Chapter 2: Aims and Methodologies

Project aims

At the outset of the project an Outline Archaeological Strategy (OAS) was prepared which set out the general aims of the project. The over-arching aim was to consider how the unique and local patterns of prehistoric human habitation, and the environmental sequences, compare with others within the Lower Thames Valley. The project was designed to consider evidence contributing to established cultural models and mechanisms of environmental change, including the transition from hunter/gathering to agriculture, the exploitation of diverse and changing wetland environments, sea-level rise and climate change along terrace edge locations. Where possible it was intended that this generic approach should proceed to the construction of a specific historical narrative in which the relationships between past cultural events and the detailed pattern of habitation would form the subject of focused investigation. Implicit in this from the outset was a strong reliance on geoarchaeological techniques and paleoenvironmental evidence to help understand the evolution of the landscape relating to the sites.

The OAS was followed by a more detailed Preliminary Archaeological Investigation Design (PAID). The PAID included a desk-based assessment of the known archaeology along the route and set out the scheme-wide research aims and objectives and the scope of the initial field evaluation programme. The PAID was developed through consultation with English Heritage (EH) and the Greater London Archaeological Advisory Service (GLAAS). This was an ongoing process throughout the duration of the project and was structured to incorporate route-wide considerations, such as research aims, as well as site specific issues, such as exploratory hole locations and sampling strategies. Road Management Services (A13 plc (RMS)) was keen to ensure that any archaeological works were undertaken with reference to relevant emerging research frameworks (eg MoLAS 2000; Sidell *et al.* 2000). In general the aims set out in the PAID were to:

- establish, as far as reasonably practicable the locations, extent, character, date and significance of any archaeological or palaeoenvironmental remains or deposits
- assess the significance of deposits/remains and the need for Further Archaeological Works
- reduce the risk of unforeseen archaeological remains being encountered during construction
- where possible within the context of the Scheme, provide benefit to the wider community by undertaking meaningful archaeological works against a series of considered research questions.

More specifically, the archaeological works were designed to investigate potential buried channels and the terrace edge, to locate any remains of prehistoric or Roman settlement or other permanent or temporary activities such as trackways, causeways, enclosures, revetments, waterfronts and artefact concentrations, with a view to:

- determine the nature, extent and date of such activities and any shifts in location through time
- recover evidence to help understand the nature and extent of human exploitation of local riparian locations and adaptations to wetland environments
- determine whether the Becton 3-D trackway and any associated or adjacent structures continue into the Woolwich Manor Way sections of the Scheme
- recover evidence from trackways and other wood structures to determine the nature of prehistoric technology, construction techniques and woodland management
- determine whether there are any physical remains of the possible East Ham High Street Roman Road and any contemporary activity adjacent to it
- determine whether any prehistoric or Roman waterfront features are present along the River Roding
- investigate current and buried channels to locate any remains of medieval and post-medieval activity such as revetments, waterfronts and boats
- identify the surface topography of the present Floodplain Terrace and the nature of the contact between any overlying deposits
- identify the nature of past fluvial conditions and date the migration of the Thames' tidal head across the Scheme area
- characterise the changing ecology with the aim of dating general trends and specific events across the Scheme area
- identify the likely dates, causes and processes by which the prehistoric peat formed.

Following the completion of the evaluation phases the following aims were defined for the mitigation works, each applicable to all three sites:

- to describe the sequence, timing and character of prehistoric cultural and related environmental events at each site
- to resolve the phasing of landscape development through facies definition
- to define within each phase the associations and spatial arrangement between related cultural stratigraphic units and groups of units
- to describe the cultural character of each stage of landscape development in terms of function and duration
- to describe a comprehensive structural sequence and identify the relationship between periods of cultural activity in order to identify priorities for specific enquiry
- to further define the resolution for dating and analysing cultural and environmental phases and events through the recovery of stratified cultural and environmental studies
- to determine whether the character and timing of late Mesolithic/early Neolithic activities in the Lower Thames floodplain provides insights on the adaptation/adoption of an agricultural subsistence base
- to consider if the construction of trackways to access the Lower Thames floodplain during the Bronze Age is related to processes of agricultural intensification and 'rituals of reproduction' on the adjoining terraces
- to consider whether local technological, social, ritual and economic strategies/adaptations were geared to mitigate/exploit circumstances related to environmental change
- to recover evidence for the mechanisms driving local environmental change, including climate change and relative sea level rise.

