ABACUS PARK PLOTS B & C
Dagenham Docks
RM9

London Borough of Barking

An archaeological evaluation and geoarchaeological report

May 2006

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MUSEUM OF LONDON
Archaeology Service

ABACUS PARK PLOTS B & C
Dagenham Docks
RM9

London Borough of Barking

An archaeological evaluation and geoarchaeological report

Site Code: ACU06
National Grid Reference: 548450 182521

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Summary (non-technical)

This report presents the results of an archaeological evaluation carried out by the Museum of London Archaeology Service Abacus Park, Dagenham Docks, London, RM9. The report was commissioned from MoLAS by Michael Sparks Associates, on behalf of:

***ABACUS PARK PROPERTY LIMITED PARTNERSHIP** (limited partnership registration number LP010887) whose principle place of business is 22 Hanover Square, London, W1A 2BN acting by **ABACUS PARK PROPERTY GENERAL PARTNER LIMITED** (a company incorporated in England with company registration number 5503471) whose registered office is at 22 Hanover Square, London, W1A 2BN, **HYPO REAL ESTATE BANK INTERNATIONAL** as agent and security trustee for the Finance Parties (as defined in a facility agreement dated 19th December 2005) of 21st floor, 30 St Mary Axe, London, EC3A 8BF and **GRAFTONGATE INVESTMENTS LIMITED** of 35 Livery Street, Birmingham, B3 2PB.*

Following the recommendations of English Heritage Archaeology Advisory Service two evaluation trenches, each with an augerhole drilled down from its base to examine the deep alluvial deposits, were excavated on the site and the results supplemented by a geoarchaeological deposit model.

Window samples were recovered from the geoarchaeological augerholes, which were logged on-site. The deposit sequence at each trench location comprised gravel overlain by sandy clay, sealed by a thick deposit of peat and capped by silty clay. The peat was radiocarbon dated to 4700–4440 BC (Late Mesolithic) at the base and 800–520 BC (Neolithic to Bronze Age) at the top.

The upper part of the peat and overlying silty clay and made ground was examined in the two evaluation trenches. No archaeological features or structural remains were present, nor were any stray finds recovered. The results of geoarchaeological modelling has enabled a better understanding of the past environment of the site and its relationship to the surrounding landscape to be obtained, which has helped to refine the initial assessment of its archaeological potential.

The auger results and the logs of previous geotechnical boreholes drilled on the site were fed into a database of information relating to the natural stratigraphy of the Dagenham area. A reconstruction of the buried landscape was produced, which showed that the site lay on an island of higher ground, encircled by stream channels and wetland areas in the Mesolithic. By the later Mesolithic peat was developing across the entire site, which had become part of the expanding prehistoric floodplain forest. The characteristics of this forest may have differed across the floodplain, reflecting the underlying topography and proximity to river channels.

The Mesolithic deposits lie at considerable depth below the modern ground surface and will only be impacted upon by the foundation piles of the proposed development. The past landscape reconstruction model has contributed to a better understanding of the buried landscape in the Dagenham area. It could be considered that the reconstruction that the model provides is sufficient mitigation for the small impact of the proposed piling associated with the redevelopment of the site. In the light of

revised understanding of the archaeological potential of the site the report concludes the impact of the proposed redevelopment is likely to be minimal.

The decision on the appropriate archaeological response to the deposits revealed rests with the Local Planning Authority and their designated archaeological advisor.

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1 Introduction

1.1 Site background

The archaeological evaluation took place at Abacus Park, Dagenham Docks, RM9, hereafter called 'the site'. It is located to the south of Choats Road and is bounded to the east by Hindemans Way and to the west by a recently constructed access road. To the south is land associated with an oil storage depot (see Fig 1). The OS National Grid Ref. for the centre of site is 548450 182521. Modern ground level immediately adjacent to the site is c 1.50m OD. The site code is ACU06.

Two previous *Archaeological assessments* (CGMS 2002a, 2002b) recommended the need for archaeological field evaluation. Based on the results of the Site Investigation (SI) (Crossfield Consulting, 2005) the *method statement* (MoLAS, 2006) proposed two trenches in areas with no water strikes from the SI borehole results, free from underground and overhead cables. It also proposed that the deepest deposits should be evaluated by two augerholes, drilled down from the base of the trenches and the results fed into a geoarchaeological deposit model, which would place the site in its past landscape context.

An archaeological field evaluation was subsequently carried out on two trenches in March 2006 (See Fig1).

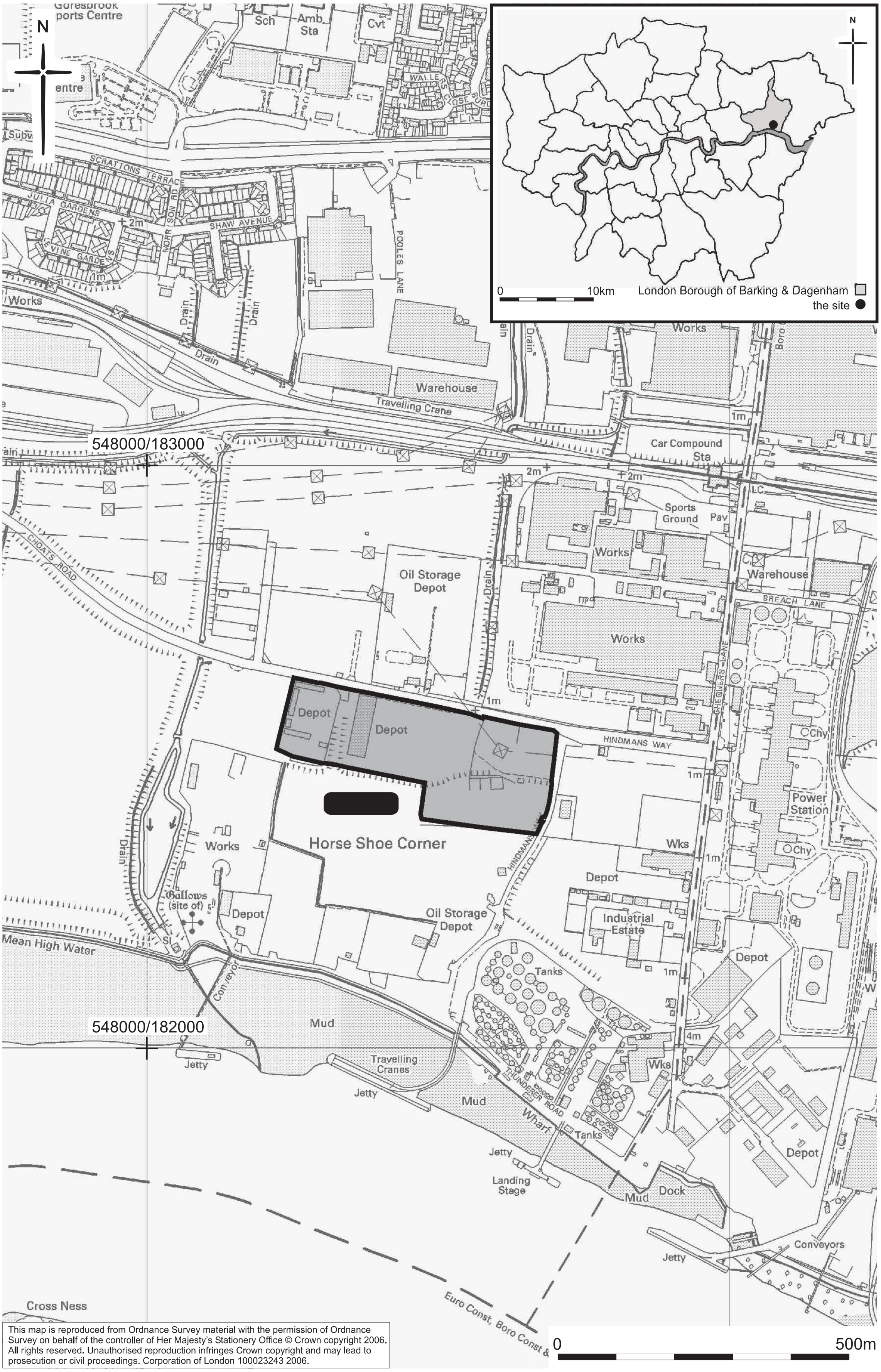

Fig 1 Site location

1.2 Planning and legislative framework

The legislative and planning framework in which the archaeological exercise took place was summarised in the *Method Statement* (MoLAS, 2006) which formed the project design for the evaluation (see Section 1.2).

1.3 Planning background

The evaluation was carried out as a condition of planning permission (Application No: 05/01280/REM Condition No 10)

1.4 Origin and scope of the report

This report was commissioned by Michael Sparks Associates and produced by the Museum of London Archaeology Service (MoLAS). The report has been prepared within the terms of the relevant Standard specified by the Institute of Field Archaeologists (IFA, 2001).

Field evaluation, and the *Evaluation report* which comments on the results of that exercise, are defined in the most recent English Heritage guidelines (English Heritage, 1998) as intended to provide information about the archaeological resource in order to contribute to the:

- formulation of a strategy for the preservation or management of those remains; and/or
- formulation of an appropriate response or mitigation strategy to planning applications or other proposals which may adversely affect such archaeological remains, or enhance them; and/or
- formulation of a proposal for further archaeological investigations within a programme of research

1.5 Aims and objectives

All research is undertaken within the priorities established in the Museum of London's *A research framework for London Archaeology*, 2002

The following research aims and objectives were established in the *Method Statement* for the evaluation (Section 2.2):

- What are the dates and nature of the old sea wall?

- Is there any evidence of post medieval or earlier buildings or roads noted on 19th century cartographic evidence?

