



CONVOYS WHARF
Prince Street
London SE8

London Borough of Lewisham

Post-excavation assessment report and updated project design

November 2013



**DEPTFORD ROYAL DOCKYARD
CONVOYS WHARF
PRINCE STREET
LONDON SE8**

LONDON BOROUGH OF LEWISHAM

Site Code CVF10

Post-excavation assessment report and updated project design

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Executive summary

This report is intended to inform the reader of the results of the excavation at the site of Deptford Royal Dockyard at Convoys Wharf in Lewisham: what was found; what post-excavation assessment work has been done so far; what work still needs to be done and why; and how and where the results of the excavation should be made public. The report is written and structured in a particular way to conform with the standards required of post-excavation analysis work as set out in *Management of Archaeological Projects* (English Heritage, 1991). This report draws on and refines the results of excavations and earlier assessments, principally the Scheme of Archaeological Resource Management (SARM, Hawkins 2009), the Written Scheme of Investigation (Francis 2010b), previous evaluations (Divers 2000, Francis 2010a) and an interim publication (Hawkins et al 2013).

The report describes the planning background and excavation history for the site (Section 1). The historical and archaeological background is contained in Section 2, and the archaeology discovered on site has been described in Section 4. In Section 5 the finds and environmental evidence is quantified and assessed. The dating evidence has been integrated with the stratigraphic data enabling the latter section to be set out in terms of the provisional periods represented on site. Sections 4 and 5 are the foundations from which Section 6, Potential of the Data has been developed. This potential is discussed in terms of how well the site can answer the original and additional research objectives (Section 7).

There was no strong evidence for prehistoric settlement, although finds indicate that the site was used by prehistoric peoples. Geoarchaeological investigation was able to reconstruct in part the environment from the prehistoric period to the 19th century specifically in relation to a palaeochannel that crosses the site. The remains of a late 2nd century to 3rd century Roman enclosure with part of a skeleton in its fill (the only burial on site) were unexpected discoveries. A concentration of *ex situ* building material suggested that there may have been a Roman building on site.

The Dockyard was founded in 1513 with the construction of a Storehouse (now a Scheduled Ancient Monument). A wide ditch nearby may have preceded this building. As the Dockyard developed through the Stuart period (1603–1714), a Dockyard Basin was constructed of timber, probably from a Tudor precursor for which some evidence survived. A narrow building was probably the Treasurer of the Navy's House and the Dockyard perimeter wall was also identified. In the south of the site, walls relating to officers' quarters and a smithy were revealed.

Sayes Court was the home of the diarist and horticulturalist John Evelyn (1620–1706). Traces of an early building were found below the ground plan of a probable 18th-century building on the site of Sayes Court. Garden walls could be more confidently reconciled with map evidence of Evelyn's home, although no trace of his famous gardens was identified.

The early Georgian period (1714–74) saw a major rebuilding of the Dockyard that expanded beyond its previous perimeter. The Tudor Storehouse was incorporated into a new, unified storehouse complex and the smithy was reconstructed. The Dockyard Basin largely rebuilt in this and the succeeding late Georgian to Victorian period (1774–1869). Ship building technology developed in the 18th and 19th centuries, until ultimately the slipways on the site became vast structures of brick, concrete and timber after 1844. Three such structures were excavated on the site

together with the foundations of their cover buildings, of which the Grade II listed Olympia building is an example, built in 1844–46. The Dockyard Basin gate and canal linking it to the river were replaced in stone and brick to a design by John Rennie (1761–1821). The Double Dock in the east of the site was rebuilt in 1839–41. The Dockyard declined from the mid-19th century and closed in 1869, becoming a cattle market a few years later.

To date post-excavation work has identified the potential and significance (Sections 6 and 7) of the archive to add to the knowledge of this area of London, in the periods discussed above. This assessment describes how the information generated by the site could ultimately be integrated into detailed studies, along with documentary, cartographic and pictorial sources. Information from relevant sites in Britain and abroad can be tied in closely with evidence from specific periods on site. In order to achieve this, the stratigraphic, finds and environmental archive will be refined through analysis (Section 9). This will clarify the site sequence to help answer research questions (set out in Section 8.1).

It is proposed that the results of the excavation are disseminated in three ways: through a MOLA monograph focussing on the post-medieval Dockyard; by a short article on the prehistoric and Roman discoveries; and via blogging / social media during the analysis and writing phases of these publications to build links with other researchers and interested parties (Section 8.2).

Finally, the intention of the project is to create an archive that provides a sustainable framework for future research. To this end the archive will be placed in the London Archaeological Archive and Research Centre (LAARC) adding to the significant body of data available there for further synthetic, integrated and thematic research.

Contents

1	Introduction	12
1.1	Site location	12
1.2	The scope of the project	12
1.3	Circumstances and dates of fieldwork	12
1.3.1	<i>Evaluations 2000 and 2010</i>	13
1.3.2	<i>Excavation 2011–2012</i>	13
1.4	Organisation of the report	14
2	Historical and archaeological background	16
2.1	Geology and topography	16
2.2	Prehistoric	16
2.3	Roman	16
2.4	Saxon	16
2.5	Medieval	16
2.6	Post-medieval	18
2.6.1	<i>Sixteenth century</i>	18
2.6.2	<i>Seventeenth century</i>	20
2.6.3	<i>Eighteenth century</i>	23
2.6.4	<i>Nineteenth century</i>	24
2.6.5	<i>Twentieth century</i>	25
3	Original research aims	26
1.1	Site specific objectives and research aims	26
1.1.1	<i>Site-wide</i>	26
1.1.2	<i>Sayes Court</i>	26
1.1.3	<i>Royal Naval Dockyard</i>	26
4	Site sequence: interim statement on field work	28
4.1	Introduction	28
4.2	Natural and topography	28
4.3	Pre-dockyard (450,000BC–AD1513)	28
4.4	Tudor dockyard (1513–1603)	30
4.5	Stuart dockyard (1603–1714)	31
4.6	Sayes Court	33
4.7	Early Georgian dockyard (1714–1774)	35
4.8	Late Georgian to Victorian dockyard (1774–1869)	37
4.9	Post-dockyard (1869–present)	41
5	Quantification and assessment	44
5.1	Post-excavation review	44

5.2	The site archive and assessment: stratigraphic	44
5.3	The site archive and assessment: finds and environmental	44
5.4	Geoarchaeology	45
5.4.1	<i>Geoarchaeological methodology</i>	45
5.4.2	<i>Geoarchaeological background</i>	46
5.4.3	<i>Geoarchaeological sediments</i>	49
5.4.4	<i>Borehole logs</i>	52
5.4.5	<i>Subsamples for palaeoenvironmental assessment</i>	57
5.4.6	<i>Diatoms</i>	57
5.4.7	<i>Results and discussion</i>	58
5.4.8	<i>Conclusions</i>	59
5.4.9	<i>Ostracods</i>	59
5.4.10	<i>Pollen</i>	61
5.4.11	<i>Insects</i>	65
5.4.12	<i>Optically stimulated luminescence dating</i>	67
5.4.13	<i>Radiocarbon dating</i>	68
5.4.14	<i>Geoarchaeological discussion</i>	70
5.5	The archaeological woodwork	75
5.5.1	<i>Introduction</i>	76
5.5.1.1	<i>Methodology</i>	78
5.5.2	<i>Medieval woodwork</i>	78
5.5.3	<i>Post-medieval woodwork</i>	78
5.5.4	<i>Post-medieval woodworking tools and sampled debris deposits</i>	87
5.6	Tree-ring spot dates	87
5.6.1	<i>Methodology</i>	88
5.6.2	<i>Results</i>	89
5.7	The building material	93
5.7.1	<i>Introduction/methodology</i>	93
5.7.2	<i>Roman daub</i>	93
5.7.3	<i>Roman ceramic building material</i>	94
5.7.4	<i>Saxon building material</i>	94
5.7.5	<i>Medieval ceramic building material</i>	94
5.7.6	<i>Post-medieval stone building material</i>	95
5.7.7	<i>Post-medieval ceramic building material</i>	96
5.7.8	<i>Post-medieval plaster</i>	99
5.8	The Roman pottery	101
5.9	The medieval and post medieval pottery	103

5.10	The bulk glass	108
5.11	The accessioned finds	112
5.12	The clay tobacco pipes	116
5.13	The bulk iron	125
5.14	The iron nails	125
5.15	The human bone	126
5.16	The animal bone	127
5.17	Conservation	129
6	Potential of the data	131
6.1	Realisation of the original research aims	131
6.1.1	<i>Site-wide</i>	131
6.1.2	<i>Sayes Court</i>	132
6.1.3	<i>Royal Naval Dockyard</i>	133
6.2	General discussion of potential	134
7	Significance of the data	141
8	Publication project: aims and objectives	145
8.1	Revised research aims	145
8.1.1	<i>Woodwork</i>	145
8.1.2	<i>Post-medieval pottery</i>	146
8.1.3	<i>Bulk iron and accessioned finds</i>	147
8.1.4	<i>Clay pipe</i>	147
8.1.5	<i>Iron nails</i>	148
8.1.6	<i>Animal bone</i>	148
8.2	Preliminary publication synopsis	148
8.2.1	<i>Chapter 1: Introduction</i>	149
8.2.2	<i>Chapter 2: Brief history of Royal Dockyards, their technology and the process of ship building</i>	149
8.2.3	<i>Chapter 3: The topography, geoarchaeology and pre-Dockyard evidence</i>	149
8.2.4	<i>Chapter 4: The Tudor Dockyard (1513–1603)</i>	150
8.2.5	<i>Chapter 5: The Stuart Dockyard (1603–1714)</i>	150
8.2.6	<i>Chapter 6: Sayes Court</i>	150
8.2.7	<i>Chapter 7: The early Georgian Dockyard (1714–74)</i>	150
8.2.8	<i>Chapter 8: The late Georgian and Victorian Dockyard (1774–1869)</i>	151
8.2.9	<i>Chapter 9: Post-Dockyard (1869–present)</i>	151
8.2.10	<i>Chapter 10: Conclusions and future research</i>	151
8.2.11	<i>Appendices: Specialist supporting data</i>	151
9	Publication project: task sequence	153

9.1	Stratigraphic method statement	153
9.2	Documentary research method statement	154
9.3	Geoarchaeological method statement	155
9.4	Archaeological timber method statement	155
9.5	Building material method statement	155
9.6	Prehistoric and Roman pottery method statement	156
9.7	Post-Roman pottery method statement	156
9.8	Bulk glass method statement	158
9.9	Accessioned finds method statement	158
9.10	Clay pipes method statement	159
9.11	Iron nails	159
9.12	Animal bone method statement	160
9.13	Conservation method statement	160
9.14	Finds review	161
9.15	Graphics	161
9.16	Write publication text	162
9.17	Editing and production of monograph	162
9.18	Editing and production of journal article	163
9.19	Project management, programming and meetings	163
9.20	Archive deposition	163
10	Publication project: resources and programme	163
11	Acknowledgements	164
12	NMR OASIS archaeological report form	165
12.1	OASIS ID: molas1-	165
13	Bibliography	168
Appendix 1 - Research Objectives		175
	Site wide objectives	175
	Sayes Court	175
	Royal Naval Dockyard	176
Appendix 2 Clay pipes for illustration		178
Appendix 3 Animal bone table		179

List of figures

Cover: The storehouse complex in Area 4, looking east

Fig 1 Site location

Fig 2 Location of trenches within the site

Fig 3 Evelyn plan 1623

Fig 4 1698 map and view of the Dockyard

Fig 5 1725 sketch of Dockyard

Fig 6 Milton map of 1753

Fig 7 The 1774 model, looking 'north'. Dockyard Basin is in the centre of the image, the small mast pond to the west of this, storehouse complex to the east. Note the slipways and extensive areas used to stockpile timber

Fig 8 Map of the Dockyard of c 1808

Fig 9 West-facing section in Area 8

Fig 10 Pre-Dockyard features (Area 4)

Fig 11 Curved ditch in Area 4, looking east

Fig 12 Inhumation [2507] in Area 4, looking east

Fig 13 Site plan of Tudor structures (Area 4)

Fig 14 Tudor Storehouse in Area 4, looking south

Fig 15 Settings for floor joists in north wall to Tudor storehouse in Area 4, looking north

Fig 16 Brick niche of Tudor storehouse with inscription AX HR 1513 (Anno Christi Henricus Rex 1513) in 1952

Fig 17 The north wall of the Tudor storehouse in 1952 (note niche in left part of image)

Fig 18 A four-light mullioned window of the Tudor storehouse revealed in 1952

Fig 19 Area 4, looking north. The narrow building in the centre of the image is probably the Treasurer of the Navy's House

Fig 20 Site plan of Stuart structures (Area 4)

Fig 21 Brick structure in Area 4, looking north

Fig 22 Site plan of Stuart structures (Areas 2, 3 and 12)

Fig 23 Eastern part of the timber basin wall with land ties and a brick crane base in Area 3, looking west

Fig 24 The timber and brick basin walls in Area 3, looking north

Fig 25 Western part of the brick and timber basin walls in Area 2, looking east

Fig 26 Land ties for walls in the western part of the basin in Area 2, looking east

Fig 27 Timber basin gate with copper plate depth gauge in Area 2, looking east

Fig 28 The Buckingham on the stocks, 1752

Fig 29 Site plan of Stuart structures (Trenches 25, 27)

- Fig 30 Launch of a 60-gun ship at Deptford Dockyard, 1739*
- Fig 31 The brick boundary wall and timber revetment in Area 12, looking north*
- Fig 32 Northwest corner of Area 2 showing boundary wall and timber revetments, looking east*
- Fig 33 Site plan of Stuart structures (Areas 5.1 and 5.2)*
- Fig 34 Area 5.1 looking south*
- Fig 35 Area 5.2 looking west*
- Fig 36 Site plan of Stuart structures (Trench 26)*
- Fig 37 Sayes Court in Area 6, looking west*
- Fig 38 Evelyn's plan of gardens at Sayes Court and map key in 1653*
- Fig 39 Sayes Court tiled floor in Area 6, looking west*
- Fig 40 Sayes Court cellar in Area 6, looking north*
- Fig 41 Site plan of Stuart structures (Sayes Court, Area 6)*
- Fig 42 Site plan of early Georgian structures (Sayes Court, Area 6)*
- Fig 43 Site plan of late Georgian to Victorian structures (Sayes Court, Area 6)*
- Fig 44 Site plan of post-Dockyard structures (Sayes Court, Area 6)*
- Fig 45 Site plan of early Georgian structures (Area 4)*
- Fig 46 1772 panorama of Dockyard*
- Fig 47 The storehouse complex, looking east. Note the tile floor from the Navy Treasurer's House in the foreground. The adjacent circular structure is an early 20th century turntable*
- Fig 48 Dockyard Basin wall and gate – close-up of 1774 model*
- Fig 49 Site plan of early Georgian structures (Areas 2, 3 and 12)*
- Fig 50 Small blocked slipway on the edge of the basin wall in Area 2, looking west*
- Fig 51 Site plan of early Georgian structures (Areas 1.1, 1.2, Trenches 3, 7)*
- Fig 52 Tie-back bracing timber Small Mast Pond wall in Trench 3, looking northeast*
- Fig 53 Cobbled surfaces and boundary wall in Area 12, looking east (Olympia building in the background)*
- Fig 54 Small Mast Pond wall and tie backs in Area 1.2, looking northwest*
- Fig 55 Trench 3, looking west. Land-ties and later Small Mast Pond wall*
- Fig 56 Site plan of early Georgian structures (Areas 5.1 and 5.2, Trench 42)*
- Fig 57 Site plan of early Georgian structures (Trench 8)*
- Fig 58 Site plan of late Georgian to Victorian structures (Area 4 and part of Area 3)*
- Fig 59 Vaulted cellars in Area 4, looking northwest*
- Fig 60 Foundations of an engine house Area 4, looking southeast*
- Fig 61 Goad map of 1870*
- Fig 62 Tie-backs to Georgian slipway in Area 4 / Trench 51, truncated to the east by later slipway No 5*

- Fig 63 Site plan of late Georgian to Victorian structures (Areas 2, 3, 12, Trenches 9, 11, 19, 37)*
- Fig 64 No 1 slipway (Area 2), looking south*
- Fig 65 No 1 slipway (Area 2) and the northwest corner of Area 2, looking east*
- Fig 66 No 1 slipway (Area 2), looking north*
- Fig 67 No 5 slipway (Area 4), looking south*
- Fig 68 Site plan of late Georgian to Victorian structures (Trenches 12, 15, 16)*
- Fig 69 No 4 slipway (Area 3) with N–S running baseplate, looking south*
- Fig 70 No 4 slipway (Area 3), looking south*
- Fig 71 Part of stone wall of slipway No 2 in Trench 21, looking west*
- Fig 72 Part of stone wall of slipway No 2 in Trench 23, looking west*
- Fig 73 Site plan of late Georgian to Victorian structures (Trenches 21, 22, 23, 24, 28)*
- Fig 74 Eastern part of the brick basin gate with depth gauge (in Roman numerals), in Area 2, looking east. Note superseded earlier timber gate in background*
- Fig 75 John Rennie's brick basin gate in Area 2, looking east*
- Fig 76 Stone shaft in Rennie's gate in Area 2*
- Fig 77 1858 map*
- Fig 78 Brick structure (top of image) in Trench 25, looking west. Later culvert in foreground*
- Fig 79 Western part of Area 12 brick walls and culvert, looking south*
- Fig 80 Site plan of late Georgian to Victorian structures (Areas 1.1, 1.2, Trenches 3, 5, 6)*
- Fig 81 South wall of Small Mast Pond and associated tie-back in Trench 7, looking north*
- Fig 82 Timber baseplate in Trench 5, looking northwest*
- Fig 83 The Great Mast Pond north wall in Trench 1, looking north*
- Fig 84 Capstan base in Trench 1, looking south*
- Fig 85 Opening for canal, linking Great Mast Pond and Small Mast Pond, Trench 1, looking north*
- Fig 86 Site plan of late Georgian to Victorian structures (Areas 5.1 and 5.2, Trenches 42, 43, 45)*
- Fig 87 West wall of the Great Dock in Trench 50, looking northwest. Iron and timber dock gate to right*
- Fig 88 Mason's mark or graffito ('H') on Great Dock Wall in Trench 50, looking northeast*
- Fig 89 East wall of the Great Dock in Trench 50, looking southeast. Painted depth gauge on left*
- Fig 90 Photograph of c 1880 showing cover building to Great Dock (left) and rigging and sail loft building with storehouse behind*
- Fig 91 Brick sawpit in Trench 15, looking east*

- Fig 92 Remains of steam kiln building (centre) with surviving abutting cobbled yard in Trench 10, looking southeast*
- Fig 93 1868 OS map of Dockyard 1:2500*
- Fig 94 Cobbled surface in Trench 17, looking northwest*
- Fig 95 Timber platform in Trench 16, looking south*
- Fig 96 1869 engraving of Dockyard*
- Fig 97 Site plan of post-Dockyard structures (Area 4)*
- Fig 98 Cover building to No 4 slipway (Area 3/4) converted to a 'sheep shed' after 1869 closure of Dockyard*
- Fig 99 Site plan of post-Dockyard structures (Areas 2, 3 and 12, Trenches 9, 20)*
- Fig 100 Map of 1872*
- Fig 101 Site plan of post-Dockyard structures (Trenches 25, 27, 28)*
- Fig 102 Site plan of post-Dockyard structures (Areas 9, 11, Trenches 15, 16, 26, 39, 40)*
- Fig 103 18th-century building converted to a cold store in Area 4, looking west*
- Fig 104 Site plan of post-Dockyard structures (Trenches 4, 5)*
- Fig 105 Site plan of post-Dockyard structures (Areas 5.1 and 5.2)*
- Fig 106 Site plan of post-Dockyard structures (Area 6)*
- Fig 107 Areas 11 and 9 (in background), looking northeast*
- Fig 108 Area 8 section 12*
- Fig 109 Area 10 section 1*
- Fig 110 Sub sample locations Area 10*
- Fig 111 Area 13 section 9*
- Fig 112 Data point and transect locations*
- Fig 113 Pollen diagram*
- Fig 114 Western north to south Transect 1*
- Fig 115 Central north to south Transect 2*
- Fig 116 Eastern north to south Transect 3*
- Fig 117 Early Holocene Topography*
- Fig 118 Area 2 stern post reused in crane, looking north*
- Fig 119 Bar diagram showing dating position of the eight dated oak tree-ring samples*

1 Introduction

1.1 Site location

The excavation took place at Convoys Wharf, Deptford, Lewisham, hereafter called 'the site' (Fig 1). The c 16.6 hectare site lies c 4km southeast of the City of London and c 1km west of Greenwich. It is bounded by the Thames to the northeast and by Watergate Street to the east, Prince Street, Sayes Court to the south, and to the west the rear of properties in Dacca Street and Grove Street. Leeway bounds the site to the east. The Ordnance Survey National Grid Reference for centre of site is 537000 178200. The level of the slab varied between c 3.3m OD in the west part of the site to c 5.0m OD in the north. The site code is CVF10.

1.2 The scope of the project

This post-excavation assessment describes the results of a series of excavations carried out on the site of Convoys Wharf in Lewisham, the site of the former Deptford Royal Dockyard (Fig 2). This report draws on and refines the results of excavations and earlier assessments, principally the Scheme of Archaeological Resource Management (SARM, Hawkins 2009), the Written Scheme of Investigation (Francis 2010b), previous evaluations (Divers 2000, Francis 2010a) and an interim publication (Hawkins et al 2013).

The assessment states that the analysis and interpretation of the archaeological data will be able to address research aims of local, regional and national significance. The proposed publication project will address these issues and introduce updated aims and objectives, raised by the discovery of unexpected evidence on the site. Reference to historic, cartographic and pictorial evidence is used to enhance this process which will advance knowledge of the history of this area of London principally (but not exclusively) in the post-medieval period.

1.3 Circumstances and dates of fieldwork

The excavation in took place in 2011–12, in advance of planning submission. This post excavation assessment reports on this excavation. Two earlier evaluations are reported elsewhere (respectively Divers 2000 and Francis 2010a), summarised below and their results integrated into this report. The Written Scheme of Investigation (Francis 2010b) was produced in accordance with locations of excavation trenches (called Areas) devised by CgMs.

The objective of the SARM is to inform the development masterplan and subsequent detailed planning applications and to formulate a strategy to ensure the long term sustainable conservation and enhancement of the Heritage resources (both built and buried) within the site. Within this overarching context, the purpose of the excavation was to examine, record and interpret archaeological deposits, features and structures and, as appropriate, retrieve artefacts, ecofacts and other remains within the site (Francis 2013, 2) in order to address stated research aims (Appendix 1).

In order that the scheduled Tudor Storehouse could be exposed, Convoys Investment s a r l applied for Scheduled Monument Consent. This was granted by English Heritage on 13 July 2011 (Siddell 2011; Scheduled Monument No: 22779 EH ref: S00016257). The consent required (among other things) that no masonry be removed, that no equipment and machinery be used that would damage the monument and that the remains of the storehouse be carefully backfilled to ensure adequate protection from all development. In addition to these requirements, a 3m

wide berm of unexcavated material was retained around the circumference of the building. The consent expired on 1 October 2011.

A small amount of human remains was unexpectedly discovered and a burial licence was granted by the Ministry of Justice (Licence Number: 11–0165, File Number: OPR/072/79, Date: 7 October 2011).

Buro Happold undertook contamination testing throughout the duration of the excavation.

1.3.1 Evaluations 2000 and 2010

Two major evaluations took place on the site in advance of the excavation. In 2000 an evaluation was undertaken by Pre-Construct Archaeology (under the site code CVW00) and in 2010 by MOLA (CVF10).

The 2000 evaluation was undertaken between October and November of that year and consisted of 19 trenches (Divers 2000). The work showed that major dockyard features and post-medieval elements of a building in the location of Sayes Court survived, but that there was no evidence of the medieval manor or settlement. Trenches from this evaluation are prefixed with 'CVW00' (eg, CVW00 Trench 1) in Fig 2 and in this report.

The 2010 evaluation was undertaken from January to April in that year, consisting of 52 trenches (Francis 2010a). The evaluation refined the initial assessment of the archaeological potential of the site and identified three main parts of the site as particularly important: the area of the Great Dock near the east boundary; the footprint of the Grade II listed Olympia building where the evaluation demonstrated that stone slipways survive; and the area of the early 16th-century Tudor storehouse, a scheduled ancient monument. Other structures identified during the evaluation included: the large mast pond and the small mast pond in the west of the site, the dockyard basin, multiphase buildings, the remains of the 18th-century dockyard wall, and other slipways.

Many of the evaluation trenches coincided with the excavation Areas. In this report, the results of these trenches have been incorporated as appropriate within the descriptions of the excavation Areas. Evaluation trenches outside the excavation Areas are described separately where their results have a significant bearing on the interpretation of the site. A full description of the evaluation trenches is available in the respective reports.

1.3.2 Excavation 2011–2012

The excavation ran from May 2011 to April 2012 in advance of a planning application. Up to 60 archaeologists worked on the site.

In consultation with the client, the Archaeological Consultant Duncan Hawkins of CgMs and English Heritage, during the course of the excavation Area 1 and Area 5 were relocated and split in two, becoming Area 1.1 and Area 1.2, and Area 5.1 and Area 5.2 respectively. Area 14 was a new area to investigate the south part of the Great Dock. The shapes of some of the Areas was altered because of the topography of the site.

Area 9 and Area 11 were broken out, but discontinued due to ground contamination. Instead, the western corner of Area 8 was extended and a new Area 13 was excavated. Six test pits (collectively referred to as Area 14), were excavated at the

south end of the Great Dock to establish the level of survival. An internal gate between the two docks that constituted the Great Dock could not be investigated due to the presence of warehouses that have yet to be demolished; this will be addressed later in the programme.

Note: Site north was taken as running at right angles to the riverfront (ie northeast of true north).

Area	Approx size	Date excavated	Notes
Area 1.1	63m by 11m	February–March 2012	
Area 1.2	67m by 11m	February–March 2012	
Area 2	100m by 70m	December 2011–April 2012	
Area 3	48m by 28m	September–November 2011	
Area 4	126m by 100m	August–December 2011	
Area 5.1	43m by 28m	February–April 2012	
Area 5.2	47m by 17m	March–April 2012	
Area 6	90m by 40m (largest)	June–July 2011	Consisted of three separate interventions
Area 7	22m by 22m	May–June 2011	
Area 8	26m by 24m	May–June 2011	
Area 9	28m by 20m	May 2011	Discontinued due to ground contamination
Area 10	22m by 20m	May 2011	
Area 11	20m by 20m	May 2011	Discontinued due to ground contamination
Area 12	87m by 44m	January–April 2012	
Area 13	20m by 20m	May 2011	Replacement for Areas 9 and 11
Area 14	28m by 2m (largest)	June 2011	Consisted of six test pits over the south end of the 'Great Dock'

Table 1 Summary of excavated Areas (see Fig 2)

1.4 Organisation of the report

The Post-excavation assessment report is defined in the relevant GLAAS guidance paper (Paper VI) as intended to 'sum up what is already known and what further work will be required to reach the goal of a well-argued presentation of the results of recording and analysis' (VI/1).

The principle underlying the concept of post-excavation assessment and updated project design were established by English Heritage in the Management of Archaeological Projects 2 (MAP2), (1991). Other GLAAS guidance emphasises the need for this stage to be seen as 'brief and transitional', the document acting as a 'gateway' to further analysis and eventual publication (EH, GLAAS, 1999 VI/1).

This document summarises the archaeological and historical background to the site (section 2) and lists the original research aims proposed in the Project Design (section 3). It describes, in interim terms, the discoveries made on site during archaeological investigations (section 4), and details the work undertaken for the assessment of the site archive (section 5). It discusses the potential of the site

(section 6) and its wider significance (section 7). Updated research aims have been framed in light of the assessment, and the proposed arrangements for publication are outlined (section 8). This is supported by a detailed method statement for the work to be undertaken during the analysis and interpretation of the archive (section 9). This phase of work corresponds to 'Phase 4, analysis and report preparation' in the terms of Management of Archaeological Projects (English Heritage 1991). A breakdown of resource requirements is also provided (section 10).

2 Historical and archaeological background

2.1 Geology and topography

The geology of the site consists of Pleistocene terrace gravels overlying chalk bedrock. The centre of the site lies on floodplain gravels or Shepperton Gravel. The present floodplain was formed by river down-cut from an earlier floodplain. South and north of the site, the gravels rise. On the site itself, an area of higher gravel occupies the east part of the site which falls away to the west which is occupied by deep deposits of alluvial clay sealed by made ground. The site consisted of a large expanse of concrete, punctuated in places by warehouses (including the listed Olympia building). The level of the slab varied between c 3.3m OD in the west part of the site to c 5.0m OD in the north.

2.2 Prehistoric

No prehistoric material or settlement was known on the site prior to the excavation.

2.3 Roman

No Roman material or settlement was known on the site prior to the excavation.

2.4 Saxon

No Saxon material or settlement was known on the site.

2.5 Medieval

In the *Domesday Book* survey of 1086, the present Deptford was not mentioned by that name, but was referred to as the manor of *Grenviz* (ie West Greenwich), held by Gilbert de Magminot, bishop of Lisieux, from Bishop Odo of Bayeux, brother of William the Conqueror. Before the Norman conquest, *Grenviz* had been held as two manors, one by Earl Harold Godwinson and the other by Brixi Cild (or Beorhtsige), perhaps corresponding to two settlement centres at Deptford Broadway and St Nicholas church. In 1086 the manor had a population of 24 villeins, four bordars, one cottar and five slaves, with their families, and comprised arable, meadow, pasture and woodland. The presence of a few bordars and an increase in annual value from £8 to £12 between 1066 and 1086 suggest that there was some expansion of the area of farmland in progress, probably by the reclamation of marshland (Watson 1987, 9–10; Williams and Martin 2002, 16).

Gilbert de Magminot, the *Domesday Book* tenant, was said to have built a castle at Deptford. Evidence for its location is not good, but in the 17th century it was thought to be represented by 'some remains of stony foundations' close to the Mast Dock on the Thames bank near Sayes Court (Philipott 1659, 160). According to Dunkin the sub-manor of Hatcham was described in an inquisition post mortem of 1323 as the manor of 'Hatche in Deptford castle', but in fact the reference was to land in Dartford (Dunkin 1877, 111; *CIPM* vi 321 no 518). The construction of Magminot's castle therefore remains enigmatic, but its influence may perhaps be seen in the settlement history of the area. The draw of the castle may have resulted in a shift of settlement away from St Nicholas church to the area of Deptford Strand and Sayes Court.

The chief manor of West Greenwich was passed on by Gilbert de Magminot to his descendants the Maminots, several of whom bore the Christian name Walkelin. Several other Walkelins were involved in 13th-century land transactions in Deptford. The manor remained in the Maminot family until the late 12th century, and then passed to their descendants the de Says, apart from two short intervals when half the manor was granted to Bermondsey Abbey (although the grant was apparently never

implemented) and when the whole manor was held by the Order of the Templars. The Say family gave the manor its alternative name of Sayes Court. In the 15th century the manor was held by the de la Pole earls of Suffolk, and was confiscated by the Crown in November 1487. In the late 15th and early 16th centuries the manor was held for several short intervals by royal courtiers, including the St John family, Charles Brandon, duke of Suffolk, and Cardinal Wolsey. It passed back to Henry VIII in 1535 and has been held by the Crown ever since (Dews 1884, 17–22; Drake 1886, 2–5; *CAD* iii 101 nos A4754–5; *CIM* i 494 no 1786; *CIPM* i 281 no 813; iii 169 no 271; vi 192 no 327; x 403 no 517; xiv 213 no 207; xv 331 no 846; xviii 366–8 nos 1069 and 1076; xx 112 no 364; TNA: PRO, E 40/6483; E 41/270).

The medieval manor house of Sayes Court was constructed of wood at about TQ 36970 78038. It was certainly in existence by 1405 (*CIPM* xviii 367 no 1069).

There was another small manor in Deptford Strand held by the Badelesmere and Mortimer families in the 14th century, and by their descendants the dukes of York in the 15th, before passing to the Crown with the accession of Edward IV in 1461. In 1327 this consisted of land and rents in West Greenwich, Rotherhithe and Camberwell, held as a tenancy of Sayes Court manor, and only later was it regarded as a distinct manor. This manor was therefore subordinate to Sayes Court, to which the king was paying a customary rent for the manor in 1464/5. In the 14th and 15th centuries it had a bailiff and other manorial officers, a manor house, a dovecote, a rabbit warren and a grange. Edward IV granted the manor to his mother Cicely Neville, Henry VII to his queen Elizabeth of York, and Henry VIII to two of his queens, Catherine of Aragon and Jane Seymour (Drake 1886, 3n13, 6–7; *CAD* iv 183–4 no A7551; *CIPM* vii 90 no 104; viii 131 no 185; xiii 133 no 167; BL Additional MS 6693 p57; TNA: PRO, SC 6/1113/12; /1114/9, 10, 12, 13, 15). In the 16th to 18th centuries it was part of the manor of Bermondsey and Deptford Strand, and had its own manorial court (LAD Class VI 67–222, 261; LLLH A66/4).

The geographical extent of this manor is unclear, but it certainly included some land in Rotherhithe and most of it probably lay in the north-west part of Deptford parish, including the Great Dock, King's Storehouse and Wet Dock areas of the later Royal Dockyard. It also included some land by the River Ravensbourne (Deptford Creek). In 1393 and 1429 the Mortimers' manor house, a toft and other lands lay in the north-west corner of Cherchefeld in the Watergate Street area, and another of their tenements was further to the west (Jones 1972, 37; CLRO Bridge House Deeds H19, H77, I18).

The basic division of land-use in the vicinity was between arable upland and pasture marshland. In 1272 the manor of *Westgernewich* (Sayes Court) included 173 acres in the uplands outside the marsh (*CIPM* i 281 no 813). Surviving deeds from the 13th century onwards, principally deriving from the possessions of the Bridge House Estate and the Hospital of St Thomas the Martyr in Southwark, permit a fairly complete reconstruction of the layout of the fields, marshes and roads of late medieval Deptford. Houses and settlements are also represented, but less frequently (Drucker 1932, 131–51, from BL Stowe MS 942; CLRO Bridge House Deeds). Further to the west beyond the Deptford Strand settlement the marshes of Cranmede, Saltmede and Tounmannismershe were bordered by the dyke of Orfletediche to the north and the demesne lands of Sayes Court, including Pottemede, to the south.

An ancient tributary of the Thames, the 'Orfleteditch' and associated marshlands was first recorded in 1279 (Riley, H.T., 1868, p224–5; Drake, H., 1886, p15n3). This

formed a natural tidal pool in the riverbank which was converted into the Dockyard Basin by 1517.

On the fields of the manor of Lewisham and Greenwich the main crops raised until the mid-14th century were wheat and barley. After 1350 these gave way to sheep-farming and corn (Mills 1993, 26). The same changes probably occurred in the demesne lands and tenant holdings of Sayes Court manor, but the evidence of the accounts no longer survives. A property transaction of 1393 specified that none of the meadow lands conveyed was to be converted into arable land, except the meadow of Tounmannismershe for three years only (CLRO Bridge House Deeds I18).

On the Bridge House lands at Deptford Strand there was tile and brick making for the London market from 1418 onwards, for which a Dutch craftsman was hired to test the qualities of the local clay. A small dock was dug to assist in the transport of the products.

Brickmaking continued at Deptford, which supplied nearly two million bricks to Henry VIII for his new manor house at Dartford (Jones 1972, 36; Smith 1985, 21, 27 and n184, 28, 49).

2.6 Post-medieval

2.6.1 Sixteenth century

In the 15th and early 16th centuries Deptford increasingly felt the influence of Greenwich Palace on its economy. With the great expansion in the numbers of courtiers there, the pastures of Deptford came to be used for the maintenance of cattle to supply the royal household. The requirements of the royal palace continued to be dominant in the pastoral economy of Deptford throughout the 16th century. The King's Slaughterhouse was established beside the River Ravensbourne on the site of Harold's Wharf to supply the Palace with meat from the cattle grazed locally. It measured 160 feet (48.8m) from east to west and was 50 feet (15.2m) wide, with a wharf and a pond at the west end. The date of its foundation is unknown, but John Bagley 'of the Boiling House' who bought the Hermitage property at Deptford Bridge in 1548 may have been one of its officers (TNA: PRO, E 315/68).

The pastures of Sayes Court were in the charge of Edmund Peckham, the Cofferer of the King's Household, from 1535 onwards, while John Johnson, the bailiff of the manor, had been appointed by the duke of Suffolk in 1516. He held manorial courts at the manor house once or twice a year. Stray sheep within the manor were seized by Peckham for the royal court's consumption (BL EP 36; TNA: PRO, SC 6/HenVIII/6024, 6025, 6026). In 1537/8 the barn at Sayes Court was repaired and a new pinfold was made (TNA: PRO, SC 6/HenVIII/6025). In 1578/9 the manorial account was drawn up by Richard Bull, deputy to the Queen's bailiff of the manor, Sir George Howard, and the demesne lands were still held by the Cofferer (BL EP 36).

The Browne family of Sayes Court oversaw operations here as Clerks of the Green Cloth in the late 16th and early 17th centuries. They grazed oxen, sheep and other animals for the royal household on their fields at Broomfield, Potmead and elsewhere, and their buildings at Sayes Court included 34 bays of ox-stalls, of which 8 were reserved for the king's cattle. In 1599 it was noted that the barn was 'very decayed and must shortly be thatched'; the stalls were built of elms and would soon require repair (BL EP 37). These stalls were 'somewhat decayed' in 1608 and

demolished by 1649 (TNA: PRO, E 317/Kent/56 fo 2; LR 2/196 fo 166v). A survey of 1660 noted that the ox-stalls and stables were formerly 300 feet (91.44m) long (BL EP 38).

In the 16th century a gateway was added to the manor house. An undated survey of the second half of the century, made by the queen's auditor John Ashton, mentions 'a meane house and a barn' as belonging to the lordship of Sayes Court (BL EP 36). The whole house was rebuilt on the same site in 1568. Late in the 16th century the manor house was separated from the manor and estates were attached to it, taken from the demesne lands of the manor. In 1585 it passed by lease to the Browne family, and eventually to their descendants the Evelyns in the 17th century (Drake 1886, 7–9).

It is clear from a later survey that the demesne lands of the manor (in the hands of the Cofferer and later the Brownes) all lay to the south, west and north of the manor house. They comprised Broomfield, Broadmarsh (alias Mould Meadow), Barn Close, New Marsh (alias Neale's Marsh or Eight Acres), Bottom Mead (alias Five Acres), Twenty-Six Acres, Potte Mead and Great Crane Mead. Only the northernmost field, Great Crane Mead had a frontage on the River Thames, stretching as far north as Earl's Sluice (TNA: PRO, E 317/Kent/56 fos 2–3). This was in the area of the later mast ponds and Victualling Yard. The bailiff of the manor was obliged to maintain and repair the river bank within the manor as part of his office, in return for his daily fee of 2d (TNA: PRO, SC 6/HenVIII/6025). The river bank or marsh wall was 160 perches (804.67m) long and included a sluice gate called King's Sluice or Crane Sluice (TNA: PRO, E 317/Kent/56 fo 10). The embankment and sluice within the manor between the Royal Dockyard and Earl's Sluice were repaired in a series of campaigns by Christopher Browne in the period 1627–36, using royal money advanced by the Cofferers of the King's Household (TNA: PRO, E 351/3402).

The economy of Deptford was given its first great boost by Henry VIII's decision to found a royal Dockyard here for the construction of his ships formalising the 'ad hoc' arrangements of his father who had rented facilities here. Lambarde wrote of Deptford that 'This towne was of none estimation at all until King Henrie the eight advised (for the better preservation of the Royal fleete) to erect a storehouse, and to create certaine officers there' (Lambarde 1970, 386).

The Dockyard was built up around the nucleus of this storehouse, built in 1513 and used for naval supplies, which survived in part until 1952. It is believed that the 1513 storehouse was provided with an undercroft which was filled in with rubble at the time of the final demolition. The 'Great Dock' was probably also first built at this time. In 1517 the old pond at Deptford Strand was adapted as a basin to accommodate several of the king's ships. The basin was enclosed with oak palings 7ft high 'in the meadow at the west end of the storehouse'. In 1547 further storehouses were hired at a rent of £17, 18s 8d and in 1574 the 'Great Dock' was rebuilt. In 1588-9 additional wharfage was established along the river bank, representing an enlargement of the Dockyard to the north west.

Sir Francis Drake's ship the 'Golden Hind' was lodged in a specially constructed brick dock in Deptford on his return from his circumnavigation voyage in 1581 (Drake 1886, 276). This was almost certainly within the Royal Naval Dockyard and on the site, although some writers have maintained it was in an inlet off the Creek (Dunkin 1877, 441 and n; Leftwich 1943, 206). Benjamin Wright's map of the Thames estuary in 1606 and a contemporary Dutch map both show 'Captain Drack's' ship to the north of 'Ditford' approximately on the site (NMM G.218;8, G21;8;9/22). Philipott stated that the skeleton of the ship was near the 'Mast Pond' (Philipott 1659, 160).

Drake's ship was a tourist attraction for some decades, before it fell to pieces in the 1650's (Drake 1886, 2n7, VCHK ii 341). The remains of the ship, complete with its stone-shot ballast, may have been disturbed during the digging of a new dock in the Dockyard in 1667 (Dunkin 1877, 518n; Banbury 1971, 77). An excavation at Deptford Wharf (TQ 368 787) in 1977, designed to find the remains of the ship and its dock, found evidence of 17th century ship building in the form of tar and wood shavings (SMR Ref: 70986; History Now, October 1977, 1 and 5; Richardson 1978, 161).

2.6.2 Seventeenth century

The development of the Dockyard in the post-medieval period is most easily followed in the sequence of surviving historic maps. The earliest detailed map of the Dockyard, and the adjacent Sayes Court, is the John Evelyn map of 1623 with later annotations (Fig 3). This clearly shows the Kings Ship yard, which at that time comprised principally of a single dock 'The Great Dock' and the storehouse built in 1513 and the 'Thrers House'. These were located on the south-east of the study site. Part of the south west of the study site was occupied by a 'brickclose' and orchard, and the remainder of the south west and west of the study site by the manorial complex of Sayes Court. Although in 1610 the Royal Naval Dockyard was enclosed with an oak paling fence, and in 1619 with a brick wall neither is shown on the Evelyn map.

The Evelyn map of 1623 does not cover the basin, on the centre north of the study site created from the pre-existing medieval pond. By 1676, part of the basin was being utilised as a mast pond.

Between 1676 and 1688 a new range of mast ponds were built to the north west of the old basin, together with an anchor wharf and new storehouses. These new features are shown in a plan of 1698 held in the British Library (Kings MS 43). This shows a plan of the Dockyard as it had been in 1688, improvements made between 1688 and 1698 (principally a rationalisation of the storage facilities), together with a panorama of the Dockyard in 1698 (Fig 4). Usefully the 1698 plan is annotated and identifies all the key features of the Dockyard at that time (reproduced in Hawkins 2000, Appendix 1).

A survey of the Crown manor of Sayes Court was made in July 1608 (surviving in several versions), and found that Christopher Browne held it with the keeping of the king's cattle under a 40-year lease which had begun in July 1603 (TNA: PRO, LR 2/196 fos 166–8; LR 2/198 fos 152v–153v; LR 2/219 fos 246–58v, printed at Dews 1884, 286–98). He was married to Thomasine Gonson, descended from Henry VIII's and Elizabeth's Treasurers of the Navy, William and Benjamin Gonson. Christopher Browne restored the buildings of the manor at his own expense, and planted its gardens and orchards. In recognition of this in January 1611 he received a new grant of the office of bailiff of the manor, with the manor house of Sayes Court, its stables, gardens and orchards, for a term of 41 years, with the right to pasture 12 cows, 1 bull and 2 horses of his own throughout the year. In November 1635 he obtained a 24-year extension of the lease of the manor house, and passed it on to his grandson Richard Browne (BL EP 37; TNA: PRO, E 317/Kent/56 fos 7–9). In 1647 Richard's daughter and heiress Mary married John Evelyn, who took possession of Sayes Court in October 1648 (Drake 1886, 7). Browne was the king's ambassador in France, and remained there during the Commonwealth period (1649–60).

In July 1649 the manor was seized with other royal estates by the Parliamentary government and surveyed for sale in the following December and January. The

survey was submitted to the Surveyor General (BL EP 38; TNA: PRO, E 317/Kent/56). The manor house and its appurtenances were in the hands of William Prettyman (as executor of Christopher Browne), who sold them on to William Somerfield of London in April 1650. Following correspondence between Prettyman and Richard Browne in 1650–2 (BL EP 38), John Evelyn moved into Sayes Court on behalf of his father-in-law in 1652, and purchased it in a series of complicated transactions, which were completed in February 1653 (de la Bedoyère 1997, 13). The manor and its demesne lands were bought by Sir Nicholas Crispe. Following the restoration of the monarchy in 1660, a survey was made of what had happened to the demesne lands during the interregnum, and was submitted to the Board of Green Cloth in December. Much of the cattle pasture and meadow land had been ploughed, dug and planted; 7 acres of Great Crane Mead had been dug out to provide ballast for ships, which had created a dock to house ships, linked to a canal intended to convey lighters to Hatcham Barn (BL EP 38). In May 1663 the restored Charles II granted Evelyn a lease of the manor house, gardens, orchards and the adjacent fields for 99 years. The bulk of the demesne lands were returned to the custody of his father-in-law Sir Richard Browne in October 1662, and leased to him by the Crown in 1671 (Drake 1886, 8–9; BL EP 29, 30, 38, 39, Deptford Charters box 2).

As described in 1608, the house was 9 bays long, 2 storeys high and contained 18 rooms (Dews 1884, 294–5; TNA: PRO, LR 2/196 fo 166v; LR 2/219 fo 254). In an uncertainly dated inventory made by Christopher and Thomasine Browne to let the house to Sir Thomas Smith in ‘year 13’ (ie either 1617/18 or 1637/8) the ‘capital messuage’ comprised: the Court Yard next to the Street, the Hall, the Parlour, the Inner Parlour, the Buttery, three cellars, the entry between the Hall and the Kitchen, the Kitchen, the Back Yard next to the Kitchen, the Wet Larder, Rooms over the Coalhouse, the Chamber over the Parlour, the Chamber over the Hall, the Chamber over the Porch, the Chamber over the Buttery, the entry at the stair head over the Still House called the Brushing Room, the entry over the passage out of the Hall into the Kitchen, two chambers over the Kitchen, the entry at the stair head leading into the chamber over the Inner Parlour, the closet adjoining this entry, the little chamber over the Inner Parlour, the Hot House, the entry between the little chamber over the Inner Parlour and the chamber over the Wet Larder, the chamber over the Wet Larder, the stair case leading up into the garret, the Great Garret, and the chamber at the end of the garret. There was also a brickhouse in the garden, a stable in the orchard, and the garden and orchard with fruit trees (BL EP 37, Deptford Charters box 1). In 1649 the house was described as timber-built, and comprised three cellars; a hall, a parlour, a kitchen, a buttery, a larder with a dairy-house and a chamber on the ground floor; eight chambers with four closets in the second storey; and three garret rooms at the top. The courts leet and courts baron for the tenants of the manor were held at the house (TNA: PRO, E 317/Kent/56 fos 6, 11). John Evelyn found that the house had some long-term structural problems (de la Bedoyère 1997, 13). In April 1652 he had repairs carried out to it, and in December 1653 made an agreement with a bricklayer to build two new chimneys (BL EP 38, 39). In 1664 he paid tax on 19 hearths in Sayes Court manor house (LLLH PT69/62).

Evelyn sketched a view of the manor house at Sayes Court onto an earlier map of Deptford (Fig 3; BL Maps *3110.(50). and Additional MS 78629A, formerly EP 42). It shows the south front with three gables (of which the central gable is the tallest), two chimneys and a central doorway opening onto a straight approach path. A 19th-century drawing derives from this sketch (BL Additional MS 16945 fo 71). The house appears with an irregular outshot rear wing to the north on Gascoigne’s plan of 1692, a dockyard plan of 1725 (TNA: PRO, CRES 6/34 fos 80v–81, copies at MPE 1/1405, and a different version at LLLH A88/8/6), and Milton’s plan of the Dockyard in 1753.

In 1608 there was a stable at the west end of the storehouse, with a hayloft over it, and a four-bay granary (TNA: PRO, LR 2/196 fo 166v). In 1649 there were two stables and a small stable adjoining the manor house; the great barn was eight bays long (TNA: PRO, E 317/Kent/56 fos 6, 7). The survey of 1660 said the barn had been 140 feet long and 26 feet wide (42.67 x 7.92m), but had been completely demolished (BL EP 38).

The survey of 1649 measured the outbuildings, courtyards, gardens and orchards around the house at 2 ac 2r 16p (TNA: PRO, E 317/Kent/56 fo 6). Evelyn found the manor house largely surrounded by pasture land, except for some old hollow elms in the stable court and next to the watercourse; he developed his famous gardens around the house. In February 1653 he planted the orchard with 300 mixed fruit trees. He had visited Pierre Morin's garden in Paris in 1644, and the design of his original oval parterre was based on this. He planted groves in 1656 and 1660, and the Lower Grove in 1662. In spring 1664 he planted the home field and west field around Sayes Court with elms. He established a holly hedge 160 feet long, 7 feet high and 5 feet thick (48.77 x 2.13 x 1.52m); by 1679 it was 300 feet (91.44m) long. In 1668 Evelyn obtained a Crown lease of a small piece of ground in Brick Close on the east side of the house, which allowed him to enlarge the forecourt of the house and build a stable. It also had the effect of distancing the house further from the Dockyard, and a new boundary wall was probably built. In 1670 he planted the Mount hedge (Dews 1884, 31–2, 206; Laird 2003, 117–18, 127, 139; de la Bedoyère 1997, 68, 338; BL EP 39).

The gardens included bowling greens, eight walnut trees, a carp pond and glass bee hives; plots for melons, peas and beans; a kitchen garden, a nursery garden and a walled private garden; a moated island for raspberries and asparagus; a banqueting house, a pigeon house, a laboratory, a brew-house, a woodhouse, a cart-house and sawpits. All these buildings and garden spaces appear on plan (BL Additional MS 78628A). In February 1685, after a devastating winter had destroyed many of his young trees, Evelyn redesigned his parterre in a semi-circular shape and planted part of an orchard (Laird 2003, 117; BL Additional MS 78628B). Occasionally Samuel Pepys visited the gardens, as in May 1665 when he saw 'a hive of bees; so as being hived in glass you may see the bees making their honey and combs mighty pleasantly' (Latham & Matthews 1972, 97) and in October 1665 when Evelyn 'showed me his gardens, which are for variety of evergreens, and hedge of holly, the finest things I ever saw in my life' (ibid, 253) and in July 1691 (de la Bedoyère 1997, 14).

The access from the manor house to the river was by a track running northwards around the wall of the Royal Dockyard to a causeway and river stairs, where Evelyn, his family and visitors disembarked. Because the Dockyard staff needed access across this causeway to reach the mast ponds on its north side, it was agreed that the watchman of the gate at the north end of the Dockyard should keep the causeway and stairs clear of mud deposited by the floods of high tides. On several occasions Evelyn wrote to Pepys to remind him of the obligation, as in September 1672, June 1686 and October 1687 (de la Bedoyère 1997, 168, 178–9). The Crown purchased the land for the mast ponds (part of Great Crane Mead) from Richard Browne in the 1670s (BL EP 39, 41, 46).

Because the severe winters of the late 17th century often made the road between Deptford and London impassable, Evelyn began spending the winters in central London. In 1694 he finally gave up Sayes Court to rent-paying tenants and moved the family seat to his other main property at Wotton, near Dorking. Initially the house was in the hands of Evelyn's daughter Susannah and her husband William Draper,

and their artistic entourage. In May 1694 Evelyn wrote to Samuel Pepys from Wotton to urge him to visit 'the young Housekeepers at Says-Court' when he went down-river, describing them as 'a family of 21 – Mrs Tuke is library-keeper, and the rest painters, embroiderers, carvers, gardener, etc'. Evelyn did not move the last of his goods from the house to Wotton until May 1700 (de la Bedoyère 1997, 14, 244, 269n7). The house was let to Captain John Benbow, and in January to April 1698 sublet to Tsar Peter the Great of Russia, who had come to England to learn the art of shipbuilding (Dews 1884, 32).

2.6.3 Eighteenth century

During the late seventeenth century the Dockyard facilities had expanded into land of the Sayes Court Estate. This process was to continue into the eighteenth century. In 1711 'The Great Dock' was lengthened and in 1712 the yard was extended to the north-west by the purchase of land from the Evelyn family at a cost of £2,050. This land was utilised for a further mast dock and anchor wharf. This block of land was initially separated from the old dockyard by a brick wall and traversed by a right of way from Sayes Court. In 1716 a slip opening into the basin was replaced by a dry dock. In 1725 the Navy commissioners purchased a further 6 acres of land from the Evelyn family extending to Sayes Court. The northern end of Grove Street was established at this time. Sayes Court itself had been rebuilt in 1568. The Mansion House appears to have been partly demolished in 1729 when it was converted into the parish workhouse (later Almshouse and Dockyard Pensioners Office). The building was substantially altered again in 1759 and it is uncertain if any of the original structure survived after this date. The last elements of the building were demolished in c 1930. The mansion house and its grounds are shown in what must have been almost their final form in a surviving plan of 1692. This plan shows the gardens of Sayes Court developed by John Evelyn from 1652. Evelyn modelled his gardens on his tours of Italy, France and Germany and carried out planting trials here which formed the basis of his work 'Slyva or a discourse of Forest Trees'. The mansion house had suffered considerable damage during the stay of Czar Peter the Great and his entourage in 1698. However, the main reason for its demolition was probably the disposal of much of the estate to the Royal Naval Dockyard and the increasing industrialisation of the area.

In 1734 six houses adjoining the north east boundary of the yard were purchased for £749 and demolished due to fire risk. The site of the houses was added to the yard. In 1744 a further addition was made to the yard by the purchase for £374 15s 10 from Mary Wickham of six tenements in a place called the Orchard adjoining Officers residences in King Street (later Watergate Street).

The form of the Dockyard in the early and mid-eighteenth century is clearly shown in a partial plan of 1725 (Fig 5) and more comprehensively in Milton's dockyard plan of 1753 (Fig 6). As with the 1698 plan Milton's plan is usefully annotated to list the dockyard features (reproduced in Hawkins 2000, Appendix 2) and provided with a panoramic view. The principal change from 1698 to 1725/53 is the increase in the number of slips and the remodelling of the basin. The latter was by this time in use as a large wet dock. This may indicate a change in emphasis from ship repair at the yard to ship building. On the extreme right of Milton's plan can be seen a number of ruined storehouses of the victualling yard. These were accidentally burnt down on July 5 1739 (Hawkins 2000).

Deptford Dockyard was again enlarged in 1765 by ground taken in from the Victualling Yard. This allowed the construction of a new larger mast pond, new masthouse and building slip. This new extension was enclosed by a brick wall in

1769. The extensions to the Dockyard are shown in a plan of 1774, which was itself used to make a contemporary model of the Dockyard now in the National Maritime Museum (Fig 7). As with the 1698 and 1753 plans the 1774 plan is fully annotated (reproduced in Hawkins 2000, Appendix 3). Captain Cook's two ships 'Resolution' and 'Adventure' were equipped for his second voyage to the Pacific in 1772–75 at the Dockyard and 'Resolution' and 'Discovery' were so equipped for his final voyage in 1776–79.

Between 1774 and the early nineteenth century the Dockyard changed only in detail as can be seen by comparing the 1774 model with a plan of about 1808 (Fig 8). As with the 1698, 1753 and 1774 plans the c 1808 plan is fully annotated identifying the buildings and activities undertaken in the Dockyard at that date (reproduced in Hawkins 2000, Appendix 4).

In 1700 John Evelyn was renting Sayes Court House to Lord Carmarthen for £73 per annum (BL EP 28). On the death of John Evelyn in 1706, both the Browne and Evelyn leases of Sayes Court and its lands passed to his grandson Sir John Evelyn (died 1763). He was able to convert the leases into a grant in fee in trust to himself and his heirs in 1726 (Drake 1886, 9; BL EP 29, 30). A valuation was made of the Deptford estate of Sir John Evelyn in February 1725 (BL EP 41). The Evelyn estate was mapped by Joel Gascoigne in 1692 (BL KTOP xviii.17.2), John Grove in c 1712 (BL KTOP xviii.17.3), and John Dugleby in 1777 (LMA O/267/1, 2). In 1720 the tenant of Sayes Court house and gardens was William Lee esquire (BL EP 29). In 1728 and 1735 Sayes Court and its gardens were leased out to Captain William Newland (BL EP 30, 33). In 1725 the Royal Dockyard was extended into the lands of Sayes Court manor by 6 acres (*VCHK* ii 367; BL EP 41).

In 1727 a carpenter, a smith and a plumber were paid for work on the pump at Sayes Court, and the grounds of the barn were fenced (BL EP 29). In 1755 payments were made for work on asparagus beds and hedges (BL EP 31).

In 1726 the parish of Deptford built a Workhouse for its poor on the east side of Church Street, adapting the building of the Deptford Bridewell prison, on part of the Gravel Pits Estate by Deptford Creek. The Workhouse served both the parishes of St Paul and St Nicholas until 1740, and thereafter St Paul's only. The parish of St Nicholas transferred its poor in 1740 to the old manor house of Sayes Court, held on lease from the Evelyn family. In 1759 the old house was demolished and a new Workhouse built, which continued to house the poor until 1848 (Dunkin 1877, 96–7; Dews 1884, 38; Drake 1886, 28–9, 35; Sturdee 1895, 46; BL Additional MSS 16945 fo 46; 32360 fo 111). The old barn was demolished as part of this process, £3 being received for its materials. Rents for the house were received by the Evelyn family in 1743, 1756, 1760, 1764, 1792, etc (BL EP 31, 32, 33). The rebuilt house appears as a rectangular block on Dugleby's maps of 1777, surrounded by the remnants of Evelyn's gardens. A view of it appears on a lease plan of 1789: it appears to be similar to the 17th-century house, but with different fenestration, a pillared central doorway and a central cupola (BL Additional MS 16945 fo 72).

2.6.4 Nineteenth century

By Admiralty order from the 31st January 1821, Deptford Dockyard was to be maintained only as a depot for small maintenance work. In 1827 the mast house and adjoining land were transferred to the victualling yard and between 1830 and 1844 the dockyard was used for ship-breaking. From 1844 the dockyard was reused for the building of small warships such as corvettes and sloops. The Olympia building was constructed at this time (1844–6), to cover No 2 and No 3 slips, the slips also

being rebuilt in brick, concrete and stone. The dockyard is shown in small scale maps of 1821 and 1833 while the Thames frontage of the site was surveyed in detail in both plan and section in 1832-38.

