LAND DRAINAGE
Site A
Dock Road Industrial Estate
West Silvertown
London
E16

London Borough of Newham

An archaeological evaluation report

August 2008

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MUSEUM OF LONDON Archaeology Service
PRE-CONSTRUCT ARCHAEOLOGY

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An archaeological evaluation report

Site Code: DRI07
National Grid Reference: 539490 180695

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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 / Pre-Construct Archaeology on Site A, Dock Road Industrial Estate, West Silvertown, London E16. The report was commissioned from MoLAS by Capita Symonds Ltd (CSL) on behalf of the client, The London Development Agency (LDA).

One evaluation trench was excavated in the north-west of the site. The results of the field evaluation have helped to refine the initial assessment of the archaeological potential of the site. The trench exposed a sequence of alluvial deposits dating from the Bronze Age when the environment consisted of mudflats/marshland. Fine bands of slightly silts and clay alternated with dark brown organic-rich silt indicating gently flowing water. This may represent flow within a tidal creek or quiet channel, with organic-rich silts washed in as the tide rises and clays deposited from slack water. Although the tidal head may not yet have migrated to this part of the Thames, the river is likely to be affected by the tidal regime. A radiocarbon date from organic material washed from the silts indicates Early Bronze Age or Late Neolithic deposition. The position of the site at the confluence of the rivers Thames and Lea almost certainly influenced the type and mode of sediment deposition. For example, organics eroding from reed marshes along the landward side of the tidal basin may have been carried by the Lea to the main channel.

Subsequently, thick silty alluvial clays were deposited on the floodplain, indicating an increase in the frequency of flood events, probably due to a general rise in river levels. Weathering of clays at the top of the sequence suggests drying out and possibly the start of soil formation in the early historic period or later. Three timber stakes were driven into the upper clay deposits (one was dated to between AD 990 and 1200). Although little can be said regarding form or function, these fragmentary remains may have formed part of a fence line or revetment.

The report concludes that there are no further impacts from the proposed redevelopment and that dating analysis should be undertaken.

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1 Introduction

1.1 Site background

The evaluation took place at Site A, Dock Road, London E16, hereafter called 'the site'. Located on the north side of Dock Road, the site is bounded by Dock Road to the south-west, the Silvertown Way slip road (Peto Road south) and the Lower Lea Crossing/Silvertown Way roundabout to the north and north-east and the northern perimeter of the adjacent Dock Road property to the south (Dock Road north, Site B; see Fig 1).

The OS National Grid Ref. for centre of site is 539840 180695. Modern ground level immediately adjacent to the site is 1.5m OD. The site code is DRI07.

A *Method Statement*, which formed the project design for the evaluation (see Section 1.2, Bull, 2007) should be referred to for information on the natural geology, archaeological and historical background of the site, and the initial interpretation of its archaeological potential. This method statement drew on recent archaeological reporting on the area of the site and interpretation. This material is detailed in the method statement.

For this exercise, one archaeological field evaluation trench was excavated in August 2007 as per the method statement (Fig 1).

1.2 Planning and legislative framework

The legislative and planning framework in which the archaeological exercise took place was summarised in the *Method Statement*, which formed the project design for the evaluation (see Section 1.2, Bull, 2007).

1.3 Planning background

The proposed redevelopment involves the temporary change of use and development of the site to provide a concrete batching facility with ancillary parking, storage, office and welfare facilities, to enable the relocation/replacement of an existing facility within the Olympic Development Zone.

The single evaluation trench was located in the area of a proposed pond feature beyond the limits of the historic Victoria Dock cutting to the north-west. The evaluation trench occupied the full footprint of the proposed pond feature.

1.4 Origin and scope of the report

This report was commissioned by Capita Symonds Ltd (CSL) on behalf of the client, The London Development Agency (LDA), and produced by the Museum of London Archaeology Service and Pre-Construct Archaeology (MoLAS-PCA). 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 (see Section 2.2, Bull, 2007):

- Can our present understanding of tidal influence on the area be refined, and do observations complement or contradict Devoy's (1979) transgressive and regressive model downstream?
- Is there evidence for past land surfaces and direct or indirect evidence for human activity within the floodplain alluvium and can this be dated?
- What do the fine-grained deposits within river gravels represent?
- Are biological macro- and micro-fossils preserved in the alluvial deposits and what information do they provide about the past environment of the site?
- To what extent can the results of the monitoring refine our understanding of the evolving landscape and archaeological/Quaternary stratigraphic sequence at the confluence of the Lea and the Thames?
- What is the level of modern truncation to the alluvial sequence and what is the extent of disturbance due to the excavation of the docks in the 1850s?

2 Geological and topographical background

2.1 Geology and topography

The London Basin comprises a west–east aligned synclinal fold of chalk filled with Tertiary sands and clays, bordered by outcrops of Cretaceous Chalk of the Chilterns in the north and the North Downs in the South. The site lies on Tertiary London Clay Bedrock (50 million year old) that represent deep water deposits laid down during the early Tertiary (Eocene *c* 65 - 23 Million years ago; Sumbler, 1996). The overlying drift geology comprises Thames river gravels (see below) and the Dock Road site lies a short distance from the north bank of the modern Thames at the confluence of the River Lea on the east of the meander of the Greenwich Peninsula. The site lies at around *c* 1.50m OD, falling slightly to the north and north-east.

2.1.1 Pleistocene (Palaeolithic)

The Pleistocene is characterised by major climatic fluctuations: long cold periods interspersed with shorter warm periods (glacial and interglacials). The Thames adopted its present course through London after being diverted by a massive ice sheet (from the Vale of St Albans) approximately half a million years ago. Sands and gravels that make up the Thames terraces in London therefore post-date this event. In major river valleys like the Thames, climate is the main influence on fluvial system dynamics. In general, terrace aggradation takes place during long cold stages, erosional phases at warm to cold transitions and secondarily at the Pleniglacial to Late glacial transition (Vandenberghe, 1995, Bridgland, 2000 and Cordier et al, 2006).