- Is there any evidence for historic activity at the northern edge of Horseshoe corner?

- What is the nature and date of any later prehistoric activity?
- What are the dates and nature of any peat deposits encountered?

- What is the nature of any early prehistoric evidence encountered?
- What was the landscape context of the site in the prehistoric and historic period?

2 Topographical and historical background

2.1 Timescales

Human activity in Britain has taken place during the period of geological time known as the Quaternary, which spans the last 2 million years and is characterised by the climatic oscillations known as 'the Ice Ages'. The Quaternary is subdivided into the:

Pleistocene:	2 million -10,000 BP (years before the present)
Holocene:	10,000 BP - present

Although ancestral humans (hominids) are known to have existed in other parts of the world from the beginning of the Quaternary, if not earlier, the earliest evidence for human activity yet found in Britain has been dated to about 650,000 years ago.

The archaeological timescale, charting the development of human activity in Britain through time, is as follows:

2.1.1 Prehistoric

Palaeolithic (ancestral humans: hominids):	650,000 - 10,000 BP
Mesolithic (hunter gatherer foragers):	10,000BP - 4,000 BC
Neolithic (the earliest farmers):	4,000-2,000 BC
Bronze Age (first use of metal, more complex societies):	2,000-600 BC
Iron Age (agricultural intensification; political elites):	600 BC-AD 43

2.1.2 Historic

Roman:	AD 43-410
Saxon / early-medieval:	AD 410-1066
Medieval:	AD 1066-1485
Post-medieval:	AD 1485-present

2.2 Topography and geology

The BGS Solid and Drift Sheet 257 (Romford) shows that the site spans the alluvial deposits accumulated within the floodplain of the Thames and the adjacent river terrace. However, owing to the build-up of thick alluvium on the floodplain, together with recent ground consolidation fills, the distinction between the floodplain and the valley side on the site is difficult to distinguish. The ground surface across most of the site lies between 1-1.5m OD.

The River Beam drains off the river terraces to the north and flow through man-made channels across the site, towards the Thames. The River Beam is likely to have existed as a river throughout the Holocene and, given the relatively high level of prehistoric activity on the river terrace from which these rivers flow it is likely that the rivers were used for transport and access in the past.

Prior to its recent industrial use the site was part of the Dagenham Marshes, an area of reed beds and wet grassland, crossed by drainage channels. Historical documents, maps and plans suggest that the marshes were partly used until the 19th century as pasture. In the past this low-lying area would have been prone to both short term flooding and to lengthy periods of inundation and, as a result, below the modern ground surface thick alluvial deposits (mainly clays and peats) exist.

2.3 Pre-Quaternary geology

The outcrop pattern of the rocks in the Greater London area is closely related to the geological structure, which is dominated by the London Basin, a gentle synclinal fold, with its axis aligned west to east. The older rocks outcrop on the edge of the syncline: the Cretaceous Chalk of the Chilterns (in the north) and North Downs (forming the southern rim of the London Basin in the south). Younger geological strata: Tertiary sands and clays, infill the centre of the syncline, which is followed for the most part by the Thames. As it flows through the Dagenham area the river has scoured the Tertiary deposits, leading to London Clay outcropping in the north part of the site itself with slightly older Tertiary deposits (Woolwich and Reading Beds) outcropping to the south.

The bedrock pre-dates human evolution and has no archaeological potential in itself, although its characteristics often determined the nature of succeeding environments and the landscapes occupied and exploited by communities in the past. On the floodplain of the Thames, however, the impact of the bedrock is negligible, as it is overlain, and its characteristics and contours masked, by a considerable thickness of Quaternary deposits.

2.4 Quaternary deposits

2.4.1 Pleistocene River terraces (gravel deposits)

The present course of the Thames was established about 0.5 million years ago, when ice sheets diverted it from its former course through the Vale of St Albans to its present more southerly route. Since that time successive cold and warm climatic oscillations have caused alternating downcutting and aggradational cycles to take place which, together with a background gradual tectonic uplift, has led to a sequence of progressively younger Quaternary deposits down the valley sides. These (mainly gravel) deposits form a series of terraces, which represent former floodplains of the river that subsequently became incised and left high and dry as the river down-cut to lower levels.

The present floodplain represents the most recent stage in this sequence. It was created as the river down-cut from a former, higher, floodplain (represented by the 'East Tilbury Marshes Gravel'), as a result of the very low sea-level and large flux of meltwater at the end of the last glacial stage (about ten to fifteen thousand years ago). It subsequently deposited coarse gravel sediments across the valley floor and these deposits (the Shepperton Gravel) underlie the alluvium in the present floodplain. The gravel was probably deposited in a network of braided, ephemeral channels at a time when the river had similar characteristics to those flowing in arctic areas today. Within the river, sand and gravel bars accumulated, forming an irregular, hummocky topography.

2.4.2 Deposits of the Late Upper Palaeolithic and Early Mesolithic

The topography created during the Late Pleistocene influenced the characteristics of the landscape well into the prehistoric period and later.

Previous work in this area shows that the floodplain gravel surface dips towards the river from about -2m OD at the floodplain-edge to about -8m OD close to the river itself. Within this overall trend undulations occur, which probably represent the surface morphology of gravel bars accumulating in the late Pleistocene braided river channel. Inputs of soliflucted material from the valley side would also have created lobes of higher gravelly sediment and outcrops of eroded river terraces may have existed within the floodplain, as well as at the valley side. The mosaic of gravel 'highs' and 'lows' created a landscape with a varied range of archaeological and archaeo-environmental potential.

Areas of higher gravel, sometimes overlain by sand, are likely to have remained as dry land during the prehistoric period (and occasionally even into the historic period) when the surrounding land was becoming waterlogged and buried beneath peat and minerogenic alluvium. In contrast areas of low gravel were probably the main threads of water flow of the late Pleistocene braided channels, which frequently became abandoned as the pattern of water flow changed in the late Pleistocene and early Holocene. Abandoned channels (which might be recognised by areas of low gravel) have potential to preserve fine-grained and organic sediments typically dating from the Late Glacial and early Holocene.

2.4.3 Holocene alluvium (Mesolithic to post-medieval)

Bates and Whittaker (2004) have recently proposed a general model for the landscape evolution for the Lower Thames floodplain area to the west of the site. The model suggests that, following the deposition of the floodplain (Shepperton) Gravel, and before the impact of rising relative sea level was felt in this part of the Lower Thames Valley, a period of landscape stability existed in the early Mesolithic, when soils developed in the Shepperton Gravels and other pre-Holocene deposits. However, as estuarine conditions migrated upstream the silts and clays of salt marsh environments began to accumulate in the later part of the Mesolithic. Widespread 'blanket' peat subsequently developed during the Neolithic and earlier Bronze Age, with a switch to brackish conditions in the Iron Age and the deposition of minerogenic deposits continuing into the historic period.

2.5 Prehistoric

One of the most significant local finds was a Neolithic carved figurine known as the Dagenham Idol. Dated to 2350 – 2140 BC, and carved of Scots Pine it was found near Ripple Road in 1922, about 900m due north of the site, and is now on display at the Castle Museum, Colchester.

In 1993, at the Hays Storage facility, the Passmore Edwards Museum excavated a substantial causeway of dumped pebbles, sandy silts and burnt flint, orientated NNE-SSW (Divers in prep). It was contained within a peat sequence; and was dated by radiocarbon means to between 1860-1840/1770-1520BC and 1380-1340/1330-990BC at a 98% confidence level. So much burnt flint was present that it is thought to derive from a nearby settlement, as there was no evidence for burning *in situ*. The causeway was approximately 4m wide and the upper surface was at -1.70m OD. It was traced for 23m by augering. Though of different construction, the causeway is one of a number of trackway structures (mostly of timber) known from the East London Thames Floodplain.

Evidence for actual occupation is limited to a complete Beaker from Gerpins Farm, Rainham, and several barrows at Moor Hall Farm, Rainham. The latter being funerary monuments that stood on the terrace overlooking the floodplain.

The Bronze Age trackways are generally found in the upper levels of an extensive peat deposit that extends across the entire floodplain in the East London area and is often referred to as the 'Tilbury III/IV' peat. To some extent this peat relates to episodes of relative sea level fall and contraction of the estuary, which took place during the later Neolithic and Early Bronze Age. The peat is overlain by clayey alluvial deposits that represent increased sediment deposition, which may result from both estuarine flooding and increased run-off, triggered by more intensive human activity on the river terraces.

Examination of these peat and clayey sediments in the vicinity of the site has been carried out by the Passmore Edwards Museum at Hays Storage (Divers in prep), and by MoLAS at Dagenham Docks (Sankey and Spurr 2004) and the Dagenham Ford Works (Corcoran 2004). Estuarine channels and freshwater marsh were both used as significant locations to ritually deposit high-status goods in the Late Bronze and Iron Ages.

2.6 Roman and Medieval

Despite periodic transgressions, transgressive pulses and significant floods, the Thames floodplain increasingly dried out through the beginning of recorded history. Roman and medieval finds are rare, and for most of these times the floodplain would have been used as water meadow for stock rearing. Agriculture was practised intensively on the gravel terraces, for instance in nearby Rainham (LSE96). Barking was the foundation in *c* AD 666 of what would become the largest Benedictine nunnery in the land, Barking Abbey. By the high medieval period Barking Abbey was responsible for the upkeep of the Barking and Dagenham levels. There were several phases of land reclamation from the 13th century, with sea walls and drainage ditches laid out to bring the area into agricultural use mainly as seasonal grazing. Considerable wealth accrued to the monasteries by supplying the urban centres with animal products.

