# Chapter 10

# Aveley Marsh

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## Aveley Marsh (Zones T16–17)

The HS1 route continues eastwards across Aveley Marsh where it skirts the edge of the gravel terrace and floodplain before crossing the Mar Dyke; a major tributary of the Thames (Fig 25). At the time of the investigations rough grass and scrub covered most of the route corridor. Ground levels averaged +0.30m OD, increasing to +1.30m OD eastwards.

### *Construction Impacts*

The railway through this part of the route continued on a piled concrete slab and, aside from the piling, there was no direct impact on the underlying alluvium. The exception, however, was at the very eastern extent of Aveley Marsh where Tank Hill Road had to be diverted on a newly constructed bridge over the HS1 line. Prior to this a series of advanced service diversions were carried out on both sides of the railway. This comprised a total of 690m of open trenching to an average depth of 1.80–2.00m. Pipe-jacking was carried out via a series of deep caisson chambers and cofferdams to carry the services beneath existing railway lines and roads. A new Pressure Reduction Station (PRS) was also constructed immediately west of Tank Hill Road (Fig 54).

### *Key Archaeological Issues*

The 1999 study designated Zones T16 and T17 (Chap 6 *Window 10*; Fig 25) of high and medium archaeological priority respectively. The sediment sequences here are complex and influenced strongly by the close proximity to the gravel terraces and the presence of the Mar Dyke tributary valley. The bedrock geology comprises Chalk overlain by Pleistocene gravel and head deposits. The Holocene sediments comprise peat and organic units intercalated with clay-silts, silts and sands.

The Pleistocene deposits in Zone T16 (28.0–28.2km) reached a maximum of *c* +1.0m OD, probably forming a promontory within the floodplain. This area probably remained dry throughout much of the prehistoric period and as such may have provided a focus for human activity. Within the Mar Dyke Valley the steeply dipping topography of the Late Pleistocene landscape would have resulted in gradual ecotonal zone shifts and dry ground zones around the wetland may similarly have been the focus of considerable activity.

### *Methodologies*

Initial fieldwork comprised an archaeological watching brief on the advanced utility diversions (Fig 54). Small assemblages of worked flint were retrieved in the base of the pipe trench excavations at the edge of the topographic high in Zone T16 (28.135km) and either side of Tank Hill Road during the construction of the new PRS (*c* 28.380–28.425km). The flint was consistently located on the surface of a weathered sand horizon directly overlying Pleistocene deposits outcropping at higher elevations along the floodplain edge and sealed beneath shallow deposits of Holocene peat and alluvium. The watching brief was followed by a series of evaluation trenches located immediately west of Tank Hill Road in order to assess the impact of the piers for the new Tank Hill Road bridge. Following the

Table 53 Summary of fieldwork events, Aveley Marshes

| Event name | Event code | Type | Zone | Interventions | Archaeological contractor |
|---|---|---|---|---|---|
| West Thames advanced utility diversions | ARC 36100 | Watching brief | 16–17 | | Oxford Archaeology |
| Tank Hill Road | ARC PFC01 | Evaluation/ excavation | 17 | 3963TT, 3964TT, 3983TT, 3984TT, 3985TT, 3986TT, 3987TT, 3988TT, 3993TP–3998TP | Wessex Archaeology |
| Tank Hill Road | ARC 310T02 | Watching brief | 17 | | Wessex Archaeology |

