English Heritage

Silbury Hill Conservation Project 2007/8

Project Number 661

Updated Project Design

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Document Control

Version	Date	Compiler	Reason
1.0	12/12/08	JL	Draft report
1.1	19/02/09	JL	Draft report incorporating comments from the internal Project Team
1.2	07/04/09	JL	Draft report incorporating comments from outside the Project Team

Contents

1 BACKGROUND

English Heritage has been engaged in work at Silbury since May 2000 when a vertical shaft originally dug in 1776 re-opened up on the summit. After temporary stabilisation, a major investigative programme revealed further local problems associated with lateral tunnels dug at the base of the hill in 1849 and 1968. A scheme for permanent remedial works was agreed, and in 2007 and 2008 remedial works as well as an intensive programme of archaeological work was undertaken. The circumstances of these events and the results of the archaeological work have been set out in detail in the Archaeological Assessment Report (Leary 2009) and are not repeated here.

This Updated Project Design sets out the Analyses Programme for all the archaeological work to be undertaken as part of the Silbury Hill Conservation Project (Project Number 661).

2 RESEARCH AIMS AND OBJECTIVES

The aims and objectives of this project have already been set out in the Project Design (McAvoy *et al*/ 2008). They are:

2.1 Aims

A1 To mitigate any disruption of archaeological deposits occasioned by the remedial works;

A2 To improve our understanding of the construction use and development of Silbury Hill in its landscape to inform a long-term management strategy;

A3 To investigate the current state of preservation within the Hill, including evidence for active and past decay;

A4 To encourage and develop the involvement of new and existing audiences for Silbury Hill

2.2 Objectives

A1.O1 To monitor all remedial works

A1.O2 To record any newly exposed deposits

A1.O3 To retrieve artefactual material from any prehistoric deposits removed during remedial works

A2.O4 To create an interpretive record to modern standards of the deposits exposed by Atkinson

A2.O5 To provide a robust chronology for the monument

A2.O6 To expand Atkinson's summit excavations and clarify his interpretation

A2.O7 To excavate and record the lower deposits of the quarry/ditch recorded by Atkinson

A2.O8 To examine Atkinson's archive as deposited in the Keiller Museum to determine what further understanding can be gained through its assessment and analysis.

A3.O9 To record the size and positions of the tunnels and any voids visible during remedial works

A3.O10 To consider the deposits within the tunnels as evidence for the recent history of the hill

A3.O11 To sample significant deposits for understanding of the mechanisms involved in the preservation of delicate biological materials within Silbury I;

A3.O12 To install equipment to monitor the preservation environment of the hill for the period after the hill has been restored.

A4.O13 To liaise with interpretation officers based at the viewing point

A4.O14 To produce a weekly web update and respond to 'ask the experts' queries by email

A4.O15 To work with documentary makers and other media as identified by the press office

A4.O16 To run an NAW event in conjunction with regional visitor operations staff

A4.O17 To create and disseminate an integrated digital archive

A4.O18 To publish both academic and popular synthetic accounts

2.3 Original Research Questions

RQ1 is there any evidence for truncation of the Old Land Surface prior to the construction of various phases of the mound?

The results from the geoarchaeological study indicate that the Old Land Surface is truncated underneath much, of if not all, of the Hill. Further to this it would appear to have been modified somehow, perhaps by trampling. Experimental studies are being undertaken as a separate project to understand this process (Project Number 5689), and will feed into this Analysis phase. Answering this Research Question has been partly achieved.

RQ2 is there any evidence that material other than turves formed part of the construction of 'core' of Silbury I?

The first evidence for construction at the site is represented by a gravel mound. This is overlain by the Lower Organic Mound and the Upper Organic Mound, both formed of topsoil, subsoil, as well as lenses of chalk, gravel and turves. Also incorporated into the Upper Organic Mound were a number of sarsen stones. It is therefore clear that material other than turves were used in the early phases of construction, and although this Research

Question has been fully answered understanding how these different materials were used and incorporated will form an important aspect of the analysis programme.

RQ3 were the turves forming the turf stack all cut from the same type of vegetation or is there a mixture of different vegetation types? This may help us establish whether they were all cut from the same area of from different areas within the landscape.
The fieldwork and assessment has established that turves from at least two different soil types, clay with flints and chalk are present. While grassland habitats predominate, detailed analysis of macroscopic plant remains, insects and molluscs, will help us understand the similarities and differences both within and between the Lower and Upper Organic Mounds and determine the possible extent of the area from which turves, topsoil etc. was removed. This question has been fully answered, however further detail will be sought during the analysis programme.

RQ4 were some of the insects and seeds remains introduced into the turves/Old Ground Surface as a result of local flooding, or deliberate wetting of the turf stack (see Breuning-Madsen *et al*, 2002)?
There was little indication of flooding or wetland habitats in any of the samples examined, in contrast to the earlier research. This probably reflects the heterogeneity of the deposits. There is a slight possibility that the local water table was rising since some of the remains from the Upper Organic Mound suggest slightly wetter conditions. However this requires further investigation (see New Research Question 29). There was no evidence for deliberate wetting of the Lower Organic Mound or Upper Organic Mound, and earlier phases generally. Diatoms were absent from the deposits, as were aquatic species. This question has been partly answered.

RQ5 are there significant differences between what was growing on the Old Ground Surface prior to construction of the mound and the vegetation represented by the turf stack?
Since the OLS appears to have been truncated it is not possible to answer this question and compare the vegetation growing on this surface with that of the turves, although comparison of the remains within this deposit should allow us to better understand the pre-monument surface and answer questions about how the mound/s were built. There is also some evidence of human activity prior to the building of the mound and this requires dating and analysis.

RQ6 can we recover further information regarding the levels of livestock present in the landscape from which the turves were cut, and subsequently (capping layers)?
The scarabaeoid dung beetles certainly have the potential to give further information on the levels of livestock stocking. This question has therefore been partly answered.

RQ7 what is the nature of the structures recorded by Atkinson on the summit? Are they walls as he interpreted and if so, can we date them?
The prehistoric deposits recorded on the summit comprised a series of layers of fine chalk dumps lain on top of one another and were held in place on the outer side by large, loose pieces of chalk rubble, which effectively formed a sloping, rough revetment wall. A similar technique to this was also seen in the backfilled buried ditches within the tunnel and on the hillside and therefore clearly represents the Neolithic construction technique used to build the final phases of the monument. This question has been fully answered.

RQ8 is the current flat top profile of the mound similar to the Neolithic profile, or has it been created by later alterations. If later, can we date these?
A series of possible post holes, thought to date to the medieval period, were recorded on the summit cutting the prehistoric deposits and are likely to indicate the presence of a large building or palisade around the summit. The truncated appearance of the prehistoric deposits in the 2007 trench on the summit, and the lack of any later deposits, suggests that the top of the hill may have been truncated and flattened prior to this work; however it is unlikely that we will be able to answer this question with any certainty.

RQ9 what is the nature of the ditch/ pit buried feature beneath Silbury III? What material does it contain, how is it preserved and can we recover material suitable for dating?
The buried feature recorded just inside the portal has been interpreted as a series of re-cut ditches; the earliest and largest of which had an associated internal bank. Four separate ditches were recorded; each ditch was deliberately backfilled and re-cut slightly further out, presumably representing the mound expanding over it. The earliest ditch was excavated down through the tunnel floor to its base, which showed that it clearly terminated in this area on the western side. This continuous re-cutting of the ditch emphasises that the ditch itself was an important and overlooked feature of the monument. The ditch fills were practically devoid of environmental remains, confirming deliberate rapid infilling and back-filling rather than natural infilling, however a few small fragments of bone and antler were recovered from it, as were some pieces of struck flint. This set of questions has been answered in full and the antler is likely to be suitable for dating.

RQ10 can we identify the surface of Silbury II in the tunnel sides and retrieve material suitable for dating?
See RQ12 – the three stage construction does not stand up to scrutiny. The middle phases of the mound are represented by a series of banks piled around the Upper Organic Mound and represent the previous Silbury II; these banks, however, are not conducive to dating. In a void and high above these banks, a miner was able to see a series of organic layers interleaved with chalk and forming what would appear to be a mound; suspended somewhere in the middle of the mound. How this feature fits in with what was recorded is unknown, however samples taken from it are suitable for dating and may help in a small way to understand the lengths of time involved in the construction process. This RQ has therefore been achieved in full.

RQ11 what was eaten by the builders of the mound and what activities were carried out on site during construction? For example is there any evidence for temporary settlement, fires for cooking etc.
While the possible hearth associated with the find of pig teeth indicates activity on the site prior to the construction of the monument, no other remains relating to the activity such as bonfires or the disposal of food waste were recovered. The construction process appears to have been carried out separately and away from the activities of everyday life. It is unlikely that this RQ will be answered with any certainty; however it remains an important topic of discussion in the analysis programme.

RQ12 how secure is the 3 stage interpretation of the construction of the mound? Can we distinguish three distinct monuments? Is there evidence to suggest the duration of any of

these phases or any activity that may have taken place on site between the construction phases?
The 2007/8 recording work identified numerous phases of the mound, suggesting that the archaeological stratigraphic sequence is considerably more complex than previously thought; the mound growing through many small events, rather than a few grand statements, and concludes that it is no longer appropriate to use the terms Silbury I, II or III. This RQ has been answered in full.

RQ13 how do the 'ditches' or 'quarries' relate to the chronology and use of the mound? Is work on the monument synchronous or are there differences between chronology between ditch and mound?
See RQ9. The chalk and clay used in the construction of banks in the middle phases of the mound is likely to have been quarried from the surrounding ditches, however further dating work should help untangle the chronology. This RQ has not been answered and remains an important question for the analysis programme.

RQ14 what kind of work practices were involved in the construction of the mound? Can we see evidence for size of work groups, speed and tempo of work, seasonality in construction? Are construction techniques consistent between or indeed within stages? Do these construction techniques link the site to other types of monument?
Given that the Old Land Surface and construction deposits are noticeably clean of remains, this suggests that the site was kept clean and separated from everyday activities such as eating and cooking. This has implications for the construction process.

Further work on both the dating and volumetric studies should help define the speed of the process and therefore the size of work groups. A consideration of the insect and plant remains will possibly provide some evidence for seasonality in construction although the results will probably be equivocal.

Construction techniques and materials differ between the phases; the final phase being constructed using revetment walls (see RQ7). A similar technique to this was recorded at the bank at Avebury by Alexander Keiller; perhaps suggesting a link exists between those that built Avebury and those that built Silbury.

The use of topsoil layers to consolidate the sides of the monument during construction is evident in a number of phases. The use of turves and loads of mixed topsoil etc. in construction process can be explored further. This RQ has been partly answered and the construction techniques used and their relation of other monuments both in southern England and further a field forms a separate research question (RQ38).

RQ15 what is the extent of disruption to the stratigraphy of the hill? What is the chronology of this disruption and is there any reason to believe it will continue once remedial works are complete?
The extent of disruption to the mound was severe but localised. Field observation and evaluation of samples also suggests that preservation is best in the least disturbed area of the Hill. Samples taken from contexts located close to the 1776 shaft contained less well preserved remains suggesting that a combination of water penetration, loosening, fungal growth and earthworm activity had compromised the deposits in this area. Preservation studies can take place as part of the general analysis of the biological remains, supporting the

detailed work proposed by Collinson and Brain. Some disruption to the stratigraphy is expected to continue following the completion of the remedial works, although every effort has been made to minimise this, particularly with regard to the early phases of construction. This RQ has been partly answered and will continue to be a question during the analysis programme.