2.7 Post-medieval

Following the Dissolution of Barking Abbey, the Commisioners of Sewers, founded in 1531, had the power to enforce landowners to maintain their section of river defences and levy rates. A horseshoe-shaped area to the south of the site had been abandoned to the tides and was used for reed-growing by 1563. The local defences also failed in 1707 resulting in the Dagenham Breach, which was not closed until 1720 (Sankey and Spurr 2004, 11).

Historic maps show the site spans the northern extremity of the reed ground (Horse Shoe Corner) and the reclaimed land of the Ripley or Ripple Levels. An old sea wall, probably an earthen bank dating from the post-medieval period onwards, is likely to exist located along the southern site boundary. An 18th century plan of the Breach shows a road (now Choats Manor Way) terminating at a building, labelled 'booth & stables' and a bank to the east separating Ripley Levels from Dagenham Levels.

The site remained largely undeveloped pasture until the mid-20th century when railway sidings were constructed across the site and fuel storage tanks were inserted in the southern site area. Additional tanks and structures were added to the site until demolition of the railway sidings and construction of a warehouse during the late 20th century. All of these structures have been removed from the site.

3 The evaluation

3.1 Methodology

All archaeological excavation and monitoring during the evaluation was carried out in accordance with the preceding *Method Statement* (MoLAS, 2006), and the MoLAS *Archaeological Site Manual* (MoLAS, 1994).

Two evaluation trenches were excavated, the ground slab being broken out and cleared by contractors under MoLAS supervision. At the ground surface the trenches measured 11m by 11m. Because of the depth of the trenches and the influx of water causing the instability of the sections, the trenches were excavated by tracked machine, to a depth of *c.*1m and then stepped in/sides battered back. This process was repeated to the final depth of each trench (at *c.* 5m depth). The trenches were monitored at all times by a member of staff from MoLAS. Augerholes were drilled through deposits at the base of each trench at a depth of approximately 1.2m deep; the in-pouring of water proving augering at a lower depth to be unsafe. (see Section 4 for the methodology and results of the auger survey).

The locations of evaluation trenches were recorded by MoLAS, this information was then plotted onto the OS grid.

A written and drawn record of all archaeological deposits encountered was made in accordance with the principles set out in the MoLAS site-recording manual (MoLAS, 1994). Levels were calculated using data supplied by the site engineers (**Greenhatch Ltd, Dwg No: 9526 Amended, Rev: Levs**).

The site has produced: 2 trench location plan; 4 context records; 2 borehole logs. No finds were recovered from the site.

The site finds and records can be found under the site code ACU06 in the MoL archive.

3.2 Results of the archaeological evaluation

For trench locations see Fig 2. For results of auger survey see Section 4.

Evaluation Trench 1	
Dimensions	11m by 11m at ground level to 3m by 3m at base.
Modern ground level	1.40m OD
Base of modern deposits	– 1.20m OD
Depth of archaeological deposits seen	2.0m
Level of base of deposits observed	– 3.70m OD

Modern deposits consisted of 0.90m modern hardcore, above 1.30m of black gravel and clinker acting as a capping layer. The archaeological deposits comprised a waterlain clay [1], the top of which was at –1.20m OD and it was *c* 1.0m thick. Below this was a peat deposit [2], the top of which was at –2.20 m OD. Excavation of spits through the peat continued for a further 1.50m. The auger hole AH1 showed the peat to be *c* 3.0m thick (see section 4). Radiocarbon (^{14}C) samples from the auger core in this trench revealed that the peat accumulated between the Late Mesolithic and Bronze Age. A sample from the base of the peat gave a radiocarbon date of *4700-4440 Cal BC* at a depth of –4.25m OD (Late Mesolithic) and a sample from the top of the peat was dated to *800-520 Cal,* at a height of –1.30m OD (Neolithic to Bronze Age). No artefacts were recovered from the clay or the peat.

Evaluation Trench 2	
Dimensions	11m by11m at ground level to 3m by 3m at base.
Modern ground level	1.60m OD
Base of modern fill	– 0.80 OD
Depth of archaeological deposits seen	2.0 m
Level of base of deposits observed	– 3.30m OD

Modern deposits consisted of 1.0m modern hardcore, above 1.40m of black gravel and clinker acting as a capping layer. The archaeological deposits comprised a waterlain clay [3], the top of which was at –0.80m OD and it was *c* 1.0m thick. Below this was a peat deposit [4], the top of which was at –1.80m OD. Excavation of spits through the peat continued for a further 1.50m. The subsequent auger hole AH2 showed the peat to be *c* 3.0m thick (see Section 4). No artefacts were recovered from either deposit.

3.3 Discussion of the results

The trenches exposed peat deposits, which were covered by approximately 1.0m of alluvial clay. Despite the potential of waterlogged alluvium to preserve abandoned trackways wooden boats and fish traps, no evidence of these were found. No archaeological features were observed in either of the trenches.

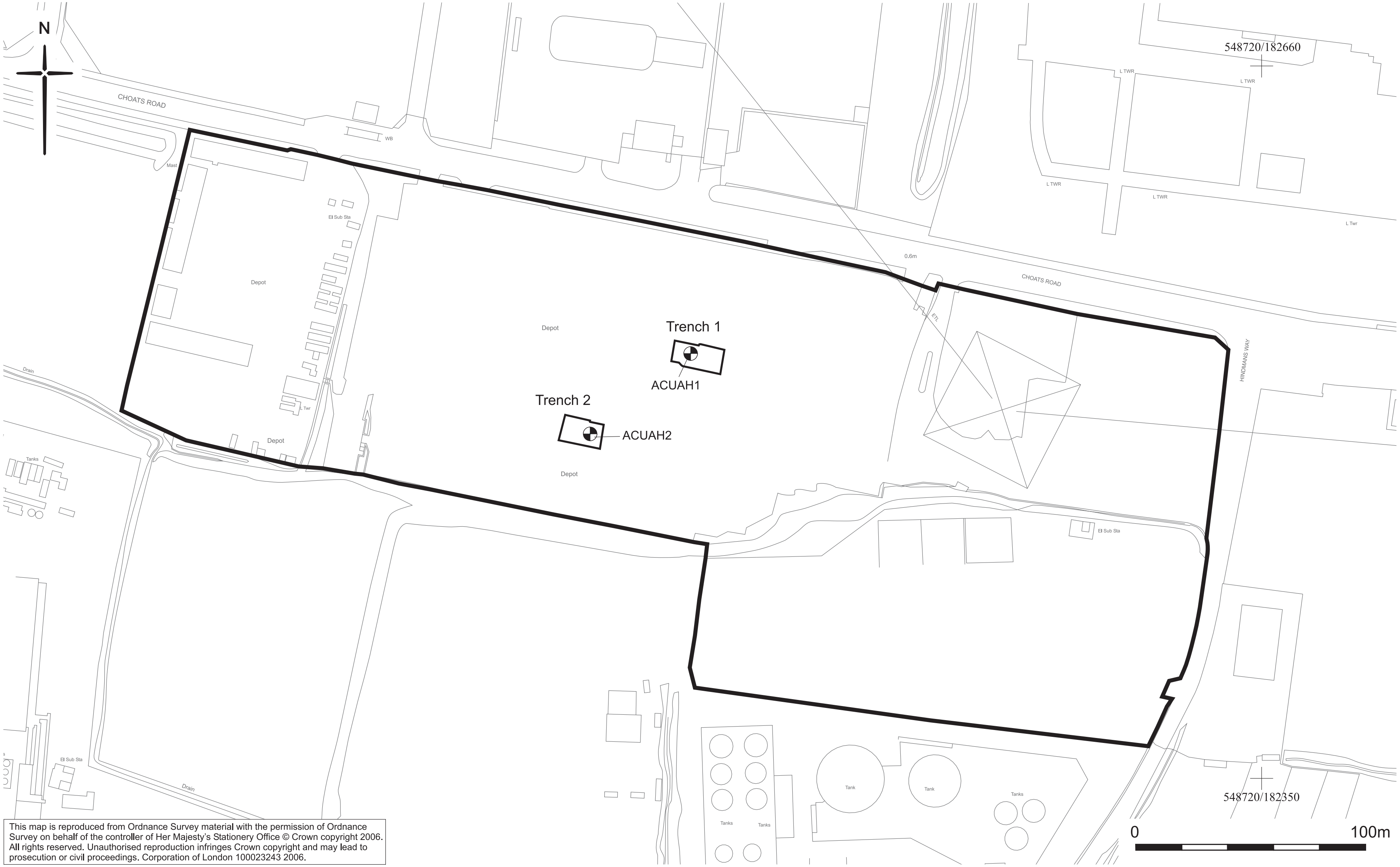

Fig 2 Areas of investigation

4 The geoarchaeological assessment

4.1 Methodology

All geoarchaeological on-site drilling and off-site core preparation work, during the evaluation was carried out in accordance with the *Specific Methodology for Geoarchaeological Evaluation* (MoLAS 2000) and where appropriate the MoLAS *Archaeological Site Manual* (MoLAS 1994).

4.1.1 On-Site

Two auger holes (ACUAH1 and ACUAH2), one in each of the two trenches, were drilled using a Cobra power auger by MoLAS geoarchaeologists. Augering ceased at the level of Pleistocene gravels.

Window samples were obtained and the sediments recorded in the field. Sediments were described using standard sedimentary criteria (relating to colour, compaction, texture, structure, bedding, inclusions, and clast-size) and the nature of the contacts between adjacent distinct units was noted. In addition, samples for radiocarbon dating were taken for off-site analysis.

The augerhole locations and associated ground level (from which the augerhole was drilled) were recorded by MoLAS surveyors and transformed onto the Ordnance Survey National Grid Projection and Ordnance Datum respectively.

