LAND AT WOOD WHARF, TRAFALGAR WAY, ISLE OF DOGS

AN ARCHAEOLOGICAL ASSESSMENT

LOCAL PLANNING AUTHORITY: LONDON BOROUGH OF TOWER HAMLETS

PLANNING REF: PA/13/02966

PCA REPORT NO: R12643

SITE CODE: TRA15

SEPTEMBER 2016

PRE-CONSTRUCT ARCHAEOLOGY

DOCUMENT VERIFICATION

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AN ARCHAEOLOGICAL ASSESSMENT

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Assessment of an Archaeological Evaluation, Excavation and Watching Brief of Land at Wood Wharf, Trafalgar Way, Isle of Dogs, E14 9SB, London Borough of Tower Hamlets

Site Code:	**TRA15**
Central NGR:	**TQ 3811 8010**
Report No.:	**R12643**
Local Planning Authority:	**London Borough of Tower Hamlets**
Planning Reference:	**PA/13/02966**
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1 ABSTRACT

1.1 This report details the result of an archaeological evaluation, excavation and watching brief undertaken by Pre-Construct Archaeology Ltd on behalf of CgMs Consulting at Trafalgar Way, Isle of Dogs, London Borough of Tower Hamlets (Figure 1). The archaeological investigation was conducted in three phases: Phase 1 and 3 were carried out between 6th and 15th July 2015 and 16th and 23rd November 2015 respectively; Phase 2 between 26th November and 23rd December 2015 and 11th January 2016; The archaeological works were carried out in accordance with the standards specified by the Institute of Archaeologist (CIfA 2014) and following the guideline issued by Historic England (Historic England 2015).

1.2 The archaeological works found evidence of Late Devensian Shepperton Gravel capped by Holocene alluvial deposits containing widespread episodes of peat formation spanning from the late Neolithic to the early Iron Age confirming the great palaeoenvironmental and geoarchaeological potential of the site (see Appendix 3). Moreover the age and thickness of the peat at Wood Wharf is consistent with peat formations observed elsewhere on the Isle of Dogs.

1.3 The archaeological works found further evidence of the development of the site during the post-medieval period. A sequence of deposits sealing the early alluvial deposits was recorded in Area 1 with an overall thickness of 1.16m. These deposits, containing fragments of post-medieval CBM, charcoal and industrial waste inclusions were interpreted as ground raising/consolidation for the construction of the Docks during the 19th century.

1.4 Further evidence of the development of the site was observed in Trench 7 in which part of the north side of the canal connecting the Blackwall Basin to the north and the Junction Dock to the south was found. The canal wall consisted of large granite ashlar blocks with a roughed western (internal) face. Only a small segment of this wall was exposed measuring 4.02m long and 1.37m wide.

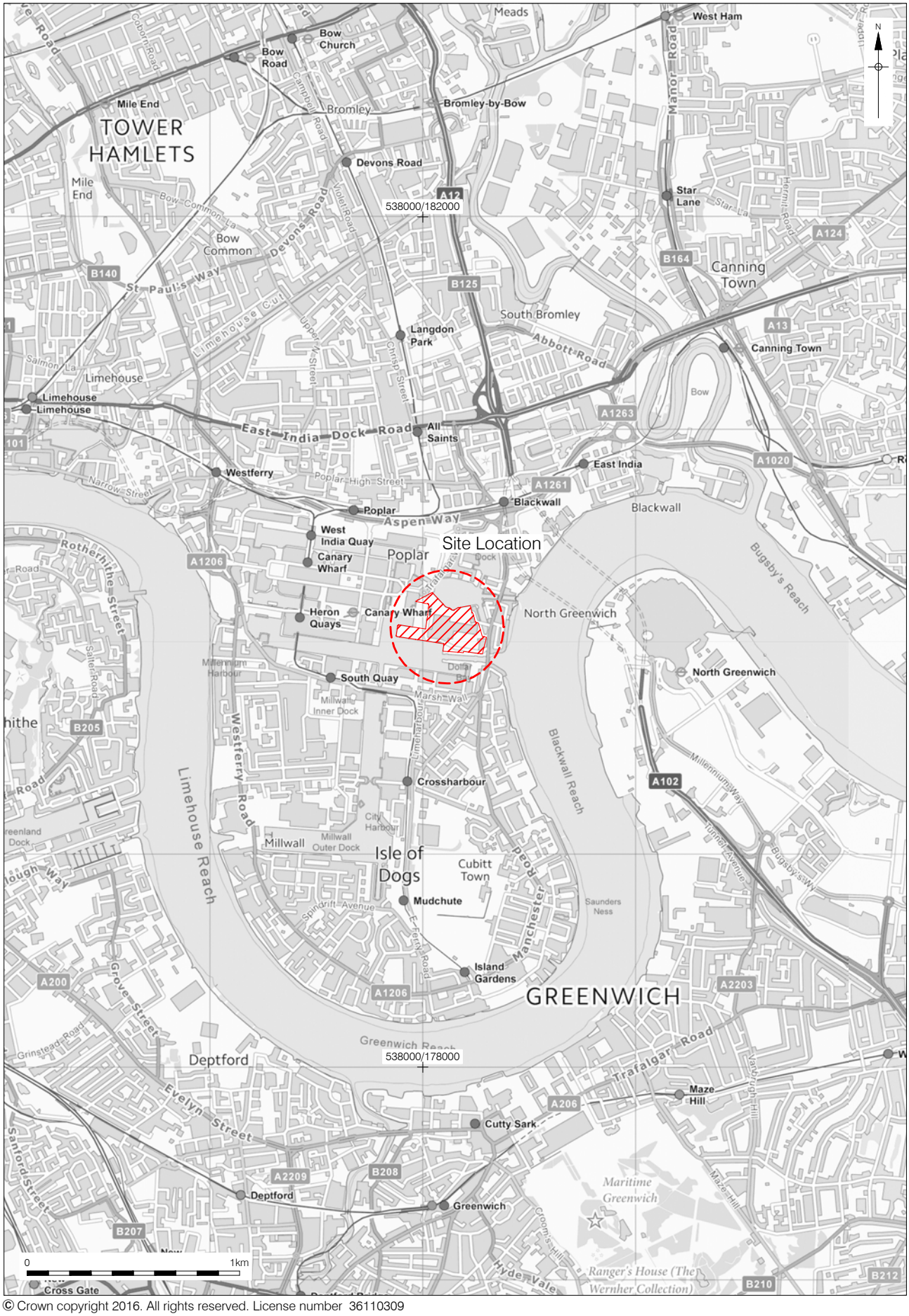
2 INTRODUCION

2.1 An archaeological evaluation, excavation and watching brief commissioned by CgMs Consulting Ltd was undertaken on land at Wood Warf, Trafalgar Way, E14 9SB in the London Borough of Tower Hamlets between 6th July 2015 and 11th January 2016. The site was irregular in shape, measured 425m east to west by 270m north to south and covered an area of approximately 6.1 hectares.

2.2 The Written Scheme of Investigation (Hawkins 2015) and updated by Chris Mayo on 29th June 2015 (Mayo 2015), detailed the methodology by which the archaeological investigation was undertaken. The WSI followed Historic England guidelines (Historic England 2015) and those of the Institute of Field Archaeologists (CIfA 2014). Phases 1 and 3 were supervised by Amelia Fairman (Figure 2); Phase 2, supervised by Ireneo Grosso, consisted in the excavation of evaluation Trench 4, the excavation of Area 1 and 3 and the watching brief in Area 2 (Figure 2). The site was project managed by Helen Hawkins for Pre-Construct Archaeology Limited and monitored by the archaeological adviser to the London Borough of Tower Hamlets, John Gould of Historic England GLAAS. Duncan Hawkins of CgMs Consulting, the client's archaeological consultant, oversaw the archaeological works.

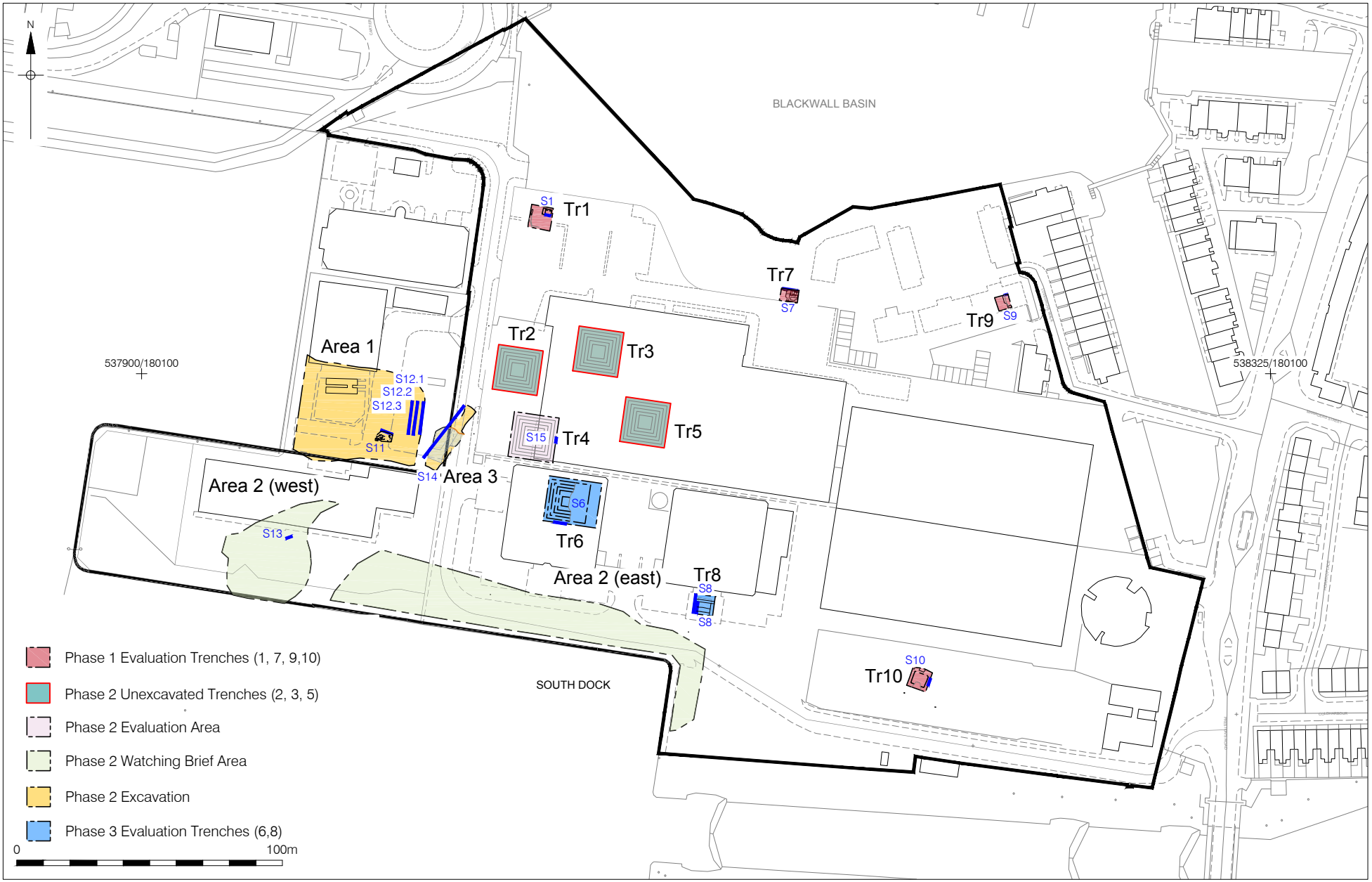
2.3 The site of the proposed development was bordered by the South Dock on the south, the West India Docks and Cartier Circle on the west, the Blackwall Basin and Lovelace Walk on the north and Preston Road on the east and was until recently occupied by warehouses.

2.4 The site was given the Museum of London site code TRA15. The complete archive comprising written, drawn and photographic records will be deposited at the London Archaeological Archive and Research Centre (LAARC).



28/01/16 RM

Figure 1
Site Location
1:25,000 at A4



29/01/16 RM

Figure 2
Trench Location Plan
1:2,000 at A4

29/01/16 RM

Figure 3
Trench Locations overlain on Ordnance Survey map of 1867
1:2,000 at A4

3 PLANNING BACKGROUND

3.1 National Planning Policy Framework (NPPF)

3.1.1 The National Planning Policy Framework (NPPF) was adopted on March 27th 2012, and now supersedes the Planning Policy Statements (PPSs). The NPPF constitutes guidance for local planning authorities and decision-takers both in drawing up plans and as a material consideration in determining applications. Chapter 12 of the NPPF concerns the conservation and enhancement of the historic environment.

3.1.2 In considering any proposal for development, including allocations in emerging development plans, the local planning authority will be mindful of the policy framework set by government guidance, existing development plan policy and of other material considerations.

3.2 Regional Guidance: The London Plan

3.2.1 Additional relevant planning strategy framework is provided by The London Plan, which was updated in 2015. It includes the following policy of relevance to archaeology within London:

Historic environments and landscapes

POLICY 7.8 HERITAGE ASSETS AND ARCHAEOLOGY

Strategic

A London's heritage assets and historical environment, including listed buildings, registered historic parks and gardens and other natural and historic landscapes, conservation areas, World Heritage Sites, registered battlefields, scheduled monuments, archaeological remains and memorials should be identified, so that the desirability of sustaining and enhancing their significance and utilising their positive role in place shaping can be taken into account.

B Development should incorporate measures that identify, record, interpret, protect and, were appropriate, present the site's archaeology.

Planning decisions

C Development should identify, value, conserve, restore, re-use and incorporate heritage assets, where appropriate.

D Development affecting heritage assets and their setting should conserve their significance, by being sympathetic to their form, scale, materials and architectural detail.

E New development should make provision for the protection of archaeological resources, landscapes and significant memorials. The physical assets should, where possible, be made available to the public on-site. Where the archaeological assets or memorial cannot be preserved or managed on-site, provision must be made for the investigation, understanding, recording, dissemination and archiving of that assets.

LDF preparation

F Boroughs should, in LDF policies, seek to maintain and enhance the contribution of built, landscaped and buried heritage to London's environmental quality, cultural identity and economy as part of managing London's ability to accommodate change and regeneration.

G Boroughs, in consultation with English Heritage, Natural England and other relevant statutory organizations, should include appropriate policies in their LDFs for identifying, protecting, enhancing and improving access to the historic environment and heritage assets and their setting where appropriate, and to archaeological assets, memorials and historic and natural landscape character within their area.

3.3 London Borough of Tower Hamlets, Local Plan: Strategic Policies

3.3.1 The local planning authority responsible for the study site is the London Borough of Tower Hamlets whose strategic policy (adopted September 2012) stipulates as follows:

SP12

3.3.2 Improve, enhance and develop a network of sustainable, connected, well-designed places across the borough through:

a. Ensuring places are well-designed so that they offer the right lay out to support the day to day activities of local people.
b. Retaining and respecting the features that contribute to each places' heritage, character and local distinctiveness.
c. Ensuring places have a rang and mix of dwelling types and tenures to promote balanced, socially mixed communities.
d. Ensuring places have access to a mixed-use town centre that offers a variety of shops and services.
e. Ensuring places have a range and mix of a high quality publicly accessible green spaces that promote biodiversity, health and well-being.
f. Promoting places that have access to a range of public transport models in order for local people to access other parts of the Borough and the rest of London.

g. Ensuring places provide for a well- connected, safe and attractive network of streets and spaces that make it easy and pleasant to walk and cycle.
h. Ensuring spaces promote wider sustainability and assist in reducing society's consumption of resources and its carbon footprint.
i. Ensuring development proposals recognise their role and function in helping to deliver the vision, priorities and principles for each place.

3.4 Site Specific Planning Background

3.4.1 The site is partially located within an Archaeological Priority Area as defined by the London Borough of Tower Hamlets. There are no Scheduled Ancient Monuments within or adjacent to the site.

3.4.2 In December 2014, Outline Planning Permission (with all matters reserved) (ref. PA/13/02966) was granted by the London Borough of Tower Hamlets (LBTH) for the comprehensive mixed-use redevelopment of the Wood Wharf Site ("the OPP Site"). A number of conditions attached to the Outline Planning Permission require details to be submitted for approval by the London Borough of Tower Hamlets at various stages specified within the Decision Notice. This report and the Written Scheme of Investigation (Hawkins 2015) (updated on 29th June 2015) which precede it has been prepared to discharge Condition 20 (a) which states:

"No Development shall take place until the applicant has secured the implementation of a programme of archaeological work in accordance with a Written Scheme of Investigation which has been submitted to and approved by the Local Planning Authority. No Development shall take place save in accordance with such Written Scheme of Investigation as approved"

4 GEOLOGY AND TOPOGRAPHY

4.1 The site lies on the northeast part of the Isle of Dogs, south of the Blackwall Basin and to the north of the South Dock. It lies *c.* 80m to the west of the Blackwall Reach part of the River Thames.

4.2 The British Geological Survey (BGS) geological map (Drift) of the site indicates that the site is underlain by recent (Holocene) alluvium, overlying a sequence of Late Pleistocene strata (up to *c* 10,000 years ago). This later sequence comprises clay, silt and sand and gravel of the Lambeth group.

4.3 The palaeotopography of the Isle of Dogs comprised gravel islands (eyots) separated by former river channels (palaeochannels). The site lies in an area where fluctuating sea and river levels resulted in the creation of marshy areas and localised peat formation, which was most prevalent during the Tilbury IV regression phase that equated with the Middle to late Bronze Age.

4.4 The site is located at between a highest recorded level of 5.55m OD and lowest recorded level of 5.08m OD. All ground levels within the site are, however, entirely artificial being a product of 19th- and 20th-century land forming and engineering. The site formed part of the former Wood Wharf area of the Docklands.

4.5 A deposit modelling exercise prepared by PCA in 2014 (Boyer 2014) used data from two phases of work from PCA and a number of logs recorded by the British Geological Society (BGS). The exercise showed that “the study area is underlain by natural terrace gravels incised by former channels and that for much of the period from the Bronze Age, if not significantly earlier, the site has been susceptible to frequent flooding, which have restricted human exploitation of the area” (Boyer 2014, 8).

5 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

5.1 Introduction

5.1.1 The archaeological and historical background cited below derives from the desk based assessment prepared for this site (CgMs 2004).

5.2 Prehistoric

5.2.1 Samuel Pepys recorded in his diary the uncovering of a fossil forest at Blackwall at the base of an alluvial sequence during Dock construction work in 1665. Palaeolithic human remains were recorded from Poplar during deep building work in 1923.

5.2.2 Cowper, in his history of Millwall dated 1853, notes the remains of a forest with associated animal and human remains, revealed during the construction of the West India Docks. Cowper also recorded that during the excavation of the former linking channel, from the Blackwall Basin, to the West India Docks, on the study site itself, decayed wood, rushes and snails below the alluvial sequence was observed. This forest has long been thought to be of Palaeolithic date. However, recent radiocarbon dates indicate that a Neolithic or Bronze Age date is much more likely. Contemporary forest remains (of Alder and Birch) have been identified in recent archaeological work on the Thames floodplain at Thamesmead and Erith. The archaeological evaluation of Fergusson's Wharf on the Isle of Dogs, revealed large quantities of fallen birch at the surface of a peat unit.

5.2.3 A mammoth tusk is recorded from the Blackwall Tunnel though the precise context of the find is now unknown.

5.2.4 A single Mesolithic find is recorded within a 1km radius of the study site, a Tranchet axe from Poplar. The archaeological investigation at Atlas Works, on the western side of the Isle of Dogs, revealed a multiphase timber platform at the top of a peat sequence. This structure, constructed between 1890-1600 BC and abandoned 1520-1160 BC, was almost certainly a base for wildfowling, fishing and/or reed gathering, rather than a permanent settlement site. The platform was located at the eastern edge of a north-northwest, south-southeast running braided channel crossing the eastern part of the site.

5.2.5 Recent archaeological work at the White Swan development on Preston Road on the Isle of Dogs has revealed a Neolithic burial lain in a timber-lined pit on an area of high gravels. This is the first Neolithic burial recorded from Greater London.

5.2.6 A Neolithic axe of polished black stone is recorded from the Thames at Blackwall and another Neolithic polished axe of Grey/Black stone is recorded from the Blackwall Tunnel.

5.2.7 Bronze Age activity has been identified on the western side of the Isle of Dogs between Westferry Road and the Thames in the form of a small quantity of burnt flint associated with peat deposits.

5.2.8 Although numerous late Neolithic and Bronze Age activity and occupation sites are now known from the Thames floodplain predicting the presence or absence of such sites is highly problematical. However, it is clear that topographical features (such as the channel at Atlas Wharf, or a sand island associated with a Neolithic timber trackway at Fort Street, Silvertown, or the sand island associated with the Neolithic burial at the White Swan site) played a significant part in their siting.

5.2.9 While there is clear evidence of late Neolithic and Bronze Age activity at Atlas Wharf, archaeological evaluations at the Blackwall Tunnel, Charrington's Wharf, Blackwall, Fergusson's Wharf, Inglewood Close, Masthouse Terrace, Millwall Wharf, Preston Street, Dingle Garden, and Blackwall Stairs revealed no evidence of Neolithic or Bronze Age occupation or activity, despite comprehensive assessment of the peat units present. An Archaeological watching brief at East Ferry Road/Glengall Grove and Limeharbour Road was similarly negative.

5.3 Roman

5.3.1 A miniature Oenochoe (Wine Vessel) was found at Blackwall before 1912 but the precise context of the find is now unknown.

5.3.2 In situ Roman activity has only recently (2002) been identified on the Isle of Dogs to the west of the West India Docks, in an area of high gravels. No Roman activity sites are currently known on the eastern side of the Isle of Dogs.

5.3.3 During the late Roman period it is known that there was a significant rise in sea level. It is likely that the whole of the Isle of Dogs, as far north as the present Poplar High Street, was either permanently or seasonally flooded from the end of this period until the 12th century. It should be noted, in this context, that Limehouse Causeway and Poplar High Street run along the top of a major late medieval flood defences, attesting to the level of flooding that could occur.

5.4 Saxon and Early Medieval

5.4.1 The site is remote from all known settlements of these periods, nor has any cultural material of any of these periods been recorded in the immediate vicinity of the site. The site lay between the main medieval river defences at Poplar High Street and the Thames and in all likelihood comprised salt marsh. Indeed, for a significant proportion of these periods the site is likely to have lain under water.

5.5 Late Medieval

5.5.1 From the 12th century onwards the Isle of Dogs was subject to the process of 'inning' whereby the salt marsh was reclaimed by embarking, drained and converted to pasture. This process was extremely slow and often subject to sudden and catastrophic reverses through flood events. However, by the 14th century the island was being noted for the

quality of its sheep pasture. The last major flood appears to have occurred in 1448, when the river wall opposite Deptford was breached.

5.5.2 By the close of this period the main flood defences probably ran along the line of Westferry Road/Manchester Road/Preston Road. There were no significant settlements on the island, though there was a Chapel for Shepherds, St Mary's first recorded in 1380, but abandoned by the 15th century and located just southeast of the Millwall outer Dock and a ferry house (at Felstead Wharf). It has been suggested that there may have been a medieval hamlet around St Mary's Chapel in the 14th century but this has yet to be proven. A settlement at Blackwall, north-east of the site was present by the 14th century (first recorded in 1362), though this was confined to a single street the 'Blackwall' adjacent to Blackwall Stairs.

5.5.3 A ferry ran from Blackwall to Greenwich from the late 14th century. A gold medieval spur was recovered during the excavation of the Millwall South Dock in 1800. The archaeological evaluation of Fergusson Wharf on the southwestern edge of the Isle of Dogs revealed evidence for the low intensity activity in this period, with the cutting of drainage ditches, the disposal of rubbish and the laying of eel traps.

5.6 Post-Medieval and Modern

5.6.1 Gascoyne's map of 1703 and Rocque's map of 1741-5 shows the study site as undeveloped agricultural land, though by this date settlement had spread south from Blackwall to Coldharbour, east of the study site.

5.6.2 The West India Dock which largely defines the shape of the site was opened in 1802 and is shown as built in Rawles plan of that year. The extreme west and southwest of the site are shown as occupied by warehousing while the remainder of the site was occupied by wharfage or vacant. The linking channel between the Blackwall Basin and the West India Docks along the northwest of the site is clearly visible. The Blackwall Basin was the first impounded or non-tidal Dock entrance ever built. Originally it was not walled, the banked sides being puddle. Map evidence indicates the northern part of the site includes part of the original extent of the Blackwall Basin now filled in. The south bank fronting the study site was walled in 1927 to 1928.

5.6.3 The Junction Dock which formerly occupied the central part of the study site was built in 1853-1855 to link the South Dock to the other parts of the West India Docks. The construction of this Dock had been mooted as early as 1819 but it was not until the collapse of the Blackwall entrance north wing wall in 1851 that the necessity for this Dock became unavoidable. The Junction Dock as built was 150ft (*c*. 45.45m) by 320ft (*c*. 96.96m) with entrances 45ft (*c.* 13.63m) wide and 25ft (*c.* 7.58m) deep. The Dock was built with Kentish Rag faced concrete footings to brick walls with slightly battered sides. The entrance passages were straight sided with inverted arched bottoms and timber reverse sweep gates. The Dock included a single granite faced timber slip with cranes to

serve adjoining wood piling grounds. The final cost of the work was £82,797. It should be noted that the southern part of the study site includes part of the original extent of the South Dock, now filled in.

5.6.4 The Ordnance Survey map of 1867 shows the site following completion of the Junction Dock but before the construction of the Graving Dock in 1876-8. At this time the site was largely utilised for storage of timber. Buildings present on the site included a large coal shed, a proving House, timber sheds, a hydraulic engine house and a guard house.

5.6.5 In 1876-8 the Graving Dock which partly occupied the extreme northeast of the site was completed. An 1881 Dockyard plan provides a detailed view of the site. The construction of the Graving Dock had caused a number of changes from 1867 with the deletion of some buildings and addition of others.