RQ16 can we describe the processes of collapse and void migration?
The road stone used to backfill part of the tunnel was loose and clearly had not been fully compacted when blown into the tunnel in 1970, and therefore provided little support to the tunnel roof. As the wooden boards that formed the tunnel roof rotted away in the years following the backfilling, chalk from the overlying mound collapsed into the tunnel, compressing the road stone by about one third, and forming a void above it. As further chalk mound material was exposed, it peeled away from the underside, allowing the void to continue migrating upwards. Further to this, the tunnel had not been entirely filled with road stone – as at Bay 57 it abruptly stopped. From this point to the back of the tunnel the tunnel was filled with a light to mid yellowish brown sticky clay and chalk mix. This material was in places highly stratified with thin bands of very fine chalk between clay layers; suggesting that it had washed into the tunnel. Presumably saturated material in the 1776 shaft had formed a slurry and flowed into the unfilled parts of the tunnel. Although this had probably been an on-going process since 1970 (hence the fine, stratified bands), the 1968/9 steel mining rings had been pushed to the south suggesting at least one catastrophic event; conceivably occurring in 2000 which resulted in the collapse on the summit. As with RQ 15, this RQ has been partly answered and will continue to be discussed throughout the analysis programme.

RQ17 are the differences in preservation of biological material due to the presence of 'old' material in the turves or a reflection of varying preservation conditions within different parts of Silbury I?
The recovery of fresh, very well preserved remains and decayed, poorly preserved remains in the samples of individual turves shows that at a large part of the variation in the state of preservation of the biological remains is due to the presence of 'old' material. The type of deposits encountered also contributed to this variation e.g. deposits of subsoil containing decayed and robust seeds typical of soil seed banks. This RQ has been fully answered but further work during the analysis programme will elucidate more detail.

RQ18 can we confirm that pollen does not survive within the turf stack but only within the Old Ground Surface and put forward possible explanations for this?
Pollen was present in the Lower Organic Mound and in the thin organic layer interpreted either as the top of the OLS or the top of turves laid face down on a bare ground surface. The survival of pollen appears largely a result of anoxic conditions plus lower pH Levels associated with turves etc. formed on clay with flints. This question has been answered, however further analysis of pollen from deposits where it survives will add to RQs, 3, 17, 25, 30, 31.

RQ19 does a decay /oxidation crust exist around the edges of the tunnel within Silbury I? If so how far does it extend and what is the nature of the decay?
The deposits within the centre of the Hill were unstable in the areas affected by water ingress. Cracking and fungal growth was evident and contexts exposed in the tunnel sides tended to collapse inwards following exposure. This was unexpected. Photos within the Atkinson archive showed very stable sides with solid columns of deposits within the central

chamber of the tunnel. Verbal accounts from those who took part in Atkinson's excavation described the deposits as compacted and very firm and said that samples had to be taken with pneumatic drills.

The anticipated decay trajectory, with iron panning on the sides of the tunnel and behind it protected 'fresh' deposits, did not exist in the majority of the sections exposed. The exception was the end wall of the main tunnel. Here it was possible to take a series of horizontal cores. Oxidation appears to extend about 10mm into these undisturbed deposits (Collinson, pers. comn, see also Plate 59 of the Assessment Report). Microbiological assessment and the assessment of the cellular and ultrastructural preservation of organic material from a number of these horizontal cores has shown that there is potential to carry out further study on the nature of the preservation within the deposits at the centre of Silbury Hill and the decay trajectory that exists from the back of the main tunnel wall and into undisturbed deposits. This RQ has been partly answered; however it remains a research question for the analysis phase.

RQ20 what is the microbiological content of the deposits a.) on exposure, b.) in the samples subsequently?
This question extends beyond the lifetime of the Analysis phase and therefore has been only partly answered. The results from the microbiological assessment show that levels were very low on exposure.

RQ21 what is the long term preservation environment within the hill?
This RQ has been partly answered and requires further investigation but clearly the compaction of the deposits and the anoxic conditions prevailing in the centre of the Hill are the major factors involved.

RQ22 how will the environmental conditions vary following infilling of the voids and tunnel?
Monitoring equipment has been installed to give an indication of the moisture and temperature regimes within the hill. Readings have been taken since summer 2008 and so far indicate stability. At the same time, a layout of electrodes was emplaced for further geophysical analysis as necessary. This RQ can not be answered at this stage, and the monitoring programme will continue into the foreseeable future.

RQ23 at what locations in the landscape can sounds from the top of the hill be heard? What is the quality of transmission? Do different sounds transmit differently? Are there unexpected effects?
The map in Figure 38 of the Assessment Report provides a conservative estimate of the 'soundshed' from the top of Silbury Hill. Higher pitched sounds tended to travel further. Steve Marshall has recorded echoes, especially for the Loughnashade trumpet, but there were no other recorded effects. This RQ has been answered.

RQ24 how can a 3D interpretive model of the recorded archaeology be disseminated? How well does this model represent the archaeology and our interpretation?
It is anticipated that the 3D model will form part of the e-text. This RQ remains active throughout the analysis programme.

2.4 New Research Questions

Following the fieldwork and assessment, further research questions have arisen. These are outlined below.

RQ25 were turves laid face down on a bare OLS and can we find further evidence of biological remains that have been trampled in?

RQ26 can we determine as close as possible the location of the gravel used in the construction of the Gravel Mound?

RQ27 can we inform the palaeo-hydrology of the area?

RQ28 is the Mini-mound earlier than the Lower organic mound. Can we recover any plant remains from the mini-mound seen in section in the main tunnel?
The contrast between the remains recovered from the mini-mound and those from the Upper and Lower Organic Mounds clearly indicates that the material making up this mound came from rather different habitat/s, place/s, although the possibility that this feature is earlier than the lower and Upper Organic Mounds, needs to be explored.

RQ29 is there evidence for progressively wetter conditions, ie is there any evidence for a rise in the local water table from the Upper Organic Mound?

RQ30 how long had the grassland habitats represented by the turves in the different phases been in existence before being incorporated into the monument?
The study of individual turves will help us understand their histories and therefore the time involved in the development of grassland indicated by the 'fresh' remains. This work will contribute to the debate on the age of chalk grassland (Waller and Hamilton, 2000; French et al. 2005; Gilbert, O, 2000, 133). The absences of yellow ants suggest that the grassland represented by the turves was of relatively recent origin.

RQ31 what can the analysis of material from the Upper Organic Mound, Lower Organic Mound and mini-mound tell us about Neolithic farming in the vicinity of the monument and in Avebury Area?
We already have a considerable amount of information. More cereal remains in the form of pollen and macroscopic remains may be recovered.

RQ32 how many antlers picks were needed for building. How were they used and where were they obtained from?

RQ33 can scapulas be used to cut/ lift turves?
We have a collection of modern scapulas used during the outreach activities. It would be useful to carry out a small piece of experimental work to see how efficient these are as a tool for detaching turves from the underlying soil and whether distinctive wear patterns are created. This could be carried out at Fort Cumberland or as part of the trampling experiment.

RQ34 can we find any evidence for pool frog in the Neolithic deposits?

The anuran bones from the tunnel could be analysed to investigate whether there is any evidence for pool frog (*Rana lessonae*). This species is currently under investigation through a UK Biodiversity Species Action Plan, whose stated current action includes "Investigation of native status using a variety of approaches including bioacoustics, genetics, palaeoarchaeology and literature review" and stated future research is to include "Continue with research to determine whether the pool frog is native to Britain. A number of lines of investigation should be pursued including genetic studies, literature research, archaeological study and archiving of reference bone material, study of calls, behaviour and morphology." (http://www.ukbap.org.uk/UKPlans.aspx?ID=545).

RQ35 what is the 'green plant' material?
Green plant material is widespread in the lower and upper organic mound at Silbury Hill (GC pers obs) and may be implicated in the layered organic material of the original ground surface (Matt Canti pers comm. October 2008). The identification of this material is therefore important in understanding the history of development and use of the early phases of Silbury Hill. Green plant material is clearly very unusual. The preservation of plastid membranes in the absence of any contextual organelles or cell structure defies explanation. If green plant material is derived from a higher plant material (such as grass) it has undergone such drastic alteration as to render it unrecognisable. It seems very unlikely that such alteration could have happened after incorporation into the Silbury Hill mound given that other associated organic material is still readily recognisable.
Possible hypotheses to test include that green plant material is

- Bryophyte (e.g. thalloid liverwort)
- Algal (from river flood or river clearing work)
- Lichen
- Higher plant which has been passed through a herbivore – mammal or bird such as ducks or geese (including birds on migration).
- Higher plant with rapid autolytic decomposition (such as Equisetum) [with thanks to Chris Page for lecture comm. at Linnean Society October 29th].

All of these hypotheses should be tested by TEM study of comparative material.

RQ36 does the clay in the clay-with-flints geology under the monument represent material used in regional pottery of this date?
Samples of the clay-with-flints were taken from the section. It is proposed that these samples are fired and then thin-sectioned in the Analysis phase for comparison with local Late Neolithic pottery types. If this clay was used in local pottery production it may have an implication regarding the siting of the monument.

RQ37 are there consistent differences between the Lower and Upper Organic Mounds, e.g. is the Upper Organic Mound much later?

RQ38 How does the construction technique used to build the various phases of the mound compare to other contemporary monuments?

RQ39 how do we understand the site in relation to the rest of the WHS and the Swallowhead Springs?

RQ40 what evidence is there for the deliberate use of certain types of materials within the monument and can this add to academic discussions of materiality?

RQ41 can new information on earlier investigations of the mound be derived from a renewed archival search?

RQ42 what can further analysis of the material from the current project and the Atkinson archive tell us about the use of Silbury in the Iron Age and Roman periods?

RQ43 what can further analysis of the material from the current project and the Atkinson archive tell us about the use of Silbury in the medieval period?

RQ44 what can further analysis of the material from the current project and the Atkinson archive tell us about the use of Silbury in the post-medieval period up to the present day?

3 BUSINESS CASE

Now that the Archaeological Assessment Report is complete, it is incumbent upon English Heritage to fully analyse the results and disseminate the findings. This is particularly important given the history of archaeological work at the site (none of the previous interventions have been adequately published) as well as the fact that the site forms part of a World Heritage Site. Further, there is great public interest in the site and the archaeological works provide an opportunity to share our understanding with the public. The work and the results will be subject to extensive scrutiny and needs to be carried out with this in mind.

It is important to underline that the archaeological works are a research project, undertaken by the Research Department. The majority of the resource for the archaeological works will be coming from the Research Department in the form of core staff time.

4 PROJECT SCOPE

All archaeological work associated with the Silbury Hill Conservation Project is considered in-scope, as are associated investigations such as the geophysical survey, topographical survey, and research into the historical and archaeological background.

5 INTERFACES

New temporary panels will be installed at the visitor's car park, and P & O have been liaising with Jim Leary over the text, which has been informed by the recent work at Silbury. Further, National Trust curators at the Alexander Keiller Museum are updating parts of the stable gallery, including the Silbury display; the project team have been closely involved in this work. Other stakeholders include AARHG, the Avebury WHS and the National Trust.

6 COMMUNICATIONS

The Project Team will communicate internally and, where necessary, externally, via e-mail discussions, as well as with regular scheduled meetings. There will be regular progress meeting between Jim Leary and Sarah May. The Project Team are expected to keep the Project Manager informed of the progress of their work. Most of the communication will be on an individual and as needed basis due to the disparate interests of the project team. A small number of web updates will be used to keep the public informed of progress.