4.1.2 Off-Site

The following procedures were carried out on each core sample as appropriate (see *Specific Methodology for Geoarchaeological Evaluation,* MoLAS 2000).

Sediments
As the bulk of the description of the samples was undertaken in the field only a small amount of further annotation and sub-sampling took place off-site.

Radiocarbon dating
Samples were taken from the top and base of the organic/peat deposits for standard radiometric (^{14}C) dating. Two samples, from the augerhole in Trench 1 were selected and submitted to Beta Analytic, Florida.

Deposit model
The logs of the two augerholes were examined and the depths and characteristics of the deposits input into a digital database (using TerraStation software). Geotechnical borehole data from the site itself (Crossfield Consulting 2005) and augerhole data from surrounding sites such as Dagenham Dock (Sankey 2002) and North London Riverside (Corcoran 2004) were also added to the database, together with information from cross-sections provided by Barking and Dagenham Council.

All boreholes that penetrated into pre-Holocene gravel deposits were selected for topographic modelling of the Pleistocene gravel surface, which is considered to approximate to the landsurface that existed at the start of the Holocene, in the Early Mesolithic. The data was modelled using Surfer 32 software to create a map of the subsurface contours, which is illustrated in (Fig 6).

The topography of the Pleistocene gravel surface is likely to have influenced the changing environments of the site and surrounding area for much of the prehistoric and even historic period. Areas of low topography may have been lakes, wetland areas or exploited by rivers, whilst areas of high gravel may have remained as dry islands rising above the expanding wetland.

In order to reconstruct subsequent episodes of environment change, the characteristics of the local deposit sequence were examined in a series of transects (cross-sections: vertical slices through the sub-surface stratigraphy) drawn across the site and its surrounding area from west to east and north to south (see Fig 3). For each transect similar deposits or groups of deposits in adjacent boreholes were linked to produce area-wide deposits ('facies'), existing across the Dagenham area as a whole. Each facies represents similar environments and processes belonging to a distinct depositional episode or regime. The characteristics, distribution and inferred environments of the various facies are discussed in section 4.4 in roughly stratigraphic/chronological order in with the oldest first. Two transects have been selected for inclusion in this report (Fig 4 & Fig 5).

The radiocarbon dates obtained from the site and surrounding sites provide a chronological framework for the deposit model and have enabled the model to be related to dated deposits and features excavated on local sites.

4.2 Results

For the augerhole locations see Fig 2. For the locations of the transects see Fig 3. For the locations of the sub-samples and the lithostratigraphy of the auger holes see Fig 4 & Fig 5.

4.2.1 The Sediments (Lithostratigraphy)

Auger hole 1 (ACUAH1) in Trench 1 was drilled to a depth of 5m, from a level of -0.2m OD. The results of the litho-stratigraphic analysis are tabulated as follows (from the basal sediments upward):

Depth below surface	Elevation and thickness of unit	ACUAH1 sedimentary description (Level on trench step -0.2m OD)
0-0.25m	*-0.2m OD to-0.45 m OD*	MADE GROUND: loose grey, gritty clinker; contact with below clear and horizontal.
0.25 to 0.30m	*-0.45m OD to -0.5mOD*	Mid brownish grey silty clay with moderate to frequent plant fragments (buried soil horizon/turf line). Contact with below clear and horizontal.
0.30 to 1m	*-0.50m OD to -1.2m OD*	Firm mottled black/ dark greenish grey SILTY CLAY containing calcareous nodules between 0.47 to 0.8m depth, becomes light orangey brown at contact with below. Contact with below graded.
1m to 1.1m	*-1.2m OD to -1.3m OD*	Mid brownish grey slightly ORGANIC SILTY CLAY. Contact with below clear and horizontal.
1.1 to 3.9m	*-1.3m OD to -4.1m OD*	Mid reddish brown (rapidly oxidising to black) dense, fibrous and woody PEAT; occasional reeds seen. Contact with unit below clear and horizontal.
3.9 to 4.25m	*-4.1m OD to -4.45m OD*	Dark grey organic CLAY with occasional reed/plant stems present. Contact with below graded.
4.25 to 4.65m	*-4.45m OD to -4.85m OD*	Mid to light bluish light grey CLAY. Contact with below clear and horizontal.
4.65m to depth unknown.	*-4.85m OD to unknown depth*	Greyish green-grey GRAVEL and sand, with angular to subangular clasts.

Table 1: The sedimentary sequence of ACUAH1 at ACU06.

Auger hole 2 (ACUAH2) in Trench 2 was drilled to a depth of 5.7m, from a level of -0.4m OD. The results of the litho-stratigraphic analysis are tabulated as follows (from the basal sediments upward):

Depth below surface	Elevation and thickness of unit	ACUAH2 sedimentary description (AH level on trench step -0.4m OD)
0-0.8m	*-0.4m OD to-1.2 m OD*	MADE GROUND: loose grey, gritty clinker; contact with below clear and horizontal.
0.8 to 1m	*-1.2m OD to -1.4m OD*	Mid brownish grey silty clay with moderate to frequent plant fragments (buried soil horizon/turf line). Contact with below clear and horizontal.
1 to 1.5m	*-1.4m OD to -1.9m OD*	Firm mottled black/ dark greenish grey SILTY CLAY becomes light orangey brown at contact with below. Contact with below graded.
1.5 to 1.7m	*-1.9m OD to -2.1m OD*	Mid brownish grey slightly ORGANIC SILTY CLAY. Contact with below clear and horizontal.
1.7 to 3.6m	*-2.1m OD to -4m OD*	Mid reddish brown (rapidly oxidising to black) dense, fibrous and woody PEAT; occasional reeds seen. Contact with unit below clear and horizontal.
3.6 to 3.9m	*-4m OD to -4.3m OD*	Dark grey organic slightly sandy CLAY SILT with occasional reed/plant stems present. Contact with below graded.
3.9 to 5.25m	*-4.3m OD to -5.65m OD*	Mid to light bluish light grey increasingly SANDY SILT. Contact with below clear and horizontal.
5.25m to depth unknown.	*-5.65m OD to unknown depth*	Greyish green-grey GRAVEL and sand, with angular to subangular clasts.

Table 2: The sedimentary sequence of ACUAH2 at ACU06.

4.2.2 The Dating (Chrono-Stratigraphy)

Two sub-samples were submitted for radiocarbon (^{14}C) age estimation to Beta Analytic, Florida. The samples were taken at the top and bottom of the peat in ACUAH1 to provide a chronological framework for the site and any further analysis. The table below lists the dates obtained.

Height (OD)	MoLAS ref.	Lab no.	Uncalibrated date	Calibrated date (2 sigma)
-1.3m OD	ACUT1/1.10BS	Beta 216015	2560+/-40BP	800-520 Cal BC
-4.25m OD	ACUT1/4.05BS	Beta 216016	5710+/- 60 BP	4700-4440 Cal BC

Table 3 : ^{14}C assays from the organic sediments in ACUAH1 at ACU06.

4.3 The geoarchaeological deposit model

The deposits that are of geoarchaeological interest on the site and in the region of the site are discussed in this section in stratigraphic order, from the oldest to the most recent. The stratigraphic sequence is illustrated in the cross-sections drawn across the site, one from north to south and a second from west to east (see Fig 3, Fig 4 & Fig 5).

4.3.1 The sandy gravels (facies 1)

The sandy gravels at the base of the sequence were probably deposited by meltwater carrying large quantities of coarse sediment in the Late Pleistocene (at the end of the Ice Age). These gravels belong to the 'Shepperton Gravels', which underlie the present floodplain. The gravels are thought to have been deposited around 15,000-10,000 years ago, following the downcutting by the river to its present floodplain, at the end of the last cold stage (the 'Devensian'), which left the East Tilbury Marshes Gravel as a river terrace, above the modern floodplain.

The gravel surface formed the topography of the ground surface at the start of the Holocene about 10,000 years ago (Fig 6). Previous work in the area has demonstrated that the floodplain gravel surface dips towards the river from about -2m OD at the floodplain-edge to about -8m OD close to the river itself (Bates, 2000). This can be clearly seen in both the N-S and W-E transects (Fig 4 & Fig 5). Within this overall trend undulations occur, which probably represent the surface morphology of gravel bars accumulating in the late Pleistocene braided river channel. The area of the site is located on a relatively high area of gravel between -5 and -5.5m OD.

Both to the north and south the gravel surface dips away from the site (see Fig 6). Towards the south there is a sharp step into the main channel of the Thames (Fig 4) and to the north and east into a shallower tributary channel, subsequently abandoned and peat-filled (Fig 5). Such abandoned channels have potential to preserve fine-grained and organic sediments typically dating from the Late Glacial and early Holocene. Within such sediments biological remains may exist, which have potential for reconstructing the environment of the Late Upper Palaeolithic and Mesolithic periods.

4.3.2 The sandy clay deposits (facies 2)

River flow became gentler after the last Ice Age and river levels lower. As a result, sands, which frequently 'fine-up' and pass laterally into clayey sand and sandy clay, were deposited. This is likely to be the origin of the clay or sandy clay silt deposits (facies 2) that occur above the Pleistocene floodplain gravels across much of the site and surrounding area. The deposition of these sediments probably occurred as a result of changes in the river regime, as climate warmed up and river flow slackened at the end of the Pleistocene. The characteristics of these clays differ laterally, as the facies represents a range of different depositional environments such as overbank flooding, lakes and channel margins.

Facies 2 is probably early Mesolithic in date and Mesolithic flints have been found within and at the surface of bedded sands in the Erith Marsh area (Sidell *et al* 1997) and in Thamesmead. Rich Mesolithic assemblages have come from similar deposits in tributary valleys of the Thames, particularly the Colne. This suggests that Mesolithic remains might be expected within or at the surface of the sand and its associated more clayey deposits, which probably continued to accumulate in the early Holocene in the vicinity of the site.

On the site itself, in ACUAH2, approximately 1.5m of sandy silts suggest an active fluvial environment, possibly an area closer to a former palaeochannel. In ACUAH1, by contrast, silty clays were seen to be well-bedded with calcareous nodules. These would have formed at or near the channel edge in a relatively quiet depositional environment (see Fig 5).

4.3.3 The lower peat deposits (facies 3)

A lower peat deposit (facies 3) appears to exist within the sandy clays of facies 2, and in particular it occurs within the deep 'main channel' area to the south of the site (Fig 4). The date of these peats has not yet been tested, but would probably date to the early/mid Mesolithic period.

The lower peats are recorded between –5m OD and –7.5m OD and are of great interest archaeologically and in palaeoenvironmental terms. Bates predicted deep peats to exist as low as -8m OD in his model for Beckton Reach (Bates, 2000). Within the main channel the lower peat forms a clear bed within the lower sandy clay and this is also the case in borehole DWG85/46 (Fig 4). Although this clear peat bed is not present on the site itself, the lower part of the deep peat in the western part of the site, which appears to infill a palaeochannel (see Fig 5), may be of similar date.

On a broad environmental level, the profile of peat layers reflects a pattern of sea level changes (eustatic change) that influenced the whole of southern Britain. In the lower Thames estuary, the sequences of eustatic change have been investigated most notably by Devoy (1979). Devoy's model produced a series of clay and peat sequences that represented periods of sea level rise (marine transgressions) and fall (marine regression) respectively, known as the Tilbury/Thames sequence. If the peat unit is Mesolithic it probably allies with the Tilbury II marine regression phase for this reach of the Thames as detailed by Devoy (1979). The accumulation of the peats occurs as eustatic (relative sea level) change creates deeper incision by the river and consequent drying of the floodplain. Colonisation by vegetation of the floodplain ensued and peat developed over time. Peat development is seen as a period of landscape stability in the model put forward by Bates and Whittaker (2004) for Beckton Reach.

Soils may also have developed above the gravel and sand adjacent to the river channels even in relatively low-lying parts of the floodplain during the Mesolithic, as water flow slackened, river levels fell and as a result of channel migration/avulsion. A peaty soil at –7.5m OD, dated to about 5,500BC, was recorded in a similar landscape position to the present site, but on the opposite side of the Thames, at Corinthian Quay in Erith (Morley 2003). Pollen evidence from such early Holocene peaty soils indicates that the floodplain in the early to mid Holocene between the river channels may have been forested with of lime-dominated woodland (Scaife 2000).

The lower peat deposit is found across the area marked as 'Landscape zone 1' in Fig 7. The extent of this landscape zone and the peat also demarcates the route of channels from the north of the area probably associated with the River Bream cutting through the East Tilbury gravels, across the floodplain and into the Thames.

4.3.4 The upper peat deposits (facies 4)

A thick peat deposit (facies 4) is recorded across most of the floodplain area including the site itself, at an average of 2 to 3m thick. At Abacus Park both augerholes revealed the peat to be woody in the lower part and this probably represents part of the floodplain forest recorded across much of the local area. The upper part of the peat although dense, exhibited reed and stems and is likely to represent generally wetter conditions typical of an Alder Carr environment / fenland.

The dates of the peat from the site (see section 4.2.2) corresponds with the 'blanket' peat unit that lies within the alluvium in other parts of the Dagenham to Wennington area, for example at Dagenham Docks (DAD04), which correlates with the Tilbury III/IV regression phase. The peat lay at –4.25m OD to –1.3m OD on the site and was dated from the late Mesolithic (4700-4440BC) to the Late Bronze Age / Early Iron Age (800-520BC). Similarly at Dagenham Docks the peat lay at about –3m to -0.8mOD and was dated from the Early Neolithic (*c* 3960-4060BC) to the late Bronze Age / early Iron Age (400-780BC). Significantly, close to its most northerly extent at the Hays Storage facility on the higher ground, a substantial Bronze Age causeway of dumped pebbles, sandy silts and burnt flint, orientated NNE-SSW was excavated by the Passmore Edwards Museum in the upper part of the peat. The causeway lay at -1.7mOD and radiocarbon dates obtained from the peat immediately over and underlying it dated to between 1860-1520BC and 1380-990BC.

Pollen evidence from Dagenham Docks (DAD04) clearly tracks the environmental change through the peat accumulation. The site appears to change from an active fluvial environment to a dry fen carr with deciduous forest predominating. Notable species such as Lime (Tilia) are represented in abundance and are seen to decline – widely considered to be due to anthropogenic disturbance. Indeed the decline of the woodland overall at this site is coupled with the emergence of cereals and herbs. The level where the decline was observed (-1.67m OD) is congruent with a Bronze Age date as it is close to the midpoint between the two radiocarbon dates.

4.3.5 The upper silty clay deposits (facies 5)

A variable upper silty clay / clay silt unit exists in the upper part of the alluvium in all borehole logs (facies 5). Generally around 1-1.5m thick across the area as a whole (and 1m on the site itself) it is likely to represent seasonal overbank flooding and wet meadowland from the late Bronze Age onward. Environmentally, these clay deposits could be part of the Thames II or Thames III marine transgression phase. Archaeologically, if these deposits relate to the Thames III phase they could have been the result of sediment in-washing into the river catchment as deforestation through the development of agriculture at this time created greater erosion of soils although a rise in sea level is generally thought to be the main driving force behind this change throughout the Thames basin. Further up profile, some of the clays are described as mottled black and reddish-brown suggesting a seasonally inundated meadowland soil, which would probably become the pastures or water meadows of the later historic period. Notably the turf line of the natural (pre-industrial) land surface was seen in both augerholes at c.-0.5mOD.

4.3.6 Modern deposits (facies 6)

The thickness of modern made ground (facies 6) varies across the area although generally about 2m to 3m thick across the site itself, where it consisted almost entirely of modern deposits with a predominance of clinker.

4.4 Archaeological potential of the buried landscape in the Dagenham floodplain

The geoarchaeological modelling shows that the relatively flat and homogenous Dagenham floodplain comprises several areas of different buried landscape characteristics. Three distinct areas can immediately be identified on the basis of the Early Holocene topography and the overlying deposits and each will have a different pattern of landscape evolution, natural stratigraphy, and archaeological/palaeo-environmental potential, as discussed below.

Landscape zone 1
Areas where the Early Holocene topography (i.e.: gravel surface) lies below -5mOD (shaded brown on Fig 7).

Landscape zone 1 comprises areas of low gravel that were probably the main threads of water flow of the late Pleistocene braided channels, which frequently became abandoned as the pattern of water flow changed in the late Pleistocene and early Holocene. Although this very low-lying environment was probably attractive for exploitation by hunter-gatherer groups, Mesolithic remains are not frequently recovered from this stretch of the Thames floodplain, although they are frequently encountered in similar landscape positions, deposits and stratigraphic locations in the tributary valleys of the Middle and Lower Thames, such as the Colne, Lea, Darent and Cray. The lack of finds may be a result of their great depth, buried below thick deposits of Holocene alluvium and it has been suggested that well-stratified Mesolithic levels, subsequently sealed by alluvium, could lie at around –8m OD in the Barking Reach area (Bates and Barham 1995).

Sands, clays and peats exist within abandoned channels in these areas, which represent in-channel, channel marginal, pools and marsh on the Early to middle Holocene. All these deposits are rarely, if at all, encountered in archaeological investigations in this area because of their depth. Should the opportunity arise that they could be properly sampled and examined (through boreholing for example), then that chance should be taken, as there is high potential for radiocarbon dating (of the peats in particular, which were seen only in cross section between -5 and -7.5m) and plant, insect, pollen, snail preservation, to reconstruct the local environment from the early Mesolithic onward.

Landscape zone 2
Areas where the Early Holocene topography lies between –5m OD and –4m OD (shaded green on Fig 7)
For much of the prehistoric period Landscape zone 2 lay at the interface of a wetland and a dryland environment. Such 'ecotonal' areas are known to have been targeted by Mesolithic peoples, as the higher and drier ground would have provided access to

wetland environs for resource exploitation such as hunting wild fowl and fishing. A peninsula of higher drier ground belonging to Landscape zone 2 extended down towards Abacus Park in the west of the Dagenham area and the deposit model suggests that the site itself may have formed an island in the late Mesolithic, surrounded by river channels or other wetland environments.

Landscape zone 2 is likely to have remained as dry land during the prehistoric period when the lower-lying land was becoming waterlogged and buried beneath peat and minerogenic alluvium. Mesolithic soils could exist in this landscape zone and it is likely that the sandy clay above the floodplain gravel represents similar floodplain soils to those in the Colne Valley, for example, within which significant Mesolithic assemblages have been recovered.

Although by some time in the Neolithic the entire Dagenham area was subsumed by peat, which developed in a damp woodland environment, it is likely that the higher gravel surface in Landscape zone 2 would have influenced the type of woodland that developed here (as opposed to the wetter, swampy, woodland in the lower-lying areas, for example). Very little work has yet been done in examining differences in peat characteristics in different parts of the prehistoric floodplain, but there is a good chance that different woodland composition, openness of the woodland, nature of the understorey and wettness of the ground would have played a part in how it was used by prehistoric people.

Landscape zone 3

Areas where the Early Holocene topography lies above –4m OD (shaded yellow on Fig 7*)*

Landscape zone 3 lies at the edge of the river terrace and comprises islands and lobes of high ground extending from the river terrace into the floodplain, which would have remained as dry ground until the later prehistoric period. The deposit model shows that the Bronze Age causeway at Hays Storage lies within this zone, on the highest part of the promontory of high ground extending into the floodplain, towards Abacus Park. This suggests that despite the mantle of peat across the entire area by the time the causeway was constructed, the higher buried topography in this area is likely to have still influenced the characteristics of the environment and that this was exploited in the location of the causeway.

The irregular surface of the upper peat (facies 4) across the area (see Fig 4 and Fig 5) suggests that creeks and channels existed within the later prehistoric landscape, which may also have formed focal points for human activity within the area.

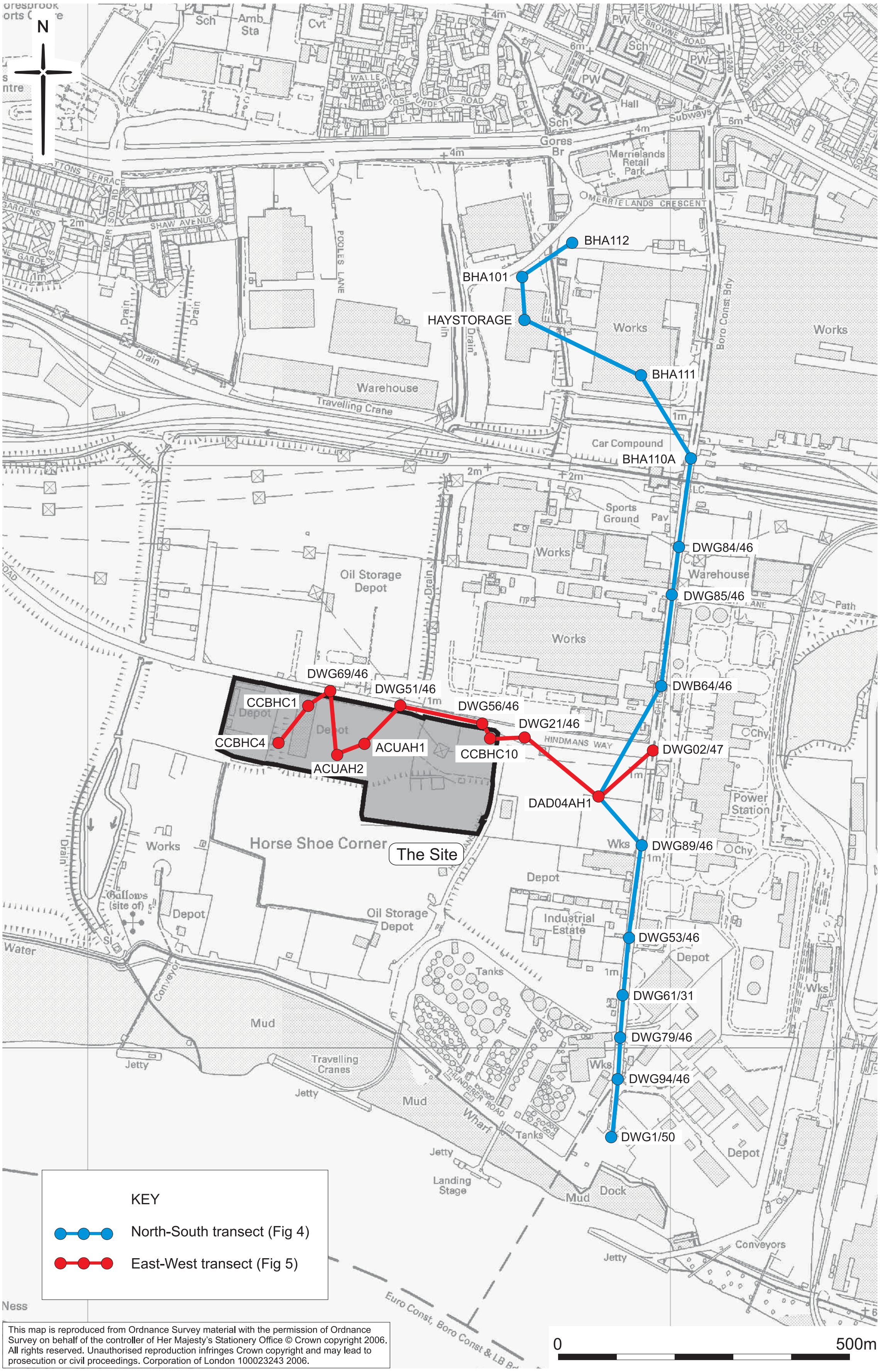

Fig 3 Location of transects

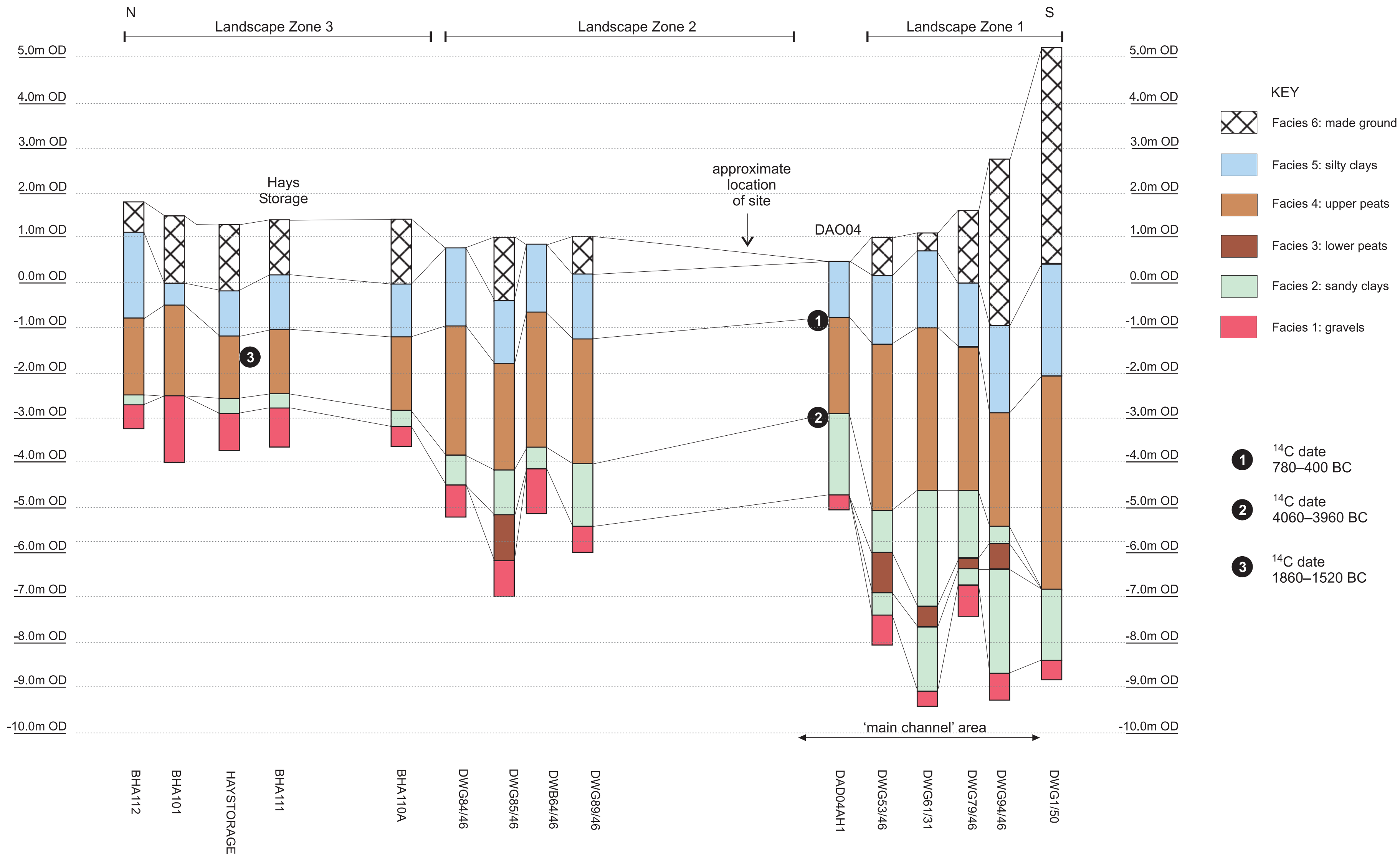

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Fig 4 N-S transect across the area immediately east of the site

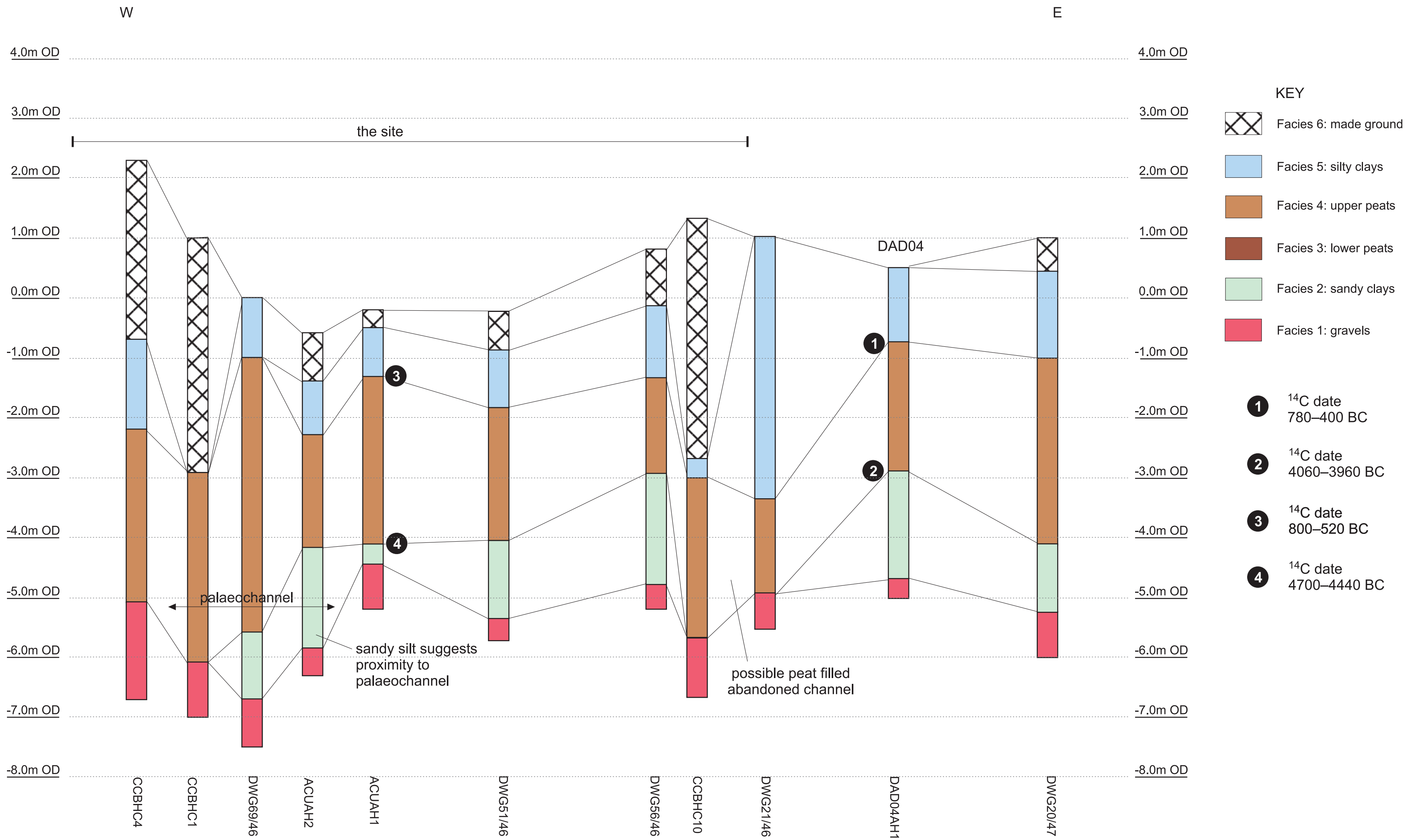

Fig 5 W-E transect across the site and surrounding area

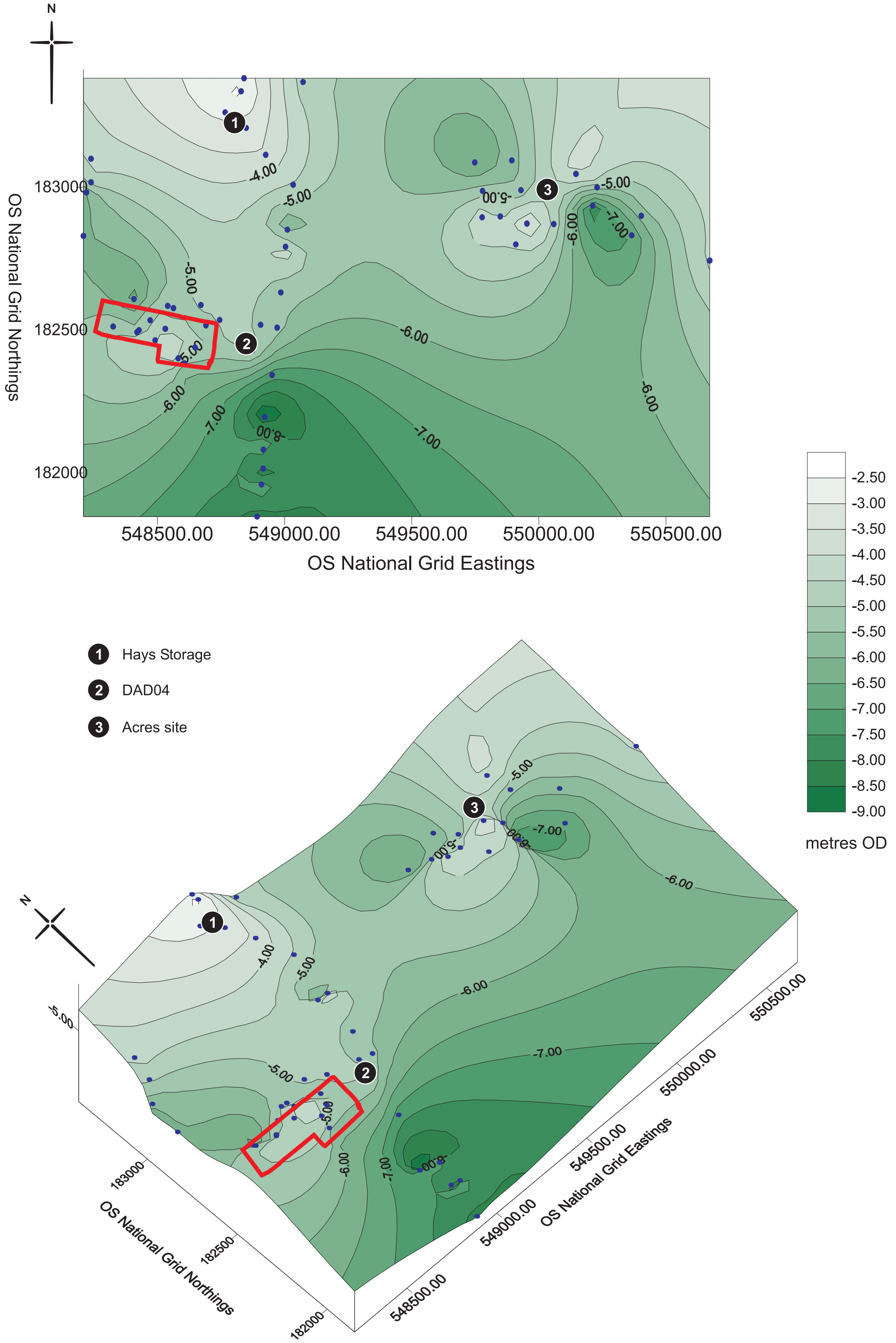

Fig 6 Gravel surface topography (approximately to Early Holocene landsurface)

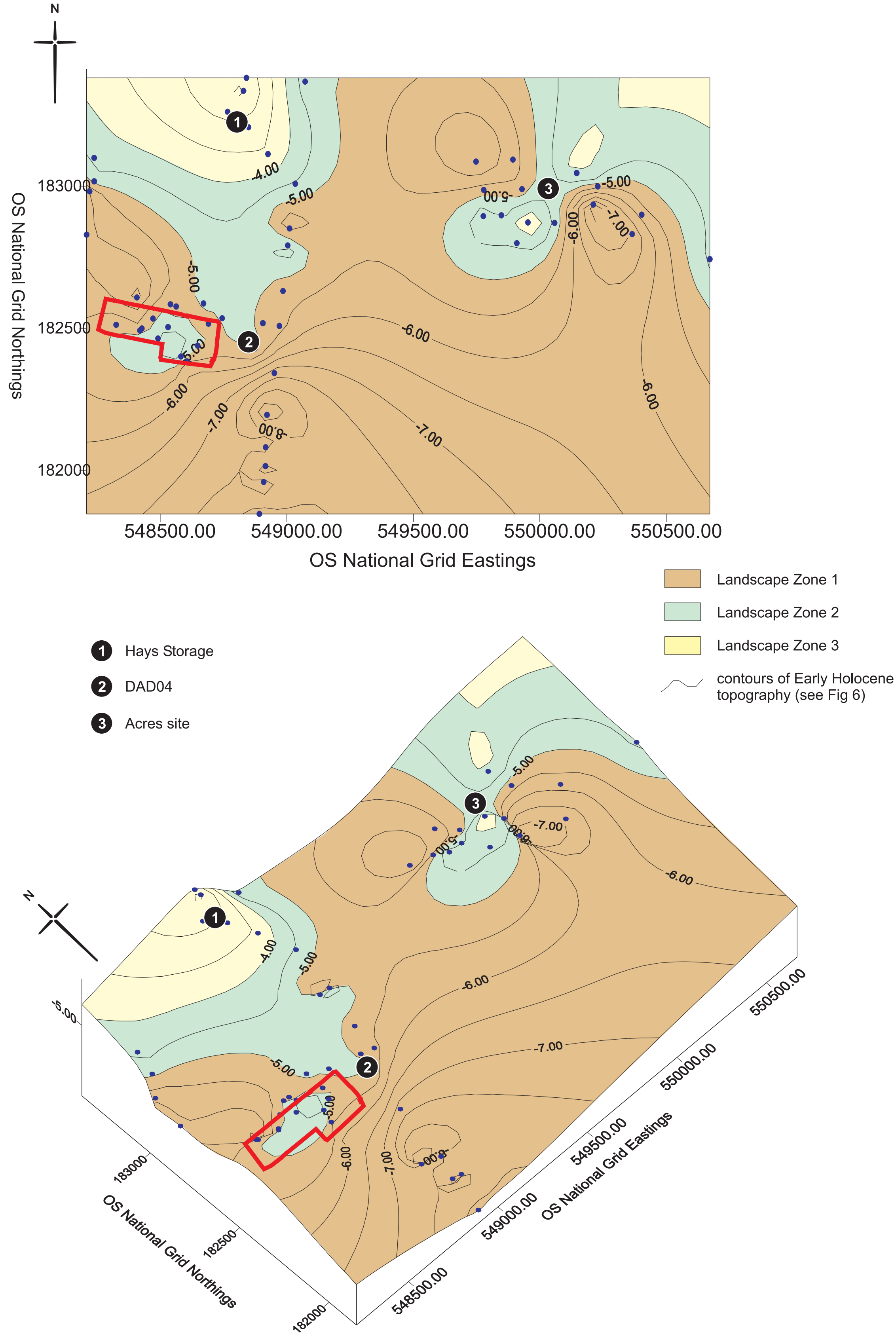

Fig 7 The buried landscape in the Dagenham area

5 Archaeological potential

5.1 Realisation of original research aims

Only a few of the original research aims can be answered.