As the archaeology and sediment sequences recorded during the excavations were largely as expected from the previous work, the majority of the excavation aims remained relevant for the post excavation analytical stage. However, apart from *in situ* material retrieved from T15 at Woolwich Manor Way, only a small amount of evidence was retrieved from the late Mesolithic to early Neolithic period. It was therefore thought unlikely that much could be done 'to determine whether the character and timing of late Mesolithic/early Neolithic activities in the Lower Thames floodplain provides insights on the adaptation/adoption of an agricultural subsistence base'. Although a number of Bronze Age trackways were identified at Woolwich Manor Way and Movers Lane, only a relatively small section of each was uncovered. Without knowing the origin or destination, the potential 'to consider if the construction of trackways to access the Lower Thames floodplain during the Bronze Age is related to processes of agricultural intensification and 'rituals of reproduction' on the adjoining terraces' is restricted. However, the trackways did offer the potential to investigate the technological aspects of their construction which allows comparison with other similar structures both in the Lower Thames and elsewhere.

Fieldwork

Evaluation

The evaluation programme was split between two phases. Phase I comprised a series of 9 boreholes and 54 test pits (TPs) (Table 2.1). The aim of the investigations was to assess the potential for archaeological remains based on a description of the Holocene sedimentary facies and the characterisation of the local archaeological landscape at locations affected by the proposed construction of the A13. The fieldwork was carried out between August and November 2000.

The boreholes were drilled using a cable-percussion rig capable of drilling and casing to depths of more than 20m below ground level through a variety of sediments including made-ground, sand and gravel. Continuous sequences of U4/U100 cores were collected from suitable fine grained and organic sediments at each borehole location. Drilling was monitored at all times under the supervision of the project geoarchaeologist and a description of the sediments and sample locations recorded on pro-forma borehole description sheets.

Test pits were normally 3m x 2m in plan at their base, allowing for the insertion of sheet metal piles or shoring boxes. Access to some test pits, however, was limited where site constraints prevented the installation of shoring. All alluvial deposits were removed in spits no more than 150mm thick with organic deposits in spits of no more than 100mm. All spoil was carefully examined to recover samples of cultural material, by appropriately qualified personnel with experience of excavating alluvial sequences. Care was taken to identify deposits that may have resulted from human activity, or which displayed features indicative of human activity such as worked wood, charcoal horizons or the presence of midden or burnt mound material. Where a cultural horizon was identified during machining, machining ceased while the appropriate hand excavation, recording and sampling took place. The stratigraphic sequence in each test pit was recorded by the project geoarchaeologist and sampling was carried out as appropriate

The Phase II trial trenching comprised the excavation of 25 trenches and was intended to focus on those areas identified in Phase I to be of high archaeological potential (Table 2.1). The fieldwork was carried out at three junctions: Prince Regent Lane, Woolwich Manor Way and Movers Lane, between October 2000 and March 2001.

Table 2.1 Summary of Phase I and II preliminary investigations

Route section	*Phase I*			*Phase II*	
	Site Code	*No. test pits*	*No. boreholes*	*Site Code*	*No. trenches*
A13 Ironbridge-Canning Town	TGW00	4	4	-	-
A13/A112 Prince Regent Lane	TGW00	18	-	PGL00	7
A13/A117 Woolwich Manor Way	TGW00	16	-	WMW00	6
A13 Old Roding Bridge	TGW00	-	5	-	-
A13 Movers Lane	TGW00	16	-	MOE00	12
Totals		54	9		25

Based on the results of the Phase I investigations and limited impact of the Scheme, no Phase II trenches were excavated at Ironbridge-Canning Town and Roding Bridge; further work was restricted to a watching brief during construction. The Phase II trenches varied in size depending on the area of the proposed construction impacts. Excavation was similar to the Phase I test pits. Modern overburden and alluvial deposits were removed by machine in spits until the first archaeological horizon was encountered. At this point machining ceased while the appropriate hand excavation, recording and sampling took place. Edge support was achieved by a combination of stepping and shoring techniques.