5.6.6 The bulk of the site was however still utilised for storing timber. Extensive alterations were made to the Blackwall Basin and the West India Docks in the course of the 1890s. Extensive light railways for moving goods and for travelling cranes had been laid out on the site and substantial sheds for storing timber constructed. These are detailed in the Ordnance Survey map of 1893.

5.6.7 Between 1893 and 1916 the timber sheds on the site were massively expanded with virtually the whole site except for the Junction Dock and Graving Dock being occupied by sheds and warehousing.

5.6.8 From 1926 the West India Docks were massively rebuilt to allow access for larger ships. The Ordnance Survey of 1938 shows the site in its existing shape though none of the existing building appear to have been present. The site was still principally occupied by timber sheds and warehousing at this time along with the Junction Dock and West India Graving Dock.

5.6.9 A survey of 1930 indicates that the timber sheds on the site were principally used for the storage of mahogany.

5.6.10 The study site underwent some bomb damage during the 1914-1918 war, the principal damage being to a Saltpetre Warehouse which had been present on the site from before 1881. The London Graving Dock Company expanded their operations into the former Saltpetre Warehouse which was rebuilt as a Platers shop in 1918-1919. A 15 ton electric travelling crane was erected alongside the Graving Dock in 1933.

5.6.11 The study site was very heavily bombed in 1940-41 and the Marine Engineering Works which had developed alongside the Graving Dock had to be rebuilt in 1942 to 1943. In 1945 the Marine Engineering Works expanded further west, the Dock was rebuilt in 1948-9 and further expansion took place in 1951.

5.6.12 The Graving Dock finally closed in 1979 and the Marine Engineering Works were completely demolished in 1985-86. In the meantime, the Junction Dock had been filled in in 1979-80 by the Port of London Authority as part of an agreement for the lease of the

site to Teltshir Brothers Limited whose warehouses was subsequently built across the site in 1986-7 to provide a total of 45,000 sq ft of office accommodation.

6 ARCHAEOLOGICAL METHODOLOGY

6.1 Following the archaeological desk based assessment carried out for the site by CgMs (CgMs 2004) and the deposit modelling exercise (Boyer 2014) the methodology was set out in the WSI (Mayo 2015) which aimed to address the following primary objectives:

- To determine the natural topography of the site and establish the palaeoenvironmental potential;
- To establish the presence or absence of prehistoric activity;
- To establish the presence or absence of peat at the site and to sample the peat for C14 dating if present;
- To establish the nature, date and survival of activity relating to any archaeological period at the site, specifically the 18th- and 19th-century dock structures;
- To establish the extent of all past-depositional impacts on the archaeological resource.

6.2 The evaluation, carried out in three phases, consisted of 10 proposed evaluation trenches. Phase 1 comprised Trenches 1, 7, 9 and 10. Phase 2 comprised Trenches 2, 3, 4, 5 and Areas 1, 2 and 3. Phase 3 comprised Trenches 6 and 8 (see Figure 2).

6.3 Trenches 1-6 aimed to reach the top of the natural gravel terrace, Trenches 7-10 were designed to expose the 18th/19th-century remains of the Docks. Excavation Areas 1 and 3 aimed to investigate and sample the upper and lower alluvial units and the peat deposits as set out in the Wood Wharf peat sampling methodology (Perez-Fernandez 2015). A watching brief located in the southern part of the site (Area 2) was also carried out.

6.4 Of the 10 proposed evaluation trenches three were not excavated (Trenches 2, 3 and 5) due to the very unstable ground conditions of the site. An attempt to open Trench 4 was made but it was later abandoned as the very unstable and waterlogged sides of this trench did not allow the excavation of a safe stepped trench aimed to reach the gravel terrace. However, the west facing section of Trench 4 was recorded without entering the trench.

6.5 The table below detail dimensions and the deepest OD level of all open trenches (including Trench 4):

Trench/ Area	Phase of work	Type of intervention	Dimension at top	Dimension at base	Max depth OD
Trench 1	1	Evaluation	8.5m N-S, 8.5m E-W	1.75m N-S, 2.25m E-W	-0.80m
Trench 4	2	Evaluation	17m N-S, 17m E-W	5m N-S, 10m E-W	2.20m
Trench 6	3	Evaluation	17m N-S, 20m E-W	3.5m N-S, 3m E-W	-1.43m

Trench 7	1	Evaluation	4.75m N-S, 5.5m E-W	4m N-S, 5.3m E-W	4.29m
Trench 8	3	Evaluation	7.4m N-S, 7.4m E-W	2m N-S, 4.90m E-W	1.44m
Trench 9	1	Evaluation	5.35m N-S, 5.25m E-W	4.20m N-S,1.50m E-W	3.88m
Trench 10	1	Evaluation	8.05m N-S, 7.5m E-W	4.6m N-S, 5.4m E-W	2.98m
Area 1	2	Excavation	38m N-S, 46m E-W	3.73m N-S, 6.20m E-W	-3.08m
Area 2 (West)	2	Watching Brief	41.3m N-S, 33.3m E-W	41.3m N-S, 33.3m E-W	-2.09m
Area 2 (East)	2	Watching Brief	21.5m N-S, 142.5m E-W	21.5m N-S, 142m E-W	-2m
Area 3	2	Excavation	27.4m NE-WS, 9.42m NW-SE	27.4m NE-SW, 9.42m NW-SE	-2.92m

6.6 The excavation of all evaluation trenches and excavation areas was undertaken using a 22 ton 360° mechanical excavator provided by the main principal contractor. The mechanical excavator used a toothless ditching bucket to remove modern overburden under constant archaeological supervision. Spoil was mounded at a safe distance from the edges of the trenches.

6.7 Following machine excavation, relevant faces of the trenches that required examination or recording were cleaned using appropriate hand tools. The investigation of archaeological levels was carried out by hand, with cleaning, examination and recording both in plan and in section.

6.8 The strategy for sampling archaeological and environmental deposits and structures was developed by PCA, in consultation with Dan Young and Rob Batchelor from QUEST.

6.9 All archaeological features (stratigraphical layers, cuts, fills, structures) were excavated with hand tools and recorded in plan at 1:20 or in section at 1:10 using standard single context recording methods. Archaeological features and deposits were recorded so as to characterise their form, function and date. Fabric samples were taken from brickwork structures and environmental samples were taken from the sequence of alluvium and peat layers.

6.10 The recording systems adopted during the investigations were fully compatible with those widely used elsewhere in London that is those developed out of the Department of Urban Archaeology Site Manual, now published by the Museum of London Archaeological Service (MoLAS 1994) and with the PCA Site Manual (Taylor and Brown 2009). The site archive was organised to be compatible with the archaeological archives produced in the Local Authority area.

6.11 A full digital photographic record was made and maintained during the archaeological investigation.

6.12 The complete archive produced during the evaluation, watching brief and excavation, comprising written, drawn and photographic records, will be deposited with the Museum of London site code TRA15.

6.13 Seven temporary benchmarks (TBM) were established using a GPS at the heights of 5.43m OD (TBM1), 5.49m OD (TBM6), 5.08m OD (TBM7), 4.99m OD (TBM9), 5.55m OD (TBM10), 5.30m OD (TBM4) and -3.08m OD (TBM11). Areas 1, 2 and 3 were recorded and located with a GPS.

7 THE ARCHAEOLOGICAL SEQUENCE

7.1 Introduction

7.1.1 The following text is an overview of the archaeological sequence recorded during the evaluation, watching brief and excavation. Full individual context description and Ordnance Datum levels are detailed in Appendix 1.

7.1.2 During the archaeological investigation it became clear that the site was exposed to different flooding events during the earliest period (Terrace Gravels, sands and clays) interrupted by dry or semi-dry environment (Peat formation). The sequence associated with archaeological Phase 1 was obtained during the excavation of Areas 1 and 3 and the WB in Area 2 (West).

7.2 Phase 1.1: Terrace Gravel and Early River Bed Deposits

7.2.1 The earliest deposit, consisting of loose sand and gravel (Terrace Gravel) was recorded at -2.38m OD and -2.42m OD in the west of central part of the site in Areas 1 and 3 respectively (see Figure 7 and Plates 1 and 2). The Terrace Gravel, recorded as [108], was extensively exposed in the base of Area 1 which measured 38m N-S by 46m E-W. No archaeological features were observed at the base of Areas 1 and 3.

7.2.2 In Area 1 the Terrace Gravel was sealed by a sequence of sands and clay layers. The sand layers recorded as [107] and [106] at -2m OD and -2.18m OD respectively were overlaid at -1.63m OD by sandy clay layer [105] (see section Figure 7 and Plates 3 and 5). Similarly to the south of the site in watching brief Area 2 (west), a very similar sequence was recorded as [130], [129] and [128]. Here sand deposit [130] found at -2.05m OD was overlaid by sandy clay [129] at -1.84m OD which in turn was sealed by organic sandy clay layer [128] at -1.84m OD (see Figure 7 and Plates 3 and 5).

7.3 Phase 1.2: Natural Cut Feature

7.3.1 Natural sandy clay layer [105] in Area 1 was truncated at -1.64m OD by natural cut feature [121] (only recorded in section 12, see Figure 7) which had its base at -2.42 OD. This cut located in the southern part of Area 1, with an approximate E-W orientation and a width of 1.87m contained a sequence of naturally deposited sandy clay fills recorded as [119], [120], [118], [117], [116] and [115] at levels between -2.16m OD and -1.47m OD. No dating material was recovered from these backfills which were interpreted as natural silting of a palaeochannel or stream [121].

7.4 Phase 1.3: Lower Alluvial Deposits

7.4.1 In Area 1 the upper fill of natural feature [121] was sealed at -1.18m OD by sterile firm mid grey clay alluvial layer [104]. In Area 3, immediately to the east of Area 1, natural Terrace Gravel (Phase 1.1) was overlaid at -1.47m OD by a similar alluvial deposit [136]

which was interpreted as being the same as context [104] in Area 1. A similar deposit, recorded as [127], was also observed at -1.69m OD in WB Area 2 (West) (see Figure 7 and Plate 8). Layers [104], [136] and [127] represented the upper horizon of the alluvium which was deposited within a generally low energy fluvial environment on the site which was soon replaced by peat formation which is indicative of a relatively drier semi-aquatic or semi-terrestrial environment supporting the growth of plants in a semi-dry semi-aquatic environment (see Phase 2 below).

7.5 Phase 2: Marsh Environment

7.5.1 A sequence of peat and alluvial clay layers was observed in Areas 1, 2 and 3 (see Figure 7, Section 11, 12, 13 and 14). In Area 1 alluvial layer [104] was overlaid at -1.60m OD by 0.15m thick clayey peat layer [103]. This layer is indicative of changing conditions on the site from a low energy fluvial environment to a semi-aquatic environment.

7.5.2 Overlying [103] at -1.04m OD was a 0.37m thick firm dark brown peat layer [102] with very frequent inclusions of large to small sized compressed fragments of un-worked wood. The wood, mostly well preserved and moist, seemed to be part of tree roots and collapsed trees which once occupied this part of the site during a period of dryer environment. This layer, recorded in Sections 11 and 12, was column sampled as <100> in section 11 and as <114> in Section 12. The results of radiocarbon testing from this layer show that this peat horizon started forming from the Middle to the Late Neolithic. The changing environmental condition reverted to a more aquatic one represented by the formation above [102] of clayey peat layer [114] (see Section 12, Figure 7) found at -0.76m OD which was 0.2m thick.

7.5.3 Following the formation of layer [114] was a period of dryer semi-aquatic environment with the formation of peat layer [113] found at -0.65m OD which was 0.28m thick (see Section 12, Figure 7). This peat horizon represents the last identified period of semi-dry environment before the site reverted to a fluvial environment shown by the re-deposited mixed clay and peat layer [101] and alluvial deposit [100] (see Phase 3 below). Peat horizon [113], sampled as <114>, underwent C14 testing. The result of the test shows that this layer start formed between the Late Bronze Age and the Early Iron Age periods.

7.5.4 During the watching brief in Area 2 (West) a similar sequence of natural deposition to the one recorded in Area 1 was observed. Here lower alluvium [127] (Phase 1.3) was overlaid by a 0.35m thick peat layer [126] at -1.53m OD which in turn was sealed by a sequence of clayey peat layers recorded as [125], [124], [123] and [122] found at -1.53m OD, -1.18m OD, -1.21m OD and -0.81m OD respectively, with an overall thickness of 0.95m (see Section 13, Figure 7 and Plate 8). A similar sequence of alluvial deposits was observed during the watching brief in Area 2 (East) where ground reduction was carried out down to an average depth of -1.30m OD.

7.5.5 In Area 3, to the east of Area 1 the peat formation was recorded as [132] at -0.73m OD with a thickness of 0.40m.

7.6 Phase 3: Upper Alluvium and Later Peat Deposits (post-Roman?)

7.6.1 In Area 1 peat layer [102] was sealed at -1.10m OD by firm dark brown silt clay peat [101] with inclusions of frequent possibly worked timber and very fragmented oyster shells. This 0.20m thick and uneven layer was interpreted as a mix of re-deposited peat, alluvium and fragment of timber caused by flooding.

7.6.2 Contexts [101] and [113] (see Phase 2) were overlaid by firm light blue grey alluvial clay [100] at 0.42m OD. This 0.96m thick deposit, contained, in its upper part, inclusions of very abraded post-medieval CBM fragments probably the result of later re-work/disturbance associated with the later post-medieval occupation of the site (see Phase 4.1 below).

7.6.3 In Area 3 peat layer [132] (see Phase 2) was truncated to the south at -0.94m OD by natural cut feature [131]. This feature was partially observed both in plan and Section 14 (see Figure 7) and extended beyond the eastern and southern limits of excavation. Its overall dimensions were 7.39m NW-SE by 13.95m NE-SW with a maximum depth of 1m. Cut [131] contained very firm/plastic dark grey bluish sandy clay [134] with very occasional inclusions of very small decayed wood chips and some preserved leaf matter. No dating material was recovered from this backfill which were interpreted as natural silting of a large palaeochannel or natural depression. Context [134] was sealed at 0.38m OD by a 1.25m thick deposit of sandy clay [135] which was interpreted as undated upper alluvium (see Section 14, Figure 7).

7.6.4 At the base of Evaluation Trench 1, located in the northwest part of the site, a firm mid blue clay with sand lenses layer [3] was observed (see Section 1, Figure 5). This 1.6m thick layer was found at 0.83m OD and because of its OD level was interpreted as part of upper alluvial layer previously recorded in Area 1 and 3 (see above). Context [3] was in turn overlaid at 1.90m OD by a 1.1m thick peat deposit [2] which represents the latest recorded peat formation on site.

7.7 Phase 4.1: Ground Raising Deposits (Post-Medieval)

7.7.1 A sequence of ground raising deposits was recorded in Area 1 as [112], [111], [110] and [109] at 0.62m OD, 0.64m OD, 0.80m OD and 1.58m OD respectively (see Figure 7 Section 12). The overall thickness of these layers was 1.16m and they contained inclusions of occasional to moderate small CBM fragments, charcoal and industrial waste. These layers were interpreted as ground raising/consolidation for the construction of the Docks during the 19th century.

7.7.2 Further evidence for ground raising deposits was recorded in Evaluation Trenches 1, 4, 8 and 9 (see Figures 5 and 6, Sections 1, 15, 8 and 9). In Trench 1 re-deposited alluvial clay [1] was found at 3.58m OD; in Trench 4 loose/waterlogged re-deposited gravelly sandy clay [137] was found at 2.20m OD; in Trench 8 re-deposited alluvium was observed at 1.94m OD and finally in Trench 9 a loose mid brown clayey silt layer [5] was found at 4.24m OD. All these ground raising deposits contained occasional to moderate post-medieval CBM and other general industrial waste dating to the post-medieval period.

7.7.3 In Evaluation Trench 6, designed to target the gravel terrace, ground raising deposits were identified at a top level of 4.59m OD in the form of re-deposited alluvial clay [21] with lenses of made ground within it (see Figure 5, Section 6). However, it is possible that the lower horizon of context [21], excavated to a maximum depth of -1.43m OD represents in situ alluvium. No gravel terrace was exposed at the base of this trench.

7.8 Phase 4.2: Dock Structures (Mid 19th Century)

7.8.1 Trench 7, located in the north part of the site, was intended to target the dock walls associated with Junction Dock. The earliest feature identified was north-south orientated masonry [14] found at 4.78m OD, consisting of large granite ashlar blocks with a roughed western (internal) face. Context [14] which was 4.02m long and 1.37m wide with its western face partially exposed to a maximum elevation of 0.48m, was interpreted as part of the eastern canal wall connecting the Balckwall Basin and the Junction Dock located to the north and south respectively (see Plate 9).

7.8.2 Constructed against the eastern side (land side) of canal wall [14] was a red brick masonry foundation [15]. This masonry found at 4.85m OD was L-shaped in plan, with its north-south segment measuring 1.55m long by 0.34m wide and its east-west segment measuring 2.2m long by 0.3m wide. This masonry was interpreted as brick reinforcement for the eastern canal wall [14] and is associated with the later construction of the east-west orientated bridge across the canal (see below).

7.8.3 Against the east and north side of masonry [15] was a rectangular shaped brick and concrete structure measuring 1.47m north-south by 2.64m east-west, consisting of contexts [17], [18], [19] and [20] which were found between 4.41m OD and 4.29m OD. This structure was interpreted as the south foundation for an east-west orientated bridge across the canal connecting the Blackwall Basin and Junction Dock (see Figure 6).

7.9 Phase 4.3: 20th Century Deposits

7.9.1 The disuse and abandonment of the docks was identified in Trench 7 in the form of dumped debris within the former canal. Deposits overlying the masonry on the land side of the dock differed in composition. On the western side of masonry [14] an interleaving sand and silty layer [11], indicative of flooding was observed (see Figure 5, Section 7). Deposits overlying masonry [14] and [15] on the land side (east) consisted of a sequence of dump/ground raising deposits recorded as [16], [13] and [12] between 4.84m OD and 4.55m OD with an overall thickness of 0.5m.

7.9.2 In the southeast quadrant of Trench 7 was also observed a concrete pad constructed against masonry [14] and [15] which suggest at least one phase of alteration and modification during the use of the dock.

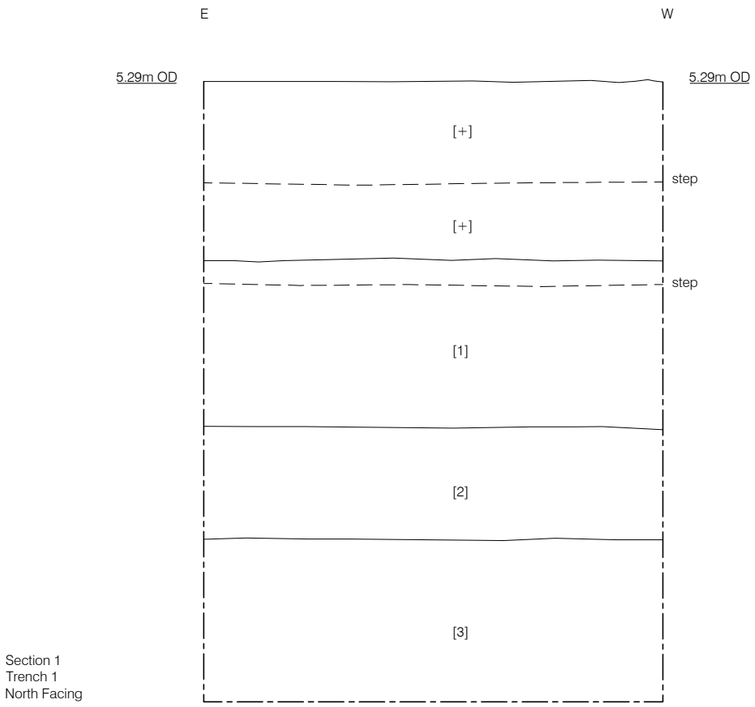
7.9.3 In Trench 9, re-deposited alluvial clay [5] (see Phase 4.1 above) was overlaid at 4.55m OD by a dump layer [4] of late-medieval/modern date which reflects the constant use and re-use of the site. Similarly in Trench 10, situated in the southeast part of the site, late post-medieval/modern dump layers [7] and [6] were found at 3.53m OD and 4.20m OD.

7.9.4 Late-medieval/modern re-deposited and dump layers were extensively observed during the watching brief in Area 2 (West) (not illustrated).

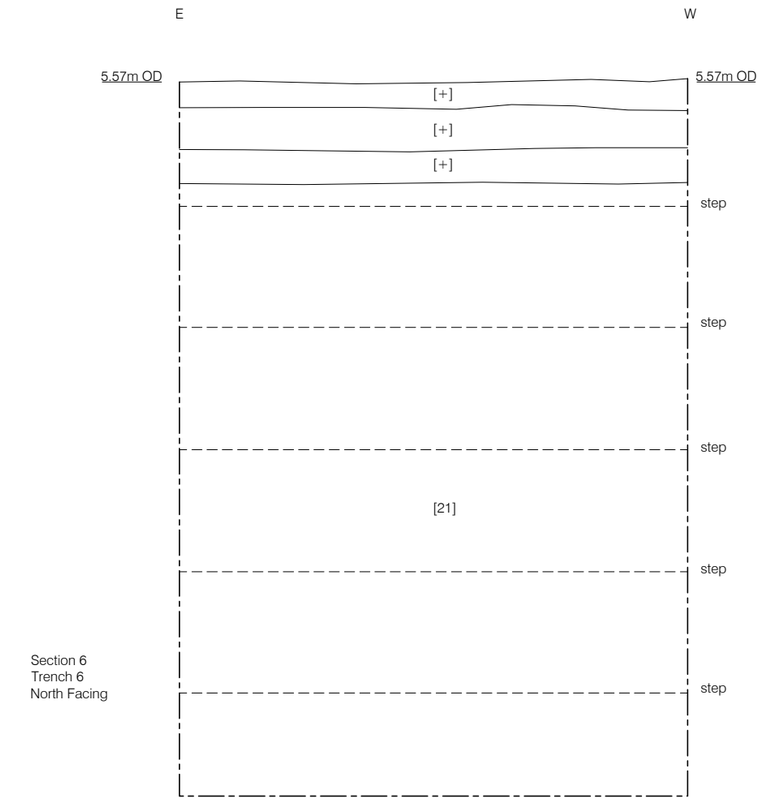
7.9.5 All evaluation Trenches and Areas were sealed by modern made ground and concrete slabs or tarmac. Modern ground level was recorded between 5m OD and 5.43m OD in the northern part of the site, at 5.30m OD between Area 3 and Trench 4 in the centre of the site and between 5.30m OD and 5.55m OD in the southern part of the site.

08/02/16 RM

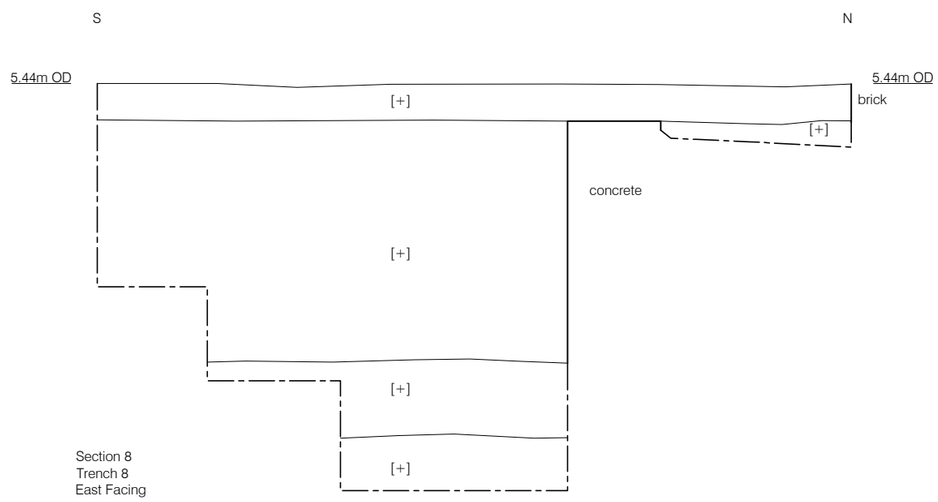
Figure 4
Location of Trench 7 overlain on the Ordnance Survey map of 1867
1:500 at A4



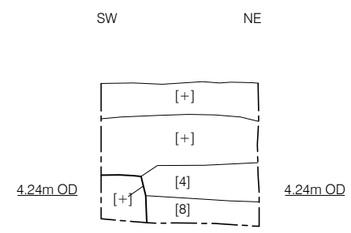
Section 1
Trench 1
North Facing



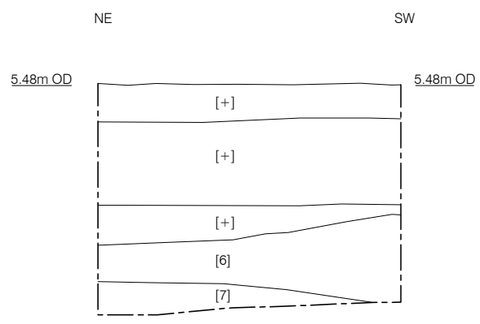
Section 6
Trench 6
North Facing



Section 8
Trench 8
East Facing



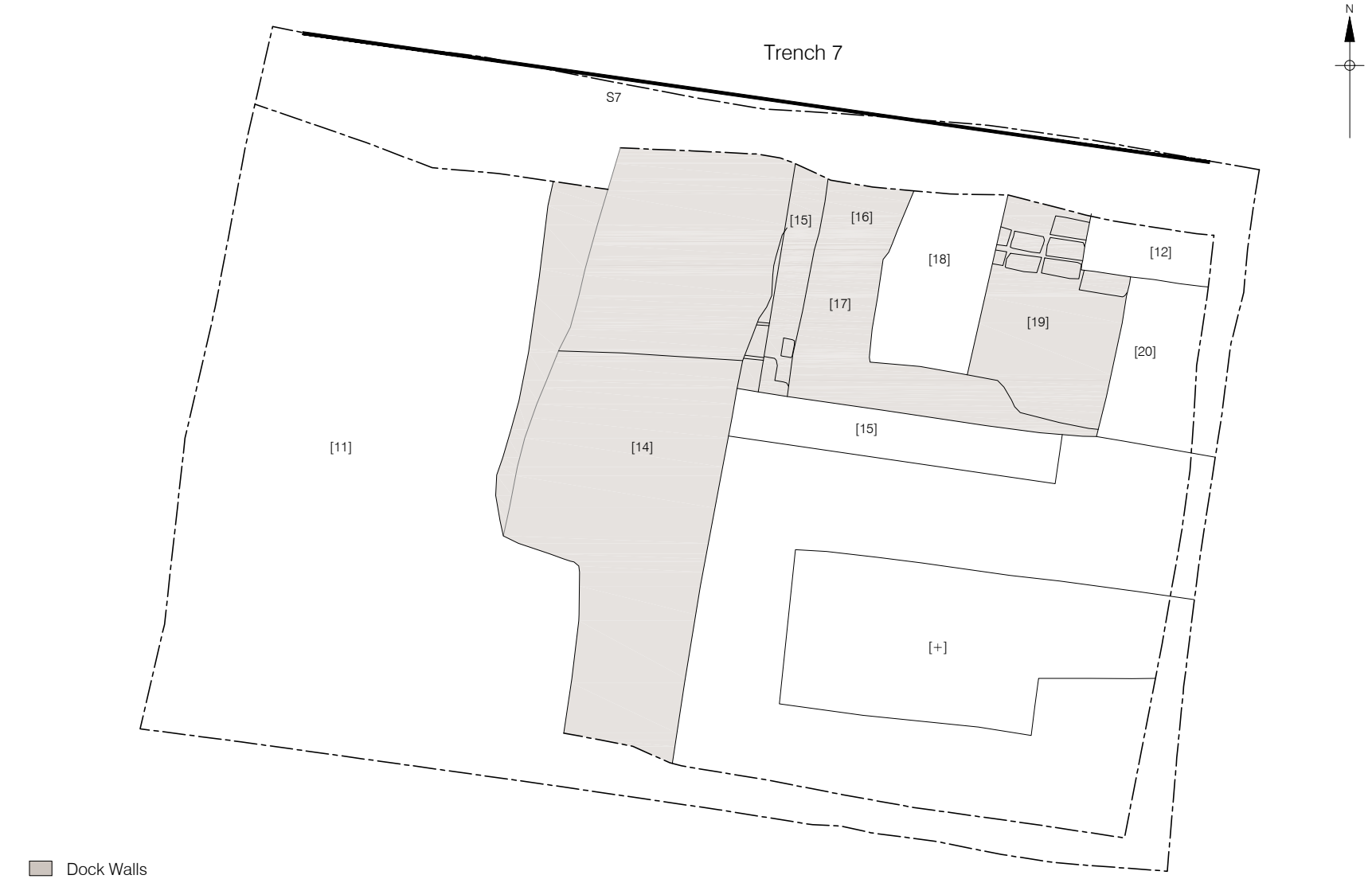
Section 9
Trench 9
Southeast Facing



Section 10
Trench 10
Northwest Facing

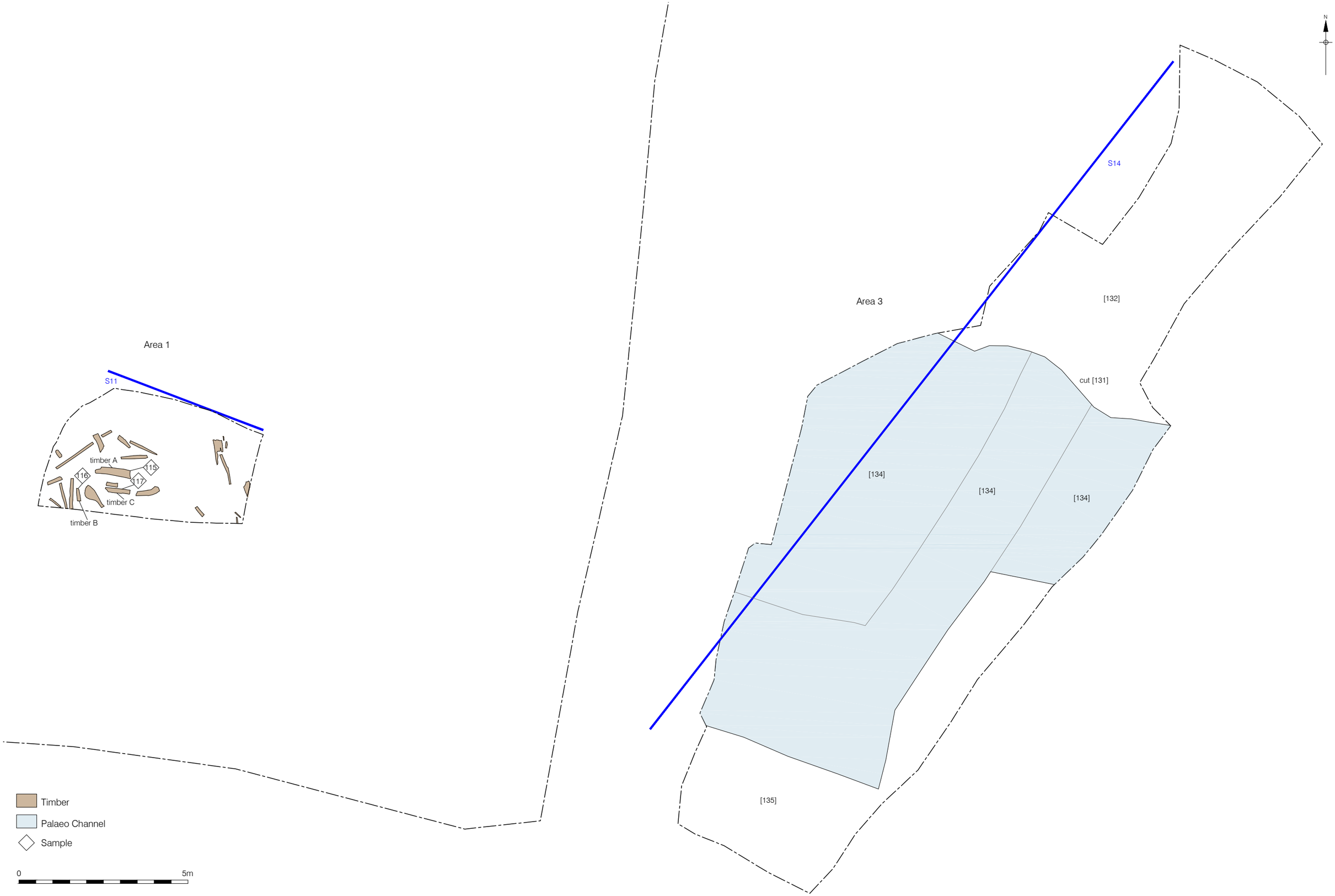
28/01/16 RM

Figure 5
Sections (Phase 1)
1:60 at A3



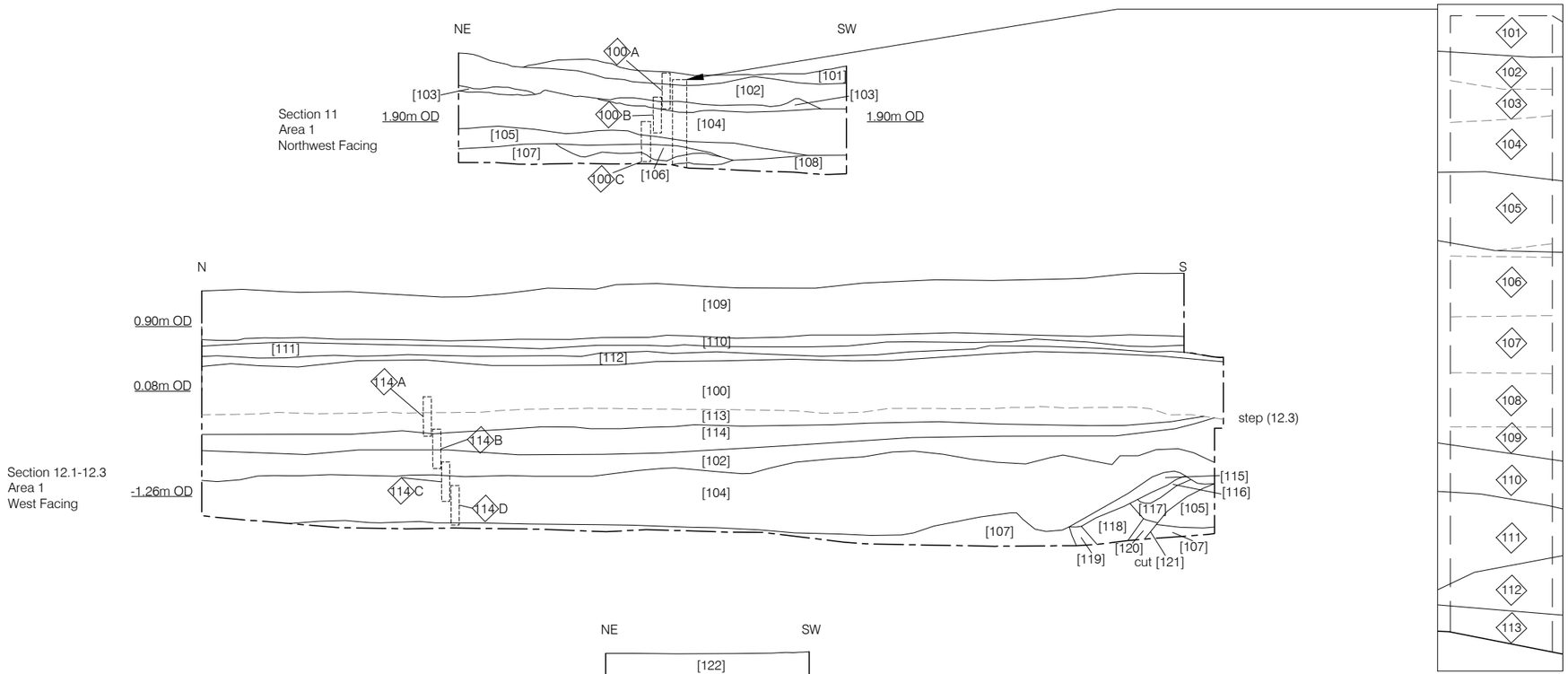
29/01/16 RM

Figure 6
Plan of Trench 7
1:40 at A4



29/01/16 RM

Figure 7
Plan of Areas 1 and 3
1:100 at A3



28/01/16 RM

Figure 8
Sections (Phase 2)
1:70 at A3

PLATES

Plate 1: General view of Area 1 looking east.

Plate 2: General view of west facing section 12

Plate 3: Column sample <114> (a, b, c and d) in section 12 (2m scale).

Plate 4: General view of Area 1 looking NW.

Plate 5: Column sample <100> in north facing section 11 (1m scale).

Plate 6: Watching Brief Area 2 (west) and South Dock wall, looking SE.

Plate 7: South Dock wall, looking NE.

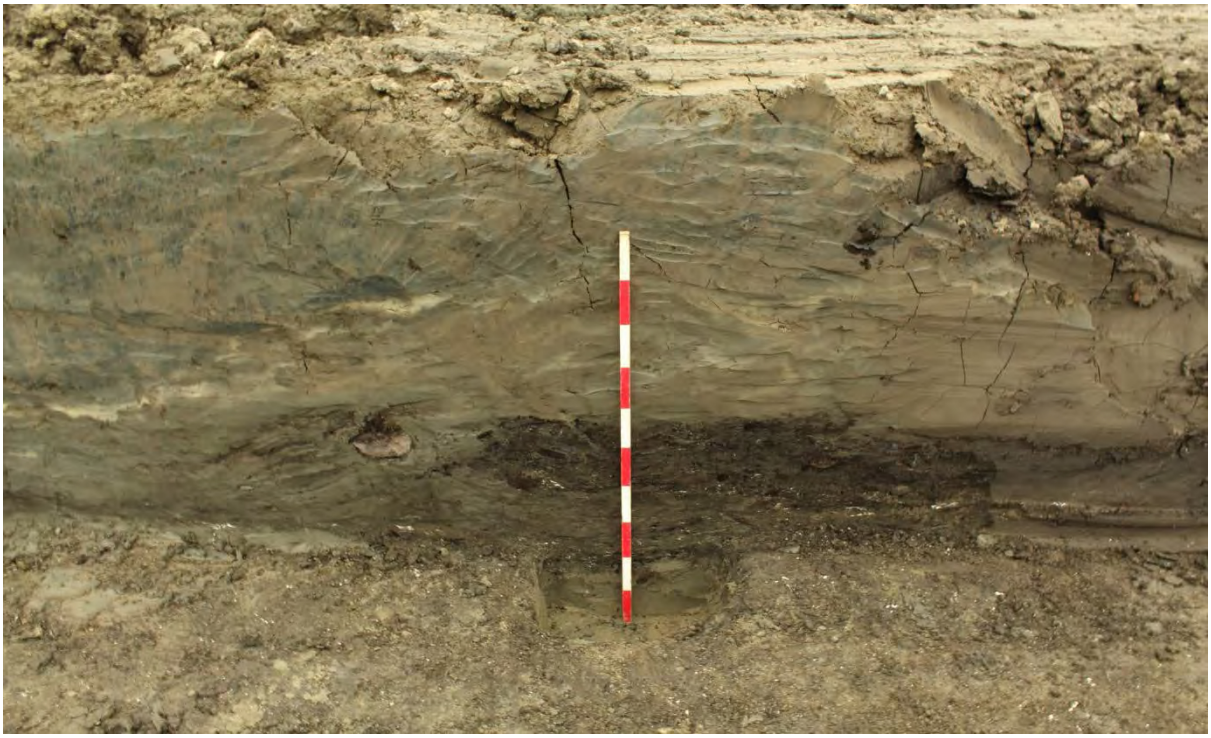


Plate 8: SE facing section 13 in Watching Brief Area 2 (west) with 1m scale.

Plate 9: evaluation Trench 7, looking NE.

8 ARCHAEOLOGICAL PHASE DISCUSSION

8.1 Phase 1.1: Terrace Gravel and Early river deposits

8.1.1 Terrace gravel was recorded in Areas 1 and 3 situated in the southeast part of the site. Its surface elevation varied between a high point of -2.38m OD in Area 1 to a level of -2.42m OD towards the east in Area 3. The archaeological evidence thus shows that there is no indication of substantial variation in the level of the terrace gravel as postulated by the deposit modelling (Boyer 2014) which suggested that a possible gravel island with a high level of 2.40m OD in the east of the central part of the site near and within the location of Area 1, 3 and Trench 4. The lack of archaeological deposits overlying the terrace gravel and the presence of river sands and clays deposits observed in Area 1 and 3 suggests that this part of the site was under water until peat deposits started forming above the alluvial clay (see Phases 1.3 and Phase 2 below).

8.2 Phase 1.2: Natural Cut Feature

8.2.1 Evidence of an east-west orientated stream or palaeochannel was identified during the excavation of Area 1. The presence of this type of natural feature is not surprising within a fluvial environment and the possibility of such streams or channel on the site was postulated in the topographical model (Boyer 2014).

8.3 Phase 1.3: Lower Alluvial Deposits

8.3.1 Evidence of fluvial deposition was also observed in Excavation Areas 1 and 3 and watching brief Area 2 (West) where clay deposits were recorded. The formation of these deposits is indicative of extensive alluvial inundation of the area through flooding within a generally low energy fluvial environment. The upper horizon of the clay deposits created a stable and semi-aquatic environment, possibly the result of the temporary lowering of the water table, which was the ideal condition for the growth of plants (see Phase 2 below).

8.4 Phase 2: Marsh Environment

8.4.1 Between the lower and the upper alluvial deposits two different episodes of peat deposits separated by a layer of mix organic alluvium were identified in Area 1 whilst, in Area 3 and during the watching brief in Area 2 (West) only one episode of peat formation was identified.

8.4.2 These peat deposits were exposed and cleaned by hand in section and plan in order to identify possible archaeological features such as wooden trackways or occupation layers. Peat levels are known to have formed throughout this part the River Thames (Gibbard 1994, 116) prevalently during the Tilbury IV regression phase which corresponds to the

Middle to Late Bronze Age. However, no archaeological structures or layers within these peat deposits were observed during the archaeological investigation.

8.4.3 Nevertheless, the organic (peat) and minerogenic (alluvium) deposits are likely to represent a range of different environments, from waterlogged vegetated land surface to tidal mudflat and salt marsh. These formed during shallow (regression) and deeper, flood plain (transgression) phases as sea and river levels fluctuated in the Holocene (post-glacial) period (Sidell *et al.* 2000, 15-17).

8.4.4 The result of the radiocarbon dating from column samples <100> and <114> in Area 1 (Section 11 and 12) indicated that peat accumulation began *c.* 4875-4835 and 4520-4410 cal BP, corresponding to the middle to the late Neolithic cultural period. As might be expected given the variable height of the peat surface, the radiocarbon dates indicate that peat cessation occurred significantly earlier in column <100> at 4780 to 4435 cal BP (middle to late Neolithic), compared to 2875 to 2765 cal BP (late Bronze Age/early Iron Age) in column <114>. Given the apparent lack of a chronological overlap between the accumulation of the peat horizons, it is possible that they represents two periods of peat formation; the significantly different dates for peat cessation support the notion of erosion of the peat surface in the area of column <100>, particularly given their close proximity (within *c.* 10m apart). However, the possibility of older remains having been washed in to the surface of the peat in column <100>, and subsequently dated, cannot be discounted (see Appendix 3).

8.4.5 The findings from the radiocarbon dating in Area 1 support the interpretation for the stratigraphic sequence of the alluvial deposits observed in Section 11 and 12. The peat ([102]) in Area 1 was sealed by layer [101] (see also Phase 3 below) which is most likely the result of natural re-deposition of alluvial clay mixed with organic deposits (peat and abraded timber) resting on the eroded/scoured upper horizon of peat layer [102] (see Plate 5). The probable erosion of the upper part of layer [102] in the south is supported by the radiocarbon result (column sample <100>) which show that peat cessation occurred in the middle to late Neolithic whilst in the east and north part of Area 1, as shown in Plate 3, layer [102] was unaffected by scouring as shown by the radiocarbon dates which indicate that the northern part of layer [102] together with layers [114] and [113] (column sample <114>) have a nearly uninterrupted peat formation from the middle/late Neolithic to the late Bronze Age/early Iron Age (layer [113]).

8.4.6 A small item of wood from column sample <114> found at the base of peat layer [102] was examined (see Appendix 2). This small fragment of roundwood seems to have an humanly cut end of ‘chisel form’ which together with other fragments of driftwood observed within deposit suggest that this simply indicates low intensity human activity

somewhere in the general vicinity, probably not very far away. The lack of other worked material suggested that the human activity was not directly on-site.

8.4.7 In watching brief Area 3 (West) peat layer [126] was sealed by a sequence of grading organic alluvial deposits suggesting a possible palaeochannel or depression in this part of the site.

8.5 Phase 3: Upper Alluvium and Later Peat Deposits

8.5.1 During this phase a layer of mix re-deposited alluvium, peat and timbers recorded as [101] was naturally deposited above peat layer [102]. Its formation does not seem to be the result of a slow process of silting up or peat formation but it rather seems to originate from the erosion of in situ deposits followed by its later re-deposition. Three timbers were collected from this deposit which were very eroded/abraded and were of natural origin probably of late Neolithic to Bronze Age date and derived from adjacent carr woodland (see Appendix 2).

8.5.2 The flooding event associated with the deposition of context [101] was followed by episodes of flooding contemporary with a much slower fluvial environment with the silting up of an approximately 1m thick deposit of alluvium which was identified in Areas 1, 3 and Evaluation Trench 1.

8.5.3 Archaeological evidence shows that the site later reverted to a marshland environment with a 1.1m thick layer of peat recorded in Evaluation Trench 1 at 1.96m OD. This layer is associated with the latest environmental event recorded on site.

8.5.4 The formation of the deposits of Phase 3 are likely to span over a very long period of time starting from the Bronze Age period to the late medieval period when the Isle of Dogs was subject to the process of ‘inning’ during which the marshland was reclaimed by embanking and drainage to be reconverted a pasture. Cartographic evidence such as Gascoyne’s map of 1703 and Rocque’s map of 1741-5 (not illustrated) show the study site as undeveloped agricultural land (CgMs 2004).

8.6 Phase 4.1: Ground Raising Deposits (Post-Medieval)

8.6.1 The archaeological evidence for this period consists of a sequence of re-deposited alluvial clay layers with inclusions of CBM dated to the post-medieval period. In Area 1 Upper Alluvium (Phase 3) was overlaid by a sequence of deposits with an overall thickness of 0.96m which were recorded as contexts [112], [111], [110] and [109] at 0.62m OD, 0.64m OD, 0.80m OD and 1.58m OD. These layers represent ground raising dump deposits associated with the construction of the Docks. The alluvial deposits excavated for the construction of the West India Docks between 1800 and 1805, were used as material to raise and consolidate the ground of the site and to build bricks for the construction of the interior walls of the warehouses, the dock and the lock walls

(http://www.british-history.ac.uk/survey-london/vols43-4/pp248-268) (see Phase 4.2 below).

8.6.2 Further evidence of deposits associated with ground rising/consolidation was identified in Evaluation Trenches 1, 4, 6, 8 and 9. The archaeological investigation also shows substantial variation for the levels of these post-medieval deposits as they were truncated by modern intrusions observed across the site during the archaeological evaluation and excavation.

8.7 Phase 4.2: Dock Structures (Mid 19th century)

8.7.1 Archaeological evidence for this phase came from Trench 7 where part of the north side of the canal connecting the Blackwall Basin to the north and the Junction Dock to the south was found. The canal wall consisted of large granite ashlar blocks with a roughed western (internal) face. Only a small segment of this wall was exposed measuring 4.02m long and 1.37m wide.

8.7.2 Against the east (land) face of the canal wall was recorded a rectangular brick structure which was interpreted as part of the foundation supporting an east-west orientated bridge built across the canal to connect the warehouses located to the east and west of the Junction Dock. After the construction of the Junction Dock and the South Dock Basin, this bridge was the only available route to access the warehouses. By 1910 the bridge and the area of the site were served by a rail network to facilitate the movement of goods across the warehouses (http://www.british-history.ac.uk/survey-london/vols43-4/pp248-268).

8.8 Phase 4.3: 20th-Century Deposits

8.8.1 Archaeological evidence for this phase was observed in Trench 7 where the canal was backfilled with modern deposits and from Trenches 4 and 6 were modern make up deposits were recorded.

9 ORIGINAL AND REVISED RESEARCH OBJECTIVES

9.1 Primary Objectives

9.1.1 The Written Scheme of Investigation (Mayo 2015) prepared before archaeological work commenced at the Wood Wharf site highlighted a set of specific objectives to be addressed by the investigation.

9.2 What is the natural topography of the site and its palaeoenvironmental potential?

9.2.1 The archaeological evidence shows that there is no indication of substantial variation in the level of the terrace gravel, contrary to what suggested by the deposit modelling exercise (Boyer 2014) which postulated a possible gravel island with a high level of 2.40m OD in the east of centre of the site, located near and within the location of Area 1, 3 and evaluation Trench 4. The revised geoarchaeological deposit modelling at the site has revealed a sequence of late Devonian Shepperton Gravel found between -2m OD and -3m OD (see Appendix 3). The lack of archaeological deposits overlying the terrace gravel and the presence of river sands and clays deposits observed in Area 1 and 3 suggests the site was under water until the later peat started forming above the alluvial clay. Radiocarbon dates from environmental samples collected in Area 1 shows that the peat layers started forming from the middle/late Neolithic to the late Bronze Age/early Iron Age.

9.2.2 The organic (peat) and minerogenic (alluvium) deposits are likely to represent a range of different environments, from waterlogged vegetated land surface to tidal mudflat and salt marsh. These formed during shallow (regression) and deeper, flood plain (transgression) phases as sea and river levels fluctuated in the Holocene (post-glacial) period.

9.3 Is there archaeological evidence of prehistoric activity on site?

9.3.1 No archaeological evidence of prehistoric activity was observed on site. The lack of *in situ* archaeological deposits overlying or within the peat deposits observed in Area 1 and 3 suggests that the site was not occupied during the prehistoric period. However, a section of small roundwood seems to have a humanly cut end of ‘chisel form’ was recovered form the base of peat layer [101]. This wood item together with other fragments of driftwood observed within layer [102] suggests low intensity human activity somewhere in the general vicinity, probably not very far away.

9.4 Have peat deposits been found on the site and what is it their c14 date?

9.4.1 Peat deposits were recorded on site in Areas 1, 2 and 3. The peat in Area 1 was sampled and radiocarbon results shows that the peat formed in the central part of the site from the middle/late Neolithic to the late Bronze Age/early Iron Age periods (see Paragraph 8.4 above).

9.5 What is the nature, date and survival of activity relating to any archaeological period at the site, specifically the 18th- and 19th-century dock structures?

9.5.1 Archaeological evidence of the 19th century development of the site was recorded in Trench 7 were part of the north side of the canal connecting the Blackwall Basin to the north and the Junction Dock to the south was found. Against the east (land) face of the canal wall was recorded a rectangular brick structure which was interpreted as part of the foundation supporting an east-west orientated bridge built across the canal to connect the warehouses located to the east and west of the Junction Dock.

9.5.2 Layers interpreted as ground raising dump deposits associated with the construction of the Docks were also recorded during the archaeological works. The alluvial deposits excavated for the construction of the West India Docks between 1800 and 1805, were used, as material to raise and consolidate the ground of the site and to build bricks for the construction of the interior walls of the warehouses, the dock and the lock walls (http://www.british-history.ac.uk/survey-london/vols43-4/pp248-268).

9.6 What is the extent of all past-depositional impacts on the archaeological resource?

9.6.1 The construction of the West India Docks between 1800 and 1805 had a huge impact on the topography of the site as the current ground level is the result of ground rising/consolidation deposits associated with the development of the site during the early 19th century. However, the archaeological investigation demonstrated that prehistoric alluvial deposits survived across the central part of the site.

