LOCATING AND EVALUATING ARCHAEOLOGY BELOW THE ALLUVIUM: 
THE ROLE OF SUB-SURFACE STRATIGRAPHICAL MODELLING

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SUMMARY

Archaeological sites preserved deep within the alluvium are commonly difficult to locate due to the thick nature of the stratigraphical record of such regions. Conventional methods of archaeological evaluation are inappropriate for such areas and novel methodologies, such as the use of boreholes to model sub-surface stratigraphical architecture, are required to aid evaluation. In order to determine the archaeological significance of the stratigraphical record preserved in such areas the nature of the archaeological signal needs to be determined in addition to attaining an understanding of the sedimentological history of the area. In this paper a model for sequence generation within a large, lowland river system in southern England is proposed and tested against sub-surface data from the north bank of the river Thames. This approach allows zones of archaeological potential to be determined and calibrated by reference to extant age estimates.

INTRODUCTION

Locating archaeological sites, in particular those dating to the prehistoric period is often difficult due to the ephemeral nature of such sites. In areas of minimal sediment accumulation, for example on chalk downlands or valley sides, traditional archaeological evaluation methodologies such as fieldwalking and aerial photography may relatively rapidly discern the archaeological potential of the area (McGill 1995). However, in areas of substantial sediment accumulation, such as river valley bottoms, deeply buried archaeological sites may be present that are invisible to surface or near surface survey (Allsop 1992; Donoghue and Shennan 1988). Within these areas novel methodologies for assessing sub-surface archaeological potential are required (Bates et al. 1997).

Evaluation strategies developed and used in field archaeology are designed to i) locate foci of human activity and ii) test extant models describing the archaeological presence in the landscape. This is necessary to understand the distribution of archaeological material in the landscape (Fig. 1). In order to achieve this the archaeologist must understand the nature of the sub-surface stratigraphy and the landscape context of the area of investigation. Additionally, the nature of the archaeological signal needs to be clarified and defined (other goals include predicting the locations of significant palaeoenvironmental sequences and interpreting extant data sources).

This paper demonstrates how a knowledge of sub-surface stratigraphical architecture can help archaeologists to evaluate the archaeological potential of an area and determine the likely zones in which different types of archaeological sites may occur.

THE NATURE OF ARCHAEOLOGICAL SITES AND SIGNALS AND THEIR LOCATION IN THE LANDSCAPE

The nature of the material remains indicative of past human activity that are accessible to the archaeologist vary. This variation depends on the original nature of the human activity leading to the production of the material remains and the post-depositional processes operating on the physical remains of the primary activity (Schiffer 1987). Archaeological evidence can be divided into two major types of signal that can be found in the stratigraphical record:

- Direct physical remains. These constitute the majority of the recovered archaeological record commonly reported by archaeologists. They include physical remains of structures, artefacts, human skeletal remains, food residues etc.
- Proxy remains. These constitute indirect evidence for human activity within the landscape. Examples include evidence for agriculture represented by cereal pollen in the pollen record (Dimbleby 1985), enhancement of phosphates in the sediment record and modification to the sediment record resulting from soil erosion (Brown and Barber 1985; Burrin and Scaife 1984; Macklin et al. 1992).

These archaeological sites and signals vary in size and scale throughout the landscape (Table 1). They range in size from a single artefact to settlements. These different archaeological elements combine hierarchically to produce the archaeological landscape that is the focus of investigation (Fig.1).
The distribution of these elements in the landscape will vary depending on the site function/type. Hence, settlement sites will be distributed according to a number of factors including resource availability, distribution of dry ground and other non-physical factors. Industrial sites will be located relative to resource material sources, location of kill sites etc. Individual artefacts, lost during transit through the landscape by the prehistoric population, may be found at any point on the prehistoric landsurface.

