Geoarchaeological sampling at Bay of Skaill in 2006
Helen Lewis

Geoarchaeological study in the 2006 season was limited, although certain interesting deposits were examined and sampled for future investigation in comparison to previously sampled deposits.

Further excavations on Trench 5 showed a number of interesting observations. A thick layer of blown sand within the structure appears to correlate with a relatively thin layer outside; in both cases these are immediately under the topsoil profile, and appear to be the same layer. This suggests that the final ‘burial’ of the structure occurred only relatively recently (the date of the last major sand deposition), and that the building survived for some time as a ruin or earthwork. Buried soil was seen underneath this on the uphill side of the trench, but not on the downhill side.

Also in Trench 5 an apparent floor sequence with hearth rake-out was discovered, including a dark grey sand layer with charcoal [2040], over a yellowish brown sand lens [2053], over a thin lens of clay [2071], over a yellow sand layer [2072]. This sequence was sampled for soil micromorphological study, targeted at the clay layer as a possible floor with trampling.

In Trench 4 on the Snusgar mound, excavations revealed a set of plough marks [1554] underlying windblown sand layer [1509]. The latter layer appeared on closer inspection to comprise two fine layers: 1) 5-10cm of white blown sand, and 2) 5-10cm of grey sand, possibly an old topsoil horizon. Lying under [1509] is layer [1581], a <5cm thick horizon of dark brownish red sand, into which the plough marks mentioned above had been cut (the plough marks were clearly seen as greyish-white sand features). This sequence overlies a black layer [1555], over a red clay-rich midden [1519]; although in section one of the marks appeared to contain [1555] in its basal fill, upon excavation it became clear that this layer actually fully underlay the mark. It was unclear in the field if the lower layer of [1509] represents a highly eroded ploughsoil horizon (Ap), or a brief stabilisation horizon of heath/grass (Ah). If the former, this phase of ploughing could have ended due to sudden or increased aeolian sand deposition.

Context [1554] comprised five plough marks, labelled A-E. The features tended to have one straight side and one irregular side, and the straight sides alternated (on the right in one mark, on the left in its neighbour etc), as if the plough were turned to create the return furrow. The bases of the marks were exposed in plan, and some complete marks were also visible in the western section of the trench. Upon excavation, although the fills were mainly white sand [1509], a few fragments and fine layers of the immediately underlying contexts were seen as inclusions. Layer [1581] occurred both on top and under/around marks, suggesting that it is directly associated with the marks as a ploughsoil, and also that mouldboard inversion was seen in a couple of the features. The mark dimensions were 10-15cm wide at the surviving tops, 10-12cm deep. No ridges were visible. This phase of ploughing appears to have been short-lived, and no evidence of inter- or cross-cutting marks was seen. Other possible ploughmarks were also noted in sections at this part of the trench. A soil micromorphology sample was taken of a typical plough mark and surrounding deposits from this sequence (see sample list below).
A profile was also revealed showing a grey sand horizon [1570] overlying a pink horizon [1576], cut through by pit [1568]. This could be a buried soil, burning or midden sequence. This profile was sampled for soil micromorphological analysis (see sample list below).

The general depositional sequence (not stratigraphic) seen on the East Mound by the author is as follows:
- Modern topsoil
- Clean sand (probably windblown)
- Thin midden deposits and yellow sand
- [1509] greyish white buried topsoil
- Mouldboard ploughmarks
- [1581] midden
- Midden layers, stone layers, burnt layers with clay patches at base
- Pit (with burnt peat)
- Clean sand (probably windblown)
- [1570]
- [1576]
- Clean sand (probably windblown) – forming main mound
- Buried soil profiles
- Clean sand (probably windblown)
- Sand (waterlogged) with oxidation of roots

During sampling for OSL dating from the deeply buried soil horizons under the East Mound, a further auger hole was drilled into the centre of Trench 4 at its deepest exposed point in 2006, for comparison to the buried soil profile revealed nearer the edge of the mound in 2005 (see 2005 report). This borehole revealed 35cm of yellow sand (under base of mound), over 10cm of light grey sand on 20cm of yellow clayey sand (buried soil profile), over 40+cm of grey waterlogged sand with patches of yellow sand and iron stained roots (this equates to c. 1.05m depth from ground surface). The overall sequence is the same to that seen nearer the edge of the mound, and the depths of the buried soil are generally comparable, taking into account the evidence of compaction and tilting of the buried soil layers at the edge of the mound seen in 2005. However, this profile is significantly different from that seen in the 2005 excavations due to the presence of a clayey layer in the buried soil, while the buried soil near the edge of the mound comprised light grey sand [1534] over a slightly purple sand layer [1537], over a light grey sand layer [1538]. It is difficult to say at present whether the clayey yellow sand layer is part of an initial buried soil profile, or has simply developed over time due to presence under the central part of the mound, where there would be greater protection from later disturbance and leaching, as well as the impact of greater overburden. It should also be noted here that the central part of the mound was very different to the slope in the upper layers, being built up of many clayey midden and burning deposits, while the slope was primarily sand with stones, and this variation would obviously have had an impact on clay availability.

**Sampling in 2006**
Two soil micromorphology samples and small bulk samples were taken to investigate these sequences further: Sample 44 [1570]-[1576] of buried soils cut through by pit
and Sample 45 [1508]-[1509]-[1581] of plough marks and possible old topsoil.

Samples remaining to be processed this year are:

2004 14/1-3 506-507-508-510  Base of spademarks [506]; top of [507] pit fill (14/1) Base of [507] & top of [508] (Bt horizon) (14/2) Layer [510] (black deposit) (14/3)


2004 18 [1045]  (possibly including base of [1017] & top of [1035]) Midden [1017], greyish brown with iron panning Brown sand, possible midden or amended soil [1045] Yellow sand [1035]


2005 11 [1535]-[1536]-[1537]  Buried soil base, underneath East Mound

2005 no number [2005]-[2007]  Possible buried soil in upper East Mound

2006 44 [1570]-[1576]  Buried soil layers (grey 1570; pink 1576) under & cut through by pit 1568

2006 45 [1508]-[1509]-[1581]  Plough marks


Jean-Luc Schwenniger sampled for OSL dating from a number of sediments, including the following which are represented in the thin section samples: OSL 8 [1509], OSL 12 [1569], OSL 13 [1570], OSL 14 [1573].

Finally here, a number of small bulk samples were taken from Trench 5 (Table 1), to explore issues of use of space in and around the structure. These await processing for standard archaeological sediment bulk analyses (e.g. particle size, pH, magnetic susceptibility, loss-on-ignition, electrical conductivity), and for assessment of potential for future elemental analyses.

**Table 1 Soil bulk samples from Trench 5 for sediment bulk analysis**

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Context</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><a href="=2002">2025</a></td>
<td>Disturbed buried soil &amp; greyish-yellow sand</td>
</tr>
<tr>
<td>2</td>
<td>[2034]</td>
<td>Dark brown occupation layer/midden</td>
</tr>
<tr>
<td>3</td>
<td>[2025]</td>
<td>Dark brown sand/occupation layer on the ‘interior’</td>
</tr>
<tr>
<td>4</td>
<td>[2034]</td>
<td>As sample 2</td>
</tr>
<tr>
<td>5</td>
<td>[2010]</td>
<td>‘Interior’, between wall and orthostats; dark brown sand with</td>
</tr>
</tbody>
</table>
charcoal

6   [2010]  As above
7   [2034]  As sample 2
8   [2034]  As sample 2
9   [2034]  As sample 2
10  [2040]  Midden-like dump/burning/occupation layer with hearth rake-out
11  [2053]  Yellowish brown silty sand on the ‘interior’, possibly trampled
12  2040    As sample 10
13  2040    As sample 10

Additional loose bagged samples available for study include:

46 [1570]
47 [1576]
48 [1573]
49 [1581]
50 [1567]
51 [1509]
52 [1561]
53 [1565]
54 [1571]
55 [1533]
56 [1547]

**Conclusions and recommendations**
The geoarchaeological study is currently at a point where sample processing is urgently needed and steps are being taken to produce thin sections from the soil micromorphology samples. It is recommended that future action follows the course of: 1) production and analysis of soil micromorphology samples for comparison to OSL dating and to each other, in order to assess the initial questions of the geoarchaeological brief; 2) assessment of data produced in light of John Cluett’s thesis on the soils of the Orkney World Heritage sites (now completed); 3) development of future strategies in light of the resulting information from 1 & 2, including selection of specific bulk samples for sedimentology studies and possible elemental analysis. It is proposed that at this stage fieldwork in geoarchaeology should concentrate on simply monitoring and recording any new trenches, with sampling of pertinent and interesting deposits, but that the focus of immediate study is on completing the fundamental level of laboratory analyses needed to address the issues of the initial project design. The only additional samples that should be actively sought at this time are those from the buried soil with clayey sand layer seen through augering at the centre of the East Mound.

Although only excavated through trenches, it does not appear that the East Mound has substantial Medieval habitation deposits (unlike the Trench 5 mound with its structural remains); rather it comprises a series of midden or dump layers in the upper sequence, along with substantial evidence for burning, including of peat burning. Recent work on plaggen soils and mounds in other parts of Scotland using diatom and soil micromorphological analyses has been able to demonstrate the presence of ashes from turf and organic muds in Medieval mound deposits (Stephen Carter 2007 pers.)
comm.), and it may be possible to further explore both the fuel type used and the processes implied on the East Mound through additional sedimentary analyses of the sampled East Mound deposits.