C257 Archaeology Central

POST-EXCAVATION ASSESSMENT AND UPDATED PROJECT DESIGN Moorgate and Finsbury Circus (CRL10)

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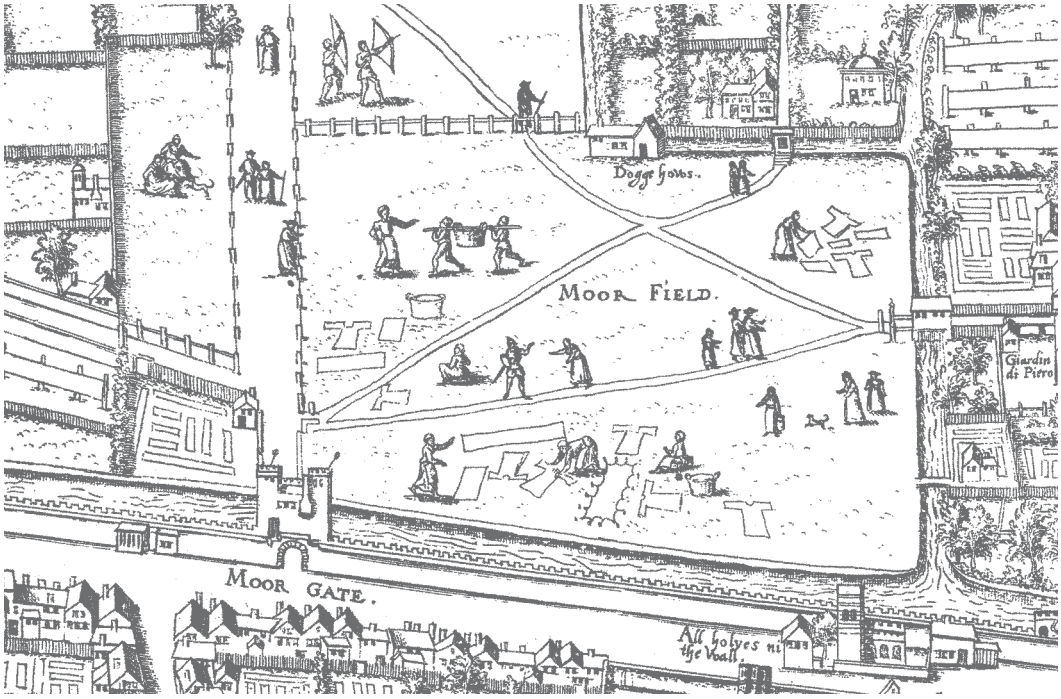

CROSSRAIL MOORGATE AND FINSBURY CIRCUS SHAFTS London EC2

City of London

Post-excavation assessment and updated project design

May 2015

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Site codes XSP10 and XRZ10
NGR 532713 181639, 532867 181592
OASIS reference

Post-excavation assessment and updated project design

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Executive summary

This report is intended to provide an assessment and updated project design for the archaeological Evaluation, Excavation, Targeted and General Watching Briefs at the Crossrail Moorgate (XSP10) and Finsbury Circus (XRZ10) Shafts and in adjacent areas, where ancillary construction activities took place. The sites lie approximately 60m apart, within Finsbury Circus gardens and immediately to the west underneath 91–109 Moorgate, 8, 17–31 Moorfields, London EC2. This work was commissioned by Crossrail Ltd and conforms with national and regional standards and advice (English Heritage1991, 2006, 2009 and 2013). All field work and subsequent assessment was carried out further to the written scheme of investigation 2010a).

The archaeological and geoarchaeological remains investigated were multi-period. The principal remains recorded were an early Roman channel, possibly a tributary of the Walbrook stream, (now canalised and running under Blomfield Street), two parallel east–west aligned Roman drainage ditches backfilled during the 2nd century AD and associated features including shallow quarry and rubbish pits and clustered post and stake holes, all of which had been modified by the formation of the Moorfields marsh, sometime during the late Roman, or early medieval period.

Situated just to the north of the Roman city, the site comprised open land during the Roman period, given over to rural activity including fields and farmland. The majority of the features were dated to the 2nd century AD. Their fills appeared to be waterlain, possibly resulting from overbank flooding of nearby Walbrook tributaries. This flooding probably led to the excavation of two east–west aligned drainage ditches. Dumping (c 120–250) and a series of intercutting pits (c 120–400) were indicative of a low level of Roman activity.

No evidence was found for the in-situ Roman burials that antiquarian records (albeit imprecisely) locate in the immediate vicinity of the Moorgate site, or those recorded to the north of Finsbury Circus. The small quantities of human bone recorded were likely to be residual and washed into the site by Walbrook tributaries from Roman cemeteries upstream.

Overlying the Roman features were extensive marsh deposits. The Moorfields marsh covered this area to the north of the Roman and medieval City Wall (constructed between c AD 180 and 225), and it is generally accepted that a later lack of maintenance of the drainage through which encouraged the development of the Moorfields marsh. This theory was broadly supported by the archaeological evidence.

At Finsbury Circus the marsh deposits survived to a thickness of over a metre and were sealed by 16th to 17th century reclamation and make-up dumps, which had been truncated by a substantial brick culvert constructed between 1666 and 1800, possibly associated with the construction of the New Bedlam Hospital, immediately to the south in 1675–6.

At Moorgate (XSP10), survival of marsh deposits was more limited. A ditch (c 13th–15th century) may represent an early failed attempt at marsh drainage at the Moorgate site, and suggests that this area of Moorfields was marshland until at least the 13th–15th century. Later medieval activity included a rubbish pit (c 1350–1500), containing quantities of leather waste and medieval shoes, and a heavily truncated hooped wooden structure and an unusual chalk lined pit.

Further south on London Wall, within a series of layers of 16th- to 17th-century date a near complete Dutch Bartmann jug was recovered, possibly discarded within the City Ditch. Of particular interest, a rare fragment of a 15th-century majolica basil-pot made either in

Valencia or close by at Paterna was found in the backfill of the Bazalgette sewer, which crossed the site.

It is recommended that the archaeological results be integrated into a journal article for London Archaeologist, with a short note on the post-medieval ceramics to be published separately.

Contents

List of illustrations

List of Photos

Tables

1. Introduction

Site background

1.1.1 The excavations and watching briefs took place at the Crossrail Moorgate and Finsbury Circus Shaft worksites.

1.1.2 The Moorgate shaft is bounded by Moorfields road, Moorgate, Moor Place and Fore Street. The centre of the site lies at National Grid reference 532713 181639. The sitecode is XSP10. The Moorgate worksite, located at 17–31 Moorfields, Moorgate station and 91–109 Moorgate occupies the western end of the site area and will be used for construction of the western ticket hall box and escalator shaft to platforms and northern line link subway. The site was recently occupied by residential and domestic premises fronting Moorgate. Modern pavement near to the site lies at *c* 113m ATD.

1.1.3 The Finsbury Circus shaft and ancillary works were entirely located within Finsbury Circus gardens and the surrounding roadways. The centre of the site lies at National Grid reference 532867 181592. The sitecode is XRZ10. The site was occupied by public gardens and a bowling green, and is located in the eastern part of the gardens. This area will be used for construction of the platform tunnels and the crossover between Liverpool Street and Farringdon stations. Modern ground level near to the site lies at *c* 113.66m ATD.

1.1.4 All levels in this document are quoted in metres Above Tunnel Datum (m ATD). To convert Tunnel Datum to Ordnance Datum subtract 100m, i.e. 101m ATD = 1m OD.

Planning background

1.1.5 This post-excavation assessment and updated project design has been carried out in accordance with the Crossrail Central Archaeology Updated Project Design (CR-XRL-T1-STP-CR001-50001, CRL10, Roman and medieval Moorgate and Finsbury Circus).

1.1.6 The legislative and planning framework in which all archaeological work took place was summarised in the Site Specific Written Scheme of Investigation (SS-WSI): Liverpool Street Station Design Package 138, Doc. No C138-MMD-T1-RST-C101-00001, Version 3, March 2011; a brief summary is included here:

1.1.7 An archaeological excavation as defined by the Institute for Archaeologists is ‘a programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological deposits, features and structures and, as appropriate, retrieves artefacts, ecofacts and other remains within a specified area or site on land, inter-tidal zone or underwater. The records made and objects gathered during fieldwork are studied and the results of that study published in detail appropriate to the project design’ (IFA, 2001).

1.1.8 The overall framework within which archaeological work will be undertaken is set out in the Environmental Minimum Requirements (EMR) for Crossrail (http://www.crossrail.co.uk/railway/getting-approval/environmental-minimum-requirements-including-crossrail-construction-code)The requirements being progressed follow the principles of Planning Policy Guidance Note 16

(PPG16)(DoE, 1990), and it's replacements Planning Policy Statement 5 (PPS5)(DCLG, 2010) and the National Policy Planning Framework (NPPF)(DCLG, 2012), on archaeology and planning. The requirements being progressed follow the principles of Planning Policy Guidance Note 16 on archaeology and planning (1990). Accordingly the nominated undertaker or any contractors will be required to implement certain control measures in relation to archaeology before construction work begins.

1.1.9 Schedules 9, 10 and 15 of the Crossrail Bill (2008) concern matters relating to archaeology and the built heritage and allows the dis-application by Crossrail of various planning and legislative provisions including those related to listed building status, conservation areas and scheduled ancient monuments (Schedule 9). Schedule 10 allows certain rights of entry to English Heritage given that Schedule 9 effectively dis-applied their existing rights to the Crossrail project, and Schedule 15 allows Crossrail to bypass any ecclesiastical or other existing legislation relating to burial grounds.

Scope of the excavations and report

1.1.10 This post-excavation assessment describes the results of the archaeological fieldwork shown on Fig 2. The fieldwork comprised programmed phases of archaeological evaluation (trial trenching) followed by controlled archaeological excavation and targeted/general watching brief, (outlined in section 1.4 below), all of which were carried out in response to groundworks associated with the proposed development of the sites.

1.1.11 The chronological scope of the archaeological remains is multi-period, with Roman, medieval and post-medieval remains recorded.

1.1.12 This report seeks to integrate the results of the fieldwork and to assess its significance and potential, drawing on related evidence from nearby excavations and cartographic sources. The role of documentary evidence in enhancing the research objectives have also been considered

1.1.13 The principles 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) and further developed in The Management of Research Projects in the Historic Environment (MoRPHE) Project Planning Note 3: Archaeological Excavations (1997, revised 2008).

Circumstances and dates of fieldwork

1.1.14 The work comprised several phases of evaluation, excavation, and general and targeted watching brief. These are outlined in Table 1 and shown on Fig 2.

1.1.15 The work was carried out in accordance with the Crossrail Archaeology Generic Written Scheme of Investigation, Doc No: CR-XRL-T1-GST-CR001-00003. Additionally, a number of site-specific Method Statements, Written Schemes of Investigation and Addenda informed the work. The research aims relevant to each phase of work and outlined in section 3 were set out in these documents.

1.1.16 All excavations were fully recorded in plan in accordance with procedures laid out in the above listed WSIs and in the Museum of London Archaeological Site Manual (MoLAS, 1994). The trench locations and the baselines employed for the

archaeological recording were located by a variety of means, both directly by MOLA's surveying team and also by onsite Crossrail engineers who later supplied the data as DWG files to MOLA. The location information was then plotted onto either the Crossrail London Survey Grid or the British National Grid depending on the format of the pre-existing template. MOLA Geomatics department has facilitated any necessary translation between the two grid coordinate systems. Similarly, levels were supplied at various points across the works as and when required by both MOLA surveyors visiting the worksites or by the onsite Crossrail engineer.

Location	Dates	Carried out in accordance with	Previous reporting
Moorgate (XSP10)			
91–109 Moorgate, Evaluation (Four evaluation trenches, three boreholes)	25/11/10–09/09/11	• A Crossrail Site-specific Written Scheme of Investigation (SS-WSI): Liverpool Street Station Design Package 138, Doc. No C138-MMD-T1-RST-C101-00001, Version 2, April 2010 • An Addendum to the WSI: Package C138 – Liverpool Street Station, Addendum to Written Scheme of Investigation: Moorgate Shaft, Doc. No: C138-MMD-T1-TCP-C101-0001, Revision 2.0, July 2010. • An Archaeological Method Statement: MOLA, C257 Archaeology Central Method Statement Archaeological Evaluation and Watching Briefs (C138) Moorgate Shaft, Doc. No: C257-MLA-T1-GMS-CR088-00003, Version 5, 30/08/11.	• MOLA, July 2011 C257 Archaeology Central, Interim Statement, Archaeological Evaluation 91 to 109 Moorgate – XSP10 Document Number: C257-MLA-X-RGN-CRG02-50028 v2.0 13.07.11 • MOLA, March 2012 C257 Archaeology Central, Fieldwork Report, Archaeological Evaluation, 91 to 109 Moorgate – XSP10, Document Number: C257-MLA-X-RGN-CRG02-50069 v2, 21.03.12
Watching brief on combined utilities diversions (phases 1 to 5) centred around the junction of London Wall and Ropemaker Street, two access shafts and a connecting heading tunnel, and various other shallow excavations.	18/04/11–16/12/11	• A Crossrail Site-specific Written Scheme of Investigation (SS-WSI): Liverpool Street Station Design Package 138, Doc. No C138-MMD-T1-RST-C101-00001, Version 3, 08.03.11 [WSI] • An Addendum to the WSI: Package C138 – Liverpool Street Station, Addendum to Written Scheme of Investigation: Moorgate Shaft, Doc. No: C138-MMD-T1-TCP-C101- 00001, v 5, 02.11.11 • An Archaeological Method Statement: MOLA, C257 Archaeology Central Method Statement Archaeological Evaluation and Watching Briefs (C138) Moorgate Shaft, Doc. No: C257-MLA-T1-GMS-CR088-00003, Version 5, 30/08/11.	• MOLA, August 2012 C257 Archaeology Central, Fieldwork Report, Archaeological Watching Brief on Combined Utilities Diversions at Moorgate Shaft (XSP10)Document Number: C257-MLA-X-RGN-CRG02-50130 v2.0 20.08.12
General and targeted watching brief on ground reduction for the OSD (over-site development).	30/05/12–28/06/14	• Crossrail 2010, A Crossrail Site-specific Written Scheme of Investigation (SS-WSI): Liverpool Street Station, Doc. No. C138-MMD-T1-RST-C101-00001, Rev. 2 [WSI]. • Crossrail 2011, An Addendum to the WSI: Addendum to Written Scheme of Investigation: Detailed Excavation and Watching Brief– Moorgate Worksite (XSP10), Doc. No. C138- MMD-T1-TCP-C101-00001 v 5, 02/11/11 [Addendum].	• MOLA July 2012, C257 Archaeology Central, Interim Statement, Archaeological Watching Brief Moorgate Worksite, OSD Foundation (Outside Diaphragm Walled Shaft) Document Number: C257-MLA-X-RGN-CRG02-50128 v2.0 24.07.12
Watching brief on sewer diversions between 8 Moorfields and Moor House	02/02/12–23/06/12	• A Crossrail Site-specific Written Scheme of Investigation (SS-WSI): Liverpool Street Station Design Package 138, Doc. No C138-MMD-T1-RST-C101-00001, v.3 08.03.11 • An Addendum to the WSI: Package C138 – Liverpool Street Station, Addendum to Written Scheme of	• MOLA, December 2013, C257 Archaeology Central Fieldwork Report Archaeological Watching Briefs on Sewer Diversions at Moorgate Shaft (XSP10) Document Number: C257-MLA-X-RGN-CRG03-50044 v2.0

		Investigation: Moorgate Shaft, Doc. No: C138-MMD-T1-TCP-C101- 0001 v.5, 02.11.11. • An Archaeological Method Statement: MOLA, C257 Archaeology Central Method Statement Archaeological Evaluation and Watching Briefs (C138) Moorgate Shaft, Doc. No: C257-MLA-T1-GMS-CR088-00003, Version 5, 30/08/11.	05.12.13
Excavation and watching brief in areas A–D Moorgate Shaft The main shaft excavation was separated into four areas A—D in a counter-clockwise fashion, each roughly of similar dimensions. Area A was located in the NW of the site, area B in the SW, area C in the SE and D in the NE. Area D was heavily truncated and recorded in a phase of watching brief after the main excavations in A–C.	14/10/13–20/11/13	• Crossrail, Generic Written Scheme of Investigation, Doc No. CR-XRL-T1-GST-CR001-00003. • A Crossrail Site-specific Written Scheme of Investigation (SS-WSI): Liverpool Street Station, Doc No. C138-MMD-T1-RST-C101-00001, v.3 08.03.11 • Addendum to the SS-WSI for the Moorgate Shaft, July 2010, Doc. No C138-MMD-T1-TCP-C101- 0001, v.5 02.11.11. • Crossrail, Archaeology Specification for Evaluation & Mitigation (including Watching Brief), Doc No CRL1-XRL-T1-RSP-CRG03-50001 • Method Statement, Archaeological Watching Brief and Excavation at Moorgate Shaft, Doc. No. C257-MLA-W-RGN-CRG03-50007 C257 Version 2 10.10.13 (MOLA for Crossrail 2013).	• MOLA, 2014 C257 Archaeology Central. Interim Statement. Archaeological Excavation and Watching Brief Moorgate Shaft (XSP10) Document Number: C257-MLA-T1-RGN-CRG03-50010 v2.0 07.03.14
Finsbury Circus (XRZ10)			
A single evaluation trench and two watching briefs on Finsbury Circus shafts	23/02/11–01/04/11	• Crossrail, February 2005b Assessment of Archaeology Impacts, Technical Report. Part 2 of 6, Central Route Section, 1E0318-C1E00-00001, [Specialist Technical Report (STR) • Crossrail, November 2009 Site-specific Written Scheme of Investigation Liverpool Street Station, Doc No. C138-MMD-T1-RST-C101-00001 • Crossrail, August 2010 Addendum to SSWSI: Trial Trench Evaluation, Watching Brief & Detailed Excavation – Finsbury Circus (XRZ10), Doc No. C138-MMD-T1-RST-C101-00006 ['the Addendum']	• MOLA, March 2011, C257 ARCHAEOLOGY Central Fieldwork Report Archaeological Evaluation and Watching Briefs Finsbury Circus Shaft (XRZ10) Document Number: C257-MLA-X-RGN-CRG03-50012 v2.0 29.03.11
Targeted and general watching brief carried out during the construction of the access shaft located in the southern part of Finsbury Circus The initial works involved a general watching brief on ground reduction and removal of post-medieval	09/11/11–15/11/11	• Crossrail, Liverpool Street Station, Site-specific Written Scheme of Investigation, Doc. No. C138-MMD-T1-RST-C101-00001, Revision 4.0 [WSI] • A Crossrail Site-specific Written Scheme of Investigation (SS-WSI): Liverpool Street Station, Doc No. C138-MMD-T1-RST-C101-00001, Revision 3, 08.03.11. • An Addendum to the WSI (Addendum): Liverpool Street	• MOLA, May 2012, C257 Archaeology Central Fieldwork Report, Archaeological Targeted and General Watching Brief at Finsbury Circus Access Shaft (XRZ10) Document Number: C257-MLA-X-RGN-C101_WS101-50001 v2.0 16.05.12

deposits. These were recorded in section; subsequent features were planned according to the MOLA procedures. A targeted watching brief (TWB) was carried out on the lower marsh deposits and underlying Roman features.		Station, Addendum to WSI: General & Targeted Watching Brief. Finsbury Circus (XRZ10), doc. no. C138-MMD-T1-RST-C101-00006, Revision 5.0, 29/06/11	