Excavation

Phase III Further Archaeological Works comprised a series of open area excavations targeted on archaeological deposits within the limits imposed by construction impacts. At Prince Regent Lane this was conducted by cofferdam excavation at Freemasons Road Underpass (Areas A and B) to excavate the Bronze Age timber piled structure identified during the evaluation. The fieldwork was carried out between October and November 2001. Excavations at Woolwich Manor Way in May 2002 consisted of two small trenches (Areas 1 and 2) to the west of the junction to mitigate the impact of flyover abutments on a series of Bronze Age brushwood trackways. Mitigation work at Movers Lane between August and October 2001 included two open area strips (Areas 2 and 3), located to the east and west of the junction to excavate prehistoric activity on the terrace gravels and the brushwood trackways identified during the Phase II works. A watching brief during construction was also maintained on earthworks at Ironbridge-Canning Town, Prince Regent Lane, Woolwich Manor Way and Movers Lane.

Geoarchaeological and palaeoenvironmental investigations

The facies-based approach to sediment recording

Throughout all fieldwork stages a facies-based approach was adopted towards the recording of sediment sequences. Sedimentary facies are a unique set of characteristics that relate to individual environments of deposition. Differing environments, in which sedimentation processes vary, will develop unique sets of traits that change across the landscape as the processes responsible for the sequence of development change. Consequently if analogy is used to link processes observable in modern environments to sets of properties of sediments, we can use this information to infer past conditions. The suite of sedimentary characteristics selected for inquiry can also be designed to reveal cultural components or signatures. This information can be subsequently used to describe the nature of the depositional environments, establish archaeological data potential (preservation and survival) and infer the nature of the generic landscapes of archaeological relevance, with particular reference to broader patterns of land-use.

This approach to recording sedimentary units developed as a practical reaction to the integration of

Table 2.2 Summary of Phase III investigations

Route section	*Contractor*	*Site Code*	*Area*
A13/A112 Prince Regent Lane (Freemasons Road Underpass)	PCA/Gifford	FRU01	Area A Area B
A13/A117 Woolwich Manor Way	PCA/Gifford	WMA02	Area 1 Area 2
A13 Movers Lane	Wessex Archaeology	RIR01	Area 2 Area 3

borehole and geotechnical test pit data with archaeological purposive trenching information, as well as the realisation that sedimentological data can significantly enhance interpretation of site specific cultural events and improve the resolution for cultural narratives across all timeframes. The facies approach also offers an opportunity to understand former landscape dynamics and provides a framework for the study of cultural processes at the sub-regional level. This relies on four key objectives: deposit characterisation, stratigraphy and chronology, describing landscape diversity and function, and understanding landscape processes. These incorporate the objectives set out in the Outline Archaeological Strategy. The primary focus of the geoarchaeological elements of the project was therefore to characterise the environments of deposition and specifically to look for evidence of pedogenesis, indirect evidence for human activity and degree of bioturbation.

In order to achieve these aims there was a need to accurately describe the sediment bodies (contexts) using standard terminology and make observations containing correct information to infer past environments. The strategy therefore considered five key requirements:

1 sediment context and resolution, in particular the vertical/lateral sediment sequences and spatial relationships between structures and adjacent deposits
2 an objective description of deposits to provide initial deposit characterisation
3 facies type assignment as the basis for primary interpretation
4 systematic sampling across vertical and lateral sequences at a number of points within the unit
5 sampling of a wide area, not just areas of interest, including 'off-site' contexts and avoiding sampling only 'problem' deposits.

The methodology of the initial investigations and assessment phases was specifically designed towards developing problem orientated analysis with explicit identification of the problem to be analysed. A process of informed interpretation was adopted where the interpretation of recovered structures, artefacts and similar was considered in light of the whole site. Adoption of a context only recording strategy was considered inappropriate because of four key weaknesses commonly encountered in archaeological recording strategies:

1 the lack of separation of pre-depositional, depositional and post-depositional attributes during context recording
2 a lack of clear criteria by which man-made stratigraphies can be separated from natural stratigraphies
3 limited recording of sedimentological structures on site at a within context and between context scale
4 limited separation of descriptive and interpretative terminologies.

A dual approach to the recording of on-site stratigraphy was agreed. A standard archaeological recording system was used in addition to detailed geoarchaeological recording of selected site areas. This is an appropriate response to complex stratigraphies containing both anthropogenic signatures and natural processes. This dual system was coordinated through the use of summary proformas. The methodology involved the description of sediment units using standard geological terminology (Jones *et al.* 1999). These descriptions were used to define provisional sediment facies types that were further detailed following assessment. The facies types were identified after examination of Phase I test pit data, prior to more extensive trenching during Phases II and III. Further laboratory assessment was carried out before and during Phase II works creating a dual feedback mechanism, allowing further resolution of objectives both on and off site. The sediment descriptions for a representative profile of each test pit and evaluation trench was presented in the assessment report for each site, along with preliminary correlation of facies types and cross sections where appropriate.

On-site sampling and assessment

Systematic sampling across vertical and lateral sequences was undertaken at a number of locations at each site. The methodology was devised to sample a wide area including 'off-site' contexts, not just areas of interest or 'problem' deposits. In general the Phase I works focused on collecting column samples for reconstructing the environmental history of the area and enhancing identification of facies types. During the Phase II evaluations and Phase III excavations column and bulk samples were collected to provide an immediate landscape context for archaeological deposits.

A range of materials was examined during the site assessment stages from a representative series of deposits. This provided preliminary information on preservation levels, environments of deposition and changes in hydrology, local and regional vegetation patterns as well as evidence for agricultural practices and the exploitation of natural resources. Sedimentological work included determination of organic content, carbonate presence, phosphate-P levels, magnetic susceptibility and lead/zinc/copper content. The biological remains examined included pollen, plant macrofossils, insects, diatoms, foraminifera and ostracods.

Laboratory analysis

The results and recommendations from the individual site assessments were incorporated into

the post-excavation project design and were considered in terms of both the site and schemewide research objectives.

Sediments

In addition to the characterisation work carried out during the assessment stages, further analytical work on the sediments targeted horizons associated with key phases of activity. Properties investigated included soil chemistry, micromorphology (thin section analysis) and magnetic susceptibility. These were used to characterise the surface of the weathered sands/land surface associated with early Neolithic artefact scatters at Woolwich Manor Way and the Bronze Age artefact scatters at Movers Lane. Also examined were sediments directly associated with the Bronze Age trackway sequences at Woolwich Manor Way and Movers Lane, along with burnt mound material sampled at the latter site.

Macroscopic plant remains and insects

Evidence of the local vegetation associated with the archaeological remains has been gained primarily from analysis of macroscopic plant remains and insects. These provide complimentary information to that gained through the study of pollen, which largely relates to the regional environment. Results at the assessment stage showed that the vast majority of the waterlogged plant remains represented wild habitats and therefore the bulk of the information obtained from these samples relates to the environmental character of the area rather than the nature of human activities. Individual plant and insect assemblages, however, in conjunction with artefactual evidence from the same samples, provided some evidence pertaining to the possible use of particular features. In total, 32 samples were submitted for the full analysis of plant remains and 13 were submitted for full insect analysis.

Charred plant remains recovered from samples have helped to elucidate the nature of the activities on the site, the wider resource base and nature of the woodland and woodland management. It had also been hoped that the plant remains would provide some information on the wider agricultural economy; however only sparse assemblages of cereal grains and associated weeds of cultivation were recovered along the route making the potential to achieve this aim difficult. In total nine samples were recommended for further work based on preservation and the archaeological significance of the associated contexts. Identification of charcoal was used to define the nature of the local woody taxa (for example to investigate whether scrub or mature woodland was present, augmenting information from both pollen and waterlogged wood) and more explicitly to define the exploitation of trees and other woody species. Management of the woodland may be elucidated from the charcoals, waterlogged wood and pollen. Nine samples were submitted for full charcoal analysis.

Pollen

Analysis of pollen provides data not only on the local vegetation but on the wider regional landscape. For the analysis, the most complete sequences with the best pollen preservation were targeted (as determined at assessment), particularly the peats and organic deposits which spanned long time periods and those containing clear evidence for environmental change. Short sequences associated with the trackways were also included; in conjunction with other environmental analyses it was hoped that the pollen could help to elucidate the environment of, and possible reasons for, their construction. In total five sequences were analysed, one from Freemasons Road Underpass (the sump sequence), two from Woolwich Manor Way (TP1 and trackway 2/14, Area 2) and three from Movers Lane (TP39 channel deposits and trackway 5268, Area 3).

Diatoms, ostracods and foraminifera

Diatoms, ostracods and foraminifera can provide information related to environments of deposition and changes in hydrological regimes. However, assessment indicated that preservation of these microfossils was very variable at the sites along the scheme and was particularly poor with regard to ostracods and foraminifera. In many cases it was considered that further detailed work would not provide significant additional information beyond what was achieved at the assessment stage. However, two sequences from Woolwich Manor Way (TP1 and Area 2) were submitted for further diatom analysis, based on the better preservation of these microfossils at this site. Additional samples from palaeochannel deposits at Movers Lane recommended at assessment for further ostracod and foraminifera work could not be investigated due to deterioration of the monolith samples in the intervening period.

Recording and sampling of waterlogged wood and timber structures

The investigation area is very low lying, well below 5m OD, with generally high water tables and dominated by recent alluvial deposits overlying bands of peat, alluvium, sands and gravels. Thus preservation of timber and roundwood structures dating from the industrial age back to at least later prehistory was expected at the outset. However, due to chance and very limited development of the wet marsh pastures up until Victorian times, the worked wood found was of later prehistoric date, without any historic material. Indeed, previous archaeological work in this region, carried out by the now defunct Passmore Edwards Museum, the Newham Museum Service, Pre-Construct Archaeology and Museum of London Archaeology, has shown that a range of roundwood trackways, fence lines and simple wooden 'platforms' have survived (Meddens 1996). By far the majority of the dated

woodwork has proved to be of the Bronze Age period. The archaeological work prior to the A13 project indicated that some areas were likely to have been zones of particularly intense prehistoric activity where structures such as trackways were very likely to occur, for example in the Beckton area (Meddens 1996, 327). It is important to note that no current form of remote sensing device can locate such structures below ground; the thick clay-silt, estuarine deposits completely hide what lies below, except where found along the Thames foreshore, truncated by modern tidal action.

It is generally clear that woody materials were the main structural materials used in the changing built environments of British prehistory, from houses to livestock fences, boats and much portable equipment. This is particularly true in an area like Greater London where there is very little building stone. Wooded environments of various types formed much of the backdrop to human activity in the area in later prehistory, but very little evidence survives of the use of wood or the nature of the woodlands on typical decayed, 'dryland' excavations. Consequently archaeologists working in a wetland zone such as the Thames floodplain are obliged to extract as much information as possible from the wood found preserved there. Much of the information gained relates not just to the wetlands but also to the the drier hinterland, where such evidence no longer exists. Since there is much modern development in this area of East London the wetland resource will inevitably diminish (through de-watering for example). This, then, is also a key reason for detailed recording while the material still survives.

The approach used for the investigation and recording of the waterlogged woodwork is broadly compatible with that laid out by English Heritage (Brunning 1996). As is established practice in the field of prehistoric wetland archaeology (Coles and Orme 1980a) the wooden structures were exposed as fully as they could be within the limits of the excavation area. Then, either the whole of a small structure or a fully representative area of a larger feature was dismantled, following which the material was recorded and sampled in detail off-site. Occasionally severe weather or safety considerations limited access to the woodwork and so precluded detailed recording. Indeed, the very narrowness of the excavation trenches presented some problems in the interpretation of some of the trackway structures. The ancient woodworking specialist for the project (D. Goodburn) provided on-site advice about the interpretation, broad dating, excavation, sampling and recording of the woodwork uncovered. Site plans were made at 1:20 with some details at 1:10. Standard section drawings were also made of box sections around some *in situ* piles and stakes, and general photographs were taken. Following excavation the selected worked or 'possibly worked' wooden items were washed, closely examined and proforma 'timber sheets' filled out for those that proved to be worked. Naturally deposited wood, fragments of bark and very repetitious worked items such as abraded small wood chips were simply listed briefly and discarded, unless there was a specific need to document their non-artefactual nature. A large proportion of the lifted clearly worked material was also drawn in detail on gridded film by the specialist, highlighting technical details such as tool marks. Finally, a subset of the worked material was also photographed off-site in several formats.