TP = testpit TT = trench

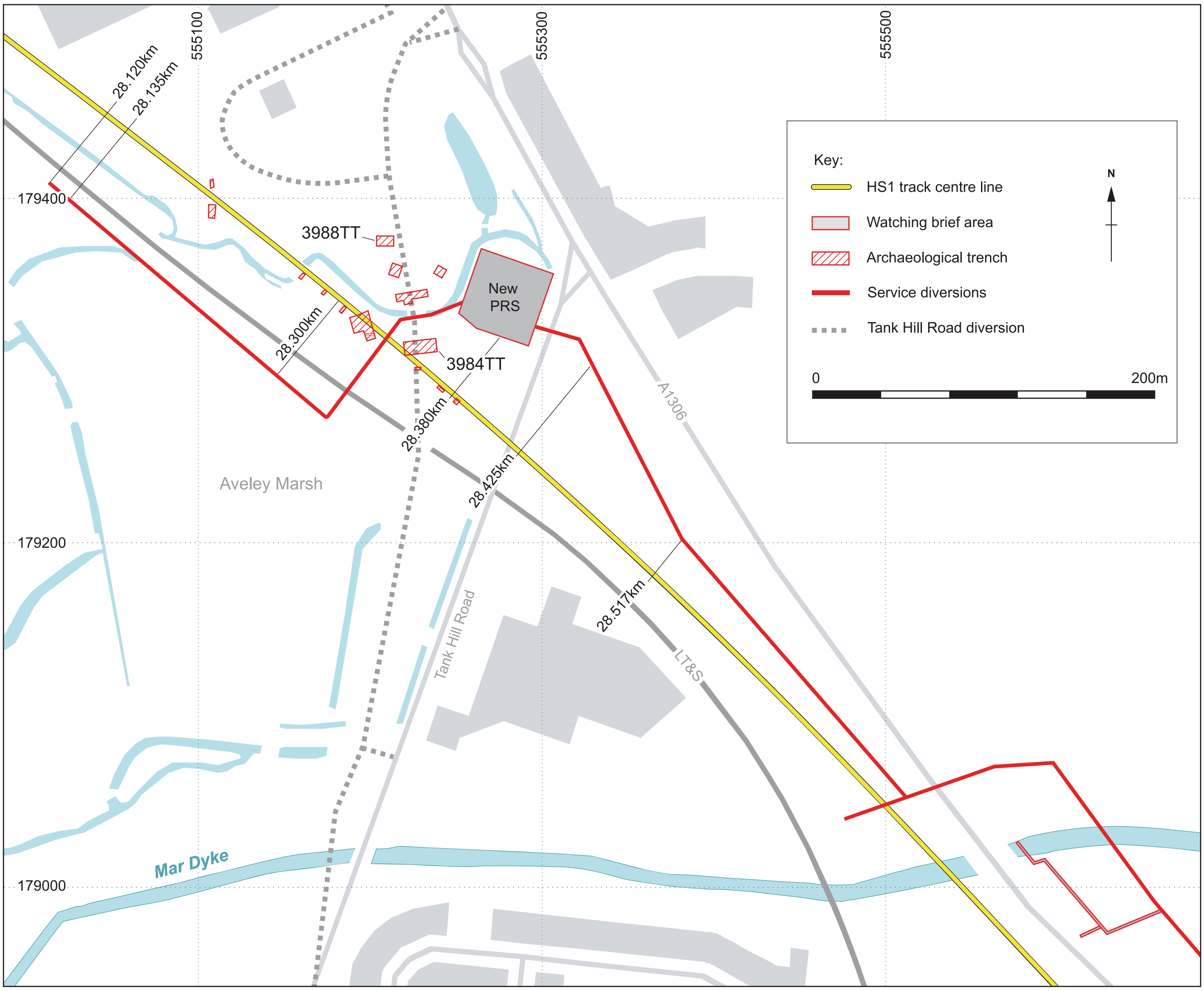


Figure 54 Plan of investigations, Aveley Marsh

identification of dense artefact scatters of mainly Late Mesolithic data, but flint of Late Upper Palaeolithic to the Early Bronze Age date was also recovered, the area was the subject of detailed excavation (Leivers *et al* 2007). A summary of the fieldwork events is included in Table 53.

Post-excavation work included the detailed analysis of a number of sample profiles in order to characterise the environments of deposition associated with the sediments and the artefactual evidence. Unfortunately it was only possible to sample the shallower sequences exposed during the watching brief. No detailed sampling was undertaken on the deeper floodplain sequences to the south of the HS1 corridor on Aveley Marsh and adjacent to the current Mar Dyke channel due to access and safety restrictions during the excavation of the caisson chambers. Interpretation of the sedimentary sequences recorded during the pipeline watching brief was carried out by Elizabeth Stafford. Palaeo-environmental work in the pipe trench at 28.517km was carried out by Lucy Verrill (pollen), Wendy Smith (waterlogged plant remains), John Whittaker (ostracods and foraminifera) and Nigel Cameron (diatoms). Five radiocarbon dates were obtained from the sequence providing a broad chronological framework. The excavation sequence associated with the flint scatters at Tank Hill Road was interpreted by Catherine Barnett (sediments), Richard Macphail (micromorphology) and John Crowther (soil chemistry). The archaeological and environmental sequences from Aveley Marsh and Tank Hill Road have been published in detail elsewhere (Leivers *et al* 2007). The following sections provide a summary of the results.

## *Results of the Investigations*

**Watching brief on service diversions**

During the advanced service diversions Pleistocene fluvial gravels were frequently exposed in the base of the excavations in the western part of the route section between 28.120km and 28.300km (south of the HS1 centre line), overlain by Holocene peat and silty clays. A topographic high was noted to the west where the surface of the gravels was noted at *c* -0.8m OD, overlain by sandy deposits to -0.15m OD (Fig 55). This

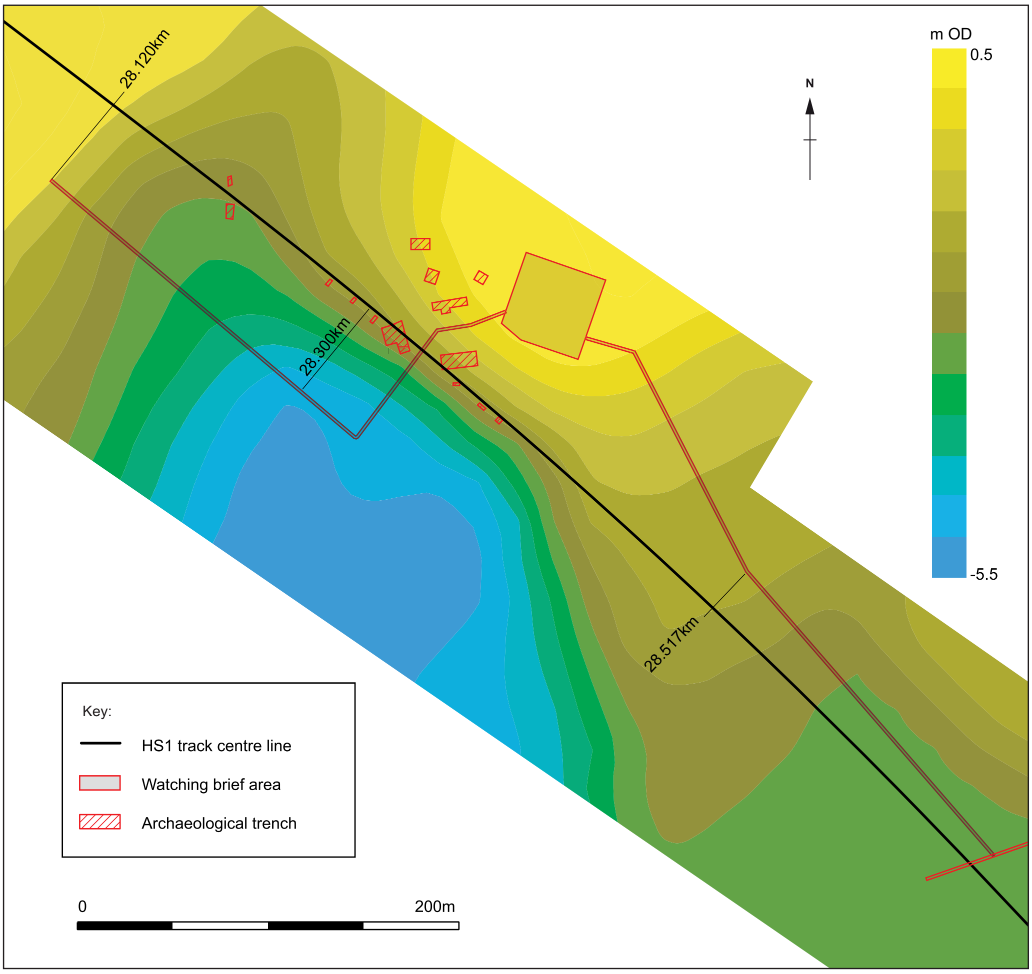


Figure 55 Early Holocene topography, Aveley Marsh

corresponds with the promontory identified during the 1999 study (Zone T16). The surface of the sands, where exposed, appeared to be 'weathered', producing occasional pieces of worked flint, and was interpreted as the remnant of a former dry landsurface probably dating from the Early to mid-Holocene. The surface dropped rapidly in elevation eastwards towards the Mar Dyke, with a corresponding thickening of the overlying peat and silty clay deposits. To the north of the HS1 centre line, either side of Tank Hill Road, the alluvial deposits thinned against the rise of the gravel terrace. Variable deposits, consisting of greenish grey clay and chalky gravel, were identified in the base of the excavations, overlying Chalk bedrock. These were interpreted as Pleistocene solifluction deposits, eroded from the higher ground. Overlying this, a discontinuous fine sandy deposit of varying thickness was noted, sealed by a thin layer of peat and silty clay alluvium. The sequence was capped by 0.30–1.0m of modern made ground at this location. The upper part of the sandy deposit, again, appeared weathered and produced a small assemblage of worked flint.

*Chainage 28.517km*

Palaeoenvironmental sampling was undertaken in the pipe trench located on the floodplain of the Mar Dyke at 28.517km. This was considered a useful 'off-site' sequence for the activity located on the higher ground around Tank Hill Road where the sequences were comparatively shallow and vertically conflated. Unfortunately the depth of recoverable sediments at 28.517km was insufficient to sample from layers contemporary with the earliest occupation of the site (if they existed) and only covered the later phases of occupation at Tank Hill Road. This was due to access and safety restrictions.

**Lower clay silt and peat**

At the base of the exposed sequence lay a minerogenic alluvial deposit of slightly sandy clayey silt (context 379), probably deposited by moderate to low energy over-bank flooding from an adjacent channel (Fig 56). This deposit became more organic up profile grading rapidly into dark reddish-brown silt, approaching the interface with the overlying peat complex at -1.93m OD. A radiocarbon date of 2480–2290 cal BC (NZA-27528, 3909±30 BP) suggests accumulation of peat at this location commenced in the Late Neolithic–Early Bronze Age (Appendix A; Barnett 2007, 33). The basal part of the peat (context 378), between -1.93 and -1.65m OD, comprised a mottled dark brown to black well humified slightly silty peat with abundant twigs, larger wood fragments and bark.

The diatom flora from the basal alluvium and peat (Fig 57) was composed mainly of freshwater species associated with shallow-water habitats (eg, *Anomoeoneis sphaerophora*, *Amphora*