The combined effects of down-cutting or incision and the long-term trend of crustal uplift in Southern Britain mean that older terraces exist at higher elevations in the valley. Thus, the gravels of the present floodplain (Shepperton Gravel) where the site is located are thought to represent fluvial sediments deposited following the last glaciation (Devensian), while the Taplow Gravel terrace at a higher elevation to the north of the site represents a former floodplain surface.

The Shepperton Gravel was deposited with glacial outwash between 15,000 and 10,000 years ago (Gibbard, 1985). The topography of the gravel surface influenced subsequent sedimentation and human activity.

2.1.2 Holocene

2.1.2.1 Prehistoric (Mesolithic to Iron Age)

The last glacial phase gave way to the Holocene our current interglacial approximately 10,000. Following the end of the last glaciation a freshwater braided system, typical of an arctic climate river regime would have persisted on the Thames floodplain. Although early to mid-Holocene river evolution remains relatively poorly understood, previous studies suggest the height of the gravel surface varies (-2m OD and -6m OD) descending towards the river. Numerous channels would have cut the surface of the Shepperton Gravel, creating gravel low points (in which fine-grained organic sediments and biological remains may be preserved) and gravel highs (eyots or bars) produced by sand accumulations or remnants of older terraces. These eyots and channels identified across the area (WA, 2000 and Sidell et al, 2000) would have formed the landscape in which Mesolithic people lived with higher land within the fertile floodplain comprising important dry areas for humans.

At the river edges and particularly at the confluence of channels, it is likely that deposits have been subject to disturbance as the Thames evolved over the Holocene from a braided river with multiple threads to a meandering system. The results of a recent MoLAS-PCA geoarchaeological investigation to the immediate south of the site at Thames Wharf (TWF07) recorded significant Holocene re-working of the gravel body (Nicholls 2007) in the area. Lumps of peat and clay eroded from the surroundings were included within reworked floodplain gravel and dated to the mid- rather than early Holocene. The gravel surface was recorded at –4.76m to –5.62m OD (approximately 6m below current ground level). A previous investigation carried out partially within the site area at the Landmark site (SVY02; Ainsworth 2002) recorded the surface of fluvially scoured gravels at –3.05m OD (BH1) and similar clods as at TWF07.

Globally, sea levels have risen approximately 120m since the last glacial maximum (20,000 years ago), but relative fluctuations in the Holocene Thames are the result of the interplay between several factors. Devoy's (1979) model of marine transgression and regression for the Lower Thames requires modification for areas further upstream such as Thames Wharf where local factors have great influence (Haggart, 1995; Wilkinson et al, 2000; Sidell et al, 2000).

The Mesolithic and Neolithic rivers on the Thames floodplain would have been prone to avulsion or switching flow (anastamosing channels) producing cut off channels that underwent a complex succession of silting up and re-activation. Peat deposits accumulated in channel marginal and abandoned channel situations as well as on higher ground, and if examined can provide important information on early post-glacial landscapes. Peat also has the potential to preserve organic remains such as the Neolithic trackway at Fort Street (WA, 2000). Artefacts and signs of activity of hunter-gatherers exploiting the rich resources of the floodplain are uncommon, but palaeoenvironmental studies play an essential part in building up a picture of contemporary environments.

Alluvium, deposited as river levels rose and spanning prehistoric to modern times, is mapped blanketing the Thames Valley (BGS sheet 256) and at depth may be inter-bedded with prehistoric organic muds and peat (mid-Holocene alder carr wood peat). The stiff, silty clay that forms the upper alluvium represents the gradual transition from mudflats to salt marsh probably during the Iron Age and subsequently to seasonally flooded, reclaimed land. Such deposits were recorded at TWF07 between –0.28m and –2.16m OD and between c –0.7m OD and – 2.0m at SVY02. The upper part of the deposit was broadly dated to the Iron Age and later (Ainsworth 2002, 21). More recent on site investigation (CGC, 2007) recorded the surface of in situ alluvium in boreholes and test pits at *c* 0.90m below present ground level (at *c* +0.6m OD). The alluvium was 4.6m thick in Borehole 1 and 3.6m in Borehole 2 but the full extent was not recorded in test pits.

2.1.2.2 Historic (Roman to Post-medieval)

During the Roman period river levels fell (Brigham, 1990) and the area around the Greenwich peninsula was perhaps habitable marshland (Corcoran, 2002). Seasonal flooding and sub-aerial weathering from the Roman period onwards produced the accumulations of weathered alluvium at the upper part of the profile. Iron Age to medieval archaeology therefore lies within or at the surface of the swathe of clay that forms the upper part of the alluvial sequence and earlier prehistoric levels lie within the complex of deposits that form the lower part of the alluvium.

A grey-brown silty clay deposit measuring an average of *c* 1m thick at *c* 1.0m–0.5m OD, characteristic of seasonally inundated soils suitable for pasturage, was recorded at SVY02. This probably built up during the medieval and post-medieval periods.

The construction of Royal Victoria Docks in the 1850s resulted in the deliberate deposition of material excavated from the dock site onto adjacent areas, which became wharves. Evidence for such redeposition was apparent during the geoarchaeological investigations at Thames Wharf (where *c* 3m depth of firm grey brown clay with orange mottles were recorded between 2.98m and 0.29m OD), and at the Landmark site where redeposited alluvium was recorded at *c* 0.7m OD. In contrast to TWF07, the SVY02 sediments indicated severe modern truncation in places or absence of these deposits (Ainsworth, 2002). The depth of modern made ground recorded in the site varied between *c* 0.5–1.0m.

3 The evaluation

3.1 Methodology

All archaeological excavation and monitoring during the evaluation was carried out in accordance with the preceding *Method Statement*, Bull, 2007), and the MoLAS *Archaeological Site Manual* (MoLAS, 1994).