In September 1848 the parish surrendered the workhouse to Mr W J Evelyn of Wotton. It was used as a factory, then an emigration depot until 1852. In 1853 it was used as a factory to make clothing and bedding for emigrants (Drake 1886, 29). In 1856 W J Evelyn sold about 15 acres to the Admiralty; on the closure of the Royal Dockyard in 1869 he bought back more than 11 acres, including the site of Sayes Court (Drake 1886, 18). In 1881 the house became the Evelyn Almshouses, Sayes Court for 21 residents, and the gardens became a recreation ground (Dews 1884, 40).

The dockyard was finally closed in 1869, the last ship built in the yard being the sloop 'Druid' launched on the 13th March of that year. The 1st edition Ordnance Survey (1:1056) of 1868 shows the working dockyard in its final form with the key elements of the docks clearly labelled. Five principal slips are shown (No 1 to No 5) together with 'The Great Dock' (head and stern dock), basin, main storehouse and ancillary structures. Comparison with the earlier maps of the Dockyard indicates that probably all the slips were of late Stuart or Georgian origin, though rebuilt. 'The Great Dock' and the main storehouse were the oldest elements, having been first established in 1513 but substantially rebuilt. It should be noted that in the 1868 map the buildings covering over the slips and docks are shown in outline only.

After closure, the Dockyard closed was converted for use as the Foreign Cattle market, receiving livestock from abroad. The Olympia cover building was put to use as a sheep and cattle shed. By 1889 the market had been extended to 27 acres (11 ha).

2.6.5 Twentieth century

By 1907, 184,971 cattle and 49,350 sheep were imported through the Foreign Cattle market, although these figures declined to 21,547 cattle and 11,993 sheep by 1912 (The Times, 13 March 1926, 12). The Foreign Cattle Market was taken over by the War Department in 1914, on a tenancy agreement from the City of London Corporation, for use as the Royal Army Service Corps Supply Reserve Depot. The War Office bought the site ten years later in 1924.

The site was bombed in WW2. The clearance of bomb-damaged buildings led to the discovery of the Tudor Storehouse in 1952 and it was demolished shortly afterwards. Warehouses were built across the site in the 1980s. A fire in July 1986 destroyed a warehouse which was replaced by a more modern example of 9900 sq metres, 20m high at its apex and costing £3.5 million, designed by Weatherall Green and Smith architects (Croudace Construction, n.d.). The need to store stacks of large rolls of paper for news print required the floor of the warehouse to be strengthened by a lattice of micro-piles.

3 Original research aims

1.1 Site specific objectives and research aims

The following archaeological research topics were compiled by the archaeological consultant and reviewed by appropriate MOLA specialists, and in particular with consideration of the results of previous archaeological investigations both on the site and on other sites in the area and in conjunction with the objectives set out in the Written Scheme of Investigations (Hawkins 2010a, 6; Francis 2010b, 9–10, 45–47). All research will be undertaken within the priorities established in the Museum of London's *A research framework for London Archaeology*, 2002.

The expanded research aims are included as Appendix 1 of this document. It should be noted that most of these cannot be fulfilled through use of archaeological evidence alone and the full use of all available and accessible published and unpublished sources will be utilised.

1.1.1 Site-wide

1. Establish the palaeotopography and palaenvironment of the study site throughout the Holocene.
2. What evidence is there for changes to the sites topography and environment as a result of human activity prior to 1513.
3. What is the evidence for land use and occupation of the site prior to 1513.
4. What is the chronology and spatial extent of river defences from the 12th century to the present and what constructional and technological changes are represented over time.

1.1.2 Sayes Court

5. Within the context of the requirement for preservation *in situ*, recover the plan form of the Mansion House of Sayes Court, its fabric composition and date.
6. Recover so far as is possible any evidence for the ancillary buildings, gardens and associated remains of the Sayes Court Estate.

1.1.3 Royal Naval Dockyard

7. Establish so far as is possible the extent, plan form and composition of the Tudor Dockyard and its development in the period 1513–1603 with particular reference to evidence for technological change.
8. Establish so far as is possible the extent plan form and composition of the Stuart Dockyard and its development in the period 1603 to 1714 with particular reference to evidence for technological change
9. Establish so far as is possible the extent plan form and composition of the Georgian Dockyard and its development in the period to 1774 when the detailed surviving model of the Dockyard was commissioned, with particular reference to evidence for technological change.
10. Establish so far as is possible the extent plan form and composition of the late Georgian and early Victorian Dockyard, with particular reference to evidence for technological change.

11. Record the evidence for the transformation of the Dockyard into the Foreign Cattle Market, Military Depot and Convoys Wharf.

4 Site sequence: interim statement on field work

4.1 Introduction

The text and plans included in this section have been drafted prior to full analysis of data, and are derived from preliminary spot date, stratigraphic, and documentary information. They attempt only to give an impression of activity during the defined periods and do not include all excavated features.

Excavations at the site have revealed a number of unexpected and important archaeological survivals. These are discussed below in terms of historical periods which correspond to important phases of activity of the site, principally the Dockyard.

Much of the west part of the site consisted of alluvial clay, not greatly suited for foundations for buildings. Presumably in an attempt to stabilise the soft ground, thousands of 'vibro-piles' were drilled in the 1950s–60s across the site. These were vertical pile holes c 0.5m in diameter, spaced only a few metres apart and filled with rammed gravel. This technique was very destructive on the underlying archaeological deposits and structures.

4.2 Natural and topography

The geology of the site consists of Pleistocene terrace gravels (Kempton Park terrace) overlying low-lying chalk bedrock. The centre of the site lies on floodplain gravels or Shepperton Gravel. The surface of these gravels lies between -1m and -5m OD indicative of a Late Glacial to Early Holocene channel west to east across the site, perhaps exploiting an area of erosion in the bedrock dating to the the Devensian cold stage or resulting from Holocene fluvial activity. This was the 'Orfleteditch', first recorded in 1279, that formed a natural tidal basin that became the Wett Dock or Dockyard Basin, by the early 16th century.

The present floodplain was formed by river down-cut from an earlier floodplain (represented by the Kempton Park Gravels) as a result of a low sea-level and the large influx of meltwater into river channels which occurred after the Last Glacial Maximum of the Devensian Glacial period (c 18000 BP). These high energy fluvial conditions deposited coarse grained sediments across the valley floor (the Shepperton Gravel) and these deposits underlie the alluvium in the present floodplain. South of the site, the gravels rise up to form the nearby Kempton Park terrace with a surface recorded between 1.5m AOD and -0.5m OD. To the north of the site the gravel surface also appears to rise.

4.3 Pre-dockyard (450,000BC–AD1513)

The development of the site was strongly influenced by its underlying geology. Peat was identified in nine geoarchaeological boreholes, five of which formed a shallow arc running across the site to the river, suggesting the peat had formed within the channel or along its edge. This channel was a feature of the site from at least the prehistoric period. The area of high gravel to the east of the channel was similar to the eyots recorded in Southwark and there are other similar landscapes nearer to the site, such as that at Greenwich Wharf. With easy access to the river, this area of high gravel would have been attractive to prehistoric peoples, although there is no strong evidence to suggest permanent settlement.

Area 8 was on the margins of the palaeochannel (Fig 9). Worked flints, perhaps from the Mesolithic period, were recovered from samples from Area 8. Area 10 and Area 13 were more centrally situated within the channel fills and careful geoarchaeological and environmental analysis of samples from these Areas have been able to trace the

development of the channel/s and the flora in different times during the prehistoric period and into the historic period (see below). Alluvial deposition continued into the Roman and later periods.

On the area of high gravel (almost entirely from Area 4), prehistoric finds included a Mesolithic blade from the fill [2755] of an irregular feature which may have been a tree throw, a stone hammer or axe from the Neolithic period found in pit [3207] and Bronze Age pottery from the lower fill of pit [2539] (although later pottery was also recovered from this feature). Iron Age pottery was also recovered from a pit [3598].

A curving ditch [2510] was also recorded in Area 4 (Fig 10, Fig 11) cut into the gravel natural. This may have been the corner of an enclosure dating to the Roman period. The ditch fill [2508] contained the largest quantity of Roman pottery recovered from the site, including part of a samian cup and black-burnished ware dishes and jars which date the fill to AD 160–250. A rim sherd from a flagon may have been made in Kent or Essex. The fill also contained the leg and feet bones of an adult individual (the rest of the burial had been truncated away by a concrete pad), perhaps a male (Fig 12). Examination of the *in situ* bones suggests that the burial was flexed (or crouched), the individual lying on its left side with the elbows and knees bent. A hole pierced the samian cup may have been a deliberate burial tradition disfigurement to render the vessel unusable.

Elsewhere in Area 4, a concentration of Roman building material indicated that a high-status building of this date may also have been located at, or close to, the site, although none was *in situ*.

One intriguing feature was a ditch [2423]/[2514]/[2372] in Area 4, running roughly N–S, but at an angle to the Tudor Storehouse of 1513 (Fig 10). The ditch ran under the walls of post-Tudor walls of the storehouse complex and survived 34.0m long and 8.0m wide, sufficient to accommodate small vessels, particularly barges. The south end of the ditch was cut by the foundation trench to a late Georgian building and the north end by modern intrusions. However, the course of the ditch, if it continued to the river, would have taken it under the Tudor Storehouse, suggesting a pre-1513 date. The sides of the shallow U-shape surviving profile had been partially backfilled, the backfill then revetted with timber. (Dendrochronological analysis on the revetment did not produce a date.) Part of this backfill ([2519]) yielded medieval pottery of 1170–1350 as well as building material that fitted with this date. Once the ditch had gone out of use, an early fill [2518] yielded medieval pottery dating to 1270–1500. A single clay pipe bowl dating to 1640–60 was recovered from one of the basal fills [2517], was likely to have been intrusive.

All of the assemblages of finds from the ditch were small. However, a combination of evidence seems to point to a pre-1513 date. The ditch is likely to have continued to the river, suggesting it pre-dated the Tudor Storehouse (although a trench excavated on the riverward side did not reveal the ditch). The ditch does not feature on the pre-1688 map (Fig 4), and must have been backfilled by then as its location is occupied by a building. Similarly, the ditch is not shown on the 1623 map (Fig 3), although another more substantial below-ground feature the 'Wett Dock' that is known to have existed at that time is not shown either.

The pipe bowl is likely to have been intrusive (vibropiles extended into the ditch and may have carried later material into the fills). If so, the ditch may have been opened as early as the 12th century and backfilled by the 16th century, in advance of the construction of Henry VIII's Dockyard. The ditch may have been a medieval barge dock, perhaps serving Sayes Court. Alternately, if the clay pipe was not intrusive, the

ditch may have been backfilled to allow construction of the Tudor Storehouse while elsewhere it was left open until the mid- to late-17th century.

4.4 Tudor dockyard (1513–1603)

The topography and underlying geology seems to have been a significant factor in the selection of the site as a dockyard. The first known structure of the Tudor dockyard was a storehouse [1967] built for Henry VIII in 1513 (Fig 13), founded on the gravel headland. Structures requiring deeper excavation, such as slipways, were situated on the softer alluvium. The Dockyard Basin or Wett Dock utilised the mouth of the Orfleditch.

The storehouse was investigated in Area 4, Trench 47 and CVW00 Trench 15; the results are integrated below. The main axis of the 52.30m by 9.50m rectangular building runs approximately E–W, parallel to the river nearby. The truncated remains of the original north, south and west walls of the storehouse survive to ground level. The east wall is not original and appears to have been a replacement for the original wall to bring the east end of the storehouse in line with the rest of the storehouse complex in the 18th century. (Note: to prevent confusion, the 1513 building will be referred to throughout as the ‘Tudor Storehouse’, while the collective term for all the storehouses, into which the 1513 building became incorporated, will be the ‘storehouse complex’.) (Fig 14, Fig 15, Fig 16, Fig 17, Fig 18)

The Tudor walls survive to a height of c 3.90–4.15m OD and were exposed up to 0.74m high. They are built of orange bricks (length 217–223mm, breadth = 100–107mm, thickness = 50–55mm) set in cream-coloured mortar of probable fabric 3033/3046 suggesting a 1470–1550 date (Ian Betts pers comm.). Typically, the walls are built English bond (with alternate courses of headers and stretchers), but occasionally two courses of stretchers were noted between header courses. The walls are typically 0.71m wide, although in the south wall a 1.50m length of wall at the east end and a 3.00m length in the central part are wider at 1.10m wide. Flat areas cut into both these wider walls may have been the bases for alcoves.

The walls survived to ground floor level, with slots along the internal faces of the north and south walls to support timber joists. The slots are 0.56–0.59m apart, 0.25m high, 0.11m wide and at least 0.25m deep. Four slots survive best at the east end of the north wall, and seem to have been modified during the Tudor period (as a partial blocking consisted of Tudor bricks). Careful inspection revealed that parts of the slots were built as part of the wall, while other lower parts had been carefully cut into the wall face. An explanation may be that the height of the floor was lowered early in the building’s history. No floor levels survived in the building.

A possible opening was recorded in the central part of the south wall. A tile abutting a stopped end seemed to be the base of this opening. The opening was at least 0.90m wide, and has been partially blocked with reused yellow stock brick and concrete. The other side of the opening had been removed by modern concrete. The opening may have been a doorway. No internal features relating to the Tudor phase of the storehouse survived.

The north and south walls are cut by ten N–S-running concrete walls at c 2.0–4.0m intervals. The concrete walls are 1.5–2.0m wide, their tops at the same level as the surviving tops of the Tudor walls. The concrete walls were not excavated in the area of the Scheduled Monument, but excavation immediately to the north showed that they were up to 3m deep. In places, the Tudor walls are also truncated at regular intervals by vibropiles.

Other sections of probable Tudor walls included those seen in a narrow building to the west of the Tudor Storehouse on a very distinctive northeast-southwest alignment. This was likely to have been the Treasurer of the Navy's House (Fig 19), probably in existence by the 1540s and with surviving sixteenth and seventeenth century fabric. This measured 50.50m north to south by 5.70m east to west and contained a number of *in situ* floor levels, including tiled floors. The Treasurer's House is shown in John Evelyn's sketch plan of 1623 as 'The Threr's House' (Fig 3). The building was demolished before 1688.

The line of the south wall of the Tudor storehouse continued as a number of fragmentary walls, returning north. Apart from the storehouse, very little else of the Tudor dockyard was identified. A 'Wett Dock' (ie the Dockyard Basin) is known to have existed in the Tudor period, making use of the Orfleteditch and the natural water-filled pond near the Thames. The route of the Orfleteditch followed a shallow arc across the site, passing just north of the location of the Wett Dock, seemed to support this hypothesis. In addition to this, a short section of on-edge planking, supported on both sides by posts, may have been a fortuitous survival of the Tudor Wett Dock in the northeast part of Area 2. Timber from this structure failed to date using dendrochronology, but a nearby post [6123] dated to AD 1554–89, suggesting it may have been part of the Tudor Wett Dock. This was a lucky survival because much of the rest of the Tudor Wett Dock seems to have been removed by later phases of the Dockyard Basin, excavated deeper and revetted in timber and ultimately in brick and stone.

4.5 Stuart dockyard (1603–1714)

Map evidence shows that by 1688 a number of buildings had been added to the Tudor Storehouse (Fig 4). These are identified in the 1698 map and key as an open-sided timber rigging house, a store-keeper's office, a pump house, a little crane and an additional storehouse. Between 1688 and 1698, a 'Great New Storehouse' was added to the west side of the Tudor Storehouse and a 'New Storehouse' was built against the south wall of the Tudor building. Subsequent development seems to have removed these as no evidence of the Stuart warehouse was identified in the excavation of Area 4 (Fig 20).

Elsewhere, survival was better. The Treasurer of the Navy's house was discussed above. An unusual brick structure (Fig 21) of unknown function is also likely to date from this period. The purpose of this structure was unclear and will be the subject of further analysis and discussion in the publication, but one possibility is that it may have been the base of an ice house serving the Treasurer of the Navy's house alongside. This would explain the lack of any residues on this industrial building. Ice houses are known in Britain from the 1660s.

The timber basin encountered in Area 2 and Area 3 (Fig 22) is that shown in the 1698 survey (Fig 4). The Basin wall ran northeast–southwest in Area 3 and was built of vertical timber beams likely set into a timber base plate. Planks were nailed to these posts from the inside of the Basin. The sheathing was surprisingly light, and iron fastenings were only used on alternating timbers. This suggests attempts to economise. Clean packing clay was used to seal the planks on the landward side of the Basin wall. A series of timber land ties on the landward side attached to the vertical posts of the basin by large iron spikes and staples. These horizontal beams were held in place by a crossbeam and two vertical posts at the end farthest from the basin (Fig 23, Fig 24).

The timber Basin wall continued into the eastern half of Area 2, truncated at its north end by the construction of the later brick Basin wall. The western section of the timber Basin wall was excavated in the central portion of Area 2. The timber wall ran east–west, returning N–S at its north end. It was of a similar construction as the eastern half seen in Area 3 apart from the use of wedged timber posts with their ends cut into a wedge shape. These appeared to have been piled in between the original timber posts after construction of the timber Basin wall. This change in construction style was seen primarily in the northern portion of the wall (Fig 25, Fig 26). On technological grounds, the timber Dock wall seemed to date to the later 17th to 18th century and so its date of construction may straddle the Stuart / early Georgian period divisions adopted in this report.

A fortunate survival was the east part of the timber Basin gate and a length of the timber canal that linked the Basin with the river (Fig 27). The west side had evidently been removed by 19th-century structures. The gate and canal wall were constructed in a similar fashion to the timber Basin wall and consisted of a series of vertical timber posts, most likely set into a timber base plate. Timber planks were nailed to the posts and braced by a series of land ties. Thick iron rods were attached to the posts and held against the horizontal members of the land ties with iron staples or ‘dogs’. Deeper excavations in this area produced a second lower tier of land ties similarly affixed to the basin wall posts (as well as relic timber structures including the post-dated to the Tudor period mentioned in the previous section). Like many of the Dockyard’s structures, the timber gate and canal can be seen in contemporary depictions (for example Fig 28, lower right hand corner).

A depth gauge on the inside of the timber gate was made of copper plate cut into Roman numerals and nailed in place at 1ft intervals. Two of the copper numerals were loose and retained as finds to prevent their being lost during backfilling. A large post on the inside of the gate had a smooth rounded recess to accommodate the hinge for the basin gate itself. No remains of the gate itself were uncovered.

The 1698 map shows a ‘Boathouse’ to the east of the canal linking the Basin to the river. The location corresponded to three brick walls on timber baseplates in this area of the excavation. A series of related construction cuts and deposits suggested there may have been two to three phases of building.

A more difficult building to interpret was located nearby in the northwest part of Area 3. This consisted of a small patch of tile and brick floor, the tile of 17th century date and the bricks forming the edging reused from the medieval period. It is unclear if this was an internal or external surface as the areas that surrounded it had all been heavily truncated by later features.

The remains of a third small rectangular brick building were recorded in Area 2, largely truncated by the eastern edge of the 19th-century slipway. It appears to be a building shown but not named in the key to the 1698 map.

A red brick wall [798] seen in the west part of Trench 25 seemed to be the deep, sloping east wall to a slipway (Fig 29). The 1698 map shows a ‘Mould Loft’ in this location connected by a small inlet in the Basin (what may be the same building is also shown in the 1688 map). The Basin was remodelled here between 1739 and 1753 and the inlet was filled in, although the Mould Loft building appears to have been retained until at least 1739 when it is shown in a picture by John Cleveley the Elder in the Ministry of Defence Art Collection (Fig 30). The Mould Loft was demolished by 1753. However, it is difficult to reconcile the deep wall seen in Trench

25 with the Mould Loft. Further research may help to clarify what the wall might relate to.

A wide red brick boundary wall ran perpendicular to the river in the northwest corner of Area 2. The wall was stepped and had brick arched openings every few metres along its entire length to allow horizontal land ties to pass through. The wall appears to match up with the Dockyard boundary seen on the 1698 map. The wall continued below the southern end of the 19th-century slipway in Area 2 and into Area 12 where its alignment changed slightly to northwest–southeast.

At least two phases of a timber revetment on the west side (ie the outside) of the wall respected the line of the wall for its entire length. The revetments consisted of timber piles with timber planks nailed in place from the west side. The revetments were slightly shorter than the brick boundary wall and ran significantly deeper (Fig 31, Fig 32).

Two slots were excavated to the west of the brick boundary wall and timber revetment, at either end of Area 12. These revealed a red brick stepped foundation wall that appeared to run parallel to the similarly-constructed boundary wall. The stepped foundation was a metre deeper than the boundary wall and lay on a timber baseplate.

It is difficult to interpret the function of the double revetment and the stepped foundation wall. The most likely explanation is that they represented attempts to channel the Orfletediche ditch and any flood water away from the Dockyard and to protect the stability of the boundary wall. The area outside the Dockyard boundary to the west wall in this period is likely to have been marsh, susceptible to erosion and unsuitable for supporting this wall's relatively shallow foundations. If this was indeed the function of the foundation and revetments, then it was unsuccessful – the boundary wall was listing alarmingly to the west when uncovered by the excavation.

The 1698 map shows a terrace of buildings – the officers' quarters – running along the east boundary, with a smithy nearby (Fig 4). The surviving Shipwrights' building, outside the site, was part of this terrace. Area 5.1 consisted of an excavation in the area of the officers' quarters (Fig 33, Fig 34). The excavation revealed a building that appears to match the southeast corner of 'building 4' in the 1698 survey, referred to as 'the clerk of cheques dwelling house'. Cesspits and wells at the back of this building contained sealed assemblages of pottery, animal bone and other material that revealed aspects of the lives of the officers that ran the Dockyard in this period (see below). Area 5.2 was opened over the smithy workshops of the dockyard (Fig 35). There are the remains of several walls and furnaces that fit within the 1698 survey maps (Fig 4, Fig 32).

Wall [724] in Trench 26 was built of red brick set in white mortar and may have been a fragment of the Stuart Dockyard wall running along the south edge of the dockyard. The NW–SE-running wall was abutted by a cobble surface which may have dated to the same period (Fig 36).

4.6 Sayes Court

The excavation identified the ground plan of a building in Area 6 whose location corresponded to that of Sayes Court, from the 1650s the home of diarist and horticulturalist John Evelyn. Only overburden was removed in the Area 6 excavation and CVW00 Trench 11 here and the building remains left intact. The results from these interventions are presented below.

The main axis of the building runs roughly E–W (Fig 37). The building is 25m long and 12m wide, facing south, with a central opening in the south wall forming the main door. A threshold stone was probably not original. The walls to the building survive about a metre high in places (eg to c 3.89m OD); floors did not generally survive and are likely to have been robbed out.

The central part of the building was flanked by wings, slightly set back from the frontage, to the west and east. The east wing comprised two rooms, with the foundations of a later bay window, while a cellar occupied the west wing.

The front door of the building opened into a central hallway, with a room either side. The east and west walls forming the hallway were built of yellow stock brick and are therefore likely to be additions in the 19th century. The east wall of the hallway had been pushed over into the eastern room where it still survived largely as a unit. At the back of the building (ie the north half), a series of rooms were evident, linked by a narrow E–W running corridor. Stone thresholds still survived in places, marking the former position of internal doorways (eg at c 3.78m OD). A tiled surface in one of the rooms in the north half of the building was the only remains of a floor, at 3.11m OD. A similar tiled surface was noted outside the building here, suggesting it predated the building.

Re-use of earlier brick made dating of the building problematic – many of the bricks in the building are remarkably similar in colour, fabric and size and date to the late 16th–17th century. Historical evidence indicates that the Sayes Court building was demolished in 1759 (eg Dunkin 1877, 96–7) and replaced with a workhouse. Similarly, it is difficult to reconcile the layout of the building whose plan was recovered in Area 6 with that of the building shown in maps pre-dating the mid-18th century (for example Evelyn's 1653 map (Fig 38) or Milton's 1753 map (Fig 6), whereas the building in Area 6 is easily matched to that depicted in post mid-18th-century maps (eg Dugleby's 1777 map (LMA O/267/1, 2)). It seems, therefore, that the large part of the building recovered in Area 6 relates to the 1759 workhouse, its fabric comprised in part from bricks re-used from the demolished earlier building (Fig 43).

No structural remains were removed, so any survival of the earlier building may lie hidden below the later. However, a tile floor, bisected by the north wall of the building, may have been part of the earlier building, as well as a fragment of wall nearby (Fig 39). The cellar at the west end of the building is more problematic (Fig 40). Few bricks in the cellar walls could be dated with any accuracy, but those that did seemed to date to the late 16th–mid / late 17th century (Ian Betts, pers comm.). On this basis, the cellar has been putatively dated to the Stuart period, although it is also difficult to reconcile the cellar with maps of this era (Fig 38). It is worth noting that maps are only ever a 'snapshot' of the area they depict, whereas structural remains are cumulative.

The cellar floor (at 1.41m OD) was later than the walls and was built of a mixture of yellow London stock, red and orange type bricks used in the cellar walls and dark red brick with cream bands and therefore probably dates to the 18th–19th century (Ian Betts pers comm.). Recesses cut into the north and west walls are likely to have been for timbers to support a stair, replaced by stone steps in an extension to the west wall of the building in the 18th–19th century (Fig 43). Two rooms at the southwest corner of the building are likely to have been latrines, probably also dating to the 1759 rebuild or later.

John Evelyn designed and laid out an important garden (shown in his map of 1653, Fig 38). No garden features were identified either in Area 6, or in targeted test pits to the west and south of Area 6, or in Trenches 29–33. The area of a possible ‘terrace’ in Trench 38 was exposed more fully in the Area 6 excavation and found to be a natural feature, perhaps a tree bole or animal burrow. In Area 6, pits, drainage features and plough marks dated to the 19th or 20th century. A garden wall to the west of the building survived up to a height of c 4.14m OD, with a fragmentary return east in the north part of Area 6. Fragmentary wall remains to the east of the building are also likely to have been garden walls. These garden walls did match with the 1653 Evelyn map and are likely to date to the earlier Sayes Court building. The position of the southernmost wall to the east of the building corresponds with a gate on Evelyn’s 1653 map, referred to in the key as ‘The door into the Milking Close’ (Fig 38).

Further east, the bricks in a culvert suggested a date of late 16th–mid / late 17th century, although modifications at its south end were later. A stretch of wall matched the position of the Dockyard perimeter wall shown on the 1653 map. The workhouse building was demolished in 1947 and a warehouse constructed (Fig 44).

4.7 Early Georgian dockyard (1714–1774)

In the 18th century, the storehouse complex was largely rebuilt (Fig 45). By 1739, the storehouse complex had been built as a unified, square building enclosing a yard. The Tudor storehouse was retained but shortened, and incorporated into the new structure. The timber rigging house was demolished, as was the Great New Storehouse built between 1688 and 1698 in favour of a uniform façade consisting of repeated units of windows and doors. The plan of the new storehouse complex is shown on the 1753 Milton plan (Fig 6) and there seem to have been only minor modifications by the last quarter of the century (Fig 7, Fig 46). The new storehouse complex included an imposing clock tower that replaced the bell tower of the earlier phase.

The principal walls of the new storehouse complex survived as foundations In Area 4 (Fig 47). Two walls on the interior of the south wall of the complex are likely to have been the remains of foundations for the clock tower. Other major changes in this phase included the construction of a building range along the west side of the storehouse complex and another smaller building to the south. These buildings can be seen on the 1774 model of the Dockyard, but do not feature on the Milton map, so were constructed between 1753 and 1774. The building range to the west survived as a series of three phases of structures. The first was a N–S-running wall abutted by patches of a roughly cobbled surface. Internal E–W-running walls which cut the cobbled surface but butted against the first-phase wall, which was presumably still standing, represent the second phase. These E–W walls subdivided the building into narrow bays. The third phase is represented by a wall parallel to the first phase wall which is presumably the outer wall that can be seen in the 1774 model. The smaller building to the south survived only as a thin N–S running wall, having been demolished between 1774 and 1810 to make way for a ‘rigging and sail loft’.

The Dockyard Basin was also rebuilt (Fig 49). The timber Basin walls were replaced with brick walling, likely done in several stages. There were four different brick building styles in evidence along the basin walls, all dating to this period. One early brick wall was identified ‘cutting off’ the northwest corner of the Basin (Fig 45). The wall, which was mortared into the timber wall at either end, may have been a repair that was made by 1725, as a sketch of this date shows the ‘cut off’ corner (Fig 5).

The brick walls were built within the boundaries of the timber basin wall, but were connected to the timber basin gate which continued in use. The junction of the brick wall with the timber gate is shown in the 1774 model (Fig 48). The convention used in the model to depict the Basin walls by 1774 corresponds to elsewhere on the model where brick is depicted. In contrast, timber is shown in a mid-brown wood colour. In addition to this, timber fenders are shown on the model of the Basin – these were not encountered when the timber phase of the Basin was exposed during the excavation. Although care must be taken in interpreting the model, which may be aspirational, it seems to show the Basin wall as almost entirely brick by 1774.

The brick walling of the basin was generally supported by two tiers of timber land ties. The two levels were located one on top of the other and connected by vertical and diagonal bracing beams which inserted into a timber base plate under the wall. The two horizontal beams inserted into the brick basin wall connecting to vertical timber fenders on the waterside of the basin wall. These fenders would have similarly been inserted into a base plate (Fig 25, Fig 26).

A stone slipway in Area 2 was built into the western edge of the brick basin wall probably at the same time as the construction of the brick basin walls. It is comprised of stone blocks at its base and brick walls built upon timber planks lining it (Fig 50).

In the northwest corner of Area 2 a few land ties were recorded that may have supported an earlier phase of the slipway wall (Fig 32).

In the 18th century, the Dockyard expanded beyond the boundary shown in the 1698 map. In Area 12 a series of timber trestles or A frames were placed into cuts made in the timber revetment from the previous phase. The trestles generally consisted of a timber base plate into which a vertical post was inserted together with flanking diagonal posts joined at the top. West of these trestles in the central part of Area 12, a series of timber posts ran parallel to the timber trestles and revetment. It is likely these supported a building seen on the 1753 Milton map, along with the timber trestles and a reuse of the brick boundary wall (Fig 31). A series of timber land ties on the east side of the brick boundary wall, running perpendicular to it, line up with openings in the brick boundary wall and may be related to the timber trestles. A red brick wall on a timber baseplate ran west to east perpendicular to the boundary wall. It is unclear how this related to a building. A number of cobbled surfaces to the west of the timber trestles represent the original surface level of the dockyard during the 18th century after it had expanded beyond its earlier boundary (Fig 53).

The earliest phase of the Small Mast Pond was constructed in timber between 1676 and 1688. The 0.06m wide timber lining (seen only in Trench 3) that was probably a later phase was braced by land-tie arrangements that consisted of oak and elm beams with lock bars held by pairs of anchor stakes (Fig 52). Land-ties relating to the south wall of the Small Mast Pond were seen in the south ends of Area 1.1 and Area 1.2 (Fig 54) and in Trench 7; those relating to the north wall were seen in the north ends of Area 1.1 and Area 1.2 and in Trench 3 where five oak-log land ties were exposed (Fig 55). The tie backs were superseded by the brick phase of the Small Mast Pond in the later Georgian period.

The 1774 model indicated some rebuilding in the officers quarters, and these changes were recorded in Area 5.1. A wall in Trench 45 may also relate to this rebuilding. The last walls built in this area were 19th century in date, indicating continuous use of these buildings though to towards the end of the life of the Dockyard. The smithy was rebuilt, the southeast corner recorded in Area 5.2 (Fig 56).

A red brick wall in the east end of Trench 8 and in the west end of Trench 27 may have been a survival of the Dockyard wall (Fig 57, Fig 29).

4.8 Late Georgian to Victorian dockyard (1774–1869)

The late Georgian to Victorian storehouse was investigated in Area 4, Trenches 47–49 and CVW00 Trenches 15–16, the results integrated below. The basic plan of the storehouse complex was largely unchanged during this period, although internal modifications were made (Fig 58). One major change was the reinforcing of the inner wall [1620] of the south range with inverted arches. A range of buildings was constructed along the south side of the internal yard of the storehouse complex and the east side (where it survived only partially). Associated with this was a set of three vaulted cellars, with their long axes running N–S (Fig 59). Other fragmentary remains of walls of small buildings in the yard were also identified. An engine house survived as foundations along the west side of the yard, including thick iron rods to anchor machinery (now lost) to the brickwork (Fig 60).

Between 1774 and 1810, the building to the south of the storehouse complex, shown in the 1774 model, and the timber storage area were replaced by an E–W-running building which was used as a ‘rigging and sail loft’ (as it is recorded as such in a Goad map of 1870, Fig 61). (The rigging and sail loft building can be seen in a photograph of c 1880, Fig 90.) The space between this building and the storehouse complex was used as an alley, and a set of gates was built at the west end, visible during the excavation as foundation walls [1698], [1699], [1749], [1766]. The gates seem to have been a late and short-lived structure, built sometime between 1858 and 1868, but demolished by 1878 according to map evidence.

The east side of a late Georgian slipway was a fortuitous survival in Area 4 and Trench 51, the rest having been truncated by later slipways. The slip consisted of the chalk substructure revetted by timber planks braced by tie backs (Fig 62). In places the planks had degraded leaving only iron nails embedded in the edge of the chalk.

Five large 19th century slipways were recorded (Fig 58, Fig 63). One slipway was revealed in Area 2 (Fig 64, Fig 65, Fig 66), Trenches 11–12, Trench 37 and CVW00 Trench 6; two further slipways in Trenches 21–24; a fourth partially in Area 3 and Area 4, its central part unexcavated below the space between these Areas; and a fifth in Area 4 (Fig 67), Trench 51 and CVW00 Trenches 13–14. The results are integrated below. In an OS map dating to 1868, these slips were numbered Nos 1, 2, 3, 4 and 5 respectively. No 1 slipway was built in 1844, Nos 4 and 5 after 1844. Slipways No 2 and No 3 were uncovered in the much smaller trenches during the 2010 evaluation and are considered below.

Slipways Nos 1, 4 and 5 are very similar in construction, consisting of a floor of E–W-running large timbers with slightly-sloping walls in stock brick on either side founded on and buttressed by early concrete. Brick buttresses were also recorded. In places the badly-poured concrete had failed. The bases of the slipways sloped towards the river and many of the timbers in the floor seemed to have been rough-outs for ships timbers, subsequently rejected. (It is likely that an upper layer of planks had been nailed into parts of the ‘floor’ of the slipways, but these had been completely robbed off).

A trench excavated across the base of slipways No 1 and No 4 (in Area 2 and Area 3 respectively) showed that the timbers of the floor were supported on a series of timber piles. These had been driven into the alluvial clay with N–S horizontal supports attached to their tops. Clay was packed in between the timbers of the floor

of the No 1 and No 5 slipways (respectively in Area 2 and Area 4), chalk in slipway No 4 (in Area 3/4). At the southern end of slipway No 1 there was a series of stabilising timbers running N–S between the large top beams, presumably to prevent movement. A number of patches of stone or brick cobbling filled gaps between some of the E–W running horizontals of the floor. Two rows of parallel mortises were cut into the timber floor at the south end of the slipway, likely for posts to support a removable timber bridge of a sort seen in the 1774 model.

In slipway No 1 (Area 2), the concrete foundation of the flanking walls was seen to be cutting into the packing material of the slipway, suggesting a later build for the walls than the timbers of the slipway floor. The walls also seemed to be later than the floor in slipway No 4 (Area 3 / 4) where the construction cut for the concrete foundations truncated the chalk deposit of the slipway bedding. Similarly, in slipway No 5 (Area 4), two of the timbers ([2730] and [2705]) in the slipway floor dated to the second half of the 18th century by dendrochronology (respectively 1745–90 and 1754–99) suggesting the 19th-century wall was later than the floor. Care must be taken in interpreting these dates as the timbers may have been stockpiled for a period of time before use or reused from scrapped structures or ships.

Along either side of the 19th-century slipway No 1 (in Area 2), a series of timber boxes enclosing timber posts was recorded. These are likely to have been the supports for a slip cover roof of c 1814–38. This would have been replaced by the open-sided cover building built by George Baker and Sons, the evidence of which was a series of brick plinths, some with the stubs of cast iron columns surviving. The same contractor constructed the Olympia cover building. Brick plinths for cover buildings were also recorded alongside No 4 and No 5 slips, some with the base of timber beams centrally-placed within the piers (Fig 69, Fig 70).

Earlier slipways are known in these locations from map evidence, but no trace of these was detected apart from the late Georgian slipway referred to above. Earlier slips are likely to have been largely removed by the much deeper later examples whose bases were c 1.65m deeper than that of the late Georgian slipway (the heights were respectively 1.96m OD and 3.61m OD). In addition, prior to the 19th century, slipways were regarded as ‘formwork’ for individual ship construction and may have been dismantled after the work was complete. Indeed, the slipways were only assigned numbers after 1842, to reflect their more permanent status (Hawkins *et al* 2013).

The 1840s saw a major rebuilding in the south part of the Dockyard Basin. A drawing relating to a contract dated October 5 1844 between the Admiralty and George Baker and George William Baker shows plans to replace the two slipways and single dock with two larger slipways, numbered Nos 2 and 3 (NMM ADM/Y/D/11). The 1.14m wide granite wall of the western slipway No 2 was seen in Trenches 21 and 23 (Fig 71, Fig 72). The granite floor of the eastern slipway No 3 was seen in Trenches 24 and 22, falling from 1.50m OD to -1.05m OD towards the Basin (Fig 73). These slipways would have been suitable for relatively small warships such as sloops and gunboats (Hawkins *et al* 2013). The Olympia building was constructed around the same time, in 1844–46, and the foundation of one of the columns of this slip cover roof lay within Trench 21. The iron column was supported on a series of concrete slabs (with some brick), a total of 0.90m thick (Fig 71).

The timber basin gateway was replaced by stone and brick and a caisson gate designed by John Rennie in the early 19th century (Fig 74, Fig 75). The position of the gateway was moved from the eastern side of the basin to a more central location. Both sides of the gateway are nearly identical in construction with smooth slightly

curved inner walls having corresponding built-in recesses for the gate (which was not found). The water-filled, cast iron caisson gate would have slotted into these recesses at either end, its up and down movement controlled by pumping out or pumping in water. The majority of the gate piers appeared to be made out of brick while the outside edges had a rounded stepped construction acting as buttresses on the other side. Both gate piers contained a rectangular stone lined shaft at the centre of their construction, perhaps for the steam-driven pumping mechanism. The eastern shaft was covered by an iron casing and could not be fully excavated while the western shaft continued vertically down over three metres with a vertical iron rod sticking up out from its centre (Fig 76).

Both sides of the gateway curve outwards as they open up into the basin. The western portion of the gateway connects almost immediately with a brick wall that was constructed during the previous phase of construction, whereas the eastern portion runs along seamlessly with a newly built wall constructed as part of this rebuild. This wall was comprised of brick and stone blocks supported by a series of buttresses with a series of vertical timber fenders connected by iron fittings to the waterside of the wall. It was connected to the red brick wall constructed during the previous phase of basin wall construction. The new gateway had a depth gauge carved into the stone of the eastern gate pier, similar in location to the depth gauge that was recorded on the timber basin. Comparison of the depth gauges revealed that the canal connecting the Basin to the river was deeper in the 19th century than in the 18th century by 1.73m. This is also likely to be true of the Basin itself – in other words the Basin was excavated deeper over time, as well as getting smaller.

The few modifications made to the brick basin wall included two rectangular brick crane bases that were attached to opposite sides, one west, one east (shown in a map of 1858, for example, Fig 77). The stone slipway that ran into the basin along its western edge was closed off with a brick wall supported by stone buttresses created from stones robbed out of the slipway. This construction work is likely to have taken place around 1844 during the final remodelling of the Basin.

In Trench 25, a large brick platform may have related to a building in this location shown on the 1868 map and may have been the massive base to a crane or other structure (Fig 78). The western section of Area 12 contained two red brick foundation walls on timber baseplates. It is not clear from the historical mapping which building they may have represented.

The walls to the Small Mast Pond were rebuilt in brick in this period, seen in Area 1.1, Area 1.2, Trench 3 and Trench 7 (Fig 80). The redundant timber tie-backs were sawn off and replaced by a later set of land-ties consisting of minimally trimmed logs, each extending through the 1.5m wide brick wall to connect to a corresponding vertical timber (fender) on the inside of the Small Mast Pond (Fig 81). The connection was made with an iron bracket. The trenches showed that the Small Mast Pond was 37m wide and 5m deep to the base of the brickwork.

Outside the northernmost walls found in Areas 1.1 and 1.2, four timber trestles were recorded. These were located between the mast pond and the Thames river wall and are likely to have supported 19th-century buildings along the riverfront. A substantial oak beam with mortises seen in Trench 5 was also likely to be part of this arrangement (Fig 82).

The Great Mast Pond was built in the west of the Dockyard (only partially within the site) between 1765 and 1774, but evidently underwent much modification. A later wall forming the north wall of the Great Mast Pond was exposed in Trench 1 (Fig 83).

A stone capstan base had been inserted into the wall (Fig 84). Built-in openings corresponded with fenders on the inside of the wall, but any connecting tie-backs supporting the wall had either been removed or had decayed. One such tie-back was identified in CVW00 Trench 2. The removal of such supports had caused the wall to subside into the fill of the Mast Pond. A second wall in the south corner of Trench 1, built of red and orange brick, is likely to have been the opening of a canal connecting the the Great Mast Pond to the Small Mast Pond, shown in a map of 1808 (Fig 85, Fig 8).

The last walls built in Area 5.1, Trench 42 and Trench 44 were late 18th–19th century in date, indicating continuous use of the terraced buildings that formed the ‘officers quarters’ though to the end of the working life of the Dockyard. There appears to have been little change to the smithy in Area 5.2 apart from the construction of a steam hammer, the foundations in brick and timber recorded during the excavation (Fig 86). A wall in Trench 45 may relate to a late rebuilding near the smithy.

The 10.4 m long west wall of the Great Double Dock ran N–S across Trench 50 of the 2010 evaluation (Fig 87), and had also been investigated on a smaller scale in CVW00 Trench 17. The north part of this wall of the ‘Stem Dock’ was built of closely-fitting granite blocks. Further south, closely-fitting limestone blocks were used and the east face of the wall formed by these blocks curved downwards. The west (landward) face of the upper part of the Stem Dock wall was built in red brick. On the top of the Stem Dock wall, square recesses had been cut, perhaps for a capstan. The entrance to the Great Dock had been rebuilt in stone by 1835 and probably by 1808, but the stonework identified in the evaluation probably dated to repairs made in 1839–41 (Hawkins *et al* 2013).

The upper parts of the gate of the Dock were exposed, comprising partially decayed oak beams and uprights of its iron frame. Thick cream paint on one of the beams suggested reuse. The oak was fast-grown and probably of British origin, perhaps surprising as in the mid-19th century more rot-resistant tropical timber species were used (Damian Goodburn pers comm.). The gate had become dislodged from the semi-circular recess cut into the stone.

The south end of the Dock west wall was stopped, and a mason’s mark or graffito (an ‘H’, 74mm high and 52mm wide,) had been carved into a stone in the end (Fig 88). An area of lime concrete [456] abutted the Great Dock here, with recesses visible, some of which still contained rotted timber, for a land-tie arrangement. A large stone was embedded in the backfill of the Dock, where it had fallen – presumably when this early concrete failed or the land ties rotted. A machine slot was excavated along the Great Dock wall through to a depth of 1.36m OD to expose the face of the wall. A number of structures were identified on the west (landward) side of the Great Dock wall, including a culvert and a well.

The east wall of the Great Dock was also exposed, although it had been more heavily robbed (Fig 89). A depth gauge, marked in feet in Roman numerals from XVII at the top of the surviving wall to XIV at the base of excavation, was painted on the north part of the wall.

The south end (the ‘Head Dock’) of the Great Dock was investigated in a number of test pits (TPs) during the excavation in Area 14, located largely on the concrete floor of the former modern Warehouses. No trace of the Great Dock was found and it seemed to have been substantially robbed in this area. The 1870 Goad map and a photograph probably dating to c 1880 shows a cover building over this part of the Dock (Fig 61, Fig 90), and a stone plinth for the east side of this cover building was

identified. The cover building was probably built in 1839–41 and demolished between 1896 and 1916 (Hawkins *et al* 2013).

Evidence relating to activity subsidiary to that of ship building in this period was also revealed during the evaluations and the excavation. In Trench 15, the brick linings of two saw pits, built of frogged yellow bricks, were uncovered (Fig 91), while in Trench 6 two parallel walls built of frogged yellow brick and connected by a shorter wall of the same build corresponded to walls to a sawmill shown on the 1868 map (Fig 93). In Trench 10, a N–S red brick wall on a timber baseplate was likely to have been part of the steam kiln (Fig 92). A N–S wall seen in Trench 28 probably related to a timber shed (Fig 73). Cobbled surfaces, probably for roads or yards were uncovered in Trench 17 (Fig 94) and CVW00 Trenches 1 and 13 (Fig 68).

Two c 1.5m square timber platforms in Trench 16 consisted of two layers of reused thick oak planks treenailed and bolted at right angles to each other. These 19th-century structures may have been ‘deadmen’, simple forms of land-anchor made of tough scrap or second hand materials for anchoring cranes or winches or they are part of the sub-ground support for a capstan used for hauling timber and gear into place (Fig 95).

The Dockyard wall, identified in Trench 27, continued in use and was abutted by the walls to later buildings with yards. The back of the Dockyard (ie south part) seems to have been used to dump alluvial clays – presumably from the construction of the slipways and other structures. These were identified in Areas 10 and 13 in addition to scrap timbers found in Area 10. Late pits and drains from this period were found in Area 7.

4.9 Post-dockyard (1869–present)

The Dockyard closed in 1869, contemporary depictions showing it as a run-down place, deserted apart from groups of disreputable characters (eg (Fig 96)). The site was rapidly converted for use as the Foreign Cattle market (Fig 97). Vertical timbers supported by raking timbers were built into the floor of the No 5 slipway (in Area 4) to support the floor of a building. The cover building to slipway No 4 (in Area 3/4) was used for livestock (Fig 98), as was the Olympia cover building.

Parts of the Dockyard were dismembered and sold off shortly after closure. A catalogue of machinery was made in 1870, and an inventory the following year. The machinery included pumps, cranes, hoists, pipes, bricks and a weighbridge, from various buildings including the Smithery, the Grindstone House, the Fitters Shop, the Engine House, the Fan House, the Tar Boiling House and the Steam Chambers by No 1 slip and by No 5 slip. Building material, including bricks, stone, roof slates, lead and timbers were sold off on June 1872 from the Magazine, Joiners’ Shop, Smitheries, Fitting Shop, Accountant’s Office, Clerks’ Office and the No 23 Store opposite the Smithy. Successful bidders were instructed that they had to take down the buildings at their own expense. The machinery of the Smithery and Fitting Shop were sold off on June 4 1872, including a 20-horse power beam steam engine, a self-acting slotting machine, pumps, a wood sawing machine, fans, 29 wrought iron smiths’ forges, 25 forge cranes, 4 blast furnaces and other items (Catalogue of Machinery 1871, Inventory of Machinery 1872, Sale of Building Material 1872, Sale of Machinery 1872, LMA, CLA/012/AD/02/002).

In Area 2, a row of brick buildings probably dates to this period and was probably a late 19th-century warehouse (Fig 99). There is no building in its location on the 1870 Goad map (Fig 61), but a building had been constructed by 1872 when it appears on

a map of this date (Fig 100). The foundations of the building truncated the remains of earlier land ties that would have braced the river wall. The buildings were constructed of yellow and red London stock brick, and divided into six rooms with inverted arches built into the walls of each room. In Area 3 and Trench 22, timber posts were driven into the soft fill of the former Dockyard Basin to support the floors to warehouse buildings. Walls and culverts seen in Trenches 25, 27 and 28 date to this period.

The southwest corner of the storehouse complex was replaced in yellow stock brick on concrete foundations. Two turntables were constructed (visible on the 1916 OS map and identified during the excavation) on a roadway (with rails) built into the centre of the internal yard. A further turntable was identified in Trench 15 (Fig 102). These date to the WWI use of the site. By the 1930s, this had developed into a railway, complete with a railway transit shed and platform, when the site was used as a Supply Reserve Depot. The construction of the railway had a considerable effect on the site, not least for the terrace of buildings in the west part that were partially demolished.

The Dockyard was bombed in WW2; three V1 flying bombs falling on or in the vicinity of the site. Largely there was only general – rather than structural – blast damage, including to the Tudor storehouse, although there were pockets of more serious damage (Saunders 2005, Map 91). The building on the site of Sayes Court was demolished in 1947 following bomb damage (Hawkins *et al* 2013). A 1947 map showing the Army Supply Reserve Depot depicts the storehouse complex as being substantially modified. Most of the south part of the complex had been converted to ‘Cold Chambers’ (eg Fig 103), the south part of the building on the west of the storehouse had been demolished so only the north half remained. The gap between the buildings in the south part of the complex was covered and named ‘Bullock Alley’, while a road on the west side of the complex had been named ‘Blood Alley’.

The Tudor storehouse at this time was a lorry stand and was recorded as a ‘ruin’ on an OS map of the late 1940s, suggesting that the building was out of use by this date. The Tudor building itself, which survived to roof plate level was revealed during work to remove bomb-damaged buildings in 1952 (The Illustrated London News, March 1, 1952) and demolished shortly afterwards. A flame-headed niche of brickwork, carrying the date of 1513, was re-erected in the Department of Computer Science at University College London.

The remains of terraced buildings of late-19th or early-20th-century date were uncovered in Area 8. This terrace appeared to lay outside the original extent of the Dockyard and lined up with modern Barnes Terrace outside the site. Two drains and one yellow brick footing seemed to relate to a post-Dockyard building in the western part of Area 12 (Fig 99). Walls and a large concrete base in the central part of the Trench 5 dated from the early 20th century; an area of closely-packed timber sets overlay on top of the concrete (Fig 104).

Warehouses were built across the site in the 1980s. A concrete ground beam foundation ran across Area 2 and Area 3. Some of the top of the brick and stone Basin wall had been lost during the construction of these warehouses and machine-bucket teeth marks where the walls had been removed were identified during the excavation. N–S-running concrete foundations were inserted across the axis of the Tudor Storehouse foundations (Fig 14). The 18th-century building on the site of Sayes Court was demolished in 1947 and a warehouse built (Fig 106). Remains of modern warehouses and other buildings post-dating the Dockyard were also seen in Trenches 4, 31, 32 and 40.

5 Quantification and assessment

5.1 Post-excavation review

This section establishes which stages in the post excavation process have been completed. It also provides a quantification and assessment of the finds and environmental material.

Tasks completed:

1. Completion of checking of site archive – plans, sections, context sheets, environmental sheets and registers
2. Compilation of context matrices
3. Location of sections and identification of contexts represented
4. Delineation of subgroups on context matrices
5. Addition of spot date data to subgroup matrix
6. Drawing of date phased subgroup matrix
7. Entry of stratigraphic information into MOLA Oracle IND3D database
8. Mapping of context data in MOLA Oracle IND3D database to MOLA subgroup database
9. Integration of evaluation data with site excavation data
10. Preparation of plans for digitisation
11. Preparation of sections for digitisation
12. Digitisation of selected contexts
13. Authorship of site summary
14. Archive quantification
15. Project progress review meetings

5.2 The site archive and assessment: stratigraphic

Type	Description	Quantity	Notes
Contexts	Excavation	5573	
	Evaluation	982	
Plans	'A4' 1:20 (no. of sheets)	560	Mostly at 1:50, selected areas at 1:20
Sections	'A4'	30	
Matrices		Yes	Digital and paper copies
Photographs		5000	

Table 2 Stratigraphic archive

5.3 The site archive and assessment: finds and environmental

Material	Quantity
Archaeological timber	150 samples for dendrochronology
Building material	20 crates (recorded), 35 (to record) of ceramic building material (bulk of recorded material discarded after assessment). Total 150.89kg
Prehistoric pottery	1 sherd Weight 0.034kg

Roman pottery	36 sherds Weight 0.705kg
Medieval pottery	74 sherds. Total 1.4 kg
Post-medieval pottery	903 sherds. Total 30 kg
Bulk glass	Bottles and containers: 372 fragments (202 ENV, 12.525kg) Window glass: 253 fragments (82 ENV, 1.628kg)
Accessioned finds	766 accessions, some boxed, some in crates, some in conservation; X-rays pending
Clay pipes	1099 fragments
Iron nails	11 boxes and 46 accessioned groups
Animal Bone	Estimated total 1750 fragments/36.000 kg
Human Bone	1 individual; 1 box

Table 3 Finds and Environmental Archive general summary

5.4 Geoarchaeology

By Virgil Yendall

5.4.1 Geoarchaeological methodology

5.4.1.1 Onsite

All archaeological excavation and monitoring during the evaluation was carried out in accordance with the preceding *Written scheme of Investigation* (MOLA, 2009), the *Archaeological Site Manual* (MoLAS, 1994) and guided by the recommendations outlined in the English Heritage Guidelines for Environmental Archaeology and Geoarchaeology (EH 2002; 2004 respectively).

During the excavation phase of the works a geoarchaeologist visited the site when deemed necessary by the site supervisors or project managers. Preliminary interpretations of the soil and sediment characteristics of the sections were made on site and an overview of the stratigraphy was produced that characterised the deposit sequence, identified soil / sediment processes and suggested depositional environments. Monolith samples were taken through representative deposit sequences and 20 litre bulk samples were taken every 0.1 to 0.2m, respecting context boundaries, adjacent to the monoliths. The monolith and bulk locations are shown on sections for Area 8 (Fig 108), Area 10 (Fig 109, Fig 110) and Area 13 (Fig 111).

In addition to the excavation, 16 window samples/ boreholes were drilled and the cores retained for geoarchaeological purposes within the site. The slab/ground was broken out and cleared by contractors under MOLA supervision. The locations of the boreholes were recorded by the MOLA surveyors. This information was then plotted onto the OS grid. The locations of the MOLA window samples and boreholes are given in Fig 112.

5.4.1.2 Offsite

The borehole logs were tabulated and input into a geoarchaeological database (Rockworks 2006). The information retrieved, plus any available previous SI data (Mott Macdonald 2010), was added to an existing MOLA database to ensure the site is considered in its wider landscape context and transects constructed.

The distribution and other characteristics of selected deposits such as peat, fluvial sands, channel deposits, deposits of potential archaeological interest and evidence of soil formation were identified. The combined information on the buried topography and distribution and sequence of deposits surviving across the site was used to reconstruct the past environments represented and to assess their archaeological potential. The dataset was transferred to ArcMap 10 and the buried early Holocene topography (which acts as the base line for deposits from the Mesolithic onwards) was modelled.

Suitable deposits within the monoliths and retained boreholes were sub-sampled and sub-samples of key deposits were submitted to external specialists for pollen, diatom and ostracod/foraminifera assessment, in order to identify the preservation quality, range and abundance of environmental remains and their potential for past environment reconstruction. For the initial assessment of the palaeoenvironmental potential of the deposits, one of the deep natural sequences from one of the primarily geoarchaeological excavations was used, specifically Area 10 section 1 (see Fig 2 for location). In addition to Area 10 radiocarbon dating and optical stimulated luminescence dating (OSL) was undertaken on key stratigraphic points across the site. The specialist reports are given below with an integrated geoarchaeological summary toward the end of the report (Section 5.4.14). The monolith and bulk locations are shown on sections for Area 8 (Fig 108), Area 10 (Fig 109) and Area 13 (Fig 111); close ups of the sub-sampled, ostracod, diatom, pollen and radiocarbon sample locations within Area 10 are given in Fig 109. The locations of these areas are shown on Fig 2.

5.4.2 Geoarchaeological background

5.4.2.1 The site

The study site is located within a geographical area not previously subject to extensive detailed geoarchaeological investigation, and offers an opportunity to compile a detailed geoarchaeological record for this part of the Lower Thames Valley for the Middle to Late Holocene in particular, which will permit comparison and integration with neighbouring records. This will enable a detailed reconstruction of spatial and temporal variations in the environment, and make a significant contribution to achieving the overarching goals of the SARM (Scheme of Archaeological Resource Management, Hawkins 2009), together with wider research themes within the Lower Thames Valley.

The principal goal of research in the Lower Thames Valley is to compile a high resolution spatial-temporal model of the changing environment of the wetland and dryland topography during the Middle and Late Holocene (last 7000 years). This integrated model is being generated by the compilation of environmental archaeological records from intercalated alluvial and peat sequences (wetland) and archaeological stratigraphy (wetland and dryland). Each record should be complementary to provide a detailed three-dimensional spatial reconstruction of changing environmental conditions, which, coupled with the archaeological records, will permit micro-scale (local) and meso-scale (regional) modelling of the interactions (eg economic and dietary activities) between human groups and their environment. In particular the study site is a source of information on floodplain development, channel migration and abandonment, marine incursion, terrestrialisation (peat and soil formation), vegetation structure and composition (both wetland and dryland), animal husbandry, cultivation, and the exploitation of wild plants and animals.

The stratigraphic models used for the Thames sequence is based on work undertaken in the Lower Thames by Devoy (1979) and Bates and Whittaker (2004).

Summaries of the models are presented in Table 4 and Table 5. Borehole stratigraphies were integrated with biostratigraphic studies and archaeological sites to identify phases of marine transgressions represented by minerogenic clay and silt units (Thames I-V [Table 4] and Stages 1, 3, 5 and 6 [Table 5]) and marine regressions represented by organic to peat units (Tilbury I-V [Table 4] and Stages 2 and 4 [Table 5]). Transgressions (uncoloured in the tables) were identified in the Palaeolithic/early Mesolithic, the late Mesolithic/early Neolithic, throughout the Bronze Age to the medieval period.

Sea level change in the outer Thames estuary (Devoy 1979)					
Archaeological period	Devoy's (1982) phase	Approximate date	Relative sea level tendency	m OD	Typical deposit
Modern	Thames V	AD 1700	rapid rise	+0.44 to -0.75	
Medieval	Tilbury V		fall		non-persistent silty peat
Roman and Iron Age	Thames IV	2600 BP (650 BC)	rise	between -0.8 to -1.8 and +0.4 to -0.9	
	Tilbury IV		minor regression		thin silty peat
Bronze Age	Thames III	3850–2800 BP (1900–850 BC)	rapid rise	between -1.9 to -6.7 and -1 to -2	
Neolithic	Tilbury III		major regression		thick monocotyledonous peat becoming wood fen peats upstream
Mesolithic and Neolithic	Thames II	6575–4930 BP (4625–6250 BC)	extensive transgression (lower rate than above)	between -6.8 to -12.3 and -3 to -6.9	
	Tilbury II		fall		alder wood peat
	Thames I	8200–6970 BP (6250–5020 BC)	rise	between -25.5 to -13.2 and -8 to -12.5	peat growth on gravel surface

Table 4: Sea level change in the outer Thames estuary (after Devoy 1979)

Sea level change in the outer Thames estuary (Bates and Whittaker 2004)					
Archaeological period	Stage	Approximate date	Relative sea level tendency		Typical deposit
Modern	6	1ka BP-present	rapid rise combined with construction of flood defences		low sedimentation
Iron Age to Medieval	5	3–1ka BP	rapid rise		minerogenic dominated sedimentation
Neolithic to Bronze Age	4	c 5–3ka BP	minor regression		brackish organic sedimentation, gravel islands
Mesolithic to Neolithic	3	c 6/7–5ka BP	rise		rapid minerogenic sedimentation and unstable floodplain, wetland expansion and some ephemeral dry surfaces
Mesolithic	2	10–6/7ka BP	fall/topographic relief		localised vegetation growth dependent on topography and hydrology. Sand sedimentation within channels
Late Pleistocene to early Holocene	1	30–10ka BP	rise		periglacial solifluction reworking the surface prior to and during downcutting associated with the glacial maximum; followed by valley filling

Table 5: Sea level change in the outer Thames estuary (after Bates and Whittaker 2004).

The study site offers great potential to provide detailed records of spatial and temporal changes in the environment due to the presence of thick intercalated alluvial and peat sequences. The stratigraphic boundaries between alluvium and peat indicate highly significant successions from aquatic to semi-aquatic and then semi-terrestrial to fully terrestrial ecosystems and the consequent potential availability to humans of plant and animal resources. Recording these changes, therefore, will inform questions relating to human adaptability and survivability against a background of changing environmental conditions as well as human modification of the natural environment.

5.4.2.2 Site context

The study site divides into two distinct zones. An area of high gravel is present on the south of the site extending northwards from the southern boundary by between 140m and 190m. There are no alluvial clays or peats within this area and made ground directly overlies the Terrace gravel which falls from 2.71m above Ordnance Datum (AOD) on the extreme south of the site to 2.48m AOD at the edge of the alluvium.

North of the high gravel is an area of alluvium where the sequence of clays/peats/silts reaches a maximum of 6.30m thick beneath made ground. The made ground is not less than 1.80m thick and has a maximum recorded depth over the alluvium of 8.05m. Locally, within the area of the former Dockyard mast ponds, basin, docks, slips and Great Storehouse the alluvial sequence has been almost completely removed with the made ground (or substantial masonry) directly overlying the truncated gravel.

Peat deposits were recorded in nine boreholes during the geotechnical investigations (BH 105 - 0.66m OD to -1.26m OD, BH 106 +0.38m AOD to -1.77m OD, BH 108 - 0.69m OD to -1.74m OD, BH 113 - 1.85m OD to -2.05m OD, BH 114 -1.10m OD to -1.41m OD, BH 121 -0.16m to -0.81m OD, BH 123 -1.0m OD to -1.25m OD, BH 127 - 0.13m OD to -1.78m OD). The peat was recorded at 1.65m thick in BH 127 within 30m of the western boundary of the site with properties on Barnes Terrace. This latter development was previously subjected to a separate geo-archaeological evaluation indicating late Neolithic peat formation identified between -1.0m and -3.0m OD (Bates, M.R., Pine, C. A. and Williamson, V. D., 1994). It has been postulated that the Dockyard Basin was formed within the mouth of a former River Channel running west to east across the site and joining the River Thames in the area of the former basin river gate. It is noteworthy that of the nine locations within the site where boreholes identified peat deposits, five of these form a shallow arc running from east to west across the site from Barnes Terrace to the Thames at a point just north of the position of the former Dockyard basin. These may therefore represent peat formation within a relic channel or along a channel edge. This identification is perhaps supported by the identification of a relic channel in Area 10.

5.4.2.3 Aims and objectives

Within the context of the overall research aims the purpose of the geoarchaeological investigations at the site are outlined here:

- To record the depth and thickness of the main stratigraphic units
- To clarify the existence and course of the possible channel across the site
- To determine whether evidence for natural and/or anthropogenic changes to the landscape occurs within the duration of the geoarchaeological sequence
- To determine whether the geoarchaeological records provide evidence for prehistoric and historic occupation locally to the site

5.4.3 Geoarchaeological sediments

The results of the relevant Area sections 8, 10 and 13 are tabled below.

5.4.3.1 Area 8

The location of Area 8 is shown on Fig 2 and the section is presented in Fig 108

Area 8 Section 12 North		
Location	536847	178147
Modern ground level/top of slab (m OD)	1.23	
Base of modern fill/slab (m OD)	n/a	
Depth of archaeological deposits seen	n/a	
Level of base of deposits observed and/or base of Area (m OD)	0.03	
Holocene natural observed (m OD)	1.23	
Pleistocene or older natural observed (m OD)	0.38	

Context	Depth below ground level (m)		Elevation (m OD)		Description	Interpretation	Facies No.
1255	0	0.55	1.23	0.68	silt clay/clay silt	Alluvium	6
1257	0.55	1.25	0.68	-0.02	silt clay/clay silt		
1258	1.25	1.4	-0.02	-0.17	silt clay/clay silt		
1256 1260 1261 1263	0.55	0.85	0.68	0.38	bands of sand, silty and occasional gravels	Colluvium	4
1264	0.85	1.2	0.38	0.03	gravel, sandy	Pleistocene gravel	1

Table 6: Area 8, Section 12.

5.4.3.2 Area 10

The location of Area 10 is shown on Fig 2 and the section is presented in Fig 109

Area 10 Section 1							
Location						536780	178285
Modern ground level/top of slab (m OD)						4.56	
Base of modern fill/slab (m OD)						2.06	
Depth of archaeological deposits seen						n/a	
Level of base of deposits observed and/or base of Area (m OD)						-2.44	
Holocene natural observed (m OD)						2.06	
Pleistocene or older natural observed (m OD)						-1.94	
Context	Depth below ground level (m)		Elevation (m OD)		Description	Interpretation	Facies No.
1033 1034 1035	0	2	4.56	2.56	made ground	Made ground	7
1036 1062 1064 1065	2	2.5	2.56	2.06	made ground, alluvium		
1066	2.5	5	2.06	-0.44	silt clay/clay silt, blue to greenish grey, soft to moderately firm	Alluvium	6
1068	5	5.3	-0.44	-0.74	Dark red brown oxidising to black, very dark brown woody peat, friable, frequent to abundant wood fragments	Wetland	3

1069	5.3	6.5	-0.74	-1.94	Spongy to firm red brown peat slightly clayey, frequent organic remains, tissue and wood fragments, oxidises to dark brown		
1112	6.5	7	-1.94	-2.44	Sandy clayey silt grading down into coarse sand, grey	Late glacial to Early Holocene fluvial sands	2

Table 7: Area 10, Section 1.

5.4.3.3 Area 13

The location of Area 13 is shown on Fig 2 and the section is presented in Fig 111

Area 13 Section 9							
Location						536810	178193
Modern ground level/top of slab (m OD)						3.15	
Base of modern fill/slab (m OD)							
Depth of archaeological deposits seen							
Level of base of deposits observed and/or base of Area (m OD)							
Holocene natural observed (m OD)							
Pleistocene or older natural observed (m OD)							
Context	Depth below ground level (m)		Elevation (m OD)		Description	Interpretation	Facies No.
-	0	1.5	3.15	1.65	made ground		
1072 1074	1.5	2.5	1.65	0.65	Dark brown very gritty sandy clay silt with friable organic inclusions, visible charcoal, abundant brick, nails, flint, sand pockets	Made ground	7
1075	2.5	2.65	0.65	0.5	Dark brown very gritty sandy clay silt with friable organic inclusions, visible charcoal, occasional brick	Alluvium	6
1076	2.65	3.4	0.5	-0.25	Firm plastic brown grey silty clay, weathered, blocky structure		
1241	3.4	4.1	-0.25	-0.95	Greenish grey silty clay, soft, massive structure	Fill of late prehistoric historic channel/scour	5

1248	4.1	4.5	-0.95	-1.35	Black to dark blue very plastic, silty clay, humic, abundant molluscs, primary organic fill of channel/ scour, occasional CaCO ₃ , occasional peg tiles/glass to base		
1242	3.5	4.4	-0.35	-1.25	Dark brown woody peat, occasional hazelnut, occ reed and twig fragments, wood, spongy	Wetland, cut by late prehistoric to historic channel/scour	3
1245	4.4	4.8	-1.25	-1.65	Peaty clay, dark mid brownish grey, soft occasional wood and reed remains, transition between alluvium (1246/1247) and overlying full wetland marsh/vegetated mud flat (1242)	Wetland, not cut by late prehistoric to historic channel/scour	
1247	4.8	5	-1.65	-1.85	Possible vegetated horizon/ephemeral soil developed on early to mid Holocene surface, very diffuse in places and very similar to (1245)		
1246	5	5.5	-1.85	-2.35	Pale blue silty clay, very soft, gleyed, slightly sandy, frequent round wood, possible roots, freshwater alluvium	Late glacial to Early Holocene fluvial sands	2

Table 8: Area 13, Section 9.

5.4.4 Borehole logs

The locations of the boreholes are presented in Fig 112, included below are the boreholes referred to in the text; those not referred to in the text are present in the appendix.

MOLA B4	
Location	536908 178352
Dimensions	0.2m wide
Modern ground level/top of slab (m OD)	5.04
Base of modern fill/slab (m OD)	3.04
Depth of archaeological deposits seen	n/a

Level of base of deposits observed and/or base of borehole (m OD)					-2.96		
Holocene natural observed (m OD)					3.04		
Pleistocene or older natural observed (m OD)					-2.96		
Unit Number	Depth below ground level (m)		Elevation (m OD)		Description	Interpretation	Facies No.
4.6	0	2	5.04	3.04	made ground	Made ground	7
4.5	2	5.35	3.04	-0.31	silt clay/clay silt, brown grey to blue grey, soft, oyster shell to surface, CaCO ₃ concretions to base	Alluvium	6
4.4	5.35	5.5	-0.31	-0.46	peat, dark reddish brown, compact, moderately friable, humified matrix with woody inclusions	Wetland	3
4.3	5.5	6.05	-0.46	-1.01	sand, soft, wet, yellowish brown, occasional small flint inclusions	Late glacial to Early Holocene fluvial sands	2
4.2	6.05	6.12	-1.01	-1.08	silt clay/clay silt, pale white/blue grey, woody clods to top		
4.1	6.12	8	-1.08	-2.96	sand, clayey to top, occasional white clay bands, yellow brown		

Table 9: Borehole B4.

MOLA B6a							
Location					536910	178270	
Dimensions					0.2m wide		
Modern ground level/top of slab (m OD)					4.64		
Base of modern fill/slab (m OD)					2.14		
Depth of archaeological deposits seen					n/a		
Level of base of deposits observed and/or base of borehole (m OD)					-4.86		
Holocene natural observed (m OD)					2.14		
Pleistocene or older natural observed (m OD)					-4.56		
Unit Number	Depth below ground level (m)		Elevation (m OD)		Description	Interpretation	Facies No.
6.9	0	2.5	4.64	2.14	made ground	Made ground	7

6.8	2.5	3.15	2.14	1.49	silt clay/clay silt, soft, plastic, blue grey, rare sand to base	Alluvium	6
6.7	3.15	3.5	1.49	1.14	sand, black and slightly humified, rare silt		
6.6	3.5	3.7	1.14	0.94	peat, sandy, dark brown, woody, rare gravel		
6.5	3.7	3.9	0.94	0.74	sand, loose black, slightly silty		
6.4	3.9	5.4	0.74	-0.76	silt clay/clay silt, dark blue grey, occ Mn patches		
6.3	5.4	7.15	-0.76	-2.51	peat, soft dark brown, well humified slightly silty to top, becoming woody to base	Wetland	3
6.2	7.15	9.2	-2.51	-4.56	silt, sandy, light grey and clayey to top becoming yellow brown and sandier to base, increasing CaCO ₃ to base	Late glacial to Early Holocene fluvial sands	2
6.1	9.2	9.5	-4.56	-4.86	gravel, sandy, fine bedding visible in silty clay matrix, yellow brown	Pleistocene gravel	1

Table 10: Borehole B6a.

MOLA B9							
Location				536708	178252		
Dimensions				0.2m wide			
Modern ground level/top of slab (m OD)				1.7			
Base of modern fill/slab (m OD)				-0.86			
Depth of archaeological deposits seen				n/a			
Level of base of deposits observed and/or base of borehole (m OD)				-6.3			
Holocene natural observed (m OD)				-0.86			
Pleistocene or older natural observed (m OD)				-5.3			
Unit Number	Depth below ground level (m)		Elevation (m OD)		Description	Interpretation	Facies No.
9.6	0	2.56	1.70	-0.86	made ground	Made ground	7

9.5	2.56	2.85	-0.86	-1.15	silt clay/clay silt, blue grey, CaCO ₃ concretions, becoming brown and humic to base	Alluvium	6
9.4	2.85	3.55	-1.15	-1.85	peat, clayey, dark brown, spongy	Wetland	3
9.3	3.55	4.76	-1.85	-3.06	silt, sandy, clayey to top, blue grey to dark brown	Late glacial to Early Holocene fluvial sands	2
9.2	4.76	7	-3.06	-5.30	sand, mid grey to dark yellow grey, fine sands		
9.1	7	8	-5.30	-6.30	gravel, sandy, yellow grey	Pleistocene gravel	1

Table 11: Borehole B9.

MOLA B12							
Location		536809		178190			
Dimensions		0.2m wide					
Modern ground level/top of slab (m OD)		2.32					
Base of modern fill/slab (m OD)		0.17					
Depth of archaeological deposits seen		n/a					
Level of base of deposits observed and/or base of borehole (m OD)		-5.18					
Holocene natural observed (m OD)		0.17					
Pleistocene or older natural observed (m OD)		-5.18					
Unit Number	Depth below ground level (m)		Elevation (m OD)		Description	Interpretation	Facies No.
12.5	0	2.15	2.32	0.17	made ground	Made ground	7
12.4	2.15	4.56	0.17	-2.24	silt clay/clay silt, firm, blue grey, occasional manganese flecks, massive structure, becoming brown to base	Alluvium, lower deposits possibly infilling late prehistoric to historic channel/scour	5/6
12.3	4.56	4.85	-2.24	-2.53	peat, dark brown, occasional organic tissue	Wetland	3
12.2	4.85	5.7	-2.53	-3.38	silt clay/clay silt, brown blue to blue grey, frequent rooting and occasional organic remains		

12.1	5.7	7.5	-3.38	-5.18	sand, greenish grey, occasional band of CaCO ₃ , fine	Late glacial to Early Holocene fluvial sands	2
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Table 12: Borehole B12.

MOLA B13							
Location				536850 178170			
Dimensions				0.2m wide			
Modern ground level/top of slab (m OD)				3.41			
Base of modern fill/slab (m OD)				0.93			
Depth of archaeological deposits seen				n/a			
Level of base of deposits observed and/or base of borehole (m OD)				-4.59			
Holocene natural observed (m OD)				0.93			
Pleistocene or older natural observed (m OD)				-4.59			
Unit Number	Depth below ground level (m)		Elevation (m OD)		Description	Interpretation	Facies No.
13.7	0	2.48	3.41	0.93	made ground	Made ground	7
13.6	2.48	4.7	0.93	-1.29	silt clay/clay silt, poor retrieval	Alluvium, lower deposits possibly infilling late prehistoric to historic channel/scour	5/6
13.5	4.7	6.5	-1.29	-3.09	peat, firm, spongy, occasional fragments of wood, becoming silty and clayey with depth	Wetland and occasional bands of fluvial	3
13.4	6.5	7.15	-3.09	-3.74	clay, sandy, blue to green		
13.3	7.15	7.4	-3.74	-3.99	peat, soft, black to brown		
13.2	7.4	7.65	-3.99	-4.24	sand, silty, blue grey, firm	Late glacial to Early Holocene fluvial sands	2
13.1	7.65	8	-4.24	-4.59	sand, yellow firm		

Table 13: Borehole B13a.

5.4.5 Subsamples for palaeoenvironmental assessment

The subsample locations and type taken from Area 10, Section 1 are listed below.

Sample Depth (m.OD)		Sample No.	Context	Sediment description	Interpretation	Facies No.
Top	Base					
0.74	0.52	O4	(1064)	Light grey clay, soft, occasional pottery and metal, 0.5m thick	Made ground / disturbed ground possibly relating to the construction of the dock	7
0.68	0.48	<1022>				
0.48	0.18	<1021>				
0.46	0.44	P8	(1060)	Soft, friable, dark brown grey, slightly sandy silt, frequent roots and organic mater, occasional subangular small stones (Topsoils?)		
0.18	-0.02	<1020>	(1066)	Mid blueish grey clay, occasional small fragments of CBM, 1.1m thick	Alluvium	6
0.15	0.13	P7				
0.13	0.11	D4				
0.11	-0.09	O3				
0.03	-0.17	<1016>				
-0.37	-0.57	<1014>				
-0.51	-0.53	P6				
-0.57	-0.77	<1013>	(1068)	Plastic peat, dark reddish brown, 0.4m thick	Wetland deposit	3
-0.57	-0.77	<1013>				
-0.69	-0.71	P5				
-0.71	-0.72	D3				
-0.72	-0.87	O2				
-0.77	-0.97	<1012>	(1069)	Soft, reddish dark brown, clayey peat, fragments of wood/vegetation, 1.1m thick (Historic bank of channel?)		
-1.15	-1.17	P4				
-1.17	-1.19	D2				
-1.35	-1.5	<1007>				
-1.58	-1.6	P3				
-1.7	-1.9	<1005>				
-1.7	-1.9	<1005>		Plastic mid grey, slightly clay silt and some fine sand, chalk and organic inclusions	Late glacial to Early Holocene fluvial sands	2
-1.85	-1.88	P2	(1112)			
-1.94	-2.09	O1	(1112)			
-2.1	-2.12	P1	(1112)			
-2.12	-2.14	D1	(1112)			

Table 14: Subsamples taken from Area 10 Section 1.

5.4.6 Diatoms

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5.4.6.1 Introduction

Four sediment sub-samples from Convoys Wharf, Deptford (CVF10) have been prepared and assessed for diatoms. The Convoys Wharf diatom samples were taken

from a single sequence of natural alluvial clay and peat on the south bank of the Thames adjacent to the site of one of Henry VIII's dockyards. The sequence is not directly associated with archaeology but appears to contain a full natural (alluvial) sequence to the western side of the excavation site.

The geoarchaeological investigation aims to provide a natural context for the archaeology. The purpose of carrying out a diatom assessment of the Convoys Wharf sequence is to evaluate the presence or absence of diatoms within the sequence and the potential of diatom assemblages for further analysis. It is hoped that, if present, the diatoms will provide information about water quality and the aquatic environment. The diatom assessment of each sample takes into account the numbers of diatoms, the state of preservation of the diatom assemblages, species diversity and diatom species environmental preferences.

5.4.6.2 Methods

Sample (m.OD)	Depth		Bag No.	Context	Sediment description
	Top	Base			
0.13	0.11	D4	1066	Mid blueish grey clay, occasional small fragments of CBM, 1.1m thick	
-0.71	-0.72	D3	1068	Plastic peat, dark reddish brown, 0.4m thick	
-1.17	-1.19	D2	1069	Soft, reddish dark brown, clayey peat, fragments of wood/vegetation, 1.1m thick (Historic bank of channel?)	
-2.12	-2.14	D1	1112	Plastic mid grey, slightly clay silt and some fine sand, chalk and organic inclusions	

Table 15: Diatom subsamples from Section 1, Area 10.

Diatom preparation followed standard techniques (Battarbee et al. 2001). Two coverslips were made from each sample and fixed in Naphrax for diatom microscopy. A large area of the coverslips on each slide was scanned for diatoms at magnifications of x400 and x1000 under phase contrast illumination.

5.4.7 Results and discussion

The MOLA diatom sample numbers and sample depths relative to Ordnance Datum are shown in Table 15 above. The results of the diatom evaluation for the section 1 sequence are summarised in Table 16.

Diatom Sample No.	Diatoms	Diatom numbers	Quality of preservation	Diversity	Assemblage type	Potential for % count
D4	-	-	-	-	-	none
D3	-	-	-	-	-	none
D2	+	v low	v poor	v low	freshwater aerophile and brackish	none
D1	-	-	-	-	-	none

Table 16: Summary of diatom evaluation results.

Diatoms are absent from three of the sub samples (D4, D3, D1) assessed from Area 10, Section 1. Sample D2 represents a clayey peat and may have come from the bank of the channel. In D2 very poorly preserved fragments of only two diatom valves were identified, these are the brackish marine benthic species *Nitzschia navicularis* and the freshwater aerophilous species *Ellerbeckia arenaria*.

The absence or very poor preservation of diatoms may reflect unfavourable conditions for diatom silica preservation (Flower 1993, Ryves et al. 2001). Given the ubiquity of diatoms in natural water bodies, the absence of their remains from the sediment samples assessed here can be attributed to taphonomic processes. This may be the result of diatom silica dissolution and breakage caused by factors such as high sediment alkalinity, the under-saturation of sediment pore water with dissolved silica, cycles of prolonged drying and rehydration, or physical damage to diatom valves from abrasion. The high alkalinity of the calcareous clay silts for example in D1 might have promoted the dissolution of diatom silica.

It is not therefore possible to comment on the water quality or other aspects of the aquatic environment based on diatom remains. There is no further potential for diatom analysis of these samples.

5.4.8 Conclusions

Diatoms are absent from three samples assessed from Convoys Wharf. In sample D2 only two valve fragments were identified. These fragments are from a benthic brackish-marine species and a freshwater aerophilous diatom. There is therefore no further potential for diatom analysis of any of the samples. The poor preservation or absence of diatom assemblages from water-lain sediments is attributed to taphonomic processes rather than the initial absence of diatom valves.

5.4.9 Ostracods

By John E. Whittaker (Natural History Museum)

5.4.9.1 Introduction

Four samples were submitted for assessment from Area 10, Section 1, CVF10, covering the interval +0.74m down to -2.09m O.D. The sequence from which the present samples were obtained lies on the western side of the excavation and is within or on the margins of an early Holocene channel running west-east across the site. From sedimentological evidence, the channel's flow rate, it is thought, slackened and the fine grained sediment carried by the sluggish flow was deposited at its base. With flow rates lessening and freshwater beginning to pond back up rivers and streams as a result of sea-level rise, a stable prehistoric landscape existed for a short time as the waterlogged deposits filling the channel formed a peat. During the late prehistoric to historic period overbank flooding dominated the landscape. It is the purpose of this assessment to examine the sediments for microfauna (especially ostracods) and, if present, substantiate or refute the environments of deposition suggested above.

5.4.9.2 Methods

Sample Depth (m.OD)		Sample No.	Weight Processed	Context	Sediment description
Top	Base				
0.74	0.52	O4	275g	1064	Light grey clay, soft, occasional pottery and metal, 0.5m thick
0.11	-0.09	O3	275g	1066	Mid blueish grey clay, occasional small fragments of CBM, 1.1m thick
-0.72	-0.87	O2	225g	1068	Plastic peat, dark reddish brown, 0.4m thick

-1.94	-2.09	O1	275g	1112	Plastic mid grey, slightly clay silt and some fine sand, chalk and organic inclusions
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Table 17: Ostracod subsamples from Section 1, Area 10.

A portion of each large sediment sample, having been weighed, was broken into small pieces by hand and put into a ceramic bowl to be thoroughly dried in an oven. A spoonful of sodium carbonate was added to help the removal of the clay fraction and boiling water was then poured over the sample which was left to soak overnight. After soaking it was washed through a 75 micron sieve with hand-hot water, the residue being decanted back into the bowl to be dried again in the oven. Because of the nature of several of these sediments, for instance the high organic content particularly of O4, this process had to be repeated several times to achieve a satisfactory breakdown. After final drying, the samples were stored in small labelled plastic bags and later picked of their microfaunal content under a binocular microscope. A selection of ostracods were picked out into faunal slides for archive purposes and the abundance of each species recorded semi-quantitatively (present or common) by eye and by experience. Other useful 'organic remains' of potential in environmental analysis, were recorded. All this data is presented in Table 18.

5.4.9.3 Results and discussion

ORGANIC REMAINS				
CONTEXT	1064	1066	1068	1112
SAMPLE NO.	O4	O3	O2	O1
Depth (O.D.)	+0.74/+0.52m	+0.11/-0.09m	-0.72/0.87m	-1.94/-2.09m
plant debris + seeds	x	X	x	x
charcoal/coal/slag/brick	x	X		
molluscs	x	X		
<i>Bithynia opercula</i>	x	X		
insect remains	x		x	
cladoceran ehippia	x			
freshwater ostracods	x	X		
earthworm granules		X		
slug plates		X		
iron/manganese mineral				x
			peat	
Ecology	'Slum ditch', polluted	Ditch with washed-in terrestrial fauna through overbank flooding	Waterlogging through sea-level rise	Alluvium; some drying out/ weathering
	Freshwater			
FRESHWATER OSTRACODS				
CONTEXT	1064	1066	1068	1112
SAMPLE NO.	O4	O3	O2	O1
Depth (O.D.)	+0.74/+0.52m	+0.11/-0.09m	-0.72/0.87m	-1.94/-2.09m
<i>Cypria ophthalmica</i>	xx			
<i>Candona neglecta</i>	x			
<i>Ilyocypris bradyi</i>		X		

Table 18: Ostracod results from Section 1, Area 10.

The results of the microfaunal assessment are shown in Table 18. Ostracods were only found in O4 and O3, covering the interval +0.74 down to -0.09m O.D. (1064 and 1066), in the upper part of the sequence, and indeed much can be made of these two samples assisted by the plentiful 'Organic remains' that accompany them. The uppermost sample (O4) from (1064) contains plant debris (some of it burnt, if not charcoal), small pieces of coal, slag and brick/tile. There are also molluscs (often fragmentary), calcitic opercula of the aragonitic snail *Bithynia*, insect remains, cladoceran ephippia (egg cases of water-fleas), and freshwater ostracods. The ostracods are of two species, *Candona neglecta*, and more commonly *Cypria ophthalmica* (Table 18), the latter being able to withstand a great deal of pollution and often referred to as a 'slum ditch' species. The environment of deposition of this sample would appear to be a rather polluted ditch perhaps dating from the time when the dockyard was being built, or at least of human/industrial occupation. There is, however, no evidence of tidal access from the microfauna.

The next sample down in the sequence (O3) from (1066) contains much plant debris and seeds (some burnt or charcoal) and a little slag. Molluscs comprise a few high-spired snails and *Bithynia* opercula. There is but one species of ostracod, *Ilyocypris bradyi*. It lives in still or very slow flowing water as it cannot swim. It is, however, the earthworm granules (which occur in their thousands) together with slug plates that characterise this sample - that suggest the surrounding soil and wet grass was rich in worms and slugs and these calcareous remains were transported into the ditch by rainfall or overtopping, although with the latter explanation there is absolutely no evidence of high tides were involved.

The peat (1068) as seen in O2 is barren of anything calcareous, as one might expect. It seems to presents a time when the channel became vegetated through ponding back of the river (through sea-level rise), but again there is no evidence of concomitant brackish tidal access. If it had been brackish then agglutinating foraminifera, which are not calcareous but make their shell from mineral grains cemented to an organic template, would have been preserved. There are none.

The lowest sample (O1) examined at -1.94/-2.09m OD (1112) is a clean silty sand and looks distinctly like alluvium. Unfortunately, apart from a little plant debris there is nothing else 'organic' that is preserved. It is however assumed for the present to be of freshwater origin. It does contain orange and brown tubes and 'agglomerations' which are probably iron and manganese, respectively, and usually evidence of the channel drying out and/or weathering. Unfortunately, this usually leads in turn to decalcification.

5.4.10 Pollen

By Dr Rob Scaife, School of Geography, University of Southampton

5.4.10.1 Introduction

A 1.5m sequence of sediments from section 1 of Area 10 has been examined for its sub-fossil pollen and spores content. From the examination of a range of organic and minerogenic facies it was anticipated that this analysis would provide data on the changing vegetation and environment of the site during the time-span represented by the sediments. Pollen has been recovered from throughout the profile except for the basal context (1112) and this report details the findings of this study.

5.4.10.2 Methodology

Sample Depth (m.OD)		Sample No.	Context	Sediment description
Top	Base			
0.46	0.44	P8	1065	Soft, friable, dark brown grey, slightly sandy silt, frequent roots and organic mater, occasional subangular small stones (Topsoils?)
0.15	0.13	P7	1066	Mid blueish grey clay, occasional small fragments of CBM, 1.1m thick
-0.51	-0.53	P6		
-0.69	-0.71	P5	1068	Plastic peat, dark reddish brown, 0.4m thick
-1.15	-1.17	P4	1069	Soft, reddish dark brown, clayey peat, fragments of wood/vegetation, 1.1m thick (Historic bank of channel?)
-1.58	-1.60	P3		
-1.85	-1.88	P2	1112	Plastic mid grey, slightly clay silt and some find sand, chalk and organic inclusions
-2.10	-2.12	P1		

Table 19: Pollen subsamples from Section 1, Area 10.

Standard pollen extraction techniques were used on sub-samples of 1.5ml volume (Moore and Webb 1978; Moore et al. 1992). A pollen sum of 100–150 pollen grains per sample was identified and counted (the pollen sum). Wetland taxa (including *Alnus*, spores of ferns and other (misc.) microfossils were counted outside of this sum providing total counts of up to ca. 350 grains. A standard pollen diagram has been constructed (Fig 113) using Tilia and Tilia Graph in which percentages have been calculated as follows:

Pollen =	% of dry land pollen (the sum)
Wetland =	% tdlp + marsh (incl. <i>Alnus</i>)
Ferns =	% tdlp + sum of spores
Misc. =	% tdlp + sum of misc. taxa.

5.4.10.3 Results

Pollen is present in (1069), (1068), (1066) and (1065) but was absent in the basal (1112) and sparse in overlying (1065). However, a less than satisfactory count was obtained from the latter. Three local pollen assemblage zones have been recognised which strongly relate to the differing sediment types (facies) and environment of deposition. The characteristics of these local pollen assemblage zones are detailed in Table 20 below.

<u>l.p.a.z. 3</u>	Transition from humic sediments/peat to clay and sandy silt facies is accompanied by a reduction of trees and shrubs and an expansion of herb pollen. Overall, the latter are dominated by Poaceae (to 65%) and Lactucoideae (to 38%) with a single peak of Brassicaceae (46%). In addition, Chenopodiaceae and cereal pollen is present in small numbers. Trees and shrubs comprise only small numbers of <i>Pinus</i> (increasing; 12%) and <i>Quercus</i> (5%). There are sporadic occurrences of <i>Picea</i> , <i>Ulmus</i> , <i>Tilia</i> and <i>Corylus avellana</i> type (There is a marked increase in fern spores of <i>Dryopteris</i> type (to 25%) with <i>Pteridium</i> (10%), and <i>Polypodium</i> (1–2%). Pre
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	–Quaternary palynomorphs are abundant (30%). Pediastrum is present.
<u>l.p.a.z. 2</u>	Change to more humic sediment is accompanied by better pollen preservation. Overall, trees and shrubs are dominant with smallest values of herbs. Alnus is dominant (to 85% sum + marsh). Quercus (peak to 47%) and Corylus avellana type (55%) are important. Tilia has a single peak to 20%. There are small occurrences of Ulmus, Fraxinus and Viburnum. Poaceae of the preceding zone decline to low levels and subsequently expand at the top of the zone (50%). Marsh taxa comprise Alnus noted and increasing numbers of Cyperaceae (peak to 22%) with Typha angustifolia type (7%). Pteridophytes are dominated by Pteridium (peak to 49%) with smaller values of Dryopteris type and Polypodium. Numbers of pre-Quaternary palynomorphs are reduced to only sporadic occurrences.
<u>l.p.a.z. 1</u>	Pollen numbers are small in these mineral sediments (clay-silt). Poaceae (40%) are most important with Quercus (11%), Corylus avellana type (17%). Cereal type and large (>45u) wild Poaceae and Plantago lanceolata are present. Marsh/fen taxa comprise Alnus (23%) with Salix (1–2%). Spores of Pteridophytes (39%) and derived pre-Quaternary palynomorphs (43%) are present.

Table 20: Details of local pollen assemblage zones

5.4.10.4 Discussion

Changes in the past vegetation as indicated by pollen reflect the changing depositional environment and thus differences in taphonomy and the size and nature of the pollen catchment. The pollen results are discussed by context below.

(1112): Holocene pollen was absent in the lower sediment of this context (l.p.a.z. 1) with only pre-Quaternary palynomorphs present. These are derived from the Tertiary bedrock or from reworked alluvial sediment. The upper sample of this context (-2.10m to -2.12m OD) contained pollen in small numbers (l.p.a.z. 1). Oak (Quercus) and hazel (Corylus) are present and may indicate local woodland although there is a strong possibility that this has been fluvially transported and may represent the broader region. Grasses (Poaceae) are the most important herb and with sedges (Cyperaceae) may derive from floodplain vegetation. High values of fern spores are also typical of poor preservation and alluvial sediments where fluvial transport has taken place.

(1069): Pollen preservation is good in these more humic levels (lower l.p.a.z. 2). Change of sediment from clay silt to more humic clayey peat is associated with the importance of alder which was probably growing on or nearby on the floodplain or along the banks of the channel. The pollen catchment is also primarily from the nearby region rather than fluvial transport as suggested for the underlying (1112). The surrounding interfluves show woodland dominated by oak and hazel, but also with lime (Tilia) and possibly with elm and occasional ash (Fraxinus). Such importance of lime is diagnostic for the middle Holocene (Atlantic/late Mesolithic) and Neolithic/early Bronze Age from this region. The possible presence of cereal pollen would indicate the latter (Neolithic-early Bronze Age).

(1068): This possible transition horizon/context shows change to wetter conditions. On site alder is reduced and sedges (Cyperaceae) and other fen taxa including reed mace and/or bur reed (Typha and Sparganium) become more important. This increasing wetness was likely caused by rising ground water tables and ponding back of rivers through late Holocene rising (relative) to land sea level. Such change has been documented in Devoy's model of sea level change in this region of the Thames (e.g Devoy 1979).

(1066) and (1065); l.p.a.z. 3: A sharp reduction in tree and shrub pollen and increase of fern spores and pre-Quaternary palynomorphs reflects a change to minerogenic sediments of alluvial or possibly salt marsh and brackish water conditions. The latter is also indicated by the presence of Chenopodiaceae (goosefoots and oraches) which maybe halophytes growing in saline habitats (salt marsh?). Brassicaceae (charlocks) pollen has high values in one sample (0.15m to 0.13m OD). Pine (Pinus) shows a clear expansion in these upper contexts and is diagnostic phenomenon of fluvial and especially marine conditions where long distance transport may occur through the buoyancy of the (saccate) pollen grains. Spruce (Picea) is non-native in the Holocene and presence here is also attributed to such transport mechanism or, the possibility that it was a Roman or post-Roman introduction (Scaife 2000). This is clearly from near or on-site vegetation and may similarly be a halophyte. Grasses and Lactucoideae (dandelion types) become important denoting an open habitat. Lactucoideae are frequently over represented in poor pollen preserving conditions such as soils and alluvial sediment where their residence time is greater due to their robust pollen form. Pollen here is degraded and over representation is likely here. (1065) differs from (1064) only in having greater numbers of grass pollen and some increase in sedges. This may relate to some stabilisation of the alluvial sediments.

Finally, although pollen is not a dating technique, some suggestions can be made prior to radiocarbon measurements. Here, the presence of lime is diagnostic, as this tree was important during the middle Holocene/late Mesolithic through to the Early to Middle Bronze Age. The possible presence of cereal pollen and the small values of elm suggest a Neolithic or later age for contexts (1069) and (1068). The small values of elm indicate a post-Neolithic Elm Decline date, that is after ca. 5,000–5,000 BP. The upper sediment contexts (1066) and (1065) are enigmatic but appear to have accumulated in response to late prehistoric/early historic rising sea-level which has been well documented for the London and lower Thames region (Devoy 1979; Wilkinson et al. 2000; Sidell et al. 2000).

5.4.10.5 Conclusions

This preliminary study sought to establish if sub-fossil pollen and spores are present in the sediment of this site. With the exception of one sample from the basal (1112), this proved to be the case and preliminary palaeo-vegetation and palaeo-environmental data has been obtained. The principal findings of this study are as follows.

- The pollen assemblages correspond closely to the different sedimentary units examined. This is because the depositional habitat has controlled the pollen taphonomy.
- (1069) and (1068) are the most humic and have the best pollen preservation. Samples from these contexts show that the on- or near site vegetation was alder dominated. Probably typical floodplain, carr woodland or alder growth along the fringes of the river channel.

- Alder woodland died out as conditions became wetter and grass-sedge fen developed (1068). This change was driven by rising relative sea level probably during the Iron Age to Romano-British period.
- It is probable that the upper sediments of (1066) and (1065) were deposited in brackish water or on salt marsh.
- The surrounding landscape during (1069) and (1068) (l.p.a.z. 2) was predominantly oak and hazel woodland with lime and is diagnostic of the late Mesolithic (middle Holocene) to Early to Middle Bronze Age.
- (1066) and (1065) (l.p.a.z. 3) show a much more open habitat. This may be due to the change in pollen taphonomy from the humic to fluvial/marine sediment. A hiatus may be present between (1068) and (1066).
- Given the location of this site, it should be possible to relate these and subsequent palynological and sediment sequences to the sea level change model of Devoy once radiocarbon dating has been undertaken.

5.4.11 Insects

Enid Allison, Canterbury Archaeology

5.4.11.1 Introduction

Convoys Wharf is situated on the south bank of the River Thames and was the location of one of Henry VIII's dockyards. Prehistoric and historic period archaeology was excavated during a program of work undertaken by Museum of London Archaeology (MOLA) on the site in 2010. A natural alluvial sequence was also revealed on the western side of the site. It was hoped that geoarchaeological and palaeoenvironmental work on these deposits might provide evidence for local environmental conditions associated with the various phases of activity represented by the archaeology.

Four samples from organic-rich peaty deposits forming the lower part of the sequence in Area 10, Section 1, were submitted for examination to ascertain the abundance and state of preservation of insect remains, particularly beetles (*Coleoptera*) and bugs (*Hemiptera*), and to assess their potential to provide ecological data. Samples from deposits overlying the peaty deposits were judged to contain no interpretable insect remains during assessment of plant macrofossils. No dating information for the deposits was available at the time of the assessment.

5.4.11.2 Methods

Sample Elevation (m OD)		Sample No.	Context	Processed (litres)	Type
Top	Base				
-1.7	-1.9	1005	1069	10 and 5	Flot and Wet Sieved
-1.35	-1.5	1007	1069	10	Flot
-0.77	-0.97	1012	1069	10 and 5	Flot and Wet Sieved
-0.57	-0.77	1013	1068	10 and 5	Flot and Wet Sieved
-0.37	-0.57	1014	1066	15	Wet Sieved
0.03	-0.17	1016	1066	15	Wet Sieved
0.18	-0.02	1020	1066	15	Wet Sieved

0.48	0.18	1021	1065	15	Wet Sieved
0.68	0.48	1022	1064	15	Wet Sieved

Table 21 Insect subsamples from Section 1, Area 10.

The samples were received as flots recovered on 0.25mm mesh during wet-sieving by MOLA. The original sample volumes were 10 litres. Paraffin flotation was carried out to extract insect remains following the methods described by Kenward et al. (1980) with recovery on 0.3mm mesh. The resulting paraffin flots were scanned for the presence of insects and other invertebrates using a low-power stereoscopic zoom microscope (x10 – x45). Abundances of beetles (*Coleoptera*) and bugs (*Hemiptera*) were estimated, the state of preservation of remains recorded using the criteria of Kenward and Large (1998), and the potential to provide detailed environmental data assessed. Ecological groups used are based on Kenward et al. (1986) and Kenward (1997). The abundance of other invertebrate remains has been scored on a three-point scale as present, common or abundant. Nomenclature for Coleoptera follows Duff (2012). The paraffin flots are currently stored in industrial methylated spirits (IMS) in glass jars.

5.4.11.3 Results and discussion

Insect remains were common or abundant in three of the samples. The results are tabulated as part of the appendix. The discussion for each sample is set out below.

Sample <1005>; (1069); -1.9 to -1.7 metres O.D. The paraffin flot consisted largely of insect remains, the bulk of which were larval fragments. A substantial assemblage of beetles and bugs was recovered, comprising a minimum of 150 individuals of at least 60 taxa. Fragmentation of the larger beetle and bug sclerites was quite high but erosion was fairly low and most of the material is identifiable. The assemblage therefore has a good potential to provide environmental data. Beetles from aquatic and damp ground/waterside habitats were common, and plant feeding taxa from marginal and terrestrial habitats were also well represented. They included *Dryops* found on wet waterside mud, donaciine leaf beetles (*Donacia* or *Plateumaris*) found on aquatic and marginal vegetation, and *Prasocuris phellandrii* which feeds on waterside *Ranunculaceae*, particularly marsh marigold (*Caltha palustris*) (Cox 2007, 144). A group of decomposer beetles was recorded but none of those noted during scanning were typical of man-made accumulations of organic material and might have occurred in moist waterside debris. Woodworm beetle (*Anobium punctatum*) is most frequently associated with structural timber but can also live in naturally occurring dead wood habitats. A bark beetle (*Scolytinae*) was suggestive of the presence of trees or woody shrubs in the vicinity.

Sample <1007>; (1069) -1.5 to -1.35 metres O.D. Beetle and bug remains were common (estimated 100+ individuals) but were slightly less well-preserved than in the lowermost sample, with both fragmentation and erosion more advanced on many sclerites. A majority of the sclerites are identifiable to a useful taxonomic level, however, and the potential for analysis is good. Aquatic, damp ground/marginal taxa and plant-associated taxa were well-represented. The water beetles included a riffle beetle (*Elmidae*) characteristic of clear, running water. There were suggestions of old, rotten deciduous trees nearby from *Sinodendron cylindricum*. Decomposers were poorly represented by comparison with the previous sample.

Sample <1012>; (1069); -0.97 to -0.77 metres O.D. The paraffin flot was relatively large (30ml) but consisted predominantly of tiny root fragments and lesser amounts of comminuted wood. Insect remains were poorly preserved and very sparsely represented (<10 individuals). All of the few fragmentary sclerites seen during

scanning were thinned and eroded with varying degrees of colour loss, presenting problems for identification. The potential for analysis of this material is very low.

Sample <1013>; (1068) -0.77 to -0.57 metres O.D. The bulk of the paraffin flot consisted of coarse plant material and woody root fragments. Insect remains were common (estimated 100+ individuals) but more poorly preserved than in either of the two lowest samples in the sequence. Fragmentation of beetle and bugs sclerites was high and most sclerites showed appreciable degradation and colour change. Despite this, most of the material is identifiable to a level that will provide environmental data, and the potential for analysis is good. A *Lesteva* species found in damp habitats was common, and there were indications of waterside mud and moss from *Dryops* and *Chaetarthria*. Water beetles included the riffle beetle *Oulimnius* found in clean, clear running water.

5.4.11.4 Conclusions

Insect remains were common in three of the samples from the peaty lower parts of the sequence: the lower parts of contexts (1069) and (1068), with the state of preservation of sclerites tending to decline from good to moderate with decreasing depth. Most of the material in all three samples is identifiable to a useful taxonomic level, however. Preservation of insect remains was very poor in the uppermost sample from (1069) by comparison with earlier and later deposits, perhaps suggesting a period of somewhat drier or more aerated conditions at that stage.

The insect remains have a good potential to provide information on the local environment and deposit formation. The assemblages are dominated by beetles and bugs from 'outdoor' habitats (i.e. unable to live and breed within buildings or in accumulations of man-made organic litter). Beetles and bugs from aquatic and marginal/damp ground habitats, and plant-associated taxa are all well-represented, and further analysis will provide data on local aquatic and terrestrial ecology. Decomposer beetles were relatively common in the lowermost sample, but no typically synanthropic taxa were seen during scanning.

It is recommended that the beetle and bug assemblages from the three productive samples are analysed in detail.

5.4.12 Optically stimulated luminescence dating

A number of samples of the Late Glacial to Early Holocene sands (facies 2) were retained unopened in their cores and immediately sealed in thick black plastic in order to provide possible OSL (optically stimulated luminescence) dates. One of these samples, from B9 (location marked on Fig 112) was sent for OSL dating as part of the assessment. University of Gloucestershire Luminescence dating laboratory was used as signified by the lab code. The full laboratory method is given in Toms (2012).

Borehole	Depth (m)	Elevation (m OD)	Lab Code	Total Dr (Gy.ka-1)	De (Gy)	Age (ka)
B9	5.51	-3.81	GL12021	0.53 ± 0.04	9.90 ± 0.51	19 ± 2 (2)

Table 22: OSL sample results

5.4.13 Radiocarbon dating

Eight samples were sent for radiocarbon dating (Table 23). Two were taken from Area 10 in order to give a date range for the palaeoenvironmental assessment carried out on that sequence. One was taken from the lowest viable deposit in Area 8 from Section 12 (Fig 108) in order to provide a date for deposits in which were located a number of prehistoric flints. Five samples were taken from boreholes along the western and central north to south transect (Fig 114, Fig 115) to provide a broad chronology for the environments across the site. Samples were processed and terrestrial seeds or plant macrofossils, excluding root material, identified by an archaeobotanist from these samples, were sent to Beta Analytic for AMS dating. The resulting $\delta^{13}\text{C}$ confirms the samples are from terrestrial and not aquatic plants. Terrestrial trees and plants preferentially uptake the lighter isotopes of carbon (resulting in a ratio of approximately -25‰ or -26‰) while relative enrichment of ^{12}C takes place in freshwater and marine plants resulting in less negative values (-16‰ and -15‰ respectively). When dating terrestrial plant material, samples are corrected if the $\delta^{13}\text{C}$ deviates from c -25‰. The lab will make this correction. One of the samples sent (Beta338234) did not provide sufficient material to date and two of the other samples (Beta338236 and Beta338235) although datable did not provide sufficient material to allow for a $^{13}\text{C}/^{12}\text{C}$ ratio. This ratio is primarily used to offset interference from marine sources or carbon as opposed to terrestrial sources. As the seeds sent for dating had already been identified as terrestrial the dates have been included here.

BH / Area	Sample Elevation (m OD)		Sample No.	Context	Lab Code	Method	Material Pretreatment	Measured Age	13C/12C	Conventional Age	2 Sigma Calibration
	Top	Base									
Area 8	0.08	-0.07	1056	1258	Beta338238	AMS	(seeds): acid/alkali/acid	2330 +/- 30 BP	-26.0 o/oo	2310 +/- 30 BP	Cal BC 400 to 370 (Cal BP 2350 to 2320)
Area 10	-0.57	-0.77	1013	1068	Beta338239	AMS	(seeds): acid/alkali/acid	3190 +/- 30 BP	-30.0 o/oo	3110 +/- 30 BP	Cal BC 1430 to 1370 (Cal BP 3380 to 3320)/Cal BC 1360 to 1310 (Cal BP 3310 to 3260)
Area 10	-1.7	-1.9	1005	1069	Beta338240	AMS	(seeds): acid/alkali/acid	4810 +/- 30 BP	-25.1 o/oo	4810 +/- 30 BP	Cal BC 3650 to 3630 (Cal BP 5600 to 5580)/Cal BC 3590 to 3530 (Cal BP 5540 to 5480)
B9	-1.15	-1.3	-	-	Beta338234	AMS	n/a	n/a	n/a	FAILED	n/a
B4	-0.36	-0.41	-	-	Beta338233	AMS	(charred material): acid/alkali/acid	4270 +/- 30 BP	-28.6 o/oo	4210 +/- 30 BP	Cal BC 2890 to 2860 (Cal BP 4840 to 4810)/Cal BC 2810 to 2750 (Cal BP 4760 to 4700)/Cal BC 2720 to 2700 (Cal BP 4670 to 4650)
B6	-2.71	-2.81	-	-	Beta338235	AMS	(seeds): acid/alkali/acid	n/a	n/a	4330 +/- 50 BP	Cal BC 3090 to 3060 (Cal BP 5040 to 5010)/Cal BC 3030 to 2880 (Cal BP 4980 to 4830)
B13	-1.29	-1.39	-	-	Beta338236	AMS	(seeds): acid/alkali/acid	n/a	n/a	3290 +/- 40 BP	Cal BC 1680 to 1490 (Cal BP 3630 to 3440)/Cal BC 1470 to 1460 (Cal BP 3420 to 3410)
B13	-3.79	-3.99	-	-	Beta338237	AMS	(seeds): acid/alkali/acid	3760 +/- 30 BP	-25.5 o/oo	3750 +/- 30 BP	Cal BC 2280 to 2250 (Cal BP 4230 to 4200)/Cal BC 2230 to 2220 (Cal BP 4180 to 4170)/Cal BC 2210 to 2120 (Cal BP 4160 to 4070)/Cal BC 2090 to 2040 (Cal BP 4040 to 3990)

Table 23: Radiocarbon dating results CVF10.

5.4.14 Geoarchaeological discussion

The geoarchaeological discussion will use the three north to south transects across the site (presented in Fig 114, Fig 115, Fig 116) and the topographic plot of the Early Holocene surface (the top of the Pleistocene gravels presented in Fig 117) to preliminarily reconstruct the evolution of the landscape and changing environment of the site. The Early Holocene surface forms the basic topographic template for the site. The sub surface deposits have been grouped into facies representing different environments and these are shown on the transects. The locations of the transects are presented in Fig 112. The general form of these deposits will be discussed by facies in the sections below. The detailed palaeoenvironmental assessment carried out on the deep natural Holocene deposits found in Area 10 (Fig 109) will be used as a general guide to assessing the nature of the facies across the site (see Table 14).

5.4.14.1 Facies 1: Pleistocene gravels

Overlying the chalk bedrock were Pleistocene terrace gravels (Kempton Park terrace). The centre of the site lies on floodplain gravels or Shepperton Gravel. The surface of these gravels was recorded between -1m and -5m OD indicative of a Late Glacial to Early Holocene channel west to east across the site (Fig 117).

The present floodplain was created as the river down-cut from a former, higher, floodplain (represented by the Kempton Park Gravels) as a result of a low sea-level and the large influx of meltwater into river channels which occurred after the Last Glacial Maximum of the Devensian Glacial period (c.18000 BP). These high energy fluvial conditions deposited coarse grained sediments across the valley floor (the Shepperton Gravel) and these deposits underlie the alluvium in the present floodplain. Palaeolithic material pre-dating the incision of the present Thames floodplain is occasionally found within or above the floodplain gravels, having been eroded from the higher, older terraces and deposited within the river gravels on the valley floor. Unfortunately, such artefacts are usually rolled and worn and their *ex-situ* context makes them of low interest archaeologically.

To the south of the site, the gravels rise up to form the nearby Kempton Park terrace with a surface recorded between 1.5m AOD and -0.5m OD. To the north of the site the gravel surface also appears to rise and may represent a remnant of the Kempton Park terrace which was not scoured out by fluvial activity or glacial outwash unlike the centre of the site, which provided a low lying route for the west to east a Late Glacial to Early Holocene channel.

The low lying area of chalk bedrock which the Late Glacial to Early Holocene channel appears to have exploited would have been formed by erosion and meltwater scouring at the end of the last Devensian cold stage or may be a result of Holocene fluvial activity. The gravels overlying the chalk within the channel are likely a result of meltwater slackening at the end of the Devensian cold stage.

5.4.14.2 Facies 2: Late Glacial to Early Holocene fluvial sands

The surface of the Pleistocene gravels form a rough topographic template on which the Holocene deposits formed. A model of this Early Holocene surface is presented in Fig 117. The low lying west to east route of a Late Glacial to Early Holocene channel is clearly evident. Sands, variably silty to organic, fill this low lying area and the surface of these deposits was recorded from 0m to -3m OD and was up to c. 3.5m thick. To the west of the site, the sands appear to be banked to the south and up against the Kempton Park terrace whereas the northern section of the low-lying channel is filled with wetland deposits of facies 3. To the centre of the site, the sand deposition appears to be banked more towards the north and against the possible

remnant of the Kempton Park terrace. Moving towards the east of the site and towards the past confluence of this channel and the River Thames, differentiating between facies 2 and the underlying sands and gravels of facies 1 becomes more problematic. Sandier, finer grained deposits are noted to the south of the site (swapping sides once again) and appear to completely fill the increasingly thin and constrained channel. The alternating deposition of the sands from south to north to south may represent the broad meandering form of the channel with the sands being deposited on the inside curve of the river bend in areas of slack flow. Notably, these banks of sands within the channel would have formed attractive, temporary base camps and flint knapping sites for prehistoric populations.

An OSL date was acquired for the sands of Borehole 9 (unit 9.3) (location marked on Fig 112 at an elevation of -3.81m OD and provided a date of 19 ± 2 kya (GL12021, see Table 22). This places the deposition of this level of the sand, about mid way through the sand profile, firmly within the Dimlington Stadial (the climatostratigraphic name for the main glacial episode of the Late Devensian in Britain), Marine Isotope Stage 2 (MIS 2). Unfortunately, the radiocarbon date from the surface of the sands (Beta338234) failed due to insufficient carbon although a date from the surface of the sands in nearby Area 10, between -1.7m and -1.9m OD, records an Early to Mid Neolithic date (Beta338240; Table 23). This gives a possible late MIS2 to Early Neolithic date for the sand deposition between c.-4m and -2m OD. Moving eastward across the site, the radiocarbon date of the organic sediments (facies 3) overlying the sands (facies 2) changes from the Early Neolithic (as noted above) to Mid Neolithic in B6 (Table 23, Beta338237). This date becomes even later moving toward the northern central and southern central fringes of the channel, where, to the north, the date is Mid to Late Neolithic (Table 23, Beta338233) and the south (B13) it is Early Bronze Age (Table 23, Beta338237). The date from Area 10 still appears to be the best date for comparison to the OSL date as the other dates referred to above are further away, at different elevations and affected by localised environmental factors that will be discussed in facies 3.

The palaeoenvironmental assessment of the facies 2 deposits in Area 10 found no diatoms or ostracods and recorded evidence of iron and manganese 'agglomerations' which are evidence of the sandy channel bank deposits possibly drying out and/or weathering. The pollen evidence found remains of pre-Quaternary plants lower in the sands (-2.10m OD, Table 14) but by -1.88m OD Oak and Hazel are present and suggest local woodland or pollen that has been fluvially transported from a wider region. Grasses are present locally along with possible sedges forming the floodplain vegetation. The high values of fern spores are also typical of poor preservation and alluvial sediments where fluvial transport has taken place and may not be present on site. On the whole, the palaeoenvironmental potential of the samples from the facies 2 deposits are low apart from the pollen remains to the very top of the facies. The results of the palaeoenvironmental assessment all appear to concur with the OSL date (see Section 5.4.12) from the sands, in that the sediment has been high and dry for much the Holocene in aerobic conditions where environmental preservation would be poor.

5.4.14.3 Facies 3: Wetland deposits

Facies 3 is characterised by fine grained organic fills of the early Holocene channel and peats representing more established wooded wetlands to the margins of the channel. The organic deposits are up to c. 2.5m in thickness. The surface of this facies is encountered between c. 0.8m OD and -2m OD.

The finer grained lower lying deposits such as those located in Mott_Mac_BH124 (Mott Macdonald 2010) would have formed as the channel's flow rate slackened and the fine grained material carried by the sluggish flow was deposited. The waterlogged deposits filling the channel may have become vegetated towards the margins with the more minerogenic or coarser grained deposits developing closer to more seasonally active parts of the channel such as seen in Mott_Mac_BH124 (Mott Macdonald 2010) and MOLA_B8 (unit 8.2). Overlying the banked sands to the south of Transect 1 (Fig 114) and to the north of Transect 2 (Fig 115), the peats are less clayey and more developed. Owing to the elevation and stratigraphic position of the peat units it is likely that they correlate with Devoy's (1979) Tilbury III/IV regressive events. The peat can be variable in the amount of minerogenic material due to fluctuations in RSL (Relative Sea Level) causing inundation of the floodplain during minor transgression events or localised flood events.

A number of radiocarbon dates were acquired for the deposits of facies 3 across the site in order to provide a preliminary chronological framework. The base of the organic deposits was dated in Area 10 (between -1.7 and -1.9m OD) to the Early to Mid Neolithic period (Table 23, Beta338240). Moving eastward across the site the onset of peat formation is dated to Mid Neolithic at -2.71m to -2.81m OD in B6 (Table 23, Beta338237). Paradoxically, the B6 date is slightly later but the elevation almost 1m lower than Area 10, indicating that the area of B6 was still an active channel during the Early Neolithic when peat formation had already begun in Area 10. Peat only developed around B6 when the active channel migrated away during the Mid Neolithic. Overall these dates are comparable, if slightly later to the Late Mesolithic to Mid Neolithic dates recorded to the north on the opposite side of the Thames as part of the DLR 3 Car project (Yendell 2012); in addition to those previously recorded at Yabsley Street (Coles et al 2008), West Silvertown Urban Village (Wilkinson et al 1996; 2000), Fort Street (Crockett et al 2002) and Canning Town (Ruddy in prep).

The date recording the onset of peat formation becomes even later toward the central northern and central southern fringes of the channel. At -0.36m to -0.41m OD to the centre north of the site (B4), the date returned is Mid to Late Neolithic (Table 23, Beta338233). The late formations of the peat here - to the northern fringes of the channel - are accounted for due to rise in elevation of the underlying gravels over the possible remnant Kempton Park terrace. The higher ground remains dry for a longer period and, as a consequence, peat formation occurs at a later date when RSL has risen sufficiently to encroach upon this area. Further to the south, over the true Kempton Park terrace (B13), the onset of peat formation is dated to the Early Bronze Age (Table 23, Beta338237). In contrast to B4, however, the date is taken from -3.79m to -3.99m OD. The reason for the very low elevation Early Bronze Age date may again be due an active channel crossing this location for much of prehistory. The active water flow would have prevented any stable vegetated horizons forming. This suggestion is supported by the presence of later prehistoric to historic channel sediments overlying the peat in B13 (facies 5, unit 13.3 and 13.5).

The cessation of peat formation was dated in three locations across the site (B4, B13 and Area 10). The Mid to Late Neolithic date returned from the peat unit in B4 (Table 23, Beta338233) has already been used above to indicate when peat formation started but the thickness of the deposits (0.15m) suggests also that peat formation was not long-lived before inundation (and the deposition of the alluvial deposits of facies 6). In comparison, further west along the Late Glacial to Early Holocene channel (and away from its confluence with the River Thames) the later the dates from the top of the peat become. In Area 10 the surface of the peats (1068 and 1069), between -0.57 and -0.77m OD, were dated to the Mid Bronze Age (Table 23, Beta338239) and at B13, between -1.29 and -1.39m OD the top of the peat is dated

to the Mid to late Bronze Age (Table 23, Beta338236). Although, somewhat lower in elevation (-1.36 to -1.84m OD) the two dates for the cessation of peat development at the Blackwall and Delta Junction sites of the DLR 3 Car project (Yendell 2012) give a similar middle Bronze Age date to that found on this site. The general chronology for the peat development and its final inundation fits in well with the chronology for the Thames Valley as put forward by the Cultural Landscape Model (Stafford 2012, Bates and Whittaker 2004).

Within the sequence assessed for palaeoenvironmental potential (Area 10, Table 14) the lower organic deposit (1069) contains more minerogenic input than the overlying organic deposit. This suggests that although the Late Glacial to Early Holocene channel was slowing and silting up in this area (and organic material, in particular wood was accumulating) some seasonal fine grained low energy fluvial deposition was still occurring. The insect remains from (1069) indicate varied flowing to pooling/damp waterlogged freshwater conditions. The pollen records alder-carr nearby and a dryland forest of Oak, Hazel Lime and Ash. The pollen data suggests cereal cultivation on site of possible late Mesolithic to Neolithic/Bronze Age date which is supported by the radiocarbon chronology discussed above. Towards the surface of (1069), although little notable change is seen in the insects or pollen, the diatom remains record a change from the freshwater environment to a brackish environment.

The overlying peat (1068) contains less evidence of sedimentation, as it lacks the higher minerogenic content of the underlying organic clay (1069). The pollen evidence indicates wetter conditions developing as alder reduces and sedge fen increases. The preliminary environmental changes can be related to the model for the landscape evolution of the Thames as suggested by Bates and Whittaker (2004). To the base of (1069) the instability of the channel and wetland environments as a result of RSL rise can be seen. This mostly freshwater phase could be related to stage 3 of Bates and Whittaker's (2004) model. As brackish conditions appear to develop towards the top of (1069) the later effects of the RSL rise involved in stage 3 emerge and stage 4 (relating to Devoy's (1979) Tilbury III/IV regressive events), a hiatus of RSL rise takes hold with a period of wetland expansion in stable waterlogged conditions.

Stage 4 of Bates and Whittaker's (2004) model may continue into (1068) and as the early effects of renewed RSL rise (stage 5), the increasingly waterlogged conditions begin to reduce the alder carr replacing it with sedge fen.

5.4.14.4 Facies 4: Colluvial deposits

Within Area 8 a number of possible brickearth to colluvial deposits (facies 4) were identified on the apparent edge of the Kempton Park terrace, dropping down northwards into the floodplain and route of the west to east Late Glacial to Early Holocene channel (Table 6 and Fig 117). These deposits were recorded from 0.68m OD and are between c. 0.3m to 0.7m in thickness. In addition, previous geotechnical boreholes indicate the presence of brickearth/colluvium to the south of Transect 2 (Fig 115). The brickearth to colluvial deposits were variably sandy clays to sandy gravels. To the base of section 12 a number of worked flints were recovered from the alluvial deposits abutting the colluvial deposits and on the surface of Pleistocene gravel (1264). Colluvial deposits are sediments which have been eroded from the edge of and down low grade slopes because of gravity. As such, having been eroded from the higher ground of either the older terrace or younger deposits overlying the terrace and deposited within its present location, the provenance of such deposits

and the artefacts found in their vicinity is problematic. An attempt was made to add the sequence to the chronological framework made up by the radiocarbon dates.

A radiocarbon date from (1258), an alluvial deposit overlying the colluvial deposit represented by (1262), produced a Pre-Roman Iron Age date (Cal BC 400 to 370 Beta338238). This date only presents a *terminus ante quem* for (1262) and the flint finds located at the base of this sequence. Therefore the finds may be of an earlier, possibly Mesolithic date.

5.4.14.5 Facies 5: Late Prehistoric to Historic channel fill

Facies 5 represents a stratigraphic group which may not be internally contemporary. The deposits vary from sandy clay to silty clay fills of possible late prehistoric to historic (small) channels crossing the floodplain. To the south west of the site and represented on Transect 1 (Fig 114) are a number of deposits encountered from 0.0m to 0.8m AOD within the boreholes Mott_Mac_BH125 (Mott Macdonald 2010), MOLA_B12 (unit 12.4), Area 13 section 9 (1248) and MOLA_B13 (unit 13.6). The deposits have a relatively uniform surface elevation and are about 1.5m thick. Their stratigraphic position places them either contemporary with the underlying organic sediments of facies 3 or as part of the overlying alluvial deposits of facies 6. For the small channels the Mid to Late Bronze Age date from the surface of the underlying organic sediments in B13 (Table 23, Beta338236) indicates a late Bronze Age date at the earliest.

One borehole in the central transect (MOLA_B6a, Fig 115) records sandy deposits within an alluvial sequence (unit 6.5 and 6.7). The surface of the deposits was located from 1.5m OD indicating that it is either a very recent water course (potentially man made and relating to the dock construction) or that these deposits are disturbed and/or redeposited.

To the east of the site and approaching the River Thames these sandy deposits were encountered at c 0.5m OD (Area 4, section 8) and c 2.0m OD in the borehole Mott_Mac_BH106 (Mott Macdonald 2010) and are c 0.5m to 1.5m thick, respectively. As a result of the proximity to the route of the River Thames these are likely to be Thames fluvial or foreshore deposits rather than any tributary crossing the floodplain.

Further palaeoenvironmental work will show how these channels relate to the sequence as a whole and whether any are related to the dock construction and specifically the two north south drainage ditches to the south east of the site.

5.4.14.6 Facies 6: Alluvial deposits

Facies 6 is characterised by blue grey silty clay, which maybe gleyed or grading into the underlying organic sediments toward the base as well as weathered with increasing rooting toward the untruncated surface. The surface of the deposit survives from c. 3.2m to 0.2m AOD across the site and is up to c. 3.2m thick. In localised areas across the site, the alluvium is partially or entirely truncated. This maybe through anthropogenic disturbance or, as is evident eastward, by the scouring of the River Thames.

Following a rise in RSL associated with Devoy's (1979) Thames IV estuarine expansion event and Bates and Whittaker's (2004) stage 5 (which is recorded across east London as a whole from about 2600 Cal BP) the floodplain landscape changed dramatically as it was inundated by the rising river levels. Generally, the occasionally organic but predominantly minerogenic silty clays are representative of late prehistoric, medieval and historic period sediments. This sedimentation occurred as

either overbank flooding or through slow moving shallow water on the marginal floodplain of the River Thames. This environment is likely to have formed a much more open, level landscape increasingly dominated by herbs and grasses. This environment was probably a water meadow environment where constant seasonal flooding of the land leads to the gradual accumulation of a silty soil.

The radiocarbon dates from the surface of the organic sediments record the cessation of peat development and the inundation by the alluvial sediments of facies 6 across a limited area of the site. Central to the site, but furthest to the east and slightly to the north of the Late Glacial to Early Holocene channel west to east channel (B4), a Mid to Late Neolithic date (Table 23, Beta338233) was returned for this transition. To the west of the site and towards the centre of the west to east channel, Area 10 provides a Mid Bronze Age date for this transition (Table 23, Beta338239). Still to the west of the site and to the south of the west to east channel, a Mid to Late Bronze Age date for the start of alluvial deposition was obtained from B13 (Table 23, Beta338236). These dates map a possible Late Neolithic to Late Bronze Age cessation of peat development and commencement of inundation by the affects RSL rise and the deposition of alluvial deposits. Finally, still to the west of the site and right on the edge of the floodplain of the west to east channel and the edge of the Kempton Park terrace, a date was obtained, not from the base but c. 1m from the surface of the alluvial profile at 0.08m OD, relating to the Pre-Roman Iron Age period (Table 23, Beta338238). This indicates the alluvial deposition definitely continued into the Roman and later periods. In order to further elucidate the chronology of the transition from wetland to alluvial deposition further radiocarbon dates would be needed across the site and in particular towards the east.

The palaeoenvironmental assessment of the facies 6 deposits in Area 10 (Fig 109; Table 14) recorded an increase ferns and a sharp reduction in trees and shrubs as conditions become too wet and the environment become more open. Later an increase in weed species is noted, which may suggest either farming nearby or clearing/ground disturbance as part of the dock construction. No diatom or insects were preserved in the alluvial sediments but the ostracod data indicates small amounts of slag in these deposits and abundant slugs and earthworms, which may account for the former having worked down into the profile from above. But also the earthworms support the seasonal drying/soil formation of these sediments.

5.4.14.7 Facies 7: Area 10 Made ground possibly relating to the dock

A preliminary palaeoenvironmental assessment of the basal deposits of made ground directly overlying the natural alluvial deposits in Area 10 was carried out (Table 14). The pollen remains indicate an increase in grasses across the site suggesting stabilisation and possibly drainage of the alluvial floodplain. No insects were preserved but the ostracods species do indicate human/industrial activity at this level (1064) and “polluted” conditions likely driven by organic debris and waste within the ditch-like environment.

5.5 The archaeological woodwork

By Damian Goodburn

Material	Length	Volume(approx)	Count	Count as % of total
Timber	Many over 5m long	NA	Many 1,000s exposed	Nearly all the woody material found was converted timber

				from medium to large sized trees.
Roundwood				Approx less than 10% of wood work were large roundwood stakes or small piles
Reused			Approx. 30 % of total number of timbers exposed	
Total				NA

Table 24 Woodwork

5.5.1 Introduction

5.5.1.1 Post-medieval waterfront and Dockyard carpentry

Waterfront archaeology has been particularly developed in the London area since the 1970's as the Victorian port was redeveloped. Initially this work was concentrated in the City of London and revealed waterlogged timber structures of the Roman, Saxo-Norman and later medieval periods. The lack of suitable local stone resulted in most of the structures being of timber or roundwood, sometimes combined with clayey earths. A systematic approach was developed to the recording and study of this structural woodwork and datable characteristics started to be defined from the beginning (Milne and Milne 1982, Milne 1985). In the late 1980's to early 1990's approaches to the recording, sampling and practical analysis of waterfront woodwork was developed further by drawing on the early fieldwork results, practical experience of recent waterfront carpenters and targeted experimental archaeology (Goodburn 1992, Milne 1992).

As areas of greater London's Docklands and the Southwark waterfront began to be investigated systematically by archaeologists in the 1990's post-medieval waterfront carpentry started to be recorded and studied. Reflecting the predominant land-use, ship, boat, barge building and breaking installations (ie boat and dockyard structures) also began to be recorded in quantity for the first time (Saxby and Goodburn 1995, Heard and Goodburn 2003, Divers 2002, 2004). The only systematic earlier work being that lead by Courtney, in the early 1970's, in parts of Woolwich Royal Dockyard (Courtney 1974, 1975).

It is now the case that these types of site are widely recognised as important archaeological resources, particularly for the post-medieval period as London developed as a world port and shipbuilding centre (Williams and Brown eds 1999). Indeed, investigations are specifically targeted on sites known to contain the remains of Dockyard (ie large shipyard) structures. Whilst some of the latter projects remain at or approaching the 'grey literature stage', such as investigations by AOC Archaeology at the large site of the East India Company, Blackwall Yard, others have been published. Some of the publications might be seen as close parallel projects to the MOLA project at Convoy's Wharf, perhaps the closest being investigations on the site of the Woolwich Royal Dockyard (Goodburn and Meddens et al 2011). The period range of the field work and analysis has ranged through the post-medieval

period to early industrial period right up to as late as the mid- 19th century (eg Pitt, and Goodburn et al 2003). Apart from *in situ* structural woodwork 'maritime industrial debris' deposits have also be subject to sampling and detailed study shedding light, on the development of very specialised, essential trades such as, block making, cooperage, ship smithing, and ship joinery (Pitt and Goodburn 2003). Thus, although a relatively new area of archaeological investigation, still accruing basic data, patterns in the evidence of post-medieval waterfront and dockyard carpentry work are beginning to be defined.

5.5.1.2 *Post-medieval nautical woodwork investigations, and Royal Dockyards as early factories*

Although the London region (middle to upper estuary) has only one relatively intact archaeologically documented wreck find of post-medieval date and very few abandoned before c. 1850, it has provided large assemblages of reused or abandoned ship, boat and barge timbers of the period c. 1500–1820. Moderately large samples of this material have been recorded and studied providing a window on changing technology and materials used for local craft and larger deep sea vessels (eg Goodburn 1991, Marsden 1996, Goodburn and Minkin 2003). Additionally, vessels known to have been worked on in the London yards but found elsewhere have also been subject to detailed investigations, such as for the early part of our interest, the *Mary Rose* (Goodburn 2009). Collaboration with tree-ring researchers, environmental archaeologists and archaeological conservators has also yielded new information not just about the key timber raw materials but also ancillary materials such as wood tar, and paints (Tyers in Marsden 1996). In sum, the corpus of data on nautical woodwork from the Greater London region is large and patterns in the material bearing on construction techniques, tools, materials and fastenings used being recognised. However, it is also clear that there are large gaps in the evidence which work at Convoys will help to fill.

It is also important to acknowledge that the scale of organised and specialised operations in the Royal Dockyards was such that they can be described as the first factories. A visit to the largely surviving later 18th-century Royal Dockyard at Chatham will show how whole buildings might be designated and equipped for one type of work such as 'treenail and coak making' (specialised wooden pegs for ship building). The historic dockyards were zoned by function though this tended to change through time. Whether this was shown in the archaeological record is clearly an issue to be explored.

Other sources of relevant information for understanding the nature of the woodwork found at Convoys Wharf; developing knowledge in building carpentry, documentary, cartographic and pictorial sources and the Royal Dockyard model of 1774 in the National Maritime Museum (Fig 7).

Practically focussed investigations by the new wave of carpenters and researchers into historic timber frame buildings has also yielded parallel data informing woodwork studies on the historic London waterfront (eg Miles and Russell 1995). Due to the relatively recent date of many of the structures encountered pictorial and cartographic sources can be drawn on heavily. The large scale Royal Dockyard model of 1774 is clearly an invaluable resource to set beside the archaeological data. Although for this project these alternative sources are particularly rich we cannot be sure that any of them are entirely reliable. For example, many now consider the model to be made for political purposes to secure greater naval spending by George III.

5.5.1.3 Particular problems of this project bearing on structural woodwork recording

The requirements of the brief for archaeological investigations on this very extensive site varied but in general limited the level of excavation and dismantling, as did safety considerations in some areas. The approach required a targeted system of levels of recording akin to that usually required for archaeological building recording, and required that the vast bulk of the structures be left *in situ*.

1.1.4 Methodology

The layered approach to recording the structural woodwork exposed during this archaeological project had to cover both its huge extensive nature and sample approach to excavation. The structures discussed here were exposed in plan by machine and hand excavation followed by careful hand cleaning. The general planning at a scale of 1:50 was then carried out. Limited areas were also drawn in elevation at 1:20 with small targeted areas drawn in more detail. Extensive and detailed photography was also used as is typical in building recording. A small sub-sample of the timbers exposed were individually numbered and recorded using pro-forma 'timber sheets' and 1:10 drawings. This writer was able to attend the site regularly to provide advice on targeted detailed recording and sampling and also to identify reused timbers. In some key areas it was possible to excavate sections through structures and these were drawn at 1:20.

Summary notes and sketches were also compiled by this writer at regular intervals. These function as *aide memoirs* with key observations with suggestions for targeted recording and sampling and have been drawn upon alongside the main plans that have been digitised and checked.

Whilst it is clear that the archive of woodwork records for this project is extensive and not always easy to compare with that of other sites, it is broadly commensurate with the practical English Heritage Guidelines on waterlogged wood (Brunning 1996). That is essential information beyond, the obvious size and shape of individual timbers has been recorded such as the materials, fastenings and joints used. Fine details such as carpenters and other marks, and some tool marks have also been recorded in written and photographic form.

The key features of the historic woodwork found will be outlined below by excavation area starting with what appears to be the earliest material within each section.

5.5.2 Medieval woodwork

Despite references to medieval river defence works in the area no clear traces were found.

5.5.3 Post-medieval woodwork

5.5.3.1 Post-medieval woodwork- Key features Area 1.1, land-ties and trestle foundations

Area 1.1 was sited to straddle the northern and southern E-W walls of the NW mast pond. Whilst the northern boundary had been disturbed and most of the timber work linked to the pond walls was displaced, the southern was much more intact. There, what appeared to be two phases of N-S land-tie beams survived with some truncation, with simple lock bars retained by pairs of anchor stakes. These were of oak and elm some evidence was also found for reuse in the form of redundant treenails. The presence of two sets of land-ties may indicate two phases of mast

pond lining. In the latest phase of woodwork, the minimally trimmed N-S logs were set in apertures in the 18th-century brick wall so as to line up with iron brackets set to hold vertical timbers (fendering) on the inside of the mast pond wall. The fendering – land-tie arrangement reinforced the brick walls and prevented abrasion to the mast timbers in the pond.

At the north end of the trench, just beyond the northern edge of the pond, the truncated remains of two large N-S orientated trestles were found. These were comprised of a sill beam with a morticed in upright supported by two diagonal braces. From work on other parts of this project and other sites along the southern edge of the lower Thames (Heard and Goodburn 2003) we know that these odd structures were used as foundations for timber buildings built in wet ground. The use of the trestle form seems to be employed where a pile driver cannot be conveniently rigged. The date range on other sites is broadly 18th to 19th century. Elsewhere they have been found to have been made using recycled ships timbers or shipyard off-cuts. This was the case here where a mix of elm, oak and softwood was used, with the braces iron spiked into place. A date in the late Georgian or Victorian period is likely here, and the trestles must be relics of a building that lay over or along the edge of the pond.

5.5.3.2 Post-medieval woodwork- Key features Area 1.2, land-ties, trestle foundations and reused ship false keels

In Area 1.2 the two phases of two pairs of land-ties to the south of the brick mast pond wall were similar to those in Area 1.1, south end, but rather more woodwork survived at the north end running back from the edge of the mast pond. Two phases of truncated land-tie assemblies were exposed that were essentially the same as those in Area 1.1. In addition slightly further north a pair of very large, almost totally intact foundation trestles were found in which the oak uprights were c 0.4m square. They were morticed into a sill beam and supported on both sides by diagonal brace timbers and also orientated N-S, roughly parallel with those in Area 1.1. Some of the elements were fresh timber and some reused as shown by relic fastenings etc. Presumably this pair of trestles was used in the same manner as those described above. Slightly later a morticed sill beam was set in a trench running E-W just to the north of the trestle heads. The sill beam must have once supported posts or studs of a timber wall probably dating to the earlier 19th century.

The sill beam was made of two pieces of ship false keels of very tough elm, possibly imported rock elm. The timbers had fragments of copper alloy staples and copper sheathing nails in them. The false keel was intended as a sacrificial element, fastened below the true keel, which could be removed in sections once worn or damaged by marine worms. The copper sheathing was applied to some ocean going vessels to protect against marine borers and through its toxicity prevent marine growth which, in the tropics, could greatly slow down a ship. Anti-fouling paints have replaced this technology.

5.5.3.3 Post-medieval woodwork- Key features, No 1 slipway (in Area 2), revetments along its west side and traces of buildings over it

The dominating structure for this area in the NW part of the excavation zone is the very large N-S slipway which was originally a totally timber lined feature, but it clearly overlay a series of NNW–SSE features, which lay mainly just to the west. The revetments appear to have functioned as the eastern edge of a watercourse with an unrevetted western bank.

5.5.3.4 *The revetments*

The earliest of these truncated features is a pile and plank revetment surprisingly made of fresh softwood timber and thus probably not earlier than the 17th century (although a late 16th-century date is not impossible.). Close to this lay a mass of roundwood, possibly of elm, some of which may have been *in situ* roots. This revetment was followed by two phases of pile and plank revetments with oak planks and piles. The latest phase was most accessible and examined in most detail. The sawn oak planking was spiked to piles of oak. Many of the oak piles were made from second hand carvel built ship framing as shown by the relict treenails once used to fasten the hull planking. Some of the planking was fitted 'anchor stock' style with stepped edges as used in parts of large ship hulls. The face of the revetment was battered with the top further to the east. Simple log land-ties were also found truncated just to the east which must have functioned with one or more of the revetments.

Nailing the sheathing to the waterside of the uprights, rather than setting it on the land-fill side, as in medieval practice, appears on the Thames in the 17th century. The use of battering to revetment faces also seems to appear at the same time (Heard and Goodburn 2003). So it would appear that on technological grounds these features are Stuart or later in date. Above the timber revetment an early brick wall with a battered front was also found. This NNW–SSE wall had arched openings for simple log land-ties apparently installed to prevent the wall moving down to the west. Some of the land-tie timbers were second hand with relict fastenings. The latest phase of battered oak revetment and the early brick wall to the east continued to the south and turned to run NW – SE in Area 12.

5.5.3.5 *No 1 slipway and the use of 'sided timber'*

The large slipway over 15m wide was fully exposed in its latest phase with battered brick side walls of late Georgian or early Victorian date. However, in places traces of what might have been an earlier form could be seen, such as along the edges where voids that had once held timber uprights were noted. The sloping base of the slip fell towards the north and the main river where it was also best preserved. The southern end was far more decayed with the sleepers surviving as voids with decayed piles under them. It was made of assorted oak cross beams mainly in three lengths. Much of the timber was hewn and sawn to have parallel faces and regular thicknesses (ie it was 'sided') but with curving sides, it seems to have been the sort of raw material shipwrights normally used to lay templates or 'moulds' on to find the best fit for ship framing. The features of the 'parent trees' used to produce the timbers were recorded such as major knots, where they could be seen. Under the sleepers some widely spread oak piles had been driven some of which were iron shod and had tenoned tops. The tenons engaged with mortices on the underside of the largest sleepers. The fitting of these assemblies would have been very tricky.

A small number of the timbers had relict fastenings indicating previous use and most of the sleepers were separated by short blocks or 'noggings'. This type of feature was also used in warehouse flooring from the late 18th century onward to strengthen them.

The surfaces of the sleepers still bore evidence of the use of the slipway apart from blobs of tar and woodchips. The cross wise sleepers were trimmed to receive blocks of timber that once were used to support the keels of ships being built or repaired on the slip, though the blocks had been removed. In other places screw threaded ring bolts had been left in place or broken off, these would have been used to secure rigging used to hold timbers in place as ship frameworks were assembled with ropes,

tackle and winches. At least one mobile capstan foot block was also found that was probably used to anchor the base of a tool used to raise heavy ship frames. Evidence of the use of larger capstans was found just to the east of the north end of the slipway in the form of large timber bearings set in brick matrices. These human powered winches were used to manoeuvre ships and handle heavy materials. Sloping recesses or 'scutches' were also found in the tops of some sleepers where struts used to support stacks of vertical blocks were once fitted. A small number of neatly made wooden wedges were also found, that were essential for shoring up vessels and fitting planks. Towards the northern end of the slipway an E-W line of paired mortices was found that almost certainly supported a temporary walkway crossing the slip, as shown in some 18th-century dockyard images.

In terms of technological features and limited stratigraphic evidence, the broad dating of the slipway must run from c. earlier 18th to the mid 19th century. Evidence of woodwork of the later period was found in a series of timber boxes which must have worked as sub ground lined post holes or sockets designed to support the massive slipway roof uprights. They were lined with oak thick sawn plank off-cuts. On some planks the saw marks were so regular that they may have been machine cut. In others the saw marks were curved and must have been cut by an early power circular saw such as were known from just before 1800 in Chatham Royal Dockyard (Edlin 1949 , 17). Some of the planking was also marked with obscure cursive marks cut with a timber scribe but the meaning of the marks is uncertain. The great effort of building the slip covers was carried out as they saved much weather damage in ships being built and repaired. Evidence of a temporary dam made with planks set edge to edge on end was also found to the west of the slipway, that may have been associated with the making of the post sockets. When the slipway finally fell out of use a series of foundation trestles were erected on the sleepers. These clearly acted as foundation trestles and were made of a mix of materials mainly oak including recycled ship deck beams with paint, mouldings and relict deck plank spikes but also including a small amount of hard tropical timber. These latter elements must have been late dockyard off-cuts, and reflected imperial connections fully developed by the early 19th century.

Note: Part of the timber base of the slipway can be seen on the modern foreshore to the north of the modern frontage and is slowly being eroded.

5.5.3.6 *Post-medieval woodwork- Key features, Area 3 and the SE part of Area 2 , the great basin walls, gates and related features together with elements of the Thames side wall, and reused ship timbers*

5.5.3.6.1 ALL TIMBER GREAT BASIN , KEY FEATURES

Moving to the east, the timber walls of the great Royal Dockyard basin were extensively uncovered behind the late Georgian and Victorian brick basin walls. The same timber lining was found in the SE of Area 2 and the whole of Area 3 running into the basin entrance gate area on the east side. The timber basin wall was sheathed with sawn oak planking c. 50 –70mm thick in relatively narrow widths and moderate lengths (rarely over 150mm wide). The planks were fastened to the waterface, with single iron spikes where they crossed the up rights and a pair at the ends. No treenails were used. Some of the planks have notched edges like some ship anchor stock planking. At least two courses of thicker oak waling beams were also used to bind together the uprights of the basin walling. This sheathing is surprisingly light and the use of alternating iron fastenings gives the impression of efforts to economise.

The basin sheathing was repaired in places such as at the NW corner where carvel ship planking with relict staggered treenail holes, was used to replace decayed sheathing.

Apart from the iron used to fasten the sheathing, large wrought iron ties were also used at staggered intervals 'dogged' (stapled) to the sides or top faces of the large land-tie beams. These were used at two levels to retain the basin frontage. The water side ends of the iron ties were attached to the wale beams in several ways: iron knee/ form ends with forelock bolts passing through the main posts and wales, in others the iron tie passed through the wale like a large bolt. On the east side of the older timber basin entrance gates grown oak knees were reused for that purpose, along side iron ties. The oak knees having been recycled from ships being repaired or broken up in the Dockyard.

The land-tie beams were particularly large, generally roughly squared and of oak, but a group were also made from some form of very tough elm. It is possible that this was imported 'rock elm' from N America. (It seems to have been a species in vogue for ship building from the early 19th century). Most of the land-tie beams were anchored in the fill behind the Great Basin frontage with two oak lock bars spiked into housings, each lock bar having a pair or more anchor stakes mainly made of sawn oak off cuts. Both in the basin walls and remaining eastern basin gateway a pattern of alternating slightly larger and smaller scantling oak upright heads could be seen. This indicated the possibility of an original build and a later phase of extensive repair, possibly also including raising of the timber walls. Just west of the basin entrance it was possible to excavate a sondage to explore this possibility and examine the lower parts of the structure. This work showed how the slightly smaller oak uprights had been roughly axe and adze trimmed to slot between the established frontage and wales and hidden oak stringer beams fastened on the land-fill sides of the original frontage uprights. At the end of the sondage excavation it was possible to extract a main post by machine, which was found to have had a tenon on the end. This showed that the timber basin wall was built as a massive timber framed wall later repaired with piles.

Just west of the entrance to the Great Basin a complex of oak timbers was found which was fastened to the basin frontage timbers and incorporated diagonal bracing timbers. The assembly presumably supported a localised above ground structure but its form and function remain uncertain. On the east side of the entrance the basin gateway some very neatly fitted lining planking had been applied and a curved sculpted recess for the gate. A neatly carved concave vertical timber made of tropical hardwood, was found located where the gate would have hinged. The regular accurate finish of this timber must have reduce leakage to a minimum.

5.5.3.6.2 BROAD DATING BY TECHNOLOGY AND THE POSSIBILITY OF A DISAPPEARING TUDOR GREAT DOCK

Very broad dating from a technological point of view might suggest a date range of later 17th to 18th century for this work. No clear trace of Tudor work was found around the west side of the Great Basin suggesting that, had such existed in Tudor times in that spot it may have been smaller and effectively removed by the digging of larger later basins.

5.5.3.6.3 INTERCUTTING LAND-TIE ASSEMBLIES AND A POSSIBLE EARLY REVETMENT NEAR THE NE CORNER OF THE TIMBER GREAT BASIN.

A complex inter cutting jigsaw of land-tie assemblies was found just east of the Great Basin entrance where there were three timber frontages to retain the basin wall the entrance channel and the Thames frontage not far to the north. As might be expected

a 'cats cradle' of large land-tie assemblies had been built. The majority of the timber was of minimally trimmed oak but some was of second hand ships timbers and even softwood baulks (possible left-over spar timber?) in the extreme NE part of the zone. These N-S hewn conifer wood baulks had been used to retain part of the Thames frontage before relatively recent truncation. At least two phases of work were also visible in the oak assemblies which may relate to the obvious rebuild of the basin and entrance channel frontage. The complex angles at which some of the timbers joined and use of iron ties and grown oak knees meant that the work of ship smiths was much in view as tie bolts and brackets had to be forged to fit individual locations. Interestingly two types of iron bolt were also seen used side by side the 'forelock bolt' secured by a tapering cotter or wedge against a washer and what must have been new-fangled threaded bolts with large square nuts. It is possible that threaded bolts were used as early as the 1690's for heavy carpentry in parts of the roof over St Pauls (J Schofield pers comm.), but they must still have been rare.

Beneath the later mass of large timbers a much slighter NW-SE revetment was round comprised of four small oak piles and pit sawn planking of oak and elm apparently set on the land ward side. In the London area pit-sawn elm plank first becomes common in the 16th century. The stratigraphic position, raw materials and position of the sheathing of this revetment suggest that it might be as early as 16th century (ie Tudor), a possible rare residual element of the earliest Dockyard.

5.5.3.6.4 SOME NOTABLE REUSED SHIPS TIMBER; COMPLEX TESTAMENTS TO THE LATE 17TH TO 18TH-CENTURY SHIPWRIGHTS CRAFT

A few large oak timbers of nautical origin were noted. These included two jointed and rebated land-tie beams found just east of the basin entrance which, after examination and detailed investigation, proved to be the main part of a three part stern post and a rudder itself, from an ocean going ship. Both had the complex, curving rebates needed to accommodate the multiple iron hinges used ('gudgeons and pintles'). A further oak stern post from a large ship was found reused as the main post in a trestle foundation assembly on the west side of the timber Great Basin. Although this example may have been a little later in date. The overall size of these timbers and their form may enable us to identify the types of vessels they came from in due course (Fig 118).

One of the essential skills of the post-medieval shipwright working on large carvel ships, was to bore long and accurate holes for bolts or treenails. In one of the stern posts a major bolt hole only just stayed with in the timber, the shipwright was only a hairs breadth away from ruining the work. Other nautical timbers found included oak frame timbers and light deck beams ('ledges').

5.5.3.6.5 WOODWORK ASSOCIATED WITH LATE 18TH- TO 19TH-CENTURY BRICK PHASES OF THE GREAT BASIN

Lying within the timber basin covering a slightly smaller area was the brick lined Great Basin of built in the 19th century. The battered frontage was similar to that of the later phases of the mast pond but more heavily built. Heavy land-tie beams of slightly trimmed oak logs were squared towards their water ends and passed through cavities in the basin wall frontage, and ended in an iron bracket that held vertical fender posts of c. 0.3m square softwood in position. The latter timbers reduced damage caused by the ships to the walls of the basin. The fendering could be replaced at regular intervals. The land-tie assemblies for the brick Great Basin walls included a few softwood baulks and a distinctive oak strut that runs up from towards the frontage end back in the direction of the anchor stakes.

Several other timber or part timber structures, were found around the edges of the brick Great Basin. In the NE corner two truncated trestle bases were found made of oak, pierced with treenails and with evidence of a vertical tenoned post supported on each side with diagonal bracing. The timbers had a strange double tapered shape in plan and bevelled edges. Close examination showed these trestle sills were recycled ship anchor stocks. Just to the east, in a short square shaft the remains of an oak capstan base c. 1m long by c. 0.5m wide were found with a large worn circular hole. On the west side of the basin near the stone lined half slip, a small masonry feature was excavated that appeared to have been lined with a tropical timber, probably teak which is documented archaeologically from London MID deposits from just after 1800 (Pitt and Goodburn 2003).

Finally, several minimally trimmed oak logs around 0.45m diameter, were found set in substantial post pits cut with in the land-fill behind the brick frontages, these would appear to have been used as anchor points for 'carreening' (leaning ships over by pulling on the masts and shifting ballast) or possibly the bases of simple cranes.

5.5.3.7 Post-medieval woodwork- Key features Area 4, two slipways, box drains, a timber lined tank, Thames river frontage walls fragmentary revetments and surprising elements of the Tudor storehouse

5.5.3.7.1 TWO SLIPWAYS

Two slipways were exposed and planned in the NW part of Area 4 (Nos 4 and 5). In their latest manifestation both had brick sides but these masked earlier side revetments. The easternmost slip was exposed to the largest amount showing the irregular oak sleepers set cross wise in the base. These sleepers were clearly roughed out 'sided' oak timber in the condition that much of it came into the yard and some were second hand nautical timbers. In several areas large iron spikes were found bent over on the surface. The space between the spike heads and surface of the sleepers was 100mm showing that once planking of that thickness, or more, had been laid there. It was possible to excavate a narrow cross section through the slipway base by machine which revealed fairly widely set lines of squared beech and oak piles under two layers of timber set on their faces. The mix of oak and beech piles may hint at two phases of construction. The use of beech suggests an effort to save money as it was generally a cheap material only used sparingly well below the waterline, it has limited rot resistance otherwise.

Once the slipway had fallen out of its original use it was partially covered with ranks of trestles. These comprising a large upright post of reused oak or softwood in some cases. The upright was supported by one diagonal brace spiked into position and many of these were of dense tropical timber. These trestles would have supported floors over the slipway after the closure of the Dockyard. Some of the brace timbers showed signs of the use of unusual fastenings in addition to oak treenails and iron spikes, they had large shallow, circular countersink. These features may well reflect the early use of machine made fastenings in the early to mid 19th century. Some of the bolt washer holes were neatly filled in with oak cask bungs.

To the west about half of the next slipway, just east of the Great Basin was exposed and a small sondage dug through the NW corner. In that corner of the slipway traces of the earlier timber framed side wall could be seen. This took the form of a large oak sill beam with a battered face and mortices set parallel to that face. This implies that the tenoned uprights that once supported the timber planks of the slip sides were set with a batter of between 10–15 degrees. None of the mortices appeared to have been locked with fastenings. Later the slip sides were replaced in brick again the

bottom of this slipway was made of rather irregular sided oak timber and supporting piles of oak were briefly seen. At least one of the piles lifted had a rough tenon cut on its top implying that at least some of the sleepers had morticed lower faces. On technological and materials grounds the dating of this structure might span the 17th to early 19th centuries.

5.5.3.7.2 A TIMBER LINED TANK IN TWO PHASES AND TWO PLANK BOX DRAINS

In the SW corner of Area 4 a timber lined tank-like structure was found of uncertain function. It was clearly built in two phases with the earliest having lining of sawn oak planks nailed to oak piles. Just inside that lining a set of small softwood piles were driven to which knotty softwood planking was nailed, close fitting and on edge. An interesting and unusual feature was found in the NW corner at the bottom edge of the lining. This was a tight fitting planked sluice gate. Towards the top edge of the lining in the NE quadrant lay the remains of a nailed plank box drain of oak and elm that ran to the nearest section of Thames frontage. Further excavation showed that a similar box drain made of elm planks butted the sluice gate and ran north to the Thames frontage. Both were edge nailed with iron spikes and the seams packed with tarred hair ('blair' or 'setwork') in the manner used to waterproof river barges in the 18th century in the London region. To the south was a large oak log set vertically.

It has been suggested that the tank and culvert system might have been used to flush out parts of the Yard but it is difficult to see how enough 'head' would have been generated. Other uses include for treating rigging and sails. On technological grounds a later 17th- to early 19th-century range seems most likely.

5.5.3.7.3 TIMBER THAMES FRONTAGE WALLS

To the north two main sections of more clearly understood Thames river frontage walls were located and small areas explored by targeted excavation. These E-W timber structures were somewhat truncated and mostly quite difficult to access due to many recent intrusions. At least two, probably three, phases of simple land-tie assemblies were found which articulated with the two phases of frontage, one of which had clearly been rebuilt using piles set either side of the original tenoned in posts. Some of the frontages also had front bracing indicating the area was not used at that phase as a working wharf for barges to unload against. All the timbers were of oak including some second hand elements with relict treenail holes etc. The sheathing planking was nailed on to the riverward side of the uprights rather than wedged behind them as is typical of 16th century and medieval style. So on technology grounds a date range in the 17th to 18th centuries with little advancement riverward over the period. The western frontage area was the location for the mouths of the pair of plank box culverts discussed above. In the eastern area a short length of N-S oak box drain was also exposed.

5.5.3.7.4 FRAGMENTARY N-S REVETMENTS

Along the southern part of Area 4 two N-S earth cut ditches were found with disturbed elements of pile and plank revetments in them. These were made of oak piles and pit-sawn oak and elm sheathing planking. In the SE corner of the area a N-S ditch was found revetted on one side, that was up to 6m wide. The function of the feature is uncertain.

5.5.3.7.5 CARPENTRY DETAILS MIRRORED IN THE BRICK WORK OF THE TUDOR NAVAL STOREHOUSE

Close observation of the remaining brickwork of the Tudor Naval Storehouse provided an insight into the carpentry of the building which we can match with details of high status building carpentry elsewhere in the SE. Voids in the brick wall formed

sockets or rather negative impressions, of the joist ends that once lay there. In medieval buildings joists were usually near square in cross section and laid with their widest faces horizontal unlike those of recent building which have a narrow plank-like form and are set on edge. Henry VIII's 'Great Standing' (Also known as Queen Elizabeth's Hunting Lodge) in Essex is one of the earliest buildings to have deep narrow, sawn joists made by pit-sawing. There the large hewn baulks of oak were sawn into slabs which were then trimmed and used as joists. Presumably the same method was used for the joists of the Deptford Storehouse floor which must have had to bear the weight of heavy naval stores.

5.5.3.8 *Post-medieval woodwork- Key features Area 12, revetments, land-ties, and trestle and piled foundations*

5.5.3.8.1 A NW-SE REVETMENT

A NW-SE battered revetment was found to run diagonally across Area 12. From the appearance, stratigraphic position and orientation it is clear that this revetment is a continuation of the latest NNW-SSE revetment from the west side of Area 2 (Above). The uprights were of oak as was the plank sheathing which was spiked to the western, water side (No revetting for the west side of the channel was found). This feature was mainly thought to have been a constructed for drainage purposes.

5.5.3.8.2 LAND-TIES FOR THE BATTERED BRICK WALL

This red brick wall is the same battered brick wall that ran NNW-SEE across Area 2, and had similar unusual openings with in it to allow the passing through of land- ties. Two sets of simple oak log land-ties were seen on the east side of the wall equipped with small lock bars and anchor stakes. The wall clearly truncated the first lower land-tie logs which implies that there was an earlier revetment of some kind. Unfortunately the round timber used was lacking in tree-rings for dating.

5.5.3.8.3 TRESTLE FOUNDATIONS AND SQUARED PILES PROBABLY FOR THE SAME BUILDING

Once the revetted channel had fallen out of use it appears that a large timber building was built to lie west of the battered brick wall. A series of oak trestle frames were set to run E-W across the ditch which appear to have supported the east side of the building whilst a series of large squared oak piles driven on a parallel alignment supported the west side. These load bearing points are widely set and any building supported above them would have to have had strong lateral beams which left little impression. The trestles comprised a simple short sill timber morticed for a short vertical post and having a short curved brace timber on the east side. The tenons were not pegged as they would normally have been in earlier work neither were the trestles supported on piles or any other foundations.

5.5.3.8.4 BRICK WALL PLANK SILLS AND REUSED NAUTICAL TIMBERS

The brick wall footings which spread across Area 12, and indeed much of the rest of the site, were often set on planks of oak which could be fresh planking or reused ship planking. Due to the nature of the brief that most wall foundations be left *in situ* relatively small amounts of these timbers were retrieved. A small section of oak carvel ship plank of the proportions used for such sills was recorded from this area. The distinguishing features here are the patterns of staggered treenail holes, left from fasten it to framing.

5.5.4 Post-medieval woodworking tools and sampled debris deposits

5.5.4.1.1 MARITIME INDUSTRIAL DEBRIS

The value of targeted archaeological investigations of craft and industrial debris associated with London's post-medieval maritime zone has been recognised for several years and productively carried out on some projects (Williams and Brown (eds) 1999). Unfortunately it is clear that Deptford Royal Dockyard was kept remarkably clean with relatively little diagnostic waste or 'Maritime Industrial Debris' allowed to build up compared to the practice evidence in some other Thameside Shipyards Yards. On other sites some groups of debris have been found to be distinctive to particular activities such as rigging block making or removal of underwater sheathing planking etc (eg Pitt and Goodburn 2003 and Goodburn in Divers 2004). Some deposits have also shed light on the details of the gradual mechanisation of shipbuilding from the end of the 18th century. Although small, the debris samples such as fastenings, off-cuts and tar taken at Convoy's Wharf should repay some further examination during the site analysis.

Other material worthy of further analysis includes several tools and fittings that were found both of metal, oak and other timbers species, these include a set of metal dividers from the north part of Area 3, caulking tools, assorted neatly made shoring wedges and a crude oak stirring paddle. Here the Woodwork Specialist would liaise with small finds researchers.

5.6 Tree-ring spot dates

By Ian Tyers, Dendrochronological Consultancy Limited

Fifty-eight samples from timbers excavated from Convoys Wharf, Deptford, London Borough of Lewisham (sitecode CVF10) were submitted for wood identification, or dendrochronological assessment and analysis. This is a very large site previously occupied by Royal naval dockyards from c. 1513 until the mid-19th century. The c. 40 acre site is bounded by the River Thames, Watergate Street, Price Street, Sayes Court, Dacca Street, Grove Street, and Leeway (centre NGR c. TQ 370 782). 44 of the submitted timbers were suitable for analysis. The material contained a wide range of anomalous growth patterns suggesting some of this material was derived from extensively managed landscapes. The sequences from 8 samples were successfully dated, these provide evidence for a timber of Henrician date, a later Tudor timber, two mid-17th-century timbers, and four mid-18th-century timbers. It is possible analysis of additional samples and the provision of phasing information will assist with the dating of some of the currently undated sequences. 2 samples (4885 and 4927) were found to match but were not dated.

The assemblage has a number of unusual features for an excavated group of timbers from London:- It is of an unusually late date for a large oak assemblage, the vast majority of timbers hitherto excavated from London are either from the 1st century or the 11th -13th centuries. There is a very poor success rate, and a remarkable absence of internal cross-matching (only 2 pairs match at a statistically significant level). This aspect possibly suggests that this material is the product of a selection of trees from across a wide area. Typical assemblages of timbers are more similar, perhaps indicating they were derived from felling within a geographically limited area, or within a few areas, of less extensively managed woodland. There is no dendrochronological evidence for non-native material, which is perhaps surprising given the period. The material has unusual rot patterns. This has led to the frequent presence of pale coloured oak heartwood, resembling sapwood (and probably mistaken for sapwood during assessment, however this must be heartwood as it has

microscopic tyloses). This rotting may perhaps have been caused by tidal fluctuations or other periodic wetting and drying.

It is worth noting that if the timbers had been stockpiled by the navy prior to their subsequent use in construction it is possible that all interpretations based on these samples must be treated as *tpq*'s.

5.6.1 Methodology

Each dendrochronological sample was supplied as a complete cross section, it is assumed in the absence of other information that these were obtained from the optimum location for outermost rings or sapwood survival from these timbers.

Each dendrochronological sample was assessed for the wood type, the number of rings it contained, and whether the sequence of ring widths could be reliably resolved. For dendrochronological analysis samples usually need to be oak (*Quercus* spp.), to contain 50 or more annual rings, and the sequence needs to be free of aberrant anatomical features such as those caused by physical damage to the tree whilst it was still alive. Standard dendrochronological analysis methods (see e.g. English Heritage 1998) were applied to each suitable sample. The sequences of ring widths in each sample were revealed by preparing a surface equivalent to the original horizontal plane of the parent tree with a variety of bladed tools. The width of each successive annual growth ring was revealed by this preparation method. The complete sequences of the annual growth rings in the suitable samples were then measured to an accuracy of 0.01mm using a micro-computer based travelling stage. The sequences of ring widths were then plotted onto semi-log graph paper to enable visual comparisons to be made between the sequences and reference data. In addition cross-correlation algorithms (e.g. Baillie and Pilcher 1973) were employed to search for positions where the ring sequences were highly correlated. Highly correlated positions were checked using the graphs and where these were satisfactory, these locations were used to identify the calendar dates of the measured series.

The *t*-values reported below were derived from the original CROS algorithm (Baillie and Pilcher 1973). A *t*-value of 3.5 or over is usually indicative of a good match, although this is with the proviso that high *t*-values at the same relative or absolute position needs to have been obtained from a range of independent sequences, and that these positions were supported by satisfactory visual matching.

The tree-ring analysis initially dates the rings present in the timber. The interpretation of these dates relies upon the nature of the final rings in the sequence. Oak timber contains 2 types of wood, heartwood and sapwood, the latter is on the outside of the tree and thus contains the most recent growth rings, this material is softer and is not always preserved under archaeological conditions. If the sample ends in the heartwood of the original tree, a *terminus post quem* (*tpq*) date for the felling of the tree is indicated by the date of the last ring plus the addition of the minimum expected number of sapwood rings which are missing. This *tpq* may be many decades prior to the actual date that a tree was felled, particularly where poor preservation or other loss of outer heartwood has occurred. Where some of the outer sapwood or the heartwood/sapwood boundary survives on the sample, a date range for the felling of a tree can be calculated by using the maximum and minimum number of sapwood rings likely to have been present. For this material the sapwood estimates used are a minimum of 10 and maximum of 55 annual rings, where these figures indicate the 95% confidence limits of the range.

Identifications of wood type are based on the taking of microscopic thin sections of the timber in three planes (radial, transverse and tangential sections). The comparison of these sections with reference slides, or by identification keys, enables secure identification to be made.

Archaeological samples may have problems of degradation during their burial, or even during their storage prior to identification, this may lead to the loss of one of more critical features that prevent any identification being made.

Hand cut thin sections were obtained from each of these samples. These sections were placed on glass slides and examined at between 40x and 1000x magnification. Comparison with permanent reference slides confirmed the identifications given below. The temporary slides and samples were then discarded.

5.6.2 Results

The submitted material comprised 53 oak (*Quercus* spp.) samples (see Table 25), 4 pine samples (*Pinus* cf. *sylvestris*) and 1 beech sample (*Fagus sylvatica*), see Table 2 for context and sample numbers of the latter 2 groups. Samples 5075 and 5631 were listed on the delivery register but were not present, whilst samples 5071, 5268 and 5633 were present though not listed. 44 of the oak samples contained measurable tree-ring sequences; the other 9 either had too few rings for analysis, or contained aberrant growth characteristics preventing their analysis. The 44 suitable samples were each measured successfully (Table 1). Cross-matching evidence identified that 8 of these individual series were of late medieval, post medieval and early modern dates (Fig 119, Tables 3-10).

The results are presented in the bar diagram (Fig 119), 7 of the dated samples retained either heartwood/sapwood boundaries, or identifiable sapwood, 2 of which were intact to bark-edge.

The dated series mostly cross-match to datasets from contemporaneous sites in London and the south-east of England, although the geographical distribution of strong reference chronologies is rather uneven during this period. These timbers can be assumed to be mostly derived from trees grown in the London, East Anglian, or South-East of England regions.

Fig 119 Bar diagram showing the dating position of the eight dated oak tree-ring samples from Convoys Wharf (CVF10). KEY; bars are labelled with Context. Interpretations are shown for each timber based on the minimum and where appropriate also the maximum typical amounts of sapwood for London oaks, using a 10-55 ring sapwood estimate, heartwood (white bars), sapwood (hatched bars).

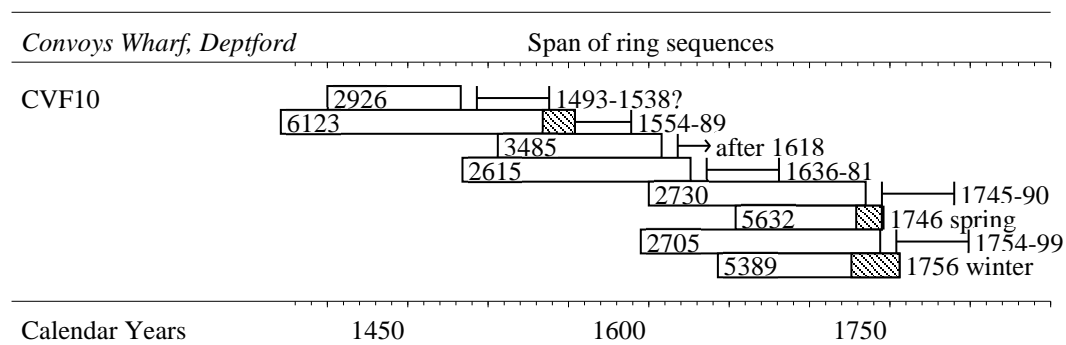


Table 25 Details of the 53 oak (*Quercus spp.*) dendrochronological samples from Convoys Wharf.

Interpretations are given using a 10-55 ring sapwood estimate. KEY; H/S ends at heartwood/sapwood edge, +B bark edge, season indeterminate, +Bw bark edge complete ring, =winter felled, +Bs bark edge partial ring =spring/summer felled, +sB bark edge partial narrow ring =early spring felled. * matched but undated, ^b bad banding preventing analysis.

Context/ sample	Size (mm)	Rings	Sap	Date of measured sequence	Interpreted result
2324 3	480 x 320	105	?H/S	undated	-
2615 14	460 x 260	143	H/S	AD1484-AD1626	AD1636-81
2619 18	255 x 200	128	11	undated	-
2705 158	515 x 275	150	H/S	AD1595-AD1744	AD1754-99
2730 159	540 x 215	136	H/S	AD1600-AD1735	AD1745-90
2765 ?6	145 x 115	~40	1	not analysed	-
2869 31	370 x 320	67	?H/S	undated	-
2926 22	195 x 40	84	?H/S	AD1400-AD1483	AD1493-1538?
3103 67	850 x 380	113	20	undated	-
3104 68	480 x 65	65	8	undated	-
3152 29	400 x 55	~25	-	not analysed	-
3418 26	140 x 115	54	14+Bw	undated	-
3485 35	430 x 80	103	-	AD1506-AD1608	after AD1618
3712 40	460 x 360	121	18	undated	-
3713 41	470 x 360	79	?H/S	undated	-
3947 50	290 x 270	71	18+Bw	undated	-
4023 176	275 x 225	98	18	undated	-
4165 52	340 x 340	60	12+Bw	undated	-
4178 173	375 x 275	81	18+sB	undated	-
4454 36	240 x 170	67	-	undated	-
4460 87	220 x 155	~40	-	not analysed	-
4885 131	275 x 235	66	15	undated *	-
4891 140	345 x 140	62	-	undated	-
4914 145	210 x 150	~75 ^b	-	not analysed	-
4927 130	205 x 180	71	9	undated *	-
4954 180	270 x 230	71	?H/S	undated	-
4957 179	230 x 170	~45	H/S	not analysed	-
4960 177	240 x 230	62	5	undated	-
5000 144	200 x 120	~40	-	not analysed	-
5071 162	560 x 255	161	-	undated	-
5090 106	460 x 420	81	-	undated	-
5234 80	210 x 165	84	-	undated	-
5236 73	185 x 115	99	-	undated	-
5237 78	240 x 120	64	15+Bw	undated	-
5268 98	270 x 230	~25	-	not analysed	-
5269 93	260 x 210	74	-	undated	-
5273 96	230 x 180	~45	?H/S	not analysed	-
5276 95	290 x 240	66	-	undated	-
5389 123	330 x 240	114	30+Bw	AD1643-AD1756	AD1756 winter
5628 60	290 x 240	104	?H/S	undated	-
5630 66	250 x 200	54	-	undated	-
5632 64	250 x 250	92	16+sB	AD1654-AD1745	AD1746 spring
5633 62	260 x 205	56	13+Bw	undated	-
5666 118	260 x 230	78	17+Bw	undated	-
5698 119	365 x 365	83	12+B	undated	-

5903 132	290 x 260	147	?H/S	undated	-
5904 148	485 x 385	104	-	undated	-
5923 72	270 x 240	82	15+Bw	undated	-
6123 108	180 x 180	184	20	AD1371-AD1554	AD1554-89
6135 117	420 x 330	120	H/S	undated	-
6144 175	255 x 250	70	18+Bs	undated	-
6156 109	400 x 30	132	24	undated	-
6453 116	145 x 100	~60 ^b	-	not analysed	-

Table 26 Non-oak timbers from Convoys Wharf

Context/Sample	timber type
3222 32	beech
5946 84	pine
5499 79	pine
2330 77	pine
5500 81	pine

Table 27 Showing example t values (Baillie and Pilcher 1973) between timber 2615 from Convoys Wharf, and reference series.

	2615 14 AD1484- 1626
Essex, Coggeshall project (Tyers 2011)	7.23
Kent, Cobham Hall Gravesend (Arnold <i>et al</i> 2003a)	7.60
Kent, Longport Farmhouse (Tyers 1996c)	6.52
London-Southwark, New British Wharf NBW90 (Tyers 1989)	7.85
London-Tower Hamlets, ToL, White Tower (Miles 2007)	7.60
Surrey, Home Farm, Newdigate (Bridge 1998a)	6.72

Table 28 Showing example t values (Baillie and Pilcher 1973) between timber 2705 from Convoys Wharf, and reference series.

	2705 158 AD1595- 1744
Cambridgeshire, Cambridge Jesus College Nave (Tyers 2006b)	5.61
Kent, Chatham Dockyard Wheelwrights Shop (Bridge 1998b)	6.42
London-Lewisham, Deptford Convoys Wharf 5632 64 (this report)	6.71
Nottinghamshire, Sherwood (Briffa <i>et al</i> 1986)	6.23
Oxfordshire, Old Clarendon Building Oxford (Worthington and Miles 2006)	5.61
Worcestershire, Worcester Cath. (Howard <i>et al</i> 2000; Arnold <i>et al</i> 2003e; 2004)	6.90

Table 29 Showing example t values (Baillie and Pilcher 1973) between timber 2730 from Convoys Wharf, and reference series.

	2730 159 AD1600-
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	1735
Bedfordshire, Bushmead Priory Colmworth (Groves and Locatelli 2004)	5.10
Bedfordshire, De Grey Mausoleum Flitton (Arnold <i>et al</i> 2003c)	5.17
Buckinghamshire, Claydon House Middle Claydon (Tyers 1995)	5.65
Lincolnshire, Bay Hall Benington (Howard <i>et al</i> 1999)	5.54
London-Greenwich, Woolwich Church Road CRQ04 (Tyers 2006c)	6.15
Oxfordshire, Old Clarendon Building Oxford (Worthington and Miles 2006)	5.58

Table 30 Showing example t values (Baillie and Pilcher 1973) between timber 2926 from Convoys Wharf, and reference series.

	2926 22 AD1400- 1483
London-Barking, Abbey Rd Barking barrels (Tyers 2001)	8.19
London-Southwark, Hays Wharf local (Tyers 1996a; b)	7.27
London-Tower Hamlets, ToL, St Thomas Tower (Tyers and Hibberd 1993b)	7.00
Surrey, Witley Church (Tyers 2002)	6.64
Sussex, Crawley Hall at Singleton (author unpubl)	7.66
Sussex, St Andrews Church Ford (Bridge 2000)	9.56

Table 31 Showing example t values (Baillie and Pilcher 1973) between timber 3485 from Convoys Wharf, and reference series.

	3485 35 AD1506 -1608
Hampshire, The Vyne Garden House (Miles <i>et al</i> 1997)	5.05
Lincolnshire, Manor House West St Alford (Arnold <i>et al</i> 2003d)	5.62
London-Hounslow, Osterley Park Stables (Tyers 2009)	5.71
Norfolk, Guntons Farmhouse Garvestone (Bridge 2001)	5.68
Suffolk, Mill House Bridge St Alpheton (Bridge 2002)	5.54
Yorkshire, York Kings Manor (King unpubl data)	6.18

Table 32 Showing example t values (Baillie and Pilcher 1973) between timber 5389 from Convoys Wharf, and reference series.

	5389 123 AD1643- 1756
Buckinghamshire, Claydon House Middle Claydon (Tyers 1995)	6.12
Essex, Cressing Temple Barley Barn (Tyers 1992)	5.86
Hampshire, Winchester (Barefoot 1975)	7.43
Kent, Longport Farmhouse (Tyers 1996c)	5.91
Kent, Manor Barn Great Newstead Staplehurst (Arnold <i>et al</i> 2003b)	6.52
Worcestershire, Worcester Cath. (Howard <i>et al</i> 2000; Arnold <i>et al</i> 2003e; 2004)	5.73

Table 33 Showing example t values (Baillie and Pilcher 1973) between timber 5632 from Convoys Wharf, and reference series.

	5632 64 AD1654- 1745
Bedfordshire, Bushmead Priory Colmworth (Groves and Locatelli 2004)	6.12
Essex, Cressing Temple New House Barn (Tyers 1997)	6.07
Essex, Thaxted Church (Tyers 1990)	5.89
London-City, Fleet Valley VAL88 E/B4.18 (Tyers and Hibberd 1993a)	5.99
London-Greenwich, Royal Arsenal Woolwich RYA99 (Tyers 2000)	6.60
London-Lewisham, Deptford Convoys Wharf 2705 158 (this report)	6.71

Table 34 Showing example t values (Baillie and Pilcher 1973) between timber 6123 from Convoys Wharf, and reference series.

	6123 108 AD1371- 1554
Berkshire, St Marys Church Winkfield (Arnold and Howard 2006)	5.61
Essex, Paycockes House Coggeshall (Tyers 2006a)	6.87
London-Hounslow, Osterley Park Stables (Tyers 2009)	5.83
London-Richmond, Thames Foreshore Old Palace Lane (Hillam 1997)	5.49
London-Southwark, Hays Wharf local (Tyers 1996a; b)	5.94
Surrey, Reigate rear of 43 High St at Singleton (Tyers 1990)	5.42

5.7 The building material

By Ian Betts with Simon Swann (post-medieval plaster)

Table 35 Building material

Material	Count	Count as % of total	Weight (kg)	Weight as % of total
Stone	28	1.85	28737	19.04
Daub	3	0.2	75	0.05
Roman ceramic	205	13.58	20781	13.77
Medieval ceramic*	686	45.43	45470	30.13
Post-med ceramic**	582	38.54	55360	36.69
Mortar	4	0.26	20	0.01
Wall plaster and moulding	2	0.13	451	0.3
Total	1,510		150.89	

* medieval and post-medieval fabrics - most of these are probably post-medieval

** not including weight of large number of brick samples

5.7.1 Introduction/methodology

All the building material has been recorded using the standard recording forms used by Museum of London Archaeology. This has involved fabric analysis undertaken with a x10 binocular microscope. The information on the recording forms has been added to the MOLA Oracle database.

5.7.2 Roman daub

A small quantity of what is probably residual Roman daub was recovered from contexts [2536] and [3283].

5.7.3 Roman ceramic building material

Roman building material was found in the following contexts: [2508], [2536], [2645], [2851], [3075], [3283] and [3778]. It is not certain if any of these were from contexts are of Roman date, but it does indicate Roman building activity somewhere in the area.

5.7.3.1 Fabrics

Early Roman fabrics

Fabric group 2815, fabrics 2454, 3023

Late Roman fabric

2459B, 2453

Undated fabrics

Fabrics 3238, 3291

5.7.3.2 Forms

Tesserae

A total of 110 red and orange tesserae were found in context [3283]. These derive from a plain tessellated floor.

Roofing tile

Fabric group 2815, fabrics 2454, 2459B, 3023, 3238, 3291?

There are a few fragmentary roofing tiles, including a later Roman import into the London area (fabric 2453).

Box-flue tile

Fabric group 2815, fabrics 2454, 2459B

The site produced a mixed assemblage of both combed and relief-patterned (also known as roller-stamped box flue tile. The latter are all keyed with the same wooden roller – die 1 (Betts et al 1994, 65, 74)

Brick

Fabric group 2815

All the brick would appear to be of bipedalis, pedalis or lydion type.

5.7.4 Saxon building material

None.

5.7.5 Medieval ceramic building material

5.7.5.1 Fabrics

Medieval fabrics

2586, 2816, 3036, 3043, 3208

5.7.5.2 Forms

Roofing tile

Peg tile

Fabrics 2586, 2816

A small scatter of glazed medieval peg tiles are present. A few unglazed peg roofing tiles may also be medieval in date.

Ridge tile
Fabric 2586

Peg tile roofs would have been covered at the top by a line of curved ridge tiles, a glazed example of which was found in context [2534].

Brick
Fabrics 3036, 3043, 3208

Three types of medieval brick are present on the site, all of which probably date to the 14th–late 15th century. The first is pink and cream (contexts [2362], [3258], [4635]) fabric 3208) and measures 172–178 x 83–91 x 38–43mm (one brick is 28–30mm). A brick from context [2362] has a worn stretcher face indicating use as paving.

The second are bricks are cream, brownish-cream, pink and brown in colour (contexts [2031], [2857], [2945], [3141] (fabric 3043). These are similar in size and measure 171–187 x 84–90 x 38–43mm.

The third type represented by a single yellow brick (context [2752] measures 73mm in breadth by 35–38mm in thickness. This is a Low Countries import, as are the bricks in fabric 3043 although from a different brickmaking areas. The bricks in fabric 3208, based on their similarity in size, may well also be Low Countries imports.

5.7.6 Post-medieval stone building material

Ashlar

A block of Reigate stone ashlar, of probably medieval or Tudor date, was found in context [5254]

Roofing

There are a number of grey stone roofing slates, including complete examples from context [2861] and [3125]. One slate has an oval nail hole with the corroded remains of an iron nail still *in situ*.

Other possible roofing material is cut from thin slabs of fine grained sandstone.

Paving

There is also stone paving cut from fine grained sandstone, along with other fragments. The stone type of a paving stone from context [5856] still needs to be identified. There is also possible stone paving cut from Kentish ragstone.

Rubble

Present is Kentish ragstone, oolitic limestone, 3116. 3135 stone rubble. Other rubble may be a type of fine grained limestone.

5.7.7 Post-medieval ceramic building material

5.7.7.1 Fabrics

Tudor fabrics

Fabrics 2322, 2324

Later fabrics

1813, 2318, 2850, 2196, 2197, 3078, 3064, 3078

Undated fabrics

Fabrics 2271, 2273, 2275, 2276, 2279, 2586, 2587, 2816, 3090, 3094, 3202, 3226, 3204, 3215, 3217, 3221, 3223, 3234, 3257, 3259, 3281, 3307

5.7.7.2 Forms

Floor tile

The majority of floor tiles are Flemish imports from the Low Countries. There are three tiles of uncertain source, but these too may be Flemish.

Low Countries 'Flemish' glazed

Fabric 2322

There are two tiles measuring 174–177mm square by 21–23mm in thickness with plain green glaze above a layer of white slip. These are probably of Tudor date.

Low Countries 'Flemish' unglazed

1813, 2318, 2850

Most Flemish floor tiles from the site are unglazed, including most of the tiles found in the *in situ* areas of flooring. Where present the nail hole is generally square or rectangular. There were probably two nail holes in each tile in diagonally opposite corners. Most floor tiles were also made with the same slightly silty clay (fabric 2850). These tiles are probably of late 16th–18th-century date. Two main size groups are present:

205–207mm square by 31–32mm thick

249–253mm square by 30mm thick

One slightly silty tile (context [3140]) has an area of glaze on the top surface, but this seems to have been accidental rather than deliberate.

Uncertain source

Fabric 2324

A very worn glazed floor tile of uncertain source was found in an unstratified context (fabric 2324) and an unglazed tile is context [4880] (fabric 3092). Another tile in the latter fabric (context [1154]) is so worn it is not possible to say whether it was ever glazed or not.

Tin-glazed

Fabrics 2196, 2197, 3078

There are three tin-glazed floor tiles from the site. The earliest is probably a so-called medallion tile showing what appears to be a dog surrounded by a multi-circular border ([5790] <690>. The tile is slightly unusual in being painted in blue with just a solitary brownish-yellow circular border line. It is more normal for medallion tiles of this type to be painted in polychrome. There are similar animal tiles but these are have oriental Wan Li corner motifs. The brownish-yellow border suggests the tile was made at the Pickleherring pothouse in Southwark around c 1618–1650. Similar London tiles are illustrated by Betts and Weinstein (1920, 100–103, nos 56–65).

Part of a well preserved polychrome floor tile with a fruit and flower design ([+] <629>). Tiles of this type, although painted in slightly different styles, are know from various London sites (Betts and Weinstein 2010, 108–109, nos 104–106). They were probably made at the Pickleherring pothouse in Southwark in c 1618–1650

From context [6013] <630> is a small part of the so-called Tudor-rose pattern, the most common design found on tin-glazed floor tiles in London. This tile was probably made at either the Pickleherring or Rotherhithe pothouse around c 1618–1650. A complete tile with this design is illustrated in Betts and Weinstein 2010, 111, no 111).

Wall tile

Tin-glazed

Fabric: 3064, 3067, 3078

There are five delft wall tiles from the site.

[2945] <113>

Sea creature: possible fish or crudely drawn dolphin painted in blue on white. Sea creatures are only found on Dutch tiles, most commonly those dating to the second half on the 17th century, which is probably the date of the CVF10 example. Blue on whit tiles with similar sea creatures are illustrated by Schaaps et al (1984, 146–151, nos 182–196). Such tiles are not common in London although they have been found, among other places, at King Edwards Street, Laurence Pountney Lane and Lambeth Road (Betts and Weinstein 2010, 168–169, 388–392). Tiles with sea creatures would have been most appropriate for a Convoys Wharf dockside building.

[2767] <111>

Small fragment showing what may be part of a building or ship painted I blue on a pale blue background. The pale blue background suggests it may be an English tile of the 18th century.

[2767] <112>

A small part of a Dutch blue on white delft tile show part of a sailing ship. The treatment of the sea is very similar to depictions of mid 17th–18th-century costal vessels illustrated by Schapps *et al* (1984, 145, no. 181) and Sabben and Hollem (52, nos 144, 152). Tiles depicting sailing vessels are not common in London by the CVF10 example bears a close resemblance to two Dutch tiles dating to 1650–80 which are believed to have come from a building in London (Betts and Weinstein 2010, 158–159, nos 343–344).

[5254] <501>

A purple on white tile showing part of a figure in a landscape scene set in a circular border. This may be either a biblical or landscape tile. This could be a Dutch or English tile of the 18th century.

[5889] <502>

The edge of a blue flower vase design with what may be a blurred blue corner a bluish-white background. A tile with a more complete version of this design was found on a Dutch tile from King Edward Street, London. The King Edward street tile is thinner (7mm) than the CVF10 tile (12mm) suggesting that it is slightly later in date. later. The CVF10 tile probably dates to around 1630–1660 date.

Roofing tile

Peg tile

Fabrics 2271, 2273, 2276, 2586, 2587, 2816, 3090, 3226, 3204, 3234

Large numbers of post-medieval peg roofing tiles were found on site, some incorporated into walls and other structural features. These are mostly of two round, square and diamond hole type. Most are in London-area fabrics, but there are a number of peg tiles in non-London fabrics (types 3204, 3234).

Slightly more unusual are two tiles with just a single round nail hole. It is probably that these were meant to have two holes but the second hole was accidentally missed out.

Pantile

Fabrics 2275, 2279, 2587, 3090, 3094, 3202, 3259

A unique feature of the site is the presence of brown glazed pantiles. Glazed pantiles are relatively rare in London, and those which do exist have either black or occasionally a purple glaze.

Pantiles rarely survive intact but there are a few part complete examples from contexts [1993], [2876] and [5419].

Ridge tile

Fabrics 2276, 2586

Post-medieval peg tile roofs would have been covered curved ridge tiles, a few fragments of which were identified on site.

Hip tile

Fabric 2271

A rare survival in context [5803] is a complete hip tile. Strangely, there are no other hip tiles identified from the site, although small fragments could easily be mistaken for peg roofing tile.

Gutter tile?

Fabric 2586

A small fragment of concave shaped roofing tile (context [3494] could be a gutter tile. Alternatively, it could a simply a piece of peg tile which bowed during firing.

Brick

Fabrics (2587–now 3307) 3032, 3033, 3042, 3043, 3046, 3065, 3215, 3217, 3221, 3223, 3257, 3281, 3307

A large number of post-medieval brick walls were present on site. Various period of brick construction seem to be represented, but exact dating will require more detailed stratigraphic analysis of the various brick features.

Initial analysis indicated that the bricks are a mixture fabric types commonly found in the London area and other fabrics which are rarer in the capital. The former were probably made in brickyards close to the City whilst the other types probably originated elsewhere, perhaps somewhere in the Deptford area. Two Victorian or later bricks in Area 4 (context [1613]) have what may be an anchor symbol between appears the letters W H in the base of the frog, whilst another frog (context [1280]) has the letter M with a blurred letter/number to the right. Other Victorian, or later, bricks have pressure marks on their stretcher face indicating how they were stacked to allow drying before being fired

The earliest bricks are of Tudor date. Two sizes are present suggesting their may have been two phases of building. Some bricks have 'glazed' header end suggesting they may originally have formed part of a decorative diaper pattern.

Most of the other bricks are of 17th, 18th and 19th-century date. There is also evidence of reuse of earlier bricks in later brick structures.

There is little evidence for any elaborate brick architecture with the exception of a carefully cut brick found unstratified on the site ([+] <689>). This may have formed the corner of a decorative brick plinth.

Drain pipes

A socketted stoneware water pipe with a brown glazed interior, exterior and end area was found in context [5419]. A large *in situ* brown glazed water/sewer pipe in Area 4 (context [2168]) was marked 'DALTON LAMBETH'.

5.7.8 Post-medieval plaster

By Simon Swann, Simon Swann Associates

5.7.8.1 Methodology

Inspection: mainly by visual inspection with some use of x10 magnification.

Note all materials characterizations' are based on assumption and not chemical testing. References to 'gypsum' imply type A gypsum casting plaster or Plaster of Paris.

Context [5867]

Most samples appear to be *in situ* run moulding, probably a cornice, but with no cast enrichments. The plaster materials used in all coats appears to be gypsum rich mortars (possibly with some lime content, and with some fine aggregates. The assumption about 'gypsum based material' is based on the qualities of the material samples, particularly the light weight and the sound the material makes when tapped.

The run moulding is made up in successive coats of mortar, applied in consecutive coats, possibly applied 'fresh on fresh' (i.e. with no drying time between coats), with a fine 1mm (or less) thick surface finish coat. Trowel marks indented into the surface of initial coats, not only push the plaster into the corner but may also be intended to act as 'plaster keys'.

There is at least one interesting ferrous rich inclusion in at least one sample, the origin of this ferrous material is uncertain.

The significant 90 degrees shape and straight surface to the back of the finds would indicate that the *in situ* run moulding has been applied to already plastered surfaces, (i.e. typically at junction of wall and ceiling).

There is a trace of possible white/off white surface decoration on some of the samples surfaces, this is probably limewash (calcium carbonate, applied as lime, i.e. calcium hydroxide, and allowed to carbonate) or distemper (calcium carbonate, in the form of fine crushed chalk/whiting applied in a medium of animal glue/size, distemper may also contain pigments as can limewash).

Probably 19th-century run cornice, medium quality, probably not associated with any other plaster decoration in the room, or just a simple cast ceiling rose.

Context [5867]

Most mouldings are consistent with findings described above, but this includes samples of another flatter moulding, which has been pre-cast and applied to plaster.

One section of the cornice moulding shows signs that it has been applied to plaster rather than '*in situ*' run, this may be a repair section or a small area that was undertaken in this way to facilitate work. In some cases mouldings were 'bench run' and then applied to walls, rather like 'cast elements' being applied to plaster walls or ceilings, but the process of making these mouldings would be to run the moulding on a bench, rather than *in situ*, and then apply the moulding to the wall. Typically this was done with gypsum rich mixes and the technique was probably not used before the 19th century.

The finding of a flatter pre-cast moulding may indicate that other plaster mouldings were present within the scheme.

Unstratified <60>

This sample is not typical of the other samples in this series but may be of the same date.

The sample consists of a cast scroll or bracket measuring 60 x 140 (wide) x 100mm. It is evident that the casting has been applied to a background with adhesive mortar (probably gypsum plaster). There are two sections of narrow wood lath embedded into the back or base of the casting, to act as re-enforcement or strengtheners. Each measures about 90mm in length and the ends can be seen on the surface of the casting, where they just stick out of the casting as a result of surface erosion. Laths were often used to re-enforce or strength castings, typically in the 19th century but possibly also in the 18th century. This system of re-enforcement was later developed to give rise to a new system of plaster which was called Fibrous plaster, in which gypsum plaster panels were constructed in the workshop and in reverse moulds, using timber battens and hessian as the main structuring materials. These panels could be plain, coved or ornamental or may just be cornices, but were very light weight in construction. These panels were then fixed on site to form the required plaster ceiling or dome or similar. Fibrous plaster was developed in the mid 19th century but became more commonly used towards the end of the 19th and early 20th centuries, it is distinctly different from typical lime and lime gypsum plaster which is often referred to as 'solid' plastering as opposed to 'Fibrous plaster' (because this is a thin plastering system). It is commonly employed in public buildings from the turn of

the 19th and early 20th centuries. It is still used today. This find is clearly not fibrous plaster

Materials used in the mortar for this cast appear to be lime gypsum blend, with a consistently fine texture, and air bubbles (surface pitting) apparent on the surface: implying that it was cast as a liquid or semi liquid material.

Significant traces of surface decoration/layers present, which have been so over applied as to obliterate or disguise surface detail of casting in places. A thick coating of a grey blue distemper or similar is visible and this has been over painted in gloss oil paint, probably with at least three coats.

5.7.8.2 Conclusion

These plasters would appear to be of 19th-century date, most being relatively simple in design would imply simple or less high status building design. The unstratified moulding (<60>) may have a different origin to the others in this series of finds.

5.8 The Roman pottery

By Beth Richardson

5.8.1.1 Introduction

All Roman pottery, stratified and residual, was spot-dated from the site: 36 sherds (from an estimated 25 vessels) from 13 contexts. All the contexts are small, some containing only one or two sherds. The Roman pottery was residual in six contexts. One context ([3598]) contains a sherd from an early Iron Age jar.

Most of the pottery is worn and abraded with a small sherd size, reflecting the possible redeposition of material and riverine nature of the site. The largest Roman sherds came from one context, [2508], dated c 160–250 AD.

The pottery was spot-dated using standard MOLA methods. It was quantified by sherds, weight and estimated number of vessels (ENV). The data has been entered into the MOLA Oracle database.

5.8.1.2 SUMMARY/DISCUSSION BY DATE

The single prehistoric sherd is from a jar. It is predominantly flint-tempered, with smaller amounts of organic temper in a silty matrix. With no rim, decoration or other characterising features it is difficult to date with precision, but is likely to be late Bronze Age/early Iron Age (c 7th–5th century BC). It was found in the fill of a pit ([3598]).

The discovery of even such a small quantity of Roman pottery on this site is important as, with the exception of the Greenwich Temple/Shrine site which has not been fully excavated (Sheldon and Yule 1978, 311–17; Birkbeck College/Time Team in prep) there are very few known roman sites in this area of south-east London. There is thought to be a Roman settlement on or near the site of Woolwich Arsenal ,where a cemetery dating from the 1st to the 4th centuries has recently been excavated (Brown 2002 307–9; Ford and Wilkinson in prep) and at Blackheath where cremation urns and burials were discovered in the 18th- and 19th-centuries (Brown ibid, 305–6). Most interestingly there is also thought to have been a Roman settlement in Deptford in the vicinity of Convoys Wharf, to the south of where the Roman road of Watling Street is thought to have crossed Deptford Creek; fragments of a tessellated floor and possible foundations have been found in the grounds of

Trinity Hospital (Brown *ibid*, 305) and recent trial excavations also in the grounds of Trinity Hospital by MoLAS and the Trust for Wessex Archaeology recovered a few sherds of Roman pottery but no structural remains. During the excavations at the East India Company docks 200m east of the site, pottery of c AD 70–160 date was recovered from reworked brickearth and early Roman pottery from the underlying gravel deposits, but no evidence for the road or any other structures of Roman or earlier date was identified (Divers 2004, 20). The Roman pottery from Convoys Wharf should be evaluated against this general background.

The date range of the Roman pottery is mixed. Two 1st-century sherds from a small jar with a thickened out-turned rim and round body (MOLA Form 2B) are from a levelling context [3121] and may be residual, although the sherds are in fresh condition. Some base sherds from a Highgate C ware jar are likely to be late 1st or early 2nd century (context [3400]). There are also one or two 1st- or early 2nd-century sherds in later contexts (eg [3596]) which also contain late 2nd or early 3rd-century pottery. A sherd from a South Spanish Baetican olive oil amphora ([3305]) may also be 1st century although this common amphora type is also common in the second century. It was redeposited in a fill around a post-medieval drain.

The largest Roman pottery context came from the fill ([2508]) of a curved ditch which contained the only skeleton found on the site. The context is dated 160–250 by an East Gaulish samian cup (form Oswald and Price LV/13) and sherds from Alice Holt and Dorset black-burnished ware dishes and jars. The samian cup sherd is large (almost half the vessel) and is pierced with a post-firing hole possibly part of a mend for a rivet) near the break. If this vessel is associated with the burial, it is also possible that it was a deliberate burial tradition disfigurement, rendering the cup unusable. There is also a large rim sherd from a cupped -mouthed flagon in an oxidised fabric, possibly originating from Kent or Essex kilns.

There is a small amount of pottery of a similar date from [3596] and (residual) in [5491].

There are sherds from two unusual imported vessels, a dish in a white possibly Rhenish (East Gaulish) fabric and a very micaceous jar. Both are residual in post-medieval contexts.

Four contexts were on the gravel headland overlooking the marsh and river: [2508], [2536], [2851], [1187]. Context [2508] (discussed above) is late 2nd to 3rd century in date. The other headland contexts contain single sherds of 1st to 2nd century pottery.

Eight contexts are near the edge of the headland. One, a layer of alluvium [3596], contains late 2nd to 3rd century pottery broadly the same date as ditch-fill [2508]. The others contain single sherds of 1st to 2nd century pottery or residual pottery with later medieval and post-medieval material.

5.9 The medieval and post medieval pottery

By Nigel Jeffries

5.9.1.1 Medieval pottery (c 900–1500)

5.9.1.1.1 INTRODUCTION

Comprised 74 sherds from up to 31 vessels (ENV, weight 1480g), this text considers the medieval pottery retrieved from 16 of the 175 contexts with pottery from this site. Up to seven sherds in contexts [1221], [2311], [2861], [3283] and [4635] appear residual, having been found alongside later post-medieval pottery.

Retrieved in 11 contexts (see Table 36), the remaining 67 medieval sherds were therefore found in isolation and appear indicative of medieval landuse broadly dated to the 11th and 15th centuries. Up to 40 of the 67 sherds are related to one vessel - a coarse border ware (CBW) large rounded jug in [3060] - leaving 27 small-sized, fragmented, sherds with little potential and significance beyond characterising the deposits it was found in and providing limited dated evidence of medieval landuse in Thameside Deptford.

Table 36 Medieval pottery from CVF10 by context, sherd count and dating applied

Context	Sherd count	TPQ	TAQ
[1558]	1	1050	1150
[1892]	1	1270	1500
[2518]	2	1270	1500
[2519]	1	1170	1350
[2536]	2	1270	1500
[2645]	4	970	1100
[3060]	40	1340	1500
[3472]	1	1050	1150
[3586]	1	1240	1400
[5491]	11	1270	1350
[1080]	1200		

5.9.1.1.2 METHODOLOGY

The medieval pottery from this site was examined macroscopically, using a binocular microscope (x 20) where appropriate, and recorded on paper and computer, using standard Museum of London codes for fabrics, forms and decoration. The numerical data comprises sherd count (SC), estimated number of vessels (ENV) and weight (by grammes) and entered onto the ORACLE database.

5.9.1.2 Post-medieval (c 1500–1900)

5.9.1.2.1 INTRODUCTION

Comprising 903 sherds in 159 contexts (596 ENV, 30540g), with the post-medieval pottery broadly dating from the mid-16th to the end of the 17th century. This text therefore evaluates the character and the date range of the assemblage with reference to the development of the Royal Naval Dockyard that stood on this site, and will determine the research questions this material can address while identifying areas of further work.

It is important to note, however, that only contexts that have a low analysis potential have been spot dated and considered (see 5.9.1.2.2) and a significant quantity of this material remains to be catalogued. This comprised most of the medium (between 30 and 99 sherds) and all the large (100 and 499 sherds) and very large-sized groups (500 sherds plus) retrieved.

This assemblage can be further sub-divided by size, as determined by the quantities of sherds present in each of the 159 contexts in which this material was found (Table 37). Statistically viable groups (MPRG 2001, 19) therefore contributed up to 273 of the 903 sherds of post-medieval pottery, retrieved in five contexts.

Table 37 Statistically viable post-medieval pottery groups from CVF10 by context, size, number of sherds and landuse

Context	Medium (M), or Large-sized (L)	No. of sherds	TPQ-TAQ	Basic interpretation
[1198]	M	45	1830–60	Demolition spread
[1281]	M	Scanned only	1820–30	External dump
[1366]	M	Scanned only	1807–30	
[3088]	M	30	1590–1650	
[4879]	M	Scanned only	1820–30	Cesspit
[4880]	VL	Scanned only	1820–30	Cesspit
[4952]	VL	Scanned only	1720–40	Cesspit
[5107]	VL	Scanned only	1820–30	Cesspit
[5439]	M	48	1740–60	Structural
[5803]	M	Scanned only	1600–50	Pit
[5804]	M	Scanned only	1600–50	Pit
[5806]	L	Scanned only	1630–50	Pit
[5935]	L	Scanned only	1701–11	Cesspit
[6013]	L	Scanned only	1612–30	Occupational Layer
[6054]	VL	Scanned only	1850–80	Well
[6405]	M	80	1630–50	Cesspit
	<i>Total</i>	<i>273</i>		

With most of the medium and all of the large and very large-sized groups remaining un-assessed, the remaining contexts with post-medieval pottery are characterised by small-sized often fragmented groups, with Table 38 displaying similarly matched sherd to vessel count ratios per context.

Table 38 Post-medieval pottery by statistical averages per context

No. of contexts	Total no. of sherds/ENV/weight (in grammes)	Average no. of sherds (per context)	Average no. of vessels (per context)	Average pottery weight per context (in grammes)
159	903/596/30540	5.6	3.7	192

5.9.1.2.2 METHODOLOGY

The post-medieval pottery from this site was examined macroscopically, using a binocular microscope (x 20) where appropriate, and recorded on paper, using standard Museum of London codes for fabrics, forms and decoration. The numerical data comprises sherd count (SC), estimated number of vessels (ENV) and weight (by grammes) and was entered onto the MOLA ORACLE database.

As noted not all the post-medieval pottery was catalogued during this phase of work and contexts [1281], [1366], [4879], [4880], [4952], [5107], [5803], [5806], [5935], [6013], [6054] and [6405] were not spot dated. These contexts contained the largest-sized and better preserved post-medieval pottery groups from this site and the tasks needed to catalogue and then analyse this material is instead determined below. Table 37 demonstrates that most of these groups were recovered in cesspit features in Area 5.1, which, importantly, can be related to buildings which housed the professional managers offices and dwellings marked on the 1698 dated 'A survey and description of the Principal Harbours with their Accommodations and Conveniences' for the Dockyard.

5.9.1.2.3 FABRICS AND FORMS

Up to 903 sherds of post-medieval pottery was found in 159 contexts. Table 39 shows the pottery divided into 12 categories by broad sources of supply: Surrey-Hampshire border wares (BORD), London made 'coarse' redwares (COAR), London made tin-glazed wares (DELF), Essex made 'fine' redwares (FINE), imported wares (Continental, far-eastern and other), industrial finewares (INDF), non-local earthenwares (NLOC) and stoneware (fine and coarse). Fabrics in the COAR group provide the most common source of supply to this site by sherd (SC 25%) and estimated vessels count (23.3%).

Table 39: Ware types for the post-medieval pottery found from CVF10 by sherd count, estimated number of vessels (ENV) and weight (in grammes)

Ware type	No of sherds	No of sherds as %	ENV total	ENV total as %	Weight (in grammes)	Weight (as %)
BORD	84	9.3%	50	8.3	2157	7.0%
COAR	226	25.0%	139	23.3	12100	39.6%
DELF	121	13.4%	78	13.0	1514	4.9%
FINE	61	6.7%	41	6.8	1549	5.0%
IMPC	144	15.9%	76	12.7	6601	21.6%
IMPF	29	3.2%	20	3.3	280	0.9%
IMPO	5	0.5%	3	0.5	114	0.3%
INDF	153	16.9%	127	21.3	2454	8.0%
MISC	6	0.6%	3	0.5	765	2.5%
NLOC	31	3.4%	24	4.0	767	2.5%
STNF	9	0.9%	9	1.5	21	0.06%
STON	33	3.6%	25	4.1	2199	7.2%
Total	903	100%	596	100%	30540	100%

The various fabrics and forms that characterise this pottery assemblage are discussed below, however not all the contexts with pottery can be specifically tied the headings related to the various phases of the Dockyard (below, 5.9.1.2.4 and 5.9.1.2.5) as the pottery comprised longer lived fabrics and forms that did not allow for precise chronological refinement.

5.9.1.2.4 CERAMICS RELATING TO THE TUDOR (1513–1603) AND STUART DOCKYARD (1613–1714)

Contexts [332], [352], [1064], [1679], [1852], [1854], [1858], [1993], [2024], [2036], [2311], [2457], [2459], [2547], [2749], [2752], [2819], [2857], [2859], [2876], [2941], [2990], [3075], [3085], [3088], [3149], [3211], [3212], [3216], [3261], [3263], [3235], [3254], [3257], [3125], [3452], [3524], [3609], [3645], [3910], [4435], [4635], [4729], [5806], [5428], [5434], [5496], [5676], [5726], [5803], [5804], [5806], [5935], [6013], [6213], [6327], [6405]

Landuse dated by pottery to c 1513–1714 is well represented on this site, and contributes 57 of the 159 contexts (469 of the 903 sherds). This sequence includes three of the medium (in [3088], [5803], [5804] and [6405]) and three of the large-sized groups found (in [5806], [5935], and [6103]: above, Table 37).

With most of the contexts with pottery having a c 1580 or later *terminus post-quem* applied, then materials pertaining to the first three quarters of the 16th century and to the foundation of the Tudor Dockyard are not therefore frequent with only 15 sherds found in deposits precisely dated 1580–1610. The pottery here contains four of the different constituents marking the introduction of major sources of supply of utilitarian pottery to the capital: delftware (fabric code TGW) and redwares (PMR) made in London, the white-fired pottery made on the Surrey-Hampshire border wares (BORD) and the Essex made ‘fine’ red earthenware (PMBL and PMFR). Overall the various fabrics that make up the ‘coarse’ redware products of the London-type ware industry (COAR, above Table 39) made in pothouses located in Woolwich (Prior & Blockley 1978), Deptford (Divers 2004) and London’s Southbank are most commonly represented, usually in utilitarian forms such as bowls, dishes and storage jars.

Sequences dated by pottery to the 17th-century Stuart Dockyard were isolated by the presence of the various products of Southwark’s Delftware pothouses (DELFT, above Table 39) and where possible these have been further catalogued according to the decorative styles employed to characterise the products of this industry (Orton 1988; Orton and Pearce 1984). Dating contexts c 1630–80 was achieved by the presence of sherds polychrome dish or chargers and drug jars in delftware styles dated to the second quarter of the 17th century (TGW D), or tin-glazed wares with plain white glaze (TGW C). 228 of 429 pottery sherds are dated to a 70 year period. Perhaps the most significant ceramic on site is the right paw of a delftware ‘cat jug’ figure in [6013] (<623>). Only the third example archaeologically retrieved in London, a complete ‘cat jug’ exists in the Museum of London’s core ceramic collections (MOLA 6326: see Britton 1987, fig. 79, 126) with dated examples noted by Britton between 1657 (in the Fitzwilliam Museum) and 1672 (*ibid*, 126).

This phase also contained a range of Continental imports. In addition to the ubiquitous Frechen stoneware (FREC) *Bartmanner*, which includes a near complete jug with an unusual medallion in [5428], there are significant groups of Spanish sourced amphora (SPOA) or olive jars (e.g. in [2857]) together with a few Seville sourced green-glazed (SPGR) bowls and starred costrels (STAR). The exact kiln source of these olive jars or amphora remains to be established.

These sources are supplemented by post-medieval black-glazed ware (PMBL) drinking vessels, made at kilns around Harlow in Essex (and one of the sources responsible for the dating contexts after c 1580 here) and describes vessels covered inside and out with a lustrous black glaze found as cylindrical and flared mugs. Essex-type post-medieval fine redware (PMFR) are less frequent of the two Essex types (FINE, above Table 39), found here mostly in mug and jug forms. The white fired products Surrey-Hampshire border wares, a common source of supply among London’s ceramics assemblages during this period, is not particularly well represented here in comparison to contemporary sites from the City of London and Southwark.

Only a few contexts with small-sized groups of pottery can currently be related to the development of the area during the last quarter of the 17th into the first quarter of the 18th century. The *post terminus-quem* of these deposits has been arrived through the later decorative styles (fabric codes TGW F and TGW H) and forms (plates and

flanged rounded bowls) applied to delftware. Pottery dated to this sequence does, however, include a large-sized (scanned) group of significance retrieved in the backfill of cesspit [5935] and dated to the first two decades of the 18th century. This assemblage includes smashed delftware plates and Chinese porcelain teawares. The amount of imported pottery from the Far East (IMPF in Table 39, above) will significantly increase as this material is well represented among this, and the other, scanned groups of pottery noted in Table 37.

5.9.1.2.5 CERAMICS RELATING TO THE GEORGIAN AND REGENCY DOCKYARD (1714–1837)

Contexts [312], [349], [1221], [1281], [1325], [1364], [1373], [1379], [1462], [1871], [3420], [4952], [4879], [4880], [5107], [5439] and [5878]

Up to 18 contexts with pottery from this site can be related to the Georgian and Regency Dockyard and include nearly all the significant large to very large pottery groups in Table 37. Discarded during the second quarter of the 19th century, these discrete groups in Area 5.1 are from features that once served the buildings which housed the professional managers offices and dwellings - for example the surgeon, clerk of surveys and clerk of cheques - as marked on the 1698 dated 'A survey and description of the Principal Harbours with their Accommodations and Conveniences' for the Dockyard. The earliest group is a large collection of pottery in cesspit fill [4952] dated to the second quarter of the 18th century comprising smashed matching delftware plates and large quantities of Chinese porcelain tea and dining wares.

The remaining four assemblages related to these buildings were also similarly in the abandonment sequences of a number of cesspits ([1281], [4879], [4880] and [5107]) and characterised by the mass-produced durable, refined earthenwares (such as creamware and pearlware etc), and later the various kinds of ironstone chinaware and so on made from the mid 18th century by the Midlands pottery industries. Together with the overwhelming success of transfer-printing as a major force in the field of decoration, this combined to transform the production, marketing and use of pottery in Britain. The pottery in [4880] is particularly worthy of note comprising matching blue transfer-printed pearlware teacups, saucers and plates (Wild Rose, Dresden Flowers and Willow pattern all feature), plain creamware dinner and serving services in addition to pearlware plates with blue shell-edged rim pattern, various refined whiteware with industrial slip decorated jugs and mugs and large quantities of later 18th-century dated Chinese porcelain. The dominance of matching services suggests a wealthy household and is similar to contemporary groups discarded by wealthy silk manufacturers of Spitalfields (Holder and Jeffries et al, in prep).

5.9.1.2.6 CERAMICS RELATING TO THE VICTORIAN DOCKYARD (1837–1869)

Contexts [1198], [1199], [5801], [5419], [5872] and [6054]

The majority of the pottery sherds pertaining to the Victorian period were recovered in cesspit fill [6054], a well preserved group possibly related to a clearance of vessels and other household stock prior to the closure of the Dockyard in 1869. This group comprises whiteware with blue-transfer printed dinner plates decorated with the Albion, Eton College, Filigree and Willow pattern prints. Coloured transfer printed mugs decorated with the Rhone and Rhine patterns with other printed wares characteristic of the designs used after the mid century also feature. Plain whiteware hygiene and sanitary wares with yellow ware rounded bowls and a variety of different English stoneware blacking and ginger beer bottles complete this group.

The remaining five small-sized groups of pottery can be dated to the second half of the 19th century, most likely to the second to third quarters through the presence of

refined whitewares decorated with various ‘new’ coloured transfer-prints (i.e. red, green or mauve colours etc) found on teawares. It remains difficult to interpret these groups; the pottery is fragmented and because most contexts did not contain anymore than up to 10 sherds or so and no overall patterning can be observed in terms of both wares and vessel types present. This suggests this pottery was derived from disturbed landuse, representing a more incidental and accumulative discard of (redeposited) materials.

5.9.1.2.7 DISCUSSION

The pottery assemblage from CVF10 is informative enough to provide further updated research aims for this site. On one level, the post-medieval presents a consistent chronology for the recorded landuse with a clear cluster of occupation c 1580–1710. Much of the material related to the Tudor and Stuart Dockyard is from small-sized groups, with an emphasis on London made redware (PMR) in bowl, dish and storage jar forms and Frechen jug and Spanish olive jars used as liquid containers rather than cooking vessels.

Most of the groups relating to the Georgian and Victorian Dockyard period, in particular those in [4879], [4880] [4952], [5107], [5935], [5107] and [6054] provides much of the focus of any discussion and further work for the post-medieval pottery assemblage. Indicative of a discrete clear out of more complete pottery, the combination of the fabric, forms, and decoration suggests these groups may have been discarded as one event, or as a series of closely linked events, and so fits the model proposed by Pearce for the ‘classic’ clearance group (2000, 144–145), which she defines as being:

‘A closed deposit of deliberately discarded, everyday household artefacts, with little evidence of chronological contamination, representing the final fill of a substantial cut feature such as a cesspit, well or cistern, in which the contents are preserved as a discrete assemblage (*ibid*, 144).’

In these deposits are creamware and pearlware, both of which had been introduced during the mid to late 18th century, continuing in production well into the next century with dining, tea drinking, and pottery for general use in the kitchen featuring.

5.9.1.2.8 ASSESSMENT WORK OUTSTANDING

Due to various constraints, various pottery groups (in [1281], [1366], [4879], [4880], [4952], [5107], [5804], [5806], [5935], [6013] and [6054], above, Table 37) with the highest potential for further work remains to be assessed. These largely contained Regency dated material that comprised a large selection of either complete or reconstructable Chinese porcelain and factory-made refined earthenwares of the types that provided the mainstay of production in the Staffordshire Potteries and other centres in the Midlands and north of England from the mid-18th century. The tasks required to complete the work on these important and significant groups is, however, provided below.

5.10 The bulk glass

By Lyn Blackmore

5.10.1.1 Introduction

All the bulk glass was examined macroscopically and recorded directly onto the MOLA Oracle database using standard Museum of London Archaeology codes for fabrics, forms and decoration, based on bottle forms defined by Dumbrell (1983) and

Noël Hume (1969). The numerical data comprises sherd count, estimated number of vessels and weight. The finds are from 60 contexts and fill nine standard 'shoe' boxes; they include one complete wine bottle and c 10 other complete items.

5.10.1.2 Categories by dating and materials

5.10.1.2.1 GREEN GLASS WINE, SPIRIT AND SPA BOTTLES

The green glass wine bottles found on the site include examples dating from the 17th century onwards, although later 18th- and 19th-century types are more common. The earliest form is the shaft-and-globe bottle, dating from c 1650–1680, with two examples, and a fragmented bottle from [6013]. Seven finds were recorded as shaft-and-globe/onion bottles, including a complete rim/neck found in [1679], while eight were recorded as probable onion bottles (1680–1730). One find could be an onion or mallet bottle, while five are probable mallet bottles (1725–60). Squat cylindrical bottles (1740–1830) are limited to two possible examples. Early cylindrical bottles (1735/50–1830) are the most common group with sherds from 18 bottles, of which 10 are from cesspit [5107] and others are from cesspits [4880] and [6054]; most are of standard size but one is a half bottle with a base diameter of only 55mm. Machine-made cylindrical wine bottles (from 1780) are the second most common type, with 10 examples, of which nine are from [6054]. Other forms include part of an octagonal bottle, probably for wine, found in [6343], a complete French champagne-type bottle from [4880], and part of a hock-type bottle from [6054]. There are also a few fragments that could not be assigned to a specific wine bottle form. Perhaps surprisingly, given the status of the site, no sealed bottles were recovered.

Case bottles, mainly used for containing gin, are rare, with only seven sherds from seven examples. Of interest is a rim/neck sherd from a large onion-type bottle, possible a carboy rather than a wine bottle ([1198]). Context [4004] contained the rim and upper neck from an imported bottle with flatted round or ovoid body containing spa water, probably imported from Belgium in the later 17th or 18th century (Van den Bossche 2001, 183–9, pls 133–8; Crismer 1979). Of more ovoid form is a complete long-necked flask in natural green glass, unfortunately unstratified (height 240 mm), which should be illustrated. The original function of this find is unclear; it is not a Hamilton bottle, and is too narrow for a urinal; it is probably another form of spa bottle, but could be something quite different, such as an early fire extinguisher. Further research might resolve this.

5.10.1.2.2 OTHER BOTTLES

The most diagnostic form is the Hamilton bottle, invented for carbonated drinks in 1814, sherds of which were found in [5801]. A base sherd from [5139] is from a large rectangular bottle in colourless glass, probably used for spirits. Part of a possible sauce bottle was found in [1198].

5.10.1.2.3 FLASKS

Flasks are represented by 39 sherds from up to nine examples (653g) from eight contexts, of which eight are small in size. The earliest is of miniature shaft and globe bottle form with base and neck/rim sherds from [5935], possible base sherds from [4004] and possible body sherds from [4952]; examples from Jamestown have been dated to c 1710 (Noël Hume 1969, fig 17, no. 9). Other hand-blown flasks are represented by sherds from a larger example with a plain neck and flaring rim from [1858] and a sherd from [2040] which is very similar in character.

Mould-blown finds include part of a colourless glass flask with rounded body, narrower flat-fronted neck with ribbed moulding on the sides and rounded projection

on the front, from [4880], and two larger examples, probably of 19th-century date, from [5107], alike but not an exact pair. Both have flat bases and one has a wide cylindrical neck with cordon just below the rim.

5.10.1.2.4 PHARMACEUTICAL AND RELATED BOTTLES

There are two main groups of medicinal bottles, of which the first, from cesspit fill [5867], includes seven small polygonal bottles/phials, identical in form but subtly different in size and weight (60g, 65g, 66g x2, 67g x2, 80g). The smallest has the words 'SEQUAH PRAIRIE FLOWER' in relief-moulded lettering while the others read 'SEQUAH' only. This identifies them as products of the American Sequah Medicine Company, which began in 1887 as the Sequah Medicine Co Ltd selling patented medicines such as prairie flower and Indian oil using travelling salesman, or quack doctors, known as Sequahs. The brand had reached England by c 1890. Another bottle reads 'ST JAKOBS OEL / The Charles A Vogeler Company / London England', a company established in Baltimore in 1847; the contents were used for pain relief, including dental pain. This context also contained the lower body of a small bottle with rectangular section, recessed arched panels on all sides. The front panel is blank for a label while the back reads 'KAY'S COMPOUND / ESSENCE OF LINSEED'. One side reads '[KAY] BROTHERS', the other '[STOCK]PORT' (all lettering from top to base); the underside of the base has an oval recess with the letter 'B' at the centre. The relief moulded lettering on a small cylindrical bottle from the same group shows that it originally contained 'Austen's Forest Flower Cologne' made by 'W J Austen and Co, OS WE66 NY'.

Two complete medicinal bottles, and one medicinal/sauce bottle, all complete and of flattened rectangular or flattened oval form, were found in [6054], probably dating to the mid 19th century; two are plain but one reads 'WILLIAMS & ELWES / HALKIN ST WEST' in relief-moulded lettering. In addition, there are sherds from a polygonal bottle in colourless glass and nine other bottles in natural blue and natural green glass, including one oval and one cylindrical with the number '23' on the underside of the base, that probably also belong to this functional category. A few other sherds from similar bottles and others of square form were also found in a few other contexts.

5.10.1.2.5 PHIALS

In all 51 sherds from 45 phials (433g), including three complete and two near complete examples, were found in seven contexts ([2042], [3149], [4880], [4952], [5107], [6013], [6054]); of these, 21 sherds from nine phials were in [4880]. The earliest, in natural blue glass, are two 17th-century bell-shaped phials from [6013] (Noel Hume 1969, fig 17, no. 8), while the latest are tall slim phials dating from c 1760 or 1780 (ibid, nos 11, 14), found in [4880], [5107]. In addition there is one very small accessioned phial from [4880] (<268>).

5.10.1.2.6 JARS

Three jars were found in [5867], two with relief-moulded lettering. One has the words 'Cheesebrough Vaseline / Manufact C. Co' while the other is of squat angular form and bears the name 'Colding Chemist' and address '42 Upper Albany Street'. The third is plain and has a dark purple residue (to be analysed). In addition there are two bases in colourless glass from [4880] that were recorded as jars but which could be large bottles. The most unusual form is a jar from [6054] with cylindrical neck and ornately moulded bell-shaped body, with a recessed panel for the label.

5.10.1.2.7 WINDOW GLASS

Window glass amounts to 275 fragments (87 ENV, 1.730kg) from c 35 contexts, including one sherd could be from a case bottle ([3263]). The largest groups are from [4880] (60 fragments, 9 ENV, 696g), [5806] (40 fragments, 8 ENV, 85g) and [5107] (25 fragments, 7 ENV, 183g); most other contexts have less than five fragments. One fragment of potash glass from [5806] could be of medieval date, but the remainder dates to the 17th to 19th centuries. Most pieces are undiagnostic, but [4880] contained five sherds from two pieces of crown spun glass, including one with a large pontil scar, while three fragments, from [4880] and [5806], are broad glass (cut cylinder). Sheet glass, between 3mm and 45mm thick, is represented by 20 fragments from eight different windows. A few finds have cut edges with frame marks, but most have no distinguishing features.

5.10.1.3 Provenance and function of objects

The glass was recovered from 60 contexts, mainly in small groups. There are four larger assemblages from cesspits in Area 5.1 (Table 40; [4880], [5107], [5867] and [6054]); all date to the 19th century, although containing some earlier material, notably a number of early cylindrical bottles from [5107]. Context [4880] contained a complete champagne bottle that could be illustrated with the associated vessel glass. The finds from [5867] are more varied, with a range of medicinal bottles.

Table 40 Quantification summary of the bulk glass from selected features

Context	Area	Description/notes	Bulk glass (SC/ENV/Gm)	Glass date	Pot date
[1281]	6	Deep post-medieval dump	9/5/203	1830–2000	1820–30
[1566]	4	Fill of construction cut for wall	0/0/0	-	-
[2857]	4	Fill of a pit / large post hole	0/0/0	-	1500–1650
[4880]	5.1	Fill of brick cesspit [5546]	131/35/2789	1830–40	1820–30
[4952]	5.1	Fill of cesspit [6524]	32/28/335	1680–1740	1720–40
[5107]	5.1	Fill of cesspit [5548]	77/23/3016	1830–1900	1820–30
[5803]	5.1	Fill of pit [5972]	0/0/0		1600–50
[5804]	5.1	Fill of pit [6188]	6/2/100	1830–2000	1600–50
[5806]	5.1	Fill of pit [5805]	46/12/158	1740–60	1630–50
[5867]		Fill of cesspit [5994]	15/15/1115	1890–1910	1830–1900
[5935]	5.1	Fill of cesspit [5994]	2/1/50	1650–1900	1701–11
[6013]	5.1	Dump deposit	47/10/378	1750–80	1612–30
[6054]	5.1	Fill of well [5970]	53/40/2697	1905–25	1850–80

5.10.1.4 Assessment work outstanding

None.

5.10.1.4.1 LIST OF OBJECTS FOR ILLUSTRATION

The best examples of the different forms from [4880], [5107] and [6054] can be illustrated in group photographs, if not by line drawings. A few other finds also merit illustration, notably the complete unstratified flask.

5.11 The accessioned finds

By Lyn Blackmore

Table 41 Summary of accessioned finds by material and period

Material	Roman	Medieval	Post-med	Not known	Total
Stone (excludes BM)	0	0	5+	0	5+
Glass	0	0	57	0	57
Iron	0	0	162	0	162
Copper alloy	0	0	147	0	147
Silver	0	0	1	0	1
Lead	0	0	28	0	28
Composite	0	0	13	0	13
Bone	0	0	11	0	11
Ivory	0	0	4/6	0	4/6
Shell	0	0	1	0	1
Fibre/hair	0	0	13	0	13
Wood			2		
Total					

5.11.1.1 Introduction

The following summarises the main categories of accessioned finds other than building materials, clay pipes and other ceramics, coins and wood, which are considered separately. All finds have been processed in accordance with Museum of London Archaeology (MOLA) standards and the records have been entered onto the MOLA Oracle relational database. Catalogue entries were created for most of the copper alloy and glass, but not for the iron or other finds.

5.11.1.2 Categories by dating and materials

5.11.1.2.1 STONE

Artefacts of stone are limited to a sandstone quern/knife grinder ([6026], <693>), a hone made of Kentish ragstone (unstratified, <691>) and a possible hone made of slate ([3324], <631>); this is a rather soft stone for this purpose and the stone is very small with rounded edges and not entirely convincing, but a slate hone was found at Narrow Quay, Bristol (Good 1987, 108). Lengths of pencil lead were recovered from [5254] (<634>).

A stone hammer or axe ([3206], <632>) dating to the Neolithic period (Jon Cotton pers comm.) was recovered from a pit in Area 4. Another two stone finds were architectural mouldings (see separate report), including a rectangular block with pronounced machine-made ridges along one edge (length 130mm+, width 29mm, thickness 11–12mm). Another piece of slate from [5804] is either a mould or an architectural moulding (<511>).

5.11.1.2.2 GLASS

Of the 57 accessions, 33 are from fill [4880] of cesspit [5546], which contained mainly wine glasses. Of these, seven goblets have bucket-shaped bowls, of which <261>,

and possibly <276>, have plain stems, and the others (<252>, <260>, <264>, <278>, <279>) have knopped stems; these forms are likely to date to the early 18th century, although they could be later. Most have a brownish discolouration, but <278> has milky white surfaces. A few rim sherds are probably also from this type of vessel (<769>). An unusual form is <255>, which appears to be a variation of a thistle-shaped bowl, with low bucket-shaped base and flaring upper body. Eight glasses are probably of plain drawn trumpet form (as the bowls are all incomplete it is impossible to be sure whether they were straight-sided or flaring), while one has additional collar at the base of the bowl (<262>); all probably date to c 1690–1710 or later. One goblet has a funnel-shaped bowl with stepped base and knopped stem (<277>); this appears to be the latest vessel in the group, possibly of mid 18th-century date. Four bases are from wine glasses of uncertain form (<254>, <273>, <274>, <275>).

Of interest is a group of five vessels, with short stems and flaring bowls with very slightly wrythen optic blown ribs which may have been a form of posset or jelly glass (cf Thorpe 1969, pl LXVI; Bickerton 1971, no.570), although no exact parallels have yet been found. The form appears to be inspired by the pedestal goblets of the 16th century, but have solid stems; although drawn, they are not of trumpet form. In the case of <280> the stem is crudely applied to the foot and <263> also has an uneven junction at this point, but <258> and <259> are more neatly finished (only the lower bowl/upper stem of <267> survive). The date of these finds is uncertain but likely to fall between c 1680–1720.

Other finds from this cesspit comprise the bases of two tumblers (<265>, <272>), part of a possible lid (<253>), part of an applied trail with reticella decoration from an object decorated in the *façon de Venise* style (<271>), and a complete miniature phial in natural green glass (<268>). As a group these finds appear to date to between c 1690–1740, which is rather earlier than the associated pottery.

Glass was also present in 10 other contexts, and mainly comprises wine/drinking glasses dating to between the late 16th/17th-century and the early 19th century. Finds that probably date to the late 16th or 17th centuries comprise the rim of a large jar from [5586] (<685>), the rim of a squat beaker with optic blown horizontal ribs and a tubular bead from [5806] (<247>, <248>), a sherd from a beaker with optic-blown wrythen ribs from [1862] (<48>), and two sherds from a mug, probably in the *façon de Venise* style, with blue glass body and base and handle in opaque white glass from [5547] (<246>); this find needs more research. Another problematic find is [6343] <621>, which has a flattened bobbin-type stem; this was recorded as a wine glass stem, but is of natural green glass and rather heavy and so possibly from a candlestick or other object. The larger groups are from [4952] (4 accessions), [5107] (4 accessions), and [6054] (3 accessions); those from [4952] include the rim of an inkwell (<240>), while [6054] includes part of a lamp in opaque white glass (<619>, <767>) dating to after the repeal of the excise tax in 1845 (N Jeffries pers comm). Parts of one or two other probable inkwells were present in [4642] (<238>, <239>).

5.11.1.2.3 IRON

The 163 iron accessions include 40 unstratified items; the remainder are from 60 contexts. The largest group is from [4096] (18 accessions), with smaller clusters from [1020] and [5867]. The finds fall into two main groups – structural/industrial fittings and other objects. The former was a small sample of what was actually present. The finds mainly comprise stakes and bars, some with wood attached. In addition to the accessioned finds there are numerous non-accessioned examples. Other structural items include two types of staple, one broad and angular with a span of 190mm ([5139] <234>, <235>), the other U-shaped, with large examples from [78] (<2>),

[4096] (<229>) and 4761] (<647>), some large square roves/washers ([4096] <640>, <646>) and over 10 forelock bolt wedges (Divers 2004, 86, fig 59.3). The finds from [5867] include a possible window bar (<661>), a possible grille from an air vent (<660>), and a ?structural brace (<664>). Context [2753] contained the upper shank and head of a square sectioned stake/nail/bolt with washer *in situ*, which explains the likely function of some of the loose annular washers found on the site. A complete lynch-pin was recovered from [2999] (<136>, length c 120mm), with another unstratified example (<84>) with washer *in situ*. A large square-headed nail was found in [3227] (<556>, length c 132mm). A range of similar finds was found at the East India Company docks at Deptford (Divers 2004, 84–6).

Non structural finds include a range of tools, such as a complete pick-axe head (<608>), file ([0] <221>), a possible punch ([4096], <230>) and a chisel ([4096], <228>). Context [1890] contained a complete L-shaped ?handle with flat-topped knob, while [2042] contained a complete possible tool with substantial square-sectioned tang and parallel-sided blade (length c 250mm). Surveying equipment includes a pair of dividers (unstratified, <545>) and a plumb bob (unstratified <543>).

Other finds include ship-related items such as a complete mooring ring ([2572], <635>), eyelets for sails ([1036] <224>; [5139] <236>) and a length of heavy chain with tar adhering ([4642], <560>), and possible machinery components such as ([5139] <233>). A complete horseshoe was found in [1064] (<551>).

Domestic equipment is limited but includes a fork from [1199] (<124>), a short-bladed knife from [3263] (<557>), originally with a wooden handle, part of a scale tang knife from [5803] (<564>) and a pair of scissors from [4618] (<231>); from the shape of the handle the latter should date to c 1740 (Noel Hume 1969, fig 87. Three laminated narrow strips with mica adhering are possibly from a mirror ([2371], <554>). Items of dress include a heel plate from a shoe ([2537], <129>).

5.11.1.2.4 COPPER ALLOY

In all there are 145 accessions of copper alloy, of which 25 are unstratified and 14 are coins (see separate assessment). A number of discs from [4880] are possibly also coins (<390>–<394>, <528>–<532>).

The remaining finds are from 41 contexts, including nine from [4880]. The main categories are nails (40 accessions), with at least 160 examples of different sizes (51 unstratified) and waste (29 accessions), the latter comprising a range of offcuts and scrap metal. Other structural fittings include a pintle [5801] <672>, a screw (u/s <14>) and two large ?washers 1198 <31> 6103 <404> (also unstratified example <19>). Other finds are probably associated with machinery used in the dockyard, such as part of a wheel from [1864] (<34>) and a small component from [5872] (<196>). A trapezoidal sheet from [5801] (<673>) may be a guard from a machine or a part of a scraper of some sort. More obvious maritime equipment includes four keel dogs from [5772] (<195>) and [5895] <197>. Lengths of wire were found in [1020], [5254], [5895], [6027] (<21>, <609>, <676>, <204>).

Identifiable objects that reflect daily life in the dockyard include a small bell, complete but for the clapper ([5254], <401>), a length of chain, possibly from a sink ([3216], <387>), and a small oval sign (88 x 55mm), the centre of which reads 'Royal Navy Mess', with 'Hopkins & Sons London & Birmingham' around the flange; interestingly there are no indications as to how this was attached. Two larger signs, hand-cut out of sheet metal, were attached by nails; one is the number XI, the other XIII, both

from [3679] (<704>, c 180 x 154mm; <705>, c 310 x 154mm). Most of these could be illustrated.

Dress accessories include two or three lace chapes ([2196] <37>, <38>), seven buttons and the greater part of a decorated shoe buckle ([2217], <208>); one of the buttons bears the words 'improved four holes' on the flange ([2753], <517>). Domestic items include three spoons ([1198] <30>; [5254] <402>, <403>, both complete).

5.11.1.2.5 SILVER

A plain thin disc from [4880] (<527>; diameter 22mm), possibly part of a larger object, may be of silver, although this needs to be confirmed scientifically.

5.11.1.2.6 LEAD

The 28 lead finds are from 16 contexts and fill one box; they include seven unstratified objects that have been recorded but which are not considered here. Most finds comprise waste or scrap, the latter including window came. There are, however, three weights and one cloth seal. One of the weights is a large disc with convex upper surface ([5139], <220>), while the others, both from [1993] are smaller; one is more or less conical with an unfinished perforation at the top (<538>), while the other has a flattened perforated head elongated, irregularly tapering form with round section. The cloth seal ([3211], <217>) appears to be unstamped but has textile impressions on the back.

5.11.1.2.7 COMPOSITE OBJECTS

There are at least 13 composite objects, of which a 17th- to 18th-century whittle tang knife (<186>) is technically unstratified, but was found in the area of [4479]. The complete ivory handle is of tapering oval section, swelling slightly at the conical terminal; the iron blade is incomplete. One other knife was found in [5107], and six were found in [4880], (<175>—<180>), of which <178> has the initial 'W' carved on the handle.

Other finds comprise a glass bottle/jar with remains of a lead/pewter lid/seal ([5439], <219>), a bone and copper alloy button ([5241], <194>), a small disc-shaped brooch or badge of copper alloy with a glass setting at the centre ([5525], <534>), a comb made of ivory/tortoiseshell and copper alloy ([2855], <173>) and part of at least one brush ([4880], <740>), the latter two in Conservation.

5.11.1.2.8 BONE

The 16 items of bone are from nine contexts, mainly [4880] and [5107]. Buttons are the most common artefact, with four examples (<183>, <184>, <189>, <190>). All are standard discs with four perforations, but <190> from [4880] is of interest as it is very crude and appears to be unfinished. Other domestic and personal items include part of a toothbrush <185> and part of a turned needle case ([1198] <58>). Other finds include a turned discoidal counter ([3216], <174>) and a complete carved fish-shaped gaming piece with painted red eye, dated to the early 19th century. The design copies the Chinese mother-of-pearl counters. See also above, composite objects.

5.11.1.2.9 IVORY

The four finds of ivory comprise a near complete knife handle ([1198] <59>), the mouthpiece for a musical instrument <172> (unstratified) and parts of two double-sided combs of a type used in the 16th and 17th centuries ([5107], <182>; [5222],

<143>). Similar combs of wood, dated to the 15th century, were found at Narrow Quay, Bristol (Good 1987, 108, fig 54). See also above, composite objects.

5.11.1.2.10 SHELL

One tiny button of mother-of-pearl was found in [4700] (<188>).

5.11.1.2.11 FIBRE, LEATHER AND RESIN

Clumps of matted fibre and hair were found in [1862] (<40>) and in [2420] (<41>) and also in [3192], [4880] (2 accessions), [5107] (2 accessions), [5139] (2 accessions), [5491] (2 accessions); these most probably represent caulking material. Object <42> from [1035] appears to comprise a length of iron with resin along one side; the latter is encased in clay with finger prints in it, and appears to have been moulded to shape, possibly in the attempt to seal, or prevent, a leak. In addition there are fragment of what appear to be mineralised leather from [5107] (<768>).

5.11.1.2.12 WOOD

The 13 finds of wood are mostly structural items or associated with boats and are not considered here.

5.11.1.3 Functional analysis

Structural fittings and industrial equipment associated with ship building are the dominant categories; in some cases it is difficult to distinguish between the two. Domestic items are less common and mainly of glass, while personal possessions and dress accessories are rare.

5.11.1.4 Provenance of objects

The main groups are from Area 5.1 where a number of cesspits were located.

5.11.1.5 Assessment work outstanding

None.

5.11.1.5.1 LIST OF OBJECTS FOR INVESTIGATIVE CONSERVATION

[4880] <527>: silver or not?

[4880] <390>-<394>, <528>-<532> discs/coins (copper alloy)

[5525] <534> brooch: copper alloy and ?glass

5.12 The clay tobacco pipes

By Jacqui Pearce

5.12.1.1 Introduction/methodology

The clay tobacco pipe assemblage from CVF10 was recorded in accordance with current Museum of London Archaeology practice and entered onto the Oracle database. The English pipe bowls have been classified and dated according to the Chronology of London Bowl Types (Atkinson and Oswald 1969), with the dating of some of the 18th-century pipes refined where appropriate by reference to Oswald's Simplified General Typology (Oswald 1975, 37–41). The prefixes AO and OS are used to indicate which typology has been applied. Quantification and recording follow guidelines set out by Higgins and Davey (1994; Davey 1997).

5.12.1.2 Quantification

Table 42 Clay tobacco pipe quantification

Total no. of fragments	1099
No. of bowl fragments	525
No. of stem fragments	552
No. of mouthpieces	22
Accessioned pipes	253
Marked pipes	221
Decorated pipes	164
Imported pipes	
Complete pipes	
Wasters	
Kiln material fragments	
Boxes (bulk\accessioned)	5 boxes acc/3 bulk

5.12.1.3 Character and dating of the clay pipes

A considerable number of clay tobacco pipe fragments were recovered from 104 contexts; several key groups with more than 20 bowls in each were recorded. A total of 42% of all identifiable pipe bowls are marked by their makers, and there is also a high proportion of decorated pipes, although no complete examples could be reconstructed during assessment. With one exception, all pipes are typical of London manufacture and the great majority appear to have been made locally, in the Greenwich area. Almost all appear to have been smoked, some of them heavily.

Twenty-five contexts have been given the broad date range of 1580–1910 by the presence of otherwise undatable stem fragments alone. All other contexts span the mid 17th to late 19th centuries. No bowl types earlier than c 1640 were identified, and there are 51 contexts dated between c 1640 and 1710. The earliest contexts are [3129], [2517] and [1864], all dated to c 1640–60/70 and all small. Pipes dating to the Restoration period (c 1660–80) are far more numerous and include key groups from [1993] and [6013] (a dump deposit in Area 5.1). Context [1993] yielded 40 pipe bowls and 12 stem fragments and is dated to c 1660–70. Type AO15 is the most numerous in this group, with 25 examples, alongside type AO12, 13 and 18. One bowl is marked with a moulded raised dot on the left side of the heel and a second bowl with a single transverse milled line under the heel. A second large group of this period, from context [6013], consists of 45 bowls, 46 stem fragments and seven mouthpieces, dated to c 1660–80. There are again numerous type AO15 pipe bowls (25 examples), as well as 11 type AO18 and eight AO13 pipes. One pipe bowl is decorated with fleur-de-lis stamps, repeated along the stem and in the form of a maker's mark under the heel. Such decoration is rare, but not unknown, although use of this stamped device is associated more with earlier pipes. The large context [5806] (a pit fill in Area 5.1), with 32 pipe bowls and 81 stem fragments, is dated slightly later, to c 1680–1710, and includes 15 type AO15 pipe bowls, alongside types AO13 and 18 and six type AO22 pipes, made at the turn of the 17th and 18th centuries. Pipe bowls of type AO15 are the second most common type recorded on the site, accounting for 17% of all examples. Many of the 17th-century pipe bowls have some milling around the rim, but there are only three pipes with any sign of burnishing.

Fourteen contexts have been given a broad 18th-century date, including cesspit fill [4952] in Area 5.1, which yielded 20 bowls, 26 stem fragments and three mouthpieces and is dated to c 1730–60. Six contexts date after c 1840, all of them small.

The largest clay pipe assemblage from the site comes from context [4880] (the fill of a brick cesspit in Area 5.1), which is dated to c 1800–40. A total of 153 bowls and two stem fragments were recovered; all but two of the bowls are of type AO27 (c 1780–1820, but dated after c 1800 when the seam is removed underneath the heel). Two later types are probably intrusive (AO28 and AO29). Makers' marks were recorded on 146 bowls, with a number of pipe makers represented by several examples each. Among the more common initials, all moulded in relief on the sides of the heel, are WG (23 examples), mostly with moulded vertical ribbing around the bowl, wheatsheaf seams and flowers around the rim. These stand for William Gosling, recorded in Greenwich in 1801–38 (Bowsher and Wollard 2001, 103). Fifty-two pipes have the maker's initials WB, including many examples with moulded vertical ribbing and leaf seams, as well as some examples with rose and thistle decoration or the Prince of Wales feathers on one side and a dragon on the other. These were made by William Burstow, recorded in 1789–1846, and working in Blackheath Hill in 18005–12 (ibid 103). There are 36 pipe bowls marked with the initials RS, again mostly decorated with moulded vertical ribbing; these were made by Richard Simmons, recorded in Greenwich in 1764–1808 (ibid 103). Other makers include JA, IS, IF and CR (to be identified). There is also one pipe marked JB in relief on the sides of the heel and stamped incuse on the back of the bowl with the name BUMBURY / SHADWELL. This large and important collection of clay pipes demonstrates the dominance of local pipe makers, with certain individuals very well represented. It also includes a high proportion of decorated types, some of which may have been made for local public houses (eg with names such as the Rose and Thistle, Prince of Wales etc).

5.12.1.4 Marked and decorated pipes

A complete listing of marked clay pipes is given in Table 43. Many of these are also decorated, and unmarked pipes with decoration are also included (ie all accessioned pipes from the site).

Table 43 Marked and decorated clay pipes

Ctxt	Ac c	B	S	Form	ED	LD	De c A	Dec B	Dec C	Mark	I/ R	M/ S	Po s
128 1	56	1		AO27	1780	1820	LB			??	R	M	SH
488 0	304	1		AO27	1780	1820	RIB V			??	R	M	SH
488 0	329	1		AO27	1780	1820	RIB V			??	R	M	SH
488 0	358	1		AO27	1780	1820				??	R	M	SH
488 0	437	1		AO27	1780	1820	RIB V	FLRM		??	R	M	SH
488 0	325	1		AO27	1780	1820	RIB V2	LB		?B	R	M	SH
488 0	343	1		AO27	1780	1820	DR GN	WB	LBST	?EB	R	M	SH
495 2	468	1		OS11	1730	1760				?IL	R	M	SH
488 0	430	1		AO29	1840	1880				?JD	R	M	SH
605 4	731	1		AO28	1820	1840	LB			?R?	R	M	SS
488 0	359	1		AO27	1780	1820				?S	R	M	SH
510	491	1		AO27	1780	1820	RIB	WB		ANDREWS /	R	M	SL

7						V			DEPTFORD // STARS ON HEEL			
510 7	759	1		AO27	1780	1820			AS	R	M	SH
525 4	590	1		AO30	1850	1910	VA RN		BILLI...	I	S	SL
488 0	367	1		AO27	1780	1820			BUMBY / SHADWELL // JB	I	S	BF
488 0	328	1		AO27	1780	1820	PO W	WB	CR	R	M	SH
510 7	485	1		AO27	1780	1820			CR	R	M	SH
487 7	575	1		OS11	1730	1760			CROWNED A?	R	M	SH
508 7	578	1		AO25	1700	1770			CROWNED E?S	R	M	SH
199 3	756	1		AO12	1640	1670			DOT (LEFT ONLY)	R	M	SH
488 0	758	1		AO28	1820	1840			DOT AND CIRCLE	R	M	SS
587 2	599	1		AO21	1680	1710			DOTS	R	M	SH
601 3	725	1		AO18	1660	1680	FD LS	FDLB	FLEUR-DE- LIS	I	S	H
488 0	442	1		AO25	1700	1770			FLOWER E FLOWER O	R	M	SH
488 0	307	1		AO27	1780	1820			FLOWERS	R	M	SH
488 0	317	1		AO27	1780	1820	RIB V	LBST	FLOWERS	R	M	SH
488 0	341	1		AO27	1780	1820			FLOWERS	R	M	SH
602 6	606	1		AO27 A	1800	1840	LB		FLOWERS	R	M	SH
525 4	586	1		AO29	1840	1880	LB		FORKS?	R	M	SH
510 7	483	1		AO27	1780	1820	RIB V2	LB	I?	R	M	SH
495 2	466	1		OS12	1730	1780			IB	R	M	SH
495 2	467	1		OS12	1730	1780			IB	R	M	SH
495 2	469	1		OS12	1730	1780			IB	R	M	SH
495 2	470	1		OS12	1730	1780			IB	R	M	SH
495 2	472	1		OS12	1730	1780			IB	R	M	SH
495 2	473	1		OS12	1730	1780			IB	R	M	SH
495 2	474	1		OS12	1730	1780			IB	R	M	SH
495 2	476	1		OS12	1730	1780			IB	R	M	SH
495 2	478	1		OS12	1730	1780			IB	R	M	SH
587 8	600	1		OS12	1730	1780			IB	R	M	SH
587 8	601	1		OS12	1730	1780			IB	R	M	SH
593 5	603	1		OS11	1730	1760			IB?	R	M	SH
593	605	1		OS11	1730	1760			IB?	R	M	SH

5													
605 4	733	1		AO28	1820	1840	LB			ID	R	M	SS
488 0	418	1		AO27	1780	1820	RIB V2	LB		IF	R	M	SH
488 0	577	1		AO27	1780	1820	RIB V	WB		IF	R	M	SH
235 6	281	1		OS11	1730	1760				II	R	M	SH
276 2	569	1		AO25	1700	1770				II	R	M	SH
322 6	570	1		AO25	1700	1770				II	R	M	SH
461 8	282	1		AO25	1700	1770				IL	R	M	SH
495 2	471	1		OS12	1730	1780				IL	R	M	SH
495 2	475	1		OS12	1730	1780				IL	R	M	SH
495 2	477	1		OS12	1730	1780				IL	R	M	SH
495 2	479	1		OS12	1730	1780				IL	R	M	SH
543 9	597	1		AO25	1700	1770				IL	R	M	SH
400 4	719	1		AO25	1700	1770				IL	R	M	SH
400 4	720	1		OS10	1700	1740				IL	R	M	SH
400 4	721	1		OS10	1700	1740				IL	R	M	SH
588 9	723	1		OS11	1730	1760				IL	R	M	SH
588 9	724	1		OS11	1730	1760				IL	R	M	SH
488 0	373	1		AO27	1780	1820				IS	R	M	SH
488 0	435	1		AO27	1780	1820	RIB V2	WB		IS	R	M	SH
487 9	574	1		AO27	1780	1820	RIB V	LB		IS	R	M	SH
119 8	53	1		AO27 A	1800	1840	RIB V	LB		JA	R	M	SS
488 0	330	1		AO27	1780	1820	RIB V	WB		JA	R	M	SH
488 0	339	1		AO27	1780	1820				JA	R	M	SH
488 0	357	1		AO27	1780	1820	RT HS	LB		JA	R	M	SH
488 0	366	1		AO27	1780	1820				JA	R	M	SH
488 0	374	1		AO27	1780	1820	RT HS	LB		JA	R	M	SH
488 0	410	1		AO27	1780	1820	RT HS	LB		JA	R	M	SH
488 0	415	1		AO27	1780	1820	RT HS	LB		JA	R	M	SH
488 0	456	1		AO27	1780	1820	RIB V			JA?	R	M	SH
525 4	579	1		AO27	1780	1820	LB			JB	R	M	SH
525 4	591	1		AO27	1780	1820	LB			JB	R	M	SH
525 4	581	1		AO28	1820	1840	RT HS	LB		JD	R	M	SS

525 4	582	1		AO27 A	1800	1840	OA KS			JD	R	M	SS
525 4	585	1		AO29	1840	1880				JD	R	M	SH
541 9	593	1		AO29	1840	1880	LB			JD	R	M	SH
605 4	728	1		AO29	1840	1880	LB			JD?	R	M	SH
605 4	729	1		AO29	1840	1880	LB			JD?	R	M	SH
605 4	730	1		AO29	1840	1880				JD?	R	M	SH
487 9	576	1		AO27	1780	1820	RT HS	WB		JS	R	M	SH
199 3	755	1		AO12	1640	1670				ROULETTE D LINE	I	S	H
488 0	286	1		AO27	1780	1820				RS	R	M	SH
488 0	291	1		AO27	1780	1820	RIB V2	LB	LBS	RS	R	M	SH
488 0	295	1		AO27	1780	1820	RIB V	LB		RS	R	M	SH
488 0	297	1		AO27	1780	1820	LB ST			RS	R	M	SH
488 0	309	1		AO27	1780	1820				RS	R	M	SH
488 0	318	1		AO27	1780	1820	RIB V2	LB		RS	R	M	SH
488 0	324	1		AO27	1780	1820	RIB V	LB		RS	R	M	SH
488 0	334	1		AO27	1780	1820	RIB V	LB		RS	R	M	SH
488 0	335	1		AO27	1780	1820	RIB V	LB		RS	R	M	SH
488 0	353	1		AO27	1780	1820	RIB V	LB	LBST	RS	R	M	SH
488 0	354	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	355	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	356	1		AO27	1780	1820	RIB V	LB		RS	R	M	SH
488 0	362	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	364	1		AO27	1780	1820	RIB V	LB	LBST	RS	R	M	SH
488 0	365	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	369	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	417	1		AO27	1780	1820	RIB V	LB		RS	R	M	SH
488 0	420	1		AO27	1780	1820	RIB V	LB		RS	R	M	SH
488 0	422	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	423	1		AO27	1780	1820	RIB V2	LB		RS	R	M	SH
488 0	424	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	425	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	426	1		AO27	1780	1820				RS	R	M	SH
488	427	1		AO27	1780	1820	RIB	LB		RS	R	M	SH

0							V2						
488 0	428	1		AO27	1780	1820	RIB V2	LB		RS	R	M	SH
488 0	431	1		AO27	1780	1820	RIB V2	LB		RS	R	S	SH
488 0	433	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	434	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	439	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	447	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	458	1		AO27	1780	1820	RIB V2	LB		RS	R	M	SH
488 0	462	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
488 0	463	1		AO27	1780	1820	RIB V2	LB		RS	R	M	SH
488 0	464	1		AO27	1780	1820				RS	R	M	SH
488 0	465	1		AO27	1780	1820	RIB V2	LB	LBST	RS	R	M	SH
510 7	486	1		AO27	1780	1820				RS	R	M	SH
510 7	489	1		AO27	1780	1820				RS	R	M	SH
510 7	490	1		AO27	1780	1820				RS	R	M	SH
510 7	492	1		AO27	1780	1820				RS	R	M	SH
510 7	493	1		AO27	1780	1820				RS	R	M	SH
524 1	494	1		AO27	1780	1820	RIB V	LB		RS	R	M	SH
488 0	342	1		AO27	1780	1820				S?	R	M	SH
525 4	583	1		AO29	1840	1880	LB			SD?	R	M	SH
602 6	607	1		AO29	1840	1880				SHIELDS	R	M	SH
488 0	300	1		AO27	1780	1820				STARS	R	M	SH
510 7	480	1		AO27	1780	1820	RIB V	LBST		STARS	R	M	SH
119 8	54	1		AO27 A	1800	1840	LB			TB	R	M	SH
488 0	323	1		AO27	1780	1820	WB			TL?	R	M	SH
113 3	52		1	UNK	1580	1910				W COP... / WOOLWICH	R	M	SL
488 0	457	1		AO27	1780	1820	RIB VS			WA	R	M	SH
488 0	287	1		AO27	1780	1820	LB	RIBV 2		WB	R	M	SH
488 0	292	1		AO27	1780	1820	PO W	DRG N	WB	WB	R	M	SH
488 0	298	1		AO27	1780	1820	LB	RIBV		WB	R	M	SH
488 0	302	1		AO27	1780	1820	RIB V2	LB		WB	R	M	SH
488 0	303	1		AO27	1780	1820	PO W	DRG N	LB	WB	R	M	SH
488 0	310	1		AO27	1780	1820	RIB V2	LB		WB	R	M	SH

488 0	311	1		AO27	1780	1820	FL OR			WB	R	M	SH
488 0	313	1		AO27	1780	1820				WB	R	M	SH
488 0	314	1		AO27	1780	1820	RIB V	LB		WB	R	M	SH
488 0	316	1		AO27	1780	1820	RIB V	FLRM		WB	R	M	SH
488 0	319	1		AO27	1780	1820	RIB V	LB		WB	R	M	SH
488 0	320	1		AO27	1780	1820	RIB V2	WB	LBST	WB	R	M	SH
488 0	321	1		AO27	1780	1820	DR GN	POW	WB	WB	R	M	SH
488 0	322	1		AO27	1780	1820	RIB V2	WB		WB	R	M	SH
488 0	326	1		AO27	1780	1820	RIB V2	LB		WB	R	M	SH
488 0	331	1		AO27	1780	1820	RIB V2	LB	FLR M	WB	R	M	SH
488 0	332	1		AO27	1780	1820	RIB V2			WB	R	M	SH
488 0	333	1		AO27	1780	1820	RIB V2	LB		WB	R	M	SH
488 0	336	1		AO27	1780	1820	RIB V	FLRM		WB	R	M	SH
488 0	337	1		AO27	1780	1820	DR GN	WB		WB	R	M	SH
488 0	338	1		AO27	1780	1820				WB	R	M	SH
488 0	340	1		AO27	1780	1820				WB	R	M	SH
488 0	344	1		AO27	1780	1820				WB	R	M	SH
488 0	345	1		AO27	1780	1820				WB	R	M	SH
488 0	347	1		AO27	1780	1820	RIB V	LB		WB	R	M	SH
488 0	348	1		AO27	1780	1820	RIB V	FLRM		WB	R	M	SH
488 0	350	1		AO27	1780	1820	RIB V2	LB	LBST	WB	R	M	SH
488 0	352	1		AO27	1780	1820	RIB V2	LB		WB	R	M	SH
488 0	361	1		AO27	1780	1820	RIB V2	WB		WB	R	M	SH
488 0	363	1		AO27	1780	1820	RIB V2	LB		WB	R	M	SH
488 0	368	1		AO27	1780	1820	RIB V2	LB		WB	R	M	SH
488 0	372	1		AO27	1780	1820	DR GN	POW	WB	WB	R	M	SH
488 0	375	1		AO27	1780	1820	RIB V2	LB		WB	R	M	SH
488 0	376	1		AO27	1780	1820	RIB V2	LB		WB	R	M	SH
488 0	378	1		AO27	1780	1820				WB	R	M	SH
488 0	379	1		AO27	1780	1820	DR GN	POW	WB	WB	R	M	SH
488 0	380	1		AO27	1780	1820	DR GN	POW	WB	WB	R	M	SH
488 0	411	1		AO27	1780	1820	DR GN	POW	WB	WB	R	M	SH
488	412	1		AO27	1780	1820	RIB	FLRM		WB	R	M	SH

0							V							
488 0	414	1		AO27	1780	1820					WB	R	M	SH
488 0	416	1		AO27	1780	1820	RIB V	WB			WB	R	M	SH
488 0	438	1		AO27	1780	1820	RIB V	FLRM			WB	R	M	SH
488 0	445	1		AO27	1780	1820	RIB V				WB	R	M	SH
488 0	446	1		AO27	1780	1820	RIB V2	LB			WB	R	M	SH
488 0	448	1		AO27	1780	1820	DR GN	POW	WB	WB		R	M	SH
488 0	449	1		AO27	1780	1820	DR GN	WB	POW	WB		R	M	SH
488 0	450	1		AO27	1780	1820	RIB V2	LB	LBST	WB		R	M	SH
488 0	453	1		AO27	1780	1820	DR GN	POW	WB	WB		R	M	SH
488 0	454	1		AO27	1780	1820	RT HS	LB			WB	R	S	SH
488 0	455	1		AO27	1780	1820	RIB V2	WB			WB	R	M	SH
488 0	460	1		AO27	1780	1820					WB	R	M	SH
510 7	481	1		AO27	1780	1820	RIB V	LB	LBST	WB		R	M	SH
510 7	488	1		AO27	1780	1820	RIB V				WB	R	M	SH
128 1	57	1		AO27	1780	1820	RIB V2	LB			WB?	R	M	SH
488 0	306	1		AO27	1780	1820					WB?	R	M	SH
605 4	732	1		AO29	1840	1880					WD	R	M	SH
488 0	294	1		AO27	1780	1820					WE	R	M	SH
488 0	351	1		AO27	1780	1820					WE?	R	M	SH
488 0	360	1		AO27	1780	1820					WE?	R	M	SH
488 0	288	1		AO27	1780	1820	RIB V				WG	R	M	SH
488 0	289	1		AO27	1780	1820	WB				WG	R	M	SH
488 0	293	1		AO27	1780	1820	RIB V	WB	LBST	WG		R	M	SH
488 0	301	1		AO27	1780	1820	RIB V	WB			WG	R	M	SH
488 0	305	1		AO27	1780	1820					WG	R	M	SH
488 0	315	1		AO27	1780	1820	RIB V	WB	FLO R	WG		R	M	SH
488 0	327	1		AO27	1780	1820	WB				WG	R	M	SH
488 0	346	1		AO27	1780	1820	WB				WG	R	M	SH
488 0	349	1		AO27	1780	1820	RIB V	WB			WG	R	M	SH
488 0	370	1		AO27	1780	1820	RT HS	WB			WG	R	M	SH
488 0	371	1		AO27	1780	1820	RIB V	FLRM			WG	R	M	SH
488 0	377	1		AO27	1780	1820	RIB V	FLRM			WG	R	M	SH

488 0	413	1		AO27	1780	1820	WB			WG	R	M	SH
488 0	419	1		AO27	1780	1820	RIB V	LBST		WG	R	M	SH
488 0	429	1		AO27	1780	1820	RIB V	WB	LBST	WG	R	M	SH
488 0	432	1		AO27	1780	1820	LB ST			WG	R	M	SH
488 0	436	1		AO27	1780	1820	WB			WG	R	M	SH
488 0	440	1		AO27	1780	1820	RIB V	WB	LBST	WG	R	M	SH
488 0	443	1		AO27	1780	1820				WG	R	M	SH
488 0	451	1		AO27	1780	1820	WB			WG	R	M	SH
488 0	452	1		AO27	1780	1820	RT HS	WB		WG	R	M	SH
488 0	459	1		AO27	1780	1820	RIB V	WB	LBST	WG	R	M	SH
488 0	461	1		AO27	1780	1820	WB			WG	R	M	SH
593 5	602	1		OS11	1730	1760				WM CROWNED	R	M	SH
593 5	604	1		OS11	1730	1760				WM CROWNED	R	M	SH
488 0	290	1		AO27	1780	1820	RIB V2	WB		WS	R	M	SH
487 9	575	1		AO27	1780	1820	WB			WS	R	M	SH
400 4	722	1		AO25	1700	1770				WS	R	M	SH

5.13 The bulk iron

By Lyn Blackmore

There are 10 boxes of bulk iron nails, and six further crates of large nails and stakes (see below, accessioned iron) which were recovered from 153 different contexts.

5.13.1.1 Assessment work outstanding

A quick scan of the finds in the crates shows considerable overlap with the accessioned iron and the two should be considered together.

5.14 The iron nails

By Michael Marshall

5.14.1.1 Introduction

A preliminary examination of the bulk iron nails was undertaken. The nails were scanned in their bags to determine the overall character, condition and size of the assemblage but no detailed quantification or recording has taken place at this stage.

5.14.1.2 Iron nails

A total of 11 boxes of bulk nails and 46 groups of accessioned nails were recovered. An estimated 40–60% are in sufficiently good condition for basic typological, metric

and other details to be recorded while a larger proportion, perhaps close to 75% would yield these details with use of selective x-raying.

At least one context [5676] has produced an assemblage of more than 30 nails but these are in poor to moderate condition and few individual contexts have assemblages of more than 10 nails.

All of the nails examined in sufficient detail during the scan are hand forged chisel tipped nails. Nails of this general type are first recorded in Middle Iron Age contexts although they are not commonly found until the Roman period. They remain in use until the present day but tend to form only a small proportion of late post-medieval and modern assemblages, often being restricted to decorative functions.

Beginning in the 18th century large scale use of first cut and then wire drawn nails was introduced. The preliminary scan identified no examples of these types. Also seemingly absent are clenched nails although these are more often found on medieval waterfront and shipyard sites.

There is clear and significant variety in both size and form within the assemblage and selected examples measured as part of the initial scan varied between 40 and 320mm in size. The overall emphasis of the extant size range is much larger than that typically encountered on domestic urban sites in London. This may reflect their association with shipbuilding activities on site or the large scale of the timber structures.

Aspects of nail condition such as clenching and extraction bends are present and recordable on many nails but have not been quantified.

5.14.1.3 List of objects for illustration

It may be desirable to illustrate a selection of the Tudor / Stuart nails (c five examples to be selected at analysis) to illustrate aspects of any discussion on shipbuilding.

5.15 The human bone

By Don Walker

The articulated but truncated skeletal remains of an adult's lower right leg bones [2507] (tibia and fibula), together with bones from the left foot (calcaneus and talus) were found within the fill of ditch [2510]. The feet of the skeleton were aligned to the west. A number of bones were also recovered from the upper fill [2508] of the ditch, including the proximal section of a right femur (thigh bone) and bones from the right foot (fifth metatarsal) and left foot (navicular, cuboid, second and fifth metatarsals). Samian pottery was also found within this fill (Henderson, 2011).

Although the majority of the skeleton was truncated by later disturbance, it is possible to comment on that part that remained articulated (Fig 12). This consisted of the lower part of the lower right leg lying immediately above the talus and calcaneus of the left foot. While it is always possible for bones and limbs to move within the burial environment or for the position of the body to be determined by its context (in this case in the base of a ditch) rather than specific burial practice, the relative location of these bones may reflect the original burial position. Firstly, the lower legs may have been placed very close together. Secondly, the right lower leg, and foot, extended beyond and to the west of the left foot. Thirdly, both the right lower leg and the left foot are resting on their left sides. Consideration of these three observations allows the possibility that this may not have been an extended burial, stretched out and lying

flat on its back, but rather a flexed (or crouched) burial lying on its left side with the elbows and knees bent.

Once excavated, the bone was processed and then boxed. It was then recorded onto an Oracle relational database system, following standard criteria (Connell and Rauxloh 2003). Where possible, bones from the upper ditch fill were compared with the articulated remains from the burial. It was found that the joint facets on the foot bones matched those from the articulated remains. On this basis, and that of the minimum number of individuals present (n=1), it was decided to record all the human bone as belonging to burial [2507]. The bone was generally well preserved, but as no skull, os coxae or ribs were present, the estimation of age at death was based on epiphyseal fusion alone (Powers 2008). The individual was found to be adult (> 18 years). Lack of preservation prevented estimation of biological sex, although the bones were relatively large and robust, often a male trait. There was no evidence of pathological lesions on the bones.

Crouched burial appears to become increasingly rare by the mid 2nd century AD. If this was a later Roman burial, it reflects practices from a prehistoric tradition that may indicate local pockets of conservatism in areas surrounding the Roman city (Philpott 1991, 53, 71). However, burial prior to the body completing rigor mortis would also prevent, in some cases, the extension of the body for interment.

The burial was placed in a ditch. This may represent a physical and liminal boundary, and Roman burials are often sited near field or property boundaries, or by roads. Although an open ditch or one filled with loose fill, may provide a practical choice of site unlikely to be required for other purposes (Cleary 2000, 137–8). This inhumation adds to the information on burial practices in the hinterland of Londinium.

5.16 The animal bone

By Alan Pipe

Table 44 Contents of animal bone archive

	Weight (g)	No. fragments	No. boxes
Animal bone (hand-collected)/estimated	36000	1750	24 standard archive boxes
Animal bone (assessed)	13860	671	9 standard archive boxes
Animal bone (wet-sieved)	nil	nil	nil

5.16.1.1 Introduction

A total of 24 standard archive boxes, an estimated 1750 fragments/36.00 kg, of hand-collected animal bone were recovered from CVF10. This report quantifies, identifies, and interprets the hand-collected animal bone from ten contexts selected for assessment; [1281], [4880], [4952], [5107], [5610], [5803], [5804], [5806], [6013] and [6054] derived from dump [1281], pit fill [4880] - [5806], occupation [6013] and well fill [6054] deposits. Hand-collected animal bone from each of these contexts was recorded directly onto the MOLA Oracle animal bone post-assessment database in terms of fragment count, species, carcass-part, estimated age, fragmentation, epiphyseal fusion, dental eruption and wear, modification, and measurement of fully-fused bones. As a result, the selected assemblage has been completely catalogued and does not require further database entry. Multiple records were made of cattle- and sheep-sized fragments of vertebra, rib and long-bone where more accurate identification was impossible due to severe fragmentation or erosion. All

identifications referred to the MOLA reference collection; with Cannon 1987; Cohen and Serjeantson 1996; and Schmid 1972. Each context assemblage was then grouped with available dating and feature description.

5.16.1.2 Post-medieval

The assessed assemblage provided 13.860 kg, 671 fragments, of well-preserved hand-collected animal bone with a maximum fragment length generally greater than 75 mm. Surface condition of the bone was usually sufficiently good to allow identification measurement points and fusion lines and all evidence for modification. The bulk of the hand-collected bone derived from adult and juvenile cattle *Bos taurus*, sheep/goat, including sheep *Ovis aries*, and pig *Sus scrofa*, with substantial groups of ‘cattle-sized’ and ‘sheep-sized’ vertebra, rib and long-bone fragments. Smaller components of the assemblage were provided by fish, poultry, ‘game’ and non-consumed domesticates. A small group of fish derived largely from marine/estuarine species; cod (family) *Gadidae*, including cod *Gadus morhua* from cess-pit fill subgroup 21 [5107] and occupation deposit subgroup 6 [6013]; plaice/flounder *Pleuronectidae*, including plaice *Pleuronectes platessa* from cesspit fills subgroup 19 [4880], subgroup 21 [5107]; pit fill subgroup 26 [5803]; and well fill subgroup 38 [6054]. Freshwater species were represented only by three vertebrae of carp family *Cyprinidae* from cess-pit fill subgroup 21 [5107]. There was considerable evidence for poultry, particularly domestic fowl *Gallus gallus* from cesspit fills [4880], [4952] and [5107]; pit fills [5803] and [5806]; and well fill [6054]; with occasional fragments of goose, probably domestic geese *Anser anser domesticus*, from [4880] and [5107]; and mallard or domestic duck *Anas platyrhynchos* from [4952] and [5107].

Non-consumed domesticates were recovered only sparsely; a single fragment of horse metapodial (foot) from pit fill subgroup 17 [5806]; and occasional fragments of dog from cesspit fill subgroup 19 [4880], occupation deposit subgroup 6 [6013] and well fill subgroup 38 [6054]; and cat from cesspit fills subgroup [4952] and subgroup 21 [5107]; and well fill subgroup 38 [6054].

Wild, ‘game’, species were represented only by a fragment of wild duck *Anatidae* from occupation deposit subgroup 6 [6013]; and occasional fragments of rabbit *Oryctolagus cuniculus* from cesspit fills subgroup 20 [4952] and subgroup 21 [5107]; and well fill subgroup 38 [6054]. Exotic species were represented by five fragments of turtle, probably green turtle, also referred to as soup turtle or edible turtle, *Chelonia mydas*, carapace and plastron from well fill subgroup 38 [6054] only. This species occurs in tropical and warm temperate marine waters worldwide; it is a large species, up to almost 300 kg in weight, highly esteemed as an expensive delicacy and probably named for the greenish colour of the fatty gelatinous meat (Witherington 2006, 69). Turtles were imported alive into London on the decks of ships and often kept alive in tanks until preparation. Indeed, after rebuilding in 1765, the London Tavern at 123 Bishopsgate in the City of London maintained a cellar just for live turtles (Witherington 2006, 160).

Commensal or ‘scavenger’ species comprised unidentified rat *Rattus* sp from cesspit fill subgroup 21 [5107] only. There was no recovery of other wild species. There was no recovery of human bone. Recovery of very young animals was extremely sparse; foetal or neonate calf from subgroup 19 cess-pit fill [4880] only; and infant calf from cess-pit fill [4880] and subgroup 17 pit-fill [5806]; infant piglet from cess-pit fills [4880] and subgroup 20 [4952]; and infant fowl from cess-pit fill subgroup 20 [4952].

The major domesticates were represented mainly by vertebra, rib, and elements of the upper and lower limb, areas of moderate and prime meat-bearing quality, with very sparse recovery of foot and toe elements, and no recovery of cattle or sheep/goat horn core. Clear evidence of butchery was seen on the major domesticates with tool mark evidence for use of knives, cleavers and, particularly, saws. Evidence of gnawing was extremely sparse; with rodent gnawing on sheep/goat bone from cess-pit fills subgroup 20 [4952] and subgroup 21 [5107]; and canine gnawing on a cattle bone from occupation layer subgroup 6 [6013]. There was no evidence for burning or for working of bone or horn. Pathological changes were noted only on an elderly dog mandible (lower jaw) from cesspit fill subgroup 19 [4880]; and a fowl sternum (breast bone) from subgroup 38 well fill [6054].

The group produced some evidence for age at death of the major domesticates with 13 mandibular tooth rows; metrical evidence included 27 complete long-bones suitable for calculation of estimated stature.

5.16.1.2.1 ASSESSMENT WORK OUTSTANDING

There is no outstanding assessment work.

5.17 Conservation

By Luisa Duarte

Table 45 Summary of conservation work

	Material	No. registered	No. conserved	No. to be treated (see below)
Inorganics	Ceramics	298	0	0
	Glass	57	0	0
	Stone	13	0	0
	Shell	1	0	0
Metals	Copper alloy	147 (16 coins)	1 (coin)	26 (16 coins)
	Iron	162	0	0
	Lead	28 (2 coins)	0	2 (coins)
	Silver	1		1
Organics	Bone	11		2
	Ivory	4		2
	Fibre	13		10
	Wood	13	1	5
Composite		13		9

5.17.1.1 Introduction

The following assessment of conservation needs for the registered and bulk finds from the excavations at Convoys Wharf encompasses the requirements for finds analysis, illustration, analytical conservation and long term curation. Work outlined in this document is needed to produce a stable archive in accordance with MAP2 (English Heritage 1992) and the Museum of London's Standards for archive preparation (Museum of London 2009).

Conservation support at the time of the excavation was provided by conservators working for the Museum of London Archaeology. Records of conservation carried out at the fieldwork stage are held in the conservation department of the Museum of London.

Treatment of objects at the fieldwork stage includes the stabilisation of vulnerable materials and composites, cleaning of coins for dating purposes and investigative cleaning and conservation according to archaeological priorities. Treatments are carried out under the guiding principles of minimum intervention and reversibility. Whenever possible preventative rather than interventive conservation strategies are implemented. Procedures aim to obtain and retain the maximum archaeological potential of each object: conservators will therefore work closely with finds specialist and archaeologists.

Most conservation work on metal artefacts begins with visual examination under a binocular microscope followed by mechanical cleaning using scalpel and other hand tools. Occasionally other mechanical devices such as air abrasive and power pen or mini drill are used. Mechanical cleaning will reveal detail and a conservation surface beneath often voluminous corrosion products enabling the true shape and purpose of the artefact to be understood.

Organic materials were found in anoxic environments on site. Textiles and fibres are carefully cleaned and then controlled air dried. All leather is pre-treated with glycerol, freeze dried to stabilise it and then packaged for long term storage. The wood is treated in the standard method, using polyethylene glycol and then freeze drying. Composite objects that contain organic and inorganic parts are assessed individually and a conservation treatment is tailored to obtain the best result for all the components.

All conserved objects are packed in archive quality materials and stored in suitable environmental conditions. Records of all conservation work are prepared on paper and on the Museum of London collections management system (mimsy XG) and stored at the Museum of London.

5.17.1.2 Preparation for deposition in the archive

Most of the small finds from this site are appropriately packed for the archive. The tar and resin samples need to be repacked as they are seeping out of the bags. Additionally, one copper alloy object is actively corroding and so requires conservation before deposition in the archive.

5.17.1.3 Remedial work outstanding

There is stabilisation work outstanding several wet items (wood, composites, fibre, bulk leather ivory and bone) which would normally take place at fieldwork.

6 Potential of the data

6.1 Realisation of the original research aims

(See Appendix 1 for full text of research aims.)

6.1.1 Site-wide

1. *Establish the palaeotopography and palaeoenvironment of the study site throughout the Holocene.*

The palaeotopography and palaeoenvironment of the site was established by geoarchaeological investigation. This found that the surface of the Pleistocene gravels (facies 1) lies between -1m and -5 m OD and forms a west to east Late Glacial to Early Holocene channel (Fig 117). To the south of the site these gravels rise up to form the nearby Kempton Park terrace, with a surface recorded between 1.5m AOD and -0.5 m OD. To the north of the site the gravel surface also appears to be part of a remnant of the Kempton Park terrace. The late Glacial to Early Holocene fluvial sands (facies 2) were recorded from 0m to -3m OD and were up to c. 3.5m thick. The wetland deposits (facies 3) are up to c. 2.5m in thickness. The surface of this facies is encountered between c. 0.8m AOD and -2m OD. The colluvial deposits (facies 4) were recorded from 0.68m AOD and are between c. 0.3 to 0.7m in thickness. The late Prehistoric to historic channel fills (facies 5) were encountered from 0.0m to 2.0m AOD and are about 1.5m thick. The alluvial deposits (facies 6) survive from c. 3.2 to 0.2m AOD across the site and are up to c. 3.2m thick.

A Late Glacial to Early Holocene west to east channel is evident from the geoarchaeological plot of the early Holocene topography (Fig 117) and the 3 transects across the site (Fig 114, Fig 115, Fig 116). An OSL date and a radiocarbon date provide a preliminary chronology for the formation of this channel during late MIS 2 (Table 22, GL12021) through to the Early Neolithic (Table 23, Beta338240) and the deposits of facies 3 through to 6 record the development and infilling of the channel course and floodplain from the Early to Mid Neolithic (Table 23, Beta338240) to the historic period (Table 23, Beta338238).

2. *What evidence is there for changes to the sites topography and environment as a result of human activity prior to 1513.*

Natural and/or anthropogenic changes to the landscape have been noted throughout the geoarchaeologically sampled sequence and have been preliminarily discussed. These include: the Pleistocene evolution of the landscape (facies 1); the deposition of the late Glacial to early Holocene fluvial sediments (facies 2); the formation of waterlogged wetlands across the site as a result of RSL rise and local hydrological conditions (facies 3); the erosion and deposition of brickearth and Kempton Park terrace sediments on the southern fringes of the floodplain of the west to east channel (facies 4); the formation and migration of possible natural and man made late prehistoric to historic small channels crossing the site (facies 5); the alluvial inundation and flattening out of the landscape (facies 6); and the environmental impact of the dock construction (facies 7).

3. *What is the evidence for land use and occupation of the site prior to 1513.*

There is some evidence of land use and occupation prior to the establishment of the Royal Dockyard in 1513, principally on the area of high gravel in Area 4 in the east of the site. Prehistoric material included a Mesolithic blade, a Neolithic stone hammer or axe and Bronze Age and Iron Age pottery. Although the site seems to have been used intermittently by prehistoric people, there is no strong evidence for settlement. A curved ditch in the same Area may have been the corner of an enclosure from the Roman period; its fill contained the only inhumation on the site. Other Roman finds included a concentration of building material that suggested a high-status building on the site.

A wide ditch, its sides partially revetted in timber, also cut into the gravel natural of Area 4. This seemed to pre-date the Tudor Storehouse of 1513 – medieval pottery was recovered from its fills and a single clay pipe bowl may have been intrusive. The function of the ditch was unclear.

The geoarchaeological record has provided indirect evidence for prehistoric human occupation on the site in the form of late Neolithic to Bronze Age cereal cultivation and historic occupation through evidence of possible clearance and pollution in the disturbed ground overlying the clean alluvium (1064).

4. *What is the chronology and spatial extent of river defences from the 12th century to the present and what constructional and technological changes are represented over time.*

Along the north edge of Area 4, a dendrochronological date was obtained for a plank in a revetment probably associated with a river defence. The date of AD 1493–1538 for timber [2926] suggests that this revetment was in place at approximately the time of the establishment of the Dockyard by Henry VIII. The revetment was cut to allow a later timber drain to be installed.

6.1.2 Sayes Court

5. *Within the context of the requirement for preservation in situ, recover the plan form of the Mansion House of Sayes Court, its fabric composition and date.*

Most of the building recovered in Area 6 is likely to be part of the 1759 rebuild of Sayes Court as a workhouse. No structural fabric was removed, so it is possible parts of the earlier building survive below these later walls. A tile floor and a short length of wall may date to the earlier building. The cellar at the west end of the building is more problematic as its fabric dates to the earlier building, but it is difficult to reconcile its location with the map evidence. A fragment of Dockyard wall and a culvert were also identified, both dating to the Stuart period.

6. *Recover so far as is possible any evidence for the ancillary buildings, gardens and associated remains of the Sayes Court Estate.*

There was no evidence for gardens and associated remains apart from some fragments of garden wall to the east of the building whose plan was uncovered in Area 6 and a more extensive garden wall to the west. These walls fit well with the 17th-century map evidence. A feature partially seen in the 2010 evaluation and interpreted as a terrace was uncovered more fully during the excavation and was found to be a natural feature. There was no evidence for ancillary buildings.

6.1.3 Royal Naval Dockyard

7. *Establish so far as is possible the extent, plan form and composition of the Tudor Dockyard and its development in the period 1513–1603 with particular reference to evidence for technological change.*

Most of the Tudor Dockyard seems to have been removed by subsequent development. The most substantial survival was the foundations of the Tudor Storehouse in Area 4, although these were truncated by 20th-century structures. Some walls dating to the Tudor period were identified in a narrow building in Area 4 – interpreted as the Treasurer of the Navy's House and shown in a map of 1623. The full extent of these walls was obscured by later walls which were not removed. References to the 'Wett Dock' (the Dockyard Basin) are known from historical sources. Part of a land-tie in Area 2 was dated by dendrochronology to the Tudor period and it is likely it is a fortuitous survival from this early phase of the Dockyard. Nearby, a small area of planking and vertical timbers (that did not yield a dendrochronological date) may also be part of the Wett Dock.

8. *Establish so far as is possible the extent plan form and composition of the Stuart Dockyard and its development in the period 1603 to 1714 with particular reference to evidence for technological change*

The Stuart Dockyard survived better than the Tudor Dockyard. The early perimeter wall along the west side of the dockyard, shown in a map of 1698, was uncovered immediately west of – and below – a 19th-century slipway in Area 2 and in Area 12, where it was better preserved. The timber lining to the Dockyard Basin of this period was also extensively revealed in Area 2, braced by land tie arrangements. Another survival was the timber gate to the canal linking the Basin with the river. Further east, the timber tie backs and chalk substructure of a slipway were revealed. Fragmentary walls and a cobbled surface survived below the 19th-century slipway in Area 4. Other buildings that continued into this period were the Treasurer of the Navy's House (although this was demolished by 1688) and the Tudor Storehouse. Other buildings in the storehouse complex, shown on the 1698 map, did not survive later development of this area. To the south, the walls to the officers' quarters were recorded in Area 5.1. Cesspit fills were analysed.

9. *Establish so far as is possible the extent plan form and composition of the Georgian Dockyard and its development in the period to 1774 when the detailed surviving model of the Dockyard was commissioned, with particular reference to evidence for technological change.*

In the early Georgian period, the timber Dockyard Basin was largely rebuilt in brick, although the timber gate was retained. Towards the end of the period, the Dockyard expanded south beyond the old boundary and timber stockpiling areas and other buildings were constructed, the remains of which were exposed in Area 12. The storehouse complex also underwent comprehensive change. The east end of the Tudor Storehouse was shortened to bring it in line with the new storehouse complex, roughly square in plan. Further south, the smithy was rebuilt.

10. *Establish so far as is possible the extent plan form and composition of the late Georgian and early Victorian Dockyard, with particular reference to evidence for technological change.*

As the technology of ship building changed and ships became ever larger, the slipways themselves increased in size. The location of the Dockyard's slipways had always been determined by other structures – such as the storehouse complex and the Basin. Consequently, earlier slipways would have been substantially removed by later structures in the same location. The 19th-century slipways in Area 2 and Area 4 were over 60m long and some 20m wide. Cover buildings were also introduced, their brick supports recorded in Areas 2, 3 and 4. The timber gate was replaced in the early 19th century by a caisson gate to the design of John Rennie, and an adjoining part of the Basin wall rebuilt. The storehouse complex underwent some adaption, with an engine house built within the enclosed yard. A 'Rigging and Sail Loft' building was constructed to the south of the storehouse complex and the smithy was furnished with a steam hammer.

11. *Record the evidence for the transformation of the Dockyard into the Foreign Cattle Market, Military Depot and Convoys Wharf.*

The late 19th-century map evidence suggests that the Dockyard was changed into the Foreign Cattle Market rapidly. Vertical timbers, supported by raking timbers, seen in the slipways in Area 3 and Area 4, were attempts to support structures over the deep areas of these former Dockyard features. The storehouse complex also underwent some change.

6.2 General discussion of potential

The Convoys Wharf excavation was the largest ever such investigation of a Royal Dockyard. The site has considerable potential to aid understanding of the Dockyard from the early post-medieval period to the late 19th century, particularly if the stratigraphic and artefactual evidence is combined with the wealth of historic, cartographic and pictorial evidence for the site. The site also has considerable potential to understand and model this area of the Lower Thames Valley for the Middle to Late Holocene for geoarchaeological purposes and there is also potential to add to the picture of this area of London in the prehistoric and Roman periods.

The potential of the stratigraphic archive in its basic form is considerable. A context matrix has been compiled to show the inter-relation between the structures, features and deposits on site and through this it is possible to see a series of distinct phases and themes becoming clear. The stratigraphic framework will now be used to place additional specialist study in its spatial, functional and chronological context.

The stratigraphic potential can be loosely separated into seven of main areas: the prehistoric and Roman use of the site; the site immediately before the establishment of the Dockyard and its subsequent founding by Henry VIII in 1513; the Dockyard in the Stuart period; Sayes Court; the Dockyard in the early Georgian period; the Dockyard in the late Georgian and Victorian period until its closure in 1869; use of the Dockyard site after closure.

The prehistoric and Roman evidence shows how the site was used in these periods, an understanding that is enhanced when linked to the environmental and geoarchaeological reconstruction of the site. There is no strong evidence of prehistoric settlement, but the site would have been attractive to prehistoric people and finds were recovered from the Mesolithic, Neolithic and the Bronze Age. The evidence from the Roman period has a number of unusual aspects – the presence of a late 2nd–3rd AD century Roman enclosure on site was wholly unexpected in an area of the hinterland of Londinium where such evidence is scarce. In addition to this,

the burial within the fill seems to show characteristics more linked to a prehistoric tradition than Roman but combined with Roman elements (the presence of a samian cup that may have been deliberately put out of use). This small but important body of evidence has the potential to shed light on social practices in this period and location.

It is clear that a number of distinct Dockyards existed on the site. The Tudor Dockyard was almost completely removed by subsequent developments. The Stuart Dockyard was rendered obsolete when the site was rebuilt in the early Georgian period. As ship building technology changed with the advent of steam slipways became vast, truncating away earlier structures. Eventually when the Dockyard closed, the buildings were repurposed and then swept away by modern warehouses. The evidence collected during the excavation has the potential to examine this complex interplay of factors and link them with social, economic and political factors during the Enlightenment, the Industrial Revolution and its aftermath.

Geoarchaeological potential

The site is located within an area not previously subject to extensive detailed geoarchaeological investigation, and offers very good potential to reconstruct the environment and landscape record for this part of the Lower Thames Valley for the Middle to Late Holocene (Mesolithic to historic periods). A detailed reconstruction of the spatial and temporal landscape variations will make a significant contribution to achieving the overarching goals of the SARM (Hawkins 2009), together with wider research themes within the Lower Thames Valley. Recording variation and changes in environment and landscape over the Holocene informs questions relating to human adaptability and survivability against a background of changing environmental conditions, and human modification of the natural environment. Such a record will enable a thorough comparison and integration with records from adjacent sites.

Further work is needed to investigate the late prehistoric to historic channels, in particular, how these channels relate chronologically and whether any are related to the dock construction (specifically the two north south drainage ditches to the south east of the site). Palaeoenvironmental comparisons of these channels and the ditches would enable any connections to be brought to life and compare the differing environments of small natural water courses on site with man made drainage ditches created for the dock works. As an initial phase of any such investigation however, further work is needed to confirm the stratigraphic interpretation of the retained cores that contain the possible recent channel fills and the palaeoenvironmental potential of the sequences involved. Other specialists will be afforded the opportunity to revisit their conclusions in the light of radiocarbon dating carried out as part of the geoarchaeological work.

Most of the insect material in all samples are identifiable to a useful taxonomic level and have a good potential to provide information on the local environment and deposit formation. It is recommended that the beetle and bug assemblages from the three most productive samples are analysed in detail.

Environmental change

In addition to the geoarchaeological evidence having the potential to illustrate how the environment has changed over a considerable period of time, the timber records have the potential to illustrate sea level change over the shorter post-medieval period. Since the mid 1970's the potential of waterfront archaeological sites to shed light on relative sea level change has been recognised. Building on early work by Milne (1992) using the form and close dating of timber structures linked to carefully excavated stratigraphy containing features such as hearths and flood clays a 'time timber and Thames level clock' has been built. This clock / level corpus still needs

more data for the post-medieval period which Deptford Dockyard may be able to provide.

The prehistoric and Roman periods

The prehistoric pottery, the small Roman pottery assemblage and the small quantity of Roman building material from the site have the potential to date the contexts in which they were found and possibly throw some light on prehistoric (probably late Bronze Age/early Iron Age) and Roman activity on this small area of raised ground overlooking the river. The pottery from one context [2508] was found in a ditch near a burial and may be associated. The possibility of a high-status Roman building on site could be further investigated.

Technological potential

There is considerable potential to understand technological change over an important time in the post-medieval period, using the evidence provided by the timbers.

The various levels of structural timber records made at Deptford Dockyard of the main dockyard structures have a considerable potential for further investigation to define key features of heavy dockyard carpentry. That study would involve documenting methods of conversion, jointing and fastening and the work of shipsmiths. Issues such as the size and volume of the materials and logistics of assembly could also be examined. The patterns in the data could then be compared with those of other nearby sites such as Woolwich Royal Dockyard and a private Thames yard.

Although the number of reused nautical timbers fully exposed and recorded was less than might have been predicted, several of the largest and best preserved exemplify the skills necessary for shipwrights building large ocean going ships in the late 17th to 18th century, such as: boring long accurate bolt holes and jointing together large timbers to make ever larger elements. This has the potential to shed light on aspects of ocean going ship construction.

There is also the potential of records to illuminate the real nature of the timber used in the Dockyards – both home grown and imported. Post-medieval shipyards and particularly the Royal Dockyards, have long been seen as major shapers of the British landscape through consuming vast quantities of mainly oak timber. Others have described this general view as wildly inaccurate and it remains a perennial speculative debate not yet informed by actual archaeological evidence of the type and volume timbers really used in ships built in Britain from the 17th to early 19th century.

Although the slipways were central features of the excavated area and are rather visible in other surviving Royal Dockyards how they were actually used is not well known. Recent practice with the use of power tools and power cranes etc has resulted in the loss of some of the skills used to build, repair and maintain vessels on a timber slipway. Evidence was found for the use of mobile capstan winches, and shores, folding wedges and various arrangements of blocks.

Although the Tudor Storehouse was only exposed in plan, site evidence has the potential to help in a partial reconstruction of this important building. By chance the recording of the voids in the brick work of the footings of the Tudor naval store building have provide us with very informative ghost of the timber work the building was originally constructed with. The partial underpinning of the wall can be deconstructed and a limited graphic reconstruction can be developed.

Timber records can help establish the zoning of activity and topographic development of the Dockyard. A number of timber structures found and partially recorded on the Deptford Dockyard site were not initially easy to interpret as to function and in some cases to phase. Thus, some further work may be required in collaboration with the main authors and finds researchers to examine the topographic zoning and development of the site.

A wide range of structural items was recovered, of which a selection can be recorded and illustrated, with other finds associated with the ship yards. The latter include items such as keel dogs ([5772] (<195>, [5895], <197>) and other wedges made of both copper alloy and iron, and eyelets for sails which have the potential to illustrate technological change.

Social potential

The post-medieval Dockyard has the potential to illustrate social change over an important period of time. Part of this assessment has focussed on well-sealed and closely-dateable fills from cesspits at the back of buildings in Area 5.1 identified in the 1698 survey as being officers' quarters. By applying this approach to other areas of the site, the combination of stratigraphic and artefactual evidence with cartographic evidence and the evidence from historic records will help understand social change in the Dockyard.

For the post-medieval pottery, the broad-brush picture that has been painted in this assessment offers considerable scope for refinement as the integration of stratigraphic and finds evidence proceeds. This will allow the isolation of those deposits that can be directly related to occupation in the area and their separation from the more generalised dumping. Refinement of the site sequence and phasing are an important area to which the ceramic evidence can contribute.

In general terms, this site provided an informative post-medieval pottery assemblage. The potential, however, of much of the small-sized groups of post-medieval pottery is currently limited and if further publication work is undertaken much of this can be best described through a more general and standard chronological narrative focussing on a number of key groups, with photographs and illustrations highlighting the more interesting or complete vessels. The small size of much of the pottery groups and the absence of any further diagnostic fabric and forms makes further refinement of the dating impossible on ceramic grounds, though clay pipe evidence can give much tighter dates within this range.

Particular ceramics groups, in particular those coherent 'clearance groups' related to cesspit features in Area 5.1 linked to buildings which housed the professional managers offices and dwellings marked on the 1698 dated 'A survey and description of the Principal Harbours with their Accommodations and Conveniences' for the Dockyard, have been picked out to form the basis of further work. The potential of the ceramics from these contexts is discussed in the following paragraphs.

The majority of the smaller-sized post-medieval pottery is dated from the late 16th to 17th-century, with ceramics relating to the Tudor Dockyard scarce. By the 17th century, however, a significant increase in activity can be witnessed by the considerable quantity of pottery recovered, including four medium (in [3088], [5803], [5804], and [6405]) and three larger-sized groups (in [5806], [5935] and [6013]) related to direct occupation of the Dockyard and its ancillary structures.

Given their character and preservation, the ceramics with most potential are these seven noted statistically viable groups that can be related to the Dockyard, together

with other ceramic groups derived from any pit or backyard features, as opposed to demolition spreads or more ambiguous deposits. For the remaining smaller-sized groups a more general overview of the fabrics and forms present is all that can often be provided (quantifying these groups by estimated vessels equivalents or rim diameter is therefore not necessary), in addition to discussion of any particular vessels highlighted for photography or illustration (for example the delftware cat jug in [6013]).

Particular themes to stress is the apparent emphasis overall on utilitarian tableware pottery such as bowls and dishes, and on ceramics used for storage of liquids such as Frechen jug and Spanish olive jars over cooking vessels. The quantity of Spanish olive jars and amphora located in a number of deposits in this phase also warrant investigation.

For the Georgian and Victorian Dockyard, the principal resource used to analyse the material culture of this Royal Naval Dockyard are those large groups in [4879], [4880] [4952], [5107], [5935], [5107] and [6054] mostly dated to the second quarter of the 19th-century. Although this material has yet to be assessed, the pottery (and other finds) offers valuable opportunities to examine questions of the nature of activity and occupation of the officers and professional managers of the Dockyard. Detailed analysis of the makeup of these groups that can be directly related to this process will provide important evidence of supply and usage, as well as of status and occupation, with a great number of questions arising from individual types and items of interest that have been identified during assessment.

These groups can contribute two specific areas of interest into the archaeology of the period. The first is the role of possessions in this property during an increasingly materialistic Regency society and the second is dating particular changing patterns of residence (by using such well-sealed finds groups). The evidence from Spitalfields (Holder and Jeffries with Daykin, Harward and Thomas, in prep) suggests that the filling of backyard privies was nearly always connected to the departure of one set of residents and replacement with another.

Generally the remaining 18th- and 19th-century ceramics from this site not particularly informative and in some cases this material was mixed with similar quantities of earlier post-medieval pottery and so cannot be used to provide further substantive data for understanding everyday life of the occupants of this site during this period.

Although the site was found to be artefact poor, due partly to the constant sweeping away of buildings as the Dockyard was redeveloped and partly to the efficient management of waste while the docks were in operation, the accessioned finds are nonetheless of considerable importance; while much of the assemblage comprises structural fittings and scrap, the finds give important insights into the activities being carried out on different parts of the site. The main groups were found in a number of pits and cesspits in Area 5.1.

No evidence was found for 16th- to 17th-century dockyards, and few artefacts could date to this period. The 17th to 19th centuries are more strongly represented. Glass is the most helpful material for dating purposes and also as an indicator of non-industrial activities on the site.

The glass vessels from [4880] form an interesting group, especially when seen in conjunction with the other finds from the pit fill (including pottery). A selection of the more complete vessels or diagnostic finds should be illustrated to demonstrate the

range of forms (eg goblets <251>, <260>, <262>, <264>, <265>, <277>, ?jelly glass <258>, façon de Venise trail <271>, lid <253> and phial <268>).

The same applies to the smaller group of glass vessels found in cesspit [5107], which could be illustrated for the purposes of comparison (goblets <245>, <244>/<770>, decanter <243>). The ?façon de Venise style mug, with blue glass body and base and handle in opaque white glass from [5547] (<246>) is an unusual and prestigious object that needs more research.

The copper alloy mainly comprises nails and scrap, with few groups of other identifiable artefacts. The group of 24 discs from cesspit fill [4880], however, is of interest, as most other items are of domestic origin. Once X-rays are available it should be possible to determine whether these are coins or not, and a decision can then be made regarding further work. The finds from fill [5107] of cesspit [5548] mainly comprise waste, but include a probable button (<700>).

Other objects that can be used to illustrate aspects of daily life in the dockyard buildings include a candlestick, a lamp ([6054], <619>/<767>) and inkwells ([4642], <239>; [4952], <240>), all of glass. Items of copper alloy include a small oval sign for the Royal Navy mess and two larger signs, hand-cut out of sheet metal, with the number XI, the other XIII, both from [3679] (<704>, <705>).

While much of the bulk glass comprises small groups, the main potential of which is as dating evidence, there are four larger assemblages ([4880], [5107], [5867] and [6054]), which merit further analysis and discursive comparison with illustrations of the best examples. All are of late 18th/19th-century date but differ in composition and character and presumably reflect the nature of the associated buildings in Area 5.1. The groups from [4880] and [5107] are earlier in date and mainly comprise wine bottles, with a complete example from [4880]. The group from [6054] is also dominated by wine bottles but includes pharmaceutical bottles, while the latter are the main form in [5867]. A few other finds merit notes in the text.

The small but well-preserved hand-collected assemblage of animal bone has some definite potential for further study of the local meat diet and patterns of waste disposal, particularly with regard to carcass-part selection and age at death of the major domesticates; cattle, sheep/goats and pig and, to a very minor extent, of poultry, game and fish. (In view of the lack of recovery of wild vertebrates; particularly amphibians and small mammals, from the samples, there is no potential for interpretation of local habitats.)

The clay pipe assemblage has considerable potential for further work, with several large key groups highlighted in this assessment. Most of these come from Area 5.1 and can be associated with features on individual properties that also yielded significant assemblages of other finds. There are therefore ample opportunities to examine the material culture of the Dockyard through these large collections of artefacts and other evidence. The clay pipes provide particularly good dating evidence, capable of further refinement through the identification of individual pipe makers whose products were identified in the larger groups. Most of these lived and worked in the Greenwich area during the 18th and 19th centuries. Further study of their pipes, used and discarded on the site, should allow close comparison with finds from other contemporaneous sites in the same area, and the identification of distribution patterns relating to individual workshops. There are also opportunities for relating some of the decorated pipes to public houses located nearby, as well as for analysis of patterns of usage across the site, by comparing distribution of the products of individual makers and decorated examples between properties.

7 Significance of the data

The site has a considerable local significance for the prehistoric/Roman period and for the post-medieval period of the Dockyard. The regional significance of the site lies in its potential to add to the picture of the layout of the Dockyard, to understand its development through important periods of history. Some of the elements of the site – such as the scheduled Tudor Storehouse – are of national significance.

It is fair to note that the evidence for historic woodwork recorded covers certain themes but not all that might have been expected from the results of other excavations on dockyard sites in east London. The volumes and quality of evidence recorded for dockyard carpentry and civil engineering in mixed materials including, timber, iron and brick is of local, regional and national importance. By contrast the number of reused ship timbers that could be recorded in detail was limited although the large stern timbers are an important group of elements that rarely survive well on wreck sites. Thus, that material must be described as locally, regionally and nationally important.

By contrast the recording and sampling of the timber raw materials used, mostly reused or roughed-out ships timbers, is significant for understanding the crucial links between timber supply and dockyard works (essentially a military material) both for regional, foreign and even imperial timber supplies. This aspect of the data is of regional, national and international interest as the degree to which the post medieval ship yards have formed the British countryside and even denuded distant forests has been a huge area of debate for over a century. Wars were apparently fought over naval timber supplies. Though much debated very little hard information from archaeological sources has been considered (Rackam 1976,99, Saxby and Goodburn 1998).

Some of the detailed recording on site together with examination of finds retrieved has produced significant information on the work actually carried out on the slipways while they were in use. Evidence for the arrangement of support blocks and mobile windlasses and shores was found which can be interpreted with reference to pictorial and model and later shipyard information. This technical and logistical information can be described as regionally and nationally significant.

Although few clearly dated features of the earliest Tudor Dockyard were exposed and recorded, close observation has enabled some details of the original construction and life history of the building to be reconstructed. It is also clear how some changes in building carpentry were applied to this high status naval storehouse at an early date in the 16th century. This data must be of local and regional significance at least.

Clearly the further study of the woodwork and woodworking debris has the potential to shed light on the development of zoning of work in the Dockyard and aspects of its topographic development.

Finally, the linking of the study of waterside timber structures with documenting tidal estuary relative sea level change, that is commonly carried out on London excavations, may be of use here when the levelled plan data is available. This area should be of at least regional interest.

Whilst the majority of the post-medieval pottery groups supply a chronology for the site and characterise the deposits they were recovered from, this material is of local significance for developing some of the many questions that remain about landuse in related to the Dockyard and determining the apparent ceramic signatures that have

been observed, in addition to comparing this against any excavations on other Royal Naval Dockyards in London. In addition, the Regency dated groups in [4879], [4880] [4952], [5107], [5935], [5107] and [6054] would provide the opportunity to discuss the material culture of a Royal Naval Dockyard (Owens, Jeffries, Wehner and Featherby 2010).

Ultimately these groups have a broader significance for understanding the material culture in circulation within the sphere of Britain's naval dockyards and how much this was influenced by the broader culture of the eighteenth-century world of goods. How much choice did the managers of the dwellings this material was used have in choosing the ceramics and glass that furnished these properties? How was ceramics, glass and the other materials supplied and discarded within the institutional confines of the Royal Navy? With such a heavy emphasis on spaces presumably mostly used by men then gender also becomes a significant factor in the interpretation and meaning of the materials excavated here.

The number of Roman tile from the site is small but may still be of significance if it indicates Roman building activity in the area. At least one building may have been at least of some social status and there is a considerable number of plain red tessera from a tessellated pavement. The presence of combed and roller-stamped box-flue tile would strongly imply a masonry building containing a hypocaust heating system.

There is relatively little medieval building material from the site. Most comprise definite and probably Low Countries brick from what appears to be three separate brickyards. All these bricks would appear to have been used, but they may relate to medieval building activity on the site as may the small number of medieval roofing tiles.

A large number of brick features have been sampled, mainly of 16th-, 17th- and 18th-century date. These include what appears to be two phased of Tudor brickwork. Some Tudor bricks are 'glazed' headers suggesting they may originally have been incorporated into a decorative diaper pattern.

The types of brick used and their fabric may be able to assist in the dating of the many brick structures found on the site. It should also help identify where earlier brick have been reused in later brick structures. The bricks examined so far appear to be an interesting mixture of London and non-London fabric types. It is uncertain at present is there is any chronological differences between these two groups.

Certain brick walls were set on timber base plates. Further analysis of these unusual walls, many of which were recorded on site, will be required to examine the size and fabric of the bricks used and to discuss whether they represent a specific phase of the dockyards development.

Two Victorian or later bricks in Area 4 have the letters W H in the frog base with what may be an anchor mark between the letters. If this is indeed an anchor symbol then this may imply the bricks were specially made for the dockyard, perhaps by a brickyard operated by the dockyard itself.

Plain glazed Flemish tiled floors were also recovered from the site and these have also been sampled. These are probably of 17th or 18th-century date. More interesting are the decorated and plain tin-glazed English-made floor tiles, suggesting the presence of a building with a high degree of social sophistication. The later Dutch delft wall tiles would have probably come from the fireplace of domestic building.

Interestingly two of these have a nautical theme which fits in well with their use in a dockyard building.

A minor, but still interesting feature is the presence of brown glazed pantiles. Pantiles are normally unglazed, although a few black and dark purple glazed examples are known in London and elsewhere. This is the first instance, as far as the author knows, of brown glazed pantiles from London. These could be of English or Dutch origin.

The plaster mouldings provide evidence for internal decoration in one of the more important 19th-century dockside buildings.

There is not much evidence for Roman activity in Deptford and this small amount of Roman pottery therefore has regional and local significance, especially if it can be related to occupation or burial on the site. The assemblage contains known imported and Romano-British wares and a few sherds of currently unidentified (probably Kentish or Essex) fabrics as well as a couple of sherds from imported vessels with unusual fabrics (also currently unidentified) both of which are residual in later contexts. The single prehistoric sherd is also significant as evidence for late Bronze Age or early Iron Age activity in the area.

Further ceramic and stratigraphic analysis should clarify the nature of activity on the site and the sources of the pottery.

The accessioned finds are of local, national and international interest. In the local context, they add to the understanding of changes in topography, landuse, industry and socio-economic conditions over some 450–500 years.

The site belongs to a small group of Royal Naval dockyards in England and Wales, others including Chatham, Portsmouth and Pembroke. The finds are thus of interest to all those studying maritime aspects of industrial archaeology and associated subjects such as provisioning, internal organisation of functions, munitions and ordnance.

As Convoys Wharf has a long and continuous history and is the only such site to be so extensively investigated, it will be of considerable interest to scholars around the world, and the associated finds are key to understanding developmental changes on the site and on a wider scale. Correctly identified and studied, objects that illustrate these changes will help make the final publication a standard reference work.

The clay pipe assemblage from the site is highly significant in a local, regional and wider national context. Their importance lies in the sheer size of the collection, with numerous closely datable key groups that can be related to finds assemblages from individual properties on the site. In this way they make a major contribution to understanding the development and use of the Dockyard, especially during the 18th and 19th centuries, by throwing light on chronology, social practices (leisure activities) and local industry (represented by the products of several pipe makers' workshops located nearby). The finds will allow comparison of clay pipe supply and demand with other major excavated assemblages from across London, thereby giving them high significance within the region. The size and quality of the assemblage also gives it a wider national importance, since it provides excellent opportunities for regional characterisation (afforded by so many marked examples) that can be compared with large assemblages of the same date from other major centres in the UK.

The hand-collected animal bone is of definite local significance, particularly in terms of meat diet, with emphasis on the skeletal representation and age-selection of cattle, sheep/goat, pig and, to a much lesser extent, poultry, game and fish. There is no wider significance or significance in terms of local habitat interpretation.

The nails have some limited local significance. They should inform discussion of the timber structures and woodworking practices on site and may serve as potentially well dated exemplars of nail types in use locally. They have no regional or national significance.

8 Publication project: aims and objectives

8.1 Revised research aims

The following revised research aims have been identified in light of discussion of the potential (Section 6) and the significance (Section 7) of the site.

8.1.1 Woodwork

To accomplish the revised research aims briefly listed here will require the Woodwork Specialist to liaise with other members of the project team, such as the main authors, tree-ring, species ID and small finds researchers. It is also likely that bespoke historical research will also yield relevant data.

It must be clearly stated that the project has not provided data to address the question of how the transition of building large clinker built ships of the early Tudor period to the new carvel built ships like the Mary Rose took place. The material evidence was just a little too late in date. However, some small details of the Tudor naval yard have come to light and can be described such as the original construction of the scheduled Tudor Storehouse. Small section of revetments of this broad period also appear to have been exposed.

The material evidence for heavy Dockyard carpentry, influenced by the shipwrights work, for the 17th to early 19th century was recorded in some detail and describing aspects of that work, comparing it with other nearby sites and surviving documentary evidence must be a central aim of the analysis. Elements of construction procedures, tool kits and logistics can be reconstructed highlighting some of the effects of early industrialisation.

The project has also provided a great opportunity to sample the evidence for the historic timber trade and supplies to the Dockyard, both the regional and long distance trade. We can provide hard data on a selection of categories of material such as the size, shape and age of oak 'great timbers' coming into the yard, or the early use of tropical hardwoods probably derived from distant imperial locations. Again this must be a serious research area during the analysis phase.

A chance to compare archaeologically derived evidence for aspects of the use of the building and repair slipways would be a shame to miss, A summary of the evidence can be placed alongside other presentations derived from studies of pictorial, model and later shipyard evidence. It is now difficult to conceive how awkward shaped timber assemblies, often weighing well over 1 ton, were manoeuvred around on building and repair slips without the use of power cranes.

In collaboration with the principal authors of the analysis study it should be possible to describe and better understand some of the timber structures found on site. This will be part of the process of reconstructing the topographic development on-site and examining whether the degree of specialisation seen in other Royal Dockyards such as Woolwich or Chatham was as well established at Deptford.

Finally, the graphic reconstruction of some of the Deptford dockyard's timber structures and comparison with data from neighbouring sites should contribute to our understanding of the more recent trends in historic relative sea level change.

8.1.2 Post-medieval pottery

The revised research aims for the post-medieval ceramics is split into two sections: the first are those pertinent to the further understanding the landuse of the site during its development during the Tudor and Stuart period and those significant individual groups related to the Georgian, Regency and Victorian periods.

Ceramics relating to the Tudor and Stuart Dockyard

After the stratigraphic sequence is finalised much of the discursive work here should be focussed on the discussing those medium-sized groups and associated contexts.

- 8.1.2.1 What is the general composition and chronology of the medium (in [3088], [5803], [5804], and [6405]) and three larger-sized groups (in [5806], [5935] and [6013])?
- 8.1.2.2 Is it possible to associate these groups to individual areas and buildings related to the Dockyard?
- 8.1.2.3 Does the remaining pottery assemblage from Tudor and Stuart period provide a ceramic signature for the site when interpreted alongside the landuse they were found from?
- 8.1.2.4 What is the nature and use of the delftware cat found in [6013]? How is this amplified as an object used in a Royal Naval Dockyard? How does it compare to other known examples?
- 8.1.2.5 Does the apparent concentration of Spanish olive jars and amphora highlighted here reveal a particular pattern of ceramic use? How is this amplified when related to the victualling of a Royal Naval Dockyard?
- 8.1.2.6 Overall how does the pottery compare with the same material related to the use and of other published Royal Naval Dockyards in London?

Ceramics relating to sequences after the Georgian and Victorian Dockyard (1714 and later)

The further study of the household rubbish in [4879], [4880] [4952], [5107], [5935], [5107] and [6054] can contribute toward seven updated research aims, which is focused on identifying the reasons why this group was deposited and its function within Georgian and Victorian Dockyard. For consistency, these revised research aims and style is similar to those already employed in the forthcoming Spitalfields publication (Holder and Jeffries, with Daykin, Harward, and Thomas, in prep). The methodologies and research aims employed for Spitalfields and elsewhere (Owens, Jeffries, Wehner and Featherby 2010) have shown how archaeology and 'household archaeology' approaches can often complicate standard historical narratives that pervade for an area with a colourful history, but also providing a means of avoiding a situation where the archaeology is merely used as an illustrative tool for 'what we already know'.

Questions remain about what the systematic backfilling of these three features indicates about the use/demolition of individual structures (and thus about of the development of the area). For these features, the combination of the finds, stratigraphic and historical data should allow reasonably precise dates of deposition of the finds to be fixed, and in some cases, establish by whom. A thorough search of

the available documentary records may allow ownership of the properties identified on the site to be traced.

- 8.1.2.7 If documentary research identifies the inhabitants of this particular property, does this assemblage match their socio-economic status?
- 8.1.2.8 Can elements of material culture use within this household be reconstructed by examining the composition of the different types of materials found?
- 8.1.2.9 How does the function of the different elements of the finds (not just the ceramics) compare against one another in terms of function, chronologies and cost?
- 8.1.2.10 Can the 'life cycle' of an individual property therefore be reconstructed by examining the composition of the ceramics and other finds recovered from this feature?
- 8.1.2.11 Does the pottery form distinct decorative sets and if so what does this suggest about the purchasing of ceramics by the inhabitants of these properties?

8.1.3 Bulk iron and accessioned finds

The following can be suggested as provisional research aims for the finds, more may emerge as the study progresses:

1. How do the finds relate to different buildings and how do they reflect the activities within those buildings?
2. How do the industrial and structural finds reflect changes in technology and the use of the site?
3. How do these finds compare with those from other dockyard sites such as the Narrow Quay, Bristol (Good 1987), East India Company at Deptford (Divers 2004)?
4. What is the full range of nail sizes, how large are the different size groups and is there any pattern to their distribution?
5. Do the finds from the cesspits reflect the documented uses of the adjacent buildings? What activities were carried out? Are the finds typical for the period or of lower or higher status than might be expected?
6. What aspects of material culture are missing?

How do the few 'female' artefacts, such as the tortoiseshell comb, perfume bottle and a possible brooch, fit within a very male environment?

8.1.4 Clay pipe

The following additional research aims are suggested by the pipe assemblage from CVF10:

1. Identify the names of clay pipe manufacturers from marked examples, as far as possible, and refine dating accordingly
2. Compare the marked clay pipes with other examples from nearby sites. How does this affect distribution patterns of the products of known manufacturers?

3. Consider the clay pipes in relation to other finds from the same contexts to allow comparison of individual properties across the site.

8.1.5 Iron nails

1. Does the iron nail assemblage provide any insights into the construction of timber structures or shipbuilding activities on site?
2. How does the iron nail assemblage compare to that found on similar sites?

8.1.6 Animal bone

1. *What are the characteristics of the local meat diet in terms of the selection of species, carcass-part and age-group?*
2. *What butchery techniques were used to process cattle and sheep/goat carcasses?*

8.2 Preliminary publication synopsis

The proposed principal publication will form part of Museum of London Archaeology's Monograph Series and focus on Deptford Royal Dockyard and the period immediately prior to the establishment of the dockyard.

Since the prehistoric and Roman discoveries during the excavation do not fit with this focus, it is proposed that these are dealt with in a separate publication as a short article. These early finds are not related to and do not add to the understanding of the post-medieval Dockyard but are important in their own right.

In addition to this, in an innovative approach, it is proposed that the progress of the research and the publication is charted in a series of blogs or other social media. The intention is to keep interested parties informed as well as building links with other researchers.

Monograph

The proposed publication will form part of Museum of London Archaeology's Monograph Series. The principal author will be Antony Francis. It is estimated that the book will contain c 125,000 words, 20 stratigraphic drawings (location plans, phase plans, sections, details), 30 maps, 30 images by historic artists (paintings, line drawings, prints), 100 drawn finds and timber illustrations (many combined on single figures), 200 photographs of selected finds and site images, and up to 4 artists' reconstructions. There will be some flexibility in these figures as the project develops.

Working title:	<u>The archaeology and history of Deptford Royal Dockyard, London SE8</u>
Principal Author:	Antony Francis
Format:	MOLA monograph
Total word count:	125,000
Total figure count:	150
(comprising):	20 stratigraphic drawings (location plans, phase plans, sections, details), 30 maps, 30 images by historic artists (paintings, line drawings, prints), 100 drawn finds and timber illustrations (many combined on single

figures), 200 photographs of selected finds and site images, and up to 4 artists' reconstructions

Total table count: 30

Abstract

Contributors: Steve White, Greg Laban, Virgil Yendell, Damian Goodburn, Ian Betts, Lyn Blackmore, Nigel Jeffries, Jacqui Keily, Beth Richardson, Alan Pipe, Don Walker
General editor: Sue Hirst (MOLA Managing Editor)
Academic advisor: Jonathan Coad has been approached for this role

Contents

List of Figures

List of Tables

Acknowledgements

8.2.1 Chapter 1: Introduction

(c 5,000 words)

This will consist of a summary of the current state of archaeological, topographical, geological and historical knowledge of the area bounded by the new development and its environs, from the sources of physical evidence, and the wider academic concerns.

The scope of the current publication project will be discussed. The general study area, and the areas of intervention will be defined. There will be a brief summary of the work pre-dating the excavation, including previous evaluation, with the circumstances and dates of field work. The history and funding of post-excavation and assessment work will also be detailed.

There will be an introduction to the research programme.

The formal structure of the report will be outlined including extensive chronological narrative chapters, thematic chapters, specialist appendices. There will be a description of the period within the narrative, as given in other MOLA monographs.

Reference to the location of and access to the project research archive and the disseminated digital version (if applicable).

The graphic and textual conventions used in the report.

8.2.2 Chapter 2: Brief history of Royal Dockyards, their technology and the process of ship building

(c 10,000 words)

An overview of Deptford Royal Dockyard and its relation to the other Royal Dockyards. A brief explanation of the technology of ship building from the 16th to the 19th century, ancillary industries, the construction of dockyards in this period. Comparison with private yards.

8.2.3 Chapter 3: The topography, geoarchaeology and pre-Dockyard evidence

(c 10,000 words)

Summary of evidence. An attempt will be made to reconstruct the environment and landscape record for this part of the Lower Thames Valley for the Middle to Late Holocene (Mesolithic to historic periods). The evidence from the prehistoric and Roman periods will be mentioned, although the intention is that this is dealt with in a stand-alone article rather than in this monograph. Reference will be made to recent excavations in the immediate vicinity to reconstruct the local topography. A description of pre-Dockyard Deptford, especially in the Tudor period leading up to the establishment of the Dockyard.

8.2.4 Chapter 4: The Tudor Dockyard (1513–1603)

(c 10,000 words)

Summary of archaeological evidence. Integration of the archaeological evidence with historic, cartographic and pictorial evidence where this exists. Historic evidence of the founding of Deptford Dockyard and the structures in this phase of the Dockyard – such as Henry VIII's Storehouse and the Wett Dock. An attempt to reconstruct the Dockyard using a synthesis of this evidence.

8.2.5 Chapter 5: The Stuart Dockyard (1603–1714)

(c 15,000 words)

Summary of archaeological evidence. Integration of the archaeological evidence with historic, cartographic and pictorial evidence and tracing the history of the Dockyard using evidence such as the map of 1623, the survey of 1698 and 17th- and early 18th-century depictions.

Detailed description of the archaeology and structures in this phase, such as the timber Dockyard Basin and gate, the early perimeter wall, the Treasurer of the Navy's House and the officers' quarters, the smithy. Detailed examination of the assemblages found in the cesspits and wells belonging to the officers' quarters and a discussion of what conclusions can be drawn.

8.2.6 Chapter 6: Sayes Court

(c 15,000 words)

Summary of archaeological evidence and a discussion of this in relation to the historic, cartographic and pictorial evidence for Sayes Court, for example the map of 1623, Evelyn's map of 1653, Evelyn's and Pepys' diaries and other historical documents.

Detailed description of the building found in Area 6 and other structures, such as the garden walls.

8.2.7 Chapter 7: The early Georgian Dockyard (1714–74)

(c 15,000 words)

Summary of archaeological evidence. Integration of the archaeological evidence with historic, cartographic and pictorial evidence and tracing the history of the Dockyard using evidence such as Milton's map of 1753 and 17th- and 18th-century depictions of the Dockyard.

Detailed description of the archaeology and structures in this phase – focussing on the rebuilding of the storehouse complex, the smithy and the Basin, as well as the expansion of the Dockyard.

8.2.8 Chapter 8: The late Georgian and Victorian Dockyard (1774–1869)

(c 15,000 words)

Summary of archaeological evidence. Integration of the archaeological evidence with historic, cartographic and pictorial evidence and tracing the history of the Dockyard using evidence such as Milton's map of 1753 and 17th- and 18th-century depictions of the Dockyard.

Detailed description of the archaeology and structures in this phase – new technology, the effect of new steam-driven machinery on the site, the new slipways, the advent of cover buildings and John Rennie's design and construction of the caisson gate. The decline of the Dockyard and its final closure.

8.2.9 Chapter 9: Post-Dockyard (1869–present)

(c 5000 words)

A full illustrated discussion of the conversion of the Dockyard into the Foreign Cattle Market in the late 19th century, the evolution of the site and its use in the 20th century. The new development.

8.2.10 Chapter 10: Conclusions and future research

(c 5000 words)

The conclusions and suggestions for the direction of future research will depend on the results of the proposed analysis. However, they will address the results of the research and briefly consider the importance of the Convoys Wharf excavations and archive for future research in the LAARC.

8.2.11 Appendices: Specialist supporting data

(c 20,000 words)

Material of general interest will have been written for integration into the narrative/catalogue/discussion/conclusions chapters. This section is intended purely to hold the minimum necessary supporting data (all specialists), such as:

- Specialist methodologies and data tables
- Reference to items of particular interest which are not in integrated text.
- Research themes of specialist interest will be addressed here..

Additionally, the structure of the project research archive will be summarised.

Bibliography

Summaries in French, German

Article on the prehistoric and Roman discoveries at Convoys Wharf

This article would be published in a publication such as London Archaeologist, of c 3000 words. These early finds are not related to and do not add to the understanding

of the Dockyard, so they could be published outside the projected monograph for the main site. The article would be entitled 'Prehistoric and Roman discoveries at Convoys Wharf, Deptford, Lewisham', or similar. Jon Cotton would be the academic referee for the article.

The article would focus on the prehistoric and Roman discoveries on the site. The amount of prehistoric material is small – background – but artefacts from the Mesolithic, Neolithic, Bronze Age and Iron Age were found. The area of high gravel in the east part of the site would have been attractive to prehistoric peoples, but there is no strong evidence from the site for prehistoric settlement. Detailed comparison would be made with the eyots in Southwark and with sites at Blackwall Lane, Greenwich Wharf and Woolwich.

The Roman discoveries included the corner of an enclosure, probably dating to the late 2nd to the mid 3rd centuries AD, a burial within its fill and a spread of *ex situ* Roman building material. The burial appeared to be flexed or crouched, an increasingly rare type of burial by the mid 2nd century AD. This may reflect practices from a relic prehistoric tradition or a local variation in burial form within a set of such forms prevalent at that time. A large fragment of samian cup found in the same fill may have been rendered unusable as part of the burial rite. These aspects would be explored and compared with other examples from the hinterland of Londinium. The significant concentration of Roman building material included tesserae from a plain tessellated floor, indicating a high-status Roman building may have been located on the site. This aspect would also be explored.

The main geoarchaeological work would feature in the monograph as the development of the Dockyard is closely tied to topographical development of the site. However, a geoarchaeological reconstruction to the site would be provided for the prehistoric to Roman periods, particularly in relation to the channels identified during the excavation.

The principal author would be Antony Francis and the article would include input from prehistoric and Roman pottery specialists, osteologists and geoarchaeologists.

Blogging / social media

In an innovative approach, it is proposed that a blog would be written during the research and writing of the publication. Social media could also be used and there will be the facility to comment. The blog would be promoted via other media. The aim would be keep Dockyard researchers and other interested parties informed of the progress of the project and of new discoveries.

The blog would also be an attempt to build links between the MOLA research team and researchers elsewhere and may lead to the discovery of information not previously known. This approach would add value to the project and fulfil in part the requirement for public dissemination of information. Contributors to the blog would include the principal author, prehistoric, Roman and post-Roman pottery specialists, woodwork specialists, osteologists and geoarchaeologists.

9 Publication project: task sequence

All work carried out on this project is subject to the health and safety policy statement of MOLA as defined in *Health And Safety Policy*, MOLA 2011. This document is available on request. *It is MOLA policy to comply with the requirements of the Health and Safety at Work Act 1974, the Management of Health and Safety at Work Regulations 1992 and all Regulations and Codes of Practice made under the Act which affect MOLA operations.*

9.1 Stratigraphic method statement

Digitised plans will form a crucial component of further analysis - the creation of the group sequence and the interpretative analysis within a CAD environment to evolve the provisional site phasing and land-use interpretations. The phased and indexed preliminary grouping structures will be placed on the ORACLE database and then will form the basis for all further analysis of human activity on the site. They will be analysed both sequentially and spatially, in conjunction with environmental, finds, and other dating information, to produce integrated accounts of the site sequences. Given what is known of historical developments on the site there will be an attempt to develop a common phasing across the site. Selected digital versions of the key historic maps of the Dockyards will be geo-referenced and placed in the CAD environment along with archaeological data to enable this strand of evidence to inform the land-use interpretations.

Phasing will be reviewed at a meeting of the stratigraphic, pottery, accessioned finds and documentary specialists. The conclusion of this phase of analysis will see a detailed publication synopsis circulated to the entire project team, to provide a framework for their analysis and report preparation.

Task 1 Ensure all dating is on MOLA database

1 day

Task 2 Determine residuality. The ceramic spot dates of each group will be considered against the group's stratigraphic position. Resultant information on the residuality of any of the finds groups will be added to the database.

1 day

Task 3 Select historic maps to geo-reference and liaise with geomatics team

2 days

Task 4 Define landuse. The 1855 subgroups will be organised, through the use of a subgroup matrix, CAD and dating evidence, into the various forms of landuse which they comprise (buildings, open areas, structures, roads, etc).

20 days

Task 5 Describe landuse. Interpretative text will be written about each landuse element including a definition of buildings, structures, open areas, etc, their broad form and apparent function on a site wide basis.

15 days

Task 6 Define periods. The general chronological phases of activity across the site will be identified from the group matrix and defined landuses. These periods will form the chronological framework of the site. There are likely to be 5 such periods; Geology and prehistory; early Roman; late Roman; medieval and post-medieval. The groups and landuses forming each period will be mapped on the oracle database.

2 days

Task 7 Describe periods. A textual summary, built from landuse and group texts where appropriate, will be formed for each of the periods.

2 days

Task 8 Detailed descriptions of the final form and general content of the monograph will be possible at this stage. The synopsis will have summaries of the land use sequences broken down into periods reflecting the development of the site and short summaries of each thematic section. The synopsis will also contain revised word counts and figure lists. Amendments to the updated project design will be made at this time. Photographic images and illustrations will be chosen for inclusion in the publication. The revised synopsis will be disseminated to the project team and archaeological consultant.

5 days

9.2 Documentary research method statement

The interpretation of the site and its structures, and the publication of the excavation results, will certainly be enhanced by an extensive programme of research into selective documentary sources. As Deptford Dockyard was a government facility for more than 350 years, these are relatively plentiful, comprising accounts, surveys, instructions, correspondence, staff lists, manorial documents, census returns, plans, elevations and views. These sources are to be found in various London repositories, principally the British Library at Euston, the National Archives at Kew, and the National Maritime Museum at Greenwich, and are fully listed in the research bibliography of the Documentary Research Assessment (Phillpotts 2012).

There is also a range of secondary works and primary sources available in print, or in the form of theses. This research will be in addition to that already undertaken on the Sayes Court area (Phillpotts 2011), and the initial sampling of some classes at the National Archives.

Two of the most voluminous classes of document at the National Archives will be approached on a sampling basis of every tenth accounting year and a series of target periods. This will produce leads which will require the consultation of further documents in these classes. The aim is to date all the structures encountered in the excavation programme (often with plans and elevations at various periods), and to elucidate the topography of the site and the working practices of the Dockyard in the medieval period (if any) and the post-medieval period.

The research will be focussed to facilitate the best interaction with the archaeological information recovered and the requirements of the publication programme. Contact will be maintained with the post-excavation team throughout the research programme, in order to achieve the fullest possible integration between the results of the documentary investigation, and those of the stratigraphic sequence and the artefactual and environmental evidence. The final selection of targeted research into primary and secondary sources will be subject on discussions between the principal author, archaeological consultant and documentary historian and will include the following material:

Printed works

British Library manuscripts

Institute of Civil Engineers' Library

Lewisham Local History and Archives Centre

London Metropolitan Archives
London School of Economics
National Archives
National Maritime Museum
Additional documents from sampling leads

Task 9 Primary documentary research and compile research bibliography

30 days

9.3 Geoarchaeological method statement

Task 10 To compile publication text based on assessment work and integrate associated specialist reports

15 days

Task 11 Preparation of geoarchaeological publication figures

2 days

9.4 Archaeological timber method statement

Task 12 Further detailed timber records and photos scanning

2 days

Task 13 To review other assessment work eg, tree-ring and wood species reports, and digitised plans and elevations with levels

1 day

Task 14 Magnified examination of the 1774 Deptford Dockyard model and three detailed c. late 17th to 18th-century ship model stern areas

1 day

Task 15 Prepare, research and compile text and explanatory draft figs for analysis of evidence for large-scale dockyard carpentry

10 days

Task 16 Prepare a text and draft explanatory figures on key ship timbers found, particularly the large sternpost / rudder timbers

4 days

Task 17 To prepare a text section with draft figures on the size and form of timber raw materials coming into the Deptford yard

4 days

Task 18 To assist with examining evidence for changing relative sea level in relationship to timber structures found in Deptford

1 day

9.5 Building material method statement

Task 19 Record any further building material selected during the stratigraphic analysis and input data to MOLA ORACLE database

5 days

Task 20 Fabric checking with fabric reference collection

1 day

Task 21 The building material assemblage should be compared with the stratigraphical sequence and all available dating evidence

1 day

Task 22 Write publication report

6 days

9.5.1.1 Suggested items for illustration/photography

Photography:

Tin-glazed floor tiles - [+] <629>, [5760] <690>, [6013] <630>

Tin-glazed wall tiles - [2767] <111>, <112> , [2945] <113>, [5254] <501>, [5889] <502>

Plaster mouldings - [+] <60> and others still to select

Draw:

Peg tile with one peg hole - [5769] (or [4519])

Hip tile - [5803]

Decorative cut brick – [+] <689>

Complete roofing slate – [2521]

9.6 Prehistoric and Roman pottery method statement

Task 23 Full integration of spot-date information with the stratigraphic sequence on the ORACLE database and checking the discrepancies to finalise phasing and to agree the chronological dividing lines of the periods with the principal author. Production of combination reports and interpretation.

0.75 day

Task 24 Write publication text

0.75 day

9.6.1.1 Suggested items for illustration/photography

Context	Form and Fabric	Comments
2508	East Gaulish samian OandP LV 13 with post-firing hole (SAMEG 6OP55/13)	*Profile. Half of vessel present. Illustrate as part of group.
2508	Unsourced oxidised ware cup-mouthed flagon (OXID1B6)	Rim/neck. Possibly a Kent or Essex product. Illustrate as part of group.
2508	Alice Holt BB ware dish (AHBB 5J)	Rim/upper body. Could illustrate as part of group or just describe.

9.7 Post-Roman pottery method statement

9.7.1.1 Stratigraphic

This is necessary for finalising the ceramic sequence from this site and needs to be established in order to provide the contextual framework needed before any descriptive or interpretive text is written.

Task 25 Full integration of spot-date information with the stratigraphic sequence on the ORACLE database and checking the discrepancies to finalise phasing and to agree the chronological dividing lines of the periods with the stratigraphic author.

1 day

9.7.1.2 *Ceramics relating to the Tudor (1513–1603) and Stuart Dockyard (1603–1714)*

In order to answer the suggested revised research aims and provide for a more discursive text, the following tasks listed below are therefore required. This will deliver a landuse based chronological narrative that is focused on the contexts provided by the statistically viable groups. This would be accompanied by a commentary of general overview of the range of pottery in terms of sources of supply, ceramic tradition represented, form, function/use and, most importantly, context.

Task 26 Spot-date the remaining two medium (in [5803] and [5804]) and two larger-sized groups (in [5806] and [6013]) filling 6 boxes

2 days

Task 27 Spot-dating, quantification and analysis of the one large-sized group in [5935] filling four boxes

4 days

Task 28 Contributing to a chronological narrative for the remaining post-medieval pottery from the Tudor and Stuart Dockyard including medium-sized groups in [3088], [5803], [5804] and [6405] and larger-sized group in [6013]

6 days

Task 29 Answering five of the six revised research aims identified

5 days

Task 30 Comparing this material against excavation of other known Royal Naval Dockyards dated to this period

2 days

9.7.1.3 *Ceramics relating to the Georgian and Victorian Dockyard (1714–1869)*

The second more discursive element of this text is on the large groups of 19th-century ceramics and other materials in [4879], [4880] [4952], [5107], [5935], [5107] and [6054]. This group should provide the bulk of the remaining word count for the *ceramics* focussing on chronology, cost, attribution, use and social space of the pottery found in these deposits.

Task 31 Spot-date the remaining two medium-sized groups in [1281] and [1366] filling 2 boxes

1 day

Task 32 Spot-dating, quantification and analysis of the remaining large and very large-sized groups in [4879], [4880], [4952], [5107], [5935] and [6054] filling 32 boxes:

20 days

Task 33 Contributing to a chronological narrative for the remaining post-medieval pottery from the Georgian and later Dockyard including medium-sized groups in [1281] and [1366]

2 days

Task 34 Answering the six relevant research aims

12 days

9.7.1.4 Suggested items for illustration/photography

Post-medieval ceramics: 2 pots for illustration; 2 pots for photography

9.8 Bulk glass method statement

Task 35 Correlate finds and stratigraphic data (60 contexts) and write text for landuse narrative

2 days

Task 36 Analyse finds from four main cesspit groups, with reference to associated finds and write comparative discussion

2 days

Task 37 Review the chronological and spatial distribution of the glass, write general discussion and contribution to thematic research

1.5 days

9.9 Accessioned finds method statement

Study of the bulk and accessioned iron would benefit from input from specialists in maritime archaeology with in-depth knowledge of marine engineering and associated industrial processes.

Task 38 Arrange meeting in conjunction with Project Manager, principal author and finds staff in respect of above and discuss the iron with external specialists:

1 day

Task 39 Examine all X-rays of iron and copper alloy (to be done) and decide on further investigative work in conjunction with conservator

2 days

Task 40 Correlate finds and stratigraphic data (142 contexts) and write text for landuse narrative

3.5 days

Task 41 Analyse iron to agreed standard and complete selected catalogue entries for iron and other material

5 days

Task 42 Analyse the composition of the finds from four main cesspit groups, with reference to accessioned finds and write comparative discussion

4 days

Task 43 Review the chronological and spatial distribution of the accessioned finds, write general discussion addressing the research aims:

2 days

Task 44 Write contribution to thematic research:

1.5 days

9.9.1.1 Finds analysis/investigation

At present there is little need for investigative work but this may change when the finds have been X-rayed. In addition to the coins, present finds comprise:

[4880] <527>: silver?
 [4880] <390>-<394>, <528>-<532> discs/coins (copper alloy)
 [5525] <534> brooch: copper alloy and ?glass

9.9.1.2 Work required for illustration/photography

At present there are few relatively finds that merit illustration, although this may change when they have been X-rayed; for example, the discs from [4880] (<390>-<394>, <528>-<532>) may prove to be coins and so need cleaning. A selection of iron finds may need some cleaning. Other finds include

[5525] <534> brooch (copper alloy and ?glass)
 [5139] <192> plaque (copper alloy)
 [5254] <401> Bell (copper alloy)
 [5254] <402> spoon (copper alloy)
 [5525] <534> brooch: copper alloy and ?glass

9.10 Clay pipes method statement

In order to carry out the requisite research and prepare a text for inclusion in any proposed publication, the following tasks will be necessary:

Task 45 Integration of site and finds data

1 day

Task 46 Research Identify the makers of marked pipes, and parallels recorded on the Oracle database.

2 days

Task 47 Research into the distribution of pipes by identified makers, and comparison with patterns observed on other sites in the vicinity.3 pd.

Task 48Preparation of publication text

2 days

Twenty-eight items have been selected for potential illustration.

9.11 Iron nails

The nails will be examined within their stratigraphic context using the computerised database (ORACLE), site plans, matrices and other information as supplied by the stratigraphic analysts.

Only selected groups of nails which are sufficiently well preserved to provide typological and metric data and which can be related to structures or the building or repair of ships on stratigraphic grounds will be addressed in detail. These will be characterised and compared with contemporary nails from other relevant sites. Specialist discussion of this material will address the assemblage in terms of the overall function of the site, particularly evidence for shipbuilding, and can be used selectively in the publication as appropriate.

Task 49 No quantification has taken place at assessment. Basic overview and recording of the entire assemblage, recording quantity and condition should take place at analysis. This will assist with selection of groups for further study, particularly those nails associated with structures or other stratigraphic units of interest.

2.5 days

Task 50 Characterise selected groups of well-preserved iron nails, to be chosen after phasing together with the principal author, to inform on the construction of timber structures and shipbuilding activities.

1.25 days

Task 51 Selective research on other contemporary ship and shipyard nail assemblages and comparison on a type presence/absence basis Write specialist text to contribute to wider discussions on the nature of shipbuilding

1 day

9.12 Animal bone method statement

The selected assemblage has been recorded in detail as individual bones, directly onto the MOLA Oracle animal bone post-assessment database; analysis and preparation of the tables and report are therefore the further work required.

Task 52 Analysis of data/preparation of tables

2.5 days

Task 53 Preparation of report

2 days

9.13 Conservation method statement

Task 54 Analysis and investigative work

6 days

Task 55 Illustration

0.5 days

Task 56 Stabilisation for the archive

0.5 day

Task 57 Remedial work outstanding

9.25 days

9.13.1.1 Finds analysis/investigation

The registered and bulk finds were reviewed with reference to the finds assessments.

[4880] <527> silver, unident – clean and spot test for silver 0.25 day

[5525] <534> copper alloy and glass, brooch – clean for id 0.25 day

[0] <6> copper, coin - x-ray, clean for dating, stabilize and pack

<144>, <145>, <146>, <147>, <148> copper, coins - x-ray, clean for dating and pack

[6213] <207> copper, coin - x-ray, clean for dating, stabilize and pack

<381>, <382>, <383>, <384>, <385> copper, coins - x-ray, clean for dating and pack

[4880] <390> 3 x copper, unident (probably coin) - x-ray, clean for id and pack

[4880] <391> 3 x copper, unident (probably coin) - x-ray, clean for id and pack

[4880] <392> 3 x copper, unident (probably coin) - x-ray, clean for id and pack

[4880] <393> 3 x copper, unident (probably coin) - x-ray, clean for id and pack

[4880] <394> copper, unident (probably coin) - x-ray, clean for id and pack

[5254] <400> copper, coin (not a button) - x-ray, clean for dating and pack

[1993] <516> copper, coin - x-ray, clean for dating, stabilize and pack

[5107] <540> lead, coin - x-ray, clean for dating, stabilize and pack
 [5107] <541> lead, coin - x-ray, clean for dating, stabilize and pack
 [4880] <528> copper, unident (probably coin) - x-ray, clean for id and pack
 [4880] <529> 2 x copper, unident (probably coin) - x-ray, clean for id and pack
 [4880] <530> copper, unident (probably coin) - x-ray, clean for id and pack
 [4880] <531> 3 x copper, unident (probably coin) - x-ray, clean for id and pack
 [4880] <532> 4 x copper, unident (probably coin) - x-ray, clean for id and pack
 [6405] <535> copper, coin - x-ray, clean for dating, stabilize and pack
 [5436] <610> copper, coin - x-ray, clean for dating, stabilize and pack

9.13.1.2 Work required for illustration/photography

The following items were identified as requiring conservation input for illustration.

[5139] <192> copper alloy, plaque – clean
 [5254] <401> copper alloy, bell – clean
 [5254] <402> copper alloy, spoon – clean
 [5525] <534> copper alloy and glass, brooch see analysis/investigation

9.13.1.3 Preparation for deposition in the archive

The following items were identified as requiring stabilisation and repackaging for long term storage.

[5107] <171> copper alloy, inident – clean, stabilise and pack
 [0] <746> tar, sample and [0] <747> tar, sample – pack

9.13.1.4 Remedial work outstanding

The following wet items require stabilisation and packaging.

25 bags of bulk leather - cleaned, stabilised and packed
 10 x fibre - stabilised and packed
 4 x ivory/bone - stabilised and packed
 7 x composites (bone/iron) – stabilised and packed
 1 x composite (wood/copper) – cleaned, stabilised and packed
 5 x wood - cleaned, stabilised and packed
 [2855] <173> stone, comb - to be stabilised and packed

9.14 Finds review

The final requirements for finds illustration will be agreed at the finds review and updated publication synopsis stage.. The method of illustration either line drawing or photography or a combination of the two will be decided upon as part of the finds review process.

Task 58 Preparation for and attendance at a finds review to select material for illustration: Roman pottery, post-Roman pottery, ceramic material and registered finds

7.5 days

9.15 Graphics

Task 59 Additional digitising of selected site plans and elevations

5 days

Task 60 Geo-reference selected historical maps

3 days

Task 61 CAD preparation of location, phase (combining archaeological and historical data) and detailed plans

5 days

Task 62 CorelDraw completion of location, phase (combining archaeological and historical data) and detailed plans for publication

15 days

Task 63 Creation of 3-D reconstruction of key phases of the Dockyard complex combining archaeological, historical maps and contemporary illustrations

20 days

Task 64 Line illustration of finds selected at finds review

5 days

Task 65 Photographs of finds selected at finds review

3 days

Task 66 Preparation of site photographs for publication

3 days

9.16 Write publication text

Task 67 Write integrated publication text for monograph, including collation and inclusion of specialist text, select and arrange illustrations et, resulting in draft (unedited) text

50 days

Task 68 Write integrated publication text for journal article, including collation and inclusion of specialist text, select and arrange illustrations etc resulting in draft (unedited) text

10 days

9.17 Editing and production of monograph

Task 69 Specialist comments, editing and corrections

5 days

Task 70 Author editing of final draft and incorporating specialist corrections

3 days

Task 71 Technical/internal editing

20 days

Task 72 Text corrections by authors

2 day

Task 73 Illustration corrections

2 day

Task 74 Production of book which includes copy editing, design, typesetting, proof reading and printing of c 500 copies

9.18 Editing and production of journal article

Task 75 Specialist comments, editing and corrections

7.5 days

Task 76 Author editing of final draft and incorporating specialist corrections

2 days

Task 77 Text corrections by authors

1 day

Task 78 Check proofs from journal and supply any final corrections

1 day

Task 79 Printing (page costs fee paid to journal)

9.19 Project management, programming and meetings

Task 80 Project management at 7% of total value of project over duration of analysis and publication work

20 days

Task 81 Project team meetings

10 days

9.20 Archive deposition

The site and research archive from Convoys Wharf will be deposited with the LAARC in accordance with deposition policies in force at the time of deposition.

Task 82 Deposit research archive

10 Publication project: resources and programme

Financial resources sufficient to cover the work proposed in this document have been obtained via a separate document.

11 Acknowledgements

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Thanks are also extended to the scores of MOLA and seconded PCA staff who worked at Convoys Wharf for their dedicated efforts, particularly those who worked through the winter of 2011–12 when Convoys Wharf was the coldest excavation that the author could remember. We would also like to thank Keltbray who undertook groundworks on the site for MOLA and its site manager Jimmy Clarke.

12 NMR OASIS archaeological report form

12.1 OASIS ID: molas1-

Project details

Project name	Deptford Royal Dockyard and Sayes Court, Convoys Wharf, Prince Street, London SE8
Short description of the project	<p>An excavation was carried out by Museum of London Archaeology (MOLA) on the 16 ha site of Deptford Royal Dockyard and Sayes Court, Convoys Wharf, Prince Street, London SE8. The work was commissioned by Convoys Investments a r l from MOLA. Stray finds indicate that the site was used by prehistoric peoples. Geoarchaeological investigation was able to reconstruct in part the environment from the prehistoric period to the 19th century specifically in relation to a palaeochannel that crosses the site. A late 2nd century to 3rd century Roman enclosure with a single burial in its fill was recorded. Ex situ Roman building material suggests there was a Roman building on site. The Dockyard was founded in 1513 with the construction of a Storehouse (now a Scheduled Ancient Monument). A wide ditch nearby may have preceded this building. The mouth of the palaeochannel became the Dockyard Basin that was constructed of timber, probably from Tudor period. The Treasurer of the Navy's House and the Dockyard perimeter wall was also identified. In the south of the site, walls relating to officers' quarters and a smithy were revealed. Sayes Court was the home of the diarist and horticulturalist John Evelyn (1620–1706). Traces of an early building were found below the ground plan of a probable 18th-century building on the site of Sayes Court. Garden walls could be more confidently reconciled with map evidence, although no trace of his famous gardens was identified.</p> <p>The early Georgian period (1714–74) saw a major rebuilding of the Dockyard that expanded beyond its previous perimeter. The Tudor Storehouse was incorporated into a new, unified storehouse complex and the smithy was reconstructed. The Dockyard Basin largely rebuilt in this and the succeeding late Georgian to Victorian period (1774–1869). Ship building technology developed in the 18th and 19th centuries, until ultimately the slipways on the site became vast structures of brick, concrete and timber after 1844. Three such structures were excavated on the site together with the foundations of their cover buildings, of which the Grade II listed Olympia building is an example, built in 1844–46. The Dockyard Basin gate and canal linking it to the river were replaced in stone and brick to a design by John Rennie (1761–1821). The Double Dock in the east of the site was rebuilt in 1839–41. The Dockyard declined from the mid-19th century and closed in 1869, becoming a cattle market a few years later.</p>
Project dates	Start: 01-05-2011 End: 30-04-2012
Previous/future work	Yes / Not known
Any associated project reference codes	CVF10 - Sitecode
Type of project	Excavation

Site status	Part scheduled, Listed II building on site
Current Land use	Warehousing
Methods & techniques	"Trenches"
Development type	Housing
Prompt	
Position in the planning process	Pre planning

Project location

Country	England
Site location	GREATER LONDON LONDON BOROUGH OF LEWISHAM Convoys Wharf, Prince Street, London SE8
Postcode	SE8 3JH
Study area	16 hectares
Site coordinates	TQ 37000 78200 Point

Project creators

Name of Organisation	MOLA
Project brief originator	Planning Authority/advisory body
Project design originator	MOLA
Project director/manager	Robin Nielsen / David Divers
Project supervisor	Antony Francis
Type of sponsor/funding body	Developer
Name of sponsor/funding body	Convoys Investment s a r l

Project archives

Physical Archive recipient	LAARC
Digital Archive recipient	LAARC
Paper Archive recipient	LAARC

**Project
bibliography 1**

Publication type	Grey literature (unpublished document/manuscript)
Title	Deptford Royal Dockyard, Convoys Wharf, Prince Street, London SE8 Post-excavation assessment report and updated project design
Author(s)/Editor(s)	Francis, A
Date	2013
Issuer or publisher	MOLA
Place of issue or publication	London
Description	A4 unpublished report
Entered by	Antony Francis (afrancis@mola.org.uk)
Entered on	Not entered on OASIS yet

13 Bibliography

BL British Library

CAD Catalogue of Ancient Deeds

CIM Calendar of Inquisitions Miscellaneous

CIPM Calendar of Inquisitions Post Mortem

CLRO Corporation of London Record Office (now at LMA)

Anon, 2008, *Convoys Ltd, Prince Street, Deptford SE8 3JH, Information provided from memory on 26 November 2008 by former Technical Director David Rhodes*, unpublished A4 typed sheet

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Appendix 1 - Research Objectives

The detailed research objectives are reproduced here from the Written Scheme of Investigation (Francis 2010b, 45–47).

Site wide objectives

- Establish the palaeotopography and palaenvironment of the study site throughout the Holocene. How has the palaeotopography and palaeoenvironment of the site altered through time as a result of climate change and the influence of maritime regression and transgression. How is the influence, the Thames and its tributaries reflected in changes to the sites palaeotopography and palaeoenvironment. The available evidence suggests the presence of an area of high gravel on the south of the site to the north of which is an area of alluvial marsh bisected by an west-east river channel. These factors may be fundamental to the latter development of the site and its subsequent division between Sayes Court and the Royal Dockyard.
- What evidence is there for changes to the sites topography and environment as a result of human activity prior to 1513. From the 12th century onwards programmes of inning and enwharfment significantly altered the banks of the Thames and its tributaries. Periods of improvement to the flood regime were often followed by episodes of catastrophic failure and re-trenchment. How is this reflected in the archaeological and environmental record.
- What is the evidence for land use and occupation of the site prior to 1513. The Sayes Court Estate is known to have occupied part of the west of the site during the late Medieval period, whereas the Royal Naval Dockyard is thought to have been newly established in 1513. The influence of the division between the west and the east of the site on human settlement is to be fully explored.
- What is the chronology and spatial extent of river defences from the 12th century to the present and what constructional and technological changes are represented over time. Evidence from the 2000 and 2010 evaluations indicates that a long sequence of river defences will be represented on site. The processes of construction, repair and replacement, and how these reflect changes in technology, and river regime management over time are to be fully examined.

Sayes Court

- Within the context of the requirement for preservation *in situ*, recover the plan form of the Mansion House of Sayes Court, its fabric composition and date. The 2000 and 2010 evaluations have identified that fragmentary remains of the post Medieval and early Modern phases of Sayes Court Mansion House are present within the south west of the site. These are to be preserved *in situ* within the context of the development proposals. As part of the Stage 2 archaeological investigations and in order to inform the scheme for preservation *in situ*, the surviving plan form of the Mansion House will be fully mapped. As part of this mapping the fabric composition and date of the

Mansion House remains will be established. The remains of the Mansion House are not however to be fully excavated, but are to be left *in situ* under a suitable backfill of terram (or similar) soil and crushed concrete (MOT Type 2: Refer to Section 4.8 (4.8.1, 4.8.2 and 4.8.3 inclusive) of Volume 1 of the SARM, Hawkins 2009).

- Recover so far as is possible any evidence for the ancillary buildings, gardens and associated remains of the Sayes Court Estate. The 2000 and 2010 archaeological evaluations revealed no evidence for the ancillary buildings of the Sayes Court estate nor was any certain evidence for the gardens of the estate (laid out by John Evelyn) identified though one area of terracing of the natural landform (Trench 38, 2010 evaluation) was identified which might conceivably represent a garden feature. Recovery of evidence for the outbuildings and gardens of Sayes Court would provide context to the preservation of the Mansion House complex, (5 above) and contribute significantly to studies of post Medieval (particularly 17th century) garden design and horticultural.

Royal Naval Dockyard

- Establish so far as is possible the extent, plan form and composition of the Tudor Dockyard and its development in the period 1513–1603 with particular reference to evidence for technological change. The Tudor dockyard was established in 1513 and is known to have comprised at its inception of a Great Dock, Storehouse and Basin (possible a tidal scour of the Thames bank, or a relict tributary mouth). The Great Dock, basin and storehouse were subsequently massively modified. Understanding the form and composition of the Dockyard in the period 1513 to 1603, and evidence for technological change over time could contribute significantly to our understanding of the evolution of the Tudor Navy and shipbuilding technology. For example the replacement of carvel construction in the first quarter of the 16th century, the development of the Great ship, such as the Mary Rose and Great Harry and their subsequent replacement with the Race built galleon, one of the first of which 'Revenge' was built within the Dockyard under the direction of Mathew Baker in 1577, contribute significantly to our understanding of the evolution of the Tudor Navy and shipbuilding technology. The context of these developments is set out in Loades, 1992. The Tudor storehouse, a Scheduled Ancient Monument is to be preserved *in situ* in the context of the redevelopment proposals and it is therefore critical to recover the precise plan form of this building to inform the engineering strategies for preservation. The fabric of the Tudor storehouse is not to be fully excavated and will be left *in situ* under a suitable backfill of terram (or similar), soil and crushed concrete (MOT Type 2). The Dockyard is the known location of the Golden Hind which was laid up at Deptford following Drake's circumnavigation (1577–1580). The ship is believed to have decayed and been broken up in the late-17th century. However, identification of any remains of the Golden Hind would be of international importance.
- Establish so far as is possible the extent plan form and composition of the Stuart Dockyard and its development in the period 1603 to 1714 with particular reference to evidence for technological change. The development of the Stuart Dockyard is known to have reflected Great Britain's emergence

as a world power, first under the Commonwealth and then under the later Stuart monarch's with massive programmes of expansion and rebuilding associated with the Anglo Dutch wars (1652–54, 1665–67, 1672–74), the War of the Grand Alliance (1688–97) and the War of the Spanish Succession (1701–1714). These programmes of expansion and rebuilding are clearly indicated in the documentary and cartographic record. This was a period of significant technological change in which the 'Line of Battleship' first emerged. The impact of these developments in surviving contemporary dockyards is set out in Coad, 1989.

- Establish so far as is possible the extent plan form and composition of the Georgian Dockyard and its development in the period to 1774 when the detailed surviving model of the Dockyard was commissioned, with particular reference to evidence for technological change. The trends evident in the development of the Stuart Dockyard continued into the 18th century. Documentary and cartographic sources suggest a major programme of rebuilding associated with the 'Seven Years War', (1754 - 1763) now identified as the first 'global' conflict. Evidence for these developments in surviving dockyards is set out in Coad, 1989.
- Establish so far as is possible the extent plan form and composition of the late Georgian and early Victorian Dockyard, with particular reference to evidence for technological change. During the period 1774 to 1860 the Dockyard was redeveloped on a massive scale, with the replacement of timber docks, slips and buildings with composite masonry, brick and timber structures. This reflected both the American and French Revolutionary Wars and the Napoleonic Wars but also fundamental changes to shipbuilding technology which saw, the increasing use of imported timber, the introduction of machined timber, the incorporation of iron reinforcing in ship construction; and a dramatic increase in warship dimensions and tonnage to support improved weaponry and the introduction of steam power as an auxiliary to sail. The results of the 2000 and 2010 evaluations show that this 'industrial revolution' in shipbuilding technology is clearly evidenced in the archaeological record of the site and that its chronology and effect on the spatial form and composition of the Dockyard is recoverable. It is apparent that during this period the Dockyards at Deptford and Woolwich were operated as parallel establishments, effectively serving as a single Dockyard with hulls launched at Deptford fitted out at Woolwich, particularly with steam engines and boilers. The impact of this industrial revolution in shipbuilding technology on surviving Dockyards is reviewed in Coad, 1989 and explored in detail in Brown, 1990 and Lambert, 1991.
- Record the evidence for the transformation of the Dockyard into the Foreign Cattle Market, Military Depot and Convoys Wharf. From 1860 onwards the Dockyard constructed only minor warships, the last vessel 'Druid' being launched in 1869. The transformation of the Dockyard over time to Convoys Wharf, falls within an important period for the development of Deptford as a community, while the operation of Convoys Wharf is remembered and has resonance locally. Evidence for this period, particularly following the closure of the Dockyard in 1869, should be recorded in the context of a 'community history'.

