

**An Geoarchaeological Watching Brief
at Hampshire Farm
near Westbourne, Hampshire**

DRAFT

**NGR 575107 107643
SU 751 076**

**Project No: 4104
Site Code: HFW09**

**ASE Report No: 2010009
OASIS id: archaeol6-71072**

**Dr Matthew Pope
With contributions by
Dr John Whittaker, Dr Martin Bates**

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Abstract

Archaeology South East was commissioned by WYG to undertake a geoarchaeological watching brief during geotechnical surveys being carried at the site by contractors Geoenvironmental at Hampshire Farm, Emsworth.

The programme of geotechnical work consisted of window sampling, percussion boreholing and test pitting. When observed sediments logs were modelled and recovered samples assessed it was determined that the site preserved a multi-phase suite of Pleistocene sediments.

These include marine and estuarine sands, high energy fluvial fan gravels and decalcified Head Deposits including Brickearth. It was not possible to determine the exact extent of the marine sequence or its relationship to an assumed cliff line running east west across the site. However, the results of the limited micropalaeontological assessment carried out by Dr Whittaker appear to confirm the beach deposits belong to the MIS 7 Brighton-Norton Raised Beach.

The site should be considered archaeologically sensitive until the nature and extent of these deposits has been more closely defined. It is now critical to determine the location of the cliffline precisely and assess for possible terrestrial facies which may contain an archaeological signature. It also offers scope for further palaeoenvironmental and palaeogeographical modelling.

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1.0 INTRODUCTION

1.1 Background

- 1.1.1 Archaeology South East was commissioned by WYG to undertake a geoarchaeological watching brief during geotechnical surveys being carried at the site by contractors Geoenvironmental at Hampshire Farm, Emsworth hereafter referred to as 'the site' (NGR 575107 107643; Figure 1). Hampshire Farm is situated near to the village of Westbourne and just within the county of Hampshire. It comprises two parcels of land covering approximately 4 hectares bounded to the north by the Long Acre Road, to the west by Redlands Road and to the south east by the Village of Westbourne.
- 1.1.2 It was determined by Hannah Fluck (Assistant County Archaeologist for Hampshire County Council) that the site offered high potential for the preservation of deposits associated with the Brighton-Norton formation; a series of marine, estuarine and terrestrial deposits associated with a 250,000 year interglacial-glacial cycle. As these deposits are considered of national significance in terms of their archaeological and palaeogeographical and/or palaeoenvironmental potential, Hampshire County Council requested that the involvement of a qualified Palaeolithic/Quaternary specialist to monitor groundworks ahead of development at the site was prudent.
- 1.1.3 The programme of geotechnical work was to consist of window sampling, percussion boreholing and test pitting.
- 1.1.4 The watching brief was carried out through November 2009.

1.2 Geology and Topography

- 1.2.1 The site comprises two fields situated on a south-facing slope rising from 11m OD. in the south to 26m OD. at the northern margin of the site. The slope represents a major palaeolandform delimiting (Bates 1998) the Lower Coastal Plain of West Sussex and Hampshire from a much dissected portion of the Upper Coastal Plain. The coastal plain of the region has long been recognised as of marine origin and representing Pleistocene phases of high sea level (Prestwich 1859). Recent research through mapping surveys funded by English heritage have proved an extensive sequence of up to five Raised Beaches through both counties dating from the MIS13 interglacial some 500,000 years b.p., through to marine deposit of the last MIS5 interglacial dating to after 125,000 year b.p. (Bates, Wenban-Smith et al. 2007a); (Roberts and Pope In Prep). The topography to the immediate west of the site comprises a continuation of this slope as a consistent landform for a further 2.5km (Figure 2). This slope is then intersected by a north south valley in the vicinity of Southleigh, the valley current carries a misfit winterbourne but would have been a significant melt water channel during glacial cycles. To the immediate east of the site the slope intersects with the flood plain of the Ems Valley, itself now a misfit winterbourne with a relatively extensive floodplain c.0.5km wide. While the Ems River catchment does not extend into the weald, it should still be considered a major Sussex River. It has been in existence since at least MIS 12 as terrace deposits relating to its

Pleistocene drainage has been mapped inter digitating with those of the Westbourne-Arundel Raised Beach (WARB) at Rackham Park Farm. The Ems Valley system drains a significant part of the West Sussex and Hampshire South Downs as well as parts of the tertiary vales of the Bere Forest Syncline. It should be considered a major glacial melt water channel and possible contributor to the Solent River system.

- 1.2.2 The site does not fall away consistently. Instead the most northern part of the site is relatively steep with a break in slope defining the more southerly, gently inclined portion of the site (Figure 2)
- 1.2.3 The mapped drift geology of the site is shown by the BGS as Terrace Gravels to the south of the site and Head Deposits on the steeper slopes to the north. The underlying solid geology is mapped as comprising London Clay of the Tertiary (Shephard-Thorn 1995).
- 1.2.4 The position of the site and its altitude is shown as being entirely consistent with the projected distribution of Pleistocene Deposits associated with the Brighton-Norton Raised Beach. Investigation by Martin Bates to the immediate west of the site at Southleigh Farm (SU 73705 7140) had previously shown the presence of Middle Pleistocene marine deposits within this part of the Hampshire Coastal Plain (Bates, Wenban-Smith et al. 2007a). The following observations were made by Dr Martin Bates as part of work carried out at the site.