Table 1 Phases of work covered at Moorgate (XSP10) and Finsbury Circus (XRZ10) covered by this assessment and UPD

Organisation of the report

1.1.17 This post-excavation assessment and updated project design has been carried out in accordance with the Crossrail Central Archaeology Updated Project Design (CR-XRL-T1-STP-CR001-50001, CRL10, Roman and medieval Moorgate and Finsbury Circus). This report contains a summary of the recommendations made for publication. Section 2 summarises archaeological background. The original research aims for the project are set out in Section 3. The archaeological features and deposits recorded during the investigations are described in Section 4. This is followed by the quantification and assessment of the finds and environmental assemblages from the site in Section 5. In Sections 6 and 7 the potential and significance of the findings are considered. Section 8 provides a discussion of the publication project including a discussion of the revised research aims in view of the data collected and the potential for future research. A preliminary publication synopsis is given and the task sequence necessary for this described with a breakdown of the methodologies to be implemented at the next stage of analysis. Section 9 describes resources and programme of continuing work.

1.1.18 Within the report the archaeological data is broken down into specific numbered units. For example [145] refers to the specific context number allocated to a feature during the excavation. These are amalgamated into larger units: subgroups (sgp001), groups (gp001), finally and Land Uses (OA1) and Periods. Context numbers are distinguished in the text by square brackets [1], accessioned finds by chevron brackets <1> and environmental samples by the use of curly brackets {1}.

MOLA team

1.1.19 In the document below the following terms should be understood:

*MOLA (*M*useum of London Archaeology)* is a company limited by guarantee registered in England and Wales with company registration number 07751831 and charity registration number 1143574. Registered office: Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED.

Project Manager - MOLA office based manager who was the client's principal point of contact and who has overall responsibility for the project budget and delivery.

Site Supervisor - MOLA site based manager who was responsible for the direction of the field team. Site supervisors on larger sites will tend to be Project Officers in grade, whilst on other sites they will be Senior Archaeologists. On some sites there may be both a Project Officer and/or one or more Senior Archaeologists.

Archaeologists - MOLA excavation staff responsible on site for archaeological excavation.

Health and Safety Compliance Manager – The MOLA manager with sole responsibility for site inspections, reporting and issuing of recommendations for the Site Supervisor and Project Manager to implement. Reports directly to MOLA CEO.

2 Topographical, historical and archaeological background

Topography

2.1.1 The sites lie within the ancient flood plain of the River Thames; consequently the topography of the surrounding area generally slopes down from north to south. The drift geology consists of Pleistocene terrace gravels of the third (Taplow) Thames terrace which have been located in boreholes at *c* 108.5m ATD. They are one of the youngest and lowest of the Thames river terrace remnants, deposited between 130,000 to 190,000 years ago during ice-age conditions when the flow of the Thames was considerably stronger than it is today. Generally fine with mixed inclusions of sand and silt, they are commonly overlaid by brickearth (Langley Silt Complex, a silty loam overlying the terrace gravels, formed from re-worked, fine-grained sediments deposited by a combination of Aeolian and alluvial processes in the Late Devensian period (32,000–10,000 years ago), named from its former use in brick-making, as recorded nearby in Riverplate House, 7–11 Finsbury Circus (RIV87) and 12–15 Finsbury Circus (FIB88).

2.1.2 Tributaries of the Walbrook stream (a tributary of the Thames that originally flowed to the east of the site, forming a broad, shallow valley) dominate the local topography. The valley of the Walbrook was widest in its upper reaches, and the west side of the valley (the area of the sites) was broad and gentle, eroded by streams feeding the main channels further east (Barber, 1996).

Archaeology

2.1.3 Crossrail worksites Moorgate (XSP10) and Finsbury Circus (XRZ10) were situated to the north of the line of the Roman and medieval City wall and its associated defensive ditches. Prehistoric evidence for the area is limited to residual artefacts found in later deposits, such as the small quantities of Iron Age pottery from Riverplate House (sitecode RIV87). A Neolithic flint axe head and deer horn axe or hoe found just under the surface of the gravel - at between 11 foot (3.35m) and 15 foot (4.57m) below street level - at 26–31 Eldon Street. Three abraded sherds of Iron Age pottery were found in gravels - i.e. just below 8.85m OD - in the southern half of River Plate House, 7–11 Finsbury Circus.

2.1.4 Tributaries of the river Walbrook are known to have flowed to the north and east of XRZ10, as recorded at 6 Broad Street Place (BDC03) and (FIB88). Channels associated with its management and drainage were also been identified to the north and east of the site at 18–31 Eldon Street (ELD88).

2.1.5 Fieldwork to the north of XSP10 in 1989 at Moorgate Hall revealed a single Roman inhumation burial, which was interpreted as not being part of the extra-mural cemeteries which existed to the north of the Roman city (LAARC summary for MOH88). Another isolated burial (although heavily disturbed) was found topgether with disarticulated remains immediately adjacent to XSP10 at Moor House (LAARC summary for MRL98). The Roman cemetery at Eldon Street (e.g. ENS03, BSP91 and ELD88), some 200m to the north-east of XRZ10, forms the nearest of the

significant cemeteries currently identified. However, there are two antiquarian records of cremations in the immediate vicinity, from Moorgate and the western side of Finsbury Circus, and a number further afield from the eastern side of Moorgate. These may suggest an area of cemetery or individual burials that has been masked by the Moorfields marsh. At least 28 cremation and 181 inhumations burials have been recorded in this locality, ranging in date from the 1st to the 4th centuries AD. The majority of Roman activity in the immediate area has been limited to ditch cuts (probably for drainage) and occasional occupational evidence (beam slots and floors) especially in the northernmost area of Moor House (MRL98).

2.1.6 The line of the Roman and medieval City wall near Moorgate runs approximately along the line of the modern London Wall road, some 60m south of the Moorgate Shaft site. Constructed between *c* AD 180 and 225, the wall fell into disuse at the end of the Roman period, and from the 9th until the 16th centuries both the ditch and the City wall were continually enlarged, repaired, rebuilt, re-cut and reused. The construction of the wall appears to have impeded the drainage of the area and encouraged the development of more wet land deposits. The Moorfields marsh formed sometime during, or after, the late 2nd or early 3rd centuries AD, possibly as a result of this silting-up of drainage channels in the area with rubbish, and the creation of a Roman road (BDC03) to the north-east that would also have adversely affected drainage. Fitzstephen in the late 12th century described this area as a 'great fen or moor'. In 1415, the Mayor of London Thomas Falconer built a postern gate (at the lower end of Moorgate at the junction with London Wall (outside the current works) and ordered the digging of ditches to try and drain the area. In 1512 and 1527 further drainage schemes were carried out in the Moorfields area, which allowed this area of wasteland to be utilised for the first time since Roman times. Previously Moorfields would have been dotted *'with raised paths and refuse-heaps, deep black ditches and detestable open sewers'* (Stow 1908 (1603)). Previous fieldwork approximately 100m to the west of XSP10, by W. Grimes in the early 20th century (Cripplegate Buildings and the City Ditch site, both WFG17) identified multiple phases of ditch, dating from the 2nd century AD to the mid-17th century (and backfilled sometime after the Civil War).

2.1.7 The Agas map of *c* 1570 shows a road (Little Moorfields) leading north from the postern gate flanked on its western side by drying cloth being stretched on tenter frames. John Stow writing in *c* 1600 noted the presence of gardens and tenter-yards here. Rocque's map of London (1746) shows that the road leading north from the postern gate was now known as Finsbury and it was flanked to the west by suburban development, behind which was another parallel street (Little Moor Fields), now known as Moorfields. Moorgate was widened in 1840. The construction of this stretch of the Metropolitan Line during 1865, by means of a huge linear trench dug from ground level (cut and cover) means that no archaeological deposits will survive under the northern part of the development (103–109 Moorgate).

3 Original research aims

3.1.1 The original aims and objectives were listed in the SS- WSI Liverpool Street Station (Doc. No. C138-MMD-T1-RST-C101-00001, see section 3.2) and stated that 'Archaeological investigation and mitigation within the Crossrail worksites for Liverpool Street Station have the potential to contribute to the research themes (from Museum of London 2002, A research framework for London archaeology 2002) set out below'. Specifically evidence relating to the Walbrook, its tributaries and Moorfields marsh deposits may provide data relevant to the following themes:

- Understanding London's hydrology, river systems and tributaries and the relationship between rivers and floodplains;
- Understanding how water supply and drainage provision were installed and managed;
- Refining our understanding of the chronology and function of the landward and riverside defences and extramural evidence of defensive or military structures in the Roman period;
- Understanding the relationships between urban settlements and royal villas or religious estates;
- Examining the proposal that there was an ideological polarity between town and anti-town systems: Roman towns did not so much fail as were discarded;
- The end of the Roman occupation: developing explanatory models to explain socio-political change and considering the influence of surviving Roman structures on Saxon development; and
- Examining the use in any one period of materials from an earlier period (e.g. Saxon use of surviving Roman fabric) and the influence on craftsmanship, manufacture and building techniques.
- Understanding the differences, if any, between burial practices in the city and outlying cemeteries;
- Understanding life expectancy, origins and belief, seen through studying health, diet and disease, and preparing models for future research;
- Considering the relationship between cemeteries and major or minor roads, in terms of symbolism, status, privacy and convenience; and
- Understanding the cultural and symbolic roles played by London's defences through the ages as reflections of power and political security or imposition and dominance.

3.1.2 Furthermore, the potential at Finsbury Circus for geo-archaeological and palaeoenvironmental deposits to be recovered will contribute to the following themes:

- The development of models for understanding the significance of geomorphology, ecology, ecosystems and climate, hydrology, and vegetational and faunal development, on human lives;
- Characterising changing climatic conditions, and air and water quality and pollution, throughout the archaeological record, towards understanding its implications for how people behaved;
- The Mesolithic/Neolithic transition: understanding the significance of horticultural experimentation at this time, and the transition from hunter-gatherers into farmers; and

- Understanding what London's past environments meant to different groups and individuals.

3.1.3 Specifically, the archaeological investigations have the potential to recover:

- Artefacts of prehistoric date redeposited in later deposits.
- Remains of Roman extra-mural activity, potentially including burials.
- Evidence of the defensive ditch associated with the Roman and medieval City Wall
- Waterlain deposits from the Roman to medieval Moorfields marsh, with the potential for organic preservation and palaeoenvironmental evidence.
- Late medieval and post-medieval drainage ditches, rubbish dumps and remains associated with the reclamation of Moorfields marsh.
- In areas not truncated by later activity: remains of mid-17th-century or earlier buildings on the western side of Moorfields, and late 17th/early 18th-century or later buildings across the whole site.

3.1.4 Specific research aims were also established in the Written Scheme of Investigation or Project Design for the excavation (Crossrail 2010a). The following objectives were devised by MOLA to guide the fieldwork:

- What is the nature, *and in particular the date*, of the Roman activity on the site, how does it compare with that in the surrounding area? Is this related to any variations the levels of the natural geology?
- Are any Roman burials present?
- At what date, and by under which environmental conditions, did the Moorgate marsh develop?
- What evidence is there for activities in the area of the marsh, or in the surrounding area, represented by dumping of refuse in/on it?
- How, and when, was the marsh reclaimed, e.g. by drainage (ditches etc.) and dumping (land raising and consolidation)?
- Is there any evidence for activities carried out in the Moorfields following reclamation of the marsh?
- Is there any evidence for the layout of Finsbury Circus gardens in the early 19th century?

4 Site sequence: interim statement on field work

Natural and topography (Period 1)

Open Area 1

4.1.1 Prior to human activity the landscape consisted of fairly uniform gently undulating terrace gravels.

XRZ10

4.1.2 At Finsbury Circus Pleistocene deposits consisting of fine pale sands were capped by compacted gravel recorded between 108.87 and 107.95m ATD.

XSP10

4.1.3 Terrace gravels mixed with occasional sands were exposed across the Moorgate worksite. The highest deposits survived at 108.50m ATD, and were capped by patches of brickearth between 108.95 and 108.23m ATD. An area of discoloured (light blue-grey) weathered brickearth was observed overlying some of the surviving brickearth in the south-west of the site (area C in particular), between 108.91 and 108.75m ATD. These are most likely naturally formed puddles or hollows caused by intermittent flooding. A thin homogenous waterlain clay 0.2m thick at 108.83m ATD, extended across the site and probably represents flooding prior to human activity.

4.1.4 Extensive modern truncation had removed deposits in the north-east of the main Moorgate site, exposing natural terrace gravels, similar levels of truncation were observed immediately to the west at 21 Moorfields/Moorgate (MoLAS, 1997).

4.1.5 Contexts [32–34] (see Fig 3) were recorded across the grout shaft and represent natural deposits. Plant remains from [32], the latest terrace deposit, indicated that it was formed in a wetland environment.

Later prehistoric/early Roman (Period 2, phase 1)

4.1.6 This phase represents the earliest evidence for Roman activity on either site, consisting of a stream channel. This possibly represents a previously unknown tributary of the Walbrook, that flowed *c* 100m to the east.

Open Area 2 (Fig 3)

XRZ10

4.1.7 A possible channel (gp002 XRZ10) (Fig 3), (Photo *1*) was recorded between 108.75m and 108.05m ATD covered a rough area of 30 square metres within the access shaft, and is tentativly dated to the Roman period. Environmental samples from the channel deposits yielded few aquatic plant remains, and the seed assemblages seem to have derived mainly from areas of grassy and disturbed ground close to the channel. Remains of grassland plants were particularly common, along with disturbed ground species. A single grape pip found within the

channel deposit (sgp022) could be intrusive, a result of bioturbation caused by earthworms. However, spelt wheat (Triticum spelta) from cultivated cereals or crop processing were found in the overlying deposit [29], a sandy clay (see 5.8), suggesting that the filling of the channel occurred during the Roman period. Furthermore a head of grain weevil (Sitophilus granarius) from [30] has never been recorded from deposits pre-dating the arrival of the Romans in Britain.

4.1.8 This channel possibly represents a previously unknown tributary of the Walbrook (that flowed *c* 100m to the east),

4.1.9 During previous work approximatly 50m north-east of the site at 16–18 Finsbury Circus and 18–31 Eldon Street (ENS03) a series of similar potentially prehistoric channels were recorded that were evidently not formal Roman attempts at drainage or water management, and probably represent the existing landscape around the time that Londinium was founded. The channel at Finsbury Circus may have formed part of this natural drainage network that fed the Walbrook to the east.

Photo 1 Recording a possible Holocene channel (sgp022) at Finsbury Circus, looking west.

XSP10

4.1.10 A single small abraded sherd of Late Iron Age flint-tempered ware (FLIN) was found residually within a Roman dump (sgp089) in evaluation Trench 6 from XSP10. The abraded nature of the material, along with that of the Roman assemblage suggests previous disturbance probably caused by localised flooding.

2nd century AD (Period 2, phase 2)

Open Area 3 (Fig 4, Fig 5 and Fig 6)

4.1.11 The 2nd century landscape would have likely consisted of fields and farmlands, situated just outside the limits of Roman London.

XSP10

4.1.12 An increase in aquatic and wetland plants (e.g. pondweed, watercress) from waterlain dumps at XSP10 indicates an increase in standing or flowing water as well as marshy ground compared to OA2 (see 5.8, plant remains).

4.1.13 The Moorgate site was dominated by two parallel east–west ditches, roughly 15m apart, that continued across the site. Both were similar in width (1.5–1.8m approx.), depth and, ceramics suggest likely contemporary.

