Collated Archive and Updated Report on the Evaluation through Coring of Physical and Geophysical Anomalies on the Northern Aspect of the Mound

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May 2006

Contents

1.0 INTRODUCTION

1.1 This is an updated version of the original evaluation report (McAvoy 2002) occasioned by the re-numbering of the cores taken by the Centre for Archaeology following further coring by Cementation Skanska.

1.2 In August 2001 a seismic survey of Silbury was carried out by Cementation Skanska to provide information on the condition of the interior of the monument. The survey had two elements, signals transmitted between four boreholes dug from the summit, (cross-borehole survey), and signals from the boreholes to a network of surface receivers, (surface geophone survey).

1.3 The surface geophone element was judged to have performed satisfactorily and identified, amongst other responses, a significant geophysical anomaly on the northern slope of the hill (Skanska 2001). This northern anomaly was investigated further by seismic survey in February 2002 (Skanska 2002a). A new cross-borehole survey was carried out in April 2002 (Skanska 2002b).

1.4 Physical anomalies on the northern aspect were identified by the Archaeological Investigations team of English Heritage, as part of their overall topographic and analytical survey of the hill and its local setting (Field 2002).

2.0 THE NORTHERN ANOMALIES

2.1 The following description of the geophysical anomaly is derived from the results of the original cross-borehole survey and the additional survey of the northern anomaly.

2.2 The depictions of the results of these surveys show low velocity signals on part of the northern slope. These signals are interpreted as representing material that could be less dense or compacted than that which generally forms the mound, and from which higher velocity signals have been obtained.

2.3 In broad terms the zone of low velocity signals is a large scoop on the side of the hill (Figs 1 and 2). This begins some 35m upslope and broadens to a width of *c* 20m towards the base. The depth of penetration of this zone into the mound has not been entirely satisfactorily established but could extend down to the old land surface.

2.4 Explanations for the presence of this anomaly (Skanska 2002a) include:

- A previous slope failure that has been infilled at a later stage.
- A construction feature which has been infilled (of Neolithic age or later).
- A zone of low density material, due to changing construction techniques or drainage.
- An area seriously affected by burrowing and physical weathering/attack.

2.5 The most prominent of the physical anomalies is a platform *c* 14m long and 5m wide, the largest of a number of such platforms or scars identified on the hill slopes (Figs 1 and 3). Field (2002) has put forward some suggestions regarding the nature of this feature:

- If Roman in date, then it might represent a hut platform, perhaps similar to one apparently found on the south-east side of the mound in earlier investigations (Wilkinson 1867) when charcoal and wood ash were recovered. Alternatively the platform may have been the base for a monument.

- If Early Medieval in date, then it might be associated with activity of this period on the summit and terraces of the hill.

- If Post-medieval in date, then it might be associated with a landscape feature, such as a grotto.

2.6 Below the platform is a trench-like scar leading to an apron, which itself has a lower scar on the same alignment that appears to cut the old ground surface. It is possible that at least part of this scarring is a result of a hitherto unlocated excavation trench dug by Professor Richard Atkinson in 1970.

2.7 Alternatively any or all of these features may be surface expressions associated directly with the low density material, as in the vertical scarring seen on the south-west slope which represents the upward migration of the collapsed 1849 tunnel.

3.0 THE CORING EVALUATION

3.1 Method

3.1.1 Four cores were obtained from the northern slope of Silbury using an Eijkelkamp system, which is fully described in Canti and Meddens 1998. These cores are numbered 8-11 with the cores obtained by Skanska being numbered 1-7.

3.1.2 The core locations were determined on the basis of the results of the original cross-borehole survey and the additional survey of the northern anomaly. Cores 8 and 10 were located within the geophysical anomaly with cores 9 and 11 on either side (core 8 was additionally sited within the large platform).

3.1.3 The core positions were set out in advance of the work by staff from Archaeological Survey but due to vegetation growth only two of the predetermined positions were found (cores 8 and 9).

3.1.4 This did not affect the overall core location strategy. Core 11 was sited 3.2m upslope from the pegged location, which was found after the core had been taken. Core 10 was sited in the centre of a line between cores 9 and 11 (Fig 3).

3.1.5 Detailed descriptions of the deposits in each core were made by Matt Canti, and the core contents were then photographed and replaced in the boreholes.

3.1.6 The sediment descriptions and their depths are presented in Figures 5-7, together with photographs. No photographs are available for core 10 due to an oversight by the author.

3.2 Results

3.2.1 The detailed descriptions are summarised below for each core.

3.2.2 **Core 8**, located on the 'platform' and within the geophysical anomaly, has predominantly 'soil' deposits to a depth of 1.35m, below which are the chalk deposits of the mound to an obtained depth of 4m. A re-deposited subsoil layer, 0.04m thick, at a depth of 2.55m, divides these chalk deposits.

3.2.3 **Core 9**, beyond the eastern limit of the geophysical anomaly, has predominantly soil deposits to a depth of 0.53m, below which are the chalk deposits of the mound (with a slightly greater soil content for the first 0.47m) to an obtained depth of 3m.

3.2.4 **Core 10**, within the geophysical anomaly, has predominantly soil deposits to a depth of 0.36m, below which are the chalk deposits of the mound to an obtained depth of 3m. These chalk deposits are divided by two re-deposited subsoil layers, 0.16m and 0.42m thick, at depths of 0.82 and 1.3m respectively. Charcoal flecks were noticed in the lower subsoil deposit as this was being extracted from the core barrel.

3.2.5 **Core 11**, beyond the western limit of the geophysical anomaly, has very shallow soil deposits to a depth of 0.3m, below which are the chalk deposits of the mound to an obtained depth of 2m.

3.2.6 No artefacts or ecofacts were recovered from the cores and no material was removed for further investigation.

4.0 CONCLUSIONS

4.1 The work successfully revealed the presence of marked contrasts in the nature of the deposits on this part of the northern aspect of the hill:

- 'Soil' dominated deposits were found to vary in depth from 0.3m in core 9, to 1.35m in core 8, where they would be consistent with the infill of a dug feature such as a platform.

- Conversely chalk and subsoil 'mound' deposits, directly comparable with those seen in the earlier Skanska cores, were seen in all of the cores. These deposits were found at depths of 0.3m in core 11, 0.35m in core 10, 0.53m in core 9, and 1.35m in core 8, where they were truncated by human and/or animal activity.

4.2 The soil deposits will be less dense than the chalk deposits and the deeper deposits may be responsible for low velocity signals recorded on the seismic survey.

4.3 It should be noted that there are distinctive differences in the colour of the vegetation on the hill (Fig 4) with some areas being much greener. On the northern aspect this could be reflect the presence of deeper soil deposits that are either more water-retentive, or nutrient-enriched from animal habitation.

4.4 The mound deposits seen in these new cores can be regarded as being as stable as those seen elsewhere but of course the coring process introduces a considerable amount of compaction and compression.

5.0 RECOMMENDATIONS FOR FURTHER WORK

5.1 It should be noted that the depiction of the northern geophysical anomaly varies considerably both in depth and extent between the two principal Skanska survey reports (Skanska 2001 and 2002b).

5.2 For example cross-section 168580 (Fig H22, Skanska 2001) shows a very considerably anomaly that is missing entirely from the same cross-section (Fig A48) in Skanska 2002b.

5.3 Similarly cross-section 168590 (Fig H23, Skanska 2001) shows a very large anomaly that is much less obvious in the same cross-section (Fig A49) in Skanska 2002b.

5.4 These differences are also seen in plan where the geophysical anomaly is shown, at the 155m level, to be much reduced in extent and to begin further to the north in Skanska 2001 (Fig H5) than in Skanska 2002b (Fig A30).

5.5 The reduction presented in the nature of the geophysical anomaly must presumably also be reflected in any re-assessment of its significance.

5.6 If it is decided to pursue the investigation of the northern geophysical anomaly further then this should consist of:

- A single core transect, with cores at 5m intervals from 410995/168600 to 410015/168600 (5 cores) and a single core, if practicable, at 410005/168605.

- All cores to be taken down as far as is reasonably practical but no deeper than 0.5m below the base of the old land surface.

5.7 If, however, coring requires considerable ground disturbance, to meet either technical or Health and Safety requirements, then it may be felt that the presence of this anomaly, like others on the periphery of the mound, should be noted and not explored further.

6.0 ACKNOWLEDGEMENTS

6.1 The author would like to thank Matthew Canti and David Robinson from CfA, who carried out the coring in rather unusual and onerous conditions.