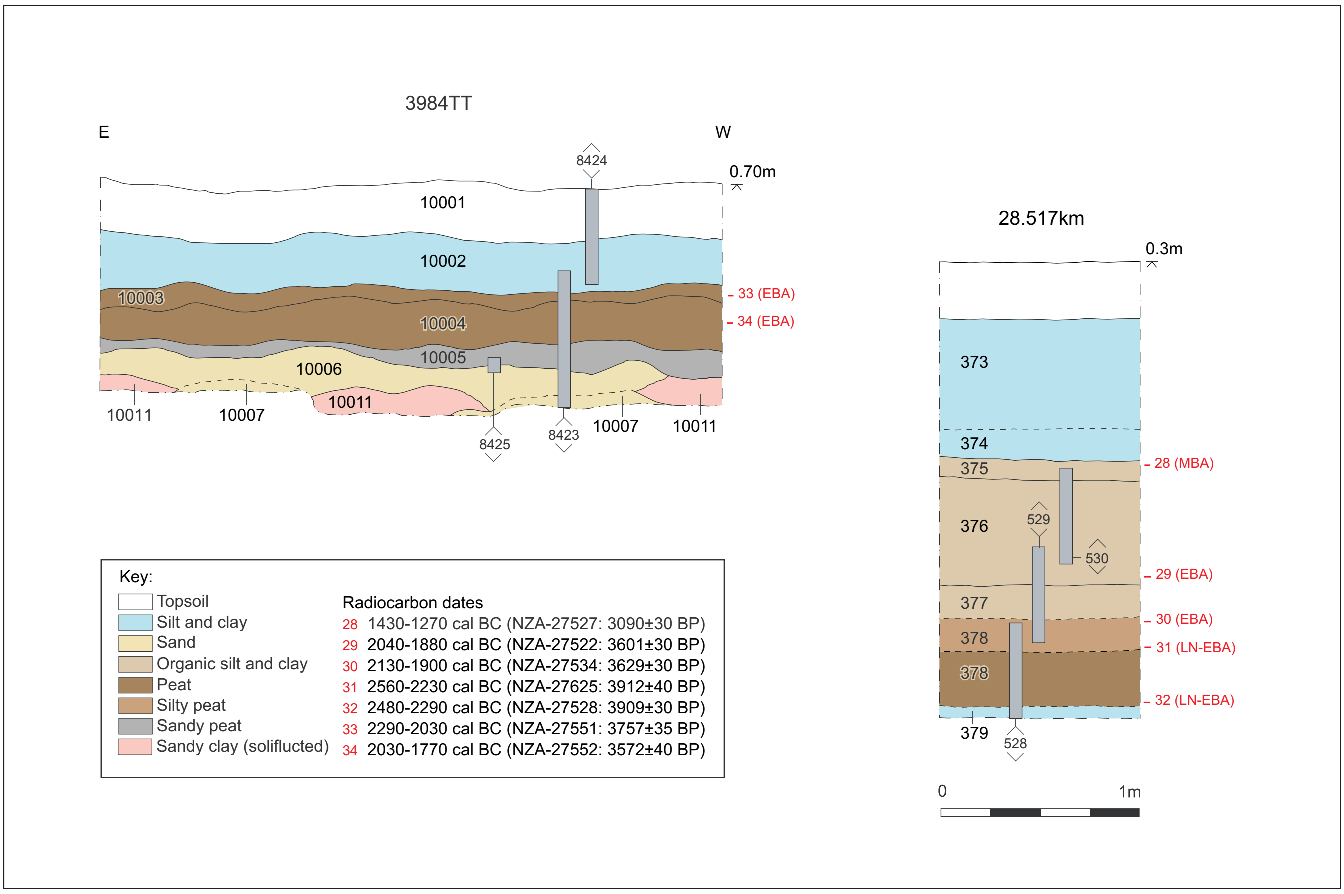


Figure 56 Sample profiles, Aveley Marsh

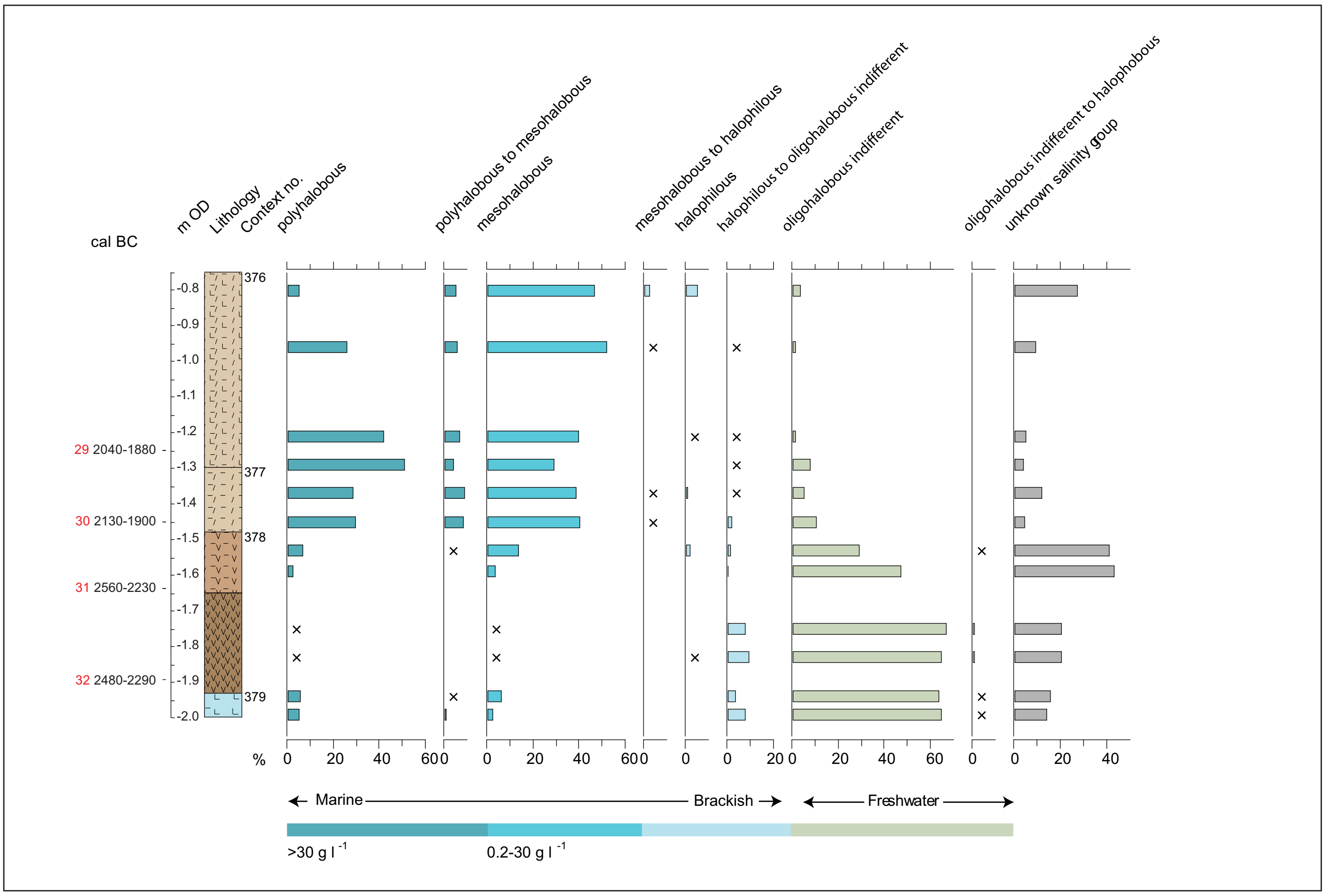


Figure 57 Diatom diagram, Aveley Marsh

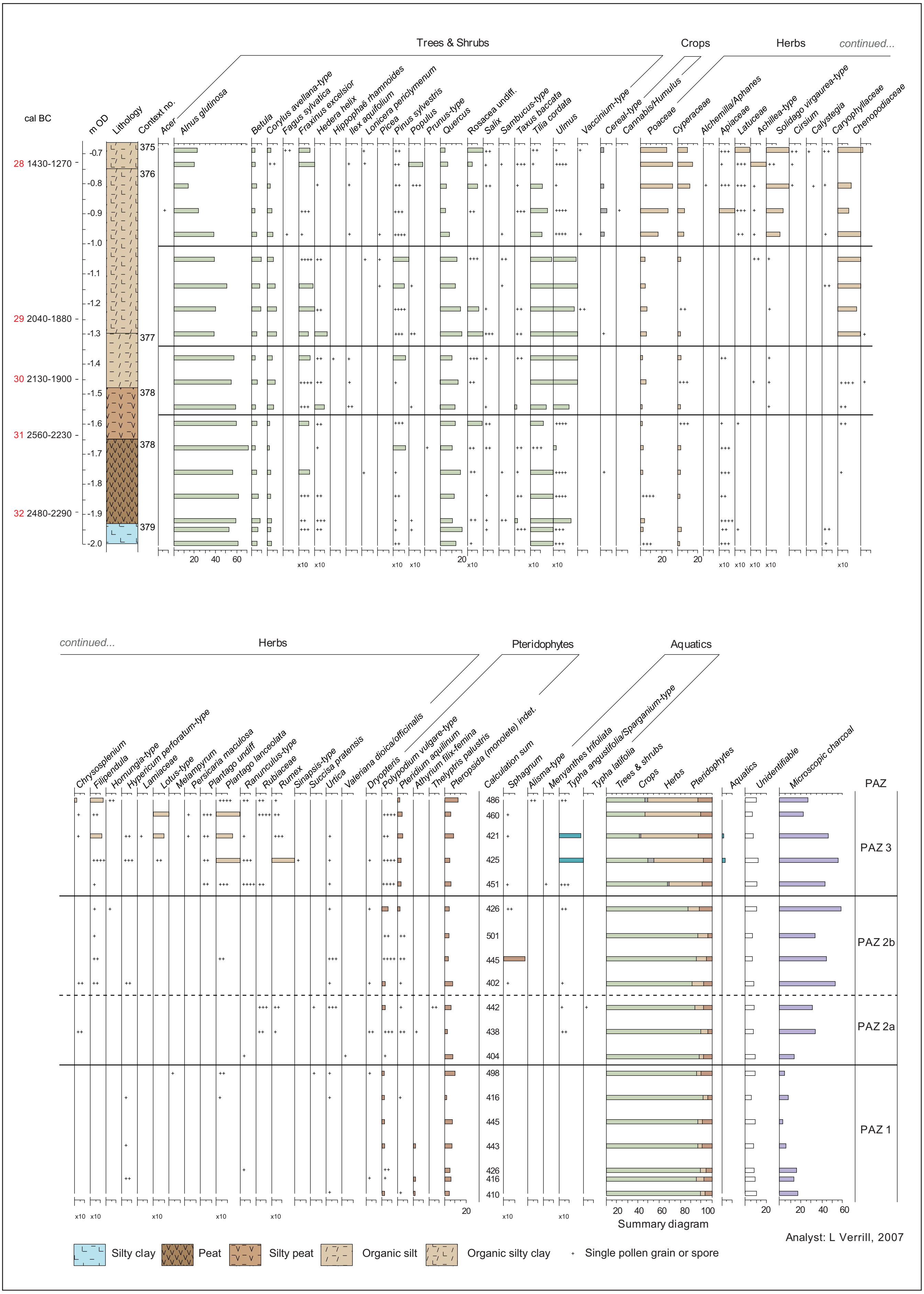


Figure 58 Pollen diagram, Aveley Marsh

*libyca, Gomphonema angustatum, Gyrosigma acuminatum, Sellaphora pupula* and *Pinnularia major/nobilis*; Cameron 2007, 35–6). The plant and pollen data indicates that the local landscape was dominated by floodplain alder carr, with the dryland component consisting of a mixed deciduous woodland. The peat contained frequent seeds and catkins of *Alnus glutinosa* (common alder) and occasional seeds of *Ranunculus* (buttercup), *Rubus* (bramble), *Solanum* sp. (nightshades) and cf *Scirpus sylvaticus* (wood club-rush) (*Table 54*). The pollen assemblages (Fig 58) are characterised by a high representation of *Alnus* followed by *Quercus* (oak) and *Betula* (birch), with lower values of *Corylus* (hazel) and *Tilia* (lime), *Ulmus* (elm) and *Betula* (birch). The non-arboreal component of the assemblage comprised low percentages (<5%) of Poaceae (grasses), Cyperaceae (sedges) and monolete spores (ferns). There was no evidence from the pollen of crop cultivation or vegetation clearance. A short-lived decline in *Tilia* was noted at -1.67m OD, followed immediately by a resurgence. If this is a true temporary decline (rather than a relative change to an increase in alder), it might be argued that an episode of coppicing or pollarding took place. Although microscopic charcoal values temporarily increase at the same point, which could indicate clearance by fire, only one other arboreal pollen type, *Quercus*, declines at the same time, and there is no corresponding increase in open-ground pollen taxa.

**Organic silts and clays**

Above -1.65m OD the peat became increasingly silty and less woody, grading into an organic silt at -1.48m OD (context 377) and an organic clay silt unit at -1.29m OD (context 376). Radiocarbon dating suggest these silty deposits began to accumulate from the Late Neolithic to Early Bronze Age at 2560–2230 cal BC (NZA-27625, 3912±40 BP). The increasing silt content suggests consistent low-energy flooding which may have been seasonal, transporting sediment from an adjacent channel. Diatoms suggest increasing marine influence during this period. Initially freshwater conditions continued, but in the organic silt (context 377) the percentage of freshwater diatoms began to decrease and marine taxa gradually increased (eg, *Paralia sulcata, Cymatosira belgica, Podosira stelligera, Rhaphoneis* spp., *Actinoptychus undulatus* and *Thalassiosira decipiens*). Brackish water species at the more saline end of the scale also increased (eg, *Cyclotella striata, Diploneis didyma, Nitzschia compressa, Nitzschia granulata* and *Nitschia navicularis*). Towards the top of context 376 preservation was poorer although the decline of some species suggested that, although salinity at the site remained high, the transport of allochthonous marine species to the sediments appears to have declined (Cameron 2007, 35–6).

The seed assemblage was similar to that described above but with the addition of *Taxus baccata* (yew), *Caltha palustris* (marsh-marigold), *Persicaria hydropiper* (water pepper), *Iris pseudacorus* (yellow iris) and *Mentha* sp. (mint), although seeds were absent from the upper part of context 376. The pollen spectrum initially sees a decline in *Alnus* from context 377 upwards which then levels out until the top of the sequence where it declines again. Although the proportion of open ground expanded only very slightly, the presence of Chenopodiaceae (goosefoots) may reflect the estuarine location rather than the alternative ruderal habitat usually interpreted from this family (eg, Behre 1981). The pollen data for the upper part of context 376 showed much greater reductions in most arboreal pollen taxa and in expansion of grasses. Mixed agricultural activity may be suggested, with disturbed ground indicated by the presence of *Plantago lanceolata* (ribwort plantain), *Rumex* sp. (docks) and *Taraxacum*-type (dandelion). Poaceae and *Filipendula ulmaria* (meadowsweet) are likely to represent both the wetland environment and areas of open grassland. Cereal-type pollen is consistently present, however, as previously discussed (Chap 7, Trench 4042TT), the similarity of cereal pollen with some wild grasses such as *Glyceria* (sweet-grass) means that the evidence remains somewhat equivocal. Subsequent work on this sequence (Waller and Grant 2012) has indicated these cereal-type grains, found highest in PAZ-3, were derived from wetland grasses (notably *Glyceria*-type) and not cereals.

Between -0.75 and -0.65m OD a slow-down in accumulation is indicated by the deposition of a thin unit of brownish-black organic silty clay (context 375) suggesting lower energy deposition, perhaps as a result of slight channel shift away from this location. Radiocarbon dating suggests a Middle Bronze Age date of 1430–1270 cal BC (NZA-27527, 3090±30 BP).

**Upper silty clays**

Above -0.65m OD there was an abrupt change in lithology to inorganic structureless minerogenic silty clay probably representing a significant ingress of tidal waters during the Middle or later Bronze Age. Unfortunately no environmental data was retrieved from the upper alluvium due to sampling problems.

## *Excavations at Tank Hill Road*

Detailed recording of the sediment sequence at Tank Hill Road (Barnett and Macphail 2007, 5–6) revealed a basal clean soft white fine–medium sand (Trench 3984TT, context group (gp) 10007) part of/derived from the underlying Pleistocene fluvial sands and gravels (Fig 56). At the top of the sand was a dirty slightly humic grey sand (context gp 10006) representing a weathered dry landsurface in which a series of dense flint scatters were recovered. This was overlain by 0.10m of highly humic sandy peat (context gp 10005). The pollen assemblage from the upper portion of the buried soil contained high numbers of degraded *Tilia* pollen, which as a robust pollen grain has become over represented in the poor preservational environment of the soil profile (Keatinge 1982; 1983). At this time, there is evidence of alder carr close by and *Quercus*, *Ulmus* and *Corylus* were present (Scaife 2007, 29–32).

Thin-section analysis (Pl 18) in 3984TT (Kubiena 8425) indicated that the weathered sand (context gp 10006) was composed of poorly humic, coarse silt to fine sands with common coarse stones including flint (Barnett and Macphail 2007, 5–6). Trace amounts of fine charcoal and the presence of likely burned stones are indicative of an anthropogenic input, consistent with the presence of artefacts. This soil horizon was highly

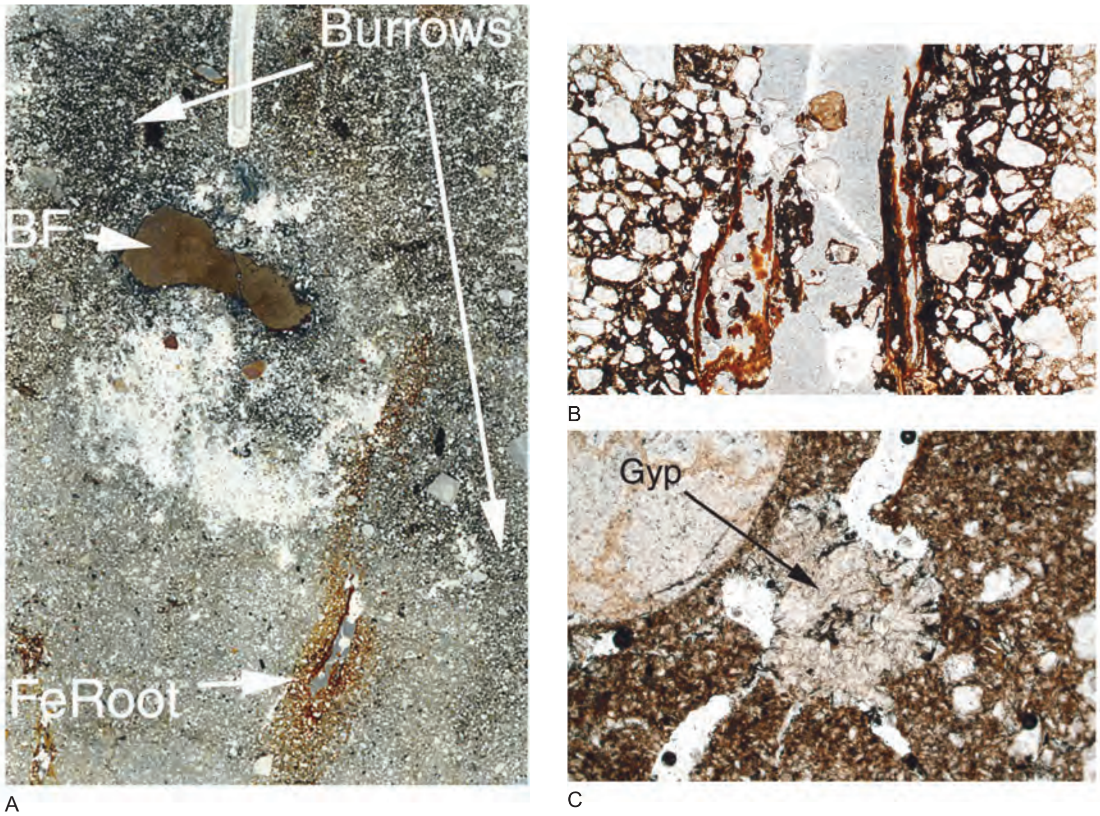


Plate 18 Microphotographs from hearth, 3985TT, Tank Hill Road. A) Kubiena 8535 thin section: The base of the hearth deposit that includes burnt flint (BF) is burrow-mixed into the subsoil sands (natural); note iron stained root traces (FeRoot). Frame width is ~50mm. B) Kubiena 8535: Iron-replaced root and associated void iron hypocoating in the 'natural' under the hearth. Plane polarised light (PPL), frame width is ~4.6 mm. C) Kubiena 8535: Detail of gypsum ($CaSO_4$); some dissolution is apparent around crystal margins. PPL, frame width is ~2.3mm

compact and the lack of void space is best explained by wetting and structural collapse caused by later inundation, peat formation and alluviation. Analysis of the overlying sandy peat indicated it was composed of once-laminated fine sands and wood peat. The peaty material included lignified remains of wood and amorphous peat burrowed by mesofauna which produced abundant organic excrements. A new shallow acid peaty gleyed soil profile was therefore superimposed over the previous stable sandy landsurface. The grey colouration of the weathered sand is, in part, attributable to humic colloids washed down and clear evidence for bioturbation exists. An eluviated soil (Ea) horizon was discerned in 3988TT on higher ground to the north-east of the site. Elsewhere, this layer was not fully developed, although a highly leached B horizon developed, with the acidic nature of the peaty layer and the open loose sands underlying it enabling groundwater leaching. The greater degree of development shown in 3988TT indicates it was dry and exposed to soil forming processes for longer than the rest of the site, which may explain the greater concentration of later prehistoric artefacts in that area. The sands across the site show evidence of being heavily rooted, the voids traceable to the overlying peaty soil and filled with gypsum crystals (in 3984TT) and humic material translocated from it, the voids also coated with iron oxides. As a consequence, any artefactual and environmental remains in the upper sands and indeed new material deposited in/on the peaty soil surface were subject to vertical movement through rooting and worm sorting.

Following the formation of the sandy peat, the continued spread of wet marsh conditions led to the accumulation of up to 0.25m of terrestrial fen peat (context gp 10004), which buried the soil profile and effectively sealed it although rooting continued to have an effect. Radiocarbon dating suggests peat accumulation commenced during the Late Neolithic to Early Bronze Age, from as early as 2400–2140 cal BC (NZA-27553, 3809±30 BP from the higher part of the site in 3988TT; Barnett 2007, 29). A gradual transition with desiccated iron-stained peat at the top (context gp 10003) to the stiff sticky clay alluvium (context gp 10002) that forms the upper portion of the sedimentary sequence indicates gradual inundation of the terrestrial peat, with no truncation of its upper surface observed. The deposition of up to 0.35m of fine overbank alluvium occurred under high water level/flood conditions. The trigger for these events may in part have been internal such as a shift in channel position but also relates to a wider change in the Thames Estuary with estuary expansion (Long *et al* 2000), the increase in brackish/marine influence clearly demonstrated by the diatom assemblage reported for the off-site sequence at 28.517km.

Plate 19 Excavation of the flint scatters at Tank Hill Road

## *The Archaeological Evidence*

Immediately west of Tank Hill Road, large spreads of Late Mesolithic struck flint were identified associated with the weathered sand horizon, along with concentrations of burnt flint probably marking the locations of hearths. A limited amount of Late Upper Palaeolithic flintwork, Early Neolithic struck flint and pottery and Late Neolithic–Early Bronze Age flintwork also occurred within the same sand layers, sealed by peats and alluvium.

As previously stated the findings from Tank Hill Road are reported in detail elsewhere (Leivers *et al* 2007). In summary, although the material was vertically conflated, the horizontal distributions were only blurred, and technologically distinct elements could be identified. The main area of Mesolithic flint working concentrated around a very dense concentration of burnt flint in and overlying a shallow cut filled with burnt sand, the only feature identified other than later tree-throw hollows. Soil micromorphological analysis (Barnett and Macphail 2007, 6–7) revealed the hearth (3985TT, Kubiena 8535) cut a poorly humic well sorted sand (with coarse silt), the parent material/subsoil of group 10006 (Fig 56), and of probable river terrace origin (Hucklesbrook soil association; Jarvis *et al* 1984). The layer was marked by post-depositional rooting and secondary iron deposition, with iron impregnation of soil channel margins (hypocoatings) typical of a drowned soil (Bouma *et al* 1990; Macphail 1994) (Pl 18A–B). The base of the hearth fill comprised burrowed sands with fine charcoal-rich silt inwash (Pl 18C) and burnt flint, and was strongly leached. The main part of the fill consisted of fine sands with charcoal and relict burned small stones, was strongly burrowed, with some burrows infilled with silt and charcoal, implying biological working of this probable 'combustion zone', a common phenomenon affecting hearths (Goldberg and Macphail 2006a; 2006b, 167–8; Goldberg and Macphail 2012). A rare and enigmatic infill feature of dark iron-stained clay is unlikely to be related to general clay inwash that can develop during inundation, or result from inundation-induced soil slaking (eg, Macphail 1994; Macphail and Crowther 2004; Macphail and Cruise 2000) since only one example is present. This may be a relict trace of clay movement caused by the release of potassium in ash-rich deposits and commonly recorded in pits containing burned residues (Courty and Fedoroff 1982; Slager and

Plate 20 Photograph of worked flint from Tank Hill Road

Van der Wetering 1977). The hearth, as with the soil recorded in 3984TT, was sealed below a wood peat with post-depositional rooting and iron staining.

The retouched tools (Pls 19 and 20) were dominated by microliths, seemingly manufactured around the hearth. Other manufacturing areas were identified to the west (tranchet axe manufacture and maintenance); evidence for later leaf-shaped and barbed and tanged arrowhead manufacture was concentrated to the north.

The Late Mesolithic material probably represents repeated human utilisation of a gravel island or promontory overlooking the floodplain; an ideal location for the exploitation of a range of both wetland and dryland resources. There was, however, an absence of evidence for structural and faunal remains at the site which to a certain extent precludes detailed discussion of the nature of the activities carried out.

## Summary

The environmental evidence indicates that during early occupation, Tank Hill Road was an open sandy island or promontory of the terrace edge. This became increasingly wooded with oak, elm and hazel (Leivers and Barnett 2007, 36–41). Wet marsh conditions progressively spread, with peat formation on the floodplain from the later Neolithic to Early Bronze Age. Peat growth soon affected the floodplain edge occupation site, with the encroachment of fen communities and alder carr onto the sand island. The differing degrees of soil maturity across the site indicate this spread was diachronous, with higher drier areas persisting to the north-east of the site, enabling continued access or occupation.

The peat would have formed a succession of semi-stable terrestrial land surfaces, which, although waterlogged, would have allowed continued access to the nearby riverine resources at least seasonally, although the growth of dense alder carr would have impeded this access. The spread of stable, though waterlogged, terrestrial surfaces represented by the peat in the Early Bronze Age would have caused a change in the opportunities offered to local groups. On the one hand the ephemeral exploitation of the rich fen habitats for food is likely to have increased but the spread of peat over once dry sand islands would have forced occupation back from the floodplain margins onto higher ground.

Gradual inundation of the peat occurred, at first dominated by fresh water conditions, with repeated high water conditions leaving a deposit of fine overbank sedimentation. The pollen and diatom evidence suggest that influence of saline water increased from the Middle Bronze Age and into the Iron Age, reflecting wider changes in base level throughout the Thames Valley.