7 PROJECT REVIEW

There is no need for a formal review point, however, the project will be under continuous review throughout its lifespan and any changes to the Updated Project Design, timetable and costs will only be undertaken by the Project Manager with the agreement of the Project Executive.

8 HEALTH AND SAFETY

All work will be carried out in accordance with the English Heritage Health and Safety Manual, and with due regard to the SCAUM and IFA archaeological Health and Safety policies.

9 PROJECT TEAM STRUCTURE

The Silbury Hill Archaeological Project Team is an expert team within the overall Silbury Hill Conservation Project. It consists of a Project Executive (Sarah May) and a Project Manager (Jim Leary), and a number of Experts (listed below). The MoRPH Project Manager's Guide (English Heritage 2006) sets out the role of Project Executive as "the final decision-maker, responsible for overall direction and for conducting formal reviews, while delegating day-today management to the Project Manager" (p.16), whilst the Project Manager "oversees the project's day-to-day operation. Responsibilities include preparation of the Project Design, project planning, identification of risks, monitoring costs and timetable, preparation of Highlight Reports and maintenance of an Issue Log." (p.16). In accordance with this, the Project Manager has full responsibility for all the Experts listed in the project team (see table below), however, may delegate some of the line management duties, eg the environmental specialists to Gill Campbell, and finds specialists to Nicola Hembrey. Ultimate responsibility, however, lies with the Project Manager, who will, when necessary, contact the Experts directly.

Archaeological Team	
EH Core Staff	
Sarah May	Project Executive
Jim Leary	Project Manager
Gill Campbell	Environmental Studies
David Field	Arch Survey & Investigation
Eddie Lyons	Graphics officer
Matt Canti	Geoarchaeologist
Fay Worley	Zooarchaeologist
Judith Dobie	Graphics officer
John Vallender	Graphics Manager
David Earle Robinson	Palynologist
Hugh Corley	Information Systems Manager
Claire Tsang	Archives
Nicola Hembrey	Finds Archaeologist
Peter Marshall	Scientific Dating
Karla Graham	Conservator
Neil Linford	Geophysics
Tony Wilmott	Roman

Manny Lopez	Data reporting
Tom Cromwell	Geomatics
Christine Jackman	Finance
Amanda Chadburn	Iron Age
Robin Taylor	Publications
Sheila Keyte	Data Processing Officer
External Staff	
Barry Bishop	Lithics
Tony Brain	Preservation in situ studies
Kayt Brown	Pottery
Ros Cleal	Prehistoric Ceramics
Margaret Collison	Preservation in situ studies
Paul Davies	Molluscs
Randy Donahue	Lithic microwear analysis
Mike Edmonds	Palaeohydrology
Brian Edwards	Archival research
Kate Fielden	Archival research
Malcolm Lillie	Microbiology
Quita Mould	Metalwork
Josh Pollard	Sarsen
Ian Riddler	Worked antler
Mark Robinson	Insects
Robert Smith	Microbiology
Paul Whitehead	Palaeohydrology

Stakeholders include: Rob Harding – the Silbury Hill Conservation Project project manager and Amanda Chadburn – Inspector of Ancient Monuments for the Avebury and Stonehenge World Heritage Site.

10 PUBLICATION AND DISSEMINATION STRATEGY

An objective of the Silbury Hill Conservation Project (A4.O18) is to produce two synthetic publications – an academic monograph aimed at professionals, students and researchers, and a popular book written for the general public.

10.1 The academic monograph

The academic monograph will be a synthetic monograph edited by Jim Leary, Gill Campbell and David Field and published by English Heritage. It will bring together the evidence for the development of the site, and discuss the interpretation of the evidence. The monograph will be available as both a print-on-demand hard copy and a free PDF download from the EH website. Following the style of the recent Raunds Area Project (Neolithic and Bronze Age) publication, the monograph will not include detailed data itself, but will be supported by a digital text (e-text), which will allow access to the detail of the project. This will provide greater flexibility in terms of the cross-referencing and integration of the information; allowing researchers access to specialist reports whilst freeing the main text to discuss broader issues and interpretations of the site and the landscape. The e-text will be available as a download online, and hyperlinked through the PDF download. The hard copy monograph can also contain this information as a CD-ROM at the back.

The monograph will be structured along thematic sections (see below), which will draw from and reference the e-text. Again, as with the Raunds Area Project publication, the monograph will make extensive use of panels (box texts), which will allow the authors to explore sub-themes or present more complex issues in detail. These panels will be clearly designed to allow them to be read without breaking the flow of the broader narrative.

The e-text will focus on the detailed evidence, including catalogues and tables, as well as the engineering details of the processes that led to the collapse. However, the e-text has other potentials, for example there are several 3D datasets available from the wider project, which provide the potential for innovative visualisation and presentation of results from the project. The e-text is the ideal way of presenting this information, allowing people to view the reconstructed models of the structure of the hill in its various stages of construction. Such models will also feed into the monograph by providing an opportunity to conduct volumetric and mass analysis of the different phases of the site.

Authors of specialist reports placed within the e-text will be fully consulted and duly acknowledged for the use of their reports.

It is planned that the final manuscript of the academic monograph will be submitted to the English Heritage Publications Team by the end of 2010.

10.1.1 Monograph proposal (submitted to the Publications Team on 08/12/08)

Project title/working title
Silbury Hill: the archaeology of a monumental mound.

Synopsis
This is an academic monograph that will discuss the Silbury Hill Conservation Project and will be linked to an e-text, very much in the style of the recent Raunds Area Project (Neolithic and Bronze Age) monograph (EH). The monograph will consist of a series of thematic chapters closely linked to the research objectives of the project. These will draw on and make reference to data presented in the e-text. Panels will be used to bring out particular aspects of the data and to allow more detailed discussion of issues or topics. Having introduced the reader to the project, and to the history and archaeology of the Hill, we will then focus on the Hill itself as a Neolithic phenomenon before widening our focus to the surrounding landscape, economy and society. We will then move forward in time to discuss Silbury from an Iron Age, Roman and medieval standpoint. The final section will bring us back to the present day, to discuss the management, presentation and conservation of this Word Heritage asset.

Delivery date
End 2010

Referees
The suggested external referees are Prof Alasdair Whittle and Prof Martin Bell.

Internally, comment can be provided by Peter Topping, Andrew David, Sarah May, Amanda Chadburn and Jonathan Last

Readership
This is an academic monograph and as such is aimed at archaeology students, researchers, professionals and academics. However, there is a huge public interest in Silbury and there is likely to be a market for those with a special interest in the monument. Wider applications include those with an interest in vegetation history and environmental preservation, including geography students. The international status of the monument suggests that there may also be an overseas market for an academic monograph.

10.1.2 Monograph thematic section list:

Section 1 – Introduction (10,000 words)
Geological and topographical background
Archaeological, historical and antiquarian background
Project background
Methodology

Section 2 – Landscape and environment (20,000 words)
Hydrology
Pre-mound evidence (environment and use)
Neolithic and Beaker land use
    Landscape/livestock management etc

Section 3 – Prehistoric Silbury (25,000 words)
Outline archaeological sequence
Construction techniques
    Antlers as tools
    Old Land Surface
    Turfs
    Chalk banks + walls
The builders
    Who are they?
    Use of the monument
    Acoustics
The broader cultural landscape
    How Silbury fits in with other monuments in the Avebury landscape
    Broader discussion of Neolithic round mounds

Section 4 – Later Silbury (15,000 words)
Iron Age and Roman
    Geophysics
    Discussion of settlement
Medieval
    Features on summit
    Discussion of use
Later use up to present
Topographic survey

Section 5 – Management and conservation (10,000 words)
Lidar

Geophysics/monitoring
Preservation
SSSI

10.2 The popular publication

The popular book will be a readable account of the archaeological history of Silbury Hill as well as the recent archaeological work, and will be written by Jim Leary and David Field and published by English Heritage.

It is planned that the final manuscript of the popular will be submitted to the English Heritage Publications Team by the end of 2009.

A further dissemination from this project can be a podcast downloadable from the English Heritage website.

10.2.1 Popular book proposal (submitted to the Publications Team on 08/12/08)

Project title/working title
Silbury Hill: Green Pyramid of the Plain.

Synopsis
Combining scholarly research and readable narrative, this book sets out the archaeological story of Silbury: from an early recognition of its importance to antiquarian and archaeological investigations of the hill. The book will describe each event, setting it within its own historical and political context; the story of the monument hanging off the enigmatic and eccentric characters of the time. The book continues with the collapse on the summit in 2000, leading to the opening of the hill's famous tunnel in 2007 to much media fanfare. This book will for the first time set out in detail the results of the recent work describing in an accessible manner early activity on the site, the origins of the monument and the construction techniques used. Using numerous reconstruction drawings, a new interpretation of this iconic prehistoric monument will be presented. The book will go further than any other discussion of Silbury by describing how the monument was seen and used by later communities; from the Roman small town that grew up around the hill – the inhabitants quite literally living in its shadow; to medieval buildings on the summit. The final chapter will discuss what Silbury means to people today: its power and spirituality for locals, visitors, New Agers and Druids alike.

Delivery date
End 2009.

Referees
It is hoped that Bill Bryson, EH commissioner and popular factual author, will provide comment on the text, as well as write the foreword.

Readership
This is an accessible and popular account of Silbury written for the general public, and will appeal particularly to armchair archaeologists, but should have a widespread readership beyond that. Pitched at the right price level it will satisfy the tourist market encountered at Avebury, Stonehenge and beyond. It is intended that the book can be read on three levels:

first (and perhaps the largest market) are tourists who are likely to buy a copy after visiting the Avebury and Stonehenge World Heritage Site (or other archaeological site) and are likely to look at the illustrations and read the detailed captions to them. Second are those that would like a little more information and will read the chapter introductions. Third are those that will read the full book.

The text will not assume prior knowledge or require the reader to have an archaeological background. Although having an archaeological background will not exclude the reader either, and it is likely that this book will be popular amongst archaeology students, professionals and academics since it will be the first published description of the recent work at Silbury Hill. Indeed, the lack of information on Silbury for many decades now means that there is a huge public and professional appetite for anything to do with Silbury. The international status of the monument suggests that there may also be an overseas market (eg Newgrange, Ireland) for a popular account.

10.2.2 Popular book chapter list

Chapter 1 – Silbury in its landscape (4000 words)
This chapter will describe what is special about Silbury Hill and why many people from across Britain and the world make the pilgrimage to the site. The different perceptions and attitudes to the site: a curiosity worth a few minutes' stop on the tourist trail or a world famous archaeological site worth a longer visit; a sacred temple or the centre of the spiritual world.

Chapter 2 – Early investigations and differences of opinion (4000 words)
John Aubrey and Charles II in 1663.
William Stukeley in 1723
Edward Drax and the Duke of Northumberland in 1776 into the heart of Silbury Hill will be described.

Henry Blandford Merewether digging in 1849.
A C Smith 1886

Chapter 3 – Atkinson and the BBC. (4000 words)
Atkinson, David Attenborough and the BBC in 1968
Atkinson's excavations and his conclusions.

Chapter 4 –Into the millennium (4000 words)
May 2000 a hole appeared on the summit.

Chapter 5 – 'But how did they build it without machinery?' (4000 words)
Sequence/stratigraphy of the Hill as recorded in 2007/8.

Chapter 6 – The Neolithic landscape (4000 words)
The development of Neolithic monuments in the vicinity of the mound, and legacy of earlier monuments.
Silbury in broader context of the Neolithic (Beaker etc).

Chapter 7 – Deciphering the palimpsest (4000 words)

Iron Age, Roman and medieval activity on and around the monument.

Chapter 8 – Aftermath - Silbury today. (3000 words)
Modern perception of the monument.

11 METHODS STATEMENT

The methodologies of material used for the assessment stage and set out in the Assessment Report (Leary 2009) will be followed for the analysis programme (e.g. pollen preparation techniques, nomenclature used) and in the interests of brevity are not repeated here. See Section 12.3 for full task list.

11.1 Stratigraphic analysis

Further work will be required on the analysis of the stratigraphy, this includes re-phasing some of the contexts based on the assessment work already undertaken (eg combining Upper Organic Mound and Further Dump Layers). An updated matrix and context index will be prepared and made available to the Project Team.

This will assist answering Research Questions: 7, 8, 9, 12, 13, 14, 16, 37, 38, 39, 40, 42, 43, and 44.

Tasks

Task 1	Stratigraphic analysis	JL	5
Task 2	Compare stratigraphic sequence with Atkinson's	JL	5

11.2 Antler fragments (Fay Worley and Ian Riddler)

The antler assemblage might represent tools used during the construction of Silbury Hill. The assemblage should be considered further and compared with previously identified antler picks to test this hypothesis. In particular, potential tool marks and use-wear could be analysed using specialist microscopy techniques to investigate their utilisation. Microscopy of the possible gnawing/binding hafting marks on small find 200728757, and tool mark on the fragment from context [4889], might clarify their origin.

The prevalence of recent fragmentation masks the number of antlers represented in the assemblage and, to some extent, the regions of the antlers present. Refitting the recently broken fragments from each context may help to clarify these data. This may also provide more information on the regions and size of antler used as tools. We may also be able to comment on whether the antlers were discarded once broken or while still viable tools. Prior to marking the antler, advice should be sought to ensure that any ink used for marking will not effect the potential investigation of stable isotopes signatures or other future chemical analytical techniques. Any marking should also take into account whether the antlers will ultimately be required for museum display and, if so, should be as discrete as possible, whilst avoiding the fragile margins of the fragments. It should be noted that refitting should take place prior to the commencement of the dating programme.

Metric analysis of the refitted antlers compared with contemporary and later antlers from elsewhere in Britain might be used to investigate biometric changes in deer populations.

The distribution of the antler in the tunnel could be considered to investigate whether the antler was discarded during all phases of hill building activity. If this analysis proves viable, scientific dating of antler from varied locations in the hill might refine the construction chronology. However, the nature of the tunnel collapses and migration of material within the hill might prevent this analysis.

The condition of the antlers might permit extraction of strontium stable isotopes. These could indicate whether the antlers were recovered from local deer or brought, perhaps with the workforce, from further a field.

Description of the types of picks and the wear patterns present on them. A publication text on the antler picks as objects, including also details of the pick impressions on the chalk block. This task would follow after the refitting of the antler and would also consider the contexts of the material and the nature of its deposition.

Experimental Work with Antler Picks. This would follow on from 6, after the types of pick and their wear patterns have been studied, and would attempt to replicate specific wear patterns, as well as assessing how long a pick could have been used on chalk before it fractured and was no longer of any use. Working alongside other members of the project team, it is assumed that this would amount to 1 day of on-site work and 1 day of discussion text.

There are no additional requirements for the curation of the antlers. The current storage of the material, bagged into context groups within an archive quality cardboard box kept in dry conditions, is suitable for continued use. The antler is currently stored in Archive Box 104.

Suggested comparative assemblages

- Durrington Walls (Clutton-Brock 1984)
- Grimes Graves (Clutton-Brock 1984, Legge 1992)
- Stonehenge (Serjeantson and Gardiner 1995)

Resources required
Fay Worley:
Marking and refitting antler fragments (1.5 days)
Recording metric data from refitted fragments (0.5 days)
Analysis of distribution of the antler in the tunnel (0.5 days)
Background research (2 days)
Report writing (2 days)

Ian Riddler (5 days @ £*** per day):
Description of the types of picks and the wear patterns present on them (3 days, £***p)
Experimental Work with Antler Picks plus report (2 days, £***p)

Analysis of stable isotopes would have to be conducted externally by NERC Isotope Geosciences Laboratory, Nottingham. Strontium isotope preparation costs will be £***.

Advice should be sought regarding cost for microscopy of the tool marks.

This will assist answering Research Questions: 14, 32, and 40.

Tasks

Task 3	Marking and refitting antler fragments	FW	1.5
Task 4	Recording metric data from refitted antler fragments	FW	0.5
Task 5	Analysis of distribution of the antler in the tunnel	FW	0.5
Task 6	Background research for antler report	FW	2
Task 7	Description of antlers as picks	IR	3
Task 50	Experimental work with antler picks and report on experimental work	IR FW JL	2 1 1
Task 60	Report writing of antler fragments	FW	5

11.3 Scientific dating (Peter Marshall)

Following completion of the analysis of the antler assemblage PM and JL will be in a position to start work on building simulation models to ascertain the optimal number of additional radiocarbon measurements required. The simulation models will build on the work of Bayliss *et al* (2006) and also incorporate the five recently obtained measurements. The simulation models will take into account the revised phasing proposed by JL. The cost of the radiocarbon dates will be met by the Scientific Dating Team.

Simulation models can only be constructed following analysis of the antler assemblage for a number of reasons:

1) in order that potential samples have been identified as tools,
2) in order that all potential samples are independent, ie to make sure that the same antler is not dated twice (the re-fitting exercise should provide this information),
3) full understanding of the spatial distribution of antlers is required to understand their relationship to the proposed phasing of the monument.

Outline timetable

Stage 1 PM and JL build initial simulations (1 day, Fort Cumberland)
Stage 1.1 PM – additional work to identify samples for round 1 (0.5 day, Sheffield)
Stage 1.2 JL and PM submission of round 1 samples to Scientific Dating Team (1 day Fort Cumberland/Sheffield)
Stage 1.3 Samples submitted by Scientific Dating Team to radiocarbon laboratories
Stage 1.4 Receipt of results 12-16 weeks following submission

Stage 2PM and JL incorporate round 1 results into simulation model, identify further samples to refine chronology (1 day, Fort Cumberland)
Stage 2.1 PM – additional work to identify samples for round 2 (0.5 day, Sheffield)
Stage 2.2 JL and PM submission of round 2 samples to Scientific Dating Team (1 day Fort Cumberland/Sheffield)
Stage 2.3 Samples submitted by Scientific Dating Team to radiocarbon laboratories
Stage 2.4 Receipt of results 12-16 weeks following submission

Stage 3 AB (or PM) and JL final model building, analysis, production of final text and figures (5 days, Fort Cumberland, and/or London and/or Sheffield.

Given the timetable of the project it should if necessary be possible to incorporate a further round of dating ie after then end of Stage 2.4 and before Stage 3.

Method statement

In order to implement a Bayesian approach a rigorous procedure for extracting the necessary information to build chronological models from archaeological sites has been developed (Bayliss and Ramsey, 2004; Fig 1). This procedure will underpin the proposed radiocarbon dating programme for Silbury Hill.

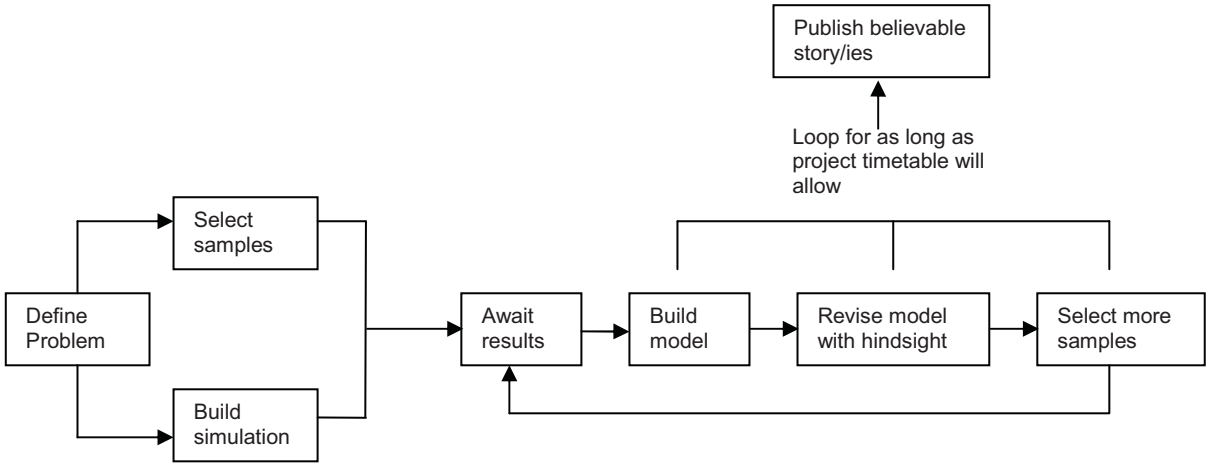

Figure 1: Flow diagram showing stages in routine chronology building

Sample selection

The contextual integrity of radiocarbon samples has been of serious concern in sample selection for many years (Bowman, 1990, van Strydonk *et al* 1999), however, it becomes even more critical when contextual information is used to modify chronologies. Thus the first stage in sample selection is to identify short-lived material, which is demonstrably not residual in the context from which it was recovered. The taphonomic relationship between a sample and its context is the most hazardous link in this process, since the mechanisms by which a sample came to be in its context are a matter of interpretative decision rather than certain knowledge. All samples should therefore consist of single entities (Ashmore 1999).

Material should only be selected only where there was evidence that a sample had been put fresh into its context. The main category of material, which is expected to meet these taphonomic criteria, will be:

- **Antler picks** – interpreted as being used during construction of the monument

Model construction

The new radiocarbon results will simulated using the R_Simulate function in OxCal v4.05 (Bronk Ramsey 1995; 1998, in press) and the calibration curve of Reimer *et al* (2004), with errors based on the material to be analysed and the type of measurement required (eg single/double run AMS/high precision).

This will assist answering Research Questions: 7, 8, 9, 10, 12, 13, 14, 28, 37 and 39.

Tasks

Task 8	Build initial dating simulations	PM JL GC	1 1 1
Task 9	Additional work to identify dating samples for round 1	PM GC	0.5 0.5
Task 10	Submission of round 1 samples to Scientific Dating Team	PM JL	1 1
Task 11	Incorporate round 1 dating results into simulation model, identify further samples to refine chronology	PM JL	1 1
Task 12	Additional work to identify dating samples for round 2	PM	0.5
Task 13	Submission of round 2 samples to Scientific Dating Team	PM JL GC	1 1 1
Task 59	Final dating model building, analysis, production of final text and figures	PM JL	5 1

11.4 **Graphics** (Eddie Lyons & John Vallender)

Preliminary work has already been carried out to produce illustrations for the Assessment Report. Further opportunities exist for more innovative graphical applications for analysis, and further for dissemination and publication.

Numerous graphic files have been generated over the last eight years for Silbury, by a number of teams. Before work begins on the analysis phase the previous work needs to be quantified, and duplicated and redundant files removed from the system. It is anticipated that this will take 2 days.

Tasks

Task 14	Quantifying existing files and removing duplicates	EL TC	1 1

3D Modelling

There are several 3D datasets available from the wider project, which provide the potential for innovative visualisation and presentation of results from the project.

These 3D data include:

- Stratigraphic records from the tunnels (from Topcon PI 3000 but exported to AutoCAD .dwg format);
- Stratigraphic records from the geotechnical cores taken from the summit of the hill into the underlying geology;
- TST survey data from the tunnels and voids, hilltop excavations, crater and shaft, and the hillside works;
- GPS survey of Silbury Hill and its immediate environs;
- Laser scanning of Silbury Hill.

All of these data, except for the laser scanning, are suitable for use in AutoCAD Civil 3D 2008 to create both surface models and solid models of Silbury Hill, and in particular the tunnels and voids inside it. Surface models are particularly useful for visualisation, allowing orthorectified aerial photographs to be draped onto them to provide realistic renderings.

The stratigraphic data should allow a reasonable attempt to be made to produce reconstructed models of the structure of the hill in its various stages of construction. Such models also provide an opportunity to conduct volumetric and mass analysis of the different phases of the hill or mound, the banks, and the surrounding ditch(es).

The surface models in particular also can be exported in a form for additional analysis in a GIS environment, such as for the acoustic analysis of the mound or hill.

Both the solid and surface models of Silbury Hill and its surroundings can be used as a basis for the production of more traditional artistic reconstruction paintings (see below).

The capture of photogrammetric models through Topcon's PI-3000 software provides the basis for dynamic digital dissemination products such as a VRML "fly-through" of the tunnel and rotatable models where the user can "travel" to a location to examine visual evidence that backs up stratigraphic interpretations. The data can be combined with other survey models and aerial photos to create models of the entire hill and its surroundings, and can even be augmented with speculative 3-D graphics to model different reconstructions or interpretations. 3-D products can be used as on-line resources, shippable models on DVD, or as fixed display devices at local visitor centres.

For the analysis stage and beyond, Autodesk Design Review (ADR) software should allow project team members to view the models or other AutoCAD drawings, and to collaborate by reviewing and annotating (redlining) drawings or models in the project folder on the Fort Cumberland local area network (LAN). These are drawings and models exported from AutoCAD in the .dwf file format. This ADR software is currently being assessed for its suitability.

The .dwf file format also provides an option for digital dissemination and publication, on CD-ROM or online.

Tasks

Task 15	3D modelling	EL JL TC	20 2 1

2D illustration

For assessment and publication there are requirements for more traditional 2D forms of illustration. The 3D datasets from Topcon PI 3000 that were exported to AutoCAD have posed a particular challenge in this respect. Nevertheless, these data have already been reprojected to a 2D format to provide section-type drawings of the stratigraphy in the three tunnels (main, east lateral and west lateral). Several illustrations in this assessment report are derived from these reprojected data, and combined with the drawn section of the buried ditch. The reprojected data also will be used to produce publication illustrations.

Plans and sections from the excavations on the summit have been digitised in AutoCAD and will be used to produce traditional illustrations.

Further to this, Atkinson's section will need to be projected onto the new section so that the stratigraphy can be compared and gaps filled.

Tasks

Task 16	Figure production (sections and plans)	EL JL	10 2
Task 17	Projection of Atkinson's section	EL	5

Cartography

For more extensive cartography ESRI ArcGIS 9.2 will be used to provide base mapping. Contour or point data downloaded from the NextPerspectives Geostore website allow the immediate environs of Silbury to be modelled in both 3D and 2D. Aerial orthophotography is also available to enhance the visualisation of Silbury within these environs.

Other suitable data sources (e.g. SRTM) will extend the capability for cartographic presentation beyond the immediate surroundings of Silbury to a regional and national scale as appropriate.

Tasks

Task 18	Cartography	EL JL	5 2

Finds Illustrations

The finds recovered during fieldwork at Silbury Hill do not have any potential for innovative approaches to illustration, and standard methods will be used for material selected for publication illustration.

20 pieces of struck flint
4 pieces of metal work
3 sherds of pottery

Tasks

Task 19	Finds illustrations (pottery, metalwork, flint)	JD JV JL NH	10 1 1 2

Reconstruction illustrations

Six reconstruction illustrations have been prepared, depicting a preliminary understanding of various aspects of the development and construction of Silbury Hill. These, along with the results of 3D modelling of the monument and the surrounding landscape, will help to inform the preparation of more accurate and detailed reconstruction illustrations for use in both academic and popular publication. In addition, there is potential for preparation of reconstruction illustrations to show significant antiquarian and archaeological events at the monument for use in popular publication. Reconstruction artwork will be prepared using both digital and traditional illustrative techniques.

Tasks

Task 20	Production of reconstruction drawings	JD JL GC	20 5 1

Diagrams and schematic illustrations

The presentation of understanding derived from the analysis of data from Silbury Hill is likely to have a high potential for the creation of diagrams and schematic illustrations. These forms of graphics are likely to be particularly important in the depiction of the structural and environmental development of the monument. Such illustrations will be prepared using a variety of digital illustrative techniques and are likely to draw heavily upon the 3D modelling exercise.

Tasks

Task 21	Diagrams and schematic illustrations	JV GC	10 1
Task 22	Enviro (insects, seeds) and antler photography	JV GC FW	10 1 1
Task 71	Formatting photographs for publication	JV	2
Task 72	Preparation & collation of publication ready image files	JD EL JV	3 4 4

This will assist answering Research Questions: 12, 13, 14, 24, and 39.

11.5 Historical research and analysis of archived material

Much research into the archaeological and historical background of Silbury Hill has already been undertaken; however much remains unknown and unrecognised texts and archives undoubtedly exist. This is best exemplified by a recent discovery of two letters in the British Library which provide previously unknown information about the 1776 shaft. A search of the available archives in the British Library, Alnwick, the Bodleian, Wilton and Charborough Park is recommended.

Time will be required to integrate this information into the text of both the popular book and the academic monograph, as well as to feed into the graphics.

This will assist answering Research Questions: 41, 423, 43, and 44.

Resources required

Kate Fielden 10 days (2 days at BL, London; 3 days at Alnwick + 2 days' travelling; 3 days at Bodleian Library) @ £***= £*** + expenses. Total £***

Task 23	Search relevant archive in the British Library	KF	2
Task 24	Search relevant archive in Alnwick	KF	5
Task 25	Search relevant archive in Bodleian	KF	3
Task 26	Search relevant archive in Wilton	BE	1
Task 27	Search relevant archive in Charborough Park	BE	1
Task 28	Report on archives recovered and integrate	DF	5

11.6 **Plant remains** (Gill Campbell)

Further analysis of plant remains from the site can answer questions concerning the construction process such as what types of material were used in the construction of the different phases, how they were used and where they came from. Analysis will increase our understanding of the nature of the late Neolithic environment of this area of Wiltshire and the development of chalk grassland. There is the potential to provide further information on Neolithic agriculture and find out more concerning the nature of Old Land Surface.

It is recommended that samples from the Old Land Surface and overlying deposits should be sampled at close intervals in order to determine whether the hypotheses concerning truncation and the laying down of turves face down on a bare surface are correct. This will require further processing of samples and the examination of these contexts at *circa* three different locations.

Further analysis of samples from both the Upper and Lower Organic Mounds is required to answer questions concerning construction and landscape history. Further study of material from the mini-mound will also contribute to answering these questions while the potential for the recovery more cereal remains is worth pursuing for any information we can gain concerning late Neolithic agriculture.

The results of the analysis also need to take account of current and recent work at Avebury and Durrington Walls, particularly in terms of the nature of the late Neolithic landscape and economy of this area of Wiltshire.

It is also recommended that experimental work is carried out in order to help identify if sheep scapulas could have been used to cut the turves recorded in the tunnel.

<u>Resources required</u>

Processing of samples and analysis of plant remains from the OLS, including thin slice sampling at three locations and full identification of the assemblage associated with the pig teeth. 20 days

Processing of samples and analysis of plant remains from the Upper and Lower Organic Mound, both individual turves and larger GBA samples. 20 days

Processing of samples and analysis of plant remains from the mini-mound and completion of analysis of the samples from the pits. 5 days

Production of e-text report for publication. 10 days

Production sections for the monograph. 15 days

Experiment with modern sheep scapulas to see how efficient they are as tools to aid turf cutting and removal. 2days

This will assist answering Research Questions: 2, 3, 5, 11, 14, 17, 25, 28, 29, 30, 31, 37, and 40.

<u>Tasks</u>

Task 29	Processing of samples and analysis of plant remains from OLS	GC	20
Task 30	Processing of samples and analysis of plant remains from Lower and Upper Organic mounds	GC	20
Task 31	Processing of samples and analysis of plant remains from the mini-mound	GC	5
Task 53	Experiment with modern sheep scapulas to see how efficient they are as tools to aid turf cutting and removal	GC FW	1 1

11.7 Geoarchaeology (Matt Canti)

It is recommended that the remainder of the Old Land Surface slides are manufactured, along with a few of the underlying clay with flints. These should then be written up in the analysis phase so we have a complete picture of the general variability throughout the tunnels and the best chance of seeing the full range of iron pans and flecks, hopefully deciding clearly whether they can all be related to plant matter.

With regard to the remaining uncut sample of the dark layer in Bay 80W, a slide should be cut and analysed to provide another example of this material and an indication of its origin. The column of three slides 9213-9215 should be retained as impregnated blocks until a need is demonstrated.

A summary of the required slides is as follows:-

Land surface – 9221, 9216, 9254, 9202, 9278, 9152, 9123

Underlying clay with flints – 9255, 9203, 9279

Other issues – 9260

Completion of the analysis and report writing will take 40 days.

This will assist answering Research Questions: 1, 5, and 25.

Tasks

Task 32	Analysis and report writing of geoarchaeology	MC	40

11.8 Insect remains (Mark Robinson)

A more detailed study of the insect remains certainly has the potential to improve our understanding of the setting, construction and environment of Silbury Hill (A2). This would be achieved both by the generation of new data associated with the better phasing of the monument and the enhancement of the earlier results by the better understanding of their context.

It is recommended that the insects from all the samples already processed be analysed in full. It is also recommended that further samples be analysed from the best-preserved part of the Old Land Surface and the mini-mound.

The sorting of additional samples for insect remains by a technician will take 12 days.
The identification and reporting on insect remains by a specialist will take 15 days.

Resources required
Technician £*** a day, 12 days, = £***

Mark Robinson £*** a day, 15 days = £***

This will assist answering Research Questions: 3, 4, 5, 6, 17, 28, 29, 30, 31, 37, and 40.

Tasks

Task 33	Sorting of additional samples for insect remains	Technician	12
Task 34	Identification and reporting of insect remains	MR	15

11.9 Land snails (Paul Davies)

Of all the samples assessed only those from the Gravel Mound and associated ?soil horizon, the fill of Pit [3074], and the secondary fill of Pit [3067] (see p.27 of assessment report) warrant full analysis. This would determine the full distinction between fresh and worn elements and possibly contribute to the debate about the potential origin of the deposits (in concert with other analyses). It is particularly interesting that the sample from the Gravel Mound, supposedly consisting of Pleistocene river gravels, contains abundant land shells. Full analyses of the pit-fills may also serve to better interpret one or two of the other assessed samples (eg of the organic mini mound) not recommended for full analysis.

Resources required
£*** for Paul Davies to analysis and report.

This will assist answering Research Questions: 3, 9, 14, 17, 30, and 37.

Tasks

Task 35	Analysis and report writing of land snails	PD	3

11.10 Pollen (David Earle-Robinson)

Although pollen analysis of the samples is difficult, it is far from impossible. It is recommended that full analysis be carried out on eight of the assessed samples and, following discussions with Gill Campbell, that a further 17 comparable samples (see below) be prepared, assessed and, if deemed suitable, analysed:

Additional 17 samples:
9439: Three sub-samples from OGS, basal and second organic layer in mini-mound.
9407: Three sub-samples OGS, "turf" above iron pan and upper part of OGS (thin layer).
9250: One sample from organic layer over gravel mound.
9353: Two sub-samples at junction between upper and lower turf mounds.
9231: Four sub-samples from OGS and three turf layers.
9313: One sample from OGS.
9323: Two sub-samples – one from OGS, one from clay capping.
9308: One sample from OGS under "Toblerone" layer.

This work should allow a thorough evaluation and interpretation of the pollen content of the Old ground surface and the turves contained in the various mound structures. The resulting data will complement those obtained from plant macrofossil and insect analyses (Campbell,

this volume; Robinson, M., this volume) and hopefully will allow conclusions to be drawn concerning the surrounding vegetation and the origin(s) of the turves used in mound construction.

This will assist answering Research Questions: 3, 14, 17, 18, 25, 28, 30 and 31.

Tasks

Task 36	Analysis of 8 assessed pollen samples	DR	8
Task 37	Assessment of a further 17 pollen samples	DR	5
Task 38	Analysis of an estimated 10 pollen samples	DR	10
Task 62	Pollen Report writing	DR	3

11.11 Microbiological assessment (Dr M C Lillie and Dr R J Smith)

In light of the observations from the microbiological assessment, it is suggested that a more targeted approach is necessary in order to identify the specific species of bacteria which are implicated in the decay process of organic material within the sediment of Silbury Hill. This can be achieved through culturing known strains of bacteria which are responsible for organic degradation from the samples currently available (Cores 4 and 7). The employment of this methodology will help increase our understanding of the relationship between microbial diversity and the biodegradation of organic material in highly anaerobic (and/or complex) environments.

Resources required

The total cost of microbial assessment will be £*** (exclusive of VAT) and take 25 days.

This will assist answering Research Questions: 19, 20, 21, and 22.

Tasks

Task 39	Microbiological analysis and reporting	ML RS	12 13

11.12 Cellular and ultrastructural preservation (Margaret Collinson and Tony Brain)

Three main pieces of future work are recommended:

Preservation at different distances into the mound

Aim to compare preservation at three sample intervals at different distances from the tunnel wall – namely 3-7 cm; 15-19 cm and 23-27 cm. The additional sediment samples are already fixed for TEM study but no further work has been done. The plant material still has to be extracted from the sediment, recognised, cleaned, embedded, sectioned and studied.

Specifically we would test the following hypothesis:

"If there has been no differential alteration to the plant material in the organic mound as a result of the tunnelling interventions then the following preservation should be seen at all levels studied –

A) Green plant material will preserve thylakoid stacks of plastid membranes.
B) Yellow plant material will show separation of cuticle from epidermal cell wall.
C) Yellow plant material will show preservation of cellular structure
D) Yellow plant material will show variable preservation of ultrastructure of cell walls with some essentially unaltered.
E) Rootlets will show 3D cellular preservation internal to the endodermis.

F) Rootlets will show excellent preservation of the differential thickening layers in the cell walls of the endodermis.
G) Beetle elytra will show preservation of all three layers of the cuticle with diagnostic ultrastructure remaining in all layers.
H) Microbes will occur commonly in green and yellow plant material and, specifically, will be present between the separated cuticle and epidermal cell wall of yellow plant material.

This study will benefit from using a variety of plant and insect material from different original locations in life and having different original chemical composition. If all material retains comparable preservation at all sampling intervals this will provide a very strong signal that tunnelling has not impacted on preservation of organic material.

Identify green plant material

Green plant material is widespread in the Lower and Upper Organic Mound at Silbury Hill (GC pers obs) and may be implicated in the layered organic material of the original ground surface (Matt Canti pers comm. October 2008). The identification of this material is therefore important in understanding the history of development and use of the early phases of Silbury Hill.

Green plant material is clearly very unusual. The preservation of plastid membranes in the absence of any contextual organelles or cell structure defies explanation.

If green plant material is derived from a higher plant material (such as grass) it has undergone such drastic alteration as to render it unrecognisable. It seems very unlikely that such alteration could have happened after incorporation into the Silbury Hill mound given that other associated organic material is still readily recognisable.

Possible hypotheses to test include that green plant material is:

- Bryophyte (e.g. thalloid liverwort)
- Algal (from river flood or river clearing work)
- Lichen
- Higher plant which has been passed through an herbivore – mammal or bird such as ducks or geese (including birds on migration).
- Higher plant with rapid autolytic decomposition (such as *Equisetum*) [with thanks to Chris Page for lecture comm. at Linnaean Society October 29th].

All of these hypotheses should be tested by TEM study of comparative material.

Link cellular and ultrastructural preservation to chemical preservation and/or to microbial colonisation.

This could be achieved through collaboration with Hull University (microbes) and with Richard Evershed (Bristol) (chemistry).

For the microbial work we would aim to identify the microbes from the TEM images, determine their role in the microbial community and determine their more precise distribution through the organic mound. Preliminary results from a single sample of fine

dispersed organic sedimentary particles studied by TEM suggest that the microbes found in the plant material are not found dispersed throughout the sediment. The overall aim would be to determine what role the microbes have in the alteration of organic material and hence to what extent microbial activity controls preservation in this archaeological context.

For the chemical work we would aim to test the hypothesis that quality of cellular and ultrastructural preservation should be reflected in chemical preservation. For example: Beetle elytra should preserve a chitin-protein complex; cuticle should preserve cutin; leaf/axis cell walls should preserve cellulose-hemicellulose (+/- lignin); endodermal cell walls should preserve suberin; plastid membranes should preserve sterol membrane lipids etc.

Expand work on cellular and ultrastructural preservation.
Work could be expanded to include -

1) More replicate samples and/or using another core.
2) Other types of plant material both in the cores and from other contexts at Silbury. Seeds and mosses are known to occur.
3) Comparison with other organic mounds and also turf constructions at other archaeological sites.

Resources required
Investigation of green plant material (£***) (16 days).

Comparison of preservation in 4 types of organic material at three depths in core (£***) (16 days).

This will assist answering Research Questions: 19, 20, 21, 22, and 35.

Tasks

Task 40	Cellular and ultrastructural preservation and reporting	MCo TB	16 16

11.13 Faunal remains (Fay Worley)

Further work of the faunal remains should include:

1. A full archive list of all hand collected animal bone and all non-micro-faunal bone from sieved residues should be produced.
2. The animal bone report should focus on two aspects of the assemblage: the medieval activity on the summit and the small assemblage of bones predating and contemporary with the construction of the hill.
3. Given the limited nature of the assemblages, the report should focus on putting them in their chronological context by comparison with contemporary local assemblages (including earlier investigations of Silbury Hill), whist stressing the unique nature of the site.
4. The anuran bones from the tunnel might be further analysed to investigate whether there is any evidence for pool frog (*Rana lessonae*). This species is currently under investigation through a UK Biodiversity Species Action Plan, whose stated current action includes "Investigation of native status using a variety of approaches including bioacoustics, genetics, palaeoarchaeology and literature review" and stated future research is to include "Continue with research to determine whether the pool frog is

native to Britain. A number of lines of investigation should be pursued including genetic studies, literature research, archaeological study and archiving of reference bone material, study of calls, behaviour and morphology. (ACTION: NE)" (http://www.ukbap.org.uk/UKPlans.aspx?ID=545).

Resources required
Produce archive list of animal bone (2 days)
Researching local contemporary assemblages (3 days)
Integration of assemblage data into an overview of all faunal material recovered from Silbury Hill excavations (research) (3 day)
Report writing (3 days)

This will assist answering Research Questions: 6, 9, 11, 33, and 34.

Tasks

Task 41	Produce archive list of animal bone	FW	2
Task 42	Researching local contemporary assemblages	FW	3
Task 43	Integration of assemblage data into an overview of all faunal material recovered	FW	3
Task 61	Faunal remains report writing	FW	3

11.14 **Struck flint** (Barry Bishop)

The assessment report was based on a preliminary examination and quantification of the lithic material recovered during investigations at the monument. It identified flintworking as being associated with its construction and also being undertaken before it had been built.

In order for its potential to be fully realized further work is recommended. The assemblage has been examined and fully catalogued. Further work should concentrate on a more detailed consideration of this with the broad aims of:

- Establishing more precisely the dating of individual pieces
- Forming an understanding of the relationship between raw material acquisition, flint production, use and discard
- Establishing in detail the typological/technological signatures of the material from the different constructional episodes in order to understand the differing ways that flint was used at the site
- Establishing the range of activities conducted during different constructional episodes
- Establishing the range of products that may have been manufactured and how these may have been used
- Exploring the technological choices made by those making and using flint implements and how these may inform on the role and significance that this assemblage held for those using it
- Examining the role that flint played and how it was perceived in the context of constructing a ceremonial monument
- Comparing the role and perception that flint had in the construction of this monument with its uses at other ceremonial monuments of the period

- Comparing the role and perception that flint had in the construction of this monument with its uses at settlements and other non-ceremonial sites of the period
- Examining how the material compares and contrasts to other lithic assemblages from the region and the implications that this may have for understanding functional and stylistic variations in contemporary industries

Specific aims should include:

- Full metrical and attribute analyses with the aim of categorizing this assemblage, both in its own right and also to allow comparisons with similarly-dated material from the region
- A detailed consideration of the material with regard to context with the aim of refining the different ways and circumstances in which flint was used
- Identifying and examining the nature and origin of earlier material incorporated into the monument
- Establishing the presence or absence of post-constructional flintworking at the monument and discussing the significance of this
- Undertaking refitting exercises in order to elucidate the material's pre-depositional history and the physical and temporal relationships between the assemblages from the different constructional phases.
- Establish the possibility of undertaking micro-wear analysis to further elucidate the ways in which some of the useable and retouched pieces may have been used

Following this further work, it is recommended that the findings are fully written up and, alongside illustrations of the most relevant pieces, included in any published account of the investigations.

Resources required
Re-examination: 2 days
Metrical Analysis: 1 day
Refitting Exercise: 1 day
Phasing concordance: 1 day
Research on other assemblages in the region: 2 days
Analysis and report writing: 2 days

Total 9 days at £*** per day.

Microwear
Further to this it is recommended that microwear analysis is undertaken on 16 pieces of struck flint: the blade, 3 flakes and utilized piece from the pits cutting in to the LOM and the 11 flakes, blades and retouched pieces from the big ditch (context [3901]). This will need to be undertaken prior to the completion of the final flint publication text.

Resources required
This work will be undertaken by Dr Randolph Donahue of the Lithic Microwear Research Laboratory, based in the Division of Archaeological, Geographical and Environmental Sciences at the University of Bradford. The work will take 20 days and cost £***.

This will assist answering Research Questions: 9, 11, 14, and 37.

Tasks

Task 46	Analysis and report writing of flint microwear	RD	20
Task 47	Analysis and report writing of struck flint	BB	9

11.15 Pottery (Kayt Brown & Nicola Hembrey)

Although the pottery offers limited potential to understanding the use and chronology of activity at Silbury, further recording is recommended on the Iron Age and Roman pottery by a specialist in the Iron Age and Roman pottery of Wiltshire. Further recording of the 2001 assemblage is also recommended, to provide a consistent record of the whole assemblage. A short summary report on the pottery should be prepared for inclusion within the final publication. The Beaker sherd, Iron Age jar rim, and Bath fabric A rim sherd could be illustrated.

Suggested illustrations:
1. Beaker sherd, context [4]
2. Iron Age jar rim, context [4805], SF 8515
3. Bath fabric A rim sherd, context [4886], SF 8766

Resources required

Kayt Brown will analyse the pottery from the site, as well as compare the thin sections.

This will assist answering Research Questions: 8, 36, 42, 43, and 44.

Tasks

Task 48	Further recording of pottery and reporting	KB	3
Task 52	Firing samples of the clay with flints and comparing the thin sections with local prehistoric pottery types	KB MC	2 1

11.16 Metalwork (Kayt Brown)

The metalwork assemblage offers limited further potential in terms of understanding the development and use of Silbury Hill, however further investigative cleaning of object SF 861 is recommended as it will aid its identification. Likewise x-radiography of the prick spur terminals will enable further comparisons to be made, and may potentially refine the date of this object.

It is recommended that an additional, right-angle x-ray be taken of small find no. SF 861 and the top section of the object airbraded to reveal the shape. Further X-radiography of the prick spur terminals, combined with investigative cleaning of the point and terminals should also be undertaken.

A short summary report will then need to be prepared for inclusion in the final publication.

It is recommended that four objects be illustrated; the prick spur, both socketed arrowheads, and the hafted bolt. Depending on the result of the cleaning of object SF 865, this may also require illustration.

Much of the metal work requires assessment, which is estimated to take 5 days. The conservation work is also estimated at 5 days.

Production of catalogue, search for further comparative material and publication report 2.5 days

The metal work has yet to be fully assessed and therefore time will be required to complete this, prior to undertaking the necessary conservation work. The metalwork will be analysed by Nicola Hembrey with assistance from Quita Mould.

This will assist answering Research Questions: 8, 36, 42, 43, and 44.

Tasks

Task 44	Assessment of conservation work	KG	5
Task 45	Conservation of metal work	KG	5
Task 49	Analysis and reporting of metal work	NH QM	4 1

Resources required
One day for Quita Mould at £*** a day.

11.17 **Sarsen stone** (Josh Pollard)

The sarsen fragments from the excavations on the summit proved extremely interesting. The majority of fragments recorded showed evidence for having been worked by both flaking and burning, whilst two conjoining fragments had been lightly pecked and then ground. It is recommended that experimental work is undertaken on a suitable sarsen fragment to see the effects of low temperature burning, and experiment with ways of breaking up sarsen using only fire setting and stone hammers. Suitable sarsens are available from Gill Swanton's farm and the experimental work could be carried out alongside that suggested for the antler pick.

Resources required
This work will require one day for the experimental work (undertaken by Josh pollard and Jim Leary) and one day report writing (undertaken by Josh Pollard). Josh Pollard: 2 days @ £*** = £*** + expenses.

This will assist answering Research Questions: 7, 14, and 40.

Tasks

Task 51	Experimental work on sarsen stones and report of experimental work	JP JL DF	2 1 1

11.18 **Acoustics** (Sarah May)

There is little more that can be done with the responses to the fieldwork because of the reporting difficulties discussed above. However, these responses may be useful in designing any further work on acoustics, audience and ritual in prehistoric landscapes.

Since the model produced was intended as preparation for fieldwork, there is a good deal more that can be done here. The first issue is to refine the parameters of the model. The

LiDAR data should be for a DTM and the recorded HrZ and dB measurements of the instruments in the fieldwork should be used.

Next the model should examine whether the landscape around Silbury affords particularly good sound transmission by comparing it with other points in the surrounding landscape. These should include other sites of prehistoric activity as well as some which have no recorded activity.

Finally, the modelling should explore how the construction of the hill affected the acoustics of the landscape. Taking the solid models of the phasing which are to be constructed in the Analysis stage, the model should be re run over different phases of the monument's life.

Research Questions for further work should relate to the changing nature of the site in the landscape. Does the siting of the monument afford particularly good sound transmission? How is this transmission affected by the changing nature of the site? How can the sound transmission help us understand the life of the monument in the landscape? In particular it may be worth considering the acoustic properties of the area in considering the later phases, considered the coincidence of the siting of the Roman town.

This work will take 15 days.

This will assist answering Research Question: 23.

Tasks

Task 54	Acoustics	SM	15

11.19 Palaeohydrology

It is hoped that both Mike Edmonds and Paul Whitehead (Royal Holloway and Reading University) will undertake a desktop assessment of the palaeohydrology of the area around Silbury Hill, including the possible southward migration of the Swallowhead spring, using the recent geophysical survey and a renewed look at Evans J. G., Limbrey S., Mate I., Mount R., 1993, An Environmental History of the Upper Kennet Valley, Wiltshire, for the last 10,000 years. *Proceedings of the Prehistoric Society* vol. **59**, pp. 139-195. Both Mike Edmonds and Paul Whitehead have been approached to do this work, although a decision has yet to be made.

Resources required

It is anticipated that this work will cost £***.

This will assist answering Research Questions: 27 and 39.

Tasks

Task 55	Analysis and reporting on palaeohydrology	ME PW	5 5

11.20 Geophysics

The geophysical survey in the fields surrounding Silbury Hill revealed significant Roman settlement activity. This work clearly has implications of the later use and perceptions of the

monument and as such is an important element of the project. A publication text specifically on the results of the geophysical survey will be required.

This will assist answering Research Questions: 42, 43, and 44.

Tasks

Task 63	Production of geophysics publication text	NL	10

11.21 Iron Age

The discovery of Iron Age pottery on the summit of Silbury Hill adds to our understanding of the later use of the monument. It will therefore be necessary for a publication text to be prepared that places these few sherds into a broader regional context.

This will assist answering Research Question: 42.

Tasks

Task 64	Production of Iron Age publication text	AC	1

11.22 Roman

The discovery of a Roman settlement focused around Silbury Hill and the Swallowhead spring, combined with the evidence for a few sherds of Roman pottery on the summit, adds significantly to our understanding of the later use and perception of the monument, as well as adding to knowledge of the Roman period within the region. It will therefore be necessary to prepare a publication text that discusses the implications of these discoveries and set them within their context, this should also include a discussion of the Roman wells/ritual shafts recorded from antiquarian excavations around the base of the monument.

This will assist answering Research Question: 43.

Tasks

Task 65	Production of Roman publication text	TW	10
Task 66	Production of wells/ritual shafts publication text	FW	10

11.23 Preparation & submission of popular text

It is estimated that it will take 40 days each for Jim Leary and David Field to write the text and edit it.

Tasks

Task 56	Preparation of popular text	JL DF	30 30
Task 57	Editing of popular text	JL DF	10 10
Task 58	Submission of popular text to publications team	JL DF	2 2

11.24 Editing & submission of academic text and digital text

The synthetic text will be written as separate tasks by the various specialists and then Jim Leary, Gill Campbell and David Field will edit the contributions for both the hardcopy monograph and the e-text as shown in the task list below.

Tasks

Task 67	Production of excavation sections for monograph	JL	20
Task 68	Production of environment sections for the monograph	GC	15
Task 69	Production of Neolithic overview sections for monograph	DF JL	10 10
Task 70	Editing of monograph text and production of introductory and concluding sections	JL GC DF	30 30 30
Task 73	Data reporting	ML	5
Task 74	Writing foreword	AC	5
Task 75	Submission of monograph text to referees	JL	2
Task 76	Submission of monograph text to publications	JL	2
Task 77	Production of e-text report for plant remains	GC	10
Task 78	Preparation of e-text report stratigraphy	JL	10
Task 79	Editing of e-text report	JL GC DF	5 5 5
Task 80	Liaison with web team over podcast	HC	15
Task 81	Preparation of podcast	JL GC DF HC	5 5 5 1

11.25 Archiving

The archiving of finds, samples, photographs and all paperwork is fundamental to the successful completion of all projects. Sufficient time to do these tasks fully, and to liaise with an appropriate digital repository, will be required. Further planning, and possibly funds, may be required for archiving.

Tasks

Task 82	Liaise with ADS over 3D model, PDF, raw data	CT HC EL	4 2 1
Task 83	Collate archive	CT JL	10 10
Task 84	Rebox finds	CT	2
Task 85	Archive deposition	CT	2

12 STAGES, PRODUCTS AND TASKS

12.1 Stages

There are three broad stages to this project: the analysis work, the preparation and submission of the publication texts, and the archiving of the project. Further planning documentation may be required for the archiving work on completion of the analysis work.

12.2 Products

The products of this project include a popular book to be written by Jim Leary and David Field and an academic monograph, which will be multi-authored and edited by Jim Leary, Gill Campbell and David Field. This monograph will be available as a print-on-demand hard copy and as a digital PDF download. It will be linked to an e-text, where the majority of technical information will be held, as well as 3D models of the hill. The e-text will be stored online

and the PDF download will link with it. A CD-ROM of the e-text can be made available in back of the hard copy monograph. It is also envisaged that a short audio-visual downloads are made available as podcasts.

12.3 Tasks

Tasks have been identified above and are outlined below:

Task id	Task description	Carried out by	Days
Admin			
	Project management and review	JL SM NH GC	15 3 7 7
	Project team meeting	JL, SM, DF, GC, NH, MC, DR, FW, JV, JD, EL, TC, CT, HC, PM, NL, KG, TW, CJ, MLo, AC	1 each
	Finance	CJ	2
Analysis work			
1	Stratigraphic analysis	JL	5
2	Compare stratigraphic sequence with Atkinson's	JL	5
Antlers			
3	Marking and refitting antler fragments	FW	1.5
4	Recording metric data from refitted antler fragments	FW	0.5
5	Analysis of distribution of the antler in the tunnel	FW	0.5
6	Background research for antler report	FW	2
7	Description of antlers as picks	IR	3
Scientific Dating			
8	Build initial dating simulations	PM JL GC	1 1 1
9	Additional work to identify dating samples for round 1	PM GC	0.5 0.5
10	Submission of round 1 samples to Scientific Dating Team	PM JL	1 1
11	Incorporate round 1 dating results into simulation model, identify further samples to refine chronology	PM JL	1 1
12	Additional work to identify dating samples for round 2	PM	0.5
13	Submission of round 2 samples to Scientific Dating Team	PM JL GC	1 1 1
Graphics office			
14	Quantifying existing files and removing duplicates	EL TC	1 1
15	3D modelling	EL JL TC	20 2 1
16	Figure production (sections and plans)	EL JL	10 2
17	Projection of Atkinson's section	EL	5
18	Cartography	EL JL	5 2
19	Finds illustrations (pottery, metalwork, flint)	JD JV JL	10 1 1