“BGS records and mapping indicated that sediments potentially correlated with the Brighton/Norton Raised Beach could be traced as far west as the Havant area with some degree of confidence although no observations of open quarries etc have been made in the region. The area also occupies an important sector as it lies close to the eastern end of the Portsdown anticline and lies within an area that is likely to have received draining from the north and the Tertiary hinterland towards Horndean. The site lies within the grounds of Southleigh Park to the north of Emsworth and below the 15m contour. Three boreholes were drilled and samples recovered. Tertiary clay bedrock was recovered in all three boreholes at elevations between 7 and 9.5m O.D. The dating of the deposits at the site relies on the comparison of the microfossil faunas with other known sites on the coastal plain and the geomorphological position of the site. Identical faunas have been recovered from the sites at Norton Farm and Portfield Pit. Similar faunas have also been recovered from Yeoman’s Road and by previous workers such as Chapman at Portslade. The local geomorphological position, the similarity of sequence types and elevation of deposits also suggests potential correlations with these sites and consequently the evidence suggests a similar age may be ascribed to the Havant site” (Bates:2007a)

- 1.2.5 Work by the Boxgrove Project, UCL, immediately to the north of the site had determined the presence of Marine Deposits dating to the MIS13 Westbourne-Arundel Raised Beach (WARB) which has produced internationally important *in-situ* archaeology at Boxgrove (Roberts and Parfitt 1999) and widespread traces of early human activity at other localities. Modelling of deposits based on the relationship between modern landforms the distribution of palaeogeographical features such as fossil cliff lines and the raised wave cut platforms had been developed in recent mapping

surveys in the region. The similarity of the topography at the Hampshire Farm site to locales which demonstrated the presence of deposits of Brighton-Norton age were striking. The possibility that site might preserve deposits of this age, with potential for sedimentary sequence containing both palaeoenvironmental remains and early Neanderthal archaeology had to be tested.

1.3 Aims and Objectives

1.3.1 The fieldwork aimed to utilise a planned programme of geotechnical work to undertake an assessment of the site for Geoarchaeological potential. It was intended that during the course of the watching brief observations could be made and samples taken which could allow the following:

- A first order sedimentary model of the site.
- Characterisation of sediments in terms of their likely age and origin.
- Characterisation of the sediments in terms of the geoarchaeological and palaeoenvironmental potential.
- An assessment of significance and further potential.
- Suggested mitigation.

1.4 Scope of Report

1.4.1 This report comprises recorded observations, a first order sedimentary model for the site and a broad palaeoenvironmental characterisation based on assessment of the sediments by John Whittaker.

2.0 METHODOLOGY

- 2.1 Ground works undertaken by the Geotechnical contractors were monitored by a geoarchaeologist until it became clear beyond reasonable doubt that no archaeological remains and/or significant geoarchaeological deposits were present (e.g. once excavation reached undisturbed natural Tertiary geology).
- 2.2 Where these works revealed significant archaeological material or palaeoarchaeological deposits, an opportunity was made for the collection of samples, which were hand-recovered and recorded to archaeological standards by the geoarchaeologist in attendance. Exposures, where possible, were hand-cleaned and recorded.
- 2.3 Soil from the works were also to be inspected by the geoarchaeologist for the recovery of both artefacts and ecofacts.
- 2.5 Pleistocene sediments were recorded in the following manner. Beneath the modern horizons, a detailed sediment log was compiled for each investigated locality. These comprised detailed sediment descriptions at 0.25m intervals or at the junction of major stratigraphic or lithological boundaries. The descriptions comprised matrix lithology, coarse components, sediment cohesion as well as characterisation of superficial structures and likelihood of decalcification. Given the presence of depositional contexts likely to preserve either artefactual or macrofaunal material at depths which are below the possibility of direct in-situ inspection, the arisings were placed in stratigraphic order to enable sieving, description and recording. During excavation dry sieving of such contexts, where possible, took place to look for lithic artefacts. In conjunction with the sieving, the spoil was constantly checked for artefacts as excavations continued.
- 2.6 Fine-grained deposits were sampled through the recovery of 40litres bulk samples suitable for the recovery of vertebrate, invertebrate micro-fauna, micro-artefacts and palynological remains.
- 2.7 Given the depth of stratigraphy, composite geological sections were drawn where possible at 1:20. Samples will be given a unique running number and marked on the section drawings. Sediment chromas and hues were recorded using a standard Munsell Soil Colour Chart. Section photography was undertaken where possible.

3.0 RESULTS

3.1 A total of four percussion boreholes, ten geotechnical test pits and six window sample holes were monitored through November 2009. The recorded logs and samples taken form the basis of this assessment.

3.2 All recorded stratigraphic observations were entered in a geological modelling programme (Rockworks) where stratigraphic designations based on lithological similarities observed in the field were modelled and tested. The Following six stratigraphic units were recorded as present in the field.