A full representative sample of the worked roundwood from each investigated area was sampled for microscopic wood species identification (Barnett in Appendix 3), except for small items clearly of yew, which has visually diagnostic features even in small diameters. The larger roundwood and small amount of material split from larger logs ('timber') was sampled for wood species identification if the material did not have clear diagnostic features. In some cases a small number of samples which had been identified by a specialist were included to act as an independent check on the veracity of the visual species determinations. Most of the unidentified material was of alder, a much used wetland tree. Thus, it is important to note that the species identification tables in Appendix 3 mainly concern roundwood and somewhat under represent the oak, ash, elm and yew that were found. Slices were taken for tree-ring studies when the parent timbers appeared to have over 45 annual rings and to be from one of the oaks or yew. Samples for radiocarbon dating were taken from young roundwood or the outer parts of larger material which contain the youngest carbon, most representative of the date of cutting.

At several stages during the project the issue of dating and changes in date ranges due to the development of more refined dating methods was discussed. As tree-ring chronologies are extended back in time and ever closer radiocarbon dating of later prehistoric woodwork becomes possible, this becomes an important issue as sites, and their woodworking attributes, can be more closely compared than was true when the A13 project was initiated. Of particular significance is the closer dating of early tool marks indicating when changes in woodworking toolkits took place. The adoption of metal tools was crucial, enabling a much greater range and extent of woodworking to become possible in the lifetime of one woodworker. The impact of the seemingly rapid adoption of the new, much more effective tools must have been widespread, leaving a large imprint on pollen and other environmental sequences. The conversion of wildwood into forms of managed woodland such as woodpasture and eventually arable land must have been much accelerated by the introduction of the new tools. Recent work on a number of projects shows that the earliest use of metal axes can now be pushed back to around 2500 BC, with tree-ring

dated wooden trackways with clear metal axe cut marks dating back to at least 2250 BC from Britain and Ireland (see for example Corlea 6 from central Ireland, O'Sullivan 1997).

Scientific dating

In total, 64 samples were submitted for radiocarbon dating and 62 dates have been obtained for the project schemewide, the detailed results of which are presented in Appendix 1.

Thirty samples (bulk sediment, wood and charred material) were submitted to Beta Analytic Inc., Florida, USA for standard radiometric dating during the assessment stages and 34 samples were sent to the Scottish Universities Environmental Research Centre (SUERC) in East Kilbride, Scotland for Accelerator Mass Spectrometry (AMS) dating during the post-excavation analytical phase. In general the purpose of the radiocarbon dating programme was help to refine the individual site chronologies and phasing. A range of material was selected from the sediment sequences, timber structures and trackways: dated materials included charred and waterlogged plant remains from key features, cremate bone and carbonised residues adhering to pot sherds. Where possible only clearly worked wood associated with the timber structures was submitted. With reference to the sediment sequences, waterlogged seeds or wood were the preferred material, but in some cases, where preservation was poor, a sample of organic sediment was submitted instead. Unfortunately two dates on charred residues adhering to potsherds failed.

The radiocarbon results are quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). They are conventional radiocarbon ages (Stuiver and Polach 1977). All dates from samples submitted from this project have been calibrated using datasets published by Reimer *et al.* (2004) and the computer program OxCal (v3.10) (Bronk Ramsey 1995, 1998, 2001) (see Appendix 1). In the text the calibrated age estimates are quoted, with the radiocarbon years in parentheses. The calibrated date ranges cited in the text are those for 95.4% (2σ) confidence.

Twenty samples of wood from the timber structures were submitted to Dr Daniel Miles at the Oxford Dendrochronology Laboratory, but unfortunately the samples proved undatable by this method. Oak piles submitted from Freemasons Road derived from very fast grown, probably managed oak, which means they contained relatively few, ill-defined annual rings. In contrast, some of the other samples from natural timbers had many more annual rings deriving from very slow grown unmanaged trees, but here the rings were too closely spaced to get a match either (Miles, pers. comm).

A number of samples from the sediments were collected for Optically Stimulated Luminescence dating (OSL, Appendix 1). Four of these samples were processed during the evaluation stage by Dr Edward Rhodes at the luminescence dating laboratory, University of Oxford, to help define the facies interpretations of the late Pleistocene and early Holocene sequences. No further samples were processed during the post-excavation stage as key phases associated with the periods of archaeological activity could be adequately dated by radiocarbon assay.