### Engineering Log - Hand Auger

**Borehole ID:** HA01  
**Date started:** 06 Feb 2015  
**Date completed:** 06 Feb 2015  
**Logged by:** PM  
**Checked by:**

**Client:**  
**Principal:**  
**Project:**  
**Location:** Katikati

#### Drilling Information

<table>
<thead>
<tr>
<th>rock type</th>
<th>notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML SILT</td>
<td>low liquid limit, dark brown, trace rootlets.</td>
</tr>
<tr>
<td>ML SILT</td>
<td>low liquid limit, dark brown mottled pale brown, trace fine rootlets.</td>
</tr>
<tr>
<td>ML SILT</td>
<td>low liquid limit, dark brown, trace fine grained sand, trace fine rootlets.</td>
</tr>
<tr>
<td>CI Silt</td>
<td>0.6 m: becoming dark brown mottled pale orange brown</td>
</tr>
<tr>
<td>Silty CLAY</td>
<td>medium plasticity, dark brown mottled pale orange-brown, minor fine grained sand, trace fine rootlets.</td>
</tr>
<tr>
<td>Silty CLAY</td>
<td>0.8 m: becoming pale orange-brown-yellow, minor rootlets and root material</td>
</tr>
<tr>
<td>Sandy Silt</td>
<td>non plastic to low liquid limit, pale orange-brown, sand to fine grained sand, trace fine rootlets.</td>
</tr>
<tr>
<td>Silty SAND</td>
<td>fine grained, uniform, pale orange brown with black specks.</td>
</tr>
<tr>
<td>Silty CLAY</td>
<td>high plasticity, dark brown, trace fine grained sand, trace rootlets.</td>
</tr>
<tr>
<td>CLAY</td>
<td>high plasticity, pale brown.</td>
</tr>
<tr>
<td>CLAY</td>
<td>high plasticity, orange-brown, trace fine grained sand, trace fine rootlets.</td>
</tr>
<tr>
<td>Hand Auger HA01 terminated at 5.0 m</td>
<td>Target depth</td>
</tr>
</tbody>
</table>

#### Additional Observations

- **VS 75/ 11 kPa**  
- **VS 103/ 22 kPa**  
- **VS 117/ 14 kPa**  
- **VS 155/ 22 kPa**  
- **VS 171/ 34 kPa**  
- **VS 132/ 26 kPa**  
- **VS 187/ 34 kPa**  
- **VS 191/ 50 kPa**  
- **VS 210/ 34 kPa**  
- **VS 160/ 12 kPa**  
- **VS 166/ 26 kPa**  
- **VS 178/ 42 kPa**  
- **VS 170/ 42 kPa**  
- **VS 70/ 26 kPa**  
- **VS 109/ 50 kPa**  
- **VS 98/ 50 kPa**  
- **VS 121/ 44 kPa**  
- **VS 78/ 42 kPa**  
- **VS 83/ 70 kPa**  
- **VS 90/ 55 kPa**  
- **VS 89/ 40 kPa**  
- **VS 79/ 59 kPa**  
- **VS 40/ 23 kPa**  
- **VS 50/ 23 kPa**

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**Method:** auger drilling*  
**Support:** M mud, N nl  
**Penetration:** C casing  
**Samples & field tests:** B bulk disturbed sample, D disturbed sample, E environmental sample, SS split spoon sample, HP hand penetrometer (kPa), N standard penetration test (SPT), Ns SPT - sample recovered, Nc SPT with solid cone, VS vane shear, peak/remoulded (kPa), R refusal, HB hammer bailing  
**Classification symbol & soil description:** based on Unified Classification System  
**Consistency / relative density:** VS very soft, S soft, F firm, St stiff, VBS very stiff, H hard, Fb friable, VL very loose, L loose, MD medium dense, D dense, VD very dense
**SILT**: non-plastic to low plasticity, pale orange-brown, sand is fine grained, trace rootlets.

**CLAY**: non-plastic to low plasticity, pale orange-brown, minor rootlets.

**Sandy SILT**: non-plastic to low liquid limit, pale orange-brown, sand is fine grained, trace rootlets, friable.

**Clayey SILT**: non-plastic to low plasticity, dark brown, trace fine grained sand, fine rootlets.

**Silty CLAY**: low plasticity, dark brown, minor fine rootlets, trace limonite inclusions.

**Silty CLAY**: medium plasticity, orange-brown mottled dark brown.

**CLAY**: high plasticity, pale grey mottled orange, with some limonite inclusions.

Hand Auger HA02 terminated at 4.2 m. Obstruction in the hole.