Unit 1: London Clay: Gley 6/10/YG dark grey firm clay with occasional 20mm seams of fine sand.

Unit 2: Marine Sand: 10YR 6/4 Light Yellowish Brown silty sand to medium sand. <1% rounded beach gravel 10-15mm

Unit 3: Fluvial Deposits: 10YR 5/8 strong brown sandy clay with 70-90% rounded flint gravel 10-90mm

Unit 4: Head Gravels: 10YR 6/4 Light Yellowish Brown decalcified silt with clay and 20-60% sub-angular flint gravel 20-120mm

Unit 5: Brickearth Head: 10YR 6/4 Light Yellowish Brown decalcified silt with clay and 0-5% sub-angular flint gravel 10-40mm

Unit 6: Holocene Topsoil: 10YR 5/6 yellowish brown silty clay.

3.2 The stratigraphic relationship of these sediments is shown on Figures 4, 5 and 6. The profiles show that the site contains marine deposits preserved at an approximate attitude of between 4 and 6m OD. These deposits appear to sit on a wave cut bench comprising undisturbed Tertiary London Clay and are presumably deposited against a cliffline cut into the Tertiary bedrock running through the northern part of the site. The geological projections shown in figures 3-5 should be considered a provisional first order model. The accurate mapping of sediment distribution for a site of this size will require more detailed observations at additional localities.

3.3 The Marine Deposits have a limited distribution, being truncated to the south by fluvial deposits forming the first terrace gravels of the River Ems. These gravels are of high energy fluvial origins and can only have been lain down under cold conditions during period of snow melt within the Pleistocene.

3.4 The entire site is covered by decalcified Head Deposits, these comprise both gravels deposited through periglacial processes such as gelifluction and Brickearth which may form as a result of lower energy fluvial processes, possibly the deposition of fine grained components from the tail of geliflucted debris flows. The fine grained Brickearth may also contain windblown loessic component. The uppermost recorded layer comprised Holocene topsoil.

4.0 THE ENVIRONMENTAL SAMPLES

4.1 Six samples were submitted by Archaeology South East from the Hampshire Farm site.. It was hoped that an assessment of the samples for microfauna and other palaeoenvironmental potential would enable identification of the suite of marine deposits recorded at the site. It was considered, on the basis of altitude, topography and position that the Brighton-Norton Raised Beach was represented at the site. Micro-palaeontology offered the most practical route to determining if this was indeed the case.

4.2 The following samples were assessed by Dr John Whittaker

Borehole/Test pit	Depth	Weight processed
BH2	4.0m	225g
TP10	3.2m	360g
WS5	4.5m	100g
WS6	2.6m	275g
WS6	3.5m	215g
WS6	4.2m	165g

4.3 Each sample was placed in a ceramic bowl and dried in an oven. In each case all the sediment provided was used. Hot water was then poured over the sample and a teaspoon of sodium carbonate was added to remove any clay fraction. This was left soaking overnight and then it was washed through a 75 micron sieve, using hot water. Each sample broke down quite readily. The residue was finally dried in an oven, before being put through a nest of sieves and examined under the binocular microscope.

4.4 The Following results were obtained:

BH2 (4.0m)	Organic remains comprise foraminifera (3 species: <i>Elphidium williamsoni</i> , <i>Haynesina germanica</i> and <i>Cassidulina reniformis</i>), broken valves of freshwater ostracods (1 species: <i>Potamocypris</i> sp.) and rare earthworm granules.
TP10 (3.2m)	Organic remains comprise rare foraminifera (1 species: <i>Haynesina germanica</i>) and one or two broken valves of freshwater ostracods (<i>Potamocypris</i> sp.).
WS5 (4.5m)	[a black clay]. Contains flint shards, mica and much pyrite. The only organic content is a little plant debris.
WS6 (2.6m)	Barren.
WS6 (3.5m)	The only organic content was a freshwater fish bone.
WS6 (4.2m)	The only organic content was a shard of a small mammal incisor.

4.5 Of the fossiliferous samples only the one sample each from BH2 and TP10 offer any potential for biostratigraphic and palaeoecological information. Although the

foraminiferal diversity is very low in these, the occurrence of the cold indicator *Cassidulina reniformis* in BH2 (which today does not live further south than mid-Norway) clearly indicates this sample belongs to the Brighton-Norton Raised Beach (Bates 2000); it has been found extensively in this deposit, including at the nearest nearby locality in the west of its outcrop, Havant BH1 and 3. The diversity is lower than at Havant but there *Elphidium williamsoni* and *Haynesina germanica* were also by far the most dominant species. Both species live today in sandy intertidal regimes and are able to tolerate brackish conditions. Here, at Hampshire Farm, this may indeed indicate a generally more brackish environment, but the lack of ostracods, which occur quite extensively at Havant and elsewhere along the Brighton-Norton outcrop, may rather suggest stronger weathering as these sediments are overlain only by a thin cover of periglacial sediments (M. Pope, pers. comm.). The accompanying freshwater ostracods in these two samples are always broken. The species present (a *Potamocypris*) indicates the presence of springs, but whether they are contemporaneous with the foraminifera is debatable. Freshwater ostracods were found in Havant BH3, but I do not have a record to hand as to what they were. In the Portfield Pit locality, near Chichester, where the Pleistocene sediments have been studied in most detail (Bates 1998), freshwater ostracods occur in small numbers within the marine/brackish Brighton-Norton Raised Beach (Unit 1) - and these include *Potamocypris zchokkei* - but in greater numbers in the overlying units 2 and 4, which are entirely freshwater and are assigned to the Devensian. It may be that the deposit seen in both these samples at Hampshire Farm is indeed Devensian, and that the Brighton-Norton Raised Beach component is reworked; on the other hand all the microfauna might be *in situ*. Only by examining more and better fossiliferous material will the problem be elucidated.

The three samples from WS 6 were all barren of microfossils. The only organic components recovered indicate a freshwater/terrestrial environment. The sole sample from WS 5, thought originally to be Tertiary (M. Pope, pers. comm.), may also be Pleistocene. The little plant debris it contains may indicate that a palynological analysis might be useful in obtaining further information.

5.0 DISCUSSION: SIGNIFICANCE, POTENTIAL AND RECOMMENDATIONS.

- 5.1 The geoarchaeological evaluation at Hampshire Farm succeeded in developing a first order geological model from observations of geotechnical works. This model (shown in figure 3-6) indicates the presence of surviving deposits associated with a raised beach palaeo-landform and Pleistocene sedimentation.
- 5.2 While no absolute dates were recovered it is possible, on the basis of position, altitude and temporal/ecological markers in the micropalaeontological assemblage to state with some certainty that marine and estuarine deposits associated with the 250,000 year old Brighton Norton Raised Beach are present at the site. These deposits are truncated laterally by fluvial gravels and vertically by the emplacement of Head Deposits.
- 5.3 Whilst it has been possible to determine the extent of the MIS7-6 deposits to a degree, the limits and character of these sediments have only been

broadly defined. It is possible that the depth and degree of preservation of these sediments both improve with proximity to the cliff line. This is strongly suspected to run through the site between BH2 and WS2. Closer to the cliff the deposits may be vertically more extensive, preserving not only thicker intertidal or estuarine facies but also terrestrial deposits relating to the MIS7-6 transition. Deposits here, preserved under a greater depth of Head cover, may well contain richer and more diverse faunal assemblages.

- 5.4 The fluvial deposits found at lower elevations remain undated and appear to offer little in the way of palaeoenvironmental significance. However, the deposits are likely to relate to periods of gravel aggregation during the Devensian and may well comprise a multi-episode long term accumulation through MIS4-2. The gravels appear to be part of a fan distribution, marking a change in fluvial regime from a tightly constricted channel of the Ems river as it flows through the Downs to a more open and less constricted regime as the river entered the coastal plain. The resulting drop in velocity may account for the accumulation of fluvial gravel across the wide floodplain here.
- 5.5 While the gravels in isolation offer only modest archaeological potential their occurrence in proximity to the Brighton-Norton raised beach marks out the site as a whole of particular interest and of regional palaeogeographical and palaeoenvironmental potential. The locale offers the chance, through further sampling and dating, to examine in detail the relationship between Middle to Late Pleistocene coastal landforms and fluvial systems. The record should offer a chance to examine changes in fluvial regime in response to climatic oscillations. The possibility that the more extensive sequences of Stage 7-6 deposits are preserved at the site also need to be considered in taking forward mitigation of the site ahead of further development. Both sequences need to be directly assessed for archaeological potential through purposive work.
- 5.6 Further purposive work could now be undertaken to evaluate archaeological and palaeoenvironmental potential. This programme, to be agreed with Hampshire County council could include geophysical surveys to determine the exact position of the cliff. Targeted borehole survey to recover more extensive and well preserved sequences close to the cliffline and assessment of fluvial gravels and identified terrestrial facies for artefacts.

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ACKNOWLEDGEMENTS

The authors would like to thank WYG for commissioning the work and Gavin Roberts of Geoenvironmental for his kind cooperation in allowing us to effectively monitor the programme of geotechnical works and for rare but productive engagement in understanding the sediment sequence of a complex site.

SMR Summary Form

Site Code	HFW09					
Identification Name and Address	Hampshire Farm, Westbourne					
County, District &/or Borough	Hampshire					
OS Grid Refs.	NGR 575107 107643					
Geology	Tertiary and Pleistocene Drift					
Arch. South-East Project Number	4104					
Type of Fieldwork			Watching Brief			
Type of Site	Green Field					
Dates of Fieldwork	Nov2009					
Sponsor/Client	WYG					
Project Manager	Neil Griffn					
Project Supervisor						
Period Summary	Palaeo.					
<p><i>Archaeology South East was commissioned by WYG to undertake a geoarchaeological watching brief on Geotechnical surveys being carried at the site by contractors Geoenvironmental. The programme of geotechnical work consisted of Window Sampling, Percussion Boreholing and Test Pitting. When observed sediments logs were modelled and recovered samples assessed it was determined that the site preserved a multi-phase suite of Pleistocene sediments. These include Marine and Estuarine sands, high energy fluvial fan gravels and decalcified Head Deposits including Brickearth. It was not possible to determine the exact extent of the Marine Sequence and its relationship to an assumed cliff line running east west across the site. However the results of the limited micropalaeontological assessment carried out by Dr Whittaker appear to confirm the beach deposits belong to the MIS 7 Brighton-Norton Raised Beach. The site should be considered archaeologically sensitive until the nature and extent of these deposits has been more closely defined. It also offers scope for further palaeoenvironmental and palaeogeographical modelling.</i></p>						