Typically important areas within the landscape occur at the boundaries of major ecological zones, eg along watercourses and at the transition between wet and dry ground. These are called ecotonal areas. Settlement patterns following ecotonal zones are well documented for the prehistoric period in the Fenland area (Hall and Coles 1994). However, within the landscape the visibility of this archaeological data will vary. Individual artefacts, perhaps lost during traverse through the landscape, are small targets that are difficult to locate. Larger field monuments and settlement sites provide an easier target during survey. Proxy archaeological records are often invisible without detailed laboratory analysis of samples, eg the identification of enhanced Total Phosphate levels or cereal pollen from core material.

In order to ensure that evidence for human activity is located during survey and evaluation it is necessary that the types of signal considered diagnostic of human activity are clearly articulated prior to commencing the evaluation programme. Evaluation techniques must be designed to target these signals. For example, widespread landscape clearances for agriculture can only be detected by a careful study of the pollen sequences from continuous core sequences. The deployment of techniques inappropriate to identify such signals may result in a 'nil-return' on the evaluation exercise and a verdict of no archaeological potential being recorded when the result simply reflects the inappropriate use of techniques rather than the absence of an archaeological presence.

For the prehistoric landscapes in south east England current evidence suggests that settlements may cluster around the wet land/dry land margins (eg as in the case of the Fenland occupation - Hall and Coles 1994). Use of drier ground uplands areas may have occurred as well as sporadic use of the wetland zones. Within the wetlands low densities of artefacts are likely to occur and proxy records of human activity will be well preserved. Key areas of landscape are therefore noted:

- Ecotonal regions between dry and wet ground.
- Wetland on the floodplain floors.
- Dry ground areas above the wetlands.

In order to model the location of these broad zones in the buried stratigraphic stack, the nature of the sub-surface topography and the associated sedimentary environments require modelling.

**SEDIMENTARY ARCHITECTURES AND BURIED LANDSURFACES**

Deposits forming the sub-surface stratigraphical record of alluvial tracts consist of a wide variety of sediment types. These range from gravels and sands to clays, silts and organic rich silts and peats (Miall 1996). These sediments were deposited in a wide range of environments from active channel margins and floodplain floors to cut-off channels and swamps. Individual sediment units laterally grade into different, but related sediment types, deposited in different environments of deposition (the concept of facies) (Reading 1986; Walker 1984a and b; Miall 1996). These units are stacked, sometimes in a predictable fashion, to form the stratigraphical record. Within these systems opportunities for erosion and reworking are common but areas of undisturbed stratigraphy may also exist. The interaction between the processes producing these sediment bodies results in the formation of complex 3-dimensional stratigraphical stack that contains detailed information regarding the environments of deposition of the individual stratigraphical units.

Conceptualising the stratigraphical stack as a product of a complex facies system formed within a dynamic environment is a powerful approach that can be used in determining the archaeological and palaeoenvironmental potential of the buried stratigraphical record. The predictable relationships that exist between deposits, based on the facies concept (Reading 1986; Walker 1984), allows correlations to be made across space in the absence of intermediate data points. For example, borehole data from geotechnical ground investigation surveys in advance of construction or through purposive boreholes drilled for geoaarchaeological purposes (Barham and Bates 1994; Bates et al. in press; Stanley and Chen 1996) can be used to construct sub-surface stratigraphical models. Other sources of information such as electrical resistivity sounding, seismic

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**Table 1 Size classification of archaeological sites**

<table>
<thead>
<tr>
<th>Unit Size</th>
<th>Archaeological Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 m</td>
<td>Single artefact/dense scatters</td>
<td>Knapping episode</td>
</tr>
<tr>
<td>1-10 m</td>
<td>Artefact scatters/single structure/faunal residue scatters</td>
<td>Tent/hut, butchery site</td>
</tr>
<tr>
<td>10-100 m</td>
<td>Groups of scatters, structures</td>
<td>Settlements</td>
</tr>
<tr>
<td>&gt;100 m</td>
<td>Associations of structural elements, route ways, field systems</td>
<td>Landscape systems</td>
</tr>
</tbody>
</table>
Potential of sub-surface strategies.

Figure 1: A flow chart illustrating the links between stages in the process of evaluating the archaeological potential.