4.1.14 The southernmost (gp012) (see below and Fig 6), was partially filled with a sterile gravelly sand, finds from which dated to AD 150-300 [53]. This deposit, along with the primary fill of the northern east–west ditch (sgp022) were possibly redeposited/trampled into the base of the cuts during excavation, or may represent early bank erosion. Two decayed timber stakes (sgp056, 058) sealed within the lower fills of this ditch may be related, the westernmost was driven 0.70m into the compacted natural gravels, and would have been a substantial upright post. Seven post-holes (s003) located immediately to the north, divided into two clusters 1.8m apart at 108.86m ATD, represent a structure or structures. Potentially contemporary with the ditch, and may have formed part of a crossing. Any related stake-holes to the south of the ditch may have been masked by a dense root system consisting of 23 (sgp051). The secondary fills of ditch (gp012), appeared to be waterlain and contained a bone needle <14> [48] and two bone hairpins [9] <10> and <11> (see 5.6 the accessioned finds).

Photo 2 East–west ditch (gp012), looking east.

4.1.15 To the north, ditch (gp013)(Photo 3) mirrored the alignment of the southern ditch, and had a similar primary fill of compacted yellowish sandy gravel, with inclusions of animal bone and pottery, closely dated by 30+ sherds to AD 140–160. The secondary fill [155], a soft mid-grey brown clay was probably waterlain, and also contained Roman pottery and animal bone, as well as fragments of a box flue-tile (see 5.3), and a section of an adult human mandible (see 5.9), probably washed into the site by Walbrook tributaries from Roman cemeteries upstream (as recorded at the known cemetery at Eldon Street, MoLAS 2007). Interestingly although the pottery assemblages were consistent with those fabrics commonly used in cremation burials their condition means that a link with disturbed burial vessels is tentative (see 5.4). A series of stake/post-holes (gp023)(see Fig 4) roughly grouped

along the southern edge and side of the ditch, possibly indicate a fence alignment (or foundations for a rudimentary bridge crossing. These may be contemporary with three shallow post-holes to the north (gp005), that were backfilled after AD 140 (see 5.4). The ditches may have had the dual function of drainage and marking out properties or paddocks for grazing. Any fencing could have reinforced that role, contained livestock and also preventing people falling in.

Photo 3 East–west ditch (gp013), with distinct primary fill (AD 140–160), looking west.

4.1.16 The primary fills of these ditches dated to AD 150–300 (gp012) and AD 140–160 (gp013), and the likelihood is that they are contemporary, forming part of the grid system of drainage ditches recorded across the area to the north of the Roman city, as recorded at Eldon Street (ENS03), that appear to predate the construction of the city wall to the south-after AD 180 (Barber 1996, p41). The profile of the pottery assemblage from both sites is dominated by 2nd century AD material, peaking in the Hadrianic and early Antonine periods (AD 120–140 and AD 140–160), likely linked with an influx of activity on the site (see 5.4). The building material supports this interpretation, with the vast majority of tiles and bricks dated AD 120–250. However the lack of later forms may suggest activity in the area ceased sometime in the 2nd century.

4.1.17 These dates are consistent with the known increases in development of the area in the late 1st and early 2nd centuries. This process involved the closer management of the Walbrook and its tributaries and the infilling of minor streams (Barber 1996, p41). The silting up of these man-made ditches again mirrors the excavated record from 16–18 Finsbury Circus and 18–31 Eldon Street (MoLAS 2007), where the management and cleansing of drainage channels appears to have ceased in the late second century, resulting in the channels slowly silted up and possibly exacerbating the wet conditions across the area that allowed the marsh to develop.

4.1.18 Further recorded features were indicative of a low level of activity, including external rubbish dumping (*c* 120–250), mainly from nitrogen-rich soils, possibly domestic organic refuse, although virtually no waterlogged plant food remains were seen (see 5.8) and a series intercutting quarry pits (*c* 120–400), within which a fragment of a blue glass bottle <9> was recovered dated *c* AD 50–200 (see 5.6). The location of these quarry pits, i.e. restricted to the north of the northern ditch (gp013), is unlikely a coincidence and may suggest that the ditch was constructed to improve drainage

and therefore allow better access for quarrying of brickearth. It is also possible that the area to the north of this ditch represented a separate allotment to that of the south, with a different tenant, who utilised the resources differently. Potentially both ditches may have been excavated separately, most likely for drainage, with piecemeal colonisation of the higher ground in-between.

XRZ10

4.1.19 To the west at Finsbury Circus shallow quarry pits [21] and [41] were recorded in the south of the grout shaft cutting the natural gravels between 108.79 and 108.42 ATD (Fig *5*). These are probably contemporary with the ditches and quarry pits from XSP10. The primary fills consisted of sterile grey coarse gravelly clay (Photo 4). A small quantity of abraded ceramic building material (identified as Roman) was recovered from within the largest pit (see 5.3). This feature (and the phase of activity as a whole), likely dates to the Roman period, as it is sealed by a Roman pit [26] containing ceramics dated AD 70–160. The shallow cut profiles of these features suggest they were likely truncated by later quarrying, and/or the formation of the marsh.

4.1.20 The rubbish pit [26] and the secondary fill (sgp017) of a quarry pit [36], shared a similar organic fil, which contained a wide range of aquatic and wetland plants consistent with rubbish disposal (see 5.8). The two features yielded quantities of unabraded Roman pottery. The larger pit (sgp018) had two distinct fills, the earliest was sterile and slight sorting of the gravels suggests it may have been naturally backfilled (e.g. left open, and the sides gradually eroded, as seen at ENS03), the secondary fill (sgp017), contained a medium assemblage of pottery including a large section of an unusual dish. These two likely related deposits dated to AD 70–160 and AD 120–160 respectively (see 5.4). All of these features were clustered to the east of the possible early Roman channel (gp002), and likely represent a later phase of activity.

Photo 4 Partially excavated quarry pit (sgp016), looking north.

4.1.21 Compared to surrounding sites at Finsbury Circus (RIV87, FIB88) there was surprisingly little surviving Roman stratigraphy. There was no evidence for the variety of burials and cremations found at FIB88 or the alluvial activity at RIV87.

Whilst this may be a result of extensive quarry pitting and/or land reclamation, it is possible that due to the sites location on the periphery of the city, and away from known communication routes (e.g. roads) it was simply comparatively underdeveloped.

Open Area 4 (Fig 7) (Fig 8)

4.1.22 Open Area 4 relates to the last period of Roman activity prior to site abandonment and flooding. Quarrying appears to have ceased, perhaps replaced by low level industrial activity.

XRZ10

4.1.23 Open Areas 4 was represented by deposits that sealed the earlier Roman features in this area, and were overlain by marsh deposits. Context [16] {5} (XRZ10) (see Fig 8) was sealed by the marsh deposits of Open Area 5, however it yielded a small but distinctive group of highly fragmented cattle bone, possibly used for grease extraction after butchery (see 5.10 the animal bone). This may indicate localised industrial activity; although they may simply be rubbish dumped from further afield.

Post Roman–medieval marsh formation and accumulation (Period 3)

4.1.24 Period 4 is characterised by the formation of marsh deposits across both sites. No features or deposits could be dated to the 3rd or 4th centuries AD, implying that either the marsh was formed prior to or during the 3rd century, or that the formation process of the marsh truncated all archaeology from this period.

Open Area 5 (Fig 7, Fig 8)

4.1.25 Open area 5 is characterised by the formation of marsh deposits across the area. The levels and depths of marsh survival varied between the Moorgate (XSP10) and Finsbury Circus (XRZ10) sites, with greater truncation of marsh deposits at Moorgate (XSP10). The marsh sequence at XRZ10 continued into period 4.

XSP10

4.1.26 The Roman and/or medieval marsh survived intermittently across the site (Photo *5*), at a maximum thickness of 0.30m at 109.00m ATD in the excavation area of XSP10. Modern truncation had removed the upper marsh deposits, and the full 1m+ sequence survived only in section in the south of the site, adjacent to Moor House. Survival was inconsistent across the site, and occasionally limited to a 0.02m thick layer. Formed of mixed blue-black brown silts and frequent organic peaty lumps, the marsh was generally well sorted, with the lower deposits slightly compacted and darker (see Photo *2* above).

Photo 5 An example of the marsh survival in the south-west of Moorgate XSP10, looking south-east.

4.1.27 Finds (leather and pottery in particular) suggest that these surviving deposits were formed (or at least sorted) by the marsh formation process. Sorting of artefacts that had sunk through the marsh sequence has been noted nearby at Eldon Street (MOLA 2011).

4.1.28 In the north-west of Area A, a linear ditch (gp030) (Photo *6*, not illustrated in plan) 5m long, 1.2m wide and 0.30m deep, aligned roughly north–south became visible once the marsh (gp018) had been removed to 108.90m ATD, and it was evident that marsh deposits also filled the ditch. Finds from the feature were dated to *c* 1240–1480 (see 5.3), suggesting an early (albeit failed) attempt to drain the marsh.

Photo 6 A north-south aligned ditch (gp030), representing a failed attempt at marsh drainage between the 13th and 15th centuries.

XRZ10

4.1.29 Marsh deposits were recorded in section (Fig 7, see 5.7).

4.1.30 The lowest brown fibrous organic deposit [15] was most recognisable as a marsh and was sealed by a potentially redeposited horizon [14] within both deposits a quantity of well-preserved medieval leather (predominantly recycled shoes) was excavated. This deposit returned a C14 dates from the late Saxon/ early Norman period (Cal AD 1020–1155, BETA 396256, see 5.7), suggesting that in this area at least the marsh may have formed considerably later in this area than is believed.

Late medieval marsh reclamation/drainage and pitting *c* 14th–16th centuries (Period 4)

Open Area 5 (Fig 7)(Fig 8)(Fig 9)

4.1.31 The marsh sequence at XRZ10 continued into period 4.

XRZ10

4.1.32 A dark blackish brown peaty deposit ([14], Fig 7) recorded at 109.60m ATD, was significantly more compacted then the underlying deposit [15], indicating environmental change, as the area returned to drier conditions and became less of a marsh and more one subject to flooding with periodic dumping of waste material. Interestingly, at the top of [14] an organic deposit consisting of plant fibre and hair indicates the possible stabling of horses in the locality, which was substantiated by the insect assessment (see 5.7). This deposit contained ceramics dated 1480–1550, as well as a fragment from a wide horseshoe (<2>) and a piece of flattened lead with wood impressions on the back (<3>), probably structural from a building (see 5.6). C14 dates for this, the latest phase of marsh (Cal AD 1440–1520/ Cal AD 1595–1620 BETA 396255, see 5.7), were consistent with those from the ceramic assemblage.

Open Area 6 (XRZ10 only) (Fig 7, Fig 8)

XRZ10

4.1.33 Contexts [10–13] (see Fig 7) represent deliberate attempts at marsh reclamation between the 16th and 18th centuries. No cut features representing attempts to drain the marsh were observed (e.g. ditches/gullies), as possibly recorded at Moorgate (XSP10, gp030), perhaps indicating that this area of Moorfields was too boggy to be utilised, or its location, away from the main north–south road leading into Moorgate [constructed by Henry V in 1415], encouraged a degree of neglect.

Open Area 7 (XSP10 only) (Fig *9*)

XSP10

4.1.34 Evidence for activity post-dating the formation of the marsh was limited to the bases of deeply cut features.

4.1.35 A wooden hooped structure (sgp044) (Fig *9*, Photo 7) only survived to a depth of 0.17m in the south-west of the site (two sherds of pottery from the backfilled construction cut dated to the 14th–15th-century). The woodwork here consisted of several barrel or tub hoops, most commonly found reused as linings for wells and pits, and also occasionally used in sumps, soakaways, and lime slaking pits (see 5.13). This feature was partially covered by a marsh deposit (gp018), perhaps suggesting that when it was constructed the ground was still marshy/boggy, although this may have been very localised and intermittent.

Photo 7 Traces of a barrel or tub (sgp044) possibly reused to line a truncated pit or small well.

4.1.36 To the north a rubbish pit (sgp047) (Fig *9*, Photo *8*) containing significant quantities of pot, animal bone, oyster shell and leather. The pottery consisted mostly of Coarse border wares (CBW) dating to *c* 1350–1500 of common everyday household use, including bunghole jugs, money boxes and various fragmented jars, bowls and dishes (see 5.5). The animal bone included rabbit and produced a sparse assemblage of fish, from marine and migratory species, including cod,

mackerel, eel and gurnard (see 5.10). The small group of late 14th-century shoe parts retrieved are also consistent with household rubbish as is the length of fine wire <4> (see 5.6), the former indicating that the pit was likely to have been utilised near the end of the 14th-century.

Photo 8 Rubbish pit (sgp047), top right of picture, looking east.

4.1.37 A circular pit (gp036)(Fig *9*, Photo *9*) lined with chalk fragments across its base, located in the north-west of site, with vertical sides at 109.15m ATD measured 1.2m across and 0.65m deep. The feature was dated by Tudor brick sealed beneath the chalk to the 15th–16th centuries. The small quantity of medieval pottery (1080-1350) recovered is assumed residual. This feature may represent the remains of a pier base, with the superstructure robbed out; with related deposits located beyond the limit of excavation to the west and subsequently truncated by 19th-century foundations. Wells from this period are also on occasion lined with chalk, to help filter groundwater, although this would be an unusually large, shallow and irregular example. There is also documentary evidence that this area of the Moorfields may have been used to burn chalk (Butler 2006, p 48) for construction in the late 15th century, although there was no evidence of *in situ* burning.

Photo 9 Chalk deposit at base of shallow circular cut (gp036), looking north.

4.1.38 In addition to the recorded features, a small quantity of residual medieval pottery (gp044) was recovered from the backfilled cut of a mid19th-century sewer on the main Moorgate worksite. This medieval pottery assemblage included a Spanish lusterware majolica mid to late 15th–century 'basil-pot' (generally used as a garden ornament), unique within British archaeological contexts, and potentially highly significant (see 5.5).

17th–19th century activity (Periods 4 and 5)

Open Area 8

XSP10

4.1.39 A single undated deposit (gp034) in sewer run S3-S4, interpreted as a medieval or early post-medieval land reclamation dump had been entirely truncated to the north and north-east by later post-medieval foundations. This is the only surviving deposit at this level on the site, and was likely considerably more extensive prior to truncation.

XSP10

4.1.40 A series of dumps similar in composition recorded at XRZ10 (gp008), also sealed the marsh deposits, dated 1550–1700, and probably represents piecemeal dumping of [?household] waste pre-dating the development of the Finsbury Circus gardens.

Open Area 9 (Fig 7)

XSP10

4.1.41 This phase of land use includes deposits located within the eastern access shaft on London Wall (gp039) (see Fig 2 for location) that were interpreted as fills or horizontal dumps. The relatively narrow date range of the latest deposit of 1660–1680, and its similarity in composition with the underlying layers, which were dated 1580–1700 (including a complete Bellarmine jug with arms of Amsterdam, see 5.5), suggests that they may have been deposited relatively quickly, and under similar

conditions, possibly to backfill the redundant city ditch in an attempt at land reclamation.

Photo 10 Horizontal deposits (gp039) recorded on London Wall, dated 1580–1700, possibly within/filling the City ditch, looking north-west

XRZ10

4.1.42 To the north-west at Finsbury Circus a series of deposits (gp010) 1.5m thick between 113.36m and 111.46m ATD was dated by ceramics to between 1680 and 1840 (see Fig 7). These layers were horizontal in nature and probably catalogued a long period of dumping within this area of open fields immediately north of the City walls. The range of pottery forms and fabrics from this period included Surrey-Hampshire border whitewares, imported Rhenish stoneware, London redwares and tin-glazed wares, typical of London's delftware industry (see 5.5) and all consistent with household waste. The latest deposits may date to the early 19th-century, in which case they may have been formed as part of the development of Finsbury Circus Gardens in (*c* 1815–17).

4.1.43 A well preserved large storm drain/sewer (gp009) (Photo *11*), also pre-dating the development of Finsbury Circus survived immediately beneath a late 19th-century cellar within the gardens. Brick types suggest this was constructed sometime after the latter half of the 17th or early 18th centuries (see 5.3). Potentially it may be associated with the development of the New Bethlem Hospital constructed in 1675–6 that bordered the south of Moorfields.

Photo 11 17th–18th century storm drain/sewer (gp009), looking east.

Nineteenth to twentieth century urban development (Period 5)

Open Area 10

XRZ10

4.1.44 The earliest deposits from this period postdate the formation of Finsbury Circus gardens, including garden soil horizons and dumping associated with its development post 1815 (the gardens were extensively redesigned and developed by William Montague between 1815 and 1819).

4.1.45 A series of dumps (gp011) dating to the 19th or early 20th century were recorded in the roads surrounding the gardens. The otherwise typical assemblages from these deposits did include an usual goblet or vase of Chinese origin (possibly Sung)(see 5.5) mixed in with general rubbish, probably imported as part of general road maintenance.

XSP10

4.1.46 To the west at Moorgate, definite 19th-century activity was limited to a deeply cut sewer (gp040)(see Fig 9 for location), designed in an innovative inverted 'egg-shape' and overseen by Sir Joseph Bazalgette (1819–1891). The large cut and cover sewer truncated areas in the west and south-west of the Moorgate site to below natural strata. The sewer was built as part of the extensive upgrading of London's sewage network undertaken in the mid 1860's. This was only fully excavated in the south of site to allow for it to be blocked and re-routed. During these excavations residual late medieval pottery was recovered (see 5.5).

4.1.47 Nineteenth–twentieth century walls were exposed in a drop shaft on London Wall (sgp74) and an undated (probably 19th-century) foundation in the basement of 87 Moorgate, exposed in a small (0.8m by 0.6m) test pit. The former was covered with rubble and is probably the remains of a domestic property, possibly damaged during and demolished soon after WWII.

5 Quantification and assessment

This section lists and describes the stages in the post-excavation assessment process which have been completed and quantifies and assesses the resulting archive. This includes the stratigraphic records from the site as well as all the relevant classes of finds and environmental material.