One evaluation trench was excavated in the north-east corner of the site in the area of a proposed pond feature.

The trench was excavated by machine by the contractors, and monitored by a Senior Archaeologist from MoLAS.

The location of the evaluation trench was surveyed by the MoLAS Geomatics team using a Leica TC805 total station and 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 by traversing from the contractors TBM located on the site at a value of 1.75m OD.

The site has produced: 1 trench location plan; 7 context records; 4 section drawings at 1:20 and 1:10; and 8 digital photographs. In addition 1 10L bulk sample and 1 timber sample were recovered from the site.

The site finds and records can be found under the site code DRI07 in the MoLAS archive.

3.2 Results of the archaeological evaluation

For trench location see Fig 2.

Location	North-east of site
Dimensions	12m x 12m x 3.77m deep
Modern ground level	1.34m OD
Base of modern fill	0.69m OD
Depth of archaeological deposits seen	1.82m
Level of base of trench	-2.43m OD
Natural observed	Gravel deposits not reached

Table 1 Details of evaluation trench

For detailed descriptions of the alluvial deposits please see Section 3.3.

The earliest deposit comprised an organic marsh deposit [3], which survived to a height of -0.54m OD in the north-west of the trench sloping to -2.43m OD in the south-east and was over 1.89m thick.

This was overlain by a floodplain deposit [2], which survived to a height of -0.34m OD and was over 0.90m thick in the east thinning to 0.20m thick in the west of the trench. Cutting into this deposit were 3 timber stakes aligned east-west in the south-west of the trench (see Figs 3 and 5). The timber stakes appeared to be of the same deciduous species (possibly willow). They had been originally driven vertically into context [2] but had collapsed towards the north. The tops of the stakes had naturally eroded indicating exposure to the elements either water or air. Analysis of tool-marks on stake [4] indicates they may have been of late medieval or early post-medieval date. Their function is unclear as these were fragmentary remains, but they may have formed part of an *in situ* fence or revetment.

Overlying these deposits was a weathered floodplain deposit [1] surviving to a height of 0.89m OD approximately 1m thick.

Modern deposits consisted of 0.65m of concrete foundation, black gravel and clinker mixed with brick and concrete rubble acting as a capping layer.

3.3 Results of the geoarchaeological evaluation

3.3.1 Introduction

A site visit was made by a MoLAS geoarchaeologist to examine the deposit sequence during evaluation at Dock Road DRI 07. The purpose of the site visit was to examine the natural deposit sequence, interpret its depositional environment and archaeological significance.

Sediments observed comprised a sequence of alluvial clays relating to the Thames floodplain. The lower part of the evaluation trench was flooded at the time of the site visit from the base of the trench around 3m below ground level (bgl) to approximately 2m bgl (*c* -1.40m OD). Deposits of interest were visible only on the step within the trench and despite pumping the base of the sequence remained submerged.

Interpretations are based on sediments observed below made ground on the step between *c* 0.00m OD and -1.34m OD.

3.3.2 Dating

Two samples were taken for radiocarbon dating (Table 2). The sample for DRI[03] comprised detrital organics washed from unit 1 (context 3) clays. DRI[04] was taken from the outer layers of on of the timber stakes. Dates are quoted in calendar years before present (cal. yr BP) with a 2 σ age range. Calibrations were made using Oxcal 4.0 (Bronk Ramsey, 1995 and 2001) the IntCal04 calibration curve (Reimer *et al.*, 2004).

Sample height (m OD)	**MoLAS ref.**	**Lab no.**	**Analysis**	**Uncalibrated conventional radiocarbon determination**	**$^{13}C/^{12}C$ ratio (‰)**	**Calibrated date BC (2 σ)** (95% probability)
-1 to -1.3	DRI07[3]	Beta-242689	AMS	4210 ± 40	-27.4	Cal BC 2900 to 2840 (4850 to 4790 cal BP) AND Cal BC 2810 to 2670 (4760 to 4620 cal BP)
XX	DRI07[4]	Beta-242690	Radiometric	960 ± 50	-26.2	Cal AD 990 to 1200 (960 to 750 cal BP)

Table 2 Radiocarbon dated samples from DRI07

The organics from unit 1 therefore date to the Late Neolithic or Early Bronze Age, while the tree used to make the timber stake was felled in the medieval period.

3.3.2.1 The deposit sequence (see River gravels

The gravel surface was not reached during evaluation despite being excavated to a depth of 3.70m below ground level. Information from geotechnical boreholes at Thames Gate anticipates the surface of Thames river gravels between 4.5 and 7.5m bgl in this area.

3.3.2.2 Unit 1 (Context [3])

The full thickness and depth of this unit was not established as water ingress to 2.43m OD. Sediments comprised alternating bands of soft brown grey silty clay and dark brown organic-rich silt are recorded. The bedding is very fine, nearly parallel and wavy.

These deposits indicate gently flowing water laying down organic rich silts followed by fine clays during periods of relative stagnation. This may represent flow within a tidal creek or quiet channel, with silts and organic material washed in as the tide rises and clays deposited from slack water. For example, suspended minerogenic material brought in with the tide, dropping out of the water column as the tide turns and coarser, organic silts gently eroded from reed marshes along the landward side of the tidal basin carried by the Lea as it exits into the main channel. The tidal head may not yet have migrated to this part of the Thames, but the ordered pattern of deposition suggests the sediments are affected by a tidal or possibly seasonally changing regime. The assumption that these sediments predate the late Bronze or Iron Age (Tilbury III) (Devoy, 1979) has been confirmed by radiocarbon dating of the organic component (see 3.3.2).

The boundary between unit 1 and unit 2 was visible across the trench and noted to broadly undulate between approximately -0.54m OD in the north-west to -1.34m OD in the south-east. This engenders the interpretation of subsequent penetrating tidal creeks eroding the surface of the bedded sediments, leaving an uneven surface later buried by alluvial clays.