**AIMS**

- Evaluation Strategies and Survey
- Defining the nature of archaeological sites and signals
- Defining the nature of the sub-surface stratigraphic architecture

**OBJECTIVES**

- Understanding of Man-Environment interactions and discerning human activity patterns
- Defining the location of archaeological sites
- Defining the archaeological site history
- Predicting the location of palaeoenvironmental sites
- Predicting the location of archaeological sites

**Underlying Prerequisites**

- Predicting the location of archaeological sites
- Defining the nature of archaeological sites and signals
- Defining the nature of the sub-surface stratigraphic architecture
Figure 2: The Lower Thames valley showing the location of sites discussed in this study and the location of sites investigated by the Geoarchaeological Service Facility.
profiling and reflection and natural gamma logging (Clayton et al. 1995) may also provide valuable information on sub-surface stratigraphic profiles. This data can provide information on both the vertical and the lateral extent of the sediments.

Commonly borehole data is presented as stratigraphical sections used to determine the 'site history'. Difficulties of correlation between boreholes may be encountered due to borehole sampling densities. The lateral distribution of sediment bodies or the top/bottom contacts/surfaces of individual units across space can also be mapped to predict the spatial distribution of landscape units (Bates and Williamson 1995). Integrated with carefully constructed cross-profile data this can provide information on the nature and changes to local landscape units through time. However, care is needed in the interpretation and presentation of such information. Commonly used computer modelling packages (eg SURFER) that provide contoured plots of surfaces, such as gravel surfaces, offer visually attractive ways to 'view' the buried topography of an area under study. However, in many cases the distribution of the primary data and the sampling intervals result in the creation of anomalies during the interpolation of the data. This may result in the creation of topographic features in the visual output that do not exist in the ground and hence erroneous conclusions may be drawn regarding the shape of the buried topography.

**BURIED LANDSURFACES**

Within the stratigraphic stacks, key zones of considerable archaeological importance are those indicating the presence of former landsurfaces. The inundation or burial of landsurfaces on which human activity has taken place can result in the sudden, in situ, burial of human and animal remains. Amongst the best known examples of buried landsurfaces are those buried by the volcanic eruption of Vesuvius in AD 79 (Jashemski 1979) or the eruption of the volcano responsible for the deposition of the Laacher See pumice in the Neuweid Basin in the Central Rhineland (Street 1986; Ikinger 1990; Baales and Street 1996). Other, less spectacular, landsurfaces are commonly found in the archaeological record and provide archaeologists with important time-slice views of the past (eg Bates et al. 1997).

Identifying and determining the lateral distribution of buried palaeoland surfaces is of critical importance in the archaeological evaluation of an area. These features represent positions within the stack at which in situ assemblages of material may occur in the context of the landscape in which they were used. They may be identified by a series of features that can be used singly or in combination to determine the presence of a buried landsurface:

- Sudden lithological change within a core profile either seen as a sudden change in sediment type or sudden shifts in properties such as loss-on-ignition and total phosphates (Barham 1995).
- The presence of a palaeosol.
- The presence of zones of weathering, rooting horizons or enhancement of magnetic susceptibility signals (Barham 1995).
- The presence of major bedding planes.

The presence of these features may imply the location of a landsurface. However, in order to determine the significance of these features their lateral extent needs to be determined through the identification and correlation of these features within a number of boreholes. This is most easily achieved using the principles of facies analysis (Reading 1986) and the construction of a sub-surface stratigraphical model.

**A THEORETICAL MODEL FOR SEQUENCE GENERATION IN LOWLAND SOUTH EASTERN BRITAIN**

At present no general model describing patterns of Holocene sediment deposition exist for the large lowland rivers of SE England. Work on the Thames (Devoy 1977, 1979), Medway and Stour in recent years has focused on the vegetation history rather than the sedimentary sequence development. For example, the pollen biostratigraphic work of Devoy (1977, 1979) has been used as the basis for dating and correlating sequences in the Lower Thames Valley. However, recently the universal application of these ideas, in an uncritical fashion, has been questioned (Bates and Barham 1995; Haggart 1995) and sediment based models of stratigraphical development are now being formulated (Barham et al. 1995; Bates and Barham 1995). As a result of work conducted by the author in the Lower Thames Valley (Fig. 2) during the last seven years coupled with information derived from other extant sources (eg Devoy 1977; Gibbard 1994) it is now possible to produce a simplified model for sequence generation within a large lowland river valley tract of the Thames type. The proposed model suggests that the valley regime moves through a series of changes over time from the late Pleistocene to the present day (Stage 1-4, Fig. 3):
Figure 3: A model illustrating changes in the floodplain of the Lower Thames during the Holocene showing the impact of flooding and inundation of former dryland areas consequent with sea-level change.
Stage 1. Late-glacial/early Holocene situation (Fig. 3a). During this stage the topographic template consists of lowland valley tracts floored by gravel bodies (deposited under high-energy conditions in braided river environments). Higher ground areas, underlain by outcrops of older fluvial deposits or bedrock form islands or interfluves between valleys. A stable river channel exists in the final late-glacial river course. Away from the river channel the floodplain is relatively stable. Local sedimentation may occur within pockets on this surface but sediment accumulation is minimal during this phase.

Stage 2. Early Holocene situation (Fig. 3b). During this phase sea-level rise is causing river waters to back-up resulting in frequent episodes of overbank flooding onto the increasingly less stable floodplain floor. Relatively rapid sea-level rise results in sudden flooding of low lying regions and the destabilisation of channel position. During this phase rapid loss of dry ground begins and infilling of the topography commences.

Stage 3. Middle Holocene situation (Fig. 3c). Continued flooding characterises this phase but well-defined wetland zones are established on former floodplain in which peat may form. Channels become more stable and gradual burial of topography continues resulting in the reduction of topographic highs relative to floodplain surface (a similar pattern of topographic reduction has been noted in the Yangtze Delta, China (Stanley and Chen 1996)).

Stage 4. Middle to Late Holocene situation (Fig. 3d). The former topography is now nearly or completely inundated and the former landscape buried.

This model assumes that sedimentation is, in general, dominated by vertical sediment accumulation (similar to that in tide dominated systems - Dalrymple et al. 1992) rather than lateral sediment accumulation (typical of deltaic type systems - Coleman and Prior 1982). Fluctuations in base level, resulting in transgressive/regressive trends (sensu Devoy 1977) may be accommodated in this model.

In this model the topographic template (Fig. 3a) represents an unconformity or buried late Pleistocene/Holocene landsurface. Progressive burial of this former landsurface through the early and middle Holocene (Figs 3a-d) is associated with the creation of temporary landsurfaces in the accretionary wetland zone (Figs 3b and c). The location of the zone, representing the area of onset of sedimentation (the sedimentation front), through time moves in response to infilling of the topographic template (ie it is time-transgressive). If age estimates are available from the sediments on-lapping (ie burying) the major landsurface (the topographic template of Fig 3a) it may be possible to:

- Predict the age of the sedimentation front at specific depths below the ground surface.
- To locate the position of the ecotonal areas during specific time intervals in the prehistoric past.
- Plot the distribution of the major sediment units across space.
- Predict the age and location of zones of high archaeological potential.

It is noted however, that this model is in all probability an oversimplification of the situation in such areas. Major difficulties would be encountered if long lived landsurfaces were present within the accumulation zone, rates of sedimentation fluctuated widely through time and variation in the patterns of sediments accumulation in the wetlands were noted (ie a tendency towards lateral rather than vertical accretion).

This model will now be tested against data gathered from an area of the north bank of the river Thames in the vicinity of Barking (Figs 2, 4 and 5).