10 IMPORTANCE OF THE RESULTS, PROPOSAL FOR FURTHER WORK AND PUBLICATION OUTLINE

10.1 Importance of the Results

10.1.1 The geoarchaeological investigations and environmental archaeological assessment have demonstrated that the Wood Wharf site has the potential to contribute significantly to our understanding of both the sedimentary and vegetation history of the Isle of Dogs and neighbouring areas, including Greenwich Peninsular.

10.2 Further Work

10.2.1 Additional environmental archaeological analysis is therefore recommended, including: (1) a minimum of three additional radiocarbon dates in order to clarify the age of peat cessation in column <100>, and to improve the chronological model for the sequence in column <114>. Such dates can form a chronological control for and contribute to the tephrochronological data from the sequences; (2) a high resolution tephrochronological assessment of recommended sections from samples <100> and <114> and, depending on the results of this, subsequent geochemical analysis. In conjunction with the radiocarbon dating, this should allow for a more robust and precise chronology; (3) analysis of selected pollen and diatom samples from one or both sequences (depending on the outcome of (1) above). In addition, a programme of deposit modelling which expands the area of the deposit model and places the sedimentary history of the Wood Wharf site in the wider context of the Isle of Dogs is also recommended. Such a deposit model could contribute to a more general publication concerning the Holocene evolution of the Lower Thames floodplain, which integrates the increasing body of work in the Isle of Dogs and compares the sedimentary deposits here with those of Greenwich Peninsula to the east, the Lea Valley to the northeast, and Southwark/Bermondsey to the west.

10.3 Publication Outline

10.3.1 It is proposed to publish the results of the further environmental analysis as an article in the peer reviewed journal *Environmental Archaeology.*

11 CONTENTS OF THE ARCHIVE

11.1 Paper Archive

Context Sheets		58 sheets
Plans	9	12 sheets
Sections	11	23 sheets

11.2 Finds

Timber	4 pieces
Bulk Samples	13
Column Samples	2 (7 tins)

11.3 Photographic archive

Digital shots	122

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13 AKNOWLEDGEMENTS

13.1 Pre-Construct Archaeology Limited would like to thank Mace for commissioning the archaeological work. Thanks to the English Heritage (GLAAS) Archaeological Advisor to the London Borough of Tower Hamlets, John Gould, who monitored the site.

13.2 The author would also like to thank: Helen Hawkins for project managing; Frank Meddens for the editing of this report; Amelia Fairman for supervising Phase 1 and 3 evaluation trenching; Damian Goodburn for the timber assessment; Ray Murphy for the illustrations; Rick Archer for the surveying and Wayne Richards with John Joyce for the logistics.

13.3 Finally the author would like to thank the following archaeologist for their hard work during the evaluation and excavation: D. Kirby, L. Wallace, Z. Kuznecovas, Jenny Wilson, Guy Seddon, Bruce Fergusson and Jim Heathcote.

APPENDIX 1: CONTEXT INDEX

Context	Type	Area	Trench	Description	Highest Level	Lowest Level	Phase
1	Layer		1	Firm mid blue grey alluvial clay	3.55	3.53	4.1
2	Layer		1	Dark black brown peat horizon	1.9	1.87	3
3	Layer		1	Firm mid blue clay with sand lenses.	0.83	0.8	3
4	Layer		9	Mid brown clayey silt layer. Post-medieval dump layer.	4.55	4.53	4.3
5	Layer		9	Loose mid brown clayey silt layer.	4.24	4.18	4.1
6	Layer		10	Loose mid yellow brown sandy silt layer.	4.2	3.9	4.3
7	Layer		10	Re-deposited gravel layer. Post-medieval in date.	3.53	3.38	4.3
11	Layer		7	Loose dark brown blackish sandy silt layer. Post-medieval dump layer.	4.77	4.47	4.3
12	Layer		7	Soft mid yellow grey sandy clay layer. Post-medieval dump layer.	4.84	4.6	4.3
13	Layer		7	Firm mid blue grey sandy clay. Post-med dump layer.	4.63	4.36	4.3
14	Masonry		7	Granite blocks. Interpreted as part of the east wall of the Junction Dock.	4.75	4.73	4.2
15	Masonry		7	Later brick structure associated with Junction Dock wall [14].	4.75	4.67	4.2
16	Layer		7	Loose mid brown sandy clay post-medieval of post-medieval date.	4.55	4.37	4.3
17	Masonry		7	Concrete slab and bricks reinforcement for masonry [15]. Post-medieval.	4.41	4.4	4.2
18	Masonry		7	Concrete and brick base associated with east side of Junction Dock.	4.41	4.4	4.2
19	Masonry		7	Masonry consisting of red frogged bricks associated with Junction Dock.	4.37	4.35	4.2
20	Masonry		7	Masonry consisting of concrete and bricks. Possible floor associated with Junction Dock.	4.29	4.28	4.2
21	Layer		6	Firm mid blue silty clay layer. Re-deposited alluvial clay.	4.59	4.55	4.1
100	Layer	1		Firm light blue grey alluvial clay. The uppermost part of this layer contained very abraded post-med CBM	0.42	0.24	3
101	Layer		1	Firm dark brown silty clay with frequent timber (possibly worked), oyster shells (very fragmented). This layer seem to be a mix of re-deposited peat, clay and fragment of timber.	-1.1	-1.28	3

102	Layer	1		Firm dark brown peat with very frequent wood fragments.	-1.04	-1.64	2
103	Layer	1		Soft light brown clay with occasional decayed wood.	-1.6	-1.72	2
104	Layer	1		Firm grey clay with occasional small to medium angular flints and decayed roots. Natural alluvial deposit with lenses of sand.	-1.18	-1.74	1.3
105	Layer	1		Soft light grey sandy clay.	-1.63	-2.16	1.1
106	Layer	1		Soft sandy clay.	-2.18	-2.33	1.1
107	Layer	1		Soft brownish clay sand layer. Natural deposit formed from the possible erosion of under lying gravel caused by tidal action of seasonal flooding	-2	-2.38	1.1
108	Layer	1		Loose light red brownish sand and gravel. Natural gravel terrace.	-2.32	-2.45	1.1
109	Layer	1		Firm dark brown grey silty clay with occasional charcoal flecks and moderate small rounded pebbles. Post-medieval made ground.	1.58	1.3	4.1
110	Layer	1		Friable dark red brownish crushed brick layer. Levelling deposit of post-medieval date associated with construction of Dock during 19th century.	0.8	0.7	4.1
111	Layer	1		Firm dark black grey silty clay layer with occasional charcoal flecks. Made ground deposit immediately overlying alluvial layer [112]. Post-med in date.	0.64	0.4	4.1
112	Layer	1		Firm dark brown grey silty clay layer. Interface between alluvial clay [100] and made ground [111].	0.62	0.34	4.1
113	Layer	1		Firm dark brown peat layer with frequent small to medium sizes wood fragments.	-0.65	-0.76	2
114	Layer	1		Firm dark brown clayey peat with moderate medium size fragments of decayed wood.	-0.76	-1.03	2
115	Fill	1		Firm light grey with pale brown mottles clayey sand with occasional very small fragments of decayed wood. Natural redeposited material within palaeochannel [121]. This fill is the latest identified fill of the palaeochannel.	-1.47	-2.18	1.2

116	Fill	1		Loose pale yellow with pale grey mottles sand with occasional clay lenses and small wood fragments. Naturally re-deposited material within palaeochannel [121].	-1.53	-1.85	1.2
117	Fill	1		Loose dark grey gravels in a sandy matrix with occasional small fragments of decayed wood inclusions. Naturally re-deposited gravels within palaeochannel [121].	-1.52	-1.88	1.2
118	Fill	1		Firm pale brownish grey clayey sand with occasional small wood fragment inclusions. Naturally deposited material within palaeochannel [121].	-1.89	-2.18	1.2
119	Fill	1		Loose pale mid grey sandy clay fill with occasional small fragments of decayed wood inclusions. Naturally deposited material within palaeochannel [121]. This fill represents, with [120], the primary fill of the palaeochannel.	-2.16	-2.18	1.2
120	Fill	1		Firm dark brown peaty sandy clay with occasional small fragments of decayed wood inclusions. Naturally deposited material within palaeochannel [121]. With fill [119] represents the primary fill of the palaeochannel.	-2.06	-2.12	1.2
121	Cut	1		Cut of palaeochannel. No finds of dating evidence recovered. It appears to have been naturally eroded to the north by the action of water that has also deposited a mixture of sandy clay fills within it.	-1.64	-2.42	1.2
122	Layer	2		Firm mottled mid brown to dark grey clay with occasional small fragments of decayed wood inclusions.	-0.81	-0.82	2
123	Layer	2		Firm mottled dark grey and pale yellow clay deposit with occasional small decayed rooting inclusions. Alluvial clay deposit under [122].	-1.21	-1.59	2
124	Layer	2		Firm mottled mid grey and mid brown clay. Alluvially deposited clay.	-1.18	-1.72	2
125	Layer	2		Firm mottled mid grey and mid brown silty clay with occasional small to medium sized wood fragments inclusions. Deposit of clay that has been naturally mixed with clay and then re-deposited upon [126].	-1.53	-1.76	2

126	Layer	2		Firm dark brown peat layer with occasional to moderate inclusions of oyster shells. Possibly associated/contemporary with peat layer [102] recorded in Area 1.	-1.53	-1.69	2
127	Layer	2		Firm mottled mid to dark brown peaty clay with occasional small wood fragment inclusions. Alluvially deposited layer of mixed clay and peat.	-1.69	-1.87	1.3
128	Layer	2		Loose mid brown sandy peat.	-1.84	-1.87	1.1
129	Fill	2		Firm pale grey sandy clay layer. Alluvial deposit layer.	-1.84	-1.96	1.1
130	Layer	2		Loose pale yellow sand. Natural sand underlying alluvial clay layers in Area 2.	-2.05	-20.6	1.1
131	Cut	3		Palaeochannel/depression orientated NW-SE and located to the NW of Area 1.	-0.94	-1.94	3
132	Layer	3		Firm dark brown organic (peat0 mixed clayey layer with occasional decayed wood branches/roots inclusions. This layer same as layer [126] recorded in section 12 (Area 1).	-0.73	-1.09	2
133	Layer	3		Very friable/loose dark grey yellowish sandy gravel. Natural gravel terrace same as [108] in Area 1.	-2.42	-2.78	1.1
134	Fill	3		Very firm/plastic dark grey bluish sandy clay with very occasional decayed wood chips and leaves. Very clean clay fill of palaeochannel/depression [131].	-0.7	-1.46	3
135	Layer	3		Very firm light yellow greyish sandy clay. Alluvial clay layer.	0.38	-0.75	3
136	Layer	3		Very firm/plastic mid grey bluish sandy clay layer. Alluvial clay layer also recorded in Area 1 as [104].	-1.47	-2.72	1.3
137	Layer		4	Very loose and waterlogged mid dark grey gravelly sandy clay layer with occasional fragments of later debris (CBM, concrete). Post-medieval re-deposited natural gravels and clay.	2.2	2.2	4.1

APPENDIX 2: TIMBER ASSESSMENT

Damian Goodburn

Background

Four items of possibly worked waterlogged wood from prehistoric deposits on the east side of the Isle of Dogs, Tower Hamlets were cleaned, examined, recorded and sampled. The main focus of the examination was to determine whether the wood had clear evidence of human working or not. The site supervisor I. Grosso provided a brief verbal introduction to the relevant parts of the project and also passed on copies of key site records, an interim summary of the deposits found and an environmental interim report by QUEST (Includes Plan 101, and section 11). The relevant section of the site lay adjacent to a paleochannel and had waterlain fluvial deposits, alternating with slightly drier peaty clay and peat wetland deposits indicating changing prehistoric water levels in the area. Such deposit sequences are well known in the London estuarine flood plain but local variations are common. A number of excavations of these prehistoric deposits in the region have been published and include detailed records and analysis of the worked wood found mostly by this author. Perhaps the most detailed summary of the accumulated evidence for wetland woodwork and paleo-environmental reconstruction is provided in Stafford, Bates and Goodburn 2012.

The lowest relevant deposit here was peat layer [102] laid down around -1.5m OD, which had frequent wood inclusions and is now variously dated to the mid Neolithic to Late-Bronze Age period. Layer [102] was covered by deposit [101] a firm dark brown mixed silt/clay/ peat deposit, with frequent wood inclusions. It was 0.2m thick and laid down at just below *c.* -1.0m OD. This was thought to be of probably of Bronze to Iron Age date in deposition but includes reworked material.

Methodology

This writer was not able to visit the site but examined the four sections of lifted wood off-site and related records at the PCA stores in August 2016. The well wrapped waterlogged wood was carefully washed so as to prevent abrasion to any possibly diagnostic tool marks, and examined in raking light. Notes and scale drawings were then made, and added to the site archive. The excavation and watching brief proceeded mainly by machine with localised hand cleaning of areas of key interest, this unavoidable results in some machine breakages in the wood found.

A small item of woodwork from column sample <114> taken from the base of peaty layer [102]

This item was found at c. -0.82 to -0.83m OD in a column sample through peat layer [102]. It was a section of small roundwood 11mm in diameter with a broken length of 64mm. Though weathered, it clearly had one humanly cut end of 'chisel form'. As there was much driftwood found on the site and the item was weathered, it is likely that it simply indicates low intensity human activity somewhere in

the general vicinity, probably not very far away. The lack of other worked material suggests that the human activity was not directly on-site.

Typically, the later peat levels in London at this OD level have been found to contain mid to late Bronze Age woodwork debris and in situ wooden structures and there is no clear reason to suggest that this item might not also be of this broad period. However, as some of the peat has been dated elsewhere on this site to the mid to Late Neolithic it is possible that an earlier date might apply. The length of the cut surface was long and fairly flat perhaps more likely indicating cutting with a metal tool. It would be useful to have the item microscopically Species identified, as small roundwood of this size can not be visually identified.

Three larger sections of waterlogged prehistoric wood lifted from deposit [101] in Area 1

This material came from a spread of assorted, short lengths (Mostly 0.4-1.0m lengths) of roundwood and small logs lying horizontally in the mixed clay/silt/peat deposit. They were labelled Timbers A, B, C. After careful cleaning it could be seen that items B and C bore no possible traces of working or gnawing by beavers etc. Piece B was a 0.31m length of bark covered stem or branch c. 75mm in diameter with anciently broken ends. Piece C was a barkless log with one ancient broken end and one with a recent break *c.* 0.74m long and compressed to a 'diameter' of 140mm. Both pieces were slice sampled for species Id/C14 dating if required. They appeared to be probably Alder.

Item A was much harder to classify with certainty in terms of whether it had originally been worked or not. Initially during cleaning it became clear that one end was recently broken by an excavation machine but that the other sloped and undulated as if it was cross cut with some form of axe. With felled stems axe cross cutting normally results in a 'V' shaped end cut from one face only, a 'bucking cut' quite distinct from either a felling cut or a point cut for a pile etc. However, after detailed cleaning it could be seen that the ancient end was heavily weathered and marked by bored damage, and that the heart had been rotted out. In places, what could possibly have been very small, eroded, partial axe stop-marks (under 30mm wide) were seen but were not clear enough to be conclusive. The log section survived to a length of 1.09m with a widest compressed 'diameter' of 240mm. The log was barkless as found but the surface away from the end was not weathered, i.e. the bark had come away after the original end was much weathered but before final deposition.

The details of Timber A might be summarised as, it is a very weathered log end possibly humanly cut but the natural decay and erosion that occurred before burial makes this uncertain, the loss of bark and differences in patina suggest it may have been a log moved and redeposited by a flood or similar natural agency. The log was slice sampled for Sp Id and C14 dating if required, and appeared also to be probably of Alder.

Overall we might suggest that this wood spread in layer [101] is of natural origin probably of late Neolithic to Bronze Age date and derived from adjacent carr woodland. However, the isolated clearly

worked cut rod end from [102] does indicate some limited human activity in the vicinity, possibly including the harvesting of rods for wattle work or fuel.

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APPENDIX 3: ENVIRONMENTAL ASSESSMENT REPORT

D.S. Young (Msc), Dr C.R. Batchelor, Dr T. Hill and K. Turner (Msc)

1. INTRODUCTION

1.1. *Site Context*

This report summarises the findings arising out of the environmental archaeological assessment undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development of land at Wood Wharf, London Borough of Tower Hamlets (National Grid Reference: centred on TQ 3820 8010; Site Code: TRA15; Figure 1). Quaternary Scientific were commissioned by Pre-Construct Archaeology Ltd to carry out the environmental archaeological assessment. The site is located on the floodplain of the estuarine Thames, within *c*. 50m west of the modern waterfront. The site lies towards the northeast of the Isle of Dogs, which itself is bounded to the west, south and east by a large meander loop of the Thames. The site is bounded to the south by the South Dock, to the west by the Bellmouth Passage and to the northeast by the Blackwall Basin. The A1206 forms the southeastern boundary, The British Geological Society (http://mapapps.bgs.ac.uk/geologyofbritain/home.html) maps the superficial geology underlying the site as 'Alluvium- Clay, Silty, Peaty, Sandy', overlying Palaeogene Lambeth Group bedrock described as 'Clay, Silt and Sand'. In fact, the Holocene alluvium at the site is underlain by a horizon of sand and gravel, frequently recorded in the Lower Thames Valley and widely recorded in British Geological Society (BGS) boreholes in the area of the site.

The results of the archaeological investigations (Grosso 2016) showed that there were no substantial variations in the level of the Pleistocene river gravels (the Late Devensian Shepperton Gravel) at the site (generally recorded at between *c*. -2 and -2.5m OD). A lack of archaeological horizons overlying the gravel, and the presence of mineral-rich (generally sandy and/or silty) alluvium in Areas 1 and 3 was considered to indicate that the site was under water until a later phase of peat accumulation occurred across the site (Grosso 2016). This peat horizon was generally recorded at between *c*. -1.5 and -0.5m OD, and was indicative of a semi-terrestrial land surface supporting the growth of wetland vegetation. The peat was overlain by a horizon of generally silty or clayey floodplain alluvium, followed by modern ground-raising deposits. During the archaeological investigation of Area 1 (Phase 2), a series of column (<100> A-C, Section 11; <114> A-D, Section 12.3) and bulk samples (<101> to <113>, Section 11) was obtained for environmental archaeological assessment.

1.2. *Palaeoenvironmental and archaeological significance*

The existing records indicate some variation in the type, thickness and age of the Holocene alluvial deposits. Such variations are significant as they represent different environmental conditions that would have existed in a given location. For example: (1) the varying surface of the basal sandy horizons may represent the location of former channels; (2) the presence of peat represents former terrestrial or semi-terrestrial land-surfaces, and (3) the alluvium represent periods of inundation/flooding by estuarine or fluvial waters. Thus by studying the sub-surface stratigraphy across the site in greater detail, it will be possible to build an understanding of the former landscapes and environmental changes that took place across space and time.

Organic-rich sediments (in particular peat) also have high potential to provide a detailed reconstruction of past environments on both the wetland and dryland. In particular, there is the potential to increase knowledge and understanding of the interactions between relative sea level, human activity, vegetation succession and climate in this area of the Lower Thames Valley. Such investigations are carried out through the assessment/analysis of palaeoecological remains (e.g. pollen, plant macrofossils & insects) and radiocarbon dating. Such palaeoenvironmental reconstructions have been carried out on the sediments from the nearby Preston Road, Poplar (Branch *et al*. 2007), Atlas Wharf (Lakin 1998), Delta Junction (Yendell 2012), 7 Limeharbour (Batchelor & Young 2016a) and 1-3 Turnberry Quay (Batchelor & Young 2016b) sites (see Figure 1). Investigations at the 7 Limeharbour site *c*. 500m to the south of the present site identified a sequence of gravels overlain by alluvium, in places including peat (Batchelor & Young 2016a). A west-east aligned trough (possible palaeochannel), measuring *c*. 60m in width and 2.5m in depth was identified traversing the southern part of this site (Batchelor & Young 2016a). At the 1-3 Turnberry Quay site (Batchelor & Young 2016b) meanwhile, peat radiocarbon dated to between 4420-4180 and 3910-3710 cal BP was recorded at between -1.0 and -1.5m OD. Elsewhere on the Isle of Dogs, peat has been recorded at Preston Road, Poplar (Branch *et al*. 2007) between -0.46 to -0.32m OD and accumulated between 4260-3910 and 3650-3360 cal BP (late Neolithic to Bronze Age). Undated Peat was also recorded beneath the Delta Junction site between 0.3 and -0.86m OD (Yendell 2012). At the Atlas Wharf site (Lakin 1998) *ca*. 1km to the southwest, peat formation occurred during the early/middle Neolithic (*c*. 5750 cal BP) through to the Bronze Age.

Finally, areas of elevated topography, soils and peat represent potential areas that might have been utilised or even occupied by prehistoric people, evidence of which may be preserved in the archaeological (e.g. features and structure) and palaeoenvironmental record (e.g. changes in vegetation composition). Significantly, the only prehistoric wetland structure recorded on the Isle of Dogs, a Bronze Age possible platform/trackway, was recorded at the Atlas Wharf site, the earliest construction date radiocarbon dated to 3840-3550 cal BP (Lakin 1998).

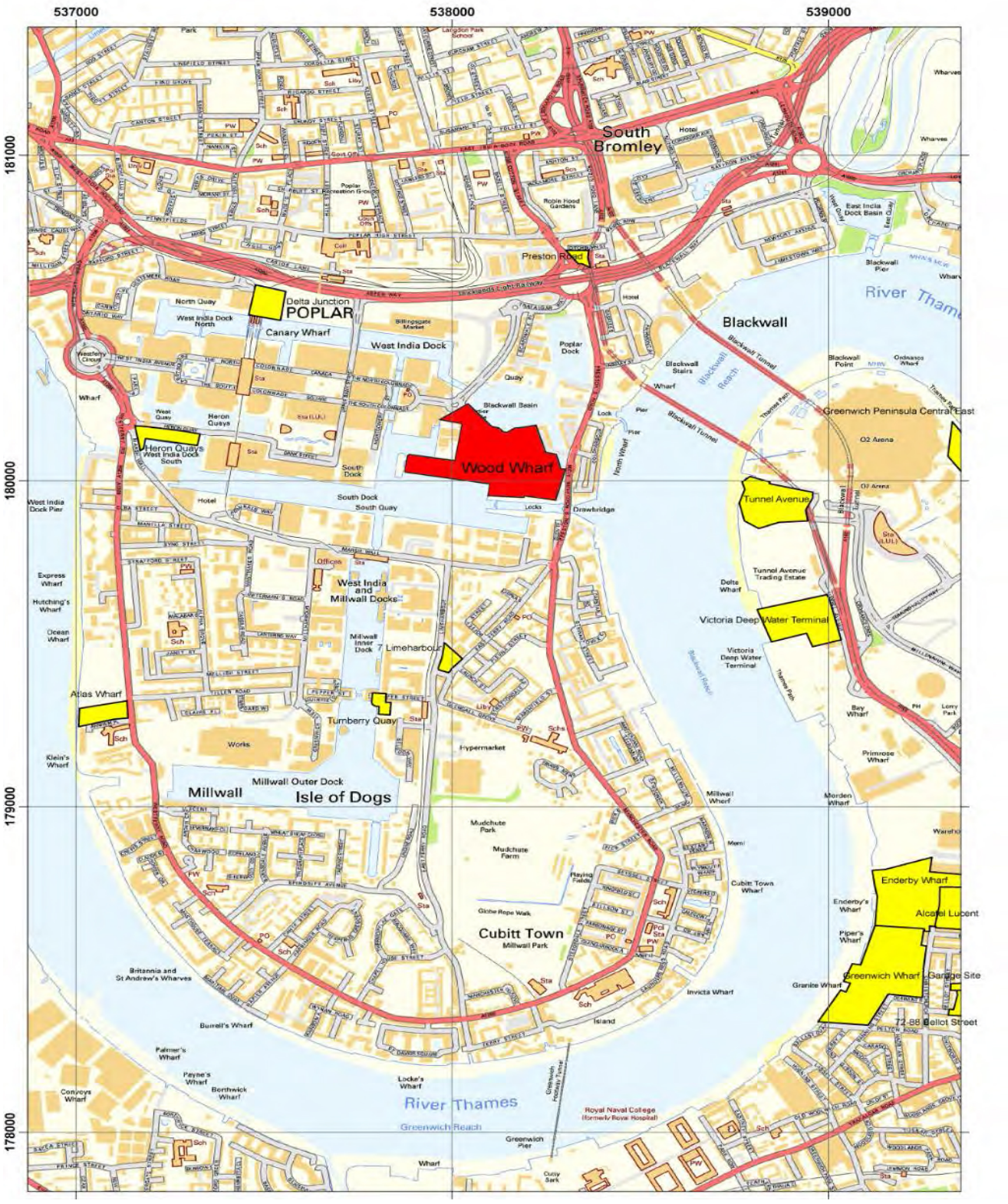
1.3. *Aims and Objectives*

The numerous geotechnical and archaeological records at the site offer the opportunity to investigate the sedimentary history of the site in more detail. In addition, a series of column and bulk samples collected during the excavation of Area 1 offers an opportunity to carry out an environmental archaeological assessment of the alluvial sequence, the aims of which were:

1. To determine the age of the peat horizons recorded across the site, and investigate their chronological relationship with prehistoric wetland archaeology recorded on the Isle of Dogs;
2. To investigate whether the sequence contains any evidence for natural and/or anthropogenic changes to the landscape, particularly associated with known prehistoric activity on the Isle of Dogs;
3. To establish whether the samples provide evidence for prehistoric and historic occupation locally to the site;
4. To establish evidence and possible causes for changes in woodland composition on the wetland and dryland surfaces during the main period of peat formation.

In order to achieve these aims, a programme of deposit modelling and an environmental archaeological assessment of column samples <100> (Area 1, Section 11) and <114> (Area 1, Section 12.3), and a series of bulk samples from Section 11 (samples <104>, <105>, <108> and <110>) was carried out, consisting of:

1. Radiocarbon dating of the base and top of the peat and a tephrochronological assessment of both sequences, to establish a chronological framework for the environmental archaeological assessment;
2. Organic matter determinations to aid identification of the sedimentary units;
3. Assessment of the palaeobotanical remains (pollen, waterlogged wood and seeds) to provide a provisional reconstruction of the vegetation history;
4. Assessment of the diatoms to provide an indication of the palaeohydrology (e.g. marine, brackish or freshwater) of the site.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South Bromley
POPLAR
Canary Wharf
West India Dock
Millwall
Isle of Dogs
Cubitt Town
River Thames
Greenwich Reach
Victoria Deep Water Terminal
Tunnel Avenue
Greenwich Peninsula Central East
Enderby Wharf
Greenwich Wharf
72-88 Bellot Street
Heron Quays
Atlas Wharf
Turnberry Quay
Millwall Outer Dock
Limeharbour
Preston Road
Royal Naval College
(formerly Royal Hospital)

Figure 1: Location of Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15) and other nearby sites of geoarchaeological/archaeological investigation: 7 Limeharbour, Isle of Dogs (Batchelor & Young 2016a); 1-3 Turnberry Quay (Batchelor & Young 2016b); Atlas Wharf (Lakin 1998); Heron Quays (Batchelor and Young 2014); Delta Junction (Yendell 2012); Preston Road (Branch *et al.* 2007); Greenwich Peninsula Central East (Young & Batchelor 2015b); Tunnel Avenue (Batchelor 2013); Victoria Deep Water Terminal (Corcoran 2002); Bellot Street (Garage Site; Branch *et al*. 2005); 72-88 Bellot Street (McLean 1993; Philp 1993); Enderby Wharf (Young & Batchelor 2013); Alcatel Lucent Telegraph Works (Young & Batchelor 2015a) and Greenwich Wharf (Halsey 2007). *Contains Ordnance Survey data © Crown copyright and database right [2014].*

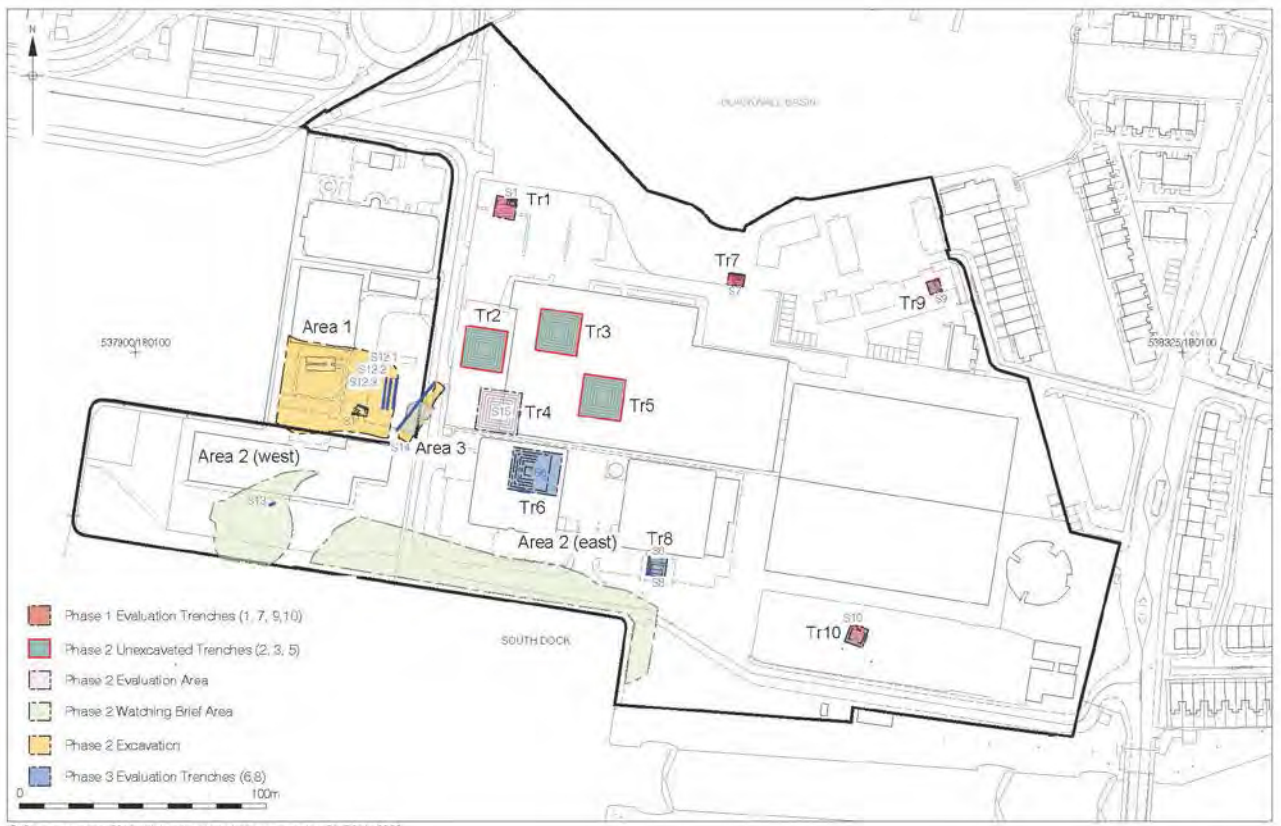


Figure 2: Site map showing the archaeological interventions at the Wood Wharf, London Borough of Tower Hamlets site, including the location of Sections 11 and 12.3 (Area 1) (from Grosso, 2016).

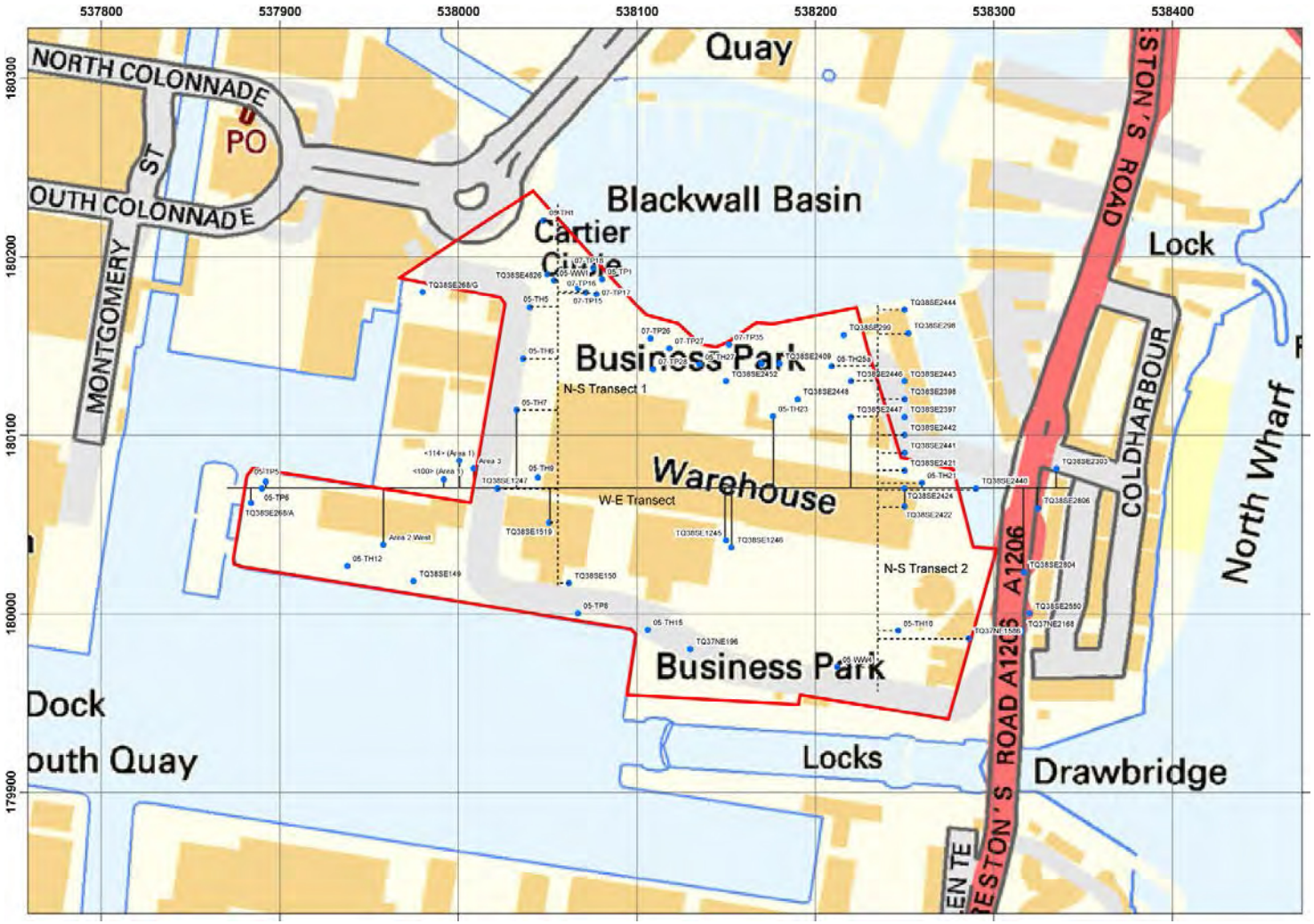


Figure 3: Site map showing the location of the geotechnical and archaeological records used in the deposit model. The West-East and two North-South transects (Figures 10 to 12) are also shown. ***Contains Ordnance Survey data © Crown copyright and database right [2014].***

2. METHODS

2.1. *Lithostratigraphic descriptions*

The lithostratigraphy of the column samples was described in the laboratory using standard procedures for recording unconsolidated and organic sediments, noting the physical properties (colour), composition (gravel, sand, clay, silt and organic matter) and inclusions (e.g. artefacts) (Tröels-Smith 1955). The procedure involved: (1) cleaning the sample using a scalpel; (2) recording the physical properties, most notably colour using a Munsell Soil Colour Chart; (3) recording the composition; gravel (Grana glareosa; Gg), fine sand (Grana arenosa; Ga), silt (Argilla granosa; Ag) and clay (Argilla steatoides); (4) recording the degree of peat humification and (5) recording the unit boundaries e.g. sharp or diffuse. The results of the geoarchaeological descriptions of the columns samples are displayed in Figure 13 and in Tables 2 to 8.

2.2. *Deposit modelling*

The deposit model was based on a review of 65 sedimentary sequences, including 30 arising from the archaeological interventions (Grosso 2016) and 35 BGS archive boreholes (www.bgs.ac.uk/opengeoscience). Modelling was undertaken using RockWorks 16 geological utilities software and displayed using ArcMAP 10. The term 'deposit modelling' describes any method used to depict the sub-surface arrangement of geological deposits, but particularly the use of computer software to create contoured maps or three dimensional representations of contacts between stratigraphic units. The first requirement is to classify the recorded borehole sequences into uniformly identifiable stratigraphic units. At the Wood Wharf site, the sedimentary units were classified into four groupings: (1) gravel, (2) peat, (3) alluvium and (4) Made Ground. Models of surface height (using a nearest neighbour routine) were generated for the gravel, peat and alluvium (Figures 4, 5 and 7). Thickness of the peat (Figure 6), combined alluvial units (Figure 8) and Made Ground (Figure 9) was also modelled (also using a nearest neighbour routine). A west-east and two north-south two-dimensional transect of boreholes across the site are shown in Figures 10 to 12. A model of the surface height of the gravel in the wider Isle of Dogs/Greenwich Peninsula area was also generated (Figure 15).

How effectively Rockworks portrays the relief features of stratigraphic contacts or the thickness of sediment bodies depends on the number of data points (boreholes/test pits) per unit area, and the extent to which these points are evenly distributed across the area of interest. The portrayal is also affected by the significance assigned to these data points, in terms of the extent of the area around the point to which the data are deemed to apply. This can be predetermined for each data set, and in the present case the value chosen for each data point (borehole) is equivalent to an area of 50m radius for all models. The boreholes are relatively well distributed over the area of investigation. In general, reliability improves towards the core area of boreholes where mutually supportive data are likely to be available from several adjacent data points. Reliability is also affected by the quality of the stratigraphic records, which in turn are affected by the nature of the sediments and/or their post-

depositional disturbance during previous stages of land-use on the site. Quality is also affected where boreholes have been put down at different times and recorded using different descriptive terms and subject to differing technical constraints in terms of recorded detail including the exact levels of the stratigraphic boundaries. Of the records used in the deposit model, the column samples described by Quaternary Scientific represent the most detailed record of the sedimentary sequences. Finally, because of the 'smoothing' effect of the modelling procedure, the modelled levels of stratigraphic contacts may differ slightly from the levels recorded in borehole logs.

Table 1: Borehole attributes for the records used in the deposit model, Wood Wharf, London Borough of Tower Hamlets.

Borehole	Easting	Northing	Elevation (m OD)
Archaeological interventions (Grosso, 2016)			
05-TH1	538047.90	180220.10	5.26
05-TH5	538040.10	180171.30	5.15
05-TH6	538036.40	180142.80	5.85
05-TH7	538032.70	180113.90	5.85
05-TH9	538044.60	180076.20	5.50
05-TH10	538246.40	179990.30	5.85
05-TH12	537938.00	180026.50	5.25
05-TH15	538106.30	179990.80	5.40
05-TH21	538259.70	180073.10	5.70
05-TH23	538176.30	180110.40	5.60
05-TH25a	538209.10	180138.50	5.39
05-TH27	538135.30	180139.60	5.24
05-TP1	538080.70	180187.30	5.24
05-TP5	537892.20	180073.70	5.30
05-TP6	537884.00	180061.90	5.30
05-TP8	538067.10	180000.20	5.22

Borehole	Easting	Northing	Elevation (m OD)
05-WW1	538053.80	180186.60	5.24
05-WW4	538212.30	179970.00	5.85
07-TP15	538067.00	180182.30	5.21
07-TP16	538071.60	180179.80	5.21
07-TP17	538077.40	180178.70	5.21
07-TP18	538075.80	180193.60	5.22
07-TP26	538107.70	180154.10	5.26
07-TP27	538118.30	180148.50	5.29
07-TP28	538109.10	180136.90	5.27
07-TP35	538151.70	180150.60	4.93
<100> (Area 1)	537992.00	180075.00	-1.25
<114> (Area 1)	538000.69	180085.71	-0.54
Area 3	538008.66	180081.20	1.00
Area 2 West	537958.07	180038.43	1.00
BGS archive boreholes			
TQ37NE1586	538286.00	179986.00	5.43
TQ37NE196	538130.00	179980.00	5.67
TQ37NE2168	538316.00	179990.00	5.13
TQ38SE1245	538150.00	180041.00	5.31
TQ38SE1246	538153.00	180037.00	5.35
TQ38SE1247	538022.00	180070.00	5.61
TQ38SE1247	538022.00	180070.00	5.61
TQ38SE149	537975.00	180018.00	5.92
TQ38SE150	538062.00	180017.00	5.94
TQ38SE1519	538051.00	180051.00	2.84

Borehole	Easting	Northing	Elevation (m OD)
TQ38SE2303	538335.00	180081.00	4.45
TQ38SE2397	538250.00	180110.00	4.96
TQ38SE2398	538250.00	180120.00	5.71
TQ38SE2409	538180.00	180140.00	5.24
TQ38SE2421	538250.00	180080.00	5.30
TQ38SE2422	538250.00	180060.00	5.21
TQ38SE2424	538250.00	180070.00	5.25
TQ38SE2440	538290.00	180070.00	5.06
TQ38SE2441	538250.00	180090.00	4.96
TQ38SE2442	538250.00	180100.00	5.71
TQ38SE2443	538250.00	180130.00	5.10
TQ38SE2444	538250.00	180170.00	5.02
TQ38SE2446	538220.00	180130.00	5.11
TQ38SE2447	538220.00	180110.00	5.79
TQ38SE2448	538190.00	180120.00	5.71
TQ38SE2452	538150.00	180130.00	5.34
TQ38SE2550	538320.00	180000.00	4.27
TQ38SE268/A	537890.00	180070.00	5.94
TQ38SE268/D	538170.00	180140.00	5.94
TQ38SE268/G	537980.00	180180.00	5.60
TQ38SE2804	538317.00	180023.00	4.83
TQ38SE2806	538325.00	180059.00	4.37
TQ38SE298	538252.00	180157.00	5.41
TQ38SE299	538216.00	180156.00	5.47
TQ38SE4826	538050.00	180190.00	5.64

2.3. *Organic matter determinations*

A total of 35 subsamples (14 from column sample <100> and 21 from column sample <114> were taken for determination of the organic matter content (Tables 9 and 10; Figure 13). These records were important as they can identify increases in organic matter possibly associated with more terrestrial conditions. The organic matter content was determined by standard procedures involving: (1) drying the sub-sample at 110°C for 12 hours to remove excess moisture; (2) placing the sub-sample in a muffle furnace at 550°C for 2 hours to remove organic matter (thermal oxidation), and (3) re-weighing the sub-sample obtain the 'loss-on-ignition' value. The samples were then re-weighed after 2 hours at 950°C for determination of the calcium carbonate content (see Bengtsson and Enell 1986).

2.4. *Radiocarbon dating*

Four subsamples of unidentified twig wood (<2-3 years old) were extracted from the top and base of the peat horizons in column samples <100> and <114>. The samples were submitted for AMS radiocarbon dating to the BETA Analytic Radiocarbon Dating Facility, Miami, Florida. The results have been calibrated using OxCal v4.0.1 (Bronk Ramsey 1995; 2001 and 2007) and the IntCal13 atmospheric curve (Reimer *et al*. 2013). The results are displayed in Figure 13 and in Tables 11 and 12.

2.5. *Pollen assessment*

Nine sub-samples from column <100> and 12 sub-samples from column <114> were extracted for pollen assessment. The pollen was extracted as follows: (1) sampling a standard volume of sediment (1ml); (2) adding two tablets of the exotic clubmoss *Lycopodium clavatum* to provide a measure of pollen concentration in each sample; (3) deflocculation of the sample in 1% Sodium pyrophosphate; (4) sieving of the sample to remove coarse mineral and organic fractions (>125µ); (5) acetolysis; (6) removal of finer minerogenic fraction using Sodium polytungstate (specific gravity of 2.0g/cm^3); (7) mounting of the sample in glycerol jelly. Each stage of the procedure was preceded and followed by thorough sample cleaning in filtered distilled water. Quality control is maintained by periodic checking of residues, and assembling sample batches from various depths to test for systematic laboratory effects. Pollen grains and spores were identified using the University of Reading pollen type collection and the following sources of keys and photographs: Moore *et al.* (1991); Reille (1992). The assessment procedure consisted of scanning the prepared slides, and recording the concentration and preservation of pollen grains and spores, and the principal taxa on four transects (10% of the slide) (Tables 13 and 14).

2.6. *Diatom assessment*

A total of 14 samples (six from column sample <100> and eight from column sample <114>) were extracted for an assessment of diatoms. 0.5g of sediment was processed for the diatom sample preparation. Many of the samples were found to be composed of silts and clays, but organic-rich

samples were also encountered. Samples typified by fine minerogenics were first treated with sodium hexametaphosphate and left overnight, to assist in minerogenic deflocculation. Samples were then treated with hydrogen peroxide (30% solution) and/or weak ammonia (1% solution) depending on organic and/or calcium carbonate content, respectively. Samples were finally sieved using a 10µm mesh to remove fine minerogenic sediments. The residue was transferred to a plastic vial, from which a slide was prepared for subsequent assessment.

A minimum of four slide traverses were undertaken across each slide sample. When encountered, diatom species ware identified with reference to van der Werff and Huls (1958-74), Hendy (1964) and Krammer & Lange-Bertalot (1986-1991). However, due to the nature of the rapid assessment, many taxa were only identified to genera level. The results of the assessment are displayed in Tables 15 and 16.

2.7. Tephra assessment

25 sub-samples for tephra assessment were extracted over suitable 10cm column sections; 9 from column <100> and 16 from column <114>. Subsamples were cleaned using a 30% H_2O_2 solution, to remove organic material, after which 5ml of 1% $Na_6P_6O_{18}$ was added to deflocculate material prior to sieving. Samples were then sieved with de-ionised water, to remove coarse material and residual organics, and the <80 and >25 µm fraction retained in 15ml round bottomed centrifuge tubes. Tubes were centrifuged at 2500 rpm for 5 minutes (brake on) and then treated using the density separation procedure outlined in Blockley *et al*. (2005) which has been designed to minimize chemical damage to potential tephra shards whilst assuring maximum retention of material. This procedure was carried out as follows; (1) 6ml of sodium polytungstate (SPT) at 2.0 g/cm3 was added to each tube and tubes were then centrifuged at 2500 rpm for 15 minutes (brake off), cleaning flot was then decanted retained for recycling; (2) repeat step '1'; (3) 6ml of SPT at 2.5 g/cm3 was added and tubes were centrifuged at 2500 rpm for 15 minutes (brake off), tephra float was then decanted into 15ml conical tubes; (4) repeat step '3'; (5) After the second tephra float was decanted, centrifuge tubes were filled to the top with de-ionised water and centrifuged at 2500 rpm for 5 minutes (brake on) and SPT poured off for recycling; (6) Tubes were refilled and step '5' repeated at least 3 further times until samples were clean of SPT; (7) Samples were centrifuged at 4000rpm for 5 minutes (brake on) and the supernatant discarded. The remaining material was then transferred onto glass slides, and placed onto a hotplate to evaporate off excess liquid. Samples were mounted using a synthetic mounting medium (for example Glycerol)

Preliminary assessment was carried out across 10 slide transects, at 400x magnification using a transmitted light microscope (following Gehrels *et al*. 2008) to determine presence/absence of tephra (Tables 17 and 18).

2.8. *Macrofossil assessment*

Two small bulk samples from column samples <100> and <114> (primarily for the identification of material for radiocarbon dating) and four bulk samples from Section 11 were processed for the recovery of macrofossil remains, including waterlogged plant macrofossils, wood, insects and Mollusca (Tables 19 to 21). The samples from columns <100> and <114> were focussed on the peat horizons in both sequences, whilst the bulk samples were extracted from both the peat and alluvium. The extraction process involved the following procedures: (1) removing a sample 2 or 3cm in thickness (column samples) or 1.0 litre in volume (bulk samples); (2) measuring the sample volume by water displacement, and (3) processing the sample by wet sieving using 300µm and 1mm mesh sizes. Each sample was scanned under a stereozoom microscope at x7-45 magnifications, and sorted into the different macrofossil classes. The concentration and preservation of remains was estimated for each class of macrofossil. Preliminary identifications of the waterlogged seeds have been made using modern comparative material in the University of Reading reference collection and reference atlases (e.g. Cappers *et al*. 2006). Nomenclature used follows Stace (2005).

3. RESULTS

3.1. RESULTS AND INTERPRETATION OF THE GEOARCHAEOLOGICAL DESCRIPTIONS, ORGANIC MATTER CONTENT AND RADIOCARBON DATING

The results of the lithostratigraphic descriptions of column samples <100> A-C (Section 11) and <114> A-D (Section 12.3) are shown in Tables 2 to 8. The results of the organic content of each sequence are shown in Tables 9 and 10 respectively, whilst the results of the radiocarbon dating are shown in Tables 11 and 12. Three-dimensional surface elevation models for the gravel, peat and Holocene alluvium are shown in Figures 4, 5 and 7 respectably, with models of peat thickness, the combined alluvial units and the Made Ground shown in Figures 6, 8 and 9. Two-dimensional transects are also presented, aligned west-east (Figure 10) and north south across the western (Figure 11) and eastern (Figure 12) areas of the site. The results of the lithostratigraphic descriptions, organic content analysis and radiocarbon dating are illustrated in Figure 13.

The full sequence of sediments recorded at the site comprises:

Made Ground

Upper Alluvium – widely present

Peat – widely present

Lower Alluvium – widely present

Gravel (Shepperton Gravel)

I. Shepperton Gravel

The Shepperton Gravel was present in all the boreholes/trenches that penetrated to the bottom of the Holocene sequence. It was deposited during the Late Glacial (15,000 to 10,000 years before present) and comprises the sands and gravels of a high-energy braided river system which, while it was active, would have been characterised by longitudinal gravel bars and intervening low-water channels in which finer-grained sediments might have been deposited. Such a relief pattern would have been present on the valley floor at the beginning of the Holocene when a lower-energy fluvial regime was being established.

For the model of the Shepperton Gravel surface, four records were removed since they were not considered reliable: 05-TH9, 05-TP8, TQ38SE268/G and TQ38SE149. The Gravel surface in these boreholes was considered erroneously high, and the data from these boreholes were not supported by other nearby records. It is possible that the high gravel surfaces identified in these records may in fact form part of the modern ground raising deposits (Made Ground); the possible gravel island with a high level of 2.40m OD postulated by Boyer (2014) is therefore considered unlikely. In fact, the surface of the Shepperton Gravel across the area of the site (Figure 4) is relatively even, generally recorded at between *c*. -2 and -3m OD except where it rises towards the southwest of the site to -1.22m OD in borehole TQ38SE150, and towards the northeast to between -1.24 (TQ38SE2446) and -1.64m OD (TQ38SE299). The Gravel surface was recorded in column <100> (Area 1, Section 11) at -2.40m OD.

The Gravel topography at the site is thus typical of that in a braided river channel, perhaps with minor gravel highs in the southwest and northeast of the site separated by intervening low-water channels which traversed the remainder of the site.

II. Lower Alluvium

Where present, the Lower Alluvium rests directly on the Shepperton Gravel and was recorded in selected records across the site (see Figures 10-12). The deposits of the Lower Alluvium are described as a predominantly silty or clayey unit, tending to become increasingly sandy downward in most sequences. The Lower Alluvium frequently contains detrital wood or plant remains, and in many cases is described as organic and with occasional Mollusca remains. The surface of the Lower Alluvium (see Figures 10-12) generally lies at between *c*. -2m and -1m and is recorded in columns <100> (Area 1, Section 11) and <114> (Area 1, Section 12.3) at -1.66 and-1.46m OD respectively. In column sample <100> the Lower Alluvium was generally less than 3% organic, indicative of frequent in-washing of mineral material at this location.