Appendix 2 Clay pipes for illustration

Ctxt	Acc	B	Form	Dec A	Dec B	Dec C	Mark	Dr
4880	292	1	AO27	POW	DRGN	WB	WB	Y
4880	293	1	AO27	RIBV	WB	LBST	WG	Y
4880	303	1	AO27	POW	DRGN	LB	WB	Y
4880	316	1	AO27	RIBV	FLRM		WB	Y
4880	317	1	AO27	RIBV	LBST		FLOWERS	Y
4880	324	1	AO27	RIBV	LB		RS	Y
4880	327	1	AO27	WB			WG	Y
4880	328	1	AO27	POW	WB		CR	Y
4880	343	1	AO27	DRGN	WB	LBST	?EB	Y
4880	357	1	AO27	RTHS	LB		JA	Y
4880	367	1	AO27				BUMBY / SHADWELL // JB	Y
4880	370	1	AO27	RTHS	WB		WG	Y
4880	371	1	AO27	RIBV	FLRM		WG	Y
4880	374	1	AO27	RTHS	LB		JA	Y
4880	380	1	AO27	DRGN	POW	WB	WB	Y
4880	447	1	AO27	RIBV2	LB	LBST	RS	Y
4880	448	1	AO27	DRGN	POW	WB	WB	Y
4880	457	1	AO27	RIBVS			WA	Y
4880	465	1	AO27	RIBV2	LB	LBST	RS	Y
5107	491	1	AO27	RIBV	WB		ANDREWS / DEPTFORD	Y
4635	571	1	AO15	MULB				Y
4879	573	1	AO30	LBPN				Y
4880	577	1	AO27	RIBV	WB		IF	Y
5254	584	1	AO30	LB	LFT			Y
5254	588	1	AO30	FTH				Y
5254	589	1	AO30	HAND				Y
5419	596	1	AO30	LB	LFT			Y
6013	725	1	AO18	FDLS	FDLB		FLEUR-DE-LIS	Y

Appendix 3 Animal bone table

Table 46 Hand-collected animal bone from selected contexts at CVF10/summary

CO NTE XT	S G P	FEA TUR E	WT (kg)	FRA G (mm)	P R E S	N O S	ca ttl e	shee p/go at	p i g	h or se	d o g	c a t	po ult ry	g a m e	f i s h	tu rtl e	foetal/ neona te	infa nt
128 1	1 0 8 1	dum p	1	>75	go od	8	X	X										
488 0	1 9	pit, cess	4.5	>75	go od	1 6 8	X	X	X		X		X		X		cattle	cattl e; pig
495 2	2 0	pit, cess	1	>75	go od	8 4	X	X	X			X	X	X				fowl ; pig
510 7	2 1	pit, cess	2.0 5	>75	go od	1 5 5	X	X	X			X	X	X	X			
561 0	3 1	pit, cess	0.1 5	>75	go od	1			X									
580 3	2 6	pit	0.0 1	>75	go od	5			X				X		X			
580 4	1 6	pit	0.1	>75	go od	3	X	X										
580 6	1 7	pit	2.1	>75	go od	7 9	X	X	X	X			X					cattl e
601 3	6	occu pati on	2.6 5	>75	go od	1 3 9	X	X	X		X			X	X			
605 4	3 8	well	0.3	>75	go od	2 9	X	X			X	X	X	X	X	X		
TOT AL			13. 86			6 7 1												

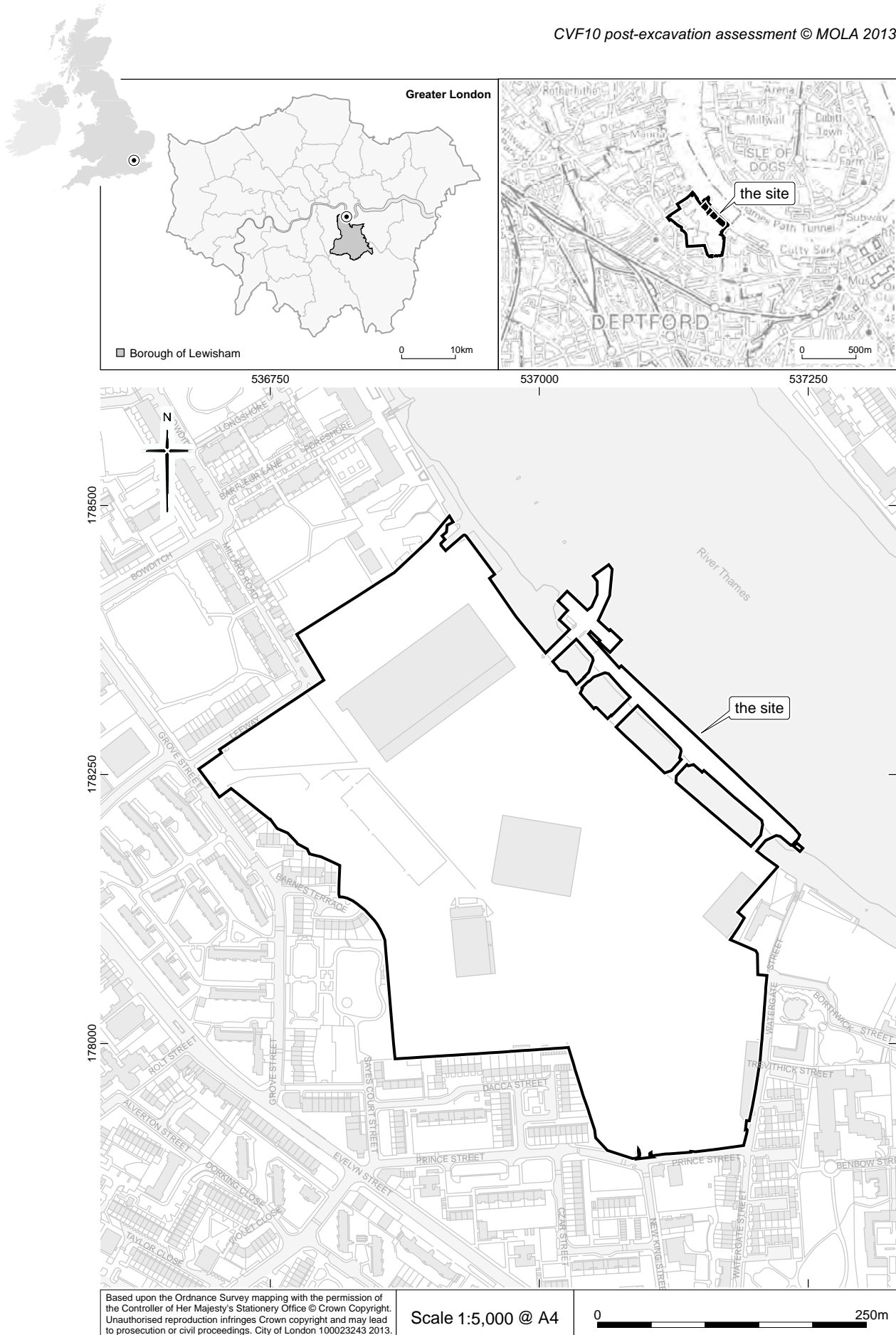


Fig 1 Site location



Fig 2 Location of trenches within the site

LEM11047PXA13#002

CVF10 post-excavation assessment © MOLA 2013

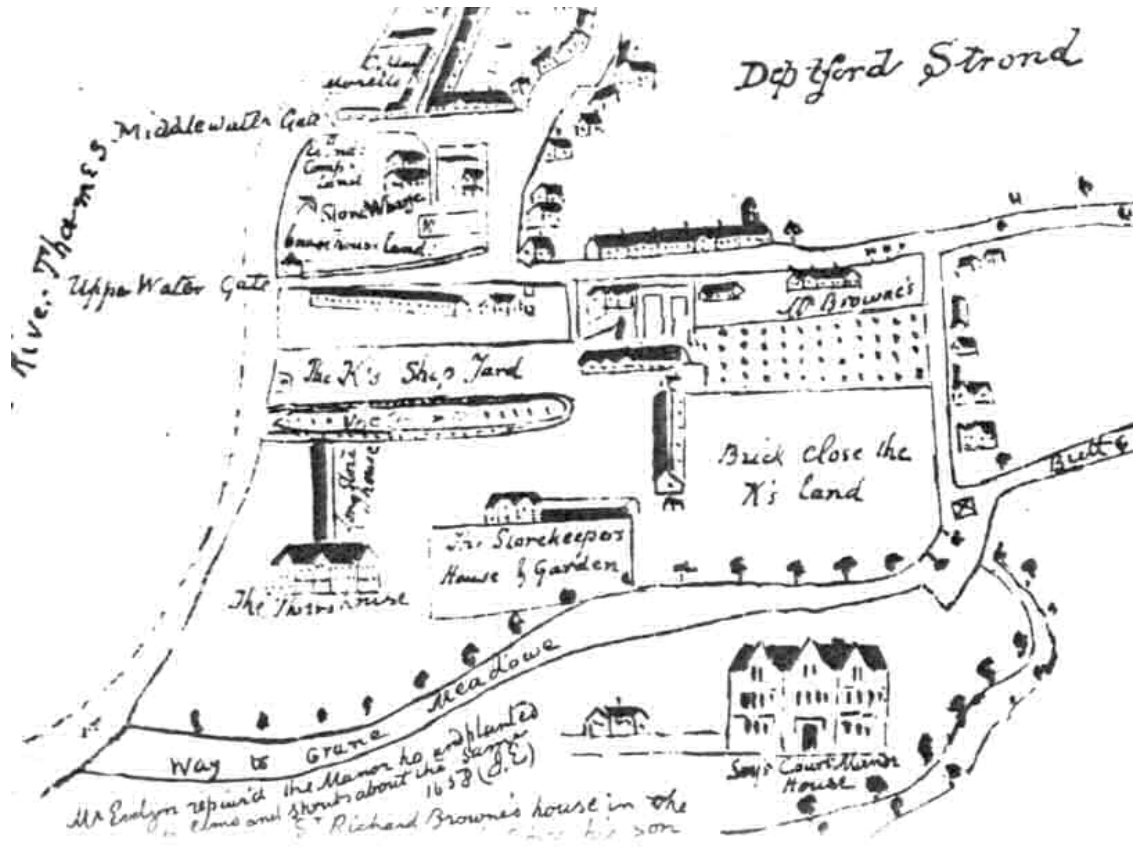


Fig 3 Evelyn plan 1623



Fig 4 1698 map and view of the Dockyard

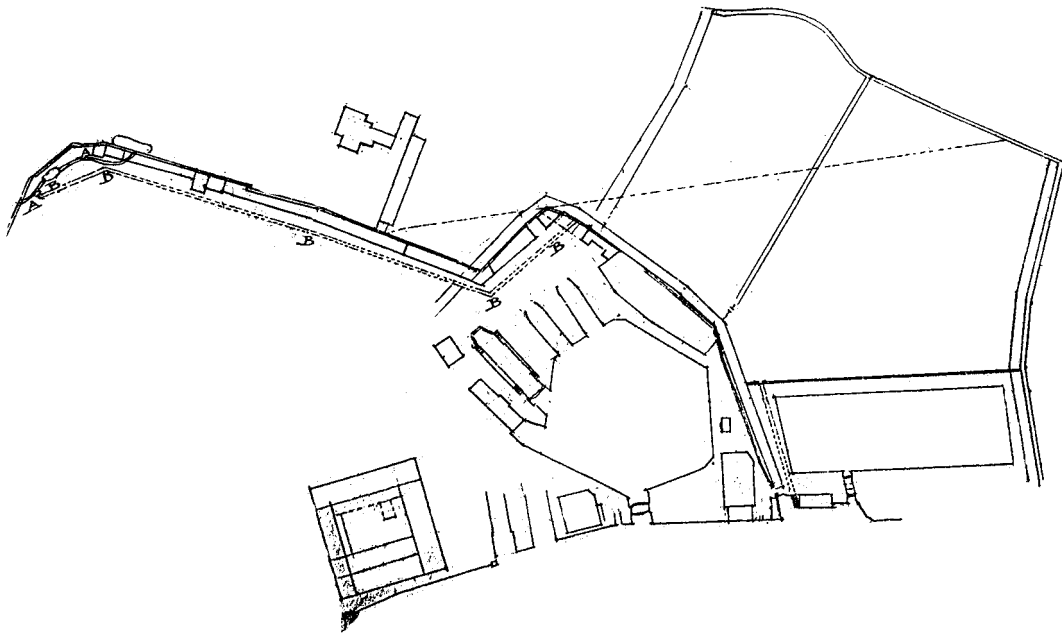


Fig 5 1725 sketch of Dockyard



Fig 6 Milton map of 1753



Fig 7 The 1774 model, looking 'north'. Dockyard Basin is in the centre of the image, the small mast pond to the west of this, storehouse complex to the east. Note the slipways and extensive areas used to stockpile timber

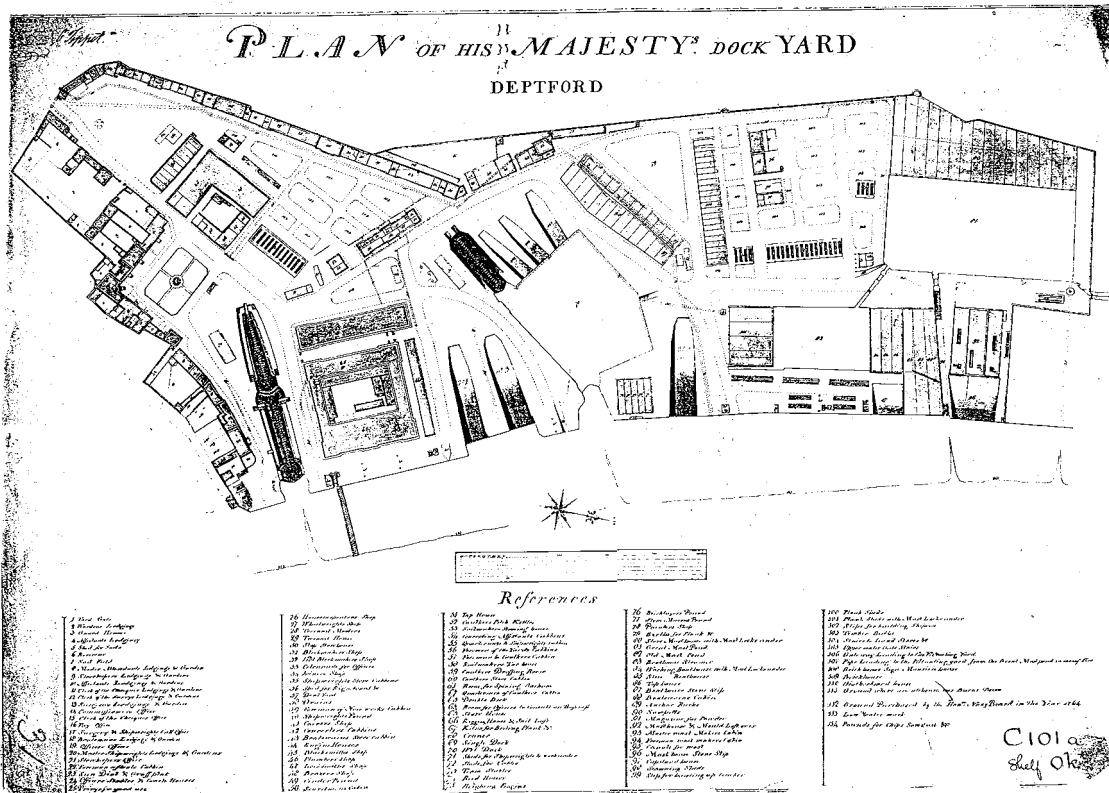


Fig 8 Map of the Dockyard of c 1808



Fig 9 West-facing section in Area 8



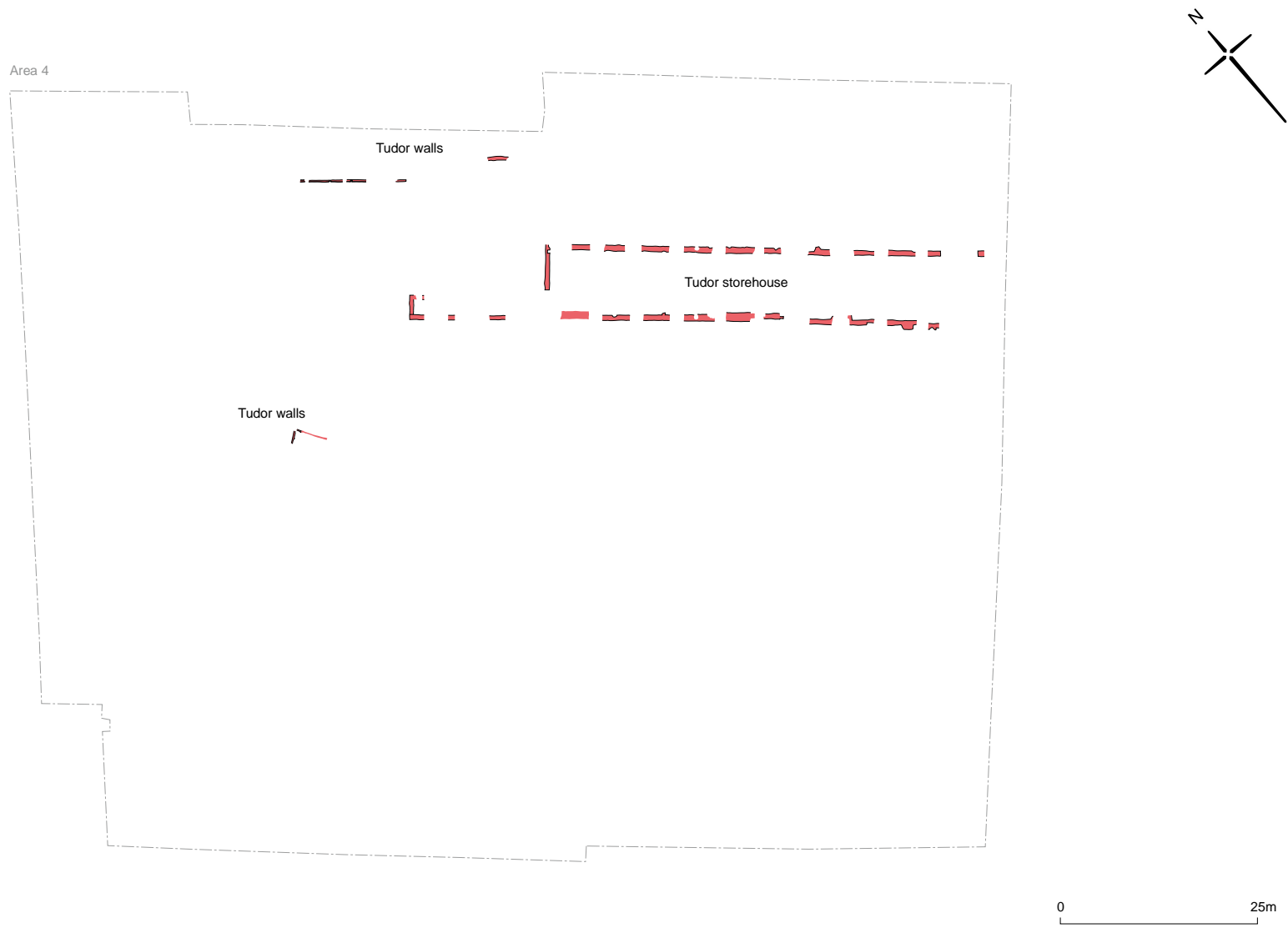
Fig 10 Pre-dockyard features (Area 4)



Fig 11 Curved ditch in Area 4, looking east



Fig 12 Inhumation [2507] in Area 4, looking east



LEW1047PX13#07

CVF10 post-excavation assessment © MOLA 2013

Fig 13 Plan of Tudor structures (Area 4)



Fig 14 Tudor Storehouse in Area 4, looking south



Fig 15 Settings for floor joists in north wall to Tudor storehouse in Area 4, looking north

Fig 16
Brick niche of Tudor storehouse
with inscription AX HR 1513
(Anno Christi Henricus Rex 1513)
in 1952



Fig 17 The north wall of the Tudor storehouse in 1952 (note niche in left part of image)



Fig 18 A four-light mullioned window of the Tudor storehouse revealed in 1952



Fig 19 Area 4, looking north. The narrow building in the centre of the image is probably the Treasurer of the Navy's House

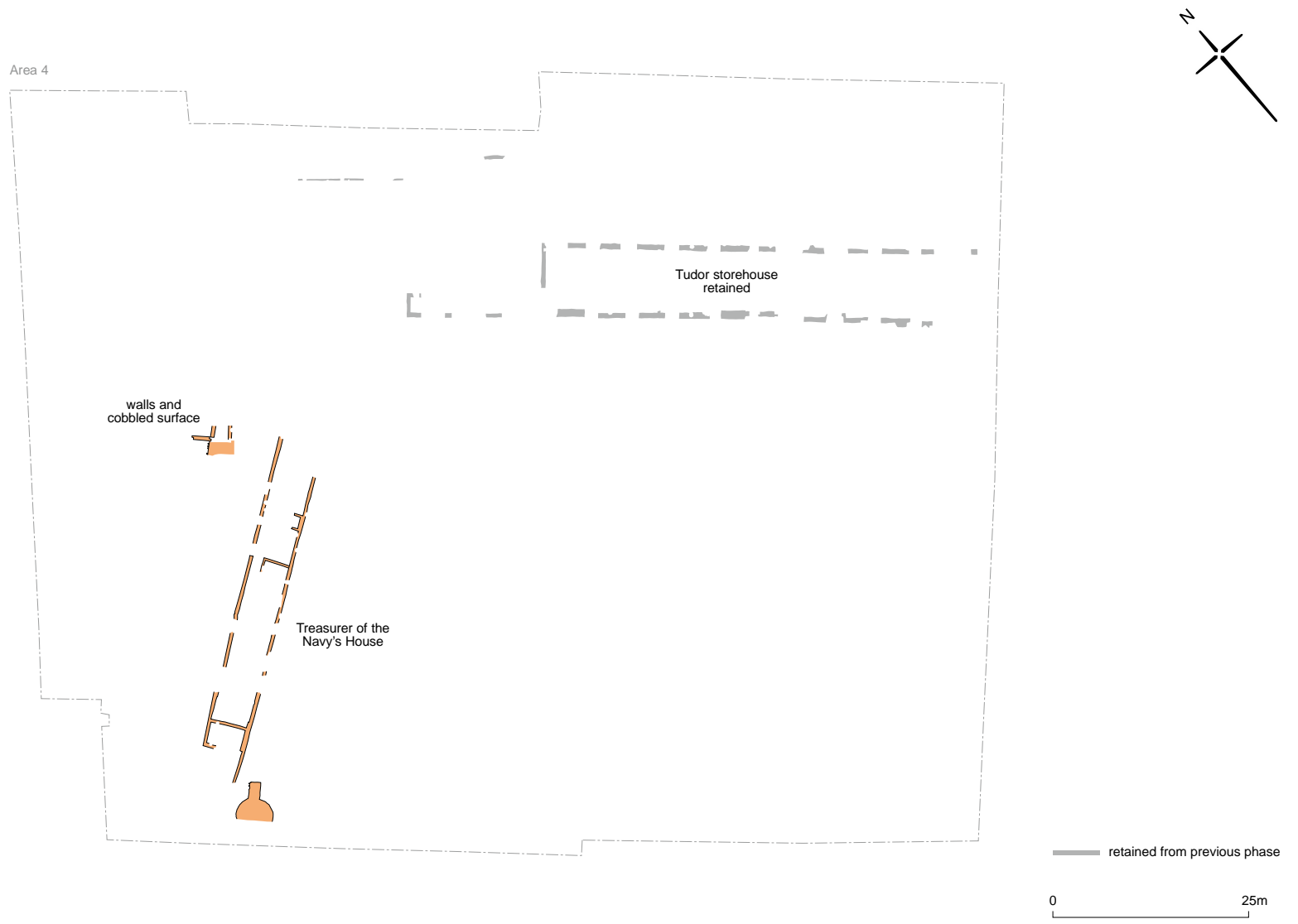
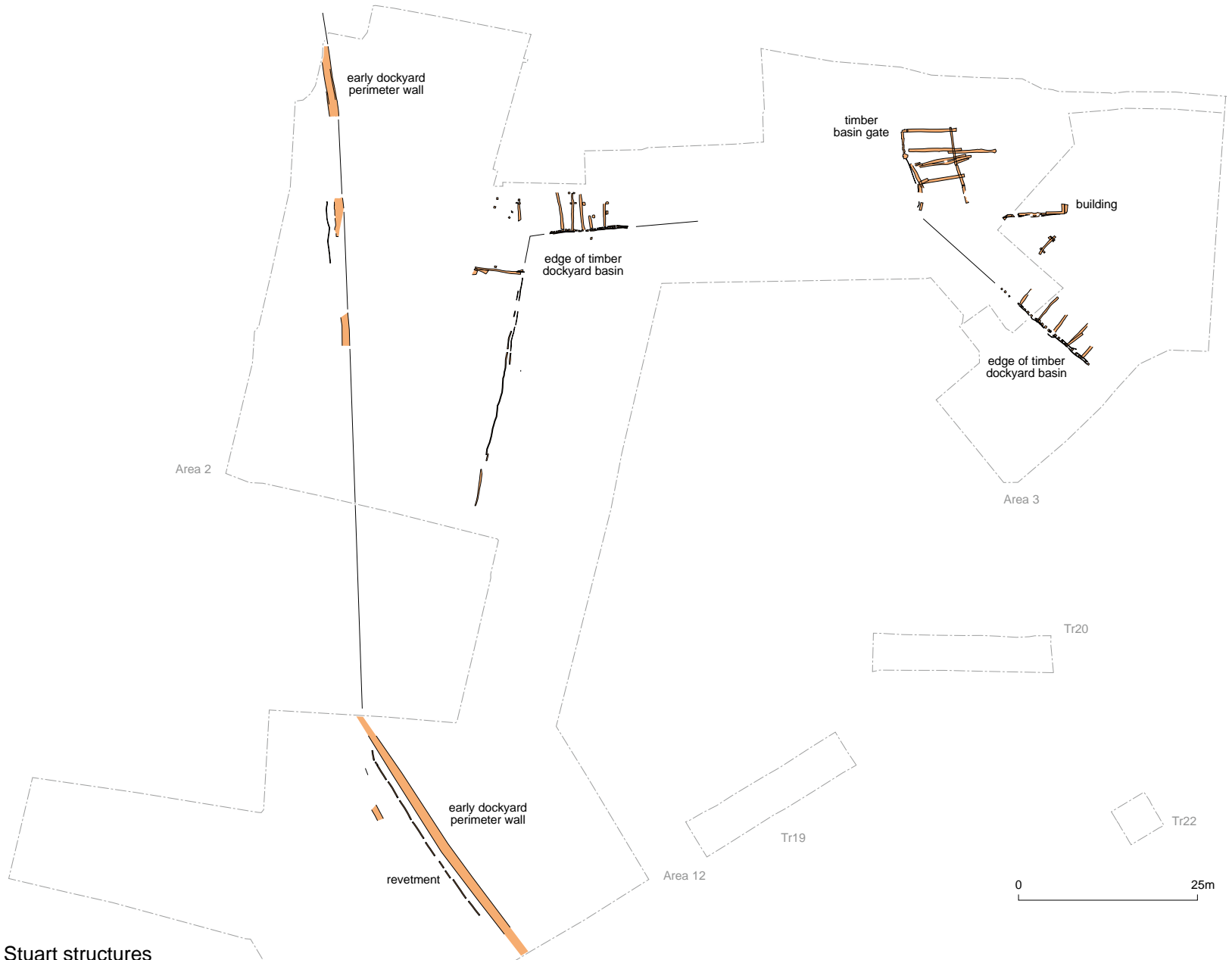
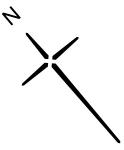


Fig 20 Site plan of Stuart structures (Area 4)



Fig 21 Brick structure in Area 4, looking north



LEW1047PX413#022

Fig 22 Site plan of Stuart structures (Areas 2, 3 and 12)



Fig 23 Eastern part of the timber basin wall with land ties and a brick crane base in Area 3, looking west



Fig 24 The timber and brick basin walls in Area 3, looking north



Fig 25 Western part of the brick and timber basin walls in Area 2, looking east



Fig 26 Land ties for walls in the western part of the basin in Area 2, looking east



Fig 27 Timber basin gate with copper plate depth gauge in Area 2, looking east



Fig 28 The Buckingham on the stocks, 1752

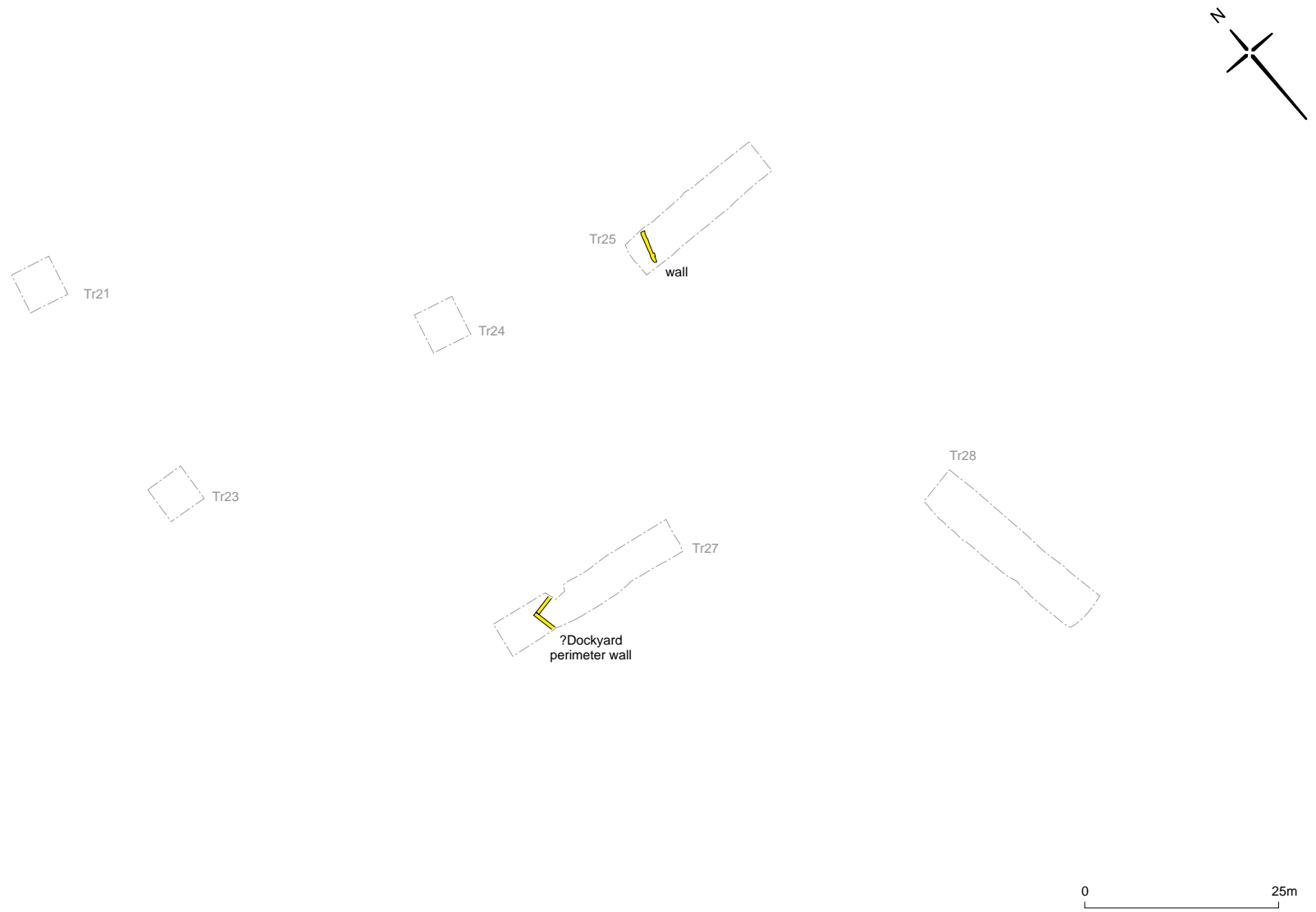


Fig 29 Site plan of Stuart structures (Trenches 25, 27)

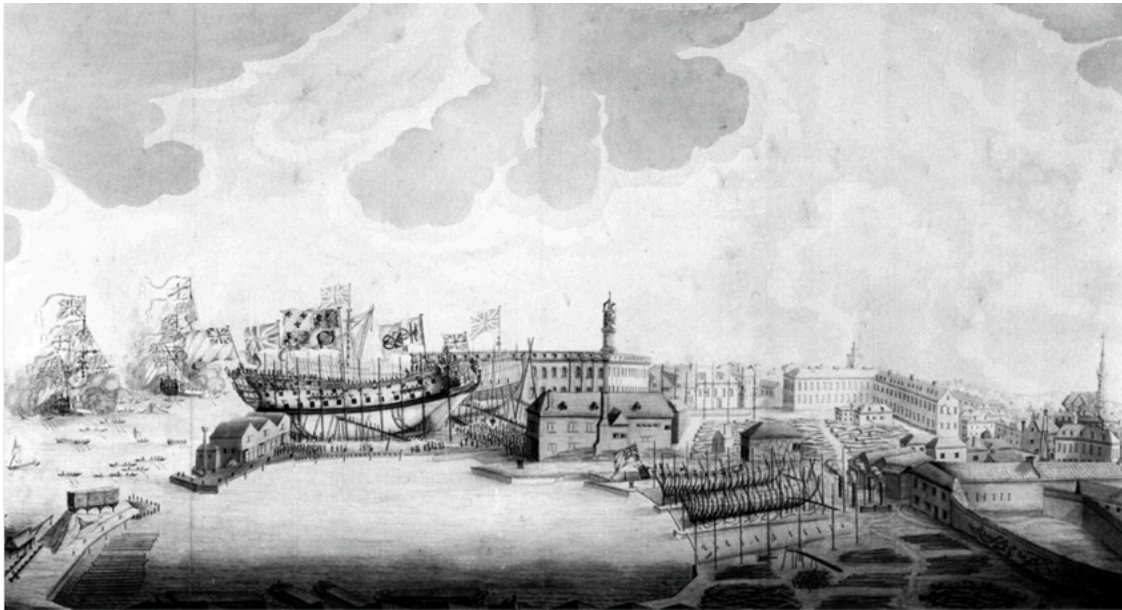


Fig 30 Launch of a 60-gun ship at Deptford Dockyard, 1739



Fig 31 The brick boundary wall and timber revetment in Area 12, looking north



Fig 32 Northwest corner of Area 2 showing boundary wall and timber revetments, looking east

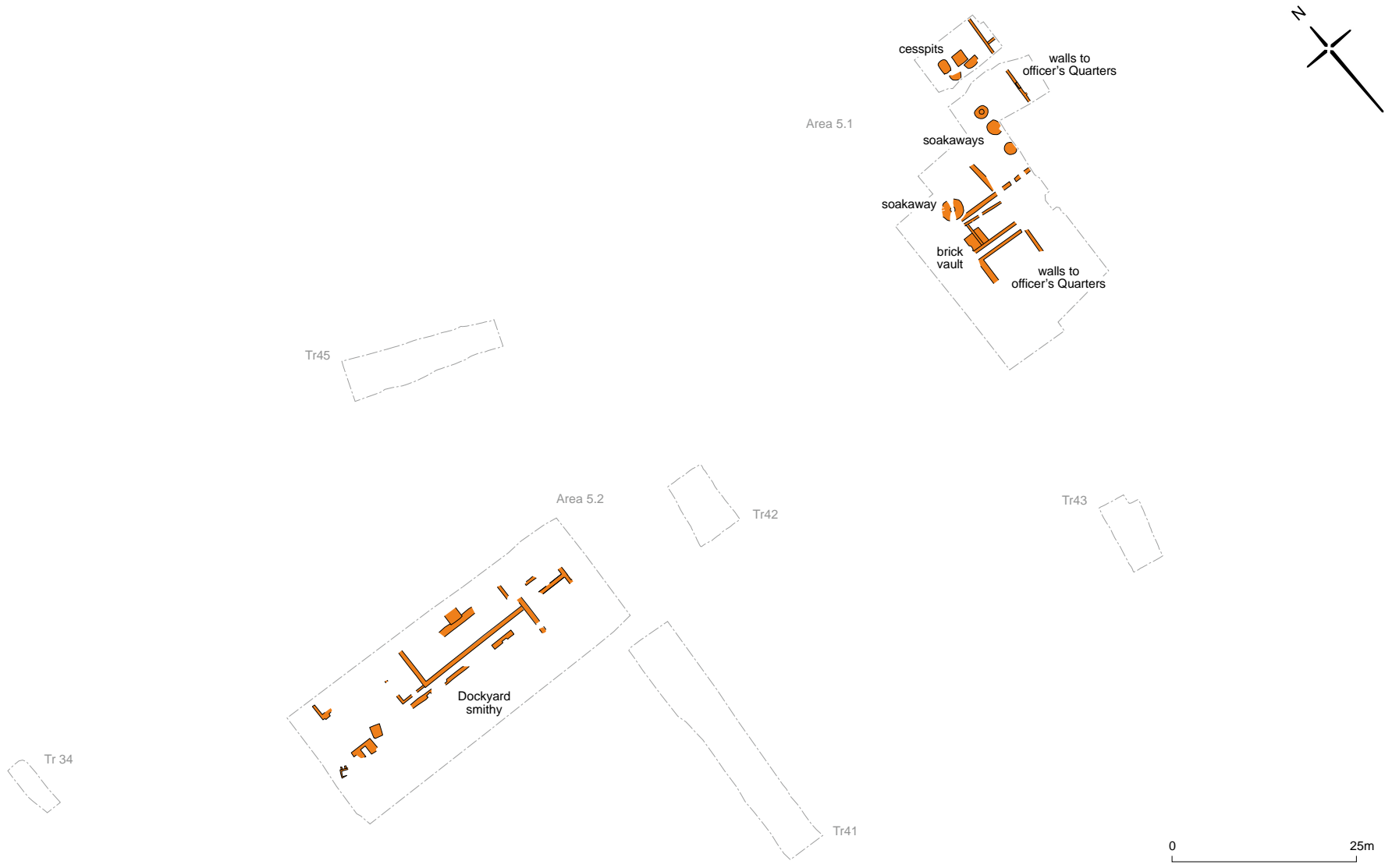


Fig 33 Site plan of Stuart structures (Areas 5.1 and 5.2)



Fig 34 Area 5.1 looking south



Fig 35 Area 5.2 looking west

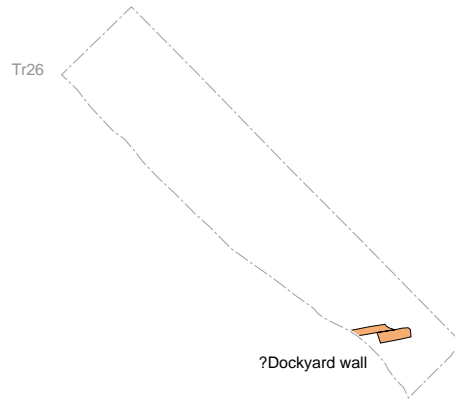
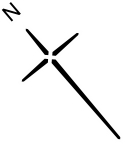


Fig 36 Site plan of Stuart structures (Trench 26)



Fig 37 Sayes Court in Area 6, looking west



Fig 38 Evelyn's plan of gardens at Sayes Court and map key in 1653



Fig 39 Sayes Court tiled floor in Area 6, looking west



Fig 40
Sayes Court cellar
in Area 6, looking north

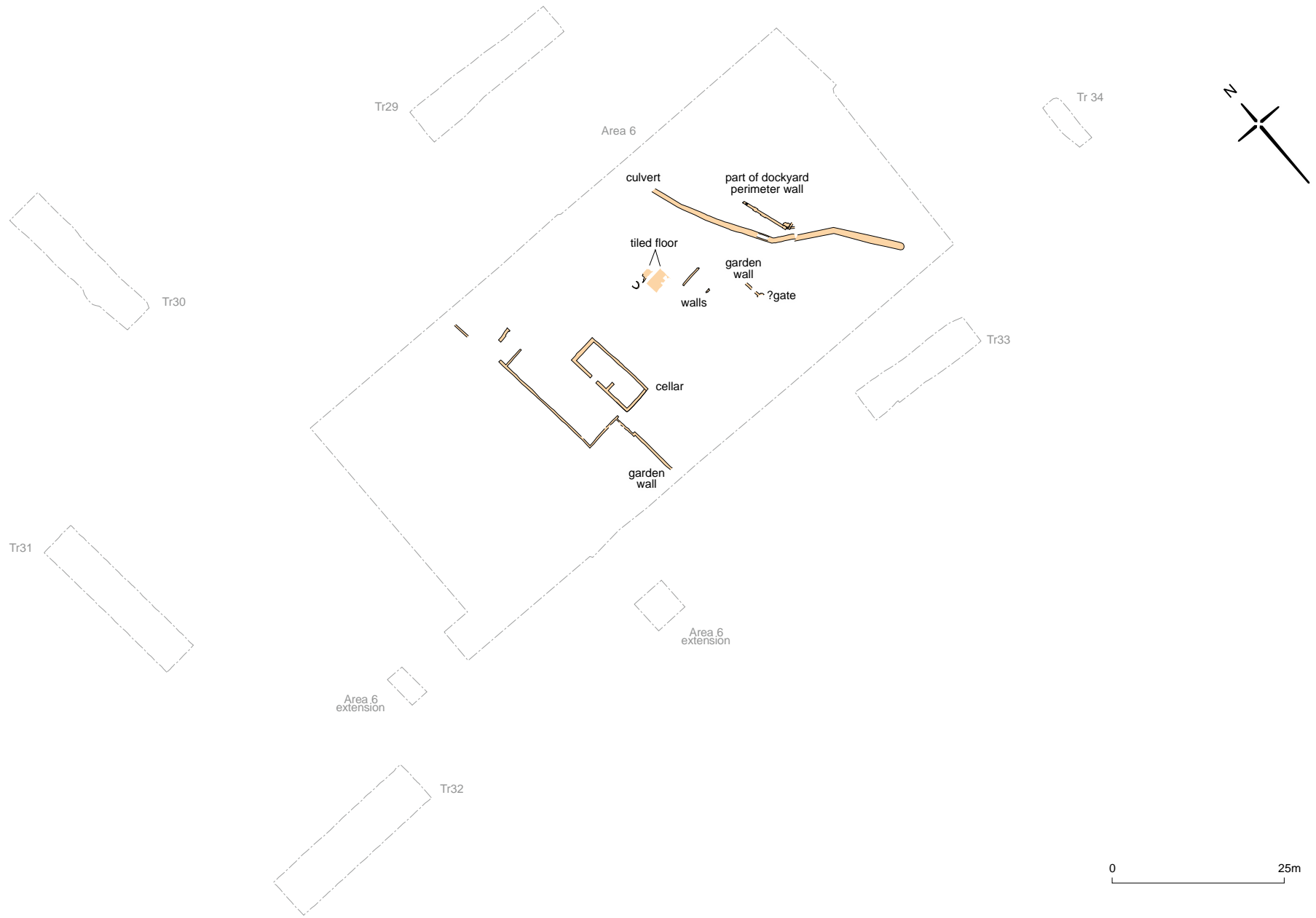


Fig 41 Site plan of Stuart structures (Sayes Court, Area 6)

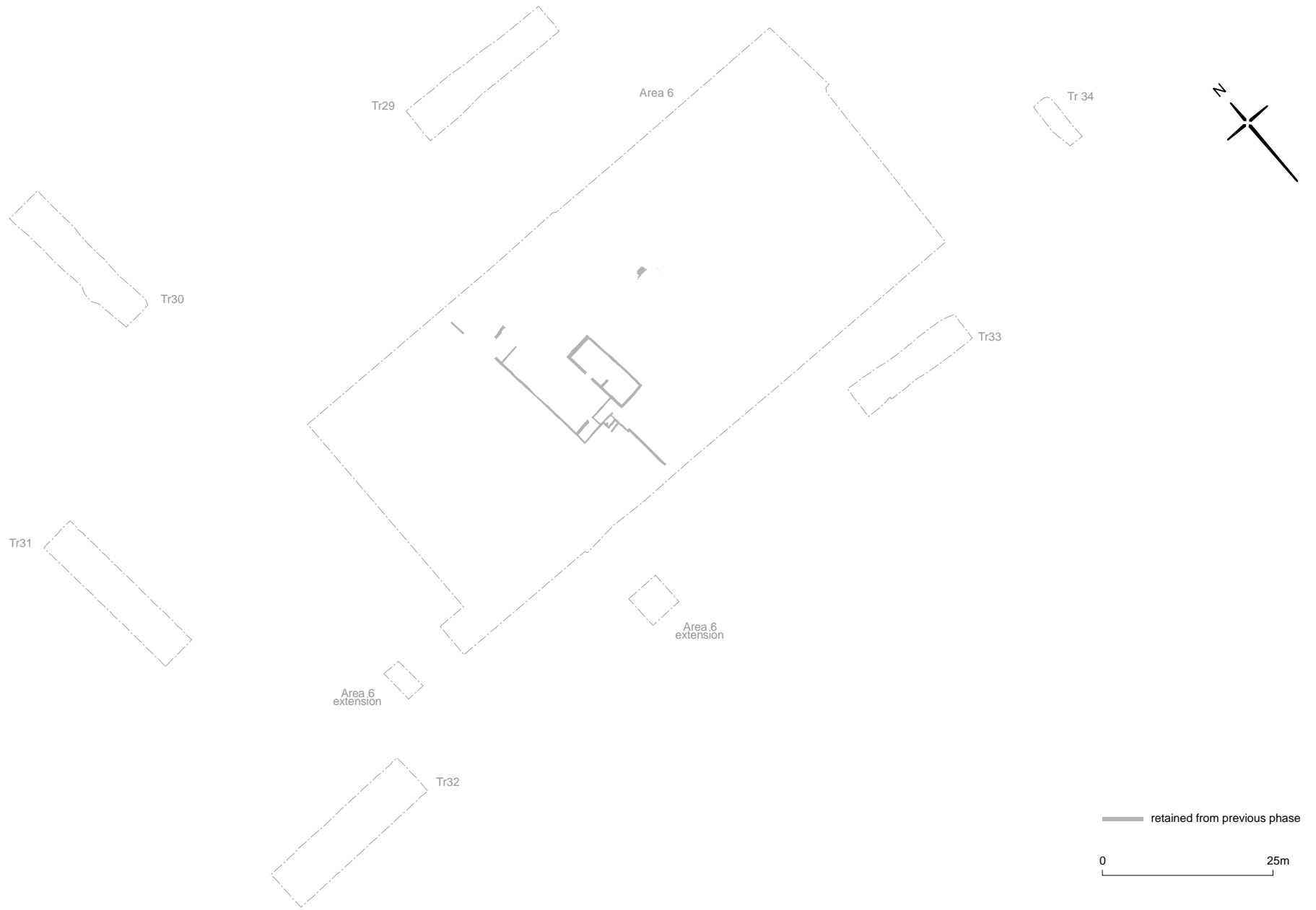
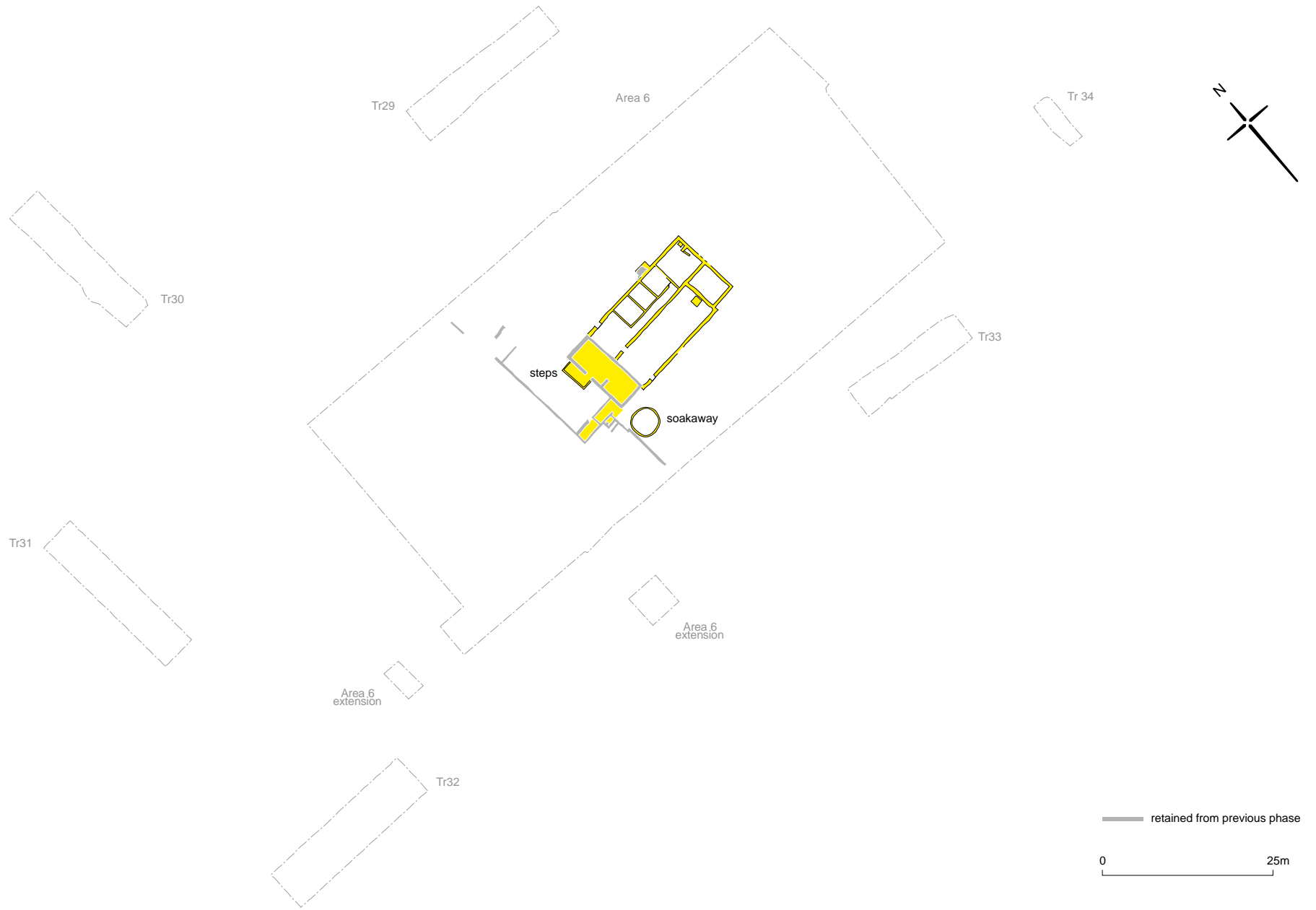


Fig 42 Site plan of early Georgian structures (Sayes Court, Area 6)



LEW11047PX413#043

CVF10 post-excavation assessment © MOLA 2013

Fig 43 Site plan of late Georgian to Victorian structures (Sayes Court, Area 6)



Fig 44 Site plan of post-Dockyard structures (Sayes Court, Area 6)

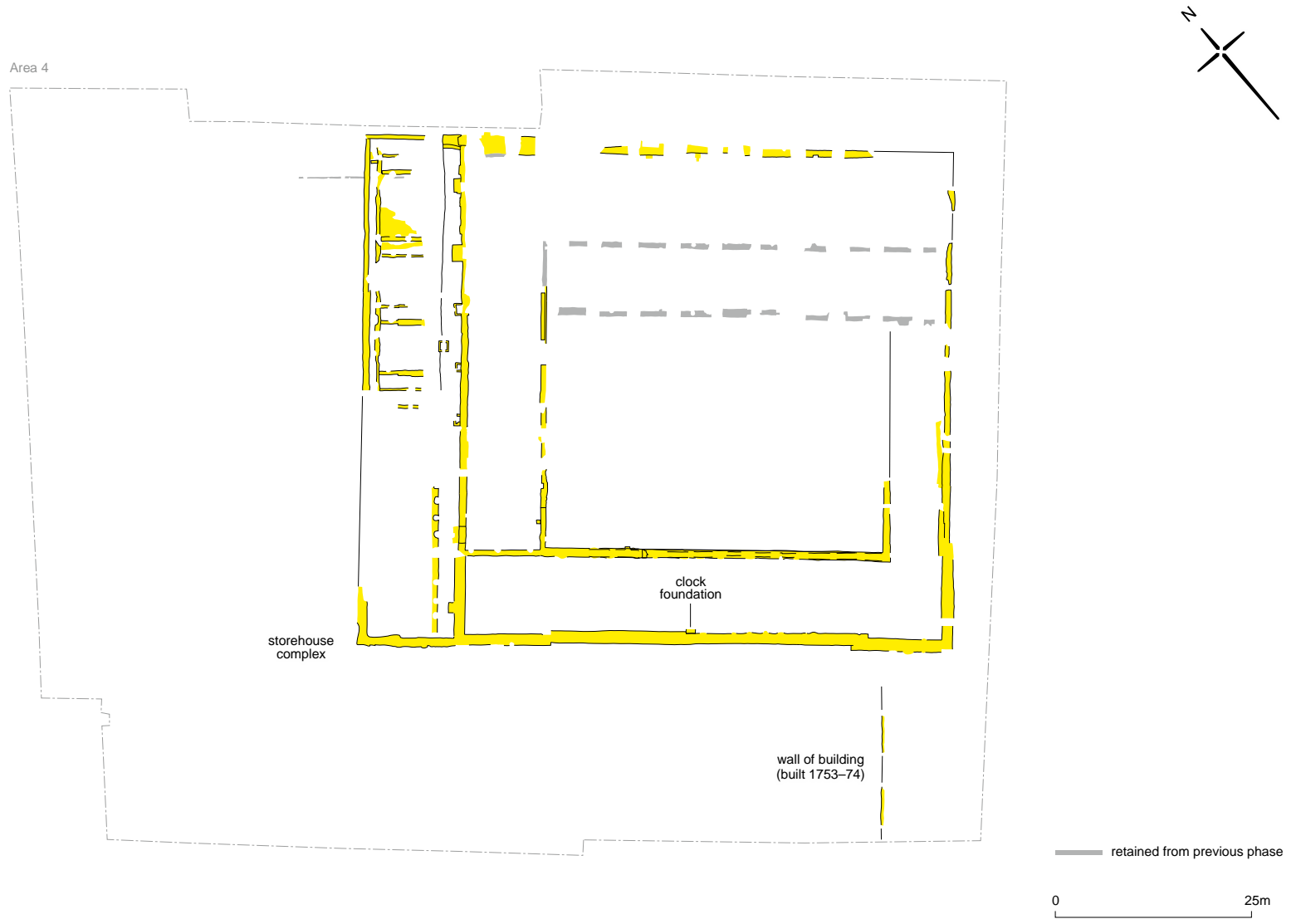


Fig 45 Site plan of early Georgian structures (Area 4)



Fig 46 1772 panorama of Dockyard



Fig 47 The storehouse complex, looking east. Note the tile floor from the Navy Treasurer's House in the foreground. The adjacent circular structure is an early 20th c turntable

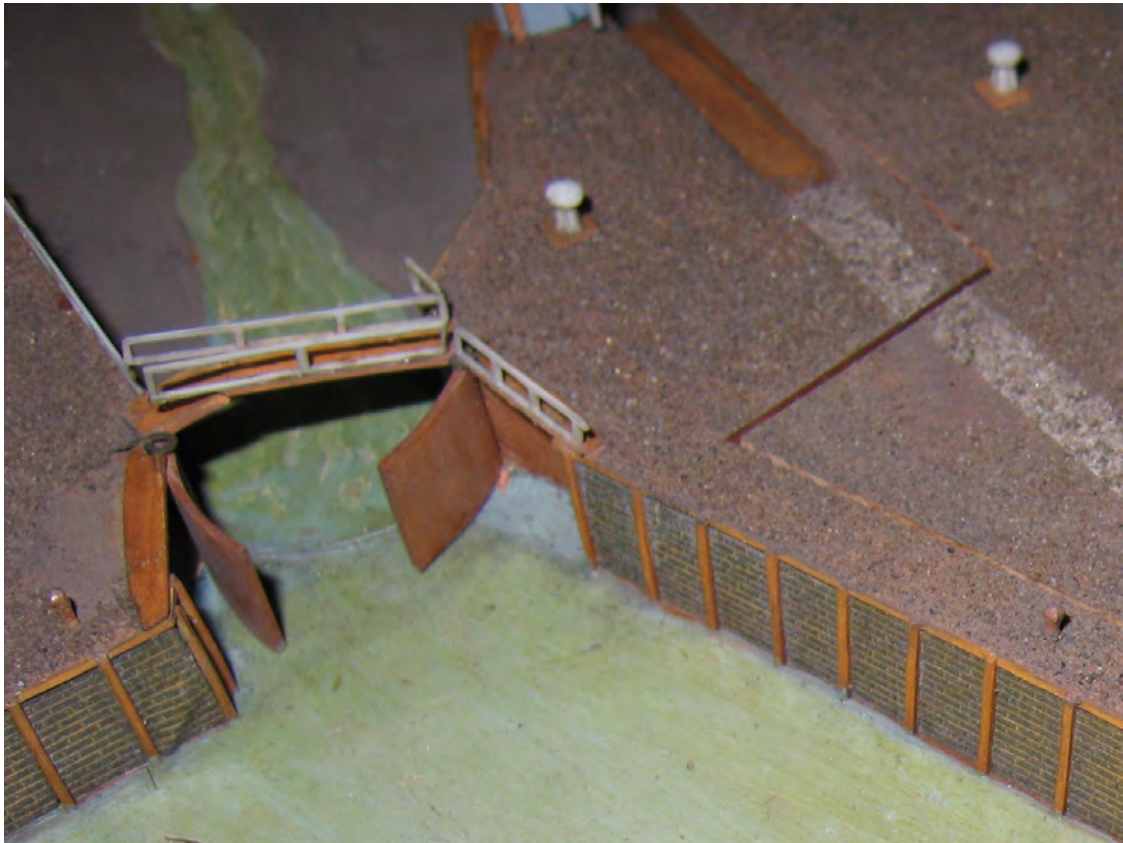


Fig 48 Dockyard Basin wall and gate – close-up of 1774 model

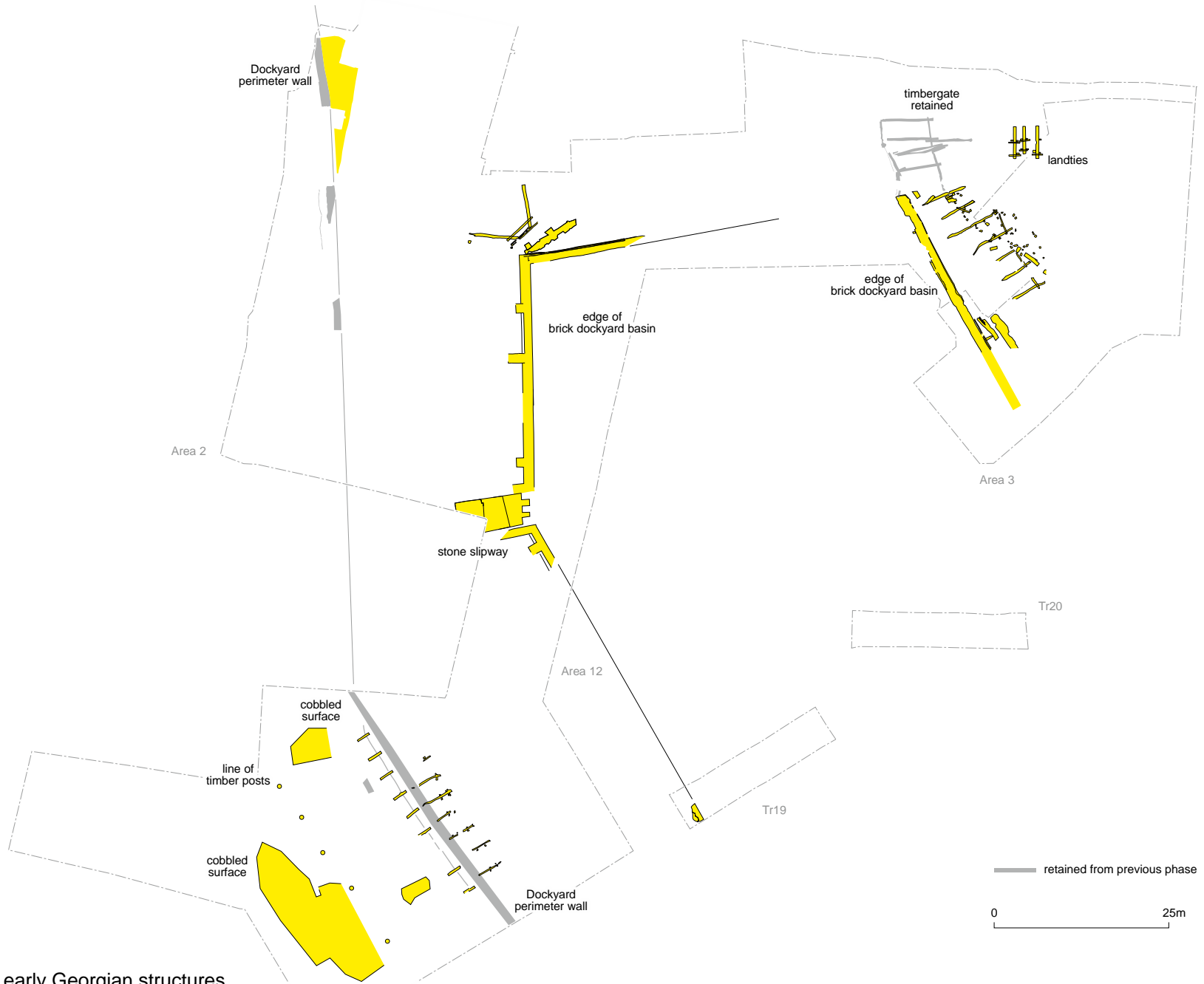
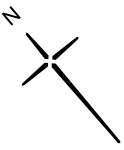
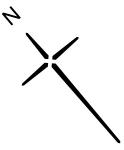


Fig 49 Site plan of early Georgian structures (Areas 2, 3 and 12)



Fig 50 Small blocked slipway on the edge of the basin wall in Area 2, looking west



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Fig 51 Site plan of early Georgian structures (Areas 1.1, 1.2, Trenches 3, 7)



Fig 52 Tie-back bracing timber Small Mast Pond wall in Trench 3, looking northeast



Fig 53 Cobbled surfaces and boundary wall in Area 12, looking east (Olympia building in the background)



Fig 54 Small Mast Pond wall and tie backs in Area 1.2, looking northwest



Fig 55 Trench 3, looking west. Land-ties and later Small Mast Pond wall



Fig 56 Site plan of early Georgian structures (Areas 5.1 and 5.2, Trench 42)

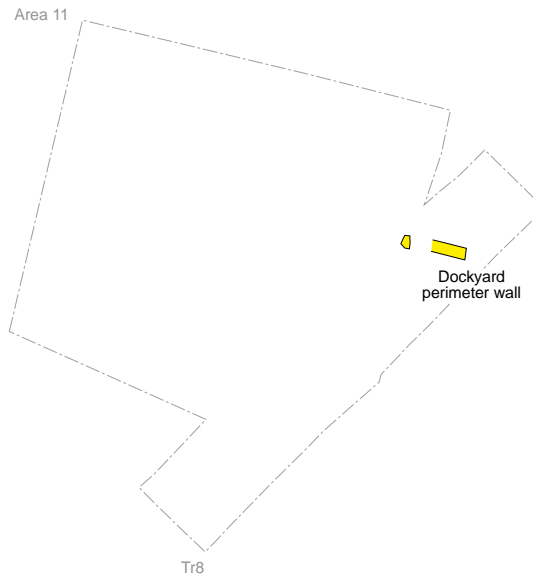
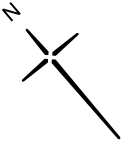


Fig 57 Site plan of early Georgian structures (Trench 8)



Fig 58 Site plan of late Georgian to Victorian structures (Area 4 and part of Area 3)



Fig 59 Vaulted cellars in Area 4, looking northwest



Fig 60 Foundations of an engine house Area 4, looking southeast