THE LOWER THAMES VALLEY

The Lower Thames Valley extends from the City of London to the Shorne Marshes (Fig. 2). The floodplain of the valley is widest between the Roding and Ingrebourne rivers where a distance of 4.5 km is attained. Holocene sediments in the valley bottom consist of sands, gravels, silts and peats that form a wedge thickening downstream from less than 5 m in the vicinity of Tower Bridge to in excess of 35 m thick at Canvey Island (Marsland 1986). Today the western part of the study area is heavily urbanised. Grassland wetlands occur to the east and little surface morphology is noted in the floodplain area at present. Bedrock is formed of chalk or Eocene/Palaeocene sediments (Sumbler 1996) overlain in places by Pleistocene sands and gravels (Bridgland 1994; Gibbard 1994). Many observations have been made of the alluvial sediments below the modern floodplain (Spurrell 1889; Whitaker 1889; Codrington 1915) however no detailed lithostratigraphy for the area has been formulated (Bates and Barham 1995). Where detailed investigation of the area has been undertaken it has commonly been based on the biostratigraphy, for example, the work of Devoy (1977, 1979). The Holocene floodplain alluvial sediments overlie Pleistocene sands and gravels known as the Shepperton Gravel that are ascribed to the Late Devensian (Gibbard 1994). Bedrock or rockhead morphology (taken here to include both the solid geology of the Cretaceous Chalk and Eocene sediments and the more recent
Island topography

Slope indicators
Possible palaeo-drainage
Areas dominated by non-peat formation
Areas dominated by peat formation

Made Ground

Floodplain topography
Bedrock/Rockhead template
Incised Channel

Metro O.D.
unconsolidated Pleistocene sands and gravels) describes the topography of the area prior to inundation and infilling by sediments during the Holocene (Stage 1, Fig. 3a). This situation is illustrated in Figure 4a for the Barking Reach area. This area was chosen for study because a large set of geotechnical information is held by the author for the area that provides a substantial body of information on the depth of the rockhead contact and the presence/absence of peat. Within the area individual borehole logs have been examined, locations plotted and the depth to gravel/rockhead contact and a presence/absence of peat has been noted at 1m vertical increments (from -7.0 m to +2.0 m OD). This information has been plotted to illustrate changing patterns of sediment distribution in the area and the movement of the sedimentation front (Fig. 4a-i). In addition a schematic section through this area has been produced (Fig. 4j), see Fig. 4a for location of transect.

The rockhead topography (Fig. 4a) forms the depocentre geography at the beginning of the Holocene (Stage 1, Fig. 3a) and the template on which later sedimentation occurred. This morphology has had a major impact on the foci of sedimentation throughout much of the Holocene. Bedrock topography within the study area is dominated by a north-west to south-east trending valley with a large, relatively flat floodplain on the southern bank (Fig. 4a-d and j). A topographic high, or island, exists in the south-west corner of the study area. Contouring of the topographic template enabled the percentage of land between successive 1 m contours to be calculated (Fig. 5b).

This shows that 57.3% of the topography described by the topographic template lies between datums of -3.0 m and -5.0 m OD. Figure 5a illustrates the percentage of dry ground existing above the sedimentation front or alluvium at similar 1 m intervals. This data suggests that a period of major topographic change would have coincided with the inundation of ground between the modern datums of -3 and -5 m OD. During this phase c. 57% of all ‘dry ground’ was inundated and buried by sediment (Figs 4d-i). Changes of such magnitude may have had considerable impact on the local populations at the time of inundation. These sudden changes were accompanied by the rapid movement of the ecotonal zone (at the edge of the dry ground/wet ground) across the topographic template (Figs 4d-f).

The progressive advance of the sedimentation front (Figs 4b-i) through Stages 2 (Figs 4d-e), 3 (Figs 4f-g) and 4 (Figs 4h-i) of the model, as a partial result of rising sea-level, caused inundation and infilling of the topography and the gradual elimination of a topographically variable landscape and its replacement by one of more homogenous topography.

