Proposals for further archaeological investigation, including geophysical survey, at Silbury Hill

Neil Linford, Dave Field and Matthew Canti

1.0 Introduction

The ongoing remedial works at Silbury Hill have provided a renewed impetus for a campaign of archaeological investigation of both the monument itself and its immediate environs (McAvoy 2004). Most recently, a high sensitivity caesium magnetometer survey was conducted by the English Heritage Geophysics Team revealing significant archaeological and geomorphological anomalies in the area immediately east of the monument (Figure 1).

This document suggests a range of proposals for further investigative work to assist interpretation of the monument within its immediate landscape environment. Some of the work has already been proposed (e.g. David 2001) but may need re-assessment in the light of changed priorities for increasing our understanding of the monument following the recent collapse history and intended repair works.

2.0 Research questions arising from the recent magnetic survey

2.1 Distribution of alluvium

The magnetic data demonstrate a distinct variation of response between the slightly raised ground to the east of the extant field drain and the more subdued anomalies along the course of the Winterbourne stream and its floodplain (Payne forthcoming). This variation is likely to reflect the underlying geology of the site (Figure 3) with good results over the valley gravel fading beneath the increasing depth of alluvial overburden. Despite the presence of substantial alluvial overburden the high sensitivity caesium magnetometer has still managed to detect a number of subtle ditch-type responses that, in part, align with similar features identified to the east of the stream. The distribution of alluvium increases to the north and west of the current survey area. Given the resource implication associated with extending the caesium magnetometer survey, some form of trial survey transect, perhaps supported by limited invasive coring, should be conducted to establish the most fruitful areas for further geophysical survey.

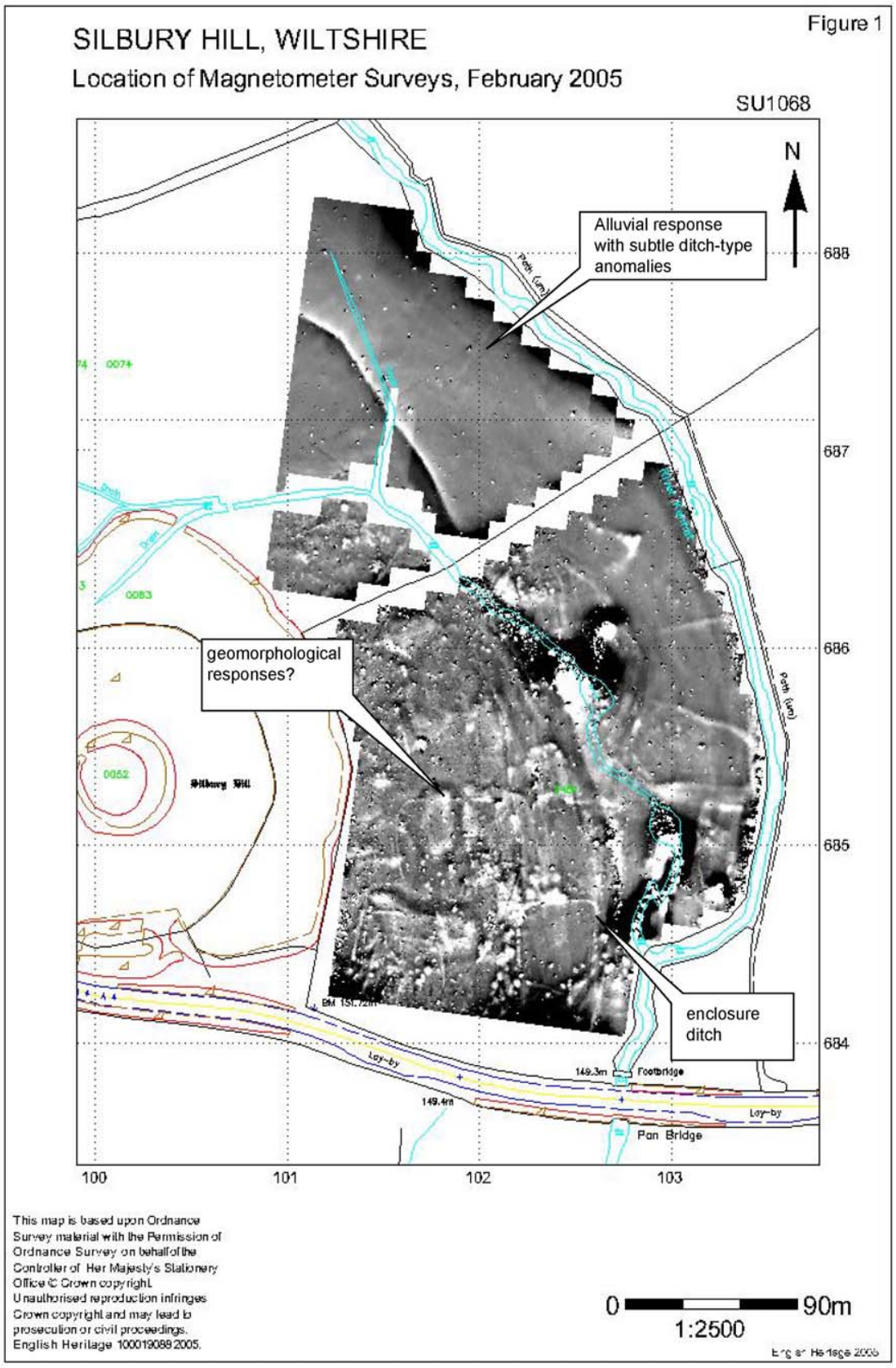

Figure 1 *Results from the recent high sensitivity caesium magnetometer survey at Silbury Hill. The plot is annotated to show examples of the alluviated areas of the survey, possible geomorphological responses and an enclosure ditch.*

2.2 Anomalies of apparent archaeological origin

A number of enclosure and ditch-type anomalies have been revealed by the magnetic survey, suggestive of further Roman occupation associated with the well of similar date identified in this area and, perhaps, marking a continuation of the settlement activity recorded both to the east of the Winterbourne on Waden Hill and south of the A4. Some invasive investigation of these anomalies would be useful to confirm their origin and discount the possibility that they may be related to a later period of activity, for example the post medieval fair that is thought to have occurred in this area. Extending the limited earth resistance survey conducted at the same time as the magnetic survey may also be helpful in this regard for the possible identification of building remains that would not, necessarily, be detected by the magnetic survey.

2.3 Extension of the magnetic survey

The success of the current caesium magnetometer survey suggests that the extension of coverage to the north and west of the monument would be fruitful, together with a survey immediately south of the A4 to place Silbury Hill within its immediate archaeological context. However, due to the area involved this is not a trivial undertaking and may be compromised by the presence of substantial alluvial deposits to the north of the hill (Figure 3). The traffic load on the A4 will also produce a corridor of approximately 30m either side of the road where the sensitivity of the caesium instrumentation may be affected by the magnetic disturbance due to the vehicles. Survey with fluxgate gradiometers could mitigate problems in these areas. In addition, much of the area protected within the SAM is not practical for survey with the caesium magnetometer system. These areas are of archaeological interest, for example in the vicinity of a possible swallow hole to the south west of the monument; they will be traversed, in part, by contractors and equipment involved in any remedial work associated with the collapsed tunnels. Geophysical survey is therefore recommended using a combination of fluxgate gradiometers and earth resistance.

Scatters of burnt flint around the southern lip of the ditch extension, to the south west of the monument, were noted during field survey and the area is likely to be one of fragile Neolithic archaeological remains. However, the area is crossed by a number of early traffic ruts and was used by Atkinson for excavation paraphernalia (Figure 2), so only fragments of former land surface may have been left intact. Geophysical survey here, although potentially awkward, is likely to demonstrate the extent to which important archaeological traces remain alongside the 'tank' (the wide area of ditch extension to the west of the hill, see Figure 6) that might indicate how it was constructed or used.

Figure 2 *Aerial view of Silbury Hill showing the location works associated with the Atkinson excavation.*

Magnetic survey to the south of the A4 is likely to have a good response and would complement both fieldwalking and air photography plots to produce an informed picture of archaeological activity and landscape development on this side of the monument. If extended eastwards onto the valley floor it would have the benefit of joining up the geophysical background around the periphery of the monument, as well as linking in to the areas where geophysical investigation has been carried out by Bristol University further to the east (Gunter and Roberts 2005). This would not only provide data about the course of the Roman Road as it approaches Silbury and crosses the Kennet valley floor, but might also locate the major Roman building, known to exist from the finds of dressed stone, the Bathstone column, tiles and other material found in one of the wells. It will also provide a valuable link between the (?near) contemporary monuments of Silbury Hill and the West Kennet palisaded enclosures. Earth resistance survey may also be considered should areas of possible building remains be identified from the magnetic data.

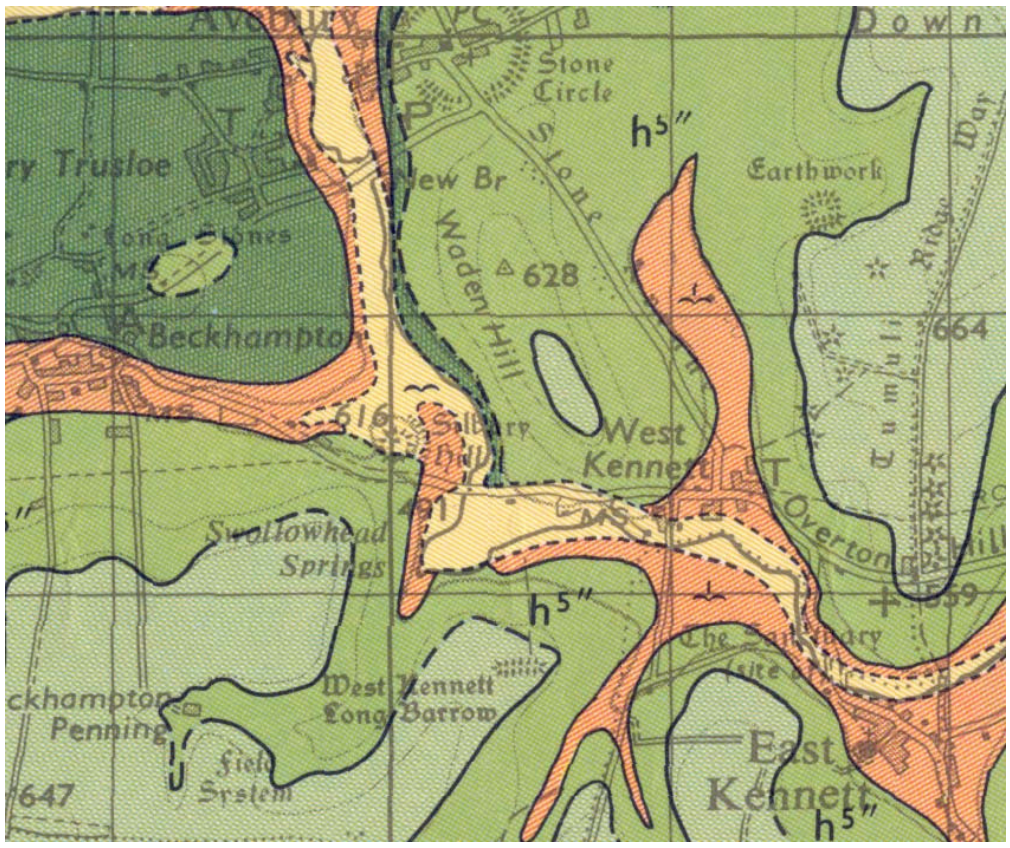

Figure 3 *Geological map of the deposits at Silbury. Green is chalk; orange valley gravel; yellow is alluvium (Institute of Geological Sciences* 1974).

2.4 Investigation of the Old Ground Surface beneath Silbury Hill

In addition to the archaeological anomalies in the fields to the east of Silbury Hill there are a variety of 5 – 10 m scale rounded, arcuate and lobate anomalies (Figure 1). By virtue of their size and irregular shape, these features give the appearance of natural, possibly geomorphological phenomena.

From the geology map (Figure 3), we can deduce that these fields are on the last exposed remnant (the eastern side) of the spur of valley gravel on which the monument was built. The remainder of the spur is either covered by the hill itself, or cut away in the areas around the hill especially to the west. Understanding the features shown by the magnetic data may, therefore, provide the key to understanding the land surface beneath Silbury Hill.