3.3.2.3 Unit 2 (Context [2])

The silty clay sediments (lying from 0.30-1.00m from the top of the step) are brown grey in colour and very soft. Organic material comprising occasional small flecks of wood and fragments of sedges is noted within the clays. Oxidised, orange-stained root casts indicate plant growth, rooting down from the mudflat surface. No bedding is discernable within the unit and probably indicates deposition by flood events with rising river levels in conjunction with bioturbation by root action.

The black patches and increased black mottling at the top of the deposit represent oxidation of manganese indicating limited oxygen within the sediments (reduction/oxidation reactions) suggesting mainly waterlogged and anoxic conditions with seasonal variation in oxygen perhaps in ground water and via penetrating roots. Annual fluctuation in the water table is typically about 5m, but it may be more than 30m (Sumbler, 1996) and it is likely that this is the main agent of the changing oxygen supply. This may also account for the occasional calcareous clasts within the profile (both in unit 2 and unit 1) likely to be the results of re-precipitation of calcium carbonate from chalk-rich ground water.

The upper part of the deposit appears to have been subject to more substantial drying out. Rapid rates of sediment input into rivers in the late prehistoric period may have accelerated the build up of alluvium and perhaps a fall in river levels such as during Roman times leading to weathering of slightly elevated floodplain deposits. Growth of vegetation on floodplain mudflats or the occurrence of now weathered out temporary land surfaces may have produced this weathered profile. Deposition is thought to have occurred in the Iron Age (first millennium BC) followed by drying out due to the regression of the 3rd and 4th centuries AD.

3.3.2.4 Unit 3 (Context [1])

Moderately compact to soft green blue grey silty clays are recorded at top 0.30m of the step. This unit represents fine overbank deposits carried onto the floodplain suspended within flood water. Silts and clays would have settled out of the water as the flood or high tide subsided. It is likely that the clay remained submerged or waterlogged after being laid down as it has retained the blue colour, caused by the formation of vivianite (ferrous phosphate) (Brown, 1997). The greenish grey colour of the sediment indicates the presence of iron phosphates or secondary iron alumino-silicates, suggesting temporarily waterlogged, or gleying.

This deposition suggests an increase in flood events provoked by rising river levels or an increasingly tidal regime perhaps associated with renewed post Roman sea-level rise continuing into the medieval period. The date from the timber stake, felled cal AD 990 to 1200, indicates the clays built up into the medieval period. The clays are heavily mottled with hard concretions giving this upper horizon a gritty texture. The orangey brown (iron hydroxides) and black (manganese) mottling is common in alluvial sediments, and is closely associated with REDOX conditions (Brown, 1997). Concretions suggest the growth of bacterial colonies acting where oxygen is re-introduced into the system (i.e. reducing conditions being replaced by oxidising conditions) (Glazovskaya, 1983). Their presence suggests drying out, allowing weathering by exposure to air. The initiation of soil formation may be indicated by these post depositional processes. It is suggested that this may have occurred during historic times, with draining of marshlands for pasture in the medieval period. However, minerogenic sediments such as alluvial clays are often difficult to date. Made ground overlies unit 3 and may have substantially truncated the natural alluvial sequence.

3.3.3)

3.3.3.1 River gravels

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The boundary between unit 1 and unit 2 was visible across the trench and noted to broadly undulate between approximately -0.54m OD in the north-west to -1.34m OD in the south-east. This engenders the interpretation of subsequent penetrating tidal creeks eroding the surface of the bedded sediments, leaving an uneven surface later buried by alluvial clays.

3.3.3.3 Unit 2 (Context [2])

The silty clay sediments (lying from 0.30-1.00m from the top of the step) are brown grey in colour and very soft. Organic material comprising occasional small flecks of wood and fragments of sedges is noted within the clays. Oxidised, orange-stained root casts indicate plant growth, rooting down from the mudflat surface. No bedding is discernable within the unit and probably indicates deposition by flood events with rising river levels in conjunction with bioturbation by root action.

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Unit/ context	Depth below ground level	Description	Interpretation
***c* +0.89m OD**			
Unit 3 Context [1]	0.65m – 1.40m	Moderately soft massive green blue grey SILTY CLAY heavily mottled brown/orange with abundant inclusions or nodules becoming heavily mottled black with nodules of manganese	Floodplain alluvium - blue greenish grey colour suggests temporary waterlogging. Mottling with manganese nodules and brown/orange iron concretions indicate weathering, probably due to drying out, and possibly initiation of soil formation - early historic/Romano-British
***c* -0.34m OD**			
Unit 2 Context [2]	1.40m - 1.60m	Soft brown grey massive SILTY CLAY with unsorted organic inclusions (including sedges) and vertical orange- coloured root casts. Very dark black patches and increased black mottling at the top of the deposit	Floodplain alluvium deposited in deepened water and experiencing temporary waterlogging. Less weathered than overlying silty clay. Root penetration and fragments of organics indicate plant growth and floating plant debris. Clear boundary at base of unit likely to indicate a significant rise in river level - suggested date: Iron Age/ 1st millennium BC
Between -0.54m OD to -1.34m OD Clear boundary			
Unit 1 Context [3]	1.60m – 3.70m	Sub-horizontal, wavy, sub-parallel finely bedded very soft brown grey slightly sandy (fine) SILTY CLAY and dark brown organic-rich silt with some fine sand (3mm thick beds).	River/fluvial but quiet depositional environments indicated by wavy planar bedding and thin bands of fine-grained material. Seasonally disturbed or tidal mudflat/marsh environments with tidal creeks penetrating
possibly to > -2.43m OD			

Table 3 Descriptions and interpretations of sediments

3.4 Discussion and conclusions

The trench exposed a sequence of alluvial deposits possibly dating from the Late Neolithic or Early Bronze Age when the environment consisted of mudflats/marshland affected by either tidal or seasonal regimes from the confluence of the rivers Thames and Lea. Thick, overlying alluvial clays represent flooding through to medieval times.

Although the base of the sequence was not observed due to the depth of water in the trench, inferences have been made on the basis of sediments between made ground and the base of the step (between approximately 0.89m OD to -1.34m OD). The sediments at the base of the exposure appear to be tidally influenced backwater deposits, probably associated with a tidal creek near the confluence of the rivers Thames and Lea. This is dated to the Late Neolithic or Early Bronze Age (2900 to 2840 cal BC or 2810 to 2670 cal BC), definitely prior to the Iron Age transgression (Thames III) that brought brackish and tidal environments to the inner Thames estuary (Devoy, 1979).

Overlying silty clays represent flood deposits perhaps laid down with increased sedimentation during the Iron Age and early historic period. Evidence of weathering may suggest subsequent drying out with Roman marine regression (3rd to 4th century).

The gleyed sediments of unit 3 have been subject to substantial weathering and possibly soil formation processes. The date of cal AD 990 to 1200 from the timber stake indicates the clays built up into the medieval period. This drying out may be associated with historic drainage.

3.5 Archaeological potential

3.5.1 Realisation of original research aims

- Can our present understanding of tidal influence on the area be refined, and do observations complement or contradict Devoy's (1979) transgressive and regressive model downstream?

Over the Holocene, superimposed on the overall trend of rising sea level Devoy records five marine regression phases (Tilbury I-V) represented by peats and four or possibly five transgressions (Thames I-V). The sequence has been broadly interpreted in relation to this model.

It was suggested that unit 1/context 3 represents the effects of the major Tilbury III regression between 5500/5000 and 4000 BP (*c* 3000 to 2000 BC). Radiocarbon dating (of 4850 to 4790 and 4760 to 4620 cal BP) confirms Late Neolithic or Early Bronze Age deposition. The deposit lies at between approximately -1.34 to -0.54m OD likely to be equivalent to Tilbury III organic sediments recorded at -1.5m to -3.5m OD at Woolwich East (borehole TQ44627942) (Devoy, 1979) as the height of deposits rises slightly upstream with narrowing of the Thames channel. The interleaved organic and slack-water clays may indicate the effect of the tide, which if dated could inform the model. It is possible that unit 1/context 3 is transitional between relative regressive and transgressive events as tidal environments encroached during Thames III. This deposit is thought to predate the main Thames III marine transgression roughly dated to the Iron Age.

- Is there evidence for past land surfaces and direct or indirect evidence for human activity within the floodplain alluvium and can this be dated?

Timber stakes driven into the alluvial clays attest to direct human activity in the area. Radiocarbon dating of the wood to cal AD 990 to 1200 indicates activity in the medieval period.

Significant drying out of the clays at the top of the profile dating to after the 12th century may represent a land surface. However, truncation suggests the observed context 1 could represent clays underlying a former land surface. No further land surfaces are visible within contexts 2 and 3, but a probable period of erosion is identified between these contexts and this may relate to land surfaces upslope nearby.

It is also possible that the change in sedimentation between contexts 3 and 2 (units 1 and 2) provides indirect evidence broadly related to human activity, marking a period of increased sedimentation into river systems due to forest clearance, soil destabilisation and greater runoff. This has generally been associated with the Iron Age.

- Are biological macro- and micro-fossils preserved in the alluvial deposits and what information do they provide about the past environment of the site?

Apart from roots and amorphous reed material, plant macrofossils were not present. Monolith tins were not taken for the following reasons: the entire sequence was not available to sample and conditions were wet and dangerous.

- To what extent can the results of monitoring refine our understanding of the evolving landscape and archaeological/Quaternary stratigraphic sequence at the confluence of the Lea and the Thames?

The alluvial sequence is thick and unit 1/context 3 contains organic matter. This material is dated to around the Late Neolithic or Bronze Age. It is possible that sediments represent tidally influenced deposition in advance of the arrival of the tidal head (around the Iron Age transgression (Thames III)). Without being able to observe the base of the sequence the sedimentary information cannot be fully assessed.

- What is the level of modern truncation to the alluvial sequence and what is the extent of disturbance due to the excavation of the docks in the 1850s?

The alluvial sequence has been subject to some modern truncation. There appears to be no disturbance due to the excavation of the docks in the 1850s in this part of the site.

3.6 General discussion of potential

The evaluation has shown that the potential for survival of ancient ground surfaces (horizontal archaeological stratification) on the north-east of the site, south of the 1850s culvert, is high. There is also potential for survival of waterside cut features. The presence of the medieval timber (the remains of a possible fence or revetment) suggests that other activity dated to this period may have taken place in the vicinity.

However, the evaluation trench covered the full extent of impacts (the proposed pond) on these deposits in this part of the site, therefore such potential survival is unlikely to be affected by the proposed scheme.

3.7 Significance

Whilst the archaeological remains are undoubtedly of local significance there is nothing to suggest that they are of regional or national importance.

4 Proposed development impact and recommendations

The redevelopment at Site A, Dock Road, London E16 involves the temporary change of use and development of the site to provide a concrete batching facility with ancillary parking, storage, office and welfare facilities, to enable the relocation/replacement of an existing facility within the Olympic Development Zone.

The impact of this on the surviving archaeological deposits will be nil, as the evaluation trench was excavated to the full extent of the proposed pond. Therefore, it is not recommended that any further fieldwork be undertaken.

Furthermore, following the radiocarbon analysis reported on here, it is not recommended that any further work is necessary.

5 Acknowledgements

MoLAS would like to thank Capita Symonds Ltd for commissioning this report.

The author would like to thank Terry Claxton of Jayflex Construction and Ryszard Bartkowiak from MoLAS. Thanks also to Mary Nicholls from MoLAS for detailed analysis of the geoarchaeology on the site and Eamon Baldwin and Mark Burch from the MoLAS geomatics department.

