Archaeology South-East

ASE

# A23 Widening, Handcross, West Sussex

## Geo-Archaeological Evaluation

**Report No: 2009113**

**NGR: 526376,127854**

**ASE Project no. 3813**
**Site code: HWW09**

**July 2009**

**Prepared by**

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## Abstract

*Archaeology South-East have undertaken a geoarchaeological investigation at the site of proposed road widening on the A23 near Handcross on behalf of Jacobs. This work involved the observation of three window sample sequences recovered using a Cobra powered augur. The investigation revealed a c.20m sequence of alluvial sediments of the flood plain. These showed the transition from high energy fluvial conditions, perhaps dating to the early Holocene, through to low-energy organic clays followed by a return to higher energy sandy alluvial facies which was sealed by down slope colluvial sediments.*

*Palynological assessment has shown good pollen preservation as part of a sequence which seem to relate to early Bronze Age clearance of the upper Ouse Valley and indication of early agricultural activity. More detailed sampling and analysis combined with the recovery of a dating sample may help to elucidate Mid-Holocene anthropogenic activity and environment change for the Upper Ouse catchment of the High Weald.*

**CONTENTS**



**FIGURES**

## 1.0 INTRODUCTION

**1.1** Archaeology South-East (ASE), the contracting division of the University College London Centre for Applied Archaeology, were commissioned by Jacobs on behalf of their client to undertake a geo-archaeological evaluation adjacent to the A23, Handcross, West Sussex (centred at NGR 526376,127854) (Fig. 1) hereafter referred to as 'the site'.

**1.2** The geoarchaeological evaluation took place in advance of a programme of widening the A23 at Handcross, West Sussex.

**1.3** The area of investigation lay just to the west of the A23, north of the river Ouse. The widening works are taking place under a Highways Agency scheme and do not require planning consent. However, the Highways Agency, as a policy of best practise, asked, through their Heritage Consultant, Jacobs, that the West Sussex County Council Archaeologist, John Mills, comment on the works and advise as to any appropriate archaeological / geo-archaeological mitigation.

**1.4** It was recommended by the West Sussex County Council Archaeologist that a sequence of boreholes excavated to assess the geoarchaeological potential of the site would be an appropriate mitigation strategy. A Written Scheme of Investigation detailing this work was produced by ASE (Sygrave and Pope 2009) and approved by Jacobs and John Mills prior to the fieldwork.

**1.5** Three boreholes were excavated forming a north south transect from the flood plain of the River Ouse onto the first terrace, across the site. A 2.2ha topography survey was also undertaken by ASE north of the river in order to place the results of the borehole survey in a wider context (Fig. 2).

## 2.0 GEO-ARCHAEOLOGICAL BACKGROUND

**2.1** The site sits on bedrock of Tunbridge Wells Sand. This formation is part of the Wealden Group dating to the Cretaceous and comprises beds of mudstones, silts and thin beds of sandstones. To the south of the outcrop these beds give way to the younger Cretaceous deposits of the Weald Clay.

**2.2** The site is situated within the valley of the Sussex Ouse River with drainage, and the valley, aligned East-West following a basal altitude of approximately 58m OD. The valley sides are more steeply inclined to the north where they attain a maximum altitude of 110m OD (Figs 1 and 3)

**2.3** While similar headwater valleys of the central Weald were investigated by Scaife and Burrin in the 1980's the current on-going programme of works represents the first systematic investigation of this particular area of drainage. A review of geotechnical borehole data by Pine et al. (2006) indicated the possible presence of valley alluvium and slope derived colluvium within the valley. The proposed works will test this conclusion and characterise more fully the nature of valley sedimentation at the site.

## 3.0 PROJECT AIMS AND OBJECTIVES

**3.1** The purpose of the geo-archaeological investigation is to ascertain the character, quality and degree of survival of palaeo-environmental and geo-archaeological remains on the site and the potential impact of development upon them. Significant findings may warrant full publication in addition to the final project report. Research aims and objectives were detailed in the WSI (Sygrave and Pope 2009) and are outlined below.