The nature of that land surface has been a problem since the six seismology cores taken right through the hill in 2001 showed the depth of clays or clay/flint mixtures that occurs in the base of most cores (Figure 4). These sorts of deposits

are found naturally on interfluves (true Clay-with-flints) or redeposited in pipes and periglacial cryoturbation features often near the surface. Clay-with-flints generally caps the interfluves above Silbury, so a periglacial sludge including it from upslope might well form a part of the valley gravel spur on which Silbury Hill was built.

If the large geomorphological anomalies in the magnetic data are indeed clay pockets associated with periglacial activity, then extrapolation to the surface beneath the Hill (Figure 5) would

suggest a similar explanation for the clay rich basal deposits found in most of the cores, as well as the fact that Core 4 had no such a layer, and the varied nature of the Evans lumps, some of which were clayey turves, while others were from rendzinas (Canti et al. 2004).

3.0 Further complementary investigations at Silbury Hill

3.1 Antiquarian investigations

Alongside any work to collate and put in order the Silbury archive, there is a pressing need to address the surviving material from early investigations up to and including that of Atkinson. None of it is adequately in the public domain and with modern analytical techniques, it could provide much detail about development and use of the site. Enormous quantities of Roman material, mentioned in passing by Atkinson have gone unreported and there are significant quantities of early medieval material, including a spearhead, that needs to be looked at. Most of the Atkinson material is housed in the Alexander Keiller Museum at Avebury, while smaller quantities, including a fragment of turf from the core of the mound, are at Devizes Museum. However, the Roman material appears to have gone missing and it may be necessary to trawl museums and university departments in order to trace it. An undergraduate dissertation for University College, Cardiff on the Roman finds from the ditch was prepared in 1971 by M. Farley but disseminated no further.

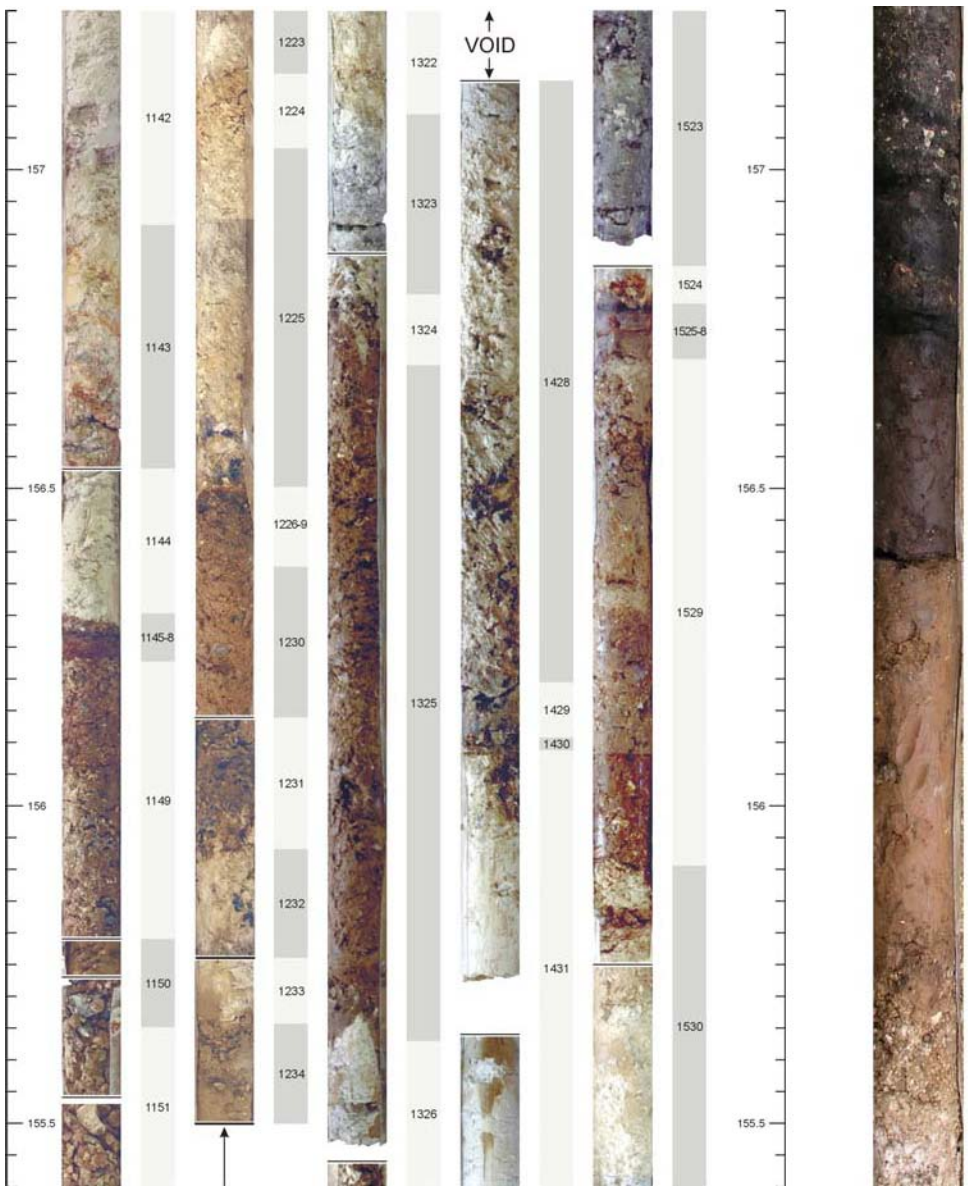

***Figure 4**. Old ground surface exposed in Cores 1 – 6. Some colour differences are due to variation between individual photographs. The scale for Cores 1 to 5 does not apply to Core 6.*

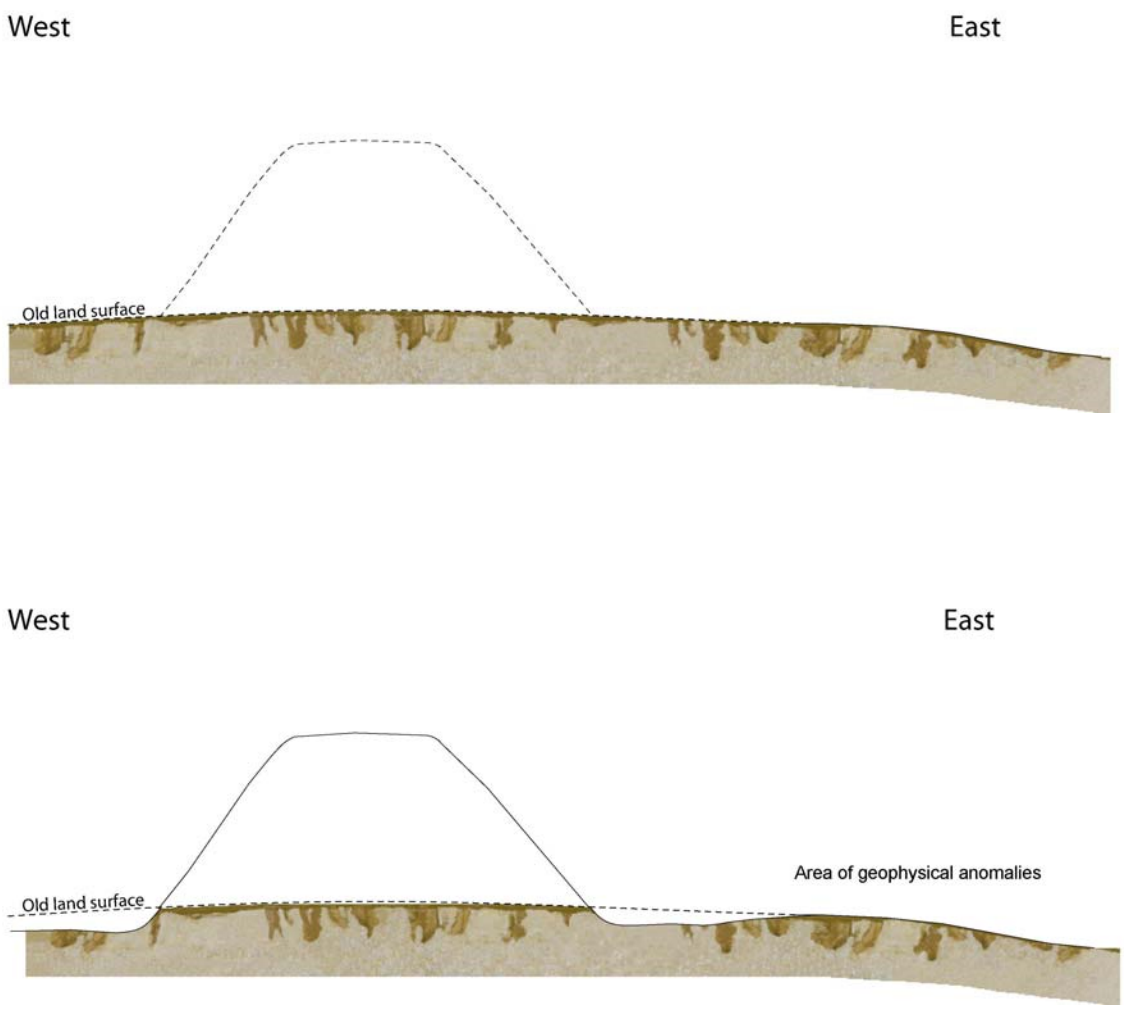

Figure 5 *Hypothetical schematic E-W line through Silbury and surrounding land, showing the original spur of valley gravel with proposed clay pockets before construction (upper view) and after construction (lower view)*

3.2 Investigation to the south of the A4-fieldwalking

The nature of archaeological activity to the south of the A4 has never been satisfactorily resolved, but is nevertheless likely to have considerable bearing on interpretation of the monument. The ditch may well underlie at least part of the road, so land immediately to the south would, therefore, lie close to the ditch

edge. If the mound was meant to be accessed it will almost certainly have been from this direction and considerable Neolithic and later activity might be expected. A Roman road and a number of wells are reported, although as it approaches Silbury the precise location, course and nature of the road is unclear. One of Stukeley's illustrations depicts a series of equally spaced hollows on either side of the road, which could be stone holes, treeholes or monument stances. The presence of buildings or burial monuments might be expected alongside the road as it approaches the settlement known to lie to the east of the Kennet. Atkinson's plans made it clear that he intended to investigate the Roman road as part of his work programme but there is no

extant report. Roman potsherd scatters were noted on the field edges during archaeological investigation in 2003.

Field walking, over a considerable portion of the northern part of the field on a tight grid system should highlight activity areas. The area to the west in the Beckhampton valley has been surveyed in such a way (by J Pollard, Bristol University) and work there might form a control for comparing artefact density. This work should be contracted out.

3.3 Air photography

The current air photograph plot was part of an NMP programme carried out in 1998 at 1:10,000 scale (i.e. to an accuracy of +/- 5 to 10m of the ground position) and intended to depict archaeological features over large areas. It is considered worthwhile revisiting the air photographs, possibly plotting a limited area at larger scale, incorporating recent photography, and depicting where appropriate geomorphological information such as ancient meanders, solution hollows or dolines. This will assist with understanding of the ancient ground surface and topography, but prehistoric use of such features has been demonstrated elsewhere, both directly (e.g. for settlement or where ritual deposits might be placed) and indirectly as barrow cemetery foci, and they may have considerable significance for the archaeology here. Such work should be carried out in house.

3.4 Improving understanding of the fills in the ditch extension

It would be useful to establish what the fills of the ditch extension are made of, what their date is, and whether they preserve plant and animal remains. This could be achieved by a transect of cores at 5 metre intervals across the ditch extension. The coring would be done using a powered percussion auger with sleeved insert.

The cores would be described and subsampled for assessment of potential for analysis of pollen, diatoms, chironomid larvae, plant macrofossils, insects and snails as appropriate to the nature of the stratigraphy. The samples would be too small for conventional assessment for insects, plant macrofossils and snails, but

may serve to identify their presence and in the case of plant macrofossils and wood, to provide samples for radiocarbon dating.

This work should allow us to establish whether the ditch sediments have the potential to provide additional information on the immediate and local environment of the hill. It may also place the information on the Neolithic grassland landscape obtained from the turf stack, for example, in its wider environmental setting. The identification of the stratigraphy in the cores would also assist in ground- truthing the results of the geophysical survey.

3.5 Vegetation mark in ditch extension

The vegetation mark showed only fleetingly as the ditch dried out (Figure 6). It is difficult to reconcile as a modern or natural feature, but instead appears to relate to subsurface ditch morphology. Aside from a little unpublished seismic work by Atkinson, and some sondages dug by Pass in 1887, very little is known about the morphology, chronology, phasing and use of the ditches. There is a possibility that (despite Atkinson's view to the contrary) the ditch was constantly wet in the past, due to a higher water table or springs which ensured constant

seepage. Understanding whether the ditch was wet or dry is crucial to understanding the nature of construction as well as use throughout time.

A geophysical investigation of the ditch profile around the monument may be useful in this regard. This would be obtained through a combination of electrical resistance imaging for the ditch profile and low frequency ground penetrating radar in an attempt to identify an interface with the water table. If successful, the geophysical data may also allow the volume of quarried chalk from the ditch to be estimated and compared with the known extent of the monument.

Figure 6 *View from the summit of Silbury Hill to the SW showing the vegetation mark visible due to waterlogged ground conditions.*

4.0 Task list

The following table summarises the individual tasks necessary to meet the research aims discussed above. The availability of these resources, particularly those of internal EH Teams, cannot be confirmed and where appropriate an indicative estimate for external provision is included.

Table 4.1

Task	Research Aims	Description	Resource	Days
1(A)	2.1, 2.2, 2.3	Extend Cs magnetometer survey to north and west of Silbury Hill and to the south of the A4	EH Geophysics	15
1(B)	2.2	Extend trial earth resistance survey over areas of archaeological activity identified in the magnetic survey	EH Geophysics (External)	5
1(C)	2.3	Investigate the area of the SAM immediately adjacent to the monument with fluxgate gradiometry and earth resistance survey	EH Geophysics (External)	5

2	2.4, (2.1 and 2.2)	Trench examination across selected anomalies using trenches of 5 – 10 m length and about 1 m deep. These will be dug across three of the natural -looking anomalies. Suggested locations are north-south centred on 1024 6855, on 1018 6853 and 1015 6847. The trenches will be recorded and photographed; finds will be dealt with appropriately. Sampling for soil analysis could be required depending on what is found, and coring may be needed from the base of the trench to test the stratigraphy a metre or so deeper.	???	???
3	3.1	Compile catalogue of Antiquarian finds and their contexts needs and then obtain appropriate specialist reports obtained.	External contract	???
4	3.2	Field walk an area of ~??ha to the S of the A4 on a ??m grid	External contract	???
5	3.3	Re-examine existing aerial photography and produce an updated survey covering the immediate environs of the monument	EH in house	???
6	3.4	5m interval cores across the ditch extension.	EH in house	???
7	3.5	Geophysical survey to examine the profile of the ditch section and any associated quarries. Multiple ERT sections and low frequency GPR transects.	EH Geophysics (External)	10

5.0 References

Canti, M G, Campbell, G, Robinson, D and Robinson, M 2004. Site Formation, Preservation and Remedial Measures at Silbury Hill. Centre for Archaeology Report Series, English Heritage 61/2004.

David, A 2001 'Geophysical Survey' in Chadburn A and Pomeroy-Kellinger, M (eds), Archaeological Research Agenda for the Avebury World Heritage Site Salisbury: Wessex Archaeology/English Heritage, 71-9

Gunter, J and Roberts, V 2005. Geophysical Surveys Spring 2005: Avebury World Heritage Site. MA in Landscape Archaeology Report, University of Bristol.

Institute of Geological Sciences 1974. Sheet 266, Marlborough, Drift edition.

McAvoy F 2004. 'Silbury Hill, an assesment of the conservation risks and possible responses arising from antiquarian and archaeological investigations deep into the hill.' English Heritage, draft for discussion (28.09.04).

Payne, A forthcoming. Silbury Hill Environs, Avebury, Wiltshire: Report on Geophysical Survey, February 2005. Research Department Report Series, English Heritage.