OASIS Form

OASIS ID: archaeol6-71072

Project details

Project name Hampshire Farm, near Westbourne, Hampshire.
Short description of the project A watching brief on geotechnical works being carried out ahead of development. Suite preserves a mix of Pleistocene marine, estuarine and fluvial deposits sealed by Head Gravels and Brickearth Deposits.

Project dates Start: 01-11-2009
Previous/future work No / Yes
Any associated project reference codes 4104 - Contracting Unit No.
Type of project Field evaluation
Current Land use Grassland Heathland 3 - Disturbed

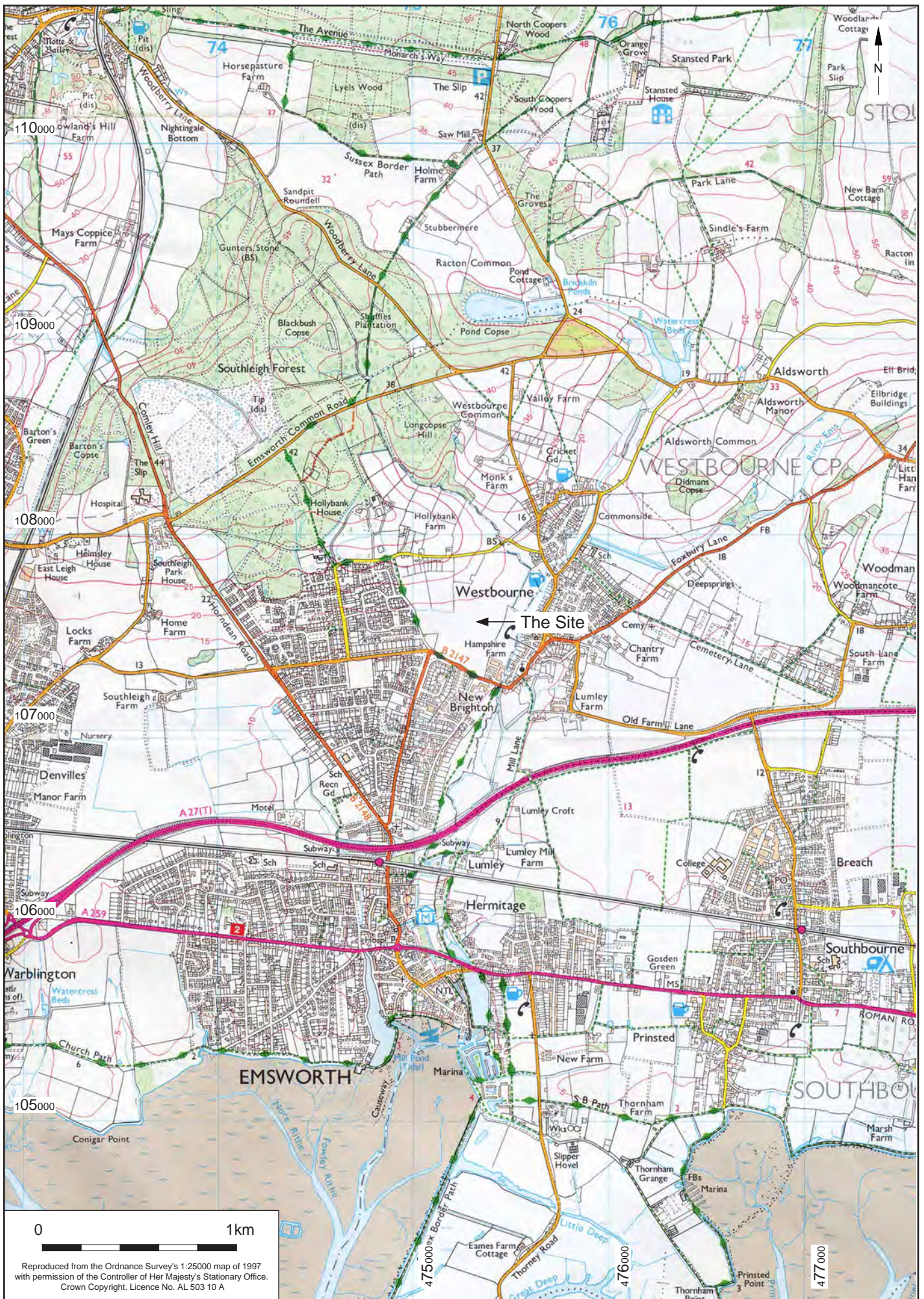
Project location

Country England
Site location HAMPSHIRE HAVANT HAVANT Hampshire Farm, near Westbourne, Hampshire.
Postcode PO10 8
Study area 4.00 Hectares
Site coordinates SU 751000 076000 50.8624665074 -0.932772691093 50 51 44 N
000 55 57 W Point
Height OD / Depth Min: 5.00m Max: 15.00m

Project creators

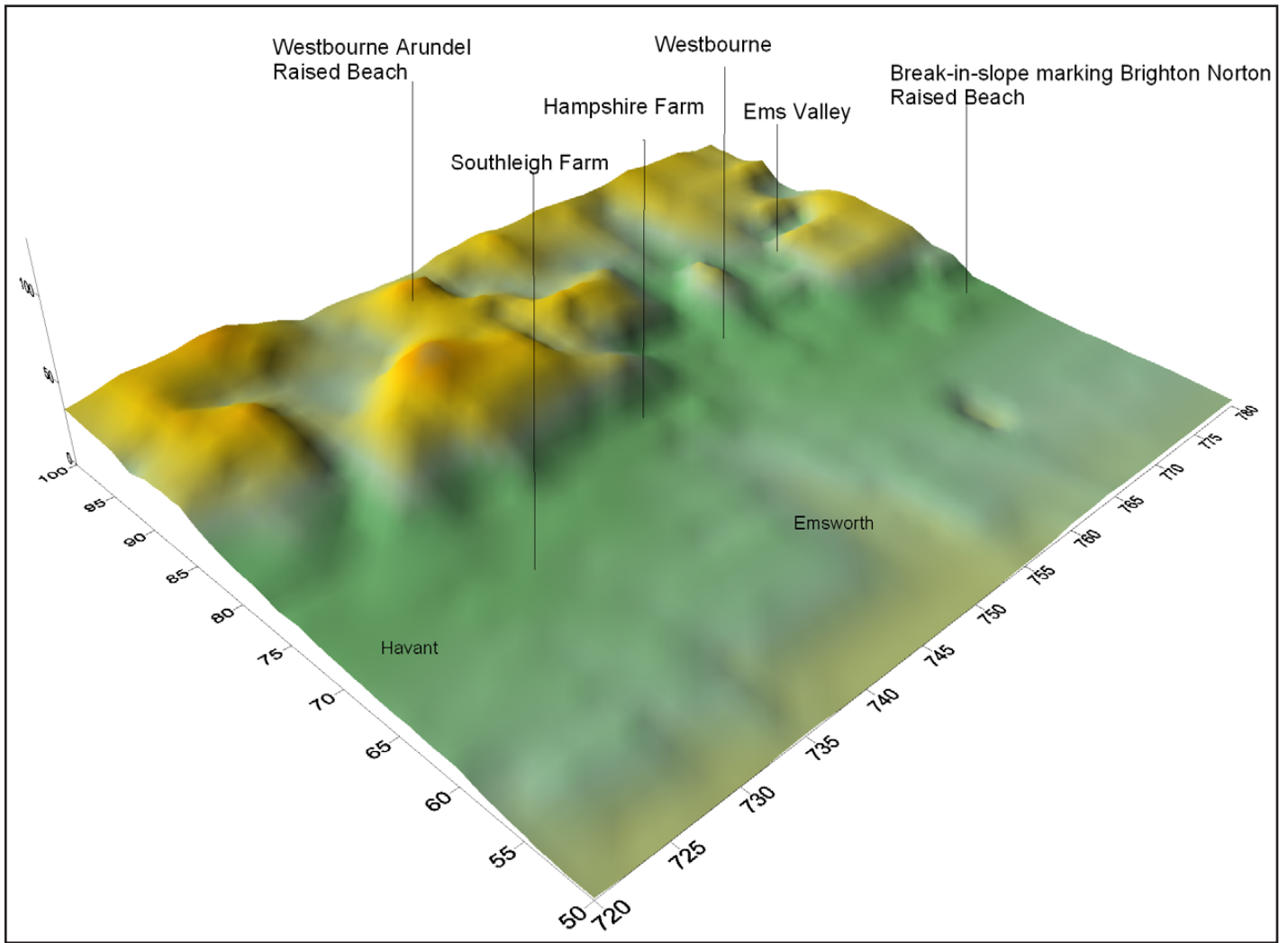
Name of Organisation Archaeology South East
Project brief originator Hampshire County Council
Project design originator WYG
Project director/manager Neil Griffin
Project supervisor Matt Pope
Type of sponsor/funding body Client

Entered by Matt Pope (m.pope@ucl.ac.uk)
Entered on 26 January 2010



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© Archaeology South-East		Emsworth	Fig. 1
Project Ref: 4104	Jan 2010	Site location	
Report Ref:	Drawn by: JLR		



© Archaeology South-East		Emsworth	Fig. 2
Project Ref: 4104	Jan 2010	Topo	
Report Ref:	Drawn by: JLR		