### 3.2 Research Aims

- To characterise the sedimentary sequence at the site in terms of Lithology, agents of deposition, preservational environment and age of deposition.
- To sample and characterise the preservational environment within bodies of sediment for the recovery of palaeoenvironmental remains.
- To develop, from the boreholes and previous geotechnical work, a first order sedimentary model for the site.
- On the basis of assessment of palaeoenvironmental remains, if recovered, a first order model for palaeoenvironmental development at the site.
- To develop from these models both recommendations for further mitigation work.

### 3.3 Specific Research Objectives

The site offers the scope for addressing the following specific Research Objectives.

- Determining the depth and character of alluviation in the central Weald.
- Examining the relationship between colluvial/alluvial processes and human clearance/modification of the watershed.
- Isolating the potential for survival of early Holocene channel profiles/land surfaces and associated artefacts/ecofacts.
- Assessing the degree to which models of river valley development developed by Scaife and Burrin are widely applicable in a central Wealden context.

## 4.0 METHODOLOGY AND RESULTS

**4.1** The Geoarchaeological boreholes were sited through consultation with Jacobs to provide a transect across the floodplain of the river Ouse within the footprint of the site (Fig. 3).

**4.2** Three boreholes were driven using a Cobra power auger with window sample equipment. Below topsoil and made ground samples will be taken at 0.2m intervals for complete recovery to up to 5m depth or upon encountering the solid geology. Each 0.2m sample was characterised in terms of its sedimentology and bagged for later assessment.

**4.3** Full reporting on the nature and character of the sequence will be presented in the final report. The following observations were made in Borehole 1. Boreholes 2 and 3 encountered weathered Cretaceous Geology immediately below sub-soil levels and therefore were of no geoarchaeological interest and are not detailed here.

**BH 1** Elevation 58m OD.

| **Depth (metres)** | **Lithology** | **Samples** | **Inferred environment of deposition** |
|---|---|---|---|
| 0.00-0.2m | | | Topsoil |
| 0.20 – 0.40 | Gley 1 6/10YG greenish grey silty clay. Structureless and compact. ---abrupt contact--- | Sample 1 | Holocene Colluvial Sands |
| 0.40 – 0.70 | 2.5Y 6/3 pale yellow medium sand. Compact and consolidated. ---graded contact--- | Sample 2 | Holocene Alluvial Sands |
| 0.70 – 1.50 | 5YR 6/8 reddish yellow medium to coarse sand. Compact and bedded. ---sharp contact--- | Sample 3 | Holocene Alluvial Sands |
| 1.50– 1.60 | 5YR 5/1 grey silty clay with organic seams. Soft and bedded. ---abrupt contact--- | Sample 4 | Holocene Organic Clays |
| 1.60 – 2.10 | 5YR 6/8 reddish yellow coarse sand. Compact and bedded. ---abrupt contact--- | | Late Glacial/Early Holocene Fluvial |
| 2.1-2.5 | 5YR 6/8 reddish yellow coarse sand. Very Compact/blocky. | | Tunbridge Wells Sand |

## 5.0 POLLEN ASSESSMENT

**5.1** For the purpose of assessment pollen analysis offered itself as the most cost effective method to characterise the sequence and, in the absence of directly datable material through C14 dating, to provide some indication of age of deposition. Pollen analysis has been carried out on 4 sub-samples taken from alluvial sediment deposits from Borehole 1. This analysis was undrtaken to ascertain if sub-fossil pollen and spores are present in these sediments and if so, to determine the broad taxonomic range present and potential for full pollen analysis. If these aspects were satisfactory, pollen analysis would enable reconstruction of the past vegetation and environment associated with the site and it's near environs. This proved to be the case and this report presents the data from this aspect of the environmental analysis.

### 5.2 Pollen Procedures

Samples taken from the site were sub-sampled in the laboratory for pollen analysis. Samples of 10ml were processed using standard techniques for the extraction of the sub-fossil pollen and spores (Moore and Webb 1978; Moore *et al.* 1991). Micromesh sieving (10um) was also used to aid with removal of the clay fraction in these sediments. Pollen was extracted from all of the 4 samples prepared. The sub-fossil pollen and spores were identified and counted using Nikon Olympus biological research microscopes. A pollen (assessment) sum of at least 200 grains of dry land taxa was counted for each level, and in some cases more. Additionally, all extant spores and pollen of marsh taxa (largely Cyperaceae), fern spores were also counted for each of the samples analysed. Percentages have been calculated in a standard way as follows:

| | |
|---|---|
| Sum = | % total dry land pollen (tdlp) |
| Marsh/aquatic = | % tdlp + sum of marsh/aquatics |
| Spores = | % tdlp + sum of spores |
| Misc.= | % tdlp + sum of misc. taxa. |

Taxonomy, in general, follows that of Moore and Webb (1978) modified according to Bennett *et al.* (1994) for pollen types and Stace (1992) for plant descriptions. These procedures were carried out in the Palaeoecology Laboratory of the Department of Geography, University of Southampton.

### 5.3 Pollen Results and Palaeoenvironmental Characterisation.

A pollen diagram is given in Figure 4. The following characterisations were made on the basis of the assessment.

*Sample 4: 1.5 – 1.6m Organic Clays*
Levels of Poaceae at 60%. This is accompanied by the presence of larger grasses, possibly cereal type, and taxa such as Chenopodiaceae, *Sinapis* type and Lacucoideae. Values of *Quercus* are <5% with *Tilia*, *Pinus sylvestris* and *Betula* also <5%. *Alnus glutinosa* (15%) and *Corylus avellana* type (12%) are also present.

*Sample 3: 0.7 - 1.5m depth Alluvial Sands*
This sample derived from alluvial sediments and exhibits a notable increase in Corylus avellana type to c. 40%, meanwhile *Quercus* increases to 10% whilst *Alnus* declines to this level. *Calluna vulgaris* rises slightly along with

*Dryopteris* type and *Polypodium vulgare*, perhaps suggesting drier conditions. Other herbs present in small quantities include *Ranunculus* type, *Plantago lanceolata,* an indicator of cultivation, and Lactucoideae.

*Sample 2: 0.4 – 0.7m Alluvial Sands*
Pollen concentrations were reasonable in sample BS3. Percentages of *Quercus* and *Alnus* increase to 20%. Other aboreal taxa include *Tilia* and *Betula* (<5%). *Corylus avellana* type dips to 15%. Levels of Poaceae remain constant whilst the presence of larger grasses, possibly cereal type is notable and a possible indication of cultivation. An increase in *Pteridium aquilinum* and *Dryopteris* type is also apparent.

*Sample 1: 0.2 – 0.4m Colluvial Sands*
This sample was colluvial in nature and contained the lowest concentrations of pollen of the samples counted. Preservation was generally poor compared to the other samples analysed. Aboreal taxa are dominated by *Alnus* (35%) and *Quercus* (5%). *Corylus avellana* type is a significant taxon present at values of c. 15%. Poaceae is present in large quantities, (40%), and there are some instances of bigger grasses, possibly cereal type. Other herbs present at <2% include Lactucoideae, *Sinapis* type and *Scabiosa* type.

## 6.0 Interpretation and Discussion

**6.1** Although based on pollen assessment and sedimentary characterisation, it has been possible to highlight a number of significant changes in the pollen/vegetation record for the locale and to determine its possible significance and wider potential. Due to the small number of samples and lack of dating evidence, only broad assumptions can be made about the site and the age range of deposition. It is most likely that the pollen sequence begins in the Neolithic/Bronze Age. This assumption is made on the absence of an Elm decline, an event broadly synchronous across Britain (Smith and Pilcher, 1973), suggesting that the samples date to post c.5000 B.P. However, radiocarbon dates are necessary to support this assumption. Furthermore, the presence of *Tilia* which declined c. 3,700 B.P. in this area (Waller *et al*., 1988) suggests that at least the alluvial samples pre-date this event.

**6.2** It is suggested by Scaife and Burrin (1992) that more sustained soil erosion, transfer and deposition occurred following the arrival of Neolithic Agriculture. It is therefore possible that the overlying colluvium is most likely a result of deforestation and movement of surface soils into the catchment but this cannot be confirmed without considerably more detailed analyses of the pollen and sediments.

**6.3** It is difficult to assess the full extent of anthropogenic activity at the site from the four samples analysed, however, certain assumptions may be made. It is possible that the large Poaceae pollen present in some of the samples is Cereal type in origin (although further, more detailed analysis would be required to confirm this). Should this be the case then it is a strong indication of agriculture in the area. This is further indicated by the presence of *Plantago lanceolata*, a weed of cultivation.

**6.4** The high levels of *Alnus* and *Corylus avellana* type throughout these samples suggests that this was the dominant on-site vegetation at this time and it is possible that the *Alnus* formed a carr community. It is most likely that *Tilia* was a part of the vegetation community at this time and that *Quercus* was growing in the area.

**6.5** Notably there are taphonomic issues surrounding pollen analysis from alluvial sediments. Difficulties in analysis may occur due to the possibility of pollen being eroded from older sediments and subsequently being reworked into younger material (Scaife and Burrin, 1992). The presence of degraded *Tilia* pollen in the alluvial samples analysed is perhaps an indication of some reworking of the pollen. However, Scaife and Burrin (1992) found little evidence of 'significant reworking' in alluvial sediments from southern England. It is often the case that preservation of pollen in mineral sediments is poor compared to those of acid peat, however, on the whole pollen preservation in the samples analysed was satisfactory or good.

## 7.0 Significance and Recommendations for further work

**7.1** This site has produced well-preserved sub-fossil pollen associated with a clear alluvial sedimentary sequence developed in the upper reaches of the Ouse Valley. Useful information on the changing patterns of vegetation and environment of, most likely, the Neolithic and Bronze Age has been obtained. This study is, however, preliminary and carried out to assessment level. Fuller analysis (for publication) would require some additional pollen counts to add taxonomic detail. It is suggested that additional samples at regular sampling intervals should be examined with counts increased to 400-500 grains per level where possible.

**7.2** Potential for the preservation of organic material, including macroscopic plant remains, wood and artefactual material is high for organic clays at 1.5m depth. The archaeological potential of higher units of alluvial and colluvial sand is likely to be of a more modest nature. However, proper characterisation of the sequence and its archaeological potential will only be possible through a programme of geoarchaeological test pitting aimed at detailed sedimentary descriptions, enhanced palaeoenvironmental sampling and determination of the presence of preserved Holocene landsurface and structures.

**7.3** Radiocarbon dating is required to establish accurately the date of these vegetation and environmental changes. It would therefore be desirable to sample at least two locations within the site through text pitting aimed at the recovery of organic remains. It is suggested that their presence would be likely given the organic nature of lenses within the alluvial sands and the water logged conditions within the lower part of the sequence.

**7.4** The topographic survey has provided useful contextual information and it is important that any future work refers to this contour data as necessary in particular to identify any potential former river terraces.

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## *OASIS ID: archaeol6-62193*

### Project details

| | |
|---|---|
| Project name | Handcross Road Widening |
| Short description of the project | Geoarchaeological Investigation of the Upper Ouse Flood Plain adjacent to the A23 at Handcross |
| Project dates | Start: 13-05-2009 |
| Previous/future work | Yes / Yes |
| Any associated project reference codes | HWW09 - Sitecode |
| Type of project | Field evaluation |
| Current Land use | Grassland Heathland 5 - Character undetermined |