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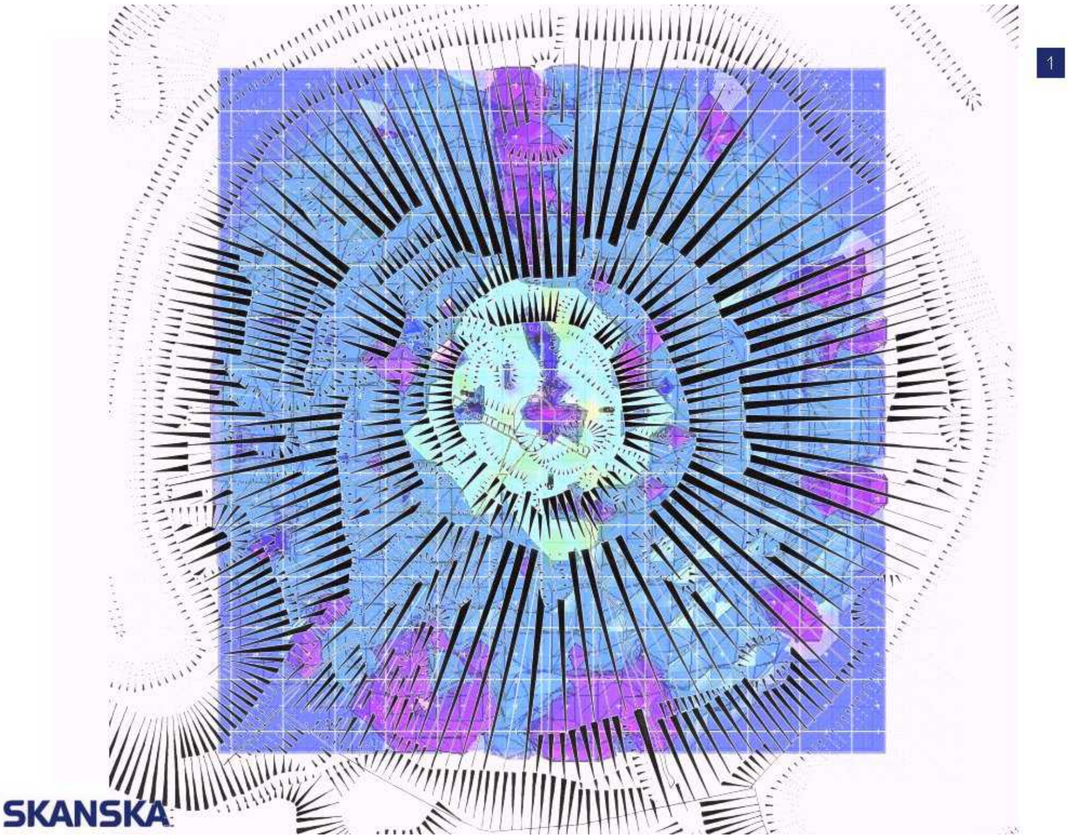

Figure 1: geophysical and physical anomalies (After Skanska 2001 and Field 2002)