The sediments of the Lower Alluvium are indicative of deposition during the Early to Mid-Holocene, when the main course of the Thames was probably confined to a single meandering channel. During this period, the surface of the Shepperton Gravel was progressively buried beneath the sandy and silty flood deposits of the river. The richly-organic nature of the Lower Alluvium suggests that this was a period during which the valley floor was occupied by a network of actively shifting channels, with a drainage pattern on the floodplain that was still largely determined by the relief on the surface of the underlying Shepperton Gravel.

III. Peat

Overlying the Lower Alluvium, and in places the Shepperton Gravel, across much of the site is a bed of generally woody and in places herbaceous peat, varying in thickness from 0.15 (TQ38SE2443) to 2.3m thick (TQ38SE268/A). The peat was recorded as 0.30 and 0.76m thick in columns <100> (Area 1, Section 11) and <114> (Area 1, Section 12.3) respectively, and was generally between 60 and 70% organic, indicative of frequent in-washing of mineral sediment during flood events. The surface of the peat is variable, generally recorded at between *c*. 0.5 and -1.5m OD (Figure 5). In column <114> it is significantly higher than in column <100>, at -0.70 and -1.36m OD respectively. However, in column <114> the peat is mineral-rich between *c*. -0.9 and -1.2m OD, recorded at between *c*. 20 and 35% organic; this horizon is most likely indicative of a significant flood event across the peat surface, and broadly corresponds to the transition to silty clay (the Upper Alluvium) in column <100> at -1.36m OD. This event also corresponds to layer [101] in Area 1, described during the archaeological excavations (Grosso 2016) as a 'firm dark brown silt clay peat' with inclusions of frequent timber (possibly worked) and fragmented oyster shells, and interpreted as a mix of 're-deposited peat, alluvium and fragments of timber caused by flooding' (Grosso 2016: 19). The variable surface of the peat is most likely indicative of erosion of the peat surface at various locations across the site, consistent with the significant input of mineral-rich material recorded in the peat in column <114>.

The results of the radiocarbon dating of the peat in columns <100> and <114> indicate that accumulation began at between *c*. 4875-4835 and 4520-4410 cal BP (see Tables 11 and 12 and Figure 13), corresponding to the middle to late Neolithic cultural period. As might be expected given the variable height of the peat surface, the radiocarbon dates indicate that peat cessation occurred significantly earlier in column <100> at 4780 to 4435 cal BP (middle to late Neolithic), compared to 2875 to 2765 cal BP (late Bronze Age/early Iron Age) in column <114>. Given the apparent lack of a chronological overlap between the accumulation of the peat horizons, it is possible that they represent two separate periods of peat formation; the significantly different dates for peat cessation support the notion of erosion of the peat surface in the area of column <100>, particularly given their close proximity (within *c*. 10m apart). However, the possibility of older plant remains having been washed in to the surface of the peat in column <100>, and subsequently dated, cannot be discounted.

The widespread occurrence of this peat indicates a general transition to a more stable valley floor, possibly associated with falling relative sea level and slight incision of the main channel of the Thames, encouraging the development of semi-terrestrial conditions across most of the floodplain. The peat is composed of wood and herbaceous remains indicating that during its accumulation the floodplain supported the growth of sedge fen/reed swamp and woodland communities.

IV. Upper Alluvium

The uppermost unit in the Holocene alluvial sequence is the Upper Alluvium, the deposits of which comprise largely sterile clays and silty clays. The Upper Alluvium is highly variable in its thickness, generally ranging between 1 and 3m in thickness, but occasional reaching up to *c*. 8m (e.g. in the area

of TQ38SE2447 and TQ38SE2442). The deposition of the Upper Alluvium had the effect of infilling the remaining inequalities in the relief of the floodplain, so that the surface of the Upper Alluvium (Figure 9) is generally relatively level at between *c*. 3 and 4m OD; however greater truncation of the sequence has reduced this level in places, so that it lies at between 1 and 2m OD. In general, the combined Holocene alluvial units (incorporating the Lower Alluvium, peat and Upper Alluvium) are between 2 and 8m thick across the site (Figure 8).

The Upper Alluvium is typical of the mineral-rich sediments that are present as the uppermost element of the Holocene sequence beneath most floodplains in southern and southeast England. It is generally considered to reflect increased sediment loads resulting from intensification of agricultural land use from the later prehistoric period onward, combined with the effects of rising sea level.

V. Made Ground

Between 2 and 5m of Made Ground overlies the Holocene alluvial sequence (Figure 9).

Figure 4: Surface of the Gravel (m OD)

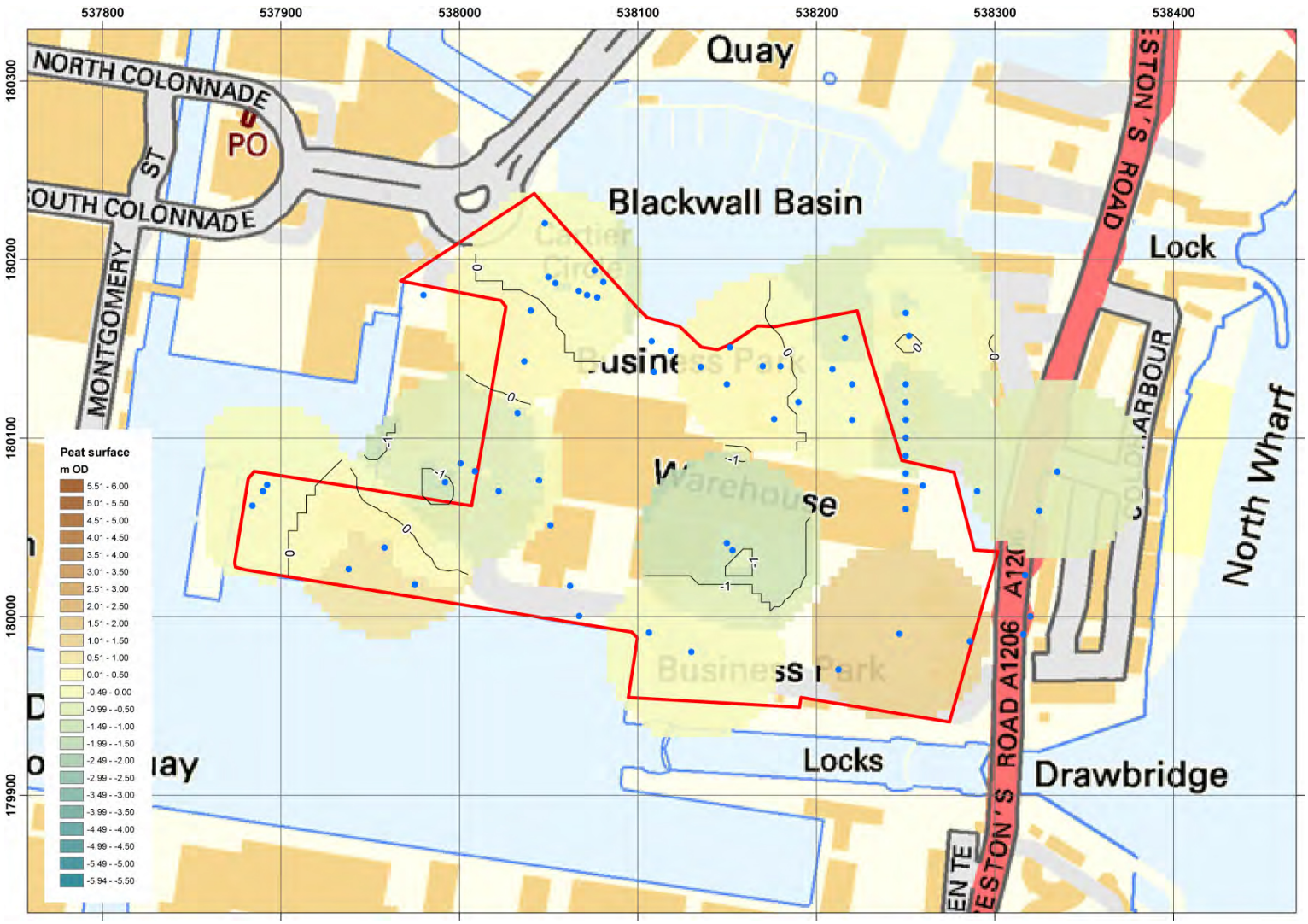


Figure 5: Surface of the peat (m OD)

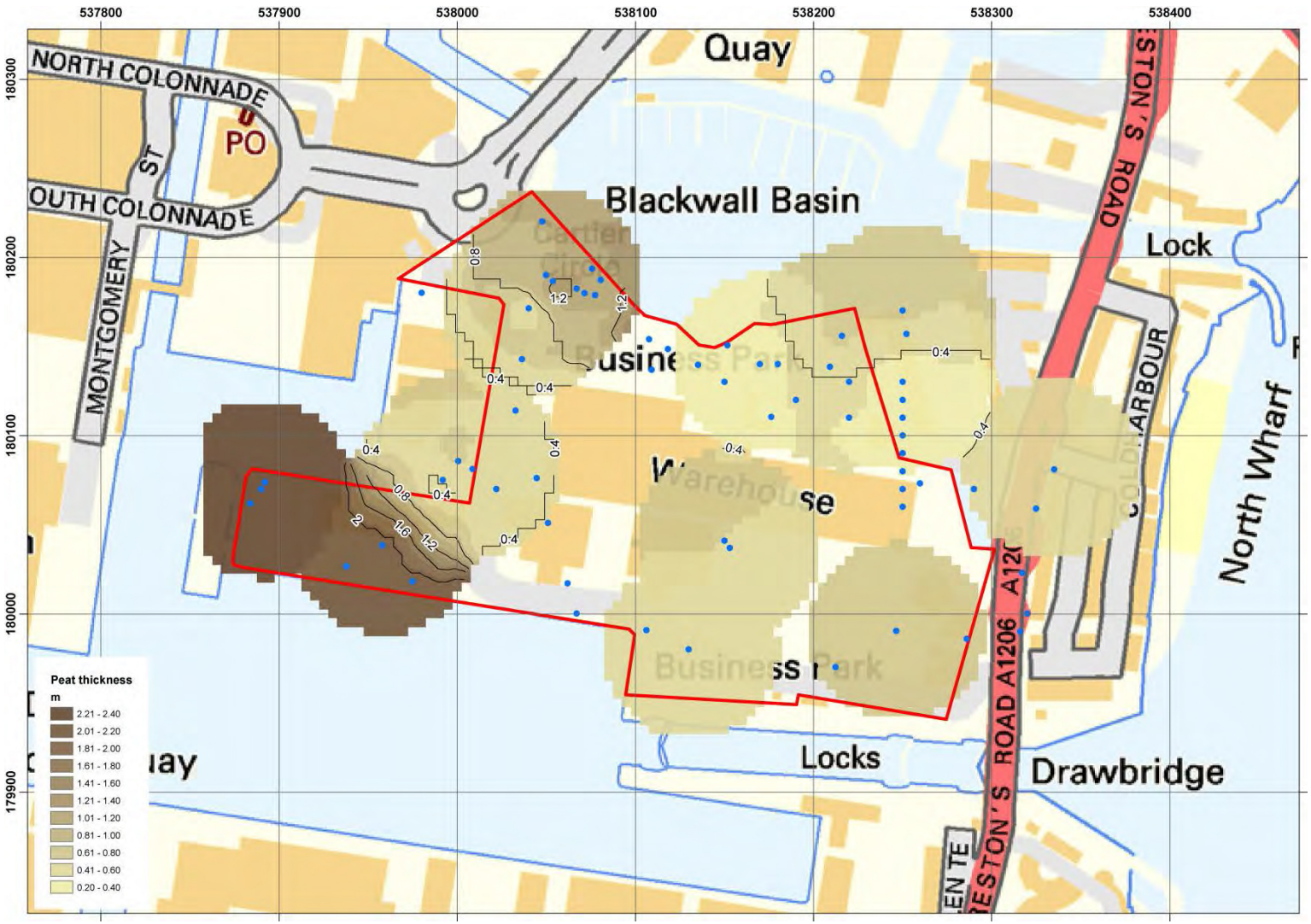


Figure 6: Thickness of the peat (m)

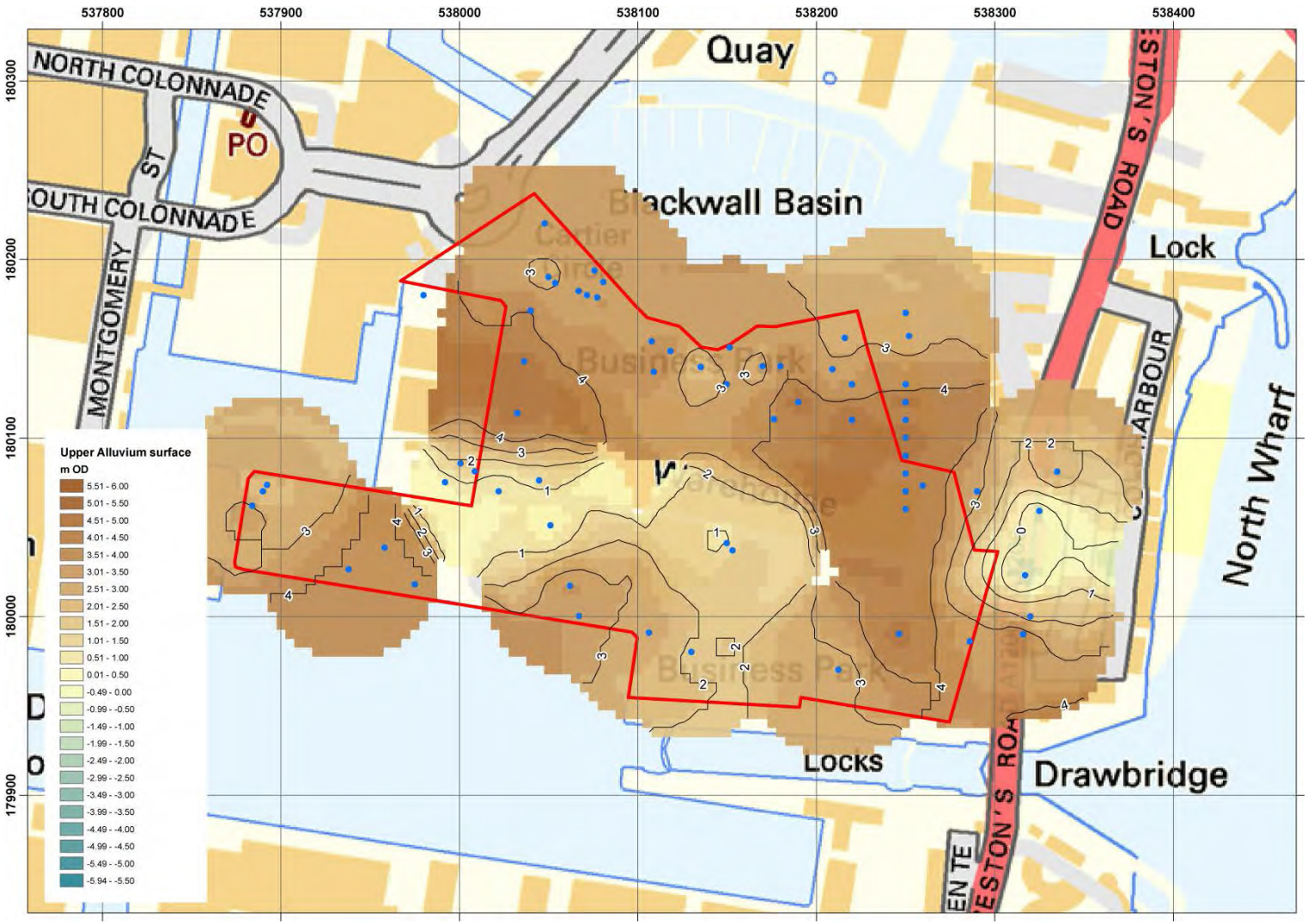


Figure 7: Surface of the alluvium (m)

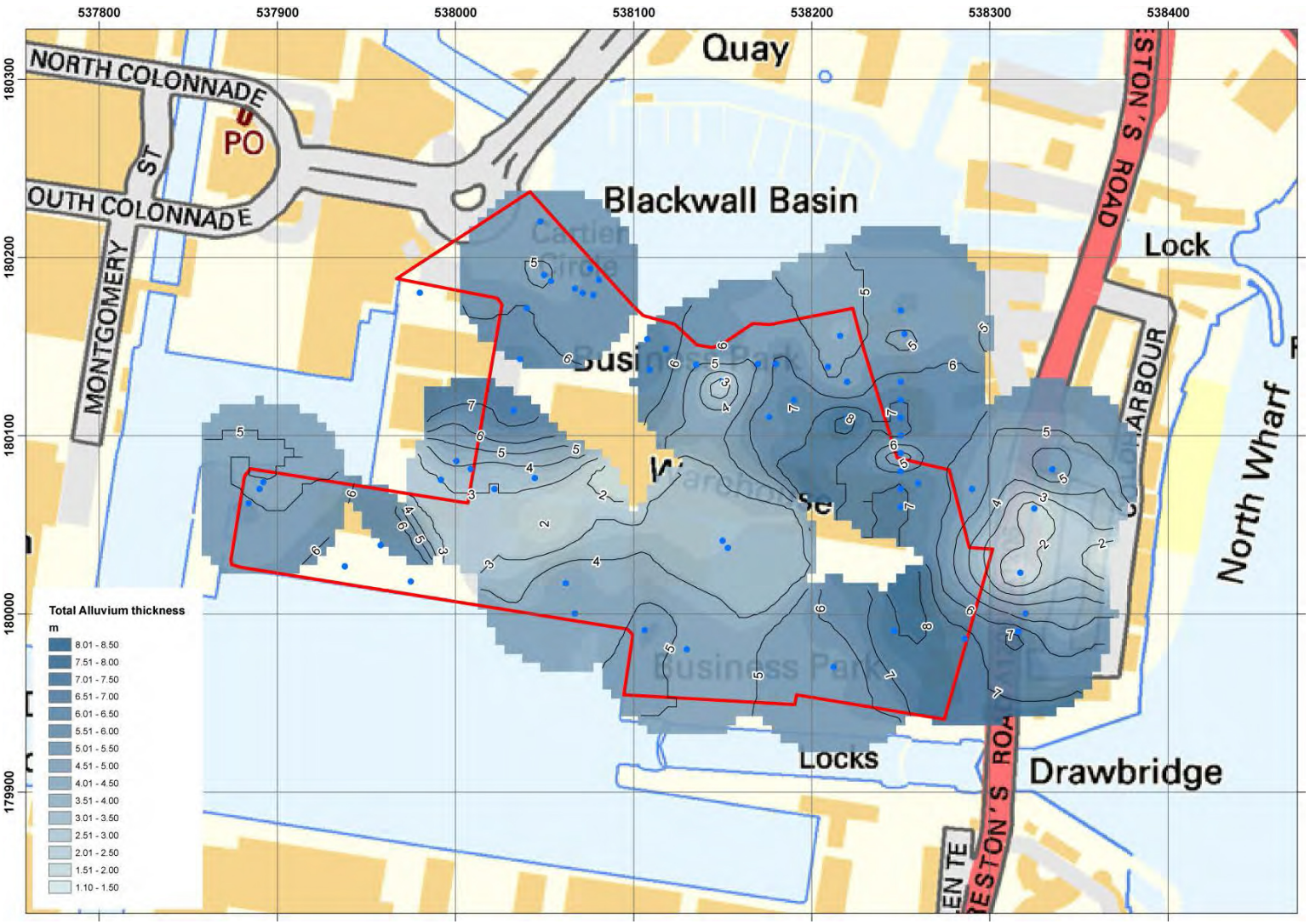


Figure 8: Thickness of the Holocene alluvial sequence (m)

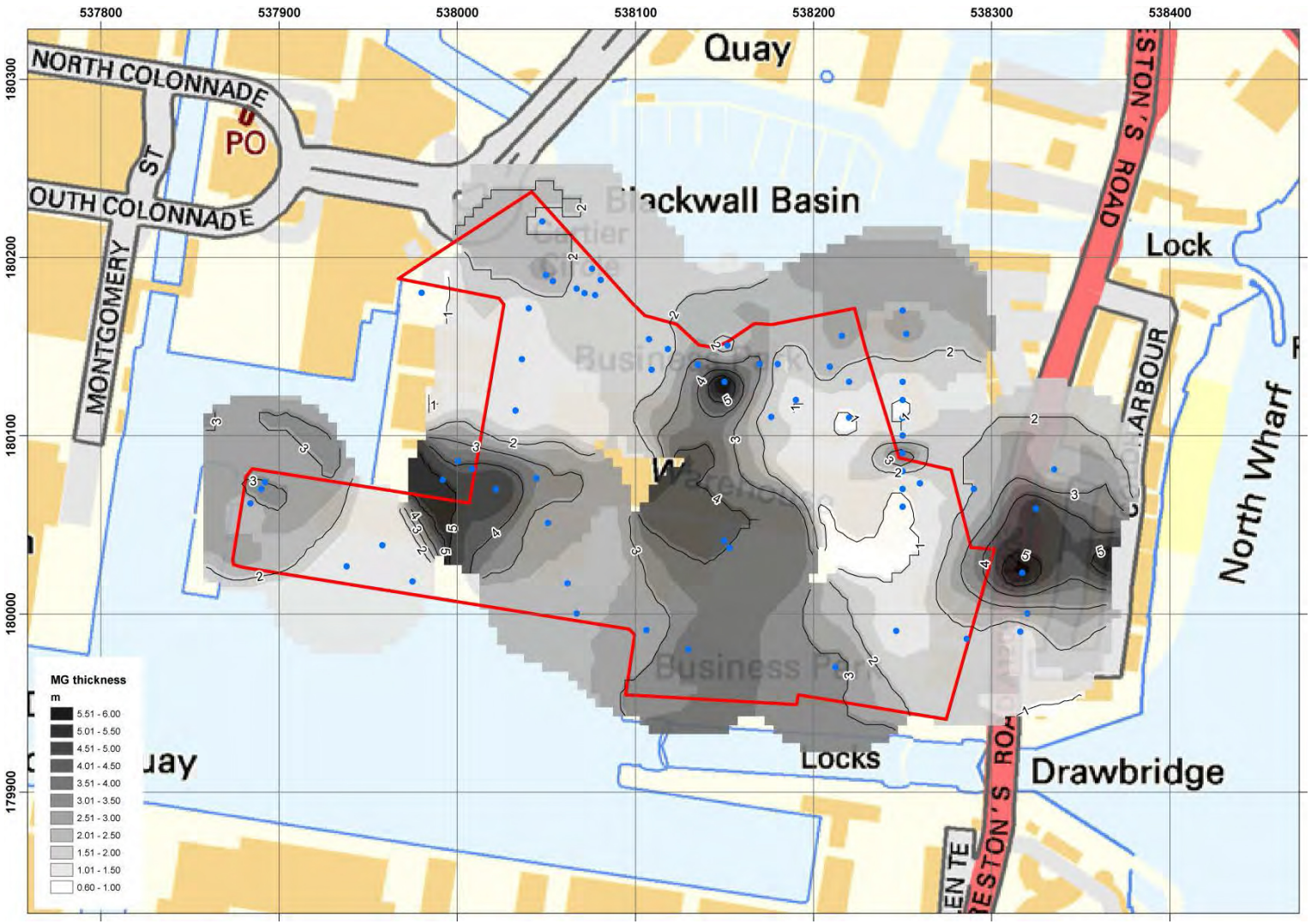


Figure 9: Thickness of the Made Ground (m)

