse SANDSTONE, minor fine to medium gravel size clasts. Weak to moderately strong.
25.15m | Unweathered, grey, fine SANDSTONE; grading to fine to medium SANDSTONE from 26.25m, minor very thin beds of SILTSTONE. Weak to moderately strong
25.44 - 25.45m | Dark grey, SILTSTONE
25.67 - 25.68m | Dark grey SILTSTONE
25.90 - 25.98m | Grades to fine to coarse SANDSTONE
25.98 - 26.00m | Dark grey SILTSTONE
26.10m | Grades to fine to medium SANDSTONE
26.3m | Unweathered, grey, CONGLOMERATE. Conglomerate comprises fine to coarse gravel size lenses of dark grey SILTSTONE (2mm to 60mm) in fine to coarse SANDSTONE matrix. Matrix supported. Weak to moderately strong
26.62m | Unweathered, grey, fine SANDSTONE, minor very thin (20mm) bed of dark grey siltstone at 26.75m. Weak to moderately strong

26.8m: Target depth

COMMENTS: 50mm I.D. piezometer. Shear vane No. 111. Presented shear vane readings have been corrected

Drilled by: Lei
Logged by: DSA
Checked: ALNA
Start Date: 29/05/2018
Finish Date: 30/05/2018

Tonkin+Taylor

General Log - 5/04/2019 11:16:57 a.m. - Produced with Core-GS by GeRoc v3.2g