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7 Appendix : NMR OASIS archaeological report form

OASIS ID: molas1-45985

Project details

Project name	Land Drainage, Site A, Dock Road Industrial Estate, West Silvertown, London E16
Short description of the project	A 10m x 10m evaluation trench exposed a sequence of alluvial deposits dating from the Bronze Age when the environment consisted of mudflats/marshland. Fine bands of slightly silts and clay alternated with dark brown organic-rich silt indicating gently flowing water. This may represent flow within a tidal creek or quiet channel, with organic-rich silts washed in as the tide rises and clays deposited from slack water. Although the tidal head may not yet have migrated to this part of the Thames, the river is likely to be affected by the tidal regime. A radiocarbon date from organic material washed from the silts indicates Early Bronze Age or Late Neolithic deposition. The position of the site at the confluence of the rivers Thames and Lea almost certainly influenced the type and mode of sediment deposition. For example, organics eroding from reed marshes along the landward side of the tidal basin may have been carried by the Lea to the main channel. Subsequently, thick silty alluvial clays were deposited on the floodplain, indicating an increase in the frequency of flood events, probably due to a general rise in river levels. Weathering of clays at the top of the sequence suggests drying out and possibly the start of soil formation in the early historic period or later. One of the three timber stakes driven into the upper clay deposits were dated to between AD 990 and 1200 confirming their late medieval origin, although little can be said regarding form or function.
Project dates	Start: 06-08-2007 End: 09-08-2007
Previous/future work	No / Not known
Any associated project reference codes	DRI07 - Sitecode

Type of project	Field evaluation
Site status	None
Current Land use	Vacant Land 1 - Vacant land previously developed
Monument type	REVETMENT Uncertain

Project location

Country	England
Site location	GREATER LONDON NEWHAM CANNING TOWN Land Drainage, Site A, Dock Road Industrial Estate, West Silvertown, London E16
Postcode	E16
Study area	3500.00 Square metres
Site coordinates	TQ 39840 80695 51.5073569334 0.01522837809580 51 30 26 N 000 00 54 E Point
Height OD	Min: -2.43m Max: 0.69m

Project creators

Name of Organisation	MoLAS/PCA
Project brief originator	Greater London Archaeology Advisory Service
Project design originator	MoLAS
Project director/manager	Kieron Tyler
Project supervisor	Elaine Eastbury
Type of sponsor/funding	London Development Agency (LDA)

body

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	Land Drainage, Site A, Dock Road Industrial Estate, West Silvertown, London E16
Author(s)/Editor(s)	Eastbury, E.
Author(s)/Editor(s)	Nicholls, M.
Date	2008
Issuer or publisher	MoLAS
Place of issue or publication	London
Description	MoLAS unpublished client report

Entered by	Mary Nicholls (mnicholls@molas.org.uk)
Entered on	24 July 2008

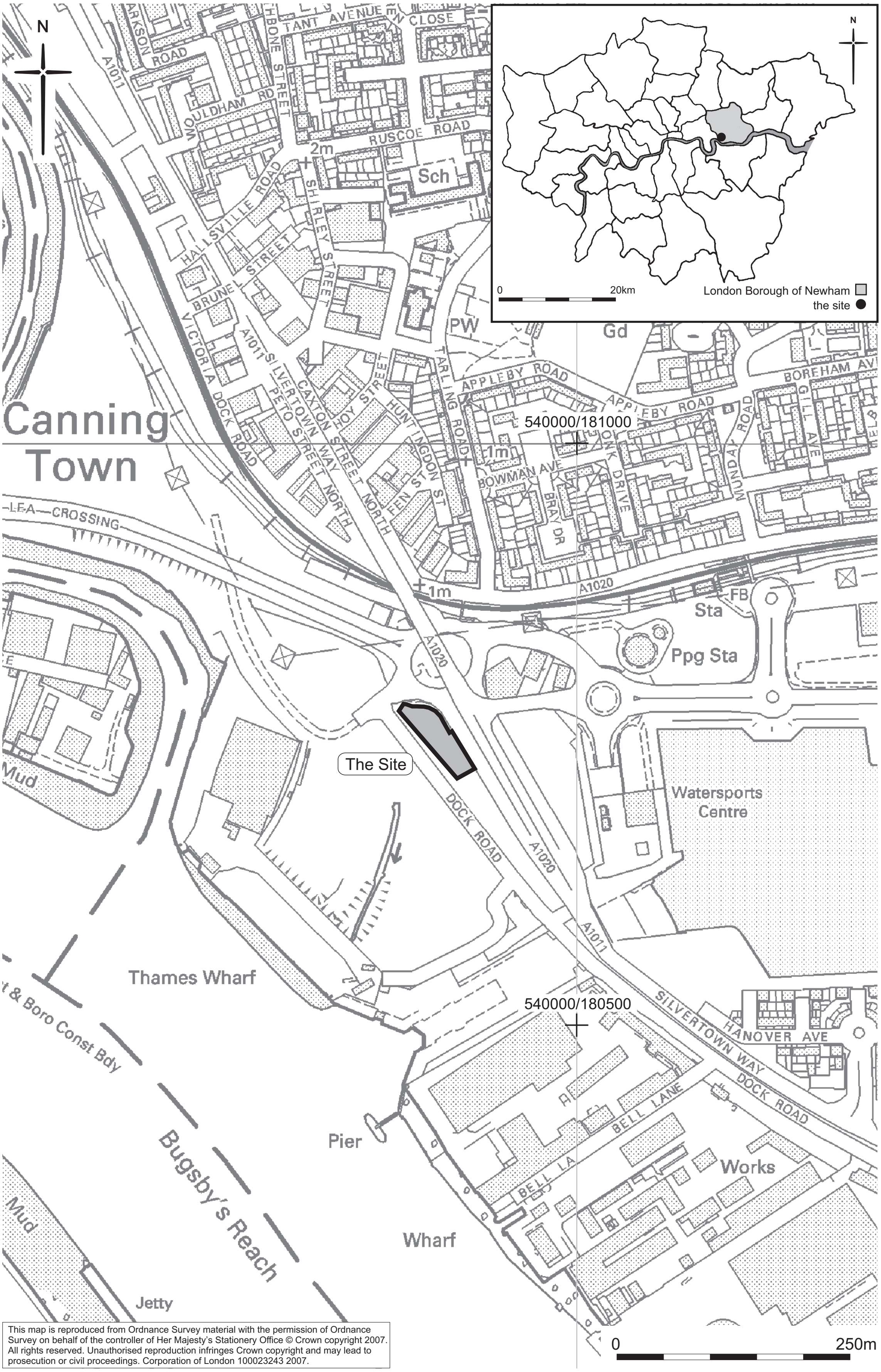

Fig 1 Site location

Fig 2 Location of evaluation trench

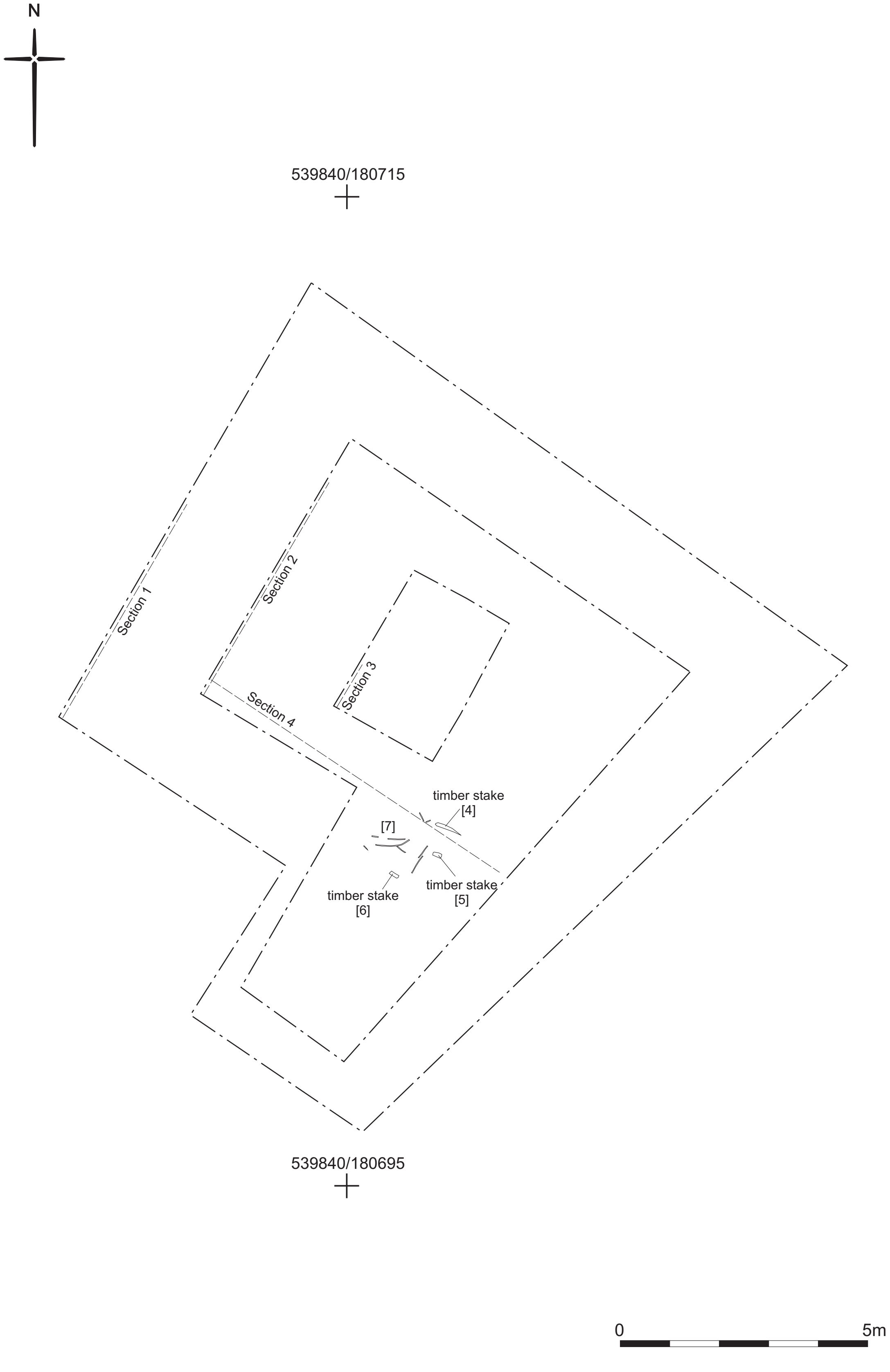

Fig 3 Location of timber stakes [4], [5] and [6]

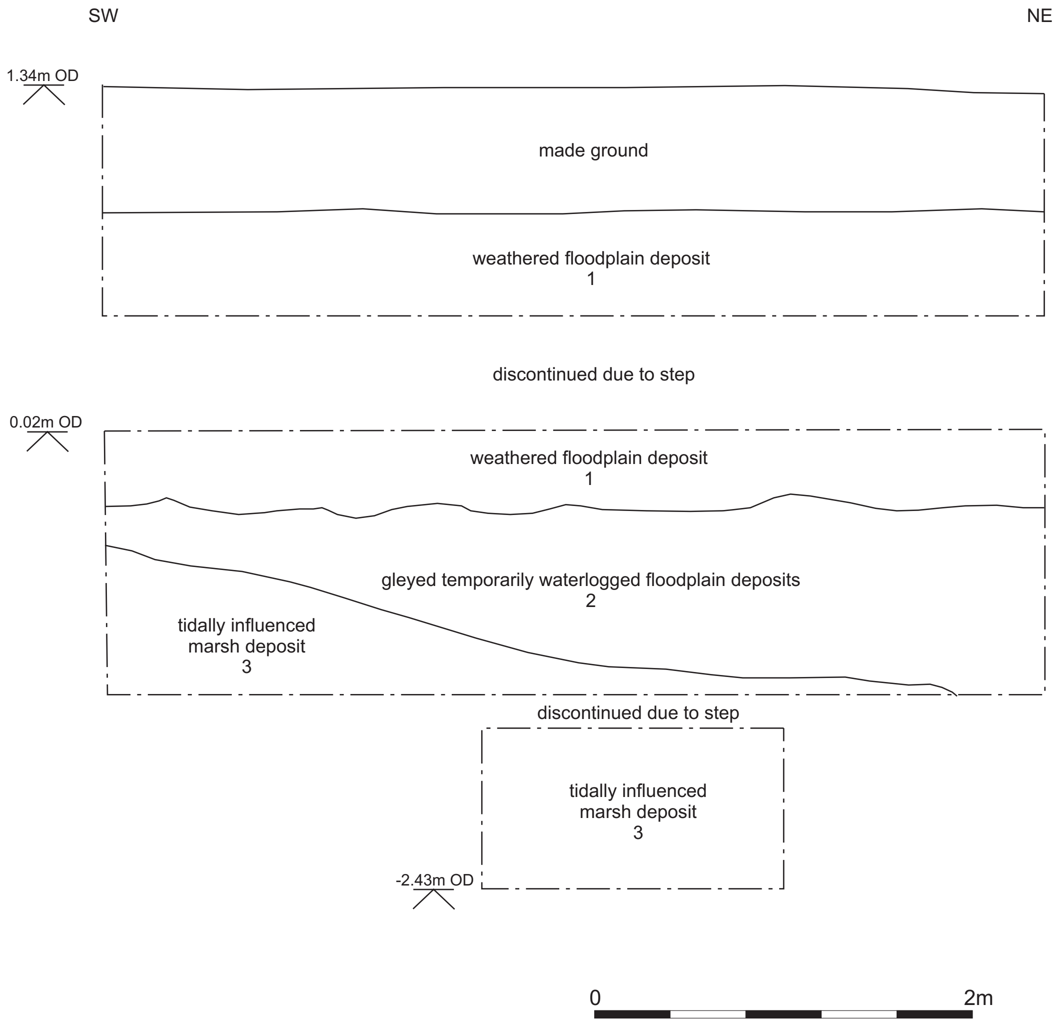

Fig 4 South facing section

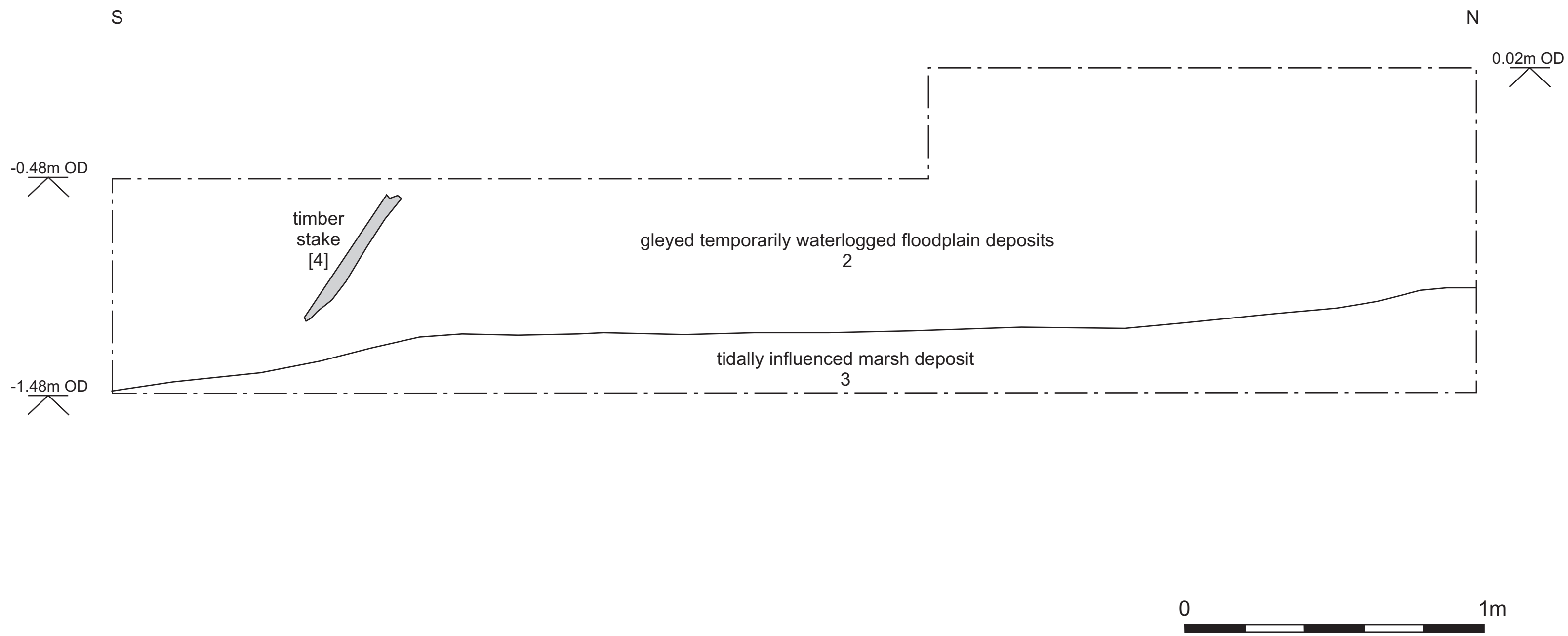

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Fig 5 East facing section

Fig 6 East facing section showing Units, 1, 2 and 3