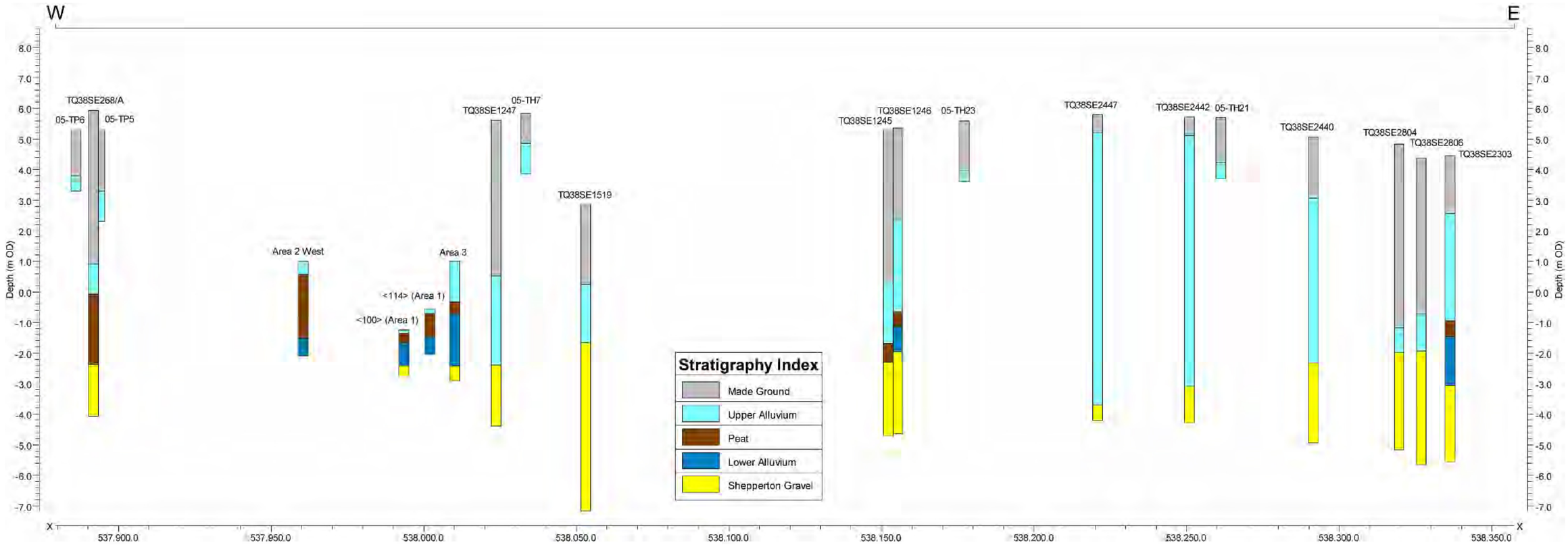


Figure 10: West-east transect of boreholes across the site

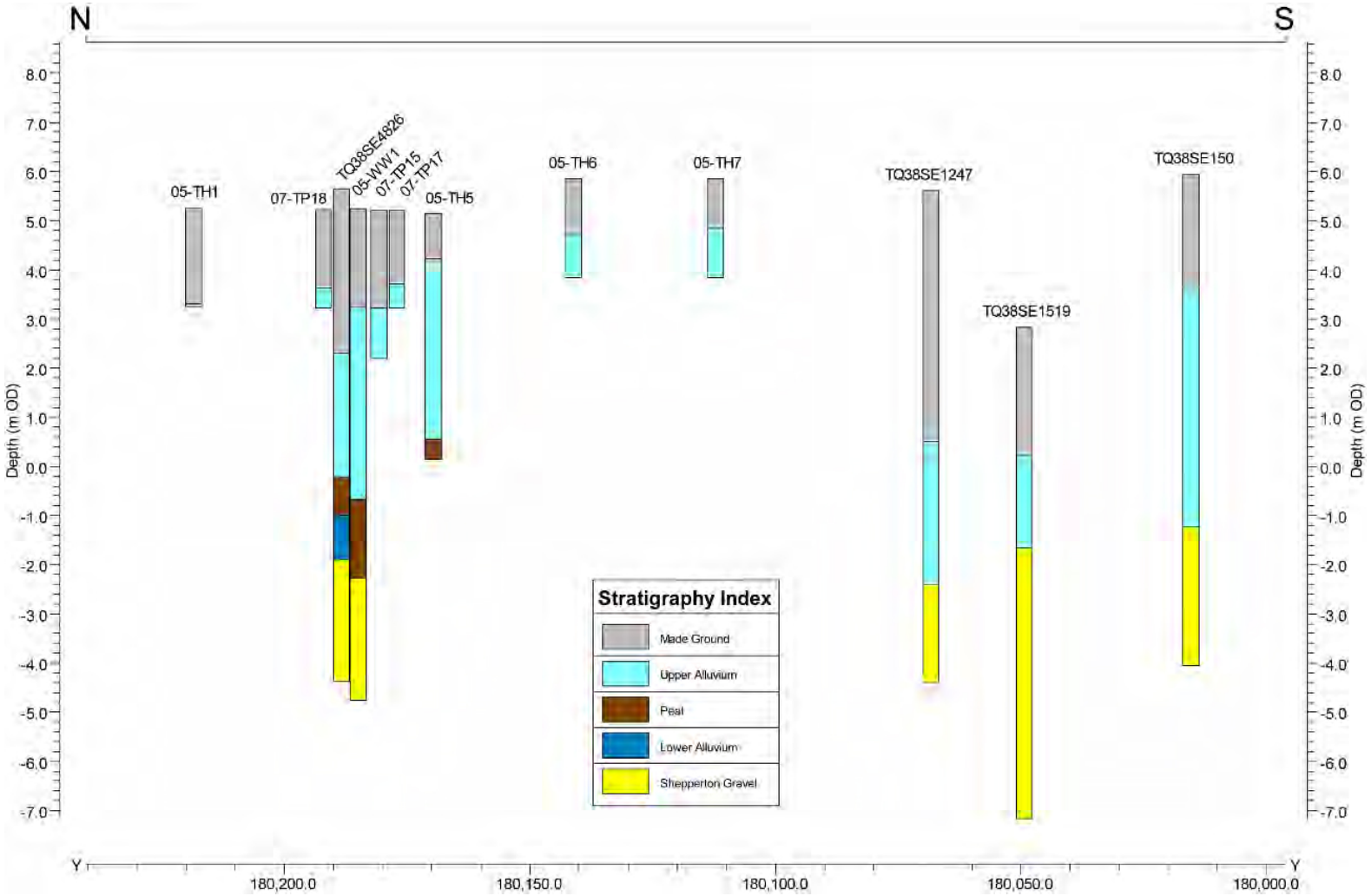


Figure 11: North-south transect of boreholes across the western area of the site

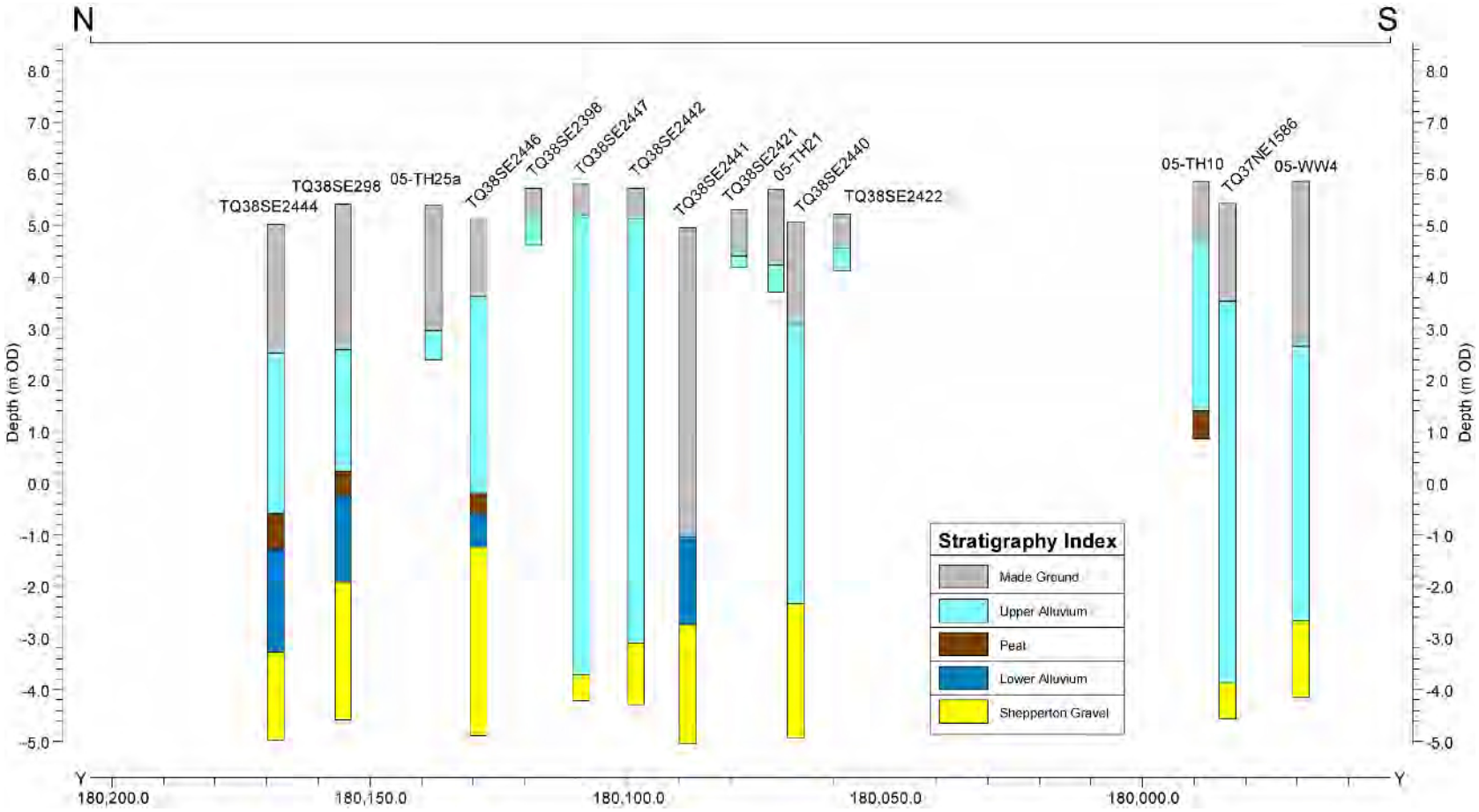


Figure 12: North-south transect of boreholes across the eastern area of the site

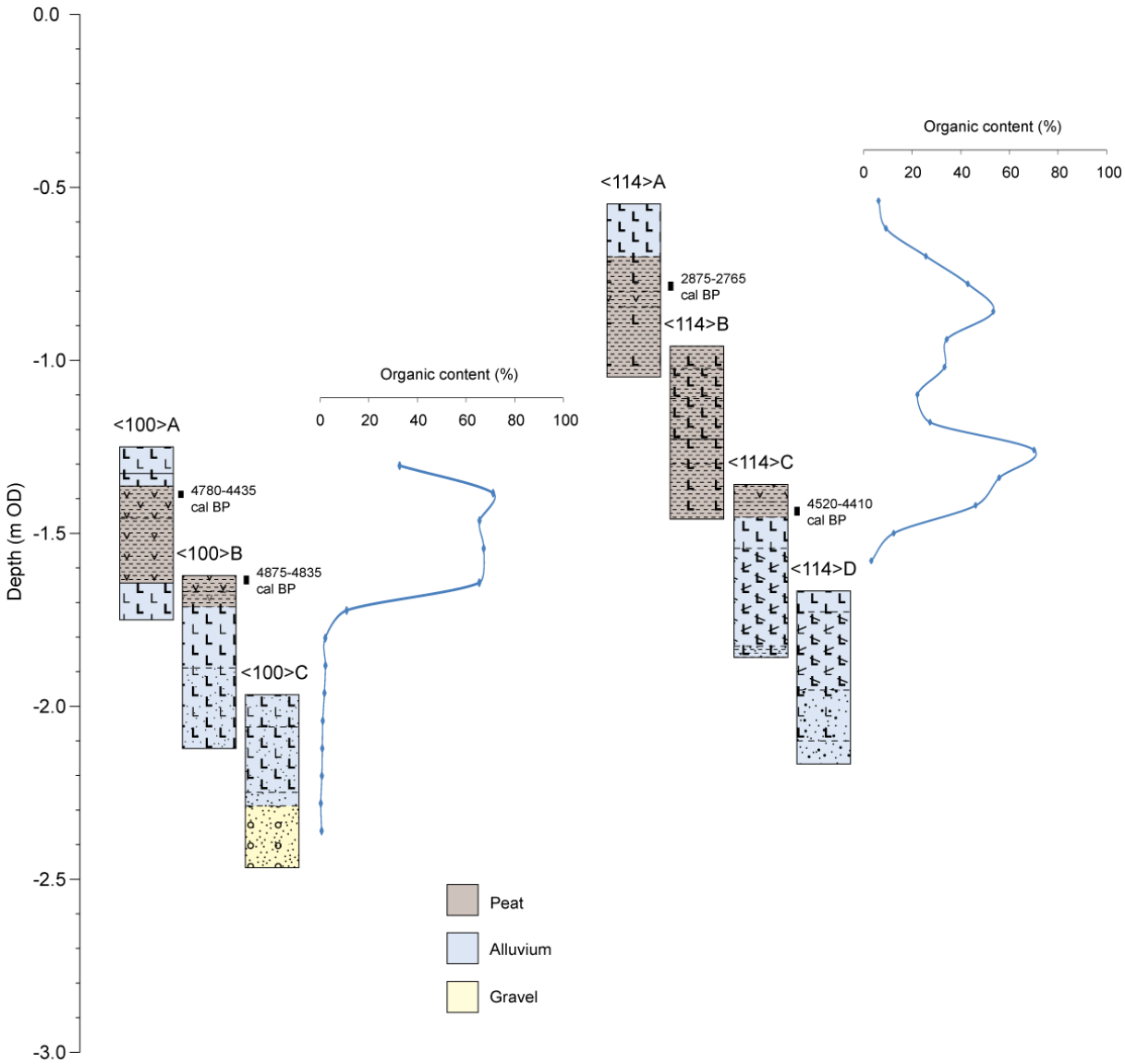


Figure 13: Results of the lithostratigraphic descriptions, organic content determinations and radiocarbon dating of column samples <100> and <114> (Area 1), Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Table 2: Lithostratigraphic description of column sample <100> (Section 11) Monolith A, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Depth (m OD)	Depth (m bgl)	Composition
-1.25 to -1.33	0.00 to 0.08	10YR 5/1; As3 Ag1 Mollusca+ Dl+; grey silty clay with trace fragments of molluscan material and detrital wood. Mixed with10YR 2/1; Sh3 Tl/Dl1 Mollusca+; black organic substance with wood or detrital wood and traces of molluscan material. Sharp and diffuse contacts between elements. Sharp contact into:
-1.33 to -1.36	0.08 to 0.11	10YR 5/1; As3 Ag1 Mollusca + Dl+; grey silty clay with trace fragments of molluscan material. Sharp contact into:
-1.36 to -1.47	0.11 to 0.22	10YR 2/1; Sh2 Tl2 As+; black wood peat with clay traces. Diffuse contact into:
-1.47 to -1.65	0.22 to 0.40	10YR 2/1; Sh3 Tl1 As+; black peat with wood fragments. Sharp contact into:
-1.65 to -1.75	0.40 to 0.50	10YR 5/1; As2 Ag2; grey silty clay.

Table 3: Lithostratigraphic description of column sample <100> (Section 11) Monolith B, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Depth (m OD)	Depth (m bgl)	Composition
-1.62 to -1.66	0.00 to 0.04	10YR 2/1; Sh2 Tl2; black wood peat. Diffuse contact into:
-1.66 to -1.71	0.04 to 0.09	10YR 2/2; Sh1 As1 Ag1 Tl1; very dark brown silty clayey wood peat. Diffuse contact into:
-1.71 to -1.89	0.09 to 0.27	10YR 5/1; As3 Ag1 Tl/Dl+; grey slightly silty clay with traces of wood or detrital wood. Diffuse contact into:
-1.89 to -2.12	0.27 to 0.50	10YR 5/2; As2 Ag1 Ga1 Dl+; greyish brown sandy silty clay with traces of detrital wood towards the base.

Table 4: Lithostratigraphic description of column sample <100> (Section 11) Monolith C, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Depth (m OD)	Depth (m bgl)	Composition
-1.97 to -2.07	0.00 to 0.10	10YR 5/2; As2 Ag1 Ga1; greyish brown sandy silty clay. Diffuse contact into:
-2.07 to -2.26	0.10 to 0.29	10YR 5/2; As2 Ag 1 Ga1 Gs+ Gg+; greyish brown sandy silty clay with occasional gravel clasts. Diffuse contact into:
-2.26 to -2.29	0.29 to 0.32	10YR 5/2; Ga3 Gs1 Ag+; greyish brown sand with traces of silt. Diffuse contact into:
-2.29 to -2.40	0.32 to 0.43	10YR 5/2; Ag2 Ga2 Gs+; greyish brown sandy clay. Sharp contact into:
-2.40 to -2.47	0.43 to 0.50	10YR 5/2; Gg2 Gs1 Ga1 Ag+; greyish brown sand with gravel clasts and traces of silt.

Table 5: Lithostratigraphic description of column sample <114> Monolith A, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Depth (m OD)	Depth (m bgl)	Composition
-0.54 to -0.70	0.00 to 0.16	10YR 5/2; As4 Gs+ Dl+ Lf+; greyish brown clay with traces of sand and detrital wood, evidence of iron staining. Diffuse contact into:
-0.70 to -0.80	0.16 to 0.26	10YR 3/1; Sh2 As2 Tl+ Lf+; very dark grey organic clay with traces

		of wood and possible evidence of iron staining. Diffuse contact into:
-0.80 to -0.84	0.26 to 0.30	10YR 2/1; Sh2 As1 Tl1; black clayey wood peat. Diffuse contact into:
-0.84 to -1.04	0.30 to 0.50	10YR 2/1; Sh3 As1 Tl+ Gs+; black clayey wood peat with some coarse sandy particles.

Table 6: Lithostratigraphic description of column sample <114> Monolith B, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Depth (m OD)	Depth (m bgl)	Composition
-0.95 to -1.02	0.00 to 0.07	10YR 2/1; Sh3 As1 Tl+ Ga+ Gs+; black clayey wood peat with traces of sand. Diffuse contact into:
-1.02 to -1.11	0.07 to 0.16	10YR 4/1; As3 Sh1 Tl+ Ga+; dark grey organic clay with traces of wood and sand. Diffuse contact into:
-1.11 to -1.23	0.16 to 0.28	10YR 3/1; As2 Sh2 Tl+ Ga+; very dark grey clayey organic material with traces of wood and sand. Sharp contact into:
-1.23 to -1.30	0.28 to 0.35	10YR 2/1; Sh3 As1 Tl+ Ga+; black clayey organic material with traces of wood and sand. Diffuse contact into:
-1.30 to -1.45	0.35 to 0.50	10YR 3/1; Sh2 As1 Tl1 Ga+; very dark grey clayey wood peat with traces of sand.

Table 7: Lithostratigraphic description of column sample <114> Monolith C, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Depth (m OD)	Depth (m bgl)	Composition
-1.36 to -1.405	0.00 to 0.045	10YR 3/1; Sh3 Tl1 As+; very dark grey wood peat with traces of clay. Diffuse contact into:
-1.405 to -1.46	0.045 to 0.10	10YR 2/1; Sh3 As1 Tl+ black clayey organic material with traces of wood. Diffuse contact into:
-1.46 to -1.54	0.10 to 0.18	10YR 2/2; As3 Ag 1 Sh+ Tl+; very dark brown organic silty clay with traces of wood. Diffuse contact into:
-1.54 to -1.83	0.18 to 0.47	10YR 5/1; As3 Dl/Tl1; grey clay with wood, evidence of possible horizontal bedding with coarse/fine beds. Diffuse contact into:
-1.83 to -1.86	0.47 to 0.50	10YR 5/1; Ga2 As1 Sh1 Gs+; grey silty organic sand.

Table 8: Lithostratigraphic description of column sample <114> Monolith D, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Depth (m OD)	Depth (m bgl)	Composition
-1.66 to 1.72	0.00 to 0.06	10YR 4/1; As3 Ag1 Dl/Tl+; dark grey silty clay with wood or detrital wood traces. Diffuse contact into:
-1.72 to -1.96	0.06 to 0.30	10YR 5/1; As2 Ag1 Dl/Tl1 Ga+; grey silty clay with wood or detrital wood inclusions, possible evidence of rooting. Diffuse contact into:
-1.96 to -2.10	0.30 to 0.44	10YR 5/1; Ga2 As1 Ag1 Tl/Dl+; grey silty clayey sand with wood or detrital wood inclusions. Diffuse contact into:
-2.10 to -2.16	0.44 to 0.50	10YR 5/2; Ga2 Gs1 Ag1; greyish brown silty sand.

Table 9: Results of the column sample <100> organic matter determinations, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Depth (m OD)		Organic matter content (%)
From	To	
-1.30	-1.31	32.91
-1.38	-1.39	70.97
-1.46	-1.47	65.42
-1.54	-1.55	67.12
-1.64	-1.65	65.32
-1.72	-1.73	11.37
-1.80	-1.81	2.67
-1.88	-1.89	2.73
-1.96	-1.97	2.31
-2.04	-2.05	1.65
-2.12	-2.13	1.45
-2.20	-2.21	1.27
-2.28	-2.29	0.84
-2.36	-2.37	1.16

Table 10: Results of the column sample <114> organic matter determinations, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Depth (m OD)		Organic matter content (%)
From	To	
-0.54	-0.55	6.12
-0.62	-0.63	9.21
-0.70	-0.71	25.64
-0.78	-0.79	42.89
-0.86	-0.87	53.40
-0.94	-0.95	34.21
-1.02	-1.03	33.33
-1.10	-1.11	22.16
-1.18	-1.19	27.37
-1.26	-1.27	70.17
-1.34	-1.35	55.82
-1.42	-1.43	46.10
-1.50	-1.51	12.38
-1.58	-1.59	3.14
-1.66	-1.67	2.89
-1.74	-1.75	1.99
-1.82	-1.83	1.60
-1.90	-1.91	2.69
-1.98	-1.99	2.11
-2.06	-2.07	1.76
-2.14	-2.15	1.39

Table 11: Results of the column sample <100> radiocarbon dating, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Laboratory code / Method	Material and location	Depth (m OD)	Uncalibrated radiocarbon years before present (yr BP)	Calibrated age BC/AD (BP) (2-sigma, 95.4% probability)	δ13C (‰)
BETA 438393	Twig wood; top of Peat	-1.38 to -1.40	4050 ± 30 BP	2830 to 2485 cal BC (4780 to 4435 cal BP)	-29.1
BETA 438391	Twig wood; base of Peat	-1.62 to -1.65	4300 ± 30 BP	2925 to 2885 cal BC (4875 to 4835 cal BP)	-29.1

Table 12: Results of the column sample <114> radiocarbon dating, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Laboratory code / Method	Material and location	Depth (m OD)	Uncalibrated radiocarbon years before present (yr BP)	Calibrated age BC/AD (BP) (2-sigma, 95.4% probability)	δ13C (‰)
BETA 438390	Twig wood; top of Peat	-0.78 to -0.80	2730 ± 30 BP	925 to 815 cal BC (2875 to 2765 cal BP)	-29.8
BETA 438392	Twig wood; base of Peat	-1.43 to -1.45	3980 ± 30 BP	2570 to 2460 cal BC (4520 to 4410 cal BP)	-27.9

3.2. RESULTS AND INTERPRETATION OF THE POLLEN ASSESSMENT

Samples were prepared for pollen assessment from column sample sequences <100> (Section 11) and <114> (Section 12.3).

Between -2.28 and -1.80m OD in column sample sequence <100> (Table 13), pollen was completely absent. This corresponds to the silt and clay deposits of the Lower Alluvium. Between -1.72 and -1.30m OD in column sample sequence <100> and -1.50 and -0.78m OD in column sample sequence <114>, the results of the assessment indicate a highly variable concentration and preservation of remains (Tables 13 and 14); 10 samples have a moderate to very high concentration, and 6 samples have a near absence of remains. Within these samples, the assemblages tend to be characterised by high values of tree and shrub pollen dominated by *Alnus* (alder) and *Quercus* (oak) with *Corylus* type (e.g. hazel), *Pinus* (pine), *Ulmus* (elm), *Tilia* (lime) and sporadic *Taxus* (yew), *Fraxinus* (ash) and *Hedera* (ivy). Herbaceous and aquatic taxa are generally limited, including Cyperaceae (sedges), Poaceae (grasses) with sporadic *Sparganium* type (bur-reed), Lactuceae (dandelions), Asteraceae (daisies), *Chenopodium* type (goosefoot family), *Cereale* type (e.g. barley) and *Plantago lanceolata* (ribwort plantain). Spores are also limited including *Filicales* (ferns), *Polypodium vulgare* (polypody)

and *Pteridium aquilinem* (bracken). Microcharcoal is largely absent, with the exception of a few horizons in which negligible to moderate concentrations are recorded.

The results of the assessment indicate that during this period the surface of the peat and organic-rich sediment was colonised by alder-carr woodland with a ground flora of sedge fen and reed swamp communities. Hazel, ash and yew may have occupied this wetland environment, but more likely grew on the dryland, forming mixed deciduous woodland with oak and lime. The limited pollen concentrations do not enable any indications of woodland clearance to be identified at this stage. However, the occurrence of moderate microcharcoal values in combination with cereal pollen at the base of the sequence does indicate an anthropogenic influence. Further human activity is indicated by the occurrence of a cereal pollen grain towards the top of the peat and organic-rich sediment in sample <114> at -1.10m OD.

Between -0.70 and -0.62m OD in column samples sequence <114> (Table 14), the concentration and preservation of pollen is high. This corresponds to the deposits of the Upper Alluvium. The assemblage is characterised by high values of herbaceous pollen, dominated by Cyperaceae and Poaceae with *Cereale* type, Asteraceae (daisies), Lactuceae, *Plantago lanceolata* and *Chenopodium* type. Trees and shrubs included *Quercus, Corylus, Alnus*, *Pinus* and *Ulmus* (elm). Microcharcoal was either recorded in occasional quantities throughout these samples.

The quantity of herbaceous and aquatic pollen suggests the dominant growth of sedge fen and reed swamp communities occupying the floodplain environment during the accumulation of the Upper Alluvium; there is limited evidence to indicate the growth of floodplain woodland within the uppermost sample. On the adjacent dryland, the growth of mixed deciduous woodland was dominated by oak and hazel. A strong anthropogenic signal is also indicated by the frequent occurrence of cereal pollen grains, and indicators of disturbed or open ground (e.g. dandelions, fat hen, and ribwort plantain).

Table 13: Results of the pollen assessment from column sample <100>, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

	Depth (m OD)	**-1.30**	**-1.38**	**-1.46**	**-1.54**	**-1.64**	**-1.72**	**-1.80**	**-1.96**	**-2.28**
	Sediment type	**Peat / organic-rich sediments**						**Lower Alluvium**		
Latin name	**Common name**									
Trees										
Alnus	alder	9	2	16	11	6	10			
Quercus	oak	2	1	12	8	6	9			
Pinus	pine	1	1				1			
Ulmus	elm	2			1		1			
Tilia	lime	1	1	1	2		2			
Fraxinus	ash			1						
Shrubs										
Corylus type	e.g. hazel	1	2	5	2		2			
Herbs										
Cyperaceae	sedge family	1								
Poaceae	grass family	3		4	2					
Cereale type	e.g. barley					2	1			
Plantago lanceolata	ribwort plantain	1								
Chenopodium type	goosefoot family	2								
Apiaceae	carrot family			2	1					
Sinapis type	e.g. charlock	1								
Aquatics										
Sparganium type	bur-reed						1			
Spores										
Pteridium aquilinum	bracken	2								
Filicales	ferns	2	1	4	6	2	2			
Polypodium vulgare	polypody		1							
Unidentifiable				2	4					
Total Land Pollen (grains counted)		24	7	41	27	14	26	0	0	0
Concentration*		4	1	5	4	2	4	0	0	0
Preservation**		3	3	4	3	3	4	0	0	0
Microcharcoal Concentration***		2	0	0	0	1	3	1	1	0
Suitable for further analysis		**YES**	**NO**	**YES**	**YES**	**YES**	**YES**	**NO**	**NO**	**NO**

*Key: *Concentration: 0 = 0 grains; 1 =1-75 grains, 2 = 76-150 grains, 3 =151-225 grains, 4 = 226-300, 5 =300+ grains per slide; **Preservation: 0 = absent; 1 = very poor; 2 = poor; 3 = moderate; 4 = good; 5 = excellent; ***Microcharcoal Concentration: 0 = none, 1= negligible, 2 = occasional, 3 = moderate, 4 = frequent, 5 = abundant*

Table 14: Results of the pollen assessment from column sample <114>, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

	Depth (m OD)	**-0.62**	**-0.70**	**-0.78**	**-0.86**	**-0.94**	**-1.02**	**-1.10**	**-1.18**	**-1.26**	**-1.34**	**-1.42**	**-1.50**
	Sediment type	**Upper Alluvium**		**Peat and organic-rich sediments**									
Latin name	**Common name**												
Trees													
Alnus	alder	1	13	1	1		2	5	2		5	21	18
Quercus	oak	1	3	2			1	7	1	1	6	48	8
Pinus	pine	4	6		1								3
Ulmus	elm		2								1	5	1
Tilia	lime			1			1	2			3	10	2
Taxus	yew										1		
Shrubs													
Corylus type	e.g. hazel		1		1			4		1	3	8	12
Hedera	ivy		1					1	1				
Herbs													
Cyperaceae	sedge family	43	4	6							1	4	5
Poaceae	grass family	2	2	1									
Cereale type	e.g. barley	2						1					
Asteraceae	daisy family	1	2										
Lactuceae	dandelion family	2		3				1					
Plantago lanceolata	ribwort plantain			1									
Chenopodium type	goosefoot family	2			1								
Valeriana type	marsh valerian		2										
Mentha type	mint			1									
Aquatics													
Sparganium type	bur-reed			3									
Spores													
Pteridium aquilinum	bracken	2	2	4			1						1
Sphagnum	moss												1
Filicales	ferns	3	6	4	3		3	3	4	2	11	10	2
Polypodium vulgare	polypody			1					1		2	7	10
Unidentifiable											1	7	1

	Depth (m OD)	-0.62	-0.70	-0.78	-0.86	-0.94	-1.02	-1.10	-1.18	-1.26	-1.34	-1.42	-1.50
	Sediment type	Upper Alluvium		Peat and organic-rich sediments									
Latin name	Common name												
Total Land Pollen (grains counted)		58	36	16	4	0	4	21	5	2	20	96	49
Concentration*		5	5	3	1	0	1	3	1	1	3	5	5
Preservation**		4	4	3	3	0	3	3	3	4	4	4-5	4
Microcharcoal Concentration***		2	1-2	1	1	1	1	2	1	0	0	0	2
Suitable for further analysis		YES	YES	YES	NO	NO	NO	YES	NO	NO	YES	YES	YES

*Key: *Concentration: 0 = 0 grains; 1 =1-75 grains, 2 = 76-150 grains, 3 =151-225 grains, 4 = 226-300, 5 =300+ grains per slide; **Preservation: 0 = absent; 1 = very poor; 2 = poor; 3 = moderate; 4 = good; 5 = excellent; ***Microcharcoal Concentration: 0 = none, 1= negligible, 2 = occasional, 3 = moderate, 4 = frequent, 5 = abundant*

3.3. RESULTS AND INTERPRETATION OF THE DIATOM ASSESSMENT

A total of 14 samples were submitted for diatom assessment from column samples <100> (Section 11) and <114> (Section 12.3), and their respective depths are listed below. A summary of the diatom assessment results is provided in Tables 15 and 16 below. Diatoms are listed in order of abundance (most common at the top of each list). Diatoms were encountered in two of the samples from column <100> and four of the samples from column <114>. In most cases, it was the organic rich samples that were found to contain diatoms. The abundance and diversity of diatoms in column <100> was found to be highest in the uppermost samples, -1.30m and -1.22m OD. The presence of diatoms in column <114> was also restricted to the uppermost part of the sequence, within samples -0.62, -0.70, -0.78 and -1.02m OD. However, their abundance and diversity was found to be much lower and when encountered, evidence of diatom fragmentation and dissolution was common, which suggests some level of post-depositional frustule dissolution having taken place (Mayer *et al.* 1991). Of the taxa encountered, the majority of genera are more typically associated with coastal/estuarine settings (Vos & deWolf 1993).

Due to the variable presence of diatoms within the samples under investigation, reliable palaeoenvironmental results may be restricted to specific elevations within the sedimentary sequences. The diatoms from column <114> are in general too poorly preserved or encountered in too low abundances to warrant further analysis. In contrast, good assemblages are present in the upper section of column <100>, and sufficient variation in the diatom taxa present, suggests some variations in palaeo-depositional conditions prevailed. Therefore full analysis would assist in understanding the likely environmental conditions that prevailed at the time, with the possibility that the influence of relative sea-level change may also be recorded within the assemblages.

Table 15: Summary of diatoms encountered in column sample <100>, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Depth (m OD)	Diatoms encountered
-1.26	*Cyclotella striata* *Nitzschia navicularis* *Paralia sulcata* Synedra sp. Diploneis sp. *Pseudomelisira westii* *Actinoptychus senarius* Amphora sp. Delphineis sp. Cocconeis sp. Cymbella sp. Gyrosigma sp.
-1.30	*Cyclotella striata*

	Nitzschia navicularis Synedra sp. *Pseudomelosira westii* Gyrosigma sp. Pinnularia sp. Melosira sp. Epithemia sp Diploneis sp. *Podosira stelligera*
-1.54	n/a
-1.58	n/a
-1.96	n/a
-2.28	n/a

Table 16: Summary of diatoms encountered in column sample <114>, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

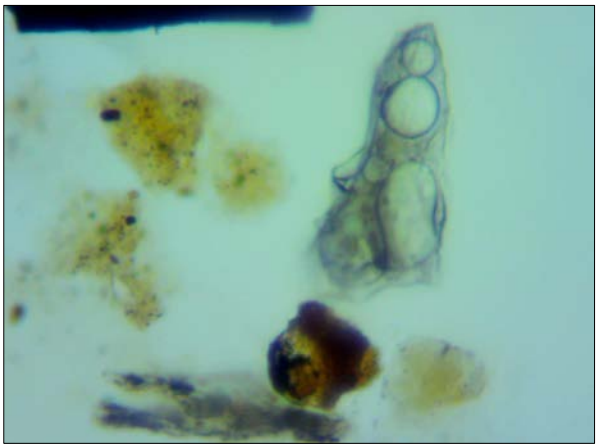
Depth (m OD)	Diatoms encountered
-0.62	Pinnularia sp. Campylodiscus sp.
-0.70	Campylodiscus sp.
-0.78	Pinnularia sp. *Nitzschia navicularis* *Paralia sulcata* Campylodiscus sp.
-1.02	Cymbella sp.
-1.18	n/a
-1.50	n/a
-1.58	n/a
-1.90	n/a

3.4. Results and interpretation of the tephra assessment

A total of 25 samples were assessed for the presence of microscopic volcanic material (tephra); the results of which are presented in Tables 17 and 18. By undertaking a preliminary evaluation of 10cm sections of both column samples it was possible to identify tephra at two depths; -1.25 to -1.35m OD in sample <100>, and -1.15 to -1.25m OD in sample <114>. Based on the proposed radiocarbon dates for these sequences (Tables 11 and 12), there is the potential that the material found could be related to two eruptions of the stratovolcano Hekla, in Southern Iceland; the Hekla-4 eruption, and the Hekla-Selsund eruption. Hekla-4, dated to around 4260 cal. yr BP (Wastegård 2005), produced a

widespread ash layer that has been identified at a significant number of locations across Northern Europe, including sites as far south as Grambower Moor in northeast Germany (van den Bogaard & Schmincke 2002), and Angstugsmossen in Southern Sweden (Wastegård 2005). The Hekla-S, also known as the Kebister tephra, has been shown to be distributed along a more easterly pathway than Hekla -4 but has also been identified in central Sweden and Germany (Wastegård *et al*. 2008), and is dated to around 3710 cal. yr BP. As both of the 'horizons' occur around a similar depth, it may also be the case that they may be related to the same event. It is unlikely that the tephra discovered in these samples was produced by central European volcanism, such as that of the Eifel range in Germany or the Massif Central in France; as no eruptions are known to have occurred in these regions during the mid Holocene.

Figure 14: Example of a vesicular tephra shard in column sample <100>, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).



As the existing chronology for samples <100> and <114> is based on minimal radiocarbon dating, a further assessment of these two 10cm sections is recommended, at 1cm resolution. This will serve to refine the exact position of the tephra horizons and, once subsequent geochemical analysis can be carried out, enable the correlation of these layers to deposits of known composition through a comparison of the major element geochemistry. The results of this could significantly increase the precision of the current radiocarbon chronology, and would represent the first account of a mid-Holocene tephra horizon being identified in the Greater London area to date, as published accounts of volcanic ash identified at sites in southern Britain are currently limited to only a handful of wetland sites in East Anglia and Wales (Brough *et al*. 2010; Pilcher & Hall 2002).

Table 17: Summary of tephra presence/absence in column sample <100>, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Column Sample	Depth (m bgl)		Depth (m OD)	Tephra P/A
	From	To		
A	0.00	0.10	-1.25	P
A	0.40	0.50	-1.65	A
B	0.09	0.19	-1.71	A
B	0.19	0.29	-1.81	A

B	0.29	0.39	-1.91	A
B	0.39	0.49	-2.01	A
C	0.00	0.10	-1.97	A
C	0.10	0.20	-2.07	A
C	0.20	0.30	-2.17	A

Table 18: Summary of tephra presence/absence in column sample <114>, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

Column sample	Depth (m bgl)		Depth (m OD)	Tephra P/A
	From	To		
A	0.00	0.10	-0.54	A
A	0.10	0.20	-0.64	A
A	0.20	0.30	-0.74	A
A	0.30	0.40	-0.84	A
A	0.40	0.50	-0.94	A
B	0.00	0.10	-0.95	A
B	0.10	0.20	-1.05	A
B	0.20	0.30	-1.15	P
B	0.30	0.40	-1.25	A
C	0.15	0.25	-1.51	A
C	0.25	0.35	-1.61	A
C	0.35	0.45	-1.71	A
D	0.00	0.10	-1.66	A
D	0.10	0.20	-1.76	A
D	0.20	0.30	-1.86	A
D	0.30	0.40	-1.96	A

3.5. RESULTS AND INTERPRETATION OF THE MACROFOSSIL ASSESSMENT

Two small bulk samples from column samples <100> (Section 11) and <114> (Section 12.3) (primarily for the identification of material for radiocarbon dating) and four bulk samples from Section 11 (<104>, <105>, <108> and <110>) were processed for the recovery of macrofossil remains, including waterlogged plant macrofossils, wood, insects and Mollusca (Tables 17 to <19>). The samples from columns <100> and <114> were focussed on the peat horizons in both sequences, whilst the bulk samples were extracted from both the peat and alluvium.

Column samples <100> (Section 11) and <114> (Section 12.3)

The results of the macrofossil rapid assessment indicate that waterlogged wood was present (generally in low to moderate concentrations) in all four samples from columns <100> and <114>;

however, no waterlogged seeds, Mollusca, insects or bone were found within the samples. No charred remains were found in any of the four samples.

Bulk samples <104>, <105>, <108> and <110> (Section 11)

Waterlogged wood was present in moderate to high quantities in the two sample from the peat and highly organic alluvium (samples <104> [102] and <105> [103]), but was absent in samples <108> [104] and <110> [105], both from the alluvium underlying the peat. The waterlogged seed assemblage was limited to one *Sparganium erectum* (branched bur-reed) stone in sample <105> [103]. A low concentration of unidentifiable charcoal (less than 2mm in diameter) was found in sample <108> [104]; no other charred remains, Mollusca, insects or bone were found in the samples. Branched bur-reed is commonly found in mesotrophic or eutrophic carr or sedge fen environments.

Table 19: Results of the macrofossil assessment of column sample <100>, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

				Charred					Waterlogged		Mollusca		Bone				
Depth (m OD)	Volume sampled (ml)	Volume processed (ml)	Fraction	Charcoal (>4mm)	Charcoal (2-4mm)	Charcoal (<2mm)	Seeds	Chaff	Wood	Seeds	Whole	Fragments	Large	Small	Fragments	Insects	Artefacts
-0.78 to -0.80	0.05	0.05	>300µm	-	-	-	-	-	2	-	-	-	-	-	-	-	-
-1.43 to -1.45	0.05	0.05	>300µm	-	-	-	-	-	2	-	-	-	-	-	-	-	-

Key: 0 = Estimated Minimum Number of Specimens (MNS) = 0; 1 = 1 to 25; 2 = 26 to 50; 3 = 51 to 75; 4 = 76 to 100; 5 = 101+

Table 20: Results of the macrofossil assessment of column sample <114>, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

				Charred					Waterlogged		Mollusca		Bone				
Depth (m OD)	Volume sampled (ml)	Volume processed (ml)	Fraction	Charcoal (>4mm)	Charcoal (2-4mm)	Charcoal (<2mm)	Seeds	Chaff	Wood	Seeds	Whole	Fragments	Large	Small	Fragments	Insects	Artefacts
-1.38 to -1.40	0.05	0.05	>300µm	-	-	-	-	-	2	-	-	-	-	-	-	-	-
-1.62 to -1.65	0.05	0.05	>300µm	-	-	-	-	-	2	-	-	-	-	-	-	-	-

Key: 0 = Estimated Minimum Number of Specimens (MNS) = 0; 1 = 1 to 25; 2 = 26 to 50; 3 = 51 to 75; 4 = 76 to 100; 5 = 101+

Table 21: Results of the macrofossil assessment of bulk samples from Section 11, Wood Wharf, London Borough of Tower Hamlets (Site Code: TRA15).

						Charred					Waterlogged		Mollusca		Bone				
Sample number	Context number	Depth (m OD)	Volume sampled (ml)	Volume processed (ml)	Fraction	Charcoal (>4mm)	Charcoal (2-4mm)	Charcoal (<2mm)	Seeds	Chaff	Wood	Seeds	Whole	Fragments	Large	Small	Fragments	Insects	Artefacts
<104>	(102)		1.0	1.0	>300µm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					>1mm	-	-	-	-	-	5	-	-	-	-	-	-	-	-
<105>	(103)		1.0	1.0	>300µm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					>1mm	-	-	-	-	-	3	1 (*S. erectum*)	-	-	-	-	-	-	-
<108>	(104)		1.0	1.0	>300µm	-	-	1	-	-	-	-	-	-	-	-	-	-	-
					>1mm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<110>	(105)		1.0	1.0	>300µm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					>1mm	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Key: 0 = Estimated Minimum Number of Specimens (MNS) = 0; 1 = 1 to 25; 2 = 26 to 50; 3 = 51 to 75; 4 = 76 to 100; 5 = 101+

4. DISCUSSION AND CONCLUSIONS

The aims of the environmental archaeological assessment at the Wood Wharf site were (1) to determine the age of the peat horizons recorded across the site, and investigate their chronological relationship with prehistoric wetland archaeology recorded on the Isle of Dogs; (2) to investigate whether the sequence contains any evidence for natural and/or anthropogenic changes to the landscape, particularly associated with known prehistoric activity on the Isle of Dogs; (3) to establish whether the samples provide evidence for prehistoric and historic occupation locally to the site; and (4) to establish evidence and possible causes for changes in woodland composition on the wetland and dryland surfaces during the main period of peat formation. In order to achieve these aims a programme of deposit modelling and an environmental archaeological assessment of column samples <100> (Area 1, Section 11) and <114> (Area 1, Section 12.3), and a series of bulk samples from Section 11 (samples <104>, <105>, <108> and <110>) was carried out, consisting of: (1) radiocarbon dating of the base and top of the peat and a tephrochronological assessment of both sequences, to establish a chronological framework for the environmental archaeological assessment; (2) organic matter determinations to aid identification of the sedimentary units; (3) assessment of the palaeobotanical remains (pollen, waterlogged wood and seeds) to provide a provisional reconstruction of the vegetation history; and (4) assessment of the diatoms to provide an indication of the palaeohydrology (e.g. marine, brackish or freshwater) of the site.

The results of the geoarchaeological deposit modelling at the site have revealed a sequence of Late Devensian Shepperton Gravel, the surface of which generally lies at between *c*. -2 and -3m OD. A deposit model of the wider Shepperton Gravel surface from selected sites on the Isle of Dogs and Greenwich Peninsula is shown in Figure 15. This model demonstrates that the Gravel surfaces recorded at Wood Wharf are generally similar to those recorded at 1-3 Turnberry Quay (Batchelor & Young 2016b) and much of 7 Limeharbour (Batchelor & Young 2016a), but generally lower than the Gravel surface recorded towards the west at Heron Quays (-0.2 and -1.2m OD; Batchelor & Young 2014). At 7 Limeharbour, a west-east aligned trough (possible palaeochannel), measuring *ca*. 60m in width and 2.5m in depth was identified traversing the southern part of the site (Batchelor & Young, 2016a), the Gravel in this channel recorded as low as *c*. -4.6m OD. Similar depressions in the Gravel surface consistent with palaeochannels have been recorded on Greenwich Peninsula, including at the Enderby Wharf (Young 2013) and Greenwich Peninsula Central East (Young *et al*. 2014) sites; a discussion of these channel features forms part of an upcoming publication (Batchelor *et al*. in prep).

The Shepperton Gravel is overlain at the present site by a sequence of Holocene alluvium, containing peat. This widespread episode of peat formation is indicative of a transition to a more stable valley floor, encouraging the development of semi-terrestrial conditions across the site. The peat varies in thickness from 0.15 to 2.3m thick, and its surface is variable, generally recorded at between *c*. 0.5 and -1.5m OD. The results of the radiocarbon dating of the peat indicate that accumulation began at *c*. 4875-4835 (middle to late Neolithic) in the area of column sample <100>, and at *c*. 4520-4410 cal BP (late Neolithic) in the area of column sample <114>. In column sample <100>, where the peat surface was lower (-1.36m OD), peat cessation occurred at 4780-4435 cal BP, whereas in column <114>

cessation occurred at 2875-2765 cal BP (late Bronze Age/early Iron Age; -0.70m OD). Given the apparent lack of a chronological overlap between the accumulation of the peat horizons, it is possible that they represent two separate periods of peat formation; the significantly different elevations and dates for the top of the peat support the notion of deeper fluvial erosion of the peat surface in some areas of the site. However, as discussed above, the possibility of older plant remains having been washed in to the surface of the peat in column <100>, and subsequently dated, cannot be discounted.

Both the depth and age of the peat at Wood Wharf is generally consistent with horizons elsewhere on the Isle of Dogs. Radiocarbon dating at 1-3 Turnberry Quay (Batchelor & Young 2016b), *c*. 600m to the south of the present site, revealed an age of between 4420-4180 and 3910-3710 cal BP for a peat horizon recorded at between -1.0 and -1.5m OD, whilst peat at Preston Road, Poplar (Branch *et al*. 2007) between -0.46 and -0.32m OD accumulated between 4260-3910 and 3650-3360 cal BP (late Neolithic to Bronze Age). Undated peat was recorded beneath the Delta Junction site at between 0.3 and -0.86m OD (Yendell 2012). At the Atlas Wharf site (Lakin 1998) *c*. 1km to the southwest, Peat formation began during the early/middle Neolithic (*c*. 5750 cal BP) through to the Bronze Age. As noted above, a Bronze Age, multi-phase structure (possible trackway) was recorded at this site, the earliest construction date radiocarbon dated to 3840-3550 cal BP and with an upper surface lying at between -1.1 and -1.9m OD (Lakin 1998). Perhaps significantly, a possible piece of worked wood was identified within the peat at the present site in column <114> at -0.82m OD. On the basis of the radiocarbon date at -0.78 to -0.80m OD (2875 to 2765 cal BP), it is likely that this possible worked wood is of late Bronze Age date.

The combined results of the palaeobotanical assessment are indicative of a peat surface dominated by alder-carr woodland, with a ground flora of sedge fen and reed swamp communities. Hazel, ash and yew may have occupied this wetland environment, but are perhaps more likely to have been growing on the dryland, forming mixed deciduous woodland with oak and lime. Although the limited concentration of pollen makes it difficult to identify any evidence for woodland clearance to be identified at this stage, the occurrence of moderate microcharcoal values, in combination with cereal pollen at the base of the sequence, is indicative of an anthropogenic influence. A cereal pollen grain was also recorded towards the top of the peat in sample <114> (-1.10m OD). Overlying the peat, the quantity of herbaceous and aquatic pollen within the Upper Alluvium suggests the dominant growth of sedge fen and reed swamp communities on the floodplain, with mixed deciduous woodland dominated by oak and hazel on the adjacent dryland. The majority of the diatom taxa recorded towards the top of the peat and in to the Upper Alluvium are indicative of an estuarine influence. At this time a strong anthropogenic signal is indicated by the frequent occurrence of cereal pollen grains and indicators of disturbed or open ground.

At Atlas Wharf (*c*. 1km to the southwest), Delta Junction (*c*. 500m to the northwest) and Preston Road, Poplar (*c*. 500m to the north) palaeoenvironmental assessment of the peat horizons at these site revealed that the floodplain was dominated by a similar environment of alder carr woodland during the accumulation of the peat horizon (Lakin 1998; Branch *et al*. 2007; Yendell 2012). At Delta

Junction, at the transition from the peat to the Upper Alluvium (*c*. -0.4m OD) the diatom evidence was also indicative of a transition to marine and brackish environments, and the pollen record indicated a transition to sedge fen environments with some evidence of cereal and pastoral agriculture on the nearby dryland (Yendell 2012). At Preston Road, the insect data from the peat provided evidence for anthropogenic activity, including animal husbandry, perhaps suggesting that the wetland was used for pasture (Branch *et al*. 2007). Here, following the transition from peat formation to mineral sediment deposition at -0.32m OD, both the insect and pollen data were indicative of inundation of the freshwater wetland by estuarine salt water (Branch *et al*. 2007).

5. RECOMMENDATIONS

The geoarchaeological investigations and environmental archaeological assessment have demonstrated that the Wood Wharf site has the potential to contribute significantly to our understanding of both the sedimentary and vegetation history of the Isle of Dogs and neighbouring areas, including Greenwich Peninsular. Additional environmental archaeological analysis is therefore recommended, including: (1) a minimum of three additional radiocarbon dates in order to clarify the age of peat cessation in column <100>, and to improve the chronological model for the sequence in column <114>. Such dates can form a chronological control for and contribute to the tephrochronological data from the sequences; (2) a high resolution tephrochronological assessment of recommended sections from samples <100> and <114> and, depending on the results of this, subsequent geochemical analysis. In conjunction with the radiocarbon dating, this should allow for a more robust and precise chronology; (3) analysis of selected pollen and diatom samples from one or both sequences (depending on the outcome of (1) above). In addition, a programme of deposit modelling which expands the area of the deposit model and places the sedimentary history of the Wood Wharf site in the wider context of the Isle of Dogs is also recommended. Such a deposit model could contribute to a more general publication concerning the Holocene evolution of the Lower Thames floodplain, which integrates the increasing body of work in the Isle of Dogs and compares the sedimentary deposits here with those of Greenwich Peninsula to the east, the Lea Valley to the northeast, and Southwark/Bermondsey to the west.

Figure 15: Surface of the Gravel in the wider Isle of Dogs/Greenwich Peninsula area (m OD) (see Figure 1 for site references).

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APPENDIX 4: OASIS REPORT FORM

OASIS ID: preconst1-262435

Project details	
Project name	Assessment of an Evaluation, Excavation and Watching Brief of Land at Wood Wharf Trafalgar Way, Isle of Dogs
Short description of the project	The archaeological works found evidence of Late Devensian Shepperton Gravel capped by Holocene alluvial deposits containing widespread episodes of peat formation spanning from the late Neolithic to the early Iron Age confirming the great palaeoenvironmental and geoarchaeological potential of the site. Moreover the age and thickness of the peat at Wood Warf is consistent with peat formations observed elsewhere on the Island of Dogs. The archaeological works found further evidence of the development of the site during the post-medieval period. A sequence of deposits sealing the early alluvial deposits was recorded in Area 1 with an overall thickness of 1.16m. These deposits, containing fragments of post-medieval CBM, charcoal and industrial waste inclusions were interpreted as ground raising/consolidation for the construction of the Docks during the 19th century. Further evidence of the development t of the site was observed in Trench 7 from were part of the north side of the canal connecting the Blackwall Basin to the north and the Junction Dock to the south was found. The canal wall consisted of large granite ashlar blocks with a roughed western (internal) face. Only a small segment of this wall was exposed measuring 4.02m long and 1.37m wide.
Project dates	Start: 06-07-2015 End: 11-01-2016
Previous/future work	Yes / No
Any associated project reference codes	TRA15 - Sitecode
Type of project	Recording project
Site status (other)	Archaeological Priority Area
Current Land use	Vacant Land 1 - Vacant land previously developed
Monument type	NONE None
Significant Finds	NONE None
Investigation type	'"Part Excavation"','"Test-Pit Survey"','"Watching Brief"'
Prompt	National Planning Policy Framework - NPPF

Project location	
Country	England
Site location	GREATER LONDON TOWER HAMLETS TOWER HAMLETS Trafalgar Way, Isle of Dogs

Postcode	E14 9SB
Study area	6.1 Hectares
Site coordinates	TQ 3811 8010 51.502436129961 -0.009919353841 51 30 08 N 000 00 35 W Point
Lat/Long Datum	Unknown
Height OD / Depth	Min: -2.42m Max: -2.38m

Project creators

Name of Organisation	Pre-Construct Archaeology Limited
Project brief originator	CgMs Consulting
Project design originator	Helen Hawkins
Project director/manager	Helen Hawkins
Project supervisor	Ireneo Grosso
Type of sponsor/funding body	via consultant: CgMs Consulting
Name of sponsor/funding body	CgMs Consulting

Project archives

Physical Archive recipient	PCA
Physical Contents	"Environmental","Wood"
Digital Archive recipient	PCA
Digital Contents	"Stratigraphic","Survey"
Digital Media available	"Database","Spreadsheets","Survey","Text"
Paper Archive recipient	LAARC
Paper Contents	"Environmental"

Paper Media available	"Context sheet","Diary","Drawing","Matrices","Photograph","Plan","Report","Section","Survey ","Unpublished Text"

Project bibliography 1

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