		NH	2
20	Production of reconstruction drawings	JD JL GC	20 5 1
21	Diagrams and schematic illustrations	JV GC	10 1
22	Enviro (insects, seeds) and antler photography	JV GC FW	10 1 1
Search of archive			
23	Search relevant archive in the British Library	KF	2
24	Search relevant archive in Alnwick	KF	5
25	Search relevant archive in Bodleian	KF	3
26	Search relevant archive in Wilton	BE	1
27	Search relevant archive in Charborough Park	BE	1
28	Report on archives recovered and integrate	DF	5
Plant remains and geoarchaeology			
29	Processing of samples and analysis of plant remains from OLS	GC	20
30	Processing of samples and analysis of plant remains from Lower and Upper Organic mounds	GC	20
31	Processing of samples and analysis of plant remains from the mini-mound	GC	5
32	Analysis and report writing of geoarchaeology	MC	40
Insect remains			
33	Sorting of additional samples for insect remains	Technician	12
34	Identification and reporting of insect remains	MR	15
Land snails			
35	Analysis and report writing of land snails	PD	3
Pollen			
36	Analysis of 8 assessed pollen samples	DR	8
37	Assessment of a further 17 pollen samples	DR	5
38	Analysis of an estimated 10 pollen samples	DR	10
Preservation			
39	Microbiological analysis and reporting	ML RS	12 13
40	Cellular and ultrastructural preservation and reporting	MCo TB	16 16
Faunal remains			
41	Produce archive list of animal bone	FW	2
42	Researching local contemporary assemblages	FW	3
43	Integration of assemblage data into an overview of all faunal material recovered	FW	3
Conservation			
44	Assessment of conservation work	KG	5
45	Conservation of metal work	KG	5
Finds			
46	Analysis and report writing of flint microwear	RD	20
47	Analysis and report writing of struck flint	BB	9
48	Further recording of pottery and reporting	KB	3
49	Analysis and reporting of metal work	NH QM	4 1
Experimental archaeology			
50	Experimental work with antler picks and report on experimental work	IR FW JL	2 1 1
51	Experimental work on sarsen stones and report	JP	2

	of experimental work	JL DF	1 1
52	Firing samples of the clay with flints and comparing the thin sections with local prehistoric pottery types	KB MC	2 1
53	Experiment with modern sheep scapulas to see how efficient they are as tools to aid turf cutting and removal	GC FW	1 1
Acoustics			
54	Analysis and reporting on acoustics	SM	15
Palaeohydrology			
55	Analysis and reporting on palaeohydrology	ME PW	5 5
Preparation and submission of text			
56	Preparation of popular text	JL DF	30 30
57	Editing of popular text	JL DF	10 10
58	Submission of popular text to publications team	JL DF	2 2
59	Final dating model building, analysis, production of final text and figures	PM JL	5 1
60	Report writing of antler fragments	FW	5
61	Faunal remains report writing	FW	3
62	Pollen Report writing	DR	3
63	Production of geophysics publication text	NL	10
64	Production of Iron Age publication text	AC	1
65	Production of Roman publication text	TW	10
66	Production of wells/ritual shafts publication text	FW	10
67	Production of excavation sections for monograph	JL	20
68	Production of environment sections for the monograph	GC	15
69	Production of Neolithic overview sections for monograph	DF JL	10 10
70	Editing of monograph text and production of introductory and concluding sections	JL GC DF	30 30 30
71	Formatting Photographs for publication	JV	2
72	Preparation & collation of publication ready image files	JD EL JV	3 4 4
73	Data reporting	MLo	5
74	Writing the foreword	AC	5
75	Submission of monograph text to referees	JL	2
76	Submission of monograph text to publications	JL	2
77	Production of e-text report for plant remains	GC	10
78	Preparation of e-text report stratigraphy	JL	10
79	Editing of e-text report	JL GC DF	5 5 5
80	Liaison with web team over podcast	HC	15
81	Preparation of podcast	JL GC DF HC	5 5 5 1
Archiving			
82	Liaise with ADS over 3D model, PDF, raw data	CT	4

		HC EL	2 1
83	Collate archive	CT JL	10 10
84	Rebox finds	CT	2
85	Archive deposition	CT	2

AC = Amanda Chadburn
BB = Barry Bishop
BE = Brian Edwards
CJ = Christine Jackman
CT = Claire Tsang
DF = David Field
DR = David Earle Robinson
EL = Eddie Lyons
FW = Fay Worley
GC = Gill Campbell
HC = Hugh Corley
IR = Ian Riddler
JD = Judith Dobie
JL = Jim Leary
JP = Josh Pollard
JV = John Vallender
KF = Kate Fielden
KG = Karla Graham
MC = Matt Canti
MCo = Margaret Collison
ML = Malcolm Lillie
ME = Mike Edmonds TBC
MLo = Manny Lopez
MR = Mark Robinson
NH = Nicola Hembrey
NL = Neil Linford
PD = Paul Davies
PM = Peter Marshall
PW = Paul Whitehead TBC
QM = Quita Mould
RC = Ros Cleal
RD = Randy Donahue
RS = Robert Smith
SM = Sarah May
TB = Tony Brain
TC = Tom Cromwell
TW = Tony Wilmott

12.4 Timetable

See timetable below.
Popular book submission end of 2009
Academic monograph submission end of 2010

Task	2009 Jan	Feb	Mar	April	May	Jun	July	Aug	Sep	Oct	Nov	Dec	2010 Jan	Feb	Mar	April	May	Jun	July	Aug	Sept	Oct	Nov	Dec	2011 Jan	Feb
Team meeting																										
Strat																										
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Task	2009 Jan	Feb	Mar	April	May	Jun	July	Aug	Sep	Oct	Nov	Dec	2010 Jan	Feb	Mar	April	May	Jun	July	Aug	Sept	Oct	Nov	Dec	2011 Jan	Feb
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Finds																										
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Task	2009 Jan	Feb	Mar	April	May	Jun	July	Aug	Sep	Oct	Nov	Dec	2010 Jan	Feb	Mar	April	May	Jun	July	Aug	Sept	Oct	Nov	Dec	2011 Jan	Feb
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Task	2009 Jan	Feb	Mar	April	May	Jun	July	Aug	Sep	Oct	Nov	Dec	2010 Jan	Feb	Mar	April	May	Jun	July	Aug	Sept	Oct	Nov	Dec	2011 Jan	Feb
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Archive																										
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13 OWNERSHIP

13.1 Ownership of materials recovered during the works

Silbury Hill is in the Guardianship of the Secretary of State and managed by English Heritage on behalf of the Department for Culture, Media and Sport. Ownership of Silbury Hill, and thus its constituent material and any artefacts or ecofacts that they may contain, resides with Lord Avebury.

Lord Avebury has agreed that English Heritage may:
Remove from site all material of archaeological interest for further study.
Curate the material and conserve, where necessary for the duration of the project.
Place a portion of the samples in long term storage for future study.

13.2 Ownership of the archive

Ownership of the archive, other than the above, and all intellectual property rights, resides with English Heritage.

13.3 Arrangements for deposition

Lord Avebury has provisionally agreed to donate all finds recovered by English Heritage to an appropriate registered depository, where they will be professionally stored and accessible for public reference. The proviso is that Lord Avebury retains the right to review the ownership of any finds prior to deposition. The deposition arrangements will be confirmed on Submission of this Updated Project Design.

The depositories at present are:
The Alexander Keiller Museum, Avebury (collections are already in the Guardianship of the Secretary of State) to take the documentary archive, the material archive (apart from biological material for long-term preservation), a copy of the digital archive. English Heritage (Archaeological Projects pro tem) to keep the digital archive (eventually to reside with a digital archiving body eg NMR or ADS). The Department of Oceanography, University of Southampton to take biological material and sediments for long-term preservation.

14 BUDGET

14.1 Resourcing strategy

External staff costs will be provided by the South-West Region of English Heritage. However, the majority of the resources required will be in-house expertise, time and facilities, which will be provided by Research and Standards.

14.2 Internal staff costs

The budget provided by R&S for core staff time is 745 days, (which if charged at the conservative rate of £*** per day would equal £***). Including T&S costs estimated at £*** and a dating programme of £***, the commitment from R&S can be estimated at £***. Publication costs will also be met by the Publications Team. The number of days for R&S internal staff can be broken down as:

Name	Days
Jim Leary	181
Gill Campbell	125.5
David Field	99
Eddie Lyons	47
Matt Canti	42
Fay Worley	34.5
Judith Dobie	34
John Vallender	28
David Robinson	27
Sarah May	19
Hugh Corley	19
Claire Tsang	19
Nicola Hembrey	14
Peter Marshall	11
Karla Graham	11
Neil Linford	11
Tony Wilmott	11
Manny Lopez	6
Tom Cromwell	3
Christine Jackman	3
Total	**745 days**

Other costs:

Scientific dating	20 samples @ £***	£***
Staff expenses		C £***
Total		**C £*** **

14.3 External staff costs

The total external costs for the analysis and publication are calculated at £***. It is proposed that £*** for the palaeo-hydrology will be provided by HEEP, and therefore the total to be provided by P&O for the non-core archaeological costs is £***, of which £*** will be payable in the 2009/10 financial year, and £*** in the 2010/11 financial year. Costs for archiving have not been included as these are not known at this stage. The costs can be broken down as:

Analysis			
Kate Fielden	Archival research	10 days @ £***	£***
Ian Riddler	Antlers	5 days @ £*** per day + expenses	£***
Mark Robinson	Insects	15 days @ £***	£***
Technician	Insects	12 days @ £***	£***
Paul Davies	Molluscs		£***
Josh Pollard	Sarsen stones	2 days @ £*** + expenses	£***
Barry Bishop	Prehistoric lithics	9 days @ £*** + expenses	£***

Randy Donahue	Microwear analysis	20 days	£***
Kayt Brown	Pottery analysis	5 days @ £***	£***
Quita Mould	Metalwork	1 day	£***
Margaret Collinson/Tony Brain	Plant material	32 days	£***
Malcolm Lillie/Robert Smith	Preservation	25 days	£***
NERC Isotope	Strontium isotope preparation		£***
Mike Edmonds + Paul Whitehead	Palaeo-hydrology		£***
Preparation and submission of text			
Alasdair Whittle	Refereeing		£***
Martin Bell	Refereeing		£***
Archiving			
Unknown at this stage			
Other			
Travel & expenses			£***
Total			**£***

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APPENDIX 1 – RISK LOG

Risk number: 1

Description: Redundancies are made within the project team

Probability: Low

Impact: High

Countermeasures: If redundancies occur within the project team the gaps will be plugged using other staff members.

Estimated time/cost: Depending on which project team member, this is likely to result in a lengthy delay, and therefore an extension to the agreed timetable will be required. Contingency funds will be required if external staff need to be bought in.

Owner: The Project Manager will be responsible for monitoring this Risk.

Date this entry last updated: The Risk Log will be reviewed formally at the Review Point in December 2009.

Risk number: 2

Description: Retirements within the project team

Probability: Low

Impact: Low

Countermeasures: If a member of the project team retires during the lifetime of the project once again the gap will be filled with another staff member or the retiree will complete their work early.

Estimated time/cost: Since retirements are generally known some time in advance this is unlikely to have a huge impact on the overall cost and timetable of the project.

Owner: The Project Manager will be responsible for monitoring this Risk.

Date this entry last updated: The Risk Log will be reviewed formally at the Review Point in December 2009.

Risk number: 3

Description: Delay to the dating programme due to accelerator breaking down in a laboratory.

Probability: Medium

Impact: Medium

Countermeasures: The accelerator tends to break down every couple of years and will result in a delay to the dating programme and thus overall project. Using more than one laboratory will reduce this risk.

Estimated time/cost: If this occurs an extension to the overall timetable will be required.

Owner: Peter Marshall will be responsible for monitoring this Risk and will notify the Project Manager if it occurs.

Date this entry last updated: Last updated with the UPD.