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**VSt/St**: very soft to soft

**D to M**: dense to medium dense

**P**: plasticity

**C**: clay content

**N**: nil

**V**: very

**M**: medium

**D**: dense

**L**: loose

**F**: fine

**VS**: very soft

**S**: soft

**H**: hard

**VL**: very loose

**T**: tight

**VSI**: very stiff

**MD**: medium dense

**D**: dense

**VD**: very dense

**Hand Auger HA02 terminated at 4.2 m. Obstruction in the hole.**

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

**material description**: structure and additional observations
**Engineering Log - Hand Auger**

**client:** Not Specified  
**principal:** Not Specified  
**project:** Not Specified  
**location:** Katikati  
**position:** Not Specified  
**drill model:** Not Specified  
**sample & field tests:** Not Specified  
**water:** Not Specified  

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>soil description</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Silt: non plastic, dark brown, trace fine grained sand, minor rootlets, friable.</td>
<td>D to M</td>
</tr>
<tr>
<td>N</td>
<td>0.3 m: becoming pale orange-brown</td>
<td>VSt</td>
</tr>
<tr>
<td>N</td>
<td>Clayey Silt: non plastic to low liquid limit, pale orange-brown, trace fine grained sand, trace fine rootlets.</td>
<td>M</td>
</tr>
<tr>
<td>N</td>
<td>Sandy Silt: non plastic, pale orange-brown, sand is fine to medium grained, trace fine rootlets.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Silty Sand: fine grained, pale orange-brown.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>1.2 m: becoming brown</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Silty Clay: low plasticity, brown, minor fine to medium grained sand, trace rootlets.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>1.4 m: becoming medium plasticity, with trace fine gravel sized organic/charcoal fragments</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Clayey Silt: non plastic to low liquid limit, orange flecked black, minor fine grained sand.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>2.6 m: becoming brown mottled pale brown/orange</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>3.0 m: becoming orange mottled pale brown/grey</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Silty Clay: low plasticity, grey mottled orange/pale purple-brown.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>3.5 m: becoming medium plasticity</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>CLAY: high plasticity, brown.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Silty Clay: high plasticity, grey mottled orange/pale purple-brown.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>3.5 m: becoming medium plasticity</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>CLAY: high plasticity, orange, limonite stained clay.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>CLAY: high plasticity, grey mottled orange/pale purple-brown.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Hand Auger HA03 terminated at 5.0 m Target depth</td>
<td></td>
</tr>
</tbody>
</table>

**Classification symbol & soil description**

**Based on Unified Classification System**

**Consistency / relative density**

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Dry</th>
<th>Moist</th>
<th>Wet</th>
<th>Plastic limit</th>
<th>Liquid limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>S</td>
<td>F</td>
<td>I</td>
<td>D</td>
<td>D</td>
</tr>
</tbody>
</table>

**Mud**

- Silt: non plastic, dark brown, trace fine grained sand, minor rootlets, friable.
- Clayey Silt: non plastic to low liquid limit, pale orange-brown, trace fine grained sand, trace fine rootlets.
- Sandy Silt: non plastic, pale orange-brown, sand is fine to medium grained, trace fine rootlets.
- Silty Sand: fine grained, pale orange-brown.
- 1.2 m: becoming brown
- Clayey Silt: non plastic to low liquid limit, orange flecked black, minor fine grained sand.
- 2.6 m: becoming brown mottled pale brown/orange
- 3.0 m: becoming orange mottled pale brown/grey
- Silty Clay: low plasticity, grey mottled orange/pale purple-brown.
- 3.5 m: becoming medium plasticity

**Clay**

- High plasticity, brown.
- High plasticity, grey mottled orange/pale purple-brown.
- High plasticity, orange, limonite stained clay.
- High plasticity, grey mottled orange/pale purple-brown.

**Topsoil/Fill**

- Hamilton Ash?:
  - VS 198/ 40 kPa
- White Tephra:
  - VS 187/ 23 kPa
  - VS 137/ 37 kPa
- Paleosol:
  - VS 156/ 20 kPa
  - VS 122/ 37 kPa
  - VS 119/ 33 kPa
- Purple Clay Layer:
  - VS 76/ 25 kPa
  - VS 73/ 24 kPa
  - VS 76/ 41 kPa
  - VS 73/ 24 kPa

**Limonite Weathered**

- VS 73/ 20 kPa

**Limonite 2**

- VS 73/ 24 kPa