The dating of sediments at successive 1m intervals along the shifting sedimentation front (Fig. 5a), ie that area of sedimentation on-lapping the rockhead topographic surface, has been calibrated by reference to radiocarbon age estimates from a number of sites examined in the Thames area (Fig. 5d). These age estimates have been used to generate curves from which time depth relationships can be determined. Two curve fits have been used here that reflect the combined effects of sea-level rise and tectonic depression (lower, earlier curve) and a younger curve following the establishment of modern sea-level datums when only tectonic depression is significant. All age estimates used in the construction of these curves are from units resting directly on the gravel/bedrock topographic surface where no differential compaction of deposits will have occurred. This data set (Fig. 5d) shows that there is an apparent linear relationship between age and depth that allows approximate age estimates for the successive depth slices to be determined (Fig. 4a). It should be noted that the following assumptions have been made i) that sedimentation was constant and ii) that vertical accretion dominated. The results of this study (Fig. 5a and d) indicate that within the study area the period of considerable topographic change resulting from the inundation of the floodplain area between -3 and -5 m OD probably took place during the early Neolithic (between c.6000 and 5300 BP - see Fig. 5a). It should be noted that direct contemporaneity between the sedimentation front and the distribution of peat/non-peat stratigraphies within the wetland areas (Figures 5a and 5c), at similar present day datums (Figs 4a-i) is unlikely given the differential, post-depositional compaction of the Holocene alluvial stack.
A number of key points emerge from this investigation:

- Considerable topographic variation occurred across the area in the early Holocene. Major topographic features included islands, floodplains and channels (Stage 1, Figs 3a, 4a and 4j).
- Peat growth commenced as isolated occurrences in hollows on the landsurface (similar occurrences have been recorded at Bramcote Green (Thomas and Rackham 1996) and West Silvertown (Museum of London Archaeology Service et al. 1996) or within the lower reaches of the buried valley system (Fig. 4b) (Stage 1, Fig. 3a).
- Patterns of sedimentation reflect the primary shape of the rockhead topography and the gradual drowning and infilling of the valley system (Fig. 4a-i) (Stage 2, Fig. 3b).
- Sudden inundation of large areas occurred between datums of -5.0 m and -3.0 m OD, this reflects the shape of the topographic template (Figs 4d-f and 5a-b).
- Considerable habitat diversity in Stage 1 (Figs 3a and 4a) will have been replaced by decreasing habitat diversity through time (to Stage 4, Figs 3d and 4i).
- Maximum expansion of peat growth followed the initial phase of flooding into the floodplain area (Figs 4f-g, 5b-c).
- Following loss of all topographic features peat presence decreased and little or no peat accumulation is present in the area above datums of 0.0 m OD. (Figs 4i and 5c).

DISCUSSION

The data presented appears to fit the model outlined for the nature of the Holocene evolution of a lowland valley in south-east England. The example from the Lower Thames Valley illustrates how a knowledge of the onset of sedimentation and the progressive burial of the early Holocene topography has considerable implications for the archaeological potential of the area:

- The mapped data (Fig. 4) combined with the extrapolated radiocarbon plot (Figs 5a and d) illustrates the rate and succession of infill of the topographic template. The movement through time of the sedimentation front (ie the contact between 'wet ground' and higher 'dry ground') plots the movement of the ecotonal area between the highland/lowland tracts. This shifting zone is of major archaeological significance.
- The shifting location of the sedimentation front/ecotone also indicates the distribution of likely concatenated and in situ assemblages for given time frames. For example, during sedimentation in the early Neolithic period (-3 to -5 m OD) both Neolithic and Mesolithic assemblages may be mixed on the higher, dry ground above the sedimentation front (Figs 4d-f) while well stratified, in situ Mesolithic assemblages may occur in the area of inundated, wet ground below the sedimentation front.
- The distribution of sites containing waterlogged remains will also reflect the location of the ecotonal zone. For example, even though at the present day all areas of the gravel topography lie below ground level and below the potential zone of waterlogging, during the early Neolithic period (-3 to -5 m OD) any Mesolithic organic remains deposited on the gravel highs (above present day datums of -3 m OD) are likely to have degraded. Waterlogged Mesolithic material will only be preserved in areas of contemporary wet ground conditions.
- Areas of most rapid set of sedimentation and sudden flooding of large areas (eg between -3 and -5 m OD) are those most likely to preserve in situ archaeology due to the suddenness of inundation.
- Mapping of the zone of change, ie the area described between two contours, eg -1 to -2 m, maps the distribution of likely ecotonal areas of archaeological significance between two successive periods.