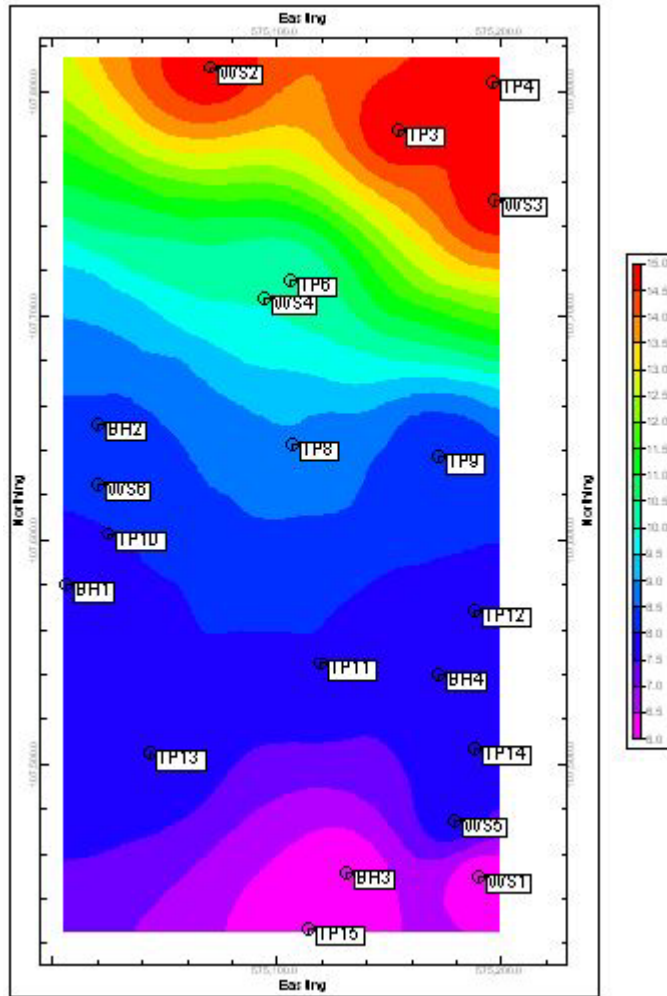


Fig. 3: Borehole and test pit location map

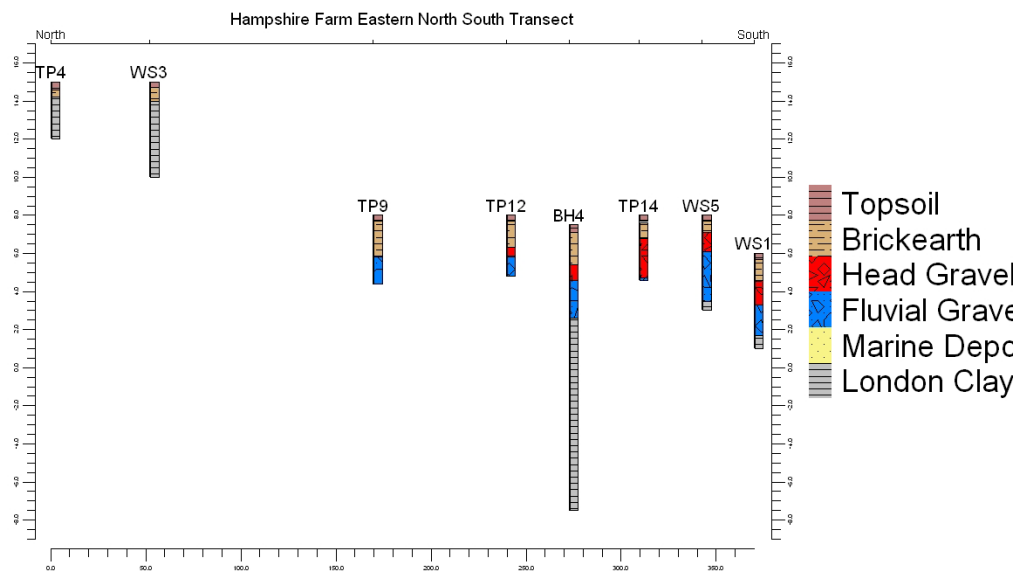


Fig. 4: Eastern transect

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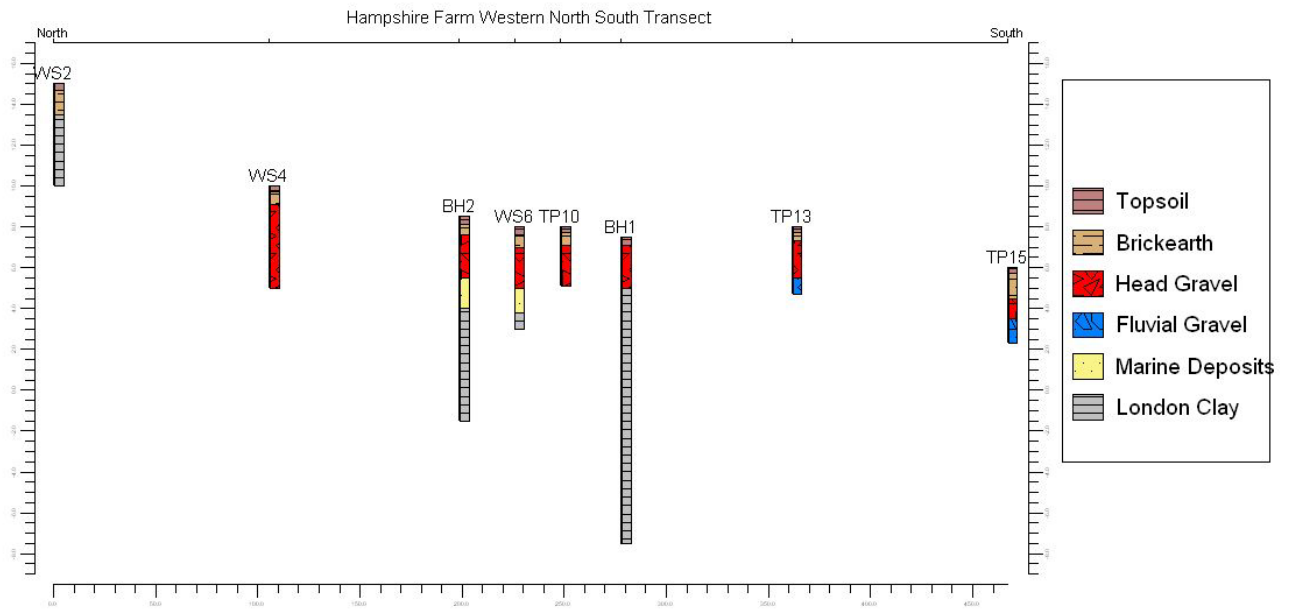


Fig. 5: Western transect

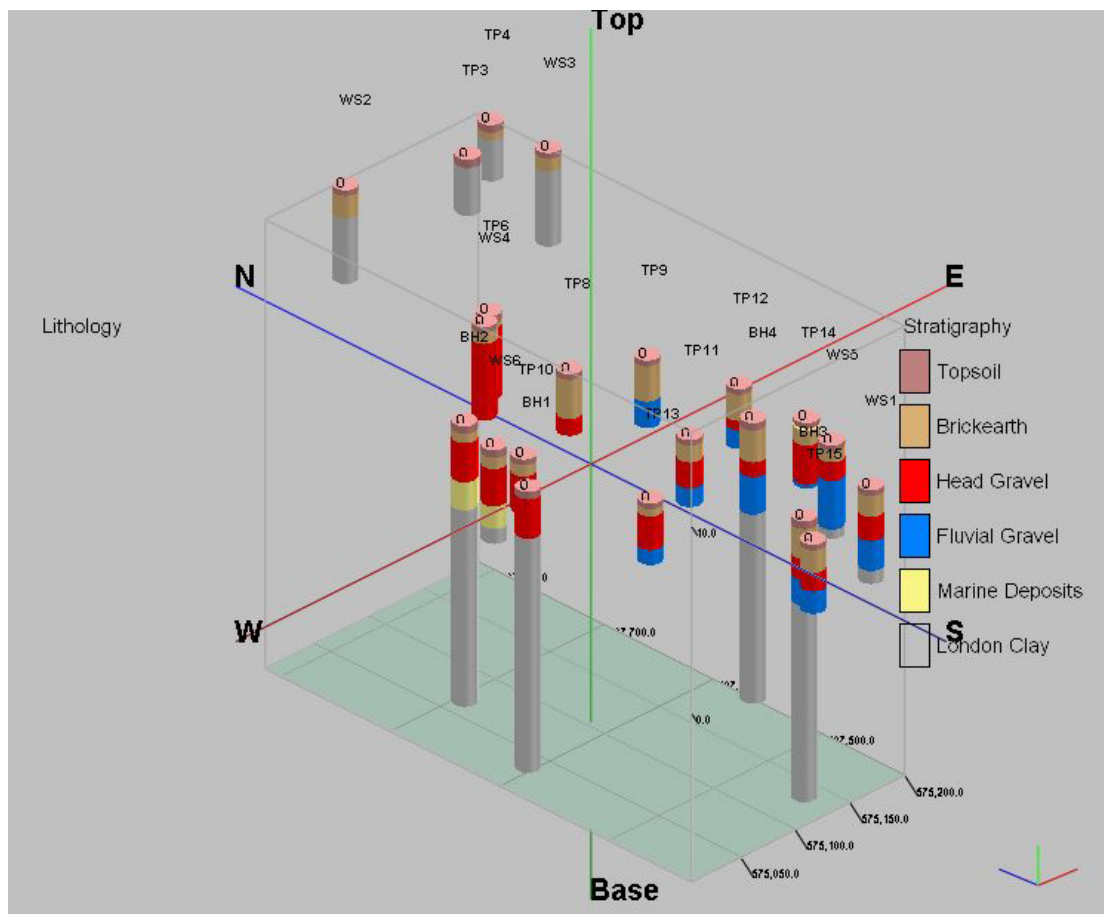


Fig. 6: 3D log model

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