- *What are the dates and nature of the old sea wall?*

The sea wall was not found in these investigations

- *Is there any evidence of post medieval or earlier buildings or roads noted on 19th century cartographic evidence?*

No evidence for buildings was found on the site.

- *Is there* any evidence for historic activity at the northern edge of Horseshoe corner?

No evidence for historic activity, other than modern dumped deposits, was present on site.

- *What is the nature and date of any later prehistoric activity?*

No evidence for later (Iron Age) prehistoric activity was found.

- *What are the dates and nature of any peat deposits encountered?*

The peat recorded in the geoarchaeological augerholes was dated by radiocarbon and calibrated to 800-520 BC at the top and 4700-4440 BC at the base. This means it accumulated from the Late Mesolithic onwards into the Early Neolithic to Bronze Age. Previous geotechnical logs show that peat extends to a greater depth in the western part of the site, where it may fill an ancient channel and here the lowest peat deposits are likely to be earlier (Late Glacial or Early to Mid Mesolithic).

- *What is the nature of any early prehistoric evidence encountered?*

There was no evidence for early prehistoric activity.

- *What was the landscape context of the site in the prehistoric and historic period?*

The site has been shown by the geoarchaeological deposit model to be located on an area of relatively high gravel, which extended into the floodplain from the promontory on which the site of Hays Storage was situated. The 'island' on which the site was located appears to have been separated from the promontory by a shallow channel and to the south of the site the buried topography fell away sharply into the deep 'main channel' of the Thames.

This topography is likely to have influenced the environment of the site throughout the prehistoric period. Sandy slays in ACUAH2 suggest the shallow channel between the island and promontory was probably an active channel during the Mesolithic, but deep peat deposits in the geotechnical boreholes slightly further west suggest the channel may have become abandoned by the river and subsequently existed as a peat-filled marshy hollow. No date for these deep peat deposits has been obtained. Soil development (associated with a relatively dry landsurface) may have taken place in the sandy clays across the site during the Mesolithic, prior to the accumulation of the thick peat deposit that extends across the site. Both augerholes revealed the peat to be woody in its lowest part, where it probably represents part of the floodplain forest recorded across much of the local area. The upper part of the peat contained reed stems and is likely to represent generally wetter conditions typical of an Alder Carr environment or fenland. The uppermost clays may represent daily tidal inundation or episodic flooding of a grassy landsurface and date from the historic period. The site remained wet, marginal land until relatively recently.

5.2 General discussion of potential

The deposit model has shown that the site spans an island of higher ground, dipping to the south into the main channel of the Thames and the west into a tributary channel. The central area of the site was probably dry land in the Mesolithic and in the sandy clays above the floodplain gravel in this area there is potential for Mesolithic assemblages. In contrast, environmental remains of Mesolithic date, suitable for past landscape reconstruction, are likely to be preserved in the deeper deposits in the west and extreme south east (see Fig 8).

A thick peat bed exists above the sandy clays on the site, which was dated by radiocarbon in ACUAH1 to the period between about 4700 BC and 520 BC (the Late Mesolithic to Early Iron Age). The peat in general represents floodplain forest in its lower part and a more open and wetter Alder Carr and sedge fen towards the top. Although little occupation evidence is likely in such wetland environments, timber trackways and platforms have elsewhere been found and the flint causeway at Hays Storage, to the north of the site demonstrates that the local wetland area was being used by Bronze Age people. However, the archaeological trenches excavated revealed that no Bronze Age structures survive in the upper part of the peat deposits on this site, which were excavated to a depth of c 5.10m depth (-3.70m OD).

5.3 Assessment of the evaluation.

GLAAS guidelines (English Heritage, 1998) require an assessment of the success of the evaluation 'in order to illustrate what level of confidence can be placed on the information which will provide the basis of the mitigation strategy'.

The auger survey coupled with the geoarchaeological assessment of the sub-surface stratigraphy has produced a model that ties Abacus Park site into to the local landscape and its evolution over time.

The evaluation trenches were located in the central part of the site and examination of the previous geotechnical logs suggests that the stratigraphy recorded in the trenches and augerholes is representative of this central area. The deposit model suggests that the buried landscape dips into deeper areas in the extreme west and south east of the site, which may have been ancient river channels, these areas have been examined by assessment of the previous geotechnical data from the site.

The archaeological trenches excavated revealed that Bronze Age remains did not survive at the top of the peat deposits, which were excavated to a depth of c 5.10m depth (3.70m OD). Where present, it is usual for Bronze Age structures to be found in the upper part of the peat. Thus it is likely that they do not exist on the site.

Despite positioning the trenches to avoid areas of high groundwater, based on the results of the previous geotechnical site investigation, rapid water ingress into the trenches occurred, which made recording difficult and potentially dangerous.

5.4 Significance

Based on deposit characteristics and what has been found in similar deposits elsewhere, there is potential for evidence for the Mesolithic environment to be preserved in the peat and clays that lie in the areas of deeper alluvium in the west and extreme south east of the site. In addition, Mesolithic assemblages may survive in the sandy clay in the central area. If such remains exist they would be of regional significance, as few Mesolithic remains are known from the floodplain of the Thames in East London. However, the deposits of Mesolithic potential lie at considerable depth.

Peat deposits, belonging to the prehistoric floodplain forest and succeeding wetland exist across the entire site and have been dated in the centre of the site to between about 4700 BC and 520 BC (the Late Mesolithic to Early Iron Age). This roughly corresponds with dates known from nearby sites. Information from the peat might provide information about the lateral variability of the prehistoric floodplain forest and wetland, which would be of local significance.

The deposit model, reconstructed with the aim of placing the site in its wider landscape context, has made a valuable contribution to our understanding of the buried landscape of the floodplain in the Dagenham area.

Fig 8 Archaeological potential

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6 Proposed development impact and recommendations

The proposed redevelopment at Abacus Park, Dagenham involves the construction of two large warehouse buildings and associated car parking areas. The impact of piles on the deposits of archaeological interest will be to remove them in specific locations. The impact of other activities such as drainage and landscaping would be confined to the extensive modern made ground deposits known to cover this site, this will have no impact on any archaeological deposits.

The deposits of archaeological interest (the peat and underlying sandy clay) lie at considerable depth. The impact of the proposed development is likely to be minimal on these deposits.

A deposit model was constructed as part of the evaluation, in order to place the site in its past landscape context and thus to better understand its archaeological potential. This model has contributed to a better understanding of the buried landscape in the Dagenham area. It could be considered that the past landscape reconstruction that the model provides, is sufficient mitigation for the small impact of the proposed piling associated with the redevelopment of the site.

The decision on the appropriate archaeological response to the deposits revealed rests with the Local Planning Authority and their designated archaeological advisor.

7 Acknowledgements

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9 NMR OASIS archaeological report form

OASIS ID: molas1-14879

Project details

Project name	Abacus Park, Dagenham Docks
Short description of the project	Two evaluation trenches were excavated on the site. No archaeological features or structural remains were present, nor were any stray finds recovered. In addition two geoarchaeological boreholes were sunk using a Cobra power auger. A series of samples were taken from the resulting cores of alluvial deposits. Carbon 14 dating showed a thick peat deposit began accumulating in the Late Mesolithic (4700–4440 BC) and continued into the Neolithic to Bronze Age (800–520 BC).
Project dates	Start: 13-03-2006 End: 22-03-2006
Previous/future work	No / Not known
Any associated project reference codes	ACU06 - Sitecode
Type of project	Field evaluation
Site status	None
Current Land use	Industry and Commerce 1 - Industrial
Methods & techniques	'Augering','Environmental Sampling','Sample Trenches'
Development type	Urban commercial (e.g. offices, shops, banks, etc.)
Prompt	Direction from Local Planning Authority - PPG16
Position in the planning process	Not known / Not recorded

Project location	
Country	England
Site location	GREATER LONDON BARKING AND DAGENHAM BARKING Abacus Park, Dagenham Docks
Postcode	RM9
Study area	240000.00 Square metres
National grid reference	TQ 4845 8252 Point
Height OD	Min: -0.80m Max: -1.20m

Project creators	
Name of Organisation	MoLAS
Project brief originator	Local Authority Archaeologist and/or Planning Authority/advisory body
Project design originator	MoLAS
Project director/manager	Ros Aitken
Project supervisor	Tony Mackinder

Project archives	
Physical Archive recipient	LAARC
Digital Archive recipient	LAARC
Paper Archive recipient	LAARC

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Abacus Park Plots B and C, Dagenham Docks
Author(s)/Editor(s)	Tony Mackinder and Graham Spurr
Date	2006
Issuer or publisher	MoLAS
Place of issue or publication	London
Description	A4 spiral bound with figures
Entered by	Tony Mackinder (tonym@molas.org.uk)
Entered on	18 May 2006