CONCLUSIONS

This study has illustrated how a knowledge of the sub-surface stratigraphical properties of an area of deep alluvium may provide information suitable for use in focusing archaeological investigations. It has been suggested here that the topographic template formed by bedrock/Pleistocene gravel onto alluvium unconformity represents a buried landsurface that defines the geography at the beginning of the Holocene prior to sediment accumulation and infill of the valley area. The shift in location of the dry ground/wet ground ecotone (sedimentation front) across this topographic template reflects the movement of a zone favoured by past human populations. Tracking and plotting the distribution of this zone across space may provide an indication of areas of likely sub-surface archaeological interest. In addition age determinations made available from sediments resting on the buried landsurface can determine the age of the shifting sedimentation front enabling predictions to be made regarding the likely date of the sedimentation front at any location across space.
Figure 5: Lower part of the diagram shows radiocarbon age estimates for the on-set of sedimentation onto the gravel surface in the Lower Thames valley and the distribution of find spots within the Thames alluvium by sediment type. The upper diagram was prepared from the Barking Reach borehole data showing the percentage of dry ground existing above the alluvium at successive 1 m intervals (calibrated against radiocarbon age estimates), percentage of ground between successive 1 m contour intervals and the percentage of peat/non-peat in inundated areas.
The approach described in this paper, when used as part of an archaeological evaluation strategy, is suitable for deployment in areas of deeply buried alluvium and may be of considerable importance as a tool for archaeologists. Commonly in such areas little is known of the archaeological potential of the area prior to investigation and costs prohibit large-scale excavation of blocks of ground down to depths of 5 – 10 m below marshland surface. Where investigations are undertaken zones of peat stratigraphy and gravel ‘islands’ are often the focus of investigation (Meddens 1996). However, a survey of 41 find spots/sites from the lower Thames area (Fig. 5e) clearly shows that significant numbers of discoveries have been made in sand/silt units hence the concentration of resources on areas of peat may be providing a biased view of the archaeological distribution of the area. Additionally investigation of ‘gravel islands’ may be producing a biased view of the buried archaeological resource. For example, in the Barking Reach area the topographic high (or ‘island’) in the south west corner of the study area only becomes an “island” at a time (c 5300 BP) when the sedimentation front reaches the −3 m contour. The approach outlined in this paper has a number of advantages over conventional methodologies:

• Predictions regarding the distribution and age of the sediments associated with the shifting sedimentation front (ecotonal area) can be made from extant geotechnical data or purposive geoarchaeological boreholes.

• The limited resources available for archaeological investigation can be focused on areas considered to be of high archaeological potential.

• No bias towards different types of sedimentary units, thought ‘more likely to contain archaeology’, is inherent in this approach.

• The model may be tested even in the absence of any archaeological material being recovered.

The approach is useful as a mechanism by which the geoarchaeological investigation of sites, in advance of costly and time-consuming archaeological trenching, is justified on the basis of archaeological criteria. This type of investigation subsequently leads to the purposive siting of trenches aimed at testing an archaeologically relevant model rather than as an exercise in undertaking palaeoenvironmental reconstructions where the only links to the archaeological record are tentative and often of regional rather than site specific nature (eg the identification of human impact on the vegetational and/or sedimentary record as a result of agricultural practices).

ACKNOWLEDGEMENTS
I would like to thank Mr A J Barham (UCL) and other members of staff of the former Geoarchaeological Service Facility at University College London, for help and discussion during the last few years when this information was gathered. Furthermore I would like to thank Mr C Pine and Mr V Williamson for help in the production of the illustrations. Finally I thank the clients of the GSF who have provided the impetus to investigate and study many of the sites in the Lower Thames from which my ideas have been generated.

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