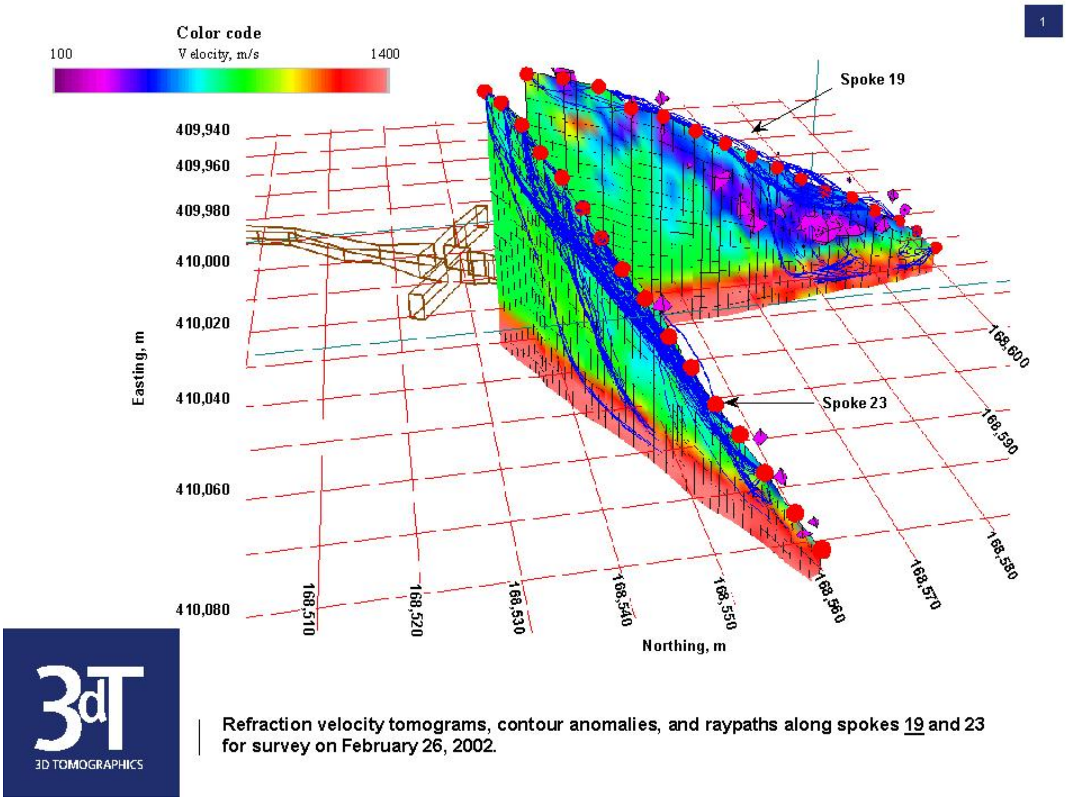

Figure 2: the northern geophysical anomaly (after Skanska 2002a)

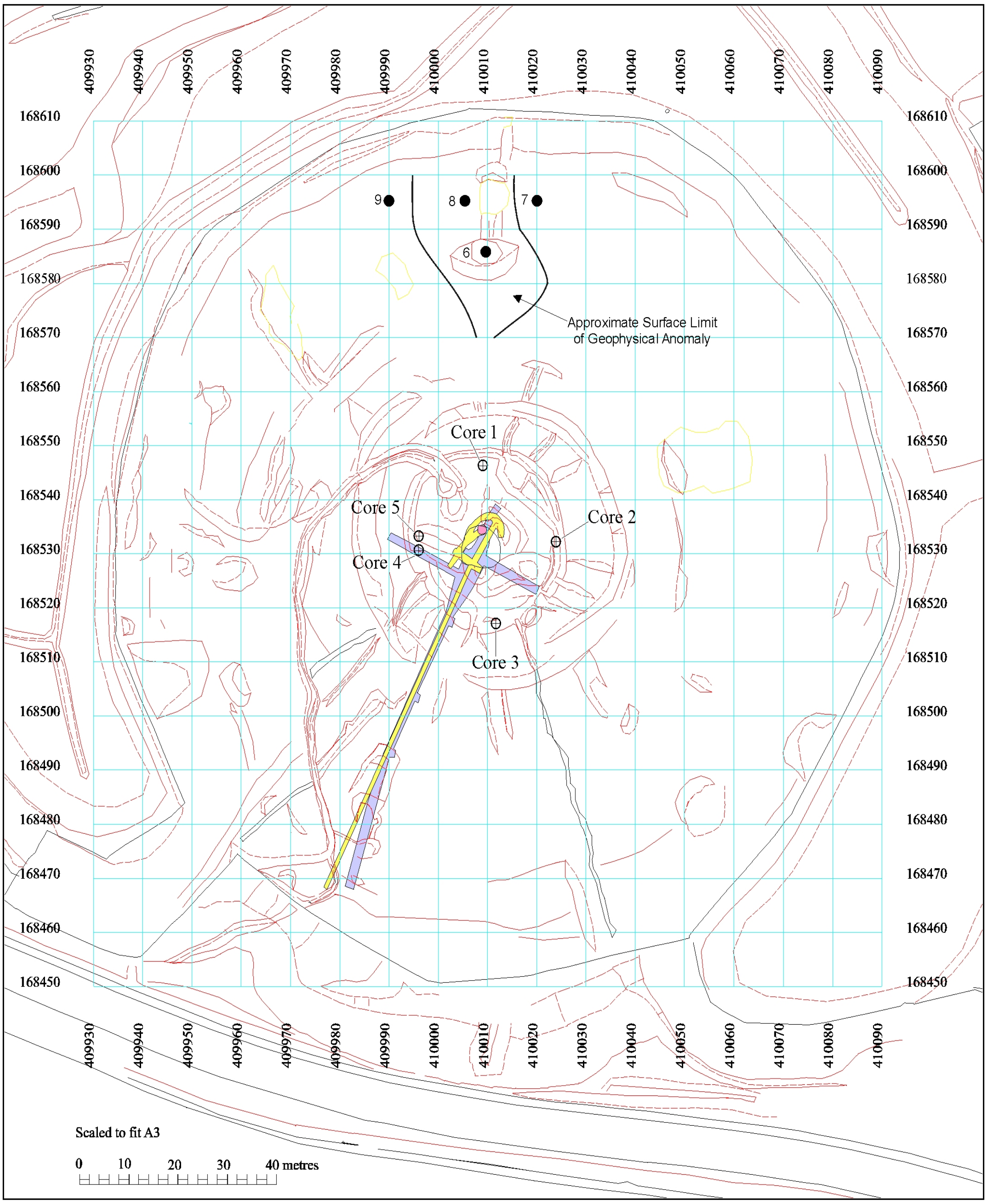

Figure 3: physical anomalies and core locations

Figure 4: overviews of the northern physical anomalies (photos: Brian Edwards, April 2001)