5.1 Post-excavation review

- site matrix completed and checked
- subgrouping completed
- subgroup matrix completed and dates entered
- grouping completed
- all groups assigned to land uses and periods
- stratigraphic information entered onto Oracle database
- plans digitised
- photographs cross referenced and indexed
- provisional ceramic dating (medieval and post-medieval) completed and entered onto Oracle database
- assessment work on registered finds and environmental ceramic building material, clay tobacco pipes, plant remains including pollen, animal bone, human bone completed and entered onto Oracle database.
- The conservation requirements of the finds archive have been assessed.

5.2 The site archive and assessment: stratigraphic

Numbers of contexts, plans, sections, photographs for each of the site codes which form part of the Assessment.

Type	Description	Quantity	Notes
Contexts	XSP10 (XRZ10)	191(46)	
Plans	'A4' 1:20 (no. of sheets)	120 (15)	
Sections	'A4'	10(7)	
Matrices	'A4'	Yes	Digital and paper copies
Photographs		Colour 270 (40)	

Table 2 Stratigraphic archive

Category	Description	Weight
Building material	2 crates of ceramic building material (bulk of material discarded after assessment). Two retained boxes	35.66kg
Roman pottery	415 sherds	7173g
Late Saxon and medieval pottery	94 sherds	2.6kg
Post-medieval pottery	71 sherds	5.2kg
Accessioned finds	245 objects; (including 54 ceramic, 69 copper alloy and 62 glass)	5 kg
Clay pipes	2 boxes (1 bulk, 1 accessioned) = 217 fragments	1kg
Bulk Soil Samples	XSP10: Flots from 23 samples; sub-samples from two samples retained unprocessed. XRZ10: Flots from 10 samples; sub-samples from eight samples	132kg

	retained unprocessed.	
Animal Bone	Estimated 521 fragments.	17.97 kg
Human Bone	8 contexts (MNI 2); 1 shoe box	>1kg

Table 3 Finds and environmental archive general summary

5.3 The building material

By Ian Betts

Material	Count	Count as % of total	Weight (kg)	Weight as % of total
Roman ceramic	144	48.48	22.62	63.44
Medieval ceramic (i)	137	46.12	9.73	27.28
Post-med ceramic	16	5.39	3.31	9.28
Total	297		35.66	

(i) includes some types which continue into the post-medieval period

Table 4 Building material from XSP10 and XRZ10

Introduction/methodology

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

Roman ceramic building material

Fabrics

Early Roman fabrics

Fabric group 2815, fabrics 2454, 3028, 3054, 3226

Late Roman fabric

2459B

Undated fabric

3238

Forms

Roofing tile

Most of the Roman building material collected comprised imbrex and tegula roofing tile. Some roofing tile has a worn surface suggesting reuse as crude paving.

Box-flue

There are two combed box-flue tiles from Open Area 3 (XSP10, context [155]). One has a wavy combed pattern whilst the other has a more conventional combing arrangement. The latter also preserves a small part of a square or rectangular vent in one of the adjacent plain sides.

There are two relief-patterned box-flue tiles from the site. One is keyed with die 3 (fabric group 2815) (XSP10, unstratified), the other with die 70 (fabric 3054) (XSP10, context [2]). The latter is a late 1st century import into London from a tilery believed to have been situated

near the south coast, perhaps in the Chichester area. Box-flue tiles keyed with die 3 have been predominantly found in London, close to where they were presumably made. Others, which may be from separate tileries, have been found on sites in Hampshire and Wiltshire (Betts *et al* 1994, 66–67).

Brick

Most of the brick present is probably of bessalis, pedalis and lydion type (Brodribb 1987, 3). A slightly thicker brick (56–61mm) may be a larger brick type such as a sesquipedalis or bipedalis. One brick, which is characterised by moulding sand which is coarser in size that on most other tiles (fabric 3226), was found in Open Area 5 (XSP10, context [44]). Recent work suggests these were made at a tilery located in the Medway area of Kent (Betts in prep).

Opus spicatum

There are a small number of opus spicatum bricks from XSP10. These were normally used as paving although none show any definite evidence of ware. These paving bricks measure 123 x 53–59 x 17–23mm in size. They would have been set in the floor on edge in a herringbone pattern. Tile pavements of this type were used at Cheapside baths and in the portico of the basilica/forum.

Medieval ceramic building material

Fabrics

Early medieval fabric

2273

Late medieval fabrics

2271, 2537, 2587, 3043, 3090, 3216, 3228

Forms

Roofing tile

Shouldered peg tile

There are a few fragments of early shouldered peg roofing tile, but these are mostly found with later normal peg tile. Shouldered peg tiles were probably made in London from the mid-12th to the early 13th century.

Peg tile

There are a large number of medieval peg roofing tiles from the sites. These are of standard two round nail hole type. Some nail holes were not pushed completely through the tile surface, a feature notes on peg tiles from other London sites. Splash glaze is present on many tiles.

Batch marks, in the form of diagonal finger lines in the top corners, are present on certain tiles. These may mark a day's output in readiness for firing.

Ridge tile

There are a few ridge tiles, although they are not always easy to distinguish from thin Roman imbrices.

Brick

Part of a 13th–late 14th century brick was found with a Tudor or later brick in Open Area 10 (XSP10, context [46]).

Post-medieval ceramic building material

Fabrics

Tudor fabrics

3033, 3046

Later fabrics

3032, 3038

Undated fabrics

2271, 2276

Forms

Roofing tile

Peg tile

Some of the peg roofing tiles are of definite or probable post-medieval date. None are glazed.

Brick

Site	Contexts	Fabric	Size (mm)	Date range
XRZ10	[37]	3032	226–230 x 98–103 x 63–68	1666–1900
XRZ10	[37]	3033	225–226 x 104–106 x 54–57	1500–1600/1666
XSP10	[46]	3033	? x 106 x 56–58	1500–1600/1666
XSP10	[130]	3033	? x 108–110 x 51–52	1450/1470–1550
XSP10	[133]	3032	? x 101 x 63–64	1700–1900

Table 5 Post-medieval brick size

The majority of bricks were probably made close to London. Both post and pre-1666 bricks are present. One brick has a top corner accidentally pushed in, perhaps it was dropped when it was being carried or stacked for drying.

A 19th or 20th century machine-made brick (fabric 3038), possibly from one of the Bedfordshire brick factories, was recovered from XSP10 context [125] but this may be later contamination.

5.4 The Roman pottery

By Amy Thorp

Introduction/methodology

The pottery from XRZ10 and XSP10 was recorded in accordance with current MOLA procedure, using standard codes for fabric, form and decoration, with quantification by sherd count, estimated number of vessels (ENV) and weight in grams. The resulting data has been entered onto the MOLA Oracle database.

All stratified pottery was spot dated from both sites and this comprised a total of 415 sherds (7173g) from 49 contexts. These contexts contain almost entirely small sized groups (less than 30 sherds).The exceptions are XRZ10 [26] and XSP10 [118] which both contain medium sized groups (30–99 sherds). Large groups (100+ sherds) and very large groups (3

boxes or more) are entirely absent from both sites. The condition of the pottery from both sites is very variable across the assemblage with some sherds having noticeable signs of abrasion (and hence probably trampled and/or re-deposited material) while other select contexts show good preservation (large sections of vessels present). Signs of burning are consistent with domestic use and heavy burning is only present on a few sherds; there is also a lack of vessels such as crucibles associated with industrial activity.

Phasing of the archaeological features into their respective dated periods was complete at the time of assessment. Despite the fact a relatively large number of contexts from the post-Roman marsh formation (Period 3 onwards) contain residual Roman pottery this material only represents a small percentage of the total assemblage (around 15% of both sherd count and weight). Therefore, the majority of the Roman pottery assemblage is contained within original contemporary Roman features.

Early Roman (1st century AD)

Distinct early Roman types were noticeably sparse during the spot dating (particularly for a City assemblage) with specific indicators limited to single sherds of Highgate Wood ware B (HWB) and an unsourced shell-tempered ware bead-rimmed jar with simple thickened rim (SHEL 2A1-4). La Graufesenque samian (SAMLG), imported predominantly between AD 50–100, is also present from six sherds (six ENV). However, samian ware often has a long life in comparison with other fabrics and is thought to have sometimes been used as an ‘heirloom’ item passed between generations.

2nd century AD

The profile of the assemblage from both sites has a strong dominance of material from the 2nd century AD. A peak of material of Hadrianic and early Antonine date (AD 120–140 and AD 140–160) is particularly clear with 12 contexts falling within this bracket and is evidently linked with an influx of activity on the site. The proportions of sherds from black-burnished ware (17.6% of total sherd count) and central Gaulish samian (13.7% of total sherd count) vessels across both Roman and post-Roman phased features are key reflections of this dating. The concentration of sherds from black-burnished ware vessels is also interesting given the site location; which is within the known western extent of the northern Roman cemetery (Hall 1996). Jars and bowls in black burnished ware fabrics are a common choice for both cremation and accessory vessels. However, the condition of the pottery from XSP10 and XRZ10 means that a link with disturbed burial vessels is tentative. The best preserved example is a fragmented section (11 sherds) of a black-burnished-style ware black-burnished type everted-rimmed jar with acute lattice (BBS 2F AL) with full profile of the vessel (around a third of the jar survives) from a ditch fill, XSP10 [150], within structure 5, period 2 phase 1. A further fill from this ditch, XSP10 [156], also contains a fragmented section (a third to half of the vessel) of a Verulamium region coarse white-slipped ware ring-necked flagon with cupped mouth (1B7–9) indicating this material is better preserved than on other areas of the site. It is recommended therefore that the two assemblages from structure 5 are re-examined for vessels for a group drawing and/or photography at analysis.

The dating of the groups present across Period 2 is extremely consistent to the above pattern. The split into phases 1, 2 and 3 is based on interpretation of the stratigraphic sequence rather than a defined progression in the pottery types recorded. There are a few indications of later 2nd-century AD assemblages present (i.e. with dates such as AD 140–200 and AD 150–200) but these are not restricted to phase 3 (the majority in fact occur within phase 1 features). Given this distribution it is highly probable that these groups represent further early Antonine material; with a lack of specific types to enable refinement of end dates to AD 160/170. This emphasis is confirmed by further residual Hadrainic and early Antonine material occurring residually in Period 3 features. An early marsh deposit, XRZ10 [35] (Period 3), contains a stamped central Gaulish samian Dragendorff form 33 cup

(SAMCG 6DR33 <10>) of the potter Paterclinus which dates to AD 155–180, this is the latest 2nd-century AD vessel present.

Period 2, phase (2) produced the most pottery with the pit and ditch fills of Open Area 3 containing a total of 167 sherds (around 40% of the total assemblage). The material within the fill of a quarry pit (XRZ10 [26]) is of particular interest as this is the only medium-sized assemblage from a Roman feature (the other medium sized group is residual in Period 3). The group contains a total of 68 sherds dating AD 120–160; a large fragmented section of an unsourced oxidised ware shallow simple dish (OXID 5J) represents most of this assemblage at 20 sherds. The fabric of this dish is unusual with abundant white clay pellets and may warrant further examination at analysis (and possible illustration/photography).

Late Roman (AD 180/200–400)

The evidence for late Roman pottery as with earlier material is very sparse even within residual material present in Period 3 groups. Two sherds of Nene valley colour-coated ware (NVCC) are the only evidence of probable late Roman material; the fabric is dated between AD 150 and 400 but is found in larger quantities among 3rd-century AD groups.

5.5 Post-Roman Pottery

By Nigel Jeffries

Introduction

This text characterises the medieval and later pottery from the various interventions on these two central Crossrail sites with this material described under their respective sitecodes. XSP10 yielded the largest volume of pottery (122 sherds), recovered from three of the five phases of archaeological work on this site with the material from the fifth and last phase considered in this report. Each phase required separate short notes on the pottery which were integrated into various reports (Pearce in MOL 2011a; Pearce in MOLA 2012) and one of the purposes of this text is therefore to consider the medieval and later pottery from XSP10 together for the first time. Conversely the same dated pottery from XRZ10 is considered by one note (Jeffries in MOL 2011b).

All medieval and later pottery was recorded using standard codes for fabric, form and decoration, with quantification by sherd count (SC), estimated number of vessels (ENV) and weight in grams. The data were entered onto the MOLA Oracle database.

Moorgate (XSP10)

The recorded land use on this site yielded both medieval and post-medieval pottery from up to 15 contexts, with an assemblage of 112 sherds from 61 vessels recovered in these deposits: one medium-sized group (a context containing between 31 and 99 pottery sherds) was recovered from [103] (54 sherds). Medieval pottery is the more frequent of the two with post-medieval pottery restricted almost exclusively to contexts up to [26] in the sequence.

<u>The medieval pottery</u>

Reflecting the various phases of archaeological work on the site, the medieval pottery is found clustered in contexts [35], [41] and [42] and then in sequences between [103] and [139]. A total of 91 sherds from a minimum of 39 vessels (2124 g) were spot-dated from 11 small contexts (neither with more than 11 sherds) with the 54 sherds from 13 vessels in [103] representing the one medium-sized group recovered.

The pottery in contexts [35], [41] and [42] was from nine vessels (10 sherds), with a total weight of 439g. Eight are the products of the Surrey whiteware industry and most common are coarse border wares (CBW) in a range of large rounded or bunghole jugs that can be

broadly dated to *c* 1350–1500. Two further CBW vessels is the base and lower profile of a lobed cup and the other comes from the base of a large bowl or dish. CBW was one of the main pottery fabrics in use in late medieval London, dominating the capital's ceramic supply from the mid-14th century onwards, although it is first found in contexts dated to the end of the 13th century.

Also of a distinct 13th to 15th–century character, the majority of the medieval pottery in second cluster of contexts (between [103] and [139]) was in [103] (54 of the 82 sherds retrieved) and some of the sherds collected are quite large. Like the medieval pottery in [35], [41] and [42], best represented are the later products of the Surrey whiteware industry (Pearce and Vince 1988: fabric codes CBW and CHEA). Coarse border wares (CBW) in [103] comprise two large rounded or bunghole jugs in this deposit with further CBW vessels include the fragments of a conical jug, two money boxes and various more fragmented jars and bowls and dishes. The pottery from the remaining several contexts is similarly composed, comprising a third product of the Surrey whiteware industry, Kingston-type ware (KING) found alongside variously London-type ware (LOND) jugs decorated in a range of applied 13th to 14th–century styles. The forms represented are amongst the most common types of everyday household wares in use during this period.

This otherwise unremarkable medieval pottery assemblage did however include (in [42) the top part of a Spanish lusterware maiolica made either in Valencia or close by at Paterna. This is an example of a mid to late 15th–century 'basil-pot' reported on by Anthony Ray in the Burlington Magazine (2000, 142, 371–5), and has survived as two ring-galleries and finials. Of the photographed vessels in Ray's article, the XSP10 'basil-pot' with its blue-line painted banded decoration forming part of the vessel seems most closely paralleled to those in figs. 46–7 (ibid, 374). Although the lustre decoration once applied has largely faded, this vessel adds to one of only a handful of known basil-pots from archaeological deposits in Europe (in Spain or Italy) with others having survived whole in private collections. The importance of this find in an archaeological context in London cannot be overstated.

The post-medieval pottery

Reported upon by Jacqui Pearce (MOL 2011a), all post-medieval pottery recorded dates to the late 16th and 17th centuries, with fabrics and forms typical of those in widespread use across the London area. Context [25] is broadly dated to *c* 1550–1700 on the basis of base sherds from two Bartmann jugs in Frechen stoneware (FREC), one of the main imported wares from the Continent during this period. A near-complete Bartmann jug, embellished with bearded face mask and the arms of the city of Amsterdam was found in context [26], lacking only its neck and handle. There are also sherds from two more Bartmänner in the same context. London-area redwares (PMR) are represented by sherds from the base of a jar or jug and the handle of a tripod pipkin, and part of a handled bowl is made in Essex-type fine redware (PMFR), from the Harlow, which was current in London *c* 1580–1700, providing a TPQ for the context. The remaining pottery comes from the Surrey-Hampshire borders and includes sherds from two flanged dishes in whiteware with yellow (clear) glaze (BORDY), one with green glaze (BORDG) and one in redware (RBOR). Part of a FREC Bartmann and a chamber pot in BORDY were also unstratified and date to the same period.

Finsbury Circus (XRZ10)

On this site the post-medieval pottery was recovered in 10 contexts ([1], [3], [4], [5], [6], [9], [11], [13], [14], and [16]) and comprised 50 sherds from 39 vessels (weighing 2134 grammes). With an average weight of 38.9 grammes per sherd, this material was recovered in a varied condition with some vessels survived as small-sized fragments with others better preserved (for example, pottery in [4] and [14]). In difference to XSP10, this material is almost entirely post-medieval dated.

The earliest post-medieval sequence is identified by the ceramics in contexts [13] and [14], which yielded mid-16th century pottery and included the three sherds of medieval pottery from this site, which at present are presumed residual. The remaining post-medieval pottery is located in a land use sequence represented by contexts [4], [5], [6], [9], [11] and [16] and is dated to the 17th century, with a range of fabrics and sources of supply common to this period found in these deposits, notably Surrey-Hampshire border whitewares, imported Rhenish stoneware and London made redwares in utilitarian forms (largely dishes and bowls). Similarly sourced tin-glazed wares supplied a range of table and apothecary wares with the presence of the variously decorated and defined products of London's delft industry supplying the main dating evidence to the recorded land use.

The most unusual and idiosyncratic pot from the site is a goblet or vase in context [1] which appears to be of a provincial Chinese source (possibly Sung) with a deliberately applied crackle glaze; this appears distinctive from Celadon ware which also has a similar glaze style.