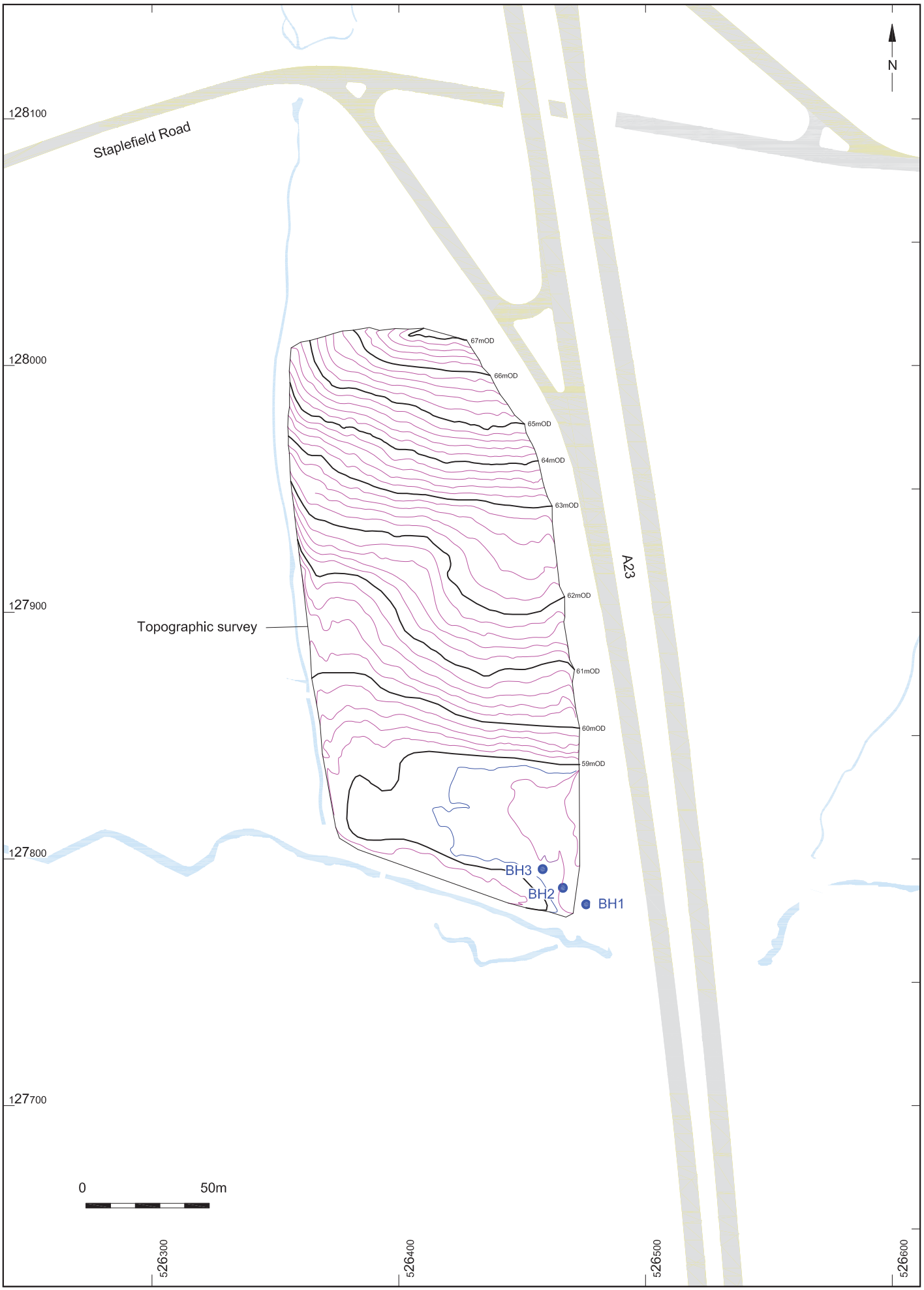
### Project location

| | |
|---|---|
| Country | England |
| Site location | WEST SUSSEX MID SUSSEX BOLNEY A23 Handcross |
| Study area | 10.00 Hectares |
| Site coordinates | TQ 526376 127854 50.8937737718 0.170630660207 50 53 37 N 000 10 14 E Point |

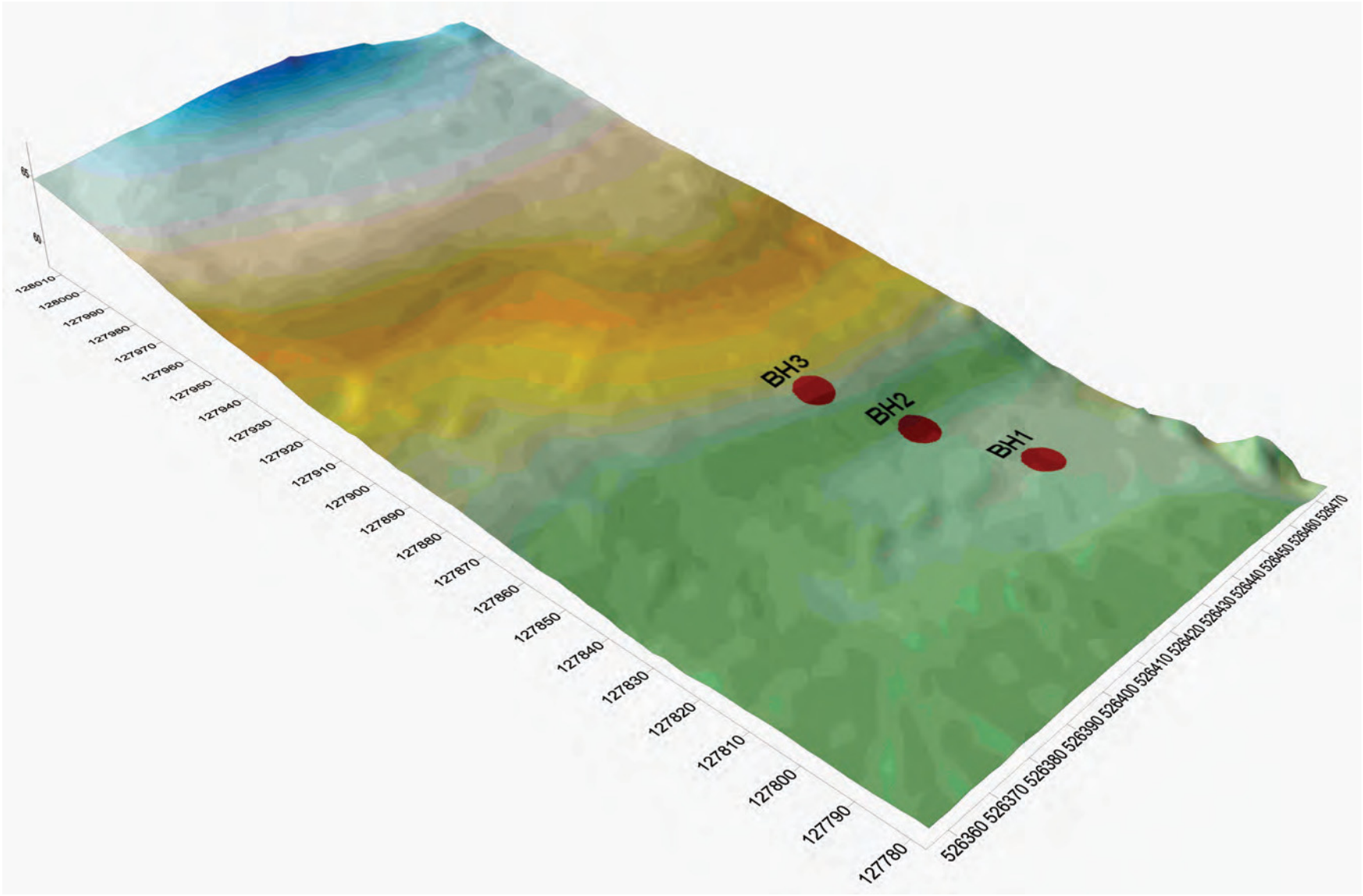
### Project creators

| | |
|---|---|
| Name of Organisation | Archaeology South East |
| Project brief originator | Jacobs UK Limited |
| Project design originator | Archaeology South-East |
| Project director/manager | Jon Sygrave |
| Project supervisor | Matt Pope |
| Entered by | Matt Pope (m.pope@ucl.ac.uk) |
| Entered on | 20 July 2009 |

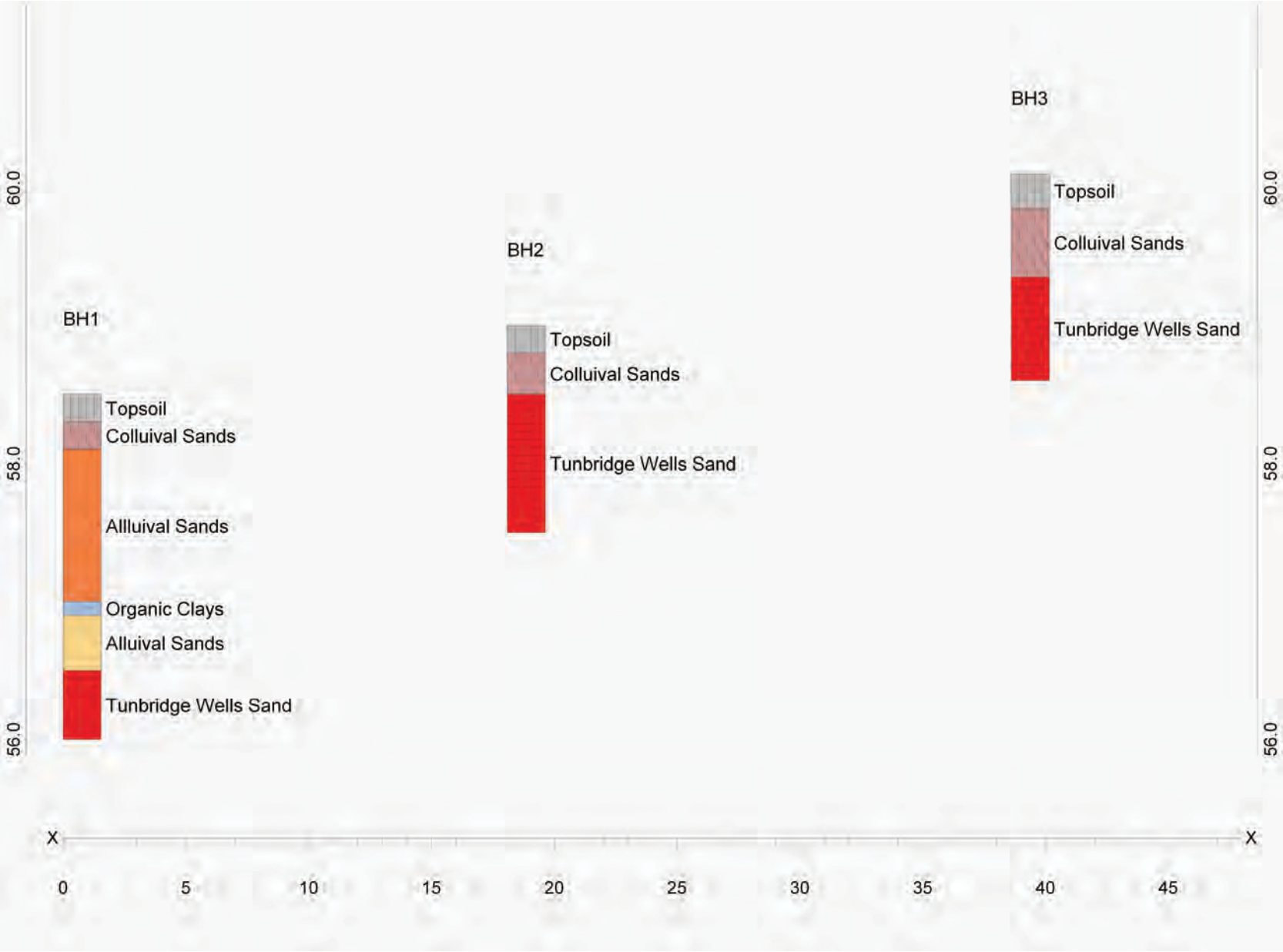

| © Archaeology South-East | | Handcross Geo-Archaeological Borehole Survey | Fig. 1 |
|---|---|---|---|
| Project Ref: 3813 | July 2009 | Site location | |
| Report Ref: 2009113 | Drawn by: JLR | | |



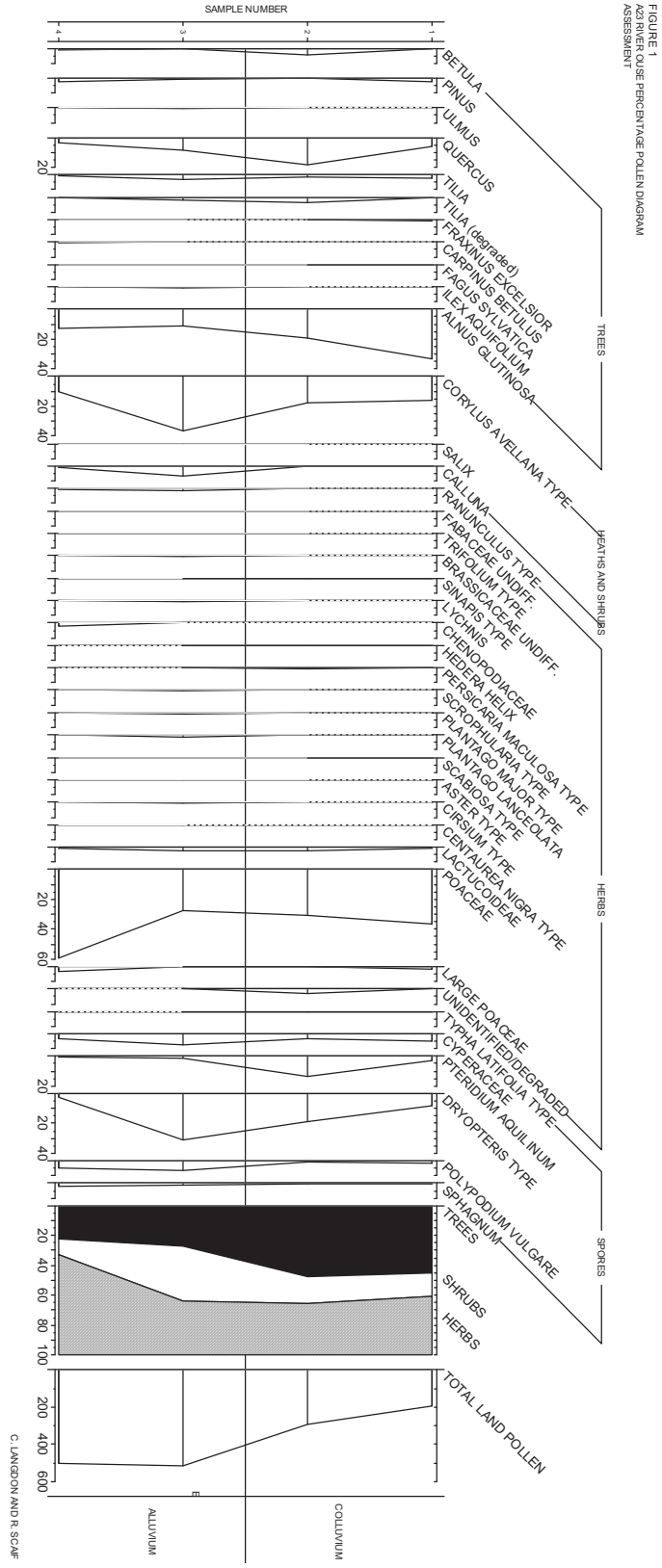

| © Archaeology South-East | | Handcross Geo-Archaeological Borehole Survey | Fig. 2 |
|---|---|---|---|
| Project Ref: 3813 | July 2009 | Borehole location and topograhic survey | |
| Report Ref: 2009113 | Drawn by: HLF | | |




| © **Archaeology South-East** | | Handcross Geo-Archaeological Borehole Survey | Fig. 3 |
|---|---|---|---|
| Project Ref: 3813 | July 2009 | Topographic model | |
| Report Ref: 2009113 | Drawn by: HLF | | |




| © **Archaeology South-East** | | Handcross Geo-Archaeological Borehole Survey | Fig. 4 |
|---|---|---|---|
| Project Ref: 3813 | July 2009 | Correlated strip log | |
| Report Ref: 2009113 | Drawn by: HLF | | |




| © **Archaeology South-East** | | Handcross Geo-Archaeological Borehole Survey | Fig. 5 |
|---|---|---|---|
| Project Ref: 3813 | July 2009 | Pollen diagram | |
| Report Ref: 2009113 | Drawn by: HLF | | |

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