Core 8

Depth from surface (m)	Deposit description
0 – 0.27	Dark brown (10 YR 4/3, field moist) silt loam with <2% 0.01-0.1m subangular to subrounded chalk stones. 0.04m smooth boundary to:-
0.27 – 0.49	Dark brown (10 YR 4/3, field moist) silty loam, with 5-10% 0.01-0.1m subrounded to rounded chalk stones. 0.03m smooth boundary to:-
0.49 – 1.35	Dark yellowish brown (10 YR 4/4, field moist) silty clay loam, with 10-15% 0.01-0.22m subangular to rounded chalk stones. 0.04m smooth boundary to:-
1.35 – 2.55	White (10 YR 8/2, field moist) silty clay loam with up to 50% subangular and subrounded chalk stones, 0.01-0.4m. Occasional streaks of dark yellowish brown (10 YR 4/4, field moist) silty clay loam. 0.02m boundary to:-
2.55 – 2.59	Brown (7.5 YR 5/4, field moist) silty clay loam, stoneless. 0.01m smooth boundary to:-
2.59 – 4	White (10 YR 8/2, field moist) silty clay loam with up to 50% subangular and subrounded chalk stones, 0.01-0.4m. Occasional streaks of dark yellowish brown (10 YR 4/4, field moist) silty clay loam.

Figure 5: core 8

Core 9

Depth from surface (m)	Deposit description
0 – 0.17	Dark brown (10 YR 4/3, field moist) silt loam with <2% 0.01-0.1m subangular to subrounded chalk stones. 0.04m smooth boundary to:-
0.17 – 0.53	Dark yellowish brown (10 YR 4/4, field moist) silty clay loam, with 10-15% 0.01-0.2m sized subangular to rounded chalk stones. 0.03m smooth boundary to:-
0.53 – 1.0	Mix of dark yellowish brown (10 YR 4/4, field moist) silty clay loam, with 10-15%, 0.01-0.2m sized subangular to rounded chalk stones and white (10 YR 8/2, field moist) silty clay loam with up to 50% subangular and subrounded chalk stones up to 0.3m in size. Boundary not visible.
1.0 – 3.0	White (10 YR 8/2, field moist) silty clay loam with up to 50% subangular and subrounded chalk stones, 0.01-0.4m. Occasional streaks of dark yellowish brown (10 YR 4/4, field moist) silty clay loam.

Figure 6: core 9

Core 10

Depth from surface (m)	Deposit description
0 – 0.1	Dark brown (10 YR 4/3, field moist) silt loam with < 2% 0.01-0.1m subangular to subrounded chalk stones. 0.03m smooth boundary to:-
0.1 – 0.36	Dark yellowish brown (10 YR 4/4, field moist) silty clay loam, with 10 -15%, 0.01-0.2m sized subangular to rounded chalk stones. 0.01m smooth boundary to:-
0.36 – 0.82	White (10 YR 8/2, field moist) silty clay loam with up to 50% subangular and subrounded chalk stones, 0.01-0.4m. Occasional streaks of dark yellowish brown (10 YR 4/4, field moist) silty clay loam. 0.02m smooth boundary to:-
0.82 – 1.0	Brown (7.5 YR 5/4, field moist) silty clay loam with up to 5% subangular and subrounded chalk stones, 0.01–0.1m. Boundary not visible
1.0 – 1.3	White (10 YR 8/2, field moist) silty clay loam with up to 50% subangular and subrounded chalk stones, 0.01-0.4m. Occasional streaks of dark yellowish brown (10 YR 4/4, field moist) silty clay loam. 0.02m smooth boundary to:-
1.3 – 1.72	Brown (7.5 YR 5/4, field moist) silty clay loam with up to 5% subangular and subrounded chalk stones, 0.01-0.1m. 0.04m boundary to:-
1.72 – 3.0	White (10 YR 8/2, field moist) silty clay loam with up to 60% subangular and subrounded chalk stones, 0.01-0.2m.

Core 11

Depth from surface (m)	Deposit description
0 – 0.3	Dark greyish brown (10 YR 4/2, field moist) silt loam, no stones. 0.05m smooth boundary to:-
0.3 – 2.0	White (10 YR 8/2, field moist) silty clay loam with up to 70% subangular and subrounded chalk stones, 0.01-0.2m.

Figure 7: core 11