5.6 The accessioned finds and leather assessment

By Beth Richardson

Material	Roman	Medieval	Post-med	Not known	Total
Glass	1				1
Iron		2	3		5
Copper alloy	1	2			3
Lead				1	1
Bone	3				3
Leather			1		1
Total	**5**	**4**	**4**	**1**	**14**

Table 6 Summary of accessioned finds (not coins) by material and period

Introduction/methodology

The finds have been accessioned in accordance with MOLA procedures and the digitised records are held on the Oracle database. All objects were examined individually, with the aid of x-rays where appropriate and archive catalogue entries have been entered on to the database. The finds from two adjacent sites (XRZ10 and XSP10) are phased and discussed together.

Roman

The majority of the few Roman accessioned finds, bone hairpins, a double-eyed bone needle and a nail-cleaner, would probably have been owned and used by women. These are all common archaeological finds, but it is interesting that they were found outside the Roman city walls in a possibly rural context.

Glass

There is one glass item, a fragment from the base of a blue glass bottle Isings form 50 dated *c* AD 50–200 (XSP10 <9>) from a heavily truncated possible Roman quarry pit (Period 2, phase 2, OA3, Group 14, subgroup 15, context [49]).

Copper alloy

A nail-cleaner from a manicure or cosmetic set, made from a strip of copper-alloy with a forked (bifid) end and broken attachment ring, (XSP10 <3>) was found in a potentially naturally formed water deposit dated *c* AD 140–60 (Period 2, Phase 1, OA3, Group 11,

subgroup 35, context [125]). The decorative circular swelling below the attachment ring is unusual. Components from these sets (nail-cleaners, tweezers, and ear-scoops) are reasonably common Roman finds.

Bone

There are three bone items. The upper part of a bone needle with a double ('figure of eight') eye (XSP10 <14>) was found in a ditch-fill closely dated to *c* AD 140–60 (Period 2, Phase 2, Group 17, subgroup 57, context [48]). Two women's hairpins, both with plain pointed heads (Crummy Type A,1), (XSP10 <10>, <11>) were found in the uppermost fill of a ditch with pottery dated *c* AD 50–300 (Period 2, Phase 2, Group 19, subgroup 41, both context [109]) .

Leather

A sole with a lasting margin for a rand from XSP10 [118] (Period 2, OA2, Group 11, subgroup 35) is late medieval and intrusive.

Medieval

Only two items, a curved corroded piece of iron and a short length of wire, were found in a secure medieval context. A lace-chape from Roman/medieval Period 3 is also medieval.

Iron

A fairly large curved fragment of iron (XSP10 <6>) has two straight edges joining at a rounded corner. It may be part of an agricultural tool, such as a spade-iron. It was found in a rubbish pit with finds dated *c* 1350–1500 (Period 4.1, Group 28, subgroup 47, [103]).

Copper-alloy

A short length of fine wire (XSP10 <4>) with one sharply pointed end may be a pin-shank from a long pin. Like iron object <6> it was found in a rubbish pit with finds dated *c* 1350–1500 (Period 4,1, Group 28, subgroup 47, [103]).

A lace-chape (XSP10 <5>) from a Roman/medieval marsh deposit (period 3, OA5, Group 18, subgroup 27, [135]) is from a shoe-lace or clothing and medieval or early post-medieval.

Bulk leather

A small quantity of medieval pointed one- and two-part shoe soles (probably 14th-century) were retrieved from the Roman/medieval marsh deposits (XSP10 Period 3, OA5, Group 18, subgroup 27, contexts [104], [129]).

A small group of late 14th-century shoe parts and waste was also retrieved from a rubbish pit dated *c* 1350–1500 (XSP10 Period 4.1, Group 28, subgroup 47, [103]). It includes pointed soles and a vamp from a late 14th-century pointed latchet-fastening shoe.

Post-medieval

Iron

A fragment from a wide horseshoe (XRZ10 <2>) has two rectangular nail-holes and a folded terminal (calkin). It was found in marshy peaty deposits containing pottery and leather footwear dated *c* 1480–1550 (Period 3, OA6, Group 7, subgroup 9, context [14]).

Lead

A piece of flattened lead with wood impressions on the back (<3>) is probably structural, from a building. Like the horseshoe it was found in marshy peaty deposits containing pottery and leather footwear dated *c* 1480–1550 (Period 3, OA6, Group 7, subgroup 9, context [14]).

Bulk and accessioned leather

There are about 40 fragments of footwear (soles, rands, vamp fragments) and a small quantity of leather waste from upper marsh deposits [14] (XRZ10 Period 3, OA6, Group 7, subgroup 9) and [38] (XRZ10 Period 3, OA5, Group 6, subgroup 10). The front section of a wide 'cow-mouth' Tudor sole ([38] <9>) dates the context to *c* 1500–1530/40. Part of a round-toed vamp with a central slit and a patten (overshoe) sole are also early to mid-16th century. The marshes outside the city wall were used for rubbish dumping in the early post-medieval period with leather surviving particularly well in the waterlogged soil.

5.7 Geoarchaeological assessment

Introduction and methodology

Several visits were made by a MOLA geoarchaeologist to examine record and sample the natural sequences / archaeological features exposed during the evaluation work. Sequences of monolith tins were taken from sections exposed in the trenches and a series of bulk samples was also taken adjacent to the monolith tins to provide sediment for off-site examination.

Finsbury Circus (XRZ10)

Two monolith tin sequences ({1} from Trench 1 and {10} from the Access Shaft) were taken during the two phases of the excavation. The monolith sequence {1} from Trench 1 was taken from a north facing section (see Fig 8) in the evaluation trench in 2010 and sampled contexts [13],[14] [15] and [16]. The monolith sequence {10} was taken from an east facing section from a geoarchaeological sondage, and sampled contexts [29], [30],[31],[32] and [33] (see Fig 3, and Fig 5 for location). A series of bulk samples was also taken adjacent to the monolith tins to provide sediment for off-site examination of deposit characteristics macrofossils, microfossils and radiocarbon dating, as described below. Each monolith tin was plotted on the section drawing and related to Ordnance Datum (OD) by the supervising archaeologist. The monolith tins were then sealed and together with the bulk samples were transported to the MOLA Environmental laboratories. For the purposes of the current report insect and mollusc assessments were undertaken on key deposits. Furthermore, two radiocarbon dates were obtained to put the samples into a chrono-stratigraphic context.

Moorgate (XSP10)

Palaeo-environmental assessment was undertaken on monoliths {7} from Trench 4 & {8} from Trench 5 (see Fig 4 for location both sampled during the 2010 excavation) and monoliths {15} & {16} (see Fig 8) sampled during the 2013 excavation. As above, a series of bulk samples was taken adjacent to the monolith tins to provide sediment of off-site examination of deposit characteristics macrofossils, microfossils and radiocarbon dating. Each monolith tin was plotted on the section drawing and related to Ordnance Datum (OD) by the supervising archaeologist. The monolith tins were then sealed and together with the bulk samples were transported to the MoLAS Environmental laboratories.

One pollen and one diatom subsample was examined from each context from the {15} & {16} sequence and invertebrate assemblages looked from {7} and {8}. Furthermore, two radiocarbon dates from the highest and lowest organic material sampled {8} were undertaken.

Geoarchaeological laboratory work and deposit assessment

The following procedures were carried out on each monolith sample as appropriate. The reports relevant to each site will be presented below with a synthesis of the data for both sites at the end.

Sediments

All the monolith samples were cleaned and described, using standard sedimentary criteria, as outlined in Jones et al (1999). This attempts to characterise the visible properties of each deposit, in particular relating to its colour, compaction, texture, structure, bedding, inclusions, clast-size and dip. For each profile the depth and nature of the contacts between adjacent distinct units was noted.

Ecological Remains

Natural deposits surviving within the monoliths were sub-sampled for microfossil remains (including pollen, diatoms, molluscs and insects) which were submitted to internal and external specialists for assessment, in order to identify the preservation quality, range and abundance of environmental remains and their potential for past environment reconstruction. The remaining organic material was processed for plant macrofossil assessment at MOLA.

Dating

Sub-samples of organic material were taken from the relevant organic contexts (outlined below) for Accelerated Mass Spectometry (AMS) dating, which was carried out by Beta Analytic, Florida.

Synthesis of Results

The results of the different types of assessment outlined above for each site (where appropriate) have been drawn together in this geoarchaeological assessment report. This has produced an outline of the development of the sites and an assessment of their potential for further archaeological and palaeo-environmental investigation as a whole.

Pollen

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

Pollen analysis has been carried out on samples taken from Section 4 (see Fig 6), overlapping monolith profiles {15} and {16} from XSP10. Four samples (Table 7) were examined. Standard techniques for extraction and concentration of the sub-fossil pollen and spores were used on sub-samples of 2ml. volume (Moore and Webb 1978; Moore *et al.* 1992). Micromesh sieving (10 micron) was also used to assist removal of fine silica in these predominantly minerogenic samples. Counts of 200 total pollen were made for each sample.

Taxonomy in general follows that of Moore and Webb (1978) modified according to Bennett *et al.* (1994) for pollen types and Stace (1991) for plant descriptions. These procedures were carried out in the Palaeoecology Laboratory of the School of Geography, University of Southampton.

Site Code	Height (mOD)	Height (m ATD)	Sample Code	Context	Monolith/Bulk Sample number
XSP10	8.77	108.77	P1	43	15
XSP10	8.60	108.6	P2	45	15
XSP10	8.31	108.31	P3	48	16
XSP10	8.14	108.14	P4	53	16

Table 7 Subsamples submitted for pollen assessment

Diatoms

By Nigel Cameron, Environmental Change Research Centre, Dept. of Geography, University College London

Subsamples for diatom assessment were submitted (Section 4 Fig 6) overlapping monolith profiles {15} and {16} from XSP10 (Moorgate; Table 8). 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 x200 x400 and x1000 under phase contrast illumination.

Site Code	Height (mOD)	Height (m ATD)	Sample Code	Context	Monolith/Bulk Sample number
XSP10	8.77	108.77	D1	43	15
XSP10	8.60	108.6	D2	45	15
XSP10	8.31	108.31	D3	48	16
XSP10	8.14	108.14	D4	53	16

Table 8 Subsamples submitted for diatom assessment

Molluscs

By Alan Pipe

For each sample from XSP10 ([9] {5} and [13] {6}) and from XRZ10 ([14] {7} and [15] {6}), preliminary identifications were made in an attempt to establish the faunal composition of each sample and to determine the potential of each sample to provide useful ecological information after identification to species level. Identification to species or genus level was only done when the remains were particularly distinctive.

This report indicates the general composition of the invertebrate faunal groups in terms of the identifiable species present, and discusses their ecological implications for interpretation of local habitats and conditions. It incorporates and replaces all earlier reports (Pipe 2011a and b). Identification followed Cameron & Redfern 1976; Henderson 1990; and Macan 1977. Preliminary interpretation followed Davies 2008; Henderson 1990; and Kerney 1999.

Insects

By Enid Allison, Canterbury Archaeological Trust

Five sub-samples washed to 0.25mm were submitted for assessment from XRZ10 (Table 9). The sub-samples were processed by paraffin flotation to extract insect remains following the methods described by Kenward *et al* (1986) and Kenward (1997) with flots recovered on 0.3mm mesh. The flots were scanned for the presence of insects and other invertebrates using a low-power microscope (x10 – x50). Abundances of various groups were estimated, and the state of preservation assessed. Nomenclature for Coleoptera follows Duff (2012).

Site Code	Trench Number	Height (mOD)	Height (mATD)	Context	Sample number
XRZ10	Eval Tr. 1	9.95	109.95	14	7
XRZ10	Eval Tr. 1	9.34	109.34	15	6
XRZ10	Shaft	8.55	108.55	29	15
XRZ10	Shaft	8.42	108.42	30	13
XRZ10	Shaft	8.35	108.35	32	11

Table 9 Insect samples from XRZ10

Radiocarbon dating

By Beta Analytic Inc.

After death, living organisms cease carbon exchange with the biosphere and the naturally occurring radioactive isotope of carbon in the organism (^{14}C) begins to decay to form the stable element ^{14}N. Measuring of the ratio of the amount of ^{12}C to the ^{14}C in a sample enables the amount of radioactive decay to be quantified and the age of the death of the organism to be determined.

The radiocarbon determination or conventional radiocarbon age, quoted with a plus or minus error, reflects the number of radiocarbon years before 1950 ('the present' [BP]) based on an assumed constant level of ^{14}C in the atmosphere. The radiocarbon determination is sometimes called the raw radiocarbon age to avoid confusion with a true calendar date.

Subsamples from contexts [29],[15] and [14] from XRZ10 and contexts [9] and [10] from XSP10 were sent to Beta Analytic, Florida for Accelerator Mass Spectrometry (AMS) dating (Table 10). The AMS technique separates the particles within the sample by charge so that the number of atoms of the carbon isotopes can be counted. This increases the method's sensitivity and enables small samples to be analysed. The error (e.g. ± 40) represents the statistical uncertainty or 'precision' of the method (a range of 2 relative standard deviations from the mean [2σ]).

Site Code	Sample Code	Context	Monolith/Bulk Sample number
XRZ10	XRZ10-c14s07	14	7
XRZ10	XRZ10-c15s06	15	6
XRZ10	XRZ10-c29s14	29	14
XSP10	XSP10-c10s10	10	10
XSP10	XSP10-c09s05	9	5

Table 10 Subsamples submitted for radiocarbon dating

Results (Finsbury Circus, XRZ10)

Assessed Logs

Sediments sampled in the monolith tins from XRZ10 were recorded in the laboratory and subsamples were taken for further analysis. All the monolith tin samples were described using standard sedimentary criteria (relating to colour, compaction, texture, structure, bedding, inclusions, and clast-size). The descriptions of the monolith tin samples are tabulated as follows:

XRZ10_{1} see Fig 8								
Monolith top	10.340							

(mOD):								
Context	**from (m BGL)**	**to (m BGL)**	**from (m ATD)**	**to (m ATD)**	**from (mOD)**	**to (mOD)**	**Description**	**Interpretation**
13	0.00	0.14	110.34	110.20	**10.34**	**10.20**	Firm mid to dark greenish blue grey mottled brown sandy silt with moderate charcoal fragments, coarse CBM fragments, rare shell fragments and occasional flint gravels	Made ground, medieval to post medieval dumping
14	0.14	0.22	110.20	110.12	**10.20**	**10.12**	Dark reddish brown peat, with compressed, horizontally bedded plant and hair fibre	Stable sweepings
	0.22	0.53	110.12	109.81	**10.12**	**9.81**	Firm dark brown slightly clayey silt with occasional CBM, leather, animal bone, shell.	Alluvial / marsh deposit and dumped material
	0.53	0.8	109.81	109.54	**9.81**	**9.54**	Firm mid greyish brown organic clay silt with abraded mollusc fragments	Alluvial / marsh deposit
15	0.80	1.27	109.54	109.07	**9.54**	**9.07**	Soft mid to dark reddish grey brown humic silt, heavy rooting, some plant fibres.	Marsh deposit
	1.27	1.40	109.07	108.94	**9.07**	**8.94**	Firm dark brownish grey humic clayey silt with rare degraded plant fragments	Marsh deposit
16	1.40	1.62	108.94	108.72	**8.94**	**8.72**	Compact mid brown grey fine clayey sand with fine to coarse flint, heavily iron stained	Pit fill or dumped deposit
	1.62	1.68	108.72	108.66	**8.72**	**8.66**	Bone	Cattle bone
	1.68	1.78	108.66	108.56	**8.66**	**8.56**	Firm light brownish grey fine slightly sandy silt with rare granular gravel and rare abraded mollusc fragments	Primary fill of pit
natural	1.78	1.90	108.56	108.44	**8.56**	**8.44**	Mid yellow grey fine sandy clay gravels	Terrace deposit

XRZ10_{10} Access Shaft (see Fig 3)								
Monolith top (mOD):	8.650							
Context	**from (m BGL)**	**to (m BGL)**	**from (m ATD)**	**to (m ATD)**	**from (mOD)**	**to (mOD)**	**Description**	**Interpretation**
29	0.00	0.20	108.65	108.45	**8.65**	**8.45**	Soft light brownish grey clay silt , iron stained with root channels and occasional fine flint pebbles	Semi- terrestrial partly vegetated alluvial deposit subject to occasional erosion
30	0.20	0.25	108.45	108.40	**8.45**	**8.40**	Soft mid whitish grey silt with iron staining and root channels	Alluvial deposit
31	0.25	0.27	108.40	108.38	**8.40**	**8.38**	Soft dark brown fine sandy silt	Alluvial deposit
32	0.27	0.42	108.38	108.23	**8.38**	**8.23**	Loose coarse light yellowish grey sandy gravels	Eroded early Holocene channel deposits
33	0.42	0.50	108.23	108.15	**8.23**	**8.15**	Compact light greyish yellow medium sand with rare fine flint pebbles	Terrace deposit

Table 11 Sedimentary description of Monolith samples from XRZ10

The monolith sequences {10} & {1} from XRZ10, although from two separate evaluations, can be taken as one sequence as they relate well in terms of height and nature of deposits. To this end, the deposits recorded in {10} indicate shallow stream deposits initially with anthropogenic activity locally which, overtime and up profile (merging into and including monolith sequence {1}), becomes a more vegetated, semi-terrestrial, marsh environment which has been subject to anthropogenic disturbance/input probably in terms of waste (dumping) particularly toward the top of the profile.

Insects

A list of all insect and invertebrate taxa recorded during scanning is shown in the table below.

Context/ Sample	**Paraffin flot volume (ml)**	**Estimated MNI beetles and bugs**	**State of preservation of insect remains**	**Invertebrates noted during scanning**
14/7	10	20	Mostly well-preserved. Fragmentation moderate, significant erosion noted on a few sclerites	Earthworm egg capsules +, ostracods +, Auchenorhyncha sp. [oa-p], fly +, fly puparia (several species) ++, *Cercyon analis* [rt-sf], *Cercyon* (decomposer sp.) [rt], *Megasternum*[rt], *Anotylus rugosus* [rt], *Oxytelus sculptus* [rt-st], *Carpelimus* [u], *Gyrohypnus fracticornis* [rt-st], *Xantholinus linearis* group [rt-sf], Staphylininae [u], *Aphodius* [ob-rf], *Anobium punctatum* [l-sf], *Chaetocnema concinna* or *picipes* [oa-p], *Sitophilus granarius* [g-ss], *Sitona* sp. [oa-p], Coleoptera spp., insect spp. larval fragments +
15/6	15	25	Most of material is fragmented, but erosion low	*Daphnia* ephippia ++, ostracods +, Corixidae [oa-w], parasitic wasp +, *Colymbetes fuscus* [oa-w], Hydroporinae sp(p). [oa-w], Dytiscidae sp. indet. [oa-w], Carabidae [ob], Hydrophilinae [oa-w], *Coelostoma orbiculare* [oa-w], *Cercyon haemorrhoidalis* [rf-sf], *Cercyon* sp. [rt], *Megasternum concinnum* [rt], *Ochthebius minimus* [oa-w], Aleocharinae [u], *Stenus* spp. [u], Staphylininae [u], *Atomaria*sp. [rd], *Donacia* [oa-p-d], *Donacia* or *Plateumaris* sp. [oa-p-d], *Tanysphyrus lemnae* [oa-p-w], Curculionidae, Coleoptera sp., insect spp. larval fragments +, mites ++, freshwater gastropod snails +

29/15	{5	9	Good to moderate. A few complete sclerites. Sclerites of large taxa broken into small fragments	Diptera spp. puparia fragments +, *Amara* or *Harpalus* sp. [oa], *Megasternum concinnum* [rt], *Tachyporus* [u], Aleocharinae [u], *Gyrohypnus* [rt-st], *Aphodius* [ob-rf], Elateridae [ob], Curculionidae [oa-p], indeterminate beetle fragments
30/13	{5	6	Sclerites of large taxa highly fragmented. No signs of significant erosion	Fly puparia fragments +, parasitic wasp +, Carabidae spp. [ob], Apionidae [oa-p], *Sitophilus granarius* [g-ss], Erirhinidae/Curculionidae [oa-p], indeterminate beetle fragments
32/11	{5	2	Slight erosion present	Curculionidae [oa-p] (underside fragment), indeterminate beetle sclerite

(*Key: d – damp ground and water side taxa, g – grain pests, l – wood-associated taxa, oa – outdoor taxa, ob – probable outdoor taxa, p – strongly plant-associated taxa, rf – foul decomposers, rt – generalized decomposers, sf – facultative synanthropes, ss – strong synanthropes, st – typical synanthropes, u – uncoded taxa, w – aquatic taxa; + present,++ common and +++ abundant*)

Table 12 Wet-sieved insect remains from XRZ10

The lowermost sample came from sands and gravels towards the base of the sequence ([32], {11}). A very small paraffin flot was recovered reflecting the low organic content of the deposit. An underside of a weevil abdomen and an undiagnostic beetle sclerite were recovered but shed no light on environmental conditions associated with the formation of the deposit.

{13} came from a gleyed waterlain deposit [30] that had formed in slowly flowing or pooling water at the base of the channel. The paraffin flot obtained was again very small, but it did contain a few identifiable beetle sclerites, the most noteworthy being a distinctive head of a grain weevil (*Sitophilus granarius*). This species has never been recorded from deposits pre-dating the arrival of the Romans in Britain. A single grape (*Vitis vinifera*) pip was present among plant remains from the underlying deposit [31] also suggesting either a later date for the channel fill or the presence of intrusive material.

Sample {15} from context [29] represented silting of the palaeochannel, with later stabilisation and vegetation growth. A small insect assemblage (single individuals of nine taxa) hinted at the presence of open ground, perhaps including grassland used as grazing land, and also possibly human activity. Examination of a larger assemblage would be desirable to provide firmer conclusions.

The two upper samples from marsh deposits contained larger numbers of identifiable insect remains (20–25 beetle and bugs). Aquatic beetles and a water boatman (Corixidae) accounted for about half of the assemblage in {6}, [15]. Water flea ephippia (*Daphnia*: resting eggs), ostracods and freshwater molluscs were also present, and these all indicate aquatic deposition. *Ochthebius minimus* is generally found in mud within and beside still waters, while *Coelostoma orbiculare* is typical of moss in floating rafts of vegetation or at the edges of water bodies (Forster *et al*. 2014, 72). *Donacia* species are associated with aquatic and emergent vegetation, and *Tanysphyrus lemnae* with duckweed (*Lemna*). The dominance of these taxa suggests that conditions were very wet. Identifiable terrestrial beetles were mainly decomposers, perhaps hinting at a small element of man-made waste. These included *Megasternum* which exploits a wide variety of decaying matter including moist waterside litter, *Cercyon haemorhoidalis* found in foul organic material including dung, and *Atomaria* which is characteristic of drier organic material.

In contrast the beetle assemblage from sample {7} (context [14]) was dominated by decomposers. Many were synanthropes associated with man-made accumulations of organic material, indicating the dumping of occupation waste onto the marsh. Grain weevils

were also present raising the possibility that some of the waste may have come from stables. Horses and perhaps other domestic animals are likely to have been fed infested grain rather than it being allowed to enter the human food chain. Infested grain often seems to have been disposed of in water-filled features, but a greater concentration of grain weevils and other insect pests would be expected if this were the case here (Smith and Kenward 2012). Woodworm beetle (*Anobium punctatum*) which is most commonly associated with structural timber was also recorded. *Chaetocnema concinna*/*picipes* was suggestive of disturbed ground since both species are usually associated with knotweeds (*Polygonum*). A larger insect sample combined with data from plant macrofossils might well shed more light on the origin of the organic waste.

The lowest deposits associated with the palaeochannel contained few insect remains. The sample from context [30] produced a record of grain weevil, a species that is not known in Britain before the Roman period. This may suggest that the deposit is later than originally thought, or that material has been introduced from later deposits by bioturbation. A small number of beetle remains in a later fill of the channel provided a few hints of local environmental conditions but examination of a larger assemblage would be desirable to provide firmer conclusions. Moderately-sized assemblages from two samples from marsh deposits overlying the palaeochannel produced more ecological information. The lower of the two samples clearly indicated aquatic well-vegetated conditions, and in the uppermost there was good evidence for the dumping of occupation waste onto the marsh. Again however, detailed interpretation was limited by the sizes of the assemblages.

As they stand, the insect assemblages obtained from the samples do not warrant further work. Since insect remains are present in fairly low concentrations (estimated 1 – 12 individuals per litre of sediment based on these results) it would be necessary to process larger amounts of sediment to provide larger assemblages for detailed analysis. If no raw sediment is available, it would probably be worthwhile to carry out paraffin flotation on the bulk sample flots produced for archaeobotanical analysis from 18 litre samples, concentrating on samples from context [31] upwards in the sequence (five samples). The archaeobotany report states that insect remains were 'quite abundant' in sample {12} from context [31], but a separate sub-sample from this was not submitted for insect assessment.

Molluscs

Wet-sieving and flotation of bulk samples from XRZ10 showed diverse invertebrate faunas from two of them; [14] {7} and [15] {6}. Microscopic inspection indicated that both samples included well-preserved, identifiable terrestrial and freshwater mollusc shells and freshwater ostracod valves. The results of the mollusc assessment from XRZ10 are listed below.

CONTEXT	SAMPLE	FEATURE	MOLLUSCS (terrestrial)	MOLLUSCS (freshwater)	OSTRACODS (freshwater)	HABITAT
15	6	NM		Planorbidae species 1		still or slow-flowing
15	6	NM		Planorbidae species 2		still or slow-flowing
15	6	NM		Planorbidae species 3		still or slow-flowing
15	6	NM		Planorbidae species 4		still or slow-flowing
15	6	NM		Planorbidae species 5		still or slow-flowing
15	6	NM		Planorbidae species 6		still or slow-flowing
15	6	NM		Planorbidae species 7		still or slow-flowing
15	6	NM		Planorbidae species 8		still or slow-flowing
15	6	NM		*Lymnaea palustris*		still or slow-flowing; liable to drying
15	6	NM		Lymnaeidae species 1		still or slow-flowing
15	6	NM		Lymnaeidae species 2		still or slow-flowing
15	6	NM			Candonidae	widespread
14	7	NM	*Discus rotundatus*			moist, sheltered
14	7	NM	*Oxychilus sp*			moist, sheltered
14	7	NM	Succineidae			damp, sheltered; liable to

						flooding
14	7	NM		Planorbidae species 1		still or slow-flowing
14	7	NM		Planorbidae species 2		still or slow-flowing
14	7	NM		Planorbidae species 3		still or slow-flowing
14	7	NM		Planorbidae species 4		still or slow-flowing
14	7	NM		Lymnaea palustris		still or slow-flowing; liable to drying
14	7	NM		Lymnaeidae species 1		still or slow-flowing
14	7	NM		Lymnaeidae species 2		still or slow-flowing
14	7	NM		Lymnaeidae species 3		still or slow-flowing
14	7	NM		*Aplexa hypnorum*		still or slow-flowing; liable to drying
14	7	NM			*Cyclocypris sp*	mainly small, still waters

Table 13 Wet-sieved invertebrates from XRZ10

Period 300 Open Area 6 Group 7 XRZ10 marsh deposit [14] {7} produced a diverse invertebrate fauna including terrestrial and freshwater molluscs and at least one species of freshwater ostracod.

Rounded/radiated snail *Discus rotundatus* and glass snail *Oxychilus sp* are both terrestrial molluscs abundant and widespread in moist, sheltered habitats throughout southern Britain. Amber snails in the family Succineidae are wetland species widespread throughout lowland Britain; they are virtually amphibious, found in damp, sheltered conditions, and able to tolerate long periods of submersion (Kerney 1990, 75–9).

Freshwater species provided the bulk of the invertebrate fauna. They derived mainly from the ram's-horn snails Planorbidae and pond snails Lymnaeidae which respectively produced four and three identifiable species. Both these families show considerable *inter*-specific differences in terms of their ecological requirements. One pond snail species, marsh pond snail *Lymnaea palustris* was identified; this is a mainly lowland species living in stagnant or slowly moving water including those liable to summer drying (Kerney 1990, 53). Moss bladder snail *Aplexa hypnorum* was also identified; this is a small species typical of swampy pools and ditches and able to survive periodic desiccation (Kerney 1999, 48).

Finally, valves of a freshwater ostracod *Cyclocypris sp* were also recovered. This genus is widely distributed throughout the northern hemisphere, particularly in small still, rather than flowing, waters.

Period 300 Open Area 5 Group 6 XRZ10 marsh deposit [15] {6} produced a freshwater invertebrate fauna with no terrestrial or 'amphibious' components. The molluscs included ram's-horn snails Planorbidae with at least eight identifiable species; and the pond snails Lymnaeidae with three identifiable species, including marsh pond snail *Lymnaea palustris* and two other identifiable species as also shown in sample [14] {7}.

Valves of freshwater ostracods from at least one species of Candonidae were also recovered. This is a large, diverse family, widely-distributed in British freshwaters.

Radiocarbon dating

The results of the radiocarbon dating for both sites are presented in the table below.

CONTEXT /SAMPLE	BETA No.	MATERIAL PRE-TREATMENT	13C/12C	CONVENTIONAL AGE	2 SIGMA CALIBRATION	% MODERN CARBON (pMC)	FRACTION MODERN	D14C
[29] / {14}	BETA 396257	(seeds): acid/alkali/acid	-24.0 %	1940 +/- 30 BP	Cal AD 5 to 125 (Cal BP 1945 to 1825)	78.5 +/- 0.3 pMC	0.7854 +/- 0.0029	-214.6 +/- 2.9 %
[15] / {6}	BETA 396256	(seeds): acid/alkali/acid	-23.9 %	960 +/- 30 BP	Cal AD 1020 to 1155 (Cal BP 930 to 795)	88.7 +/- 0.3 pMC	0.8874 +/- 0.0033	-112.6 +/- 3.3 %
[14] / {7}	BETA 396255	(seeds): acid/alkali/acid	-24.8 %	400 +/- 30 BP	Cal AD 1440 to 1520 (Cal BP 510	95.1 +/- 0.4 pMC	0.9514 +/- 0.0036	-48.6 +/- 3.6 %

					to 430) and Cal AD 1595 to 1620 (Cal BP 355 to 330)			

Table 14 Radiocarbon dating results XRZ10

The date range from the XRZ10 samples indicates the context [29] accumulated between the late Iron Age and early second century Roman period (BETA 396257), context [15] in the late Saxon / early Norman period (BETA 396256) and context [14] in the late Medieval/ early post-medieval period (BETA 396255).

Results (Moorgate, XSP10)

Assessed Logs

Sediments sampled in the monolith tins from XSP10 were recorded in the laboratory and subsamples were taken for further analysis. All the monolith tin samples were described using standard sedimentary criteria (relating to colour, compaction, texture, structure, bedding, inclusions, and clast-size). The descriptions of the monolith tin samples are tabulated as follows:

XSP10_{7} Trench 4 (see Fig 4)								
Monolith top (mOD):	9.300							
Context	**from (m BGL)**	**to (m BGL)**	**from (m ATD)**	**to (m ATD)**	**from (mOD)**	**to (mOD)**	**Description**	**Interpretation**
13	0.00	0.20	109.30	109.10	**9.30**	**9.10**	Soft mid brownish grey organic clay silt with fine gravels and rare molluscs	Formation of Moorfields Marsh in the late Roman or medieval periods.
14	0.20	0.27	109.10	109.03	**9.10**	**9.03**	Firm dark grey brown highly organic silty clay	Roman dumping layers or a Roman period soil horizon / proto marsh
15	0.27	0.50	109.03	108.80	**9.03**	**8.80**	Firm mid greyish orange fine to medium gravelly silt with rare iron staining	Brickearth

XSP10_{8} Trench 5 (see Fig 4)								
Monolith top (mOD):	9.200							
Context	**from (m BGL)**	**to (m BGL)**	**from (m ATD)**	**to (m ATD)**	**from (mOD)**	**to (mOD)**	**Description**	**Interpretation**
9	0.00	0.20	109.20	109.10	**9.20**	**9.10**	Firm greyish brown highly organic silty clay with moderate mollusc fragments	Formation of Moorfields Marsh in the late Roman or medieval periods.
10	0.20	0.38	109.00	108.92	**9.00**	**8.92**	Firm black / very dark brown highly organic silts with abundant mollusc fragments	Roman dumping layers or a Roman period soil horizon / proto marsh

11	0.38	0.50	108.82	108.80	**8.82**	**8.80**	Firm mid greyish orange fine to coarse gravelly silt with iron staining along root channels	Brickearth

XSP10_{15} & {16} Section 4 (see Fig 6)								
Monolith top (mOD):	9.050							
Context	**from (m BGL)**	**to (m BGL)**	**from (m ATD)**	**to (m ATD)**	**from (mOD)**	**to (mOD)**	**Description**	**Interpretation**
43	0.00	0.16	109.05	108.89	**9.05**	**8.89**	Firm mid grey brown highly organic silty clay with rare mollusc fragments throughout	Roman and/or medieval marsh
43	0.16	0.38	108.89	108.67	**8.89**	**8.67**	Firm very silty clay humified peat with rare plant fragment	
45	0.38	0.59	108.67	108.46	**8.67**	**8.46**	Firm dark grey brown highly organic silty clay with small pockets of golden sand and granular gravels and rare charcoal flecks	Roman dumping layers or a Roman period soil horizon / proto marsh
48	0.59	1.02	108.46	108.03	**8.46**	**8.03**	Firm mid brownish grey increasingly fine sandy organic silty clay with moderate oyster shell and gravels	Secondary fill of cut feature
53	1.02	1.09	108.03	107.96	**8.03**	**7.96**	Light orangey brown fine sandy silt with moderate fine gravels	Primary fill of cut feature

Table 15 Sedimentary description of Monolith samples from XSP10

Pollen

Pollen analysis has been carried out on samples taken from the ditch fills in Area C, Section 6, overlapping monolith profiles {15} and {16}. As with other assessments carried out for the Crossrail project, the principal aims of this analysis were to establish whether sub-fossil pollen and spores are present and if so to provide some preliminary data on the past vegetation and environment of the site concomitant with the deposition of the sediment. The study proved successful and the results of this preliminary investigation are given here.

The pollen data is given in table form below. Data for the latter are calculated as a percentage of dry-land pollen (the sum) and for marsh (% Sum + Marsh) and ferns (% Sum + Fern spores). Numbers of reworked geological (pre-Quaternary) palynomorphs were also present and are given as a percentage of the sum + miscellaneous palynomorphs.

SAMPLE/CONTEXT	***P1/ [43]***	***P2/ [45]***	***P3/ [48]***	***P4/[53]***
TREES & SHRUBS				
BETULA	1	1	0	0
PINUS	0	1	1	0
ULMUS	1	0	0	0
QUERCUS	33	0	7	0
ALNUS GLUTINOSA	4	0	0	0
PRUNUS/MALUS TYPE	1	0	0	0
CORYLUS AVELLANA TYPE	3	3	0	1
ERICA	0	0	0	0
HERBS				
RANUNCULACEAE UNDIFF.	0	0	1	1
RANUNCULUS TYPE	7	1	0	1
BRASSICACEAE UNDIFF.	0	0	1	3
SINAPIS TYPE	0	0	0	0
HORNUNGIA TYPE	1	0	1	0
DIANTHUS TYPE	1	0	1	1
STELLARIA TYPE	0	1	0	0
CHENOPODIACEAE	1	10	5	5
MALVACEAE	0	0	0	0
TRIFOLIUM TYPE	1	0	1	0
FILIPENDULA	0	0	1	0
SANGUISORBA OFFICINALIS	0	0	1	0
APIACEAE	1	0	0	0
POLYGONUM AVICULARE TYPE	0	0	1	0
PERSICARIA MACULOSA TYPE	0	1	0	3
FALLOPIA CONVOLVULUS	0	0	1	0
RUMEX	1	1	1	1
RUMEX CONGLOMERATUS TYPE	0	5	3	1
SCROPHULARIACEAE UNDIFF.	0	0	1	1
PLANTAGO MAJOR TYPE	4	1	1	0

PLANTAGO LANCEOLATA	7	5	5	4
RUBIACEAE	1	0	0	0
SUCCISA TYPE	0	0	0	1
BIDENS TYPE	5	0	0	0
ANTHEMIS TYPE	1	0	3	4
CIRSIUM TYPE	0	0	0	0
CENTAUREA NIGRA TYPE	0	2	0	1
LACTUCOIDEAE	5	15	29	9
POACEAE	75	134	99	152
CEREAL TYPE	4	10	0	6
LARGE POACEAE	4	0	0	3
UNIDENTIFIED/DEGRADED	0	1	0	0
MARSH				
CALTHA TYPE	1	0	0	0
ALISMA TYPE	5	0	5	0
TYPHA ANGUSTIFOLIA TYPE	11	0	13	0
CYPERACEAE	25	5	17	5
FERNS				
EQUISETUM	47	0	0	0
PTERIDIUM AQUILINUM	19	1	1	1
DRYOPTERIS TYPE	0	0	0	1
POLYPODIUM	0	0	0	3
MISCELLANEOUS				
SPHAGNUM	0	0	0	0
LIVERWORTS	0	0	0	1
PRE-QUATERNARY	0	1	1	0

Table 16 Pollen results XSP10

Pollen preservation is moderate to poor and absolute numbers are small. However, sufficient numbers for this preliminary assessment were obtained. Overall, herb pollen is dominant with few trees and shrubs. The pollen is largely homogenous throughout the depth encompassed by the two monolith profiles. The palynological characteristics of the profile are as follows.

Trees and shrubs: Numbers of arboreal pollen are extremely small with the exception of greater numbers of *Quercus* in the upper most sample (P1[43]: 20%). Other trees include very small numbers of *Betula, Pinus, Ulmus, Alnus Prunus* type and *Corylus avellana* type. These occur largely in the upper monolith profile {15}.

Herbs: Poaceae are dominant in all samples with highest values towards the base and declining upward (77% to *c* 40%). Cereal type (to 6%) is more important in upper monolith {15} (P1[43] and P2[45]) along with a greater diversity of herbs in these levels. Other herb taxa with more continuous occurrence include Chenopodiaceae (to 5%) in [45], *Rumex* (2%), *Plantago lanceolata* (to 5%) and Asteraceae types (especially Lactucoideae).

Marsh / fen taxa: There is a consistent occurrence of fen taxa of which Cyperaceae are most important to *c* 9%). Other consistent taxa include *Alisma* type and *Typha angustifolia* type. Damp ground herbs also include *Caltha* type and *Sanguisorba officinalis*. It is probable that a substantial proportion of the Poaceae noted above derive from the on-site vegetation community.

Ferns Equisetum: (20% sum + Ferns) is important in the uppermost sample (P1[43]). There are also slightly greater numbers of *Pteridium aquilinum* in the top sample. Other than these, there are only small numbers of *Dryopteris* type and *Polypodium vulgare*.

The vegetation and environment.

The pollen data can be viewed in terms of the pollen derived from the on-site and off-site vegetation at the time of sediment deposition and taking into account the possibility of reworked material.

The on-site depositional habitat was one of open grass-sedge fen with no evidence of any floodplain, carr woodland. Apart from grasses (Poaceae) and sedges (Cyperaceae) which are present throughout, other typical fen taxa included water plantain (*Alisma plantago-aquatica*), bulrush and/or reed mace (*Typha angustifolia* type). On the fringes or slightly drier zones, marsh marigold (*Caltha* palustris), meadowsweet (*Filipendula ulmaria*) and Greater burnet, devil's-bit scabious (*Succisa pratensis*), (*Sanguisorba officinalis*) were present. It is possible that other less well defined pollen taxa may also be referred to this fringing wet, possibly rough pasture.

With the exception of sample (P1) [43], a marsh deposit overlying ditch (gp012) (108.77mATD), there is no evidence for any local tree or shrub growth amongst the off-site vegetation. The values from this upper sample may indicate occasional local growth of oak (*Quercus*). However, oak and hazel is ubiquitous in the pollen record of the historical period and represents regional remaining and probably managed woodland. The records of all other trees are not regarded as of any significance as these are all anemophilous taxa which produce substantial numbers of pollen with capability of long distance dispersion.

The herb pollen flora is relatively diverse showing that the local environment was largely grassland, which may have been pasture. Apart from grass pollen, other typical taxa include ribwort plantain (*Plantago lanceolata*) and possibly docks (*Rumex* spp.), buttercups (*Ranunculus* spp), vetches/medicks (*Trifolium*/*Medicago*) and daisy/dandelion family/knapweeds (Lactucoideae, *Centaurea* sp. *Bellis*). These latter taxa are not palynologically differentiable to a lower taxonomic level and thus more definable habitat.

Cereal pollen and weeds of arable and disturbed ground also attest to cultivation. These are more abundant in the upper monolith/upper ditch profile. Associated weed taxa may include charlocks (*Sinapis* type), Chenopodiaceae (goosefoot and oraches), persicaria (*Persicaria maculosa* type) and greater plantain (*Plantago major*). Similarly, some other, less differentiable pollen taxa may be referable to arable habitats.

Conclusions

Pollen was extracted and identified from all of the (4) samples. Preservation is rather poor but with enough pollen to enable evaluation counts to be made. The data obtained show clearly that the environment of sediment deposition was a wet, open grass-sedge fen surrounded by damper ground, possibly wet pasture. The surrounding terrestrial zone was treeless, open agricultural ground, which was largely pastoral grassland. There is, however, evidence for use of cereals. This may have been cultivation in the vicinity of the site/ditch or the cereal pollen may have been derived from secondary sources such as domestic waste, ordure or from crop processing debris. Macro-fossil analysis may be able to differentiate this.

Diatoms

Poorly preserved diatoms are present in the top two samples from XSP10 (D1 hand D2), however, with the exception of a possible rim fragment from an indeterminate centric species found in D3, diatoms are absent from the bottom two samples (D3 and D4).

Sample / Context	Height (m ATD)	Diatoms	No. of Diatoms	Quality of preservation	Diversity	Assemblage type	Potential for % count

D1/[43]	108.77	present	v low	v poor	low	fw aero hpl est?	none
D2/[45]	108.6	present	v low	v poor	one sp.	fw aero	none
D3/[48]	108.31	absent	-	-	-	-	none
D4/[53]	108.14	absent	-	-	-	-	none

(fw – freshwater, bk – brackish, mar – marine, halophil – halophilous, aero – aerophilous)

Table 17: Diatom results from XSP10

The diatom assemblage in sample D1[43] is very poorly preserved with very low numbers of diatoms and low species diversity. The diatom valves present are dissolved and fragmented. Fragments of large *Pinnularia* sp. and *Pinnularia* cf. *major* are present. These are freshwater and aerophilous taxa. Dissolved central area fragments of the halophilous species *Anomoeoneis sphaerophora* are present. A dissolved valve of *Cyclotella* cf *striata*, an estuarine planktonic species was recorded, however the species identity was uncertain because of the very poor quality of preservation and it is possible that the valve is from the halophilous diatom *Cyclotella meneghiniana*. A possible valve of a halophilous species *Navicula* cf. *pusilla* was recorded. Other diatom fragments recorded in sample D1[43] are *Gomphonema* sp., *Navicula* sp., cf, *Nitzschia* sp., unknown Naviculaceae, and indeterminate pennate diatom fragments. The poor taxonomic resolution here reflects the poor quality of diatom preservation. A relatively high number of chrysophyte stomatocysts were also recorded in sample D1 [43]. These cysts are heavily silicified and can therefore be preferentially preserved. The chrysophytes may be derived from both fresh and brackish water.

Diatom preservation in sample D2 [45]is of even poorer quality than that of sample D1[43]. Again there are relatively high numbers of chrysophyte stomatocysts. The freshwater/aerophious species *Pinnularia* cf. *major* was identified along with an indeterminate pennate diatom fragment.

The absence or poor preservation of diatoms in the sediments from XSP10 reflects unfavourable conditions for diatom silica preservation and can be attributed to taphonomic processes (Flower 1993, Ryves *et al.* 2001). 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.

It is not therefore possible to comment further on the water quality or other aspects of the aquatic environment based on the diatom remains in XSP10. There is no further potential for diatom analysis of these samples.

Conclusions

- Poorly preserved diatoms are present in samples D1[43] and D2 [45]. Diatom assemblages are absent from samples D3 [48]and D4 [53].
- The halophilous diatoms present in D1[43] may reflect increased salinity levels and there is an input of terrestrial, aerophilous diatoms. However, because of the poor quality of preservation, the diatom evidence for direct contact with tidal water is weak.
- The absence or poor preservation of diatoms in the sediments is attributed to taphonomic processes.
- There is no further potential for diatom analysis of these samples.

<u>Molluscs</u>

Wet-sieving and flotation of bulk samples [9] {5} and [13] {6} from XSP10 produced assemblages of well-preserved mollusc shell, although here microscopic inspection indicated that all derived from freshwater species with no terrestrial molluscs or freshwater ostracods. The results of the mollusc assessment from XSP10 are listed below.

CONTEXT	SAMPLE	FEATURE	MOLLUSCS (terrestrial)	MOLLUSCS (freshwater)	OSTRACODS (freshwater)	HABITAT
9	5	NM		*Bithynia tentaculata*		still or slow-flowing
9	5	NM		*Bathyomphalos contortus*		still or slow-flowing
9	5	NM		*Planorbis planorbis*		still or slow-flowing; liable to drying
9	5	NM		*Gyraulus crista*		still or slow-flowing
9	5	NM		*Segmentina nitidus*		still or slow-flowing
9	5	NM		*Lymnaea palustris*		still or slow-flowing; liable to drying
9	5	NM		*Lymnaea peregra*		still or slow-flowing; ubiquitous
13	6	NM		*Bithynia tentaculata*		still or slow-flowing
13	6	NM		*Bathyomphalos contortus*		still or slow-flowing
13	6	NM		*Planorbis planorbis*		still or slow-flowing; liable to drying
13	6	NM		*Lymnaea palustris*		still or slow-flowing; liable to drying
13	6	NM		*Lymnaea peregra*		still or slow-flowing
13	6	NM		*Anisus leucostoma*		still or slow-flowing; liable to drying

Table 18: Wet-sieved invertebrates from XSP10

The faunal groups

For both samples from XSP10, the mollusc fauna derived entirely from pond snails Lymnaeidae and ram's-horn snails Planorbidae; both families show considerable *inter*-specific differences in terms of ecological requirements and, therefore, habitat implications; they are generally common and widespread in suitable habitats throughout lowland SE England.

Period 300 Open Area 5 Group 18 XSP10 marsh deposit [9] {5} produced a mollusc fauna derived from seven snail species; mainly common bithynia *Bithynia tentaculata*, common or wandering pond snail *Lymnaea peregra*, twisted ram's-horn *Bathyomphalos contortus* and margined ram's-horn *Planorbis planorbis* with single examples of marsh pond snail *Lymnaea palustris*, nautilus ram's-horn *Gyraulus crista* and shiny ram's-horn *Segmentina nitida*.

Period 300 Open Area 5 Group 18 XSP10 marsh deposit [13] {6} produced a mollusc fauna derived from six snail species; mainly common bithynia *Bithynia tentaculata*, common or wandering pond snail *Lymnaea peregra*, twisted ram's-horn and margined ram's-horn *Planorbis planorbis* with a single shell of marsh pond snail *Lymnaea palustris* and a few shells of button or white-lipped ram's-horn *Anisus leucostoma*.

Common bithynia *Bithynia tentaculata* occurs in slow-moving, well-oxygenated hard water, particularly in muddy-bottomed situations with dense growths of aquatic plants (Kerney 1999, 39).

Common/wandering pond snail *Lymnaea peregra* is a ubiquitous species in all kinds of hard and soft waters. It is a rapid colonist of new, man-made habitats and is tolerant of brackish water and mild pollution (Kerney 1999, 56).

Marsh pond snail *Lymnaea palustris* is a mainly lowland species living in stagnant or slowly moving water including those liable to summer drying (Kerney 1990, 53).

Twisted ram's-horn *Bathyomphalos contortus* occurs in hard and soft water in a wide variety of aquatic habitats ranging from stagnant drains to well-vegetated clean running water. It avoids situations liable to seasonal drying (Kerney 1999, 63).

Margined ram's-horn *Planorbis planorbis* is found in all kinds of well-vegetated aquatic habitats of lowland type but is especially characteristic of hard-water shallow pools and swampy ditches liable to dry up in summer; it is often associated with marsh pond snail *Lymnaea palustris* and button/white-lipped ram's-horn *Anisus leucostoma* (Kerney 1999, 58).

Nautilus ram's-horn *Gyraulus crista* is a minute species found in hard and soft water in a range of situations ranging from slow-flowing rivers to weedy ditches except for those liable to dry up (Kerney 1999, 67).

Button or white-lipped ram's-horn *Anisus leucostoma* is a lowland species with some preference for hard water. It is found in a wide variety of aquatic habitats but is most typical of swampy pools and ditches especially those liable to summer drying (Kerney 1999, 60).

Shiny ram's-horn *Segmentina nitida* occurs today mainly in drainage ditches in marsh levels, usually in clean, hard, well-vegetated waters with a rich associated fauna. Now effectively extinct over most of England except for East Anglia, Kent and Sussex, it was common around London until the 19th century. Reasons for the decline may include pollution and reduction in water level; surviving populations prefer uncleared ditches (Davies 2008, 22) in areas of traditional grazing with low phosphate and nitrate enrichment (Kerney 1999, 69).

Although eight species of freshwater snail were recovered from samples [9] {5} and [13] {6}, four species; common bithynia, common/wandering pond snail, twisted ram's-horn and margined ram's-horn, provided virtually all of the shell count. Common/wandering pond snail is a ubiquitous, ecologically catholic species tolerant of hard and soft water and of some degree of pollution, the other species are predominantly hard-water snails with a preference for well-oxygenated and vegetated situations. Margined ram's-horn, unlike the other three species, prefers situations liable to summer drying. The less commonly recovered species are also divided between those able to tolerate seasonal drying (marsh pond snail, button/white-lipped ram's-horn) and those tending to avoid it (nautilus ram's-horn, shiny ram's-horn). Overall, the mollusc assemblage suggests a well-vegetated still or slow-flowing, well vegetated water body with permanent areas predominant over others more susceptible to seasonal drying. Although common/wandering pond snail is a major component of the fauna, the ecological requirements of the species-diversity of the bulk of the assemblage suggest that there was no gross pollution.

The predominant species-composition of each sample; common bithynia, common/wandering pond snail, twisted ram's-horn and margined ram's-horn, suggest an early (primary) stage in the development of reed swamp but with some less abundant species; marsh pond snail and button/white-lipped ram's-horn, also indicative of a later stage of successional development into *Glyceria* (sweet grass) reed swamp (Davies 2008, 27).

Radiocarbon dating

The results of the radiocarbon dating for XSP10 are presented in the table below. Dates are then set against a calibration curve to calibrate the radiocarbon timescale against a chronology of calendar years. This may produce multiple dates within the two sigma range although the percentage probability distributions can narrow this date further.

CONTEXT /SAMPLE	BETA No.	MATERIAL PRE-TREATMENT	13C/12C	CONVENTIONAL AGE	2 SIGMA CALIBRATION	% MODERN CARBON (pMC)	FRACTION MODERN	D14C
[9] / {5}	BETA 396259	(seeds): acid/alkali/acid	-25.6 %	1940 +/- 30 BP	Cal AD 990 to 1045 (Cal BP 960 to 905) and Cal AD 1095 to 1120 (Cal BP 855 to 830) and Cal AD 1140 to 1145 (Cal BP 810 to 805)	88.3 +/- 0.3 pMC	0.8829 +/- 0.0033	-117.1 +/- 3.3 %

[10] / {10}	BETA 396258	(charred material): acid/alkali/acid	-21.5 %	960 +/- 30 BP	Cal AD 55 to 135 (Cal BP 1895 to 1815)	78.9 +/- 0.3 pMC	0.7894 +/- 0.0029	-210.6 +/- 2.9 %

Table 19 Radiocarbon dating results XSP10

The date range from the XSP10 samples indicates context [9] accumulated in the late Saxon / early Medieval period (BETA 396259) and context [10] accumulated in the mid first to early second century Roman period (BETA 396258).

Site sequence: interim statement on deposit sequence

The results of the different types of sedimentary, macrofossil, microfossil and radiocarbon analyses outlined above have been drawn together in this geoarchaeological summary with regards to Monolith sample sequences from both sites.

Finsbury Circus (XRZ10)

The monolith sequences {10} & {1} from XRZ10, although from two separate evaluations, can be taken as one sequence as they relate well in terms of height and nature of deposits.

The single monolith sample {10} and associated bulk samples, which sampled the sediments in the Access Shaft at the base of the whole sequence, sampled contexts [32], [31], [30] and [29] from 108.23m to 108.65m ATD. Lithologically, [30] and [31] were considered to represent stream channel silting up deposits overlying the river terrace deposits [32]. The channel probably forms part of the wider Walbrook floodplain seen in previous archaeological investigations in the vicinity (e.g. Harward 2004) where anastomosing channels seem to form under low fluvial energetic conditions. In a previous assessment, plant macrofossil remains in [32] indicated wetland environment along with disturbed ground flora indicating anthropogenic activity (MOLA 2011a) (insect remains were identified in this assessment but were too fragmented to provide any evidence). A single grape seed found in [31] indicated a Roman or post Roman date which concurs with the appearance of grain weevil in the insect assessment of [30], a species considered to be a Roman introduction. This relative dating (and the Early Roman Period 2.1 assignation) has been substantiated by the radiocarbon date for the top of [29] from {10} which produced a late Iron Age to early second century Roman period date (BETA 396257). Interestingly, the lithology and insect assessment also indicated a change in environment from a wetter, stream or channel environment toward a drier more semi-terrestrial, vegetated environment represented by [29]. This was again substantiated by the earlier plant macrofossil assessment for [29] when Alder, reeds and Spelt (an early cereal crop) indicated a more riparian environment, possibly cultivated. The sequence from {10} therefore is the first indicator of a wetland environment which, over time, dries out to some degree, a cycle that will repeat itself up profile in sample {1}.

Monolith sample {1} and associated bulk samples, which sampled the sediments in the Access Shaft overlying {10}, sampled contexts [16], [15], [14] and [13] from 108.44m to 110.34m ATD (see Fig 8). The lowest context sampled in this sequence, [16], was a mixed deposit with gravels (containing animal bone) overlying silts and was considered to be a pit fill or dumped deposit. In the previous assessment, plant macrofossil remains indicated a generally dry environment with Roman period indicators such as a Fig seed and charred grain as well as leather fragments which, again, correlates well with the current Late Roman Abandonment Period 2.2 allocation (MOLA 2011a).This was sealed by [15] which generally consisted of more organic silts with frequent plant fragments representing the Moorfield marsh (Post-Roman marsh development, Period 3). During this period, as the lithology suggests, the area once more became wet and marshy. Both the insect and mollusc assessment for this report also indicates sustained wet periods/ponding occurring which concurs with evidence of predominantly aquatic and wetland plants in the previous plant macrofossil assessment. Furthermore, the marsh does indeed develop in the Post Roman

period as the radiocarbon date places the accumulation of [15] to the late Saxon/ early Norman period (BETA 396256). In contrast, the overlying context [14] tends to indicate a return to drier conditions as the area became less of a marsh and more one subject to flooding with periodic dumping of waste material. Both the mollusc assessment and the previous plant macrofossil assessment indicate the site suffers periods of drying out becoming a semi-terrestrial, probably seasonally flooded environment. Molluscs from [14] indicate a diverse fauna reflecting both periods of drying and long periods of submersion which resonates well with the plant macrofossils data from which a picture of a mixed dry and wet environment emerges, possibly cultivated (presumably during the summer months) along with evidence of domestic waste dumping with Hemp, leather and marine molluscs fragments in the samples. Interestingly, at the top of [14] an organic deposit consisting of plant fibre and hair indicates the possible stabling of horses in the locality, which was substantiated in the insect assessment. The radiocarbon dating suggests [14] accumulated in the late Medieval / early post medieval period (BETA 396255) which ties in well with the archaeological evidence. Finally, [13], the uppermost of the contexts sampled was a mottled sandy silt with fragments of CBM, charcoal and shell. This context although not assessed is considered to represent largely made ground, post medieval deposits presumably to solidify and rise above a seasonally wet and marshy environment.

Overall the sequence of deposits sampled at XRZ10 for geoarchaeological assessment point toward a local environment that was essentially riparian, dominated by the presence of the Walbrook river system. The initial sediments sampled in {10} indicate a stream channel with evidence of early Roman activity and food waste which dries out (possibly through water management or perhaps natural through river migration) to become semi-terrestrial and locally cultivated. After Roman abandonment and toward the beginnings of the Norman period, the sediments from sample {1} show the site area becomes very wet again with substantial ponds forming across a marsh. This environment changes again becoming drier overall (although probably seasonally wet) during the late Medieval or early post Medieval period after which it becomes (as it had often been used in the past) an area for dumping waste until more substantial made ground deposits raise the ground and finally seal the fate of the marsh below during the later post Medieval period.

Moorgate (XSP10)

The monolith sequences {7} from Trench 4 and {8} from Trench 5 from the 2010 excavation and monolith sequences {15} & {16} from section 6 from the 2013 excavation at XSP10 all relate closely in terms of height and nature of deposits. To this end, certain profiles were examined in detail for microfossils, macrofossils and radiocarbon dating to elucidate the nature of the changing environment at XSP10 as a whole.

Monolith sequence {8} from Trench 5 sampled contexts [9], [10] and [11]. This monolith sample equates well altitudinally with those taken from the other trenches (from 109.2 to 108.82m ATD) and provided a chronological framework to add to the spot dating as both contexts [10] and overlying [9] were radiocarbon dated. The lower context [10] was a firm black or very dark brown highly organic silt. The silt tends to indicate a floodplain environment and as such is probably associated with the Walbrook. [10] equates well lithologically and altitudinally with the lower (early) marsh deposit [14] from Trench 4 and returned a late first to early second century Roman period date (BETA 396258) which concurs with the Roman pottery fragment spot dated to AD120 to 160 in [10]. Interestingly, [48] from sequence {15} & {16} from the later excavation ties in well to the chronology as the pottery from this context was more closely dated to the second century also (AD140–160). Pollen assessment indicates[48] (and by association [10] and [14]) represented a wet environment with local stands of oak and other deciduous species which, however, was preceded by a dryer environment in [53] where cereals were being grown or processed locally prior to the onset of the wetter conditions.

The uppermost context [9] from Trench 5, a firm greyish brown highly organic silty clay with moderate mollusc fragments equates it with [13] from {7} (Trench 4) and [43] from sequence {15} & {16} (section 6) thought to represent a post Roman marsh. Again, the silt component indicates the input of flood deposits (from the Walbrook) across the marsh periodically. In marked contrast to the date returned for [10] however, [9] returned a date relating to the late Saxon or early Medieval period (BETA 396259), some thousand years later. The mollusc assessment indicated [9] represented a well vegetated water body predominating with some polluted but relatively clean, hard (calcium rich) water which probably suffered periods of drying albeit peripherally. The differences in the dates between [10] and [9] probably mean either a certain amount of truncation or erosion has occurred between the two contexts as the longer sequence retrieved in Section 6 ({15} & {16}) reveals nuances between the wetter environment contexts [48] and [43], namely the intervening context [45]. Pollen and diatom data indicate that [45] was a period when little or no marsh existed during a time when cereal production peaked. This is considered to be a later Roman period deposit (as it post-dates the AD 140–160 pottery date from the underlying [48]), reflecting a dryer environment (possibly ephemeral), prior to when the marsh re-establishes itself probably as a result of lack of water management in [43].

In sum, the sampled sedimentary sequences sampled from XSP10 reflect an environment which was predominantly peripheral to a river and marshy with standing water at times interspersed by periods of relative dryness. The dry period initially appears to be early Roman extending into the early second century at which tome the area becomes wet before a period of dryness (when cereal production peaked and managed woodland developed) until the area flooded again probably after Roman abandonment with standing water bodies into the late Saxon or early Norman period.

Geoarchaeological summary

Both the sequences from Finsbury Circus (XRZ10) and Moorgate (XSP10) reflect a similar riparian environment which goes through cycles of being relatively dry or wet/marshy throughout the period of Roman occupation becoming a full marsh post Roman abandonment up into the Medieval period. It appears that initially during the early Roman period there was little to no marsh at XSP10 whereas it is a little wetter at XRZ10 in the vicinity of a stream channel, probably a small anastomosing channel part of a wider Walbrook system. As it drys out at XRZ10 it seems to become wetter at XSP10 in the mid second century although these variations could be due to very localised conditions. In any case, during the dry periods at both locations, which could be due to Roman attempts at water management or perhaps the natural migration of the river channel(s) away from the site, anthropogenic activity including cereal production and waste dumping occurred locally. After Roman abandonment the marsh develops substantially across both site areas however, with well vegetated pools of standing water developing. This exists up until at least the late Saxon / early Norman period as dated at XSP10 until, again, becoming drier overall during the late Medieval or early post Medieval period as dated in XRZ10.

5.8 The plant remains

By Anne Davis

Introduction/methodology

Twenty-three environmental samples, ranging from 10 to 40 litres in volume, were taken from excavations at XSP10 (Moorgate), and 11 from XRZ10 (Finsbury). The majority from XSP10 came from fills of Roman drainage ditches, and post-Roman marsh deposits thought to date to the medieval period. Most of the samples from XRZ10 were from early Roman alluvial deposits with three from the post-Roman marsh. The samples were processed by flotation, using meshes of 0.25mm and 1.00mm to catch the flot and residue respectively.

The residues from flotation were dried, and sorted by eye for any finds or environmental material, and the flots were stored in water. All flots were then scanned briefly, using a low-powered binocular microscope. Many of the flots were very large, so sub-samples of 50 to 100ml only were scanned. The abundance, diversity and general nature of plant macrofossils and faunal remains were recorded on the MoLAS Oracle database, and the botanical information is summarised in Table 1.

Charred remains

Occasional small fragments of wood charcoal were present in the majority of samples, but abundant only in three from period 2.2 (XRZ10 [26]{9}, XSP10[149]{32} and [160]{34}), all of which were from fills of pits or ditches. Each of these also contained charred cereal remains, with XSP10 {32} (from pit [153]) producing a large assemblage of cereal chaff and (mainly) oat (Avena sp.) grains. Very occasional cereal remains were seen in several other samples, usually in very poor condition.

Waterlogged and mineralised remains

Survival of organic remains was good in the majority of samples, with unidentified plant epidermal tissues, probably from stems or roots, present in many samples of all dates, and in some cases dominating the samples. Moss was common, though rather less so in the post-Roman samples, but wood fragments were relatively rare in all periods, presumably suggesting a relatively open environment. Two samples from one of the post-Roman marsh deposits (XRZ10[14]{7} and {8}) appeared to contain cereal straw.

Large assemblages of seeds were seen in the majority of samples, with those from disturbed-ground and indeterminate habitats, and aquatic/wetland environments generally dominating. Few indications of trees were seen, apart from the ubiquitous elder and brambles, and the environment seems to have been fairly open.

Chronological narrative

Period 1:

One sample, from a natural deposit XRZ10 [32]{11} (see Fig 3) was assessed from this period, and produced an extremely small and mixed plant assemblage.

Early Roman (Period 2.1):

Samples from this period came mostly from channel fills on the Finsbury site, XRZ10 (samples [31]{12}, [30]{13}, [29]{14} and {15}) (see Fig 3). All appeared to contain a higher incidence of seeds from dry-ground habitats than was seen in the single Moorgate sample from this period (XSP10 [96]{22}), or in the medieval samples from either site. Grassland plants, including taxa such as hawkbit (Leontodon sp.), self-heal (Prunella vulgaris), cat's ear (Hypochoeris sp.) and sheep's sorrel (Rumex acetosella agg) were particularly prominent in these four samples, and occasional seeds from weeds of cultivation were also noted.

Aquatic and waterside taxa formed a relatively small part of these Finsbury assemblages, although seeds of blinks (Montia fontana) were seen only in these four samples.

Later Roman (Period 2.2):

There was an imbalance between samples from the two parts of the site, with only one ([26]{9}) from a quarry pit fill on the eastern side (XRZ10) and six ([160]{34}, [113]{25}, [149]{32}, [155]{33}, [48]{13} and [110]{24}) from ditches and a pit on western XSP10.

A notable increase in the proportion of aquatic and wetland taxa was seen in the samples from both sites, with seeds of plants such as pond weed (Potamogeton sp.), watercress

(Rorippa nasturtium-aquatica), (Oenanthe sp.), crowfoots (Ranunculus subgen Batrachium) and sedges (Carex spp.) indicating standing or flowing water as well as marshy ground.

Dry ground plants from both sites in this period came mainly from disturbed-ground habitats, and included several which are characteristic of nitrogen-rich soils, such as hemlock (Conium maculatum), thistles (Carduus/Cirsium sp,), glaucous/red goosefoot (Chenopodium glaucum/rubrum), and stinging nettle (Urtica dioica). This may result from the dumping of organic refuse on waste ground outside the city walls, although as in the previous period, virtually no waterlogged plant food remains were seen. Three samples did however contain charred cereal remains (see above).

Late Roman abandonment (Period 2.3):

Only two of the assessed samples (XRZ10 [16]{5} and XSP10 [142]{31}) have been assigned to this period, and the same trends were seen in the XSP10 sample as were noted in Period 2.2, with abundant wetland and disturbed-ground plants. The sample from XRZ10, from an external dump, produced very few waterlogged remains although it did contain leather fragments and abundant charcoal.

Post-Roman marsh development (Period 3):

Three samples were assessed from the eastern part of the site. One of these, XRZ10 [15]{6} came from marsh deposits in Open Area 5, and is thought to be slightly earlier than the two others, XRZ10 [14]{7} and {8} from Open Area 6. Eight further samples were taken from the Moorgate site: XSP10 [139]{30}, [104]{23}, [45]{14}, [43]{11}, [44]{12}, [13]{6}, [10]{10} and [9]{5}. Wetland plants were prominent in most of these samples, particularly XRZ10 {6} and XSP10 {14}, {11}, {12}, {10}, {6}, {5}, with several aquatic taxa, such as soft hornwort (Ceratophyllum submersum), horned pondweed (Zannichellia palustris), duckweed (Lemna sp.) and stonewort (Chara sp.) spores seen only in samples from this phase, and indicating increasing wetness and areas of standing or flowing water. Two samples from this phase, XSP10 [139]{30} and [104]{23} were less typical, with fewer wetland plants and a higher proportion of waste/disturbed-ground taxa. Both included small fragments of leather and sample {30} also contained remains of several food plants, suggesting domestic waste disposal.

The two later samples from the Finsbury site, XRZ10 [14]{7} and {8} also contained fewer wetland indicators, with many disturbed/waste-ground plants in {7}, and {8}, more closely resembled those from XRZ10 phase 2.1 with several grassland taxa noted. This sample also contained a few seeds of alder (Alnus glutinosa), holly (Ilex aquifolium) and birch (Betula sp.) – the only remains of trees, other than a few wood fragments, found on the site. Both of these samples contained leather and animal hair, perhaps from tanning, and also plant stems including cereal straw.

Medieval drainage & pitting (Period 4):

One sample, from a fill XSP10 [103]{28} of pit [115], contained a very mixed seed assemblage with occasional plant food remains and seeds of wild plants from a variety of habitats.

Faunal remains

Insect remains were seen in the majority of samples, with occasional or moderate fragments of beetle (Coleoptera) exoskeleton recorded in most and fly puparia in approximately half. Fragments from the aquatic larval cases of caddis flies (Trichoptera) were seen in six samples, and remains of other freshwater invertebrates, namely water-flea eggs (Cladoceran ephippia), mollusc shells and ostracod valves were common. Most classes of invertebrate appeared to more abundant in samples from period 3 than in earlier phases, and this was seen most clearly in the case of the molluscs shells which were absent from the

early Roman (period 2.1), present in small numbers in later Roman (period 2.2) samples and abundant in many samples from period Ostracods were seen only in Period 3 samples.

Animal-based waste materials were represented by small quantities of animal bone (mostly mammal) and/or marine mollusc shells in a number of samples, and eggshell in two. These were virtually absent from period 2.1 samples from XRZ10.

Artefactual remains

Small fragments of leather were noted in samples from XRZ10 [16]{5} (period 2.3), [15]{6}, [14]{7} and {8} (period 3), and from XSP10 [139]{30}, [104]{23} (period 3) and [103]{28} (period 4). Other artefacts were quite rare in the samples, but occasional pottery was recorded from 11 sample residues, ceramic building material in 12 and nails in two. No artefactual remains were recovered from XRZ10 period 2.1 samples, and the leather remains came mostly from period 3 (both sites). Other artefacts were quite evenly distributed between the later Roman and medieval samples.

5.9 The human bone

By Don Walker and Natasha Powers

Ten elements of disarticulated human bone were recovered from 8 contexts of probable Roman date (Table 20). Contexts [30], [44], [45] were marsh deposits, [51] and [118] were natural alluvial deposits and [110], [144] and [155] were ditch fills. The dark colouration of the bone was consistent with it having been redeposited in Moorfields marsh. While the bone shafts were relatively well preserved, the majority of the diaphyses were absent due to post-mortem breakage. The assemblage contained adult remains only and represented a minimum number of two individuals.

Context	Body area	Elements present	Age	Sex	Pathology	MNI	Comments
30	U. limb	R.humerus	Adult	Undetermined		1	Robust muscle markings
Total MNI						**1**	
44	L. limb	R.femur	Adult	Undetermined		1	None
Total MNI						**1**	
45	U. limb	R.humerus	Adult	Undetermined		1	None
Total MNI						**1**	
51	L. limb	R.femur	Adult	Undetermined		1	None
51	L. limb	R.tibia	Adult	Undetermined		1	None
Total MNI						**1**	
110	U. limb	L.ulna	Adult	Undetermined		1	None
Total MNI						**1**	
118	U. limb	L.humerus	Adult	Undetermined		1	None
118	L. limb	L.tibia	Adult	Undetermined	Healed periostitis	1	None
Total MNI						**1**	
144	L. limb	R.femur	Adult	Undetermined		1	None
Total MNI						**1**	
155	Skull	Mandible	Adult	Undetermined	Enamel hypoplasia	1	None
Total MNI						**1**	
MNI						**2**	

Grand Total							

Table 20 XSP10 disarticulated human bone summary

Human remains have been found within the Roman fluvial and marsh deposits of the Moorgate, Finsbury Circus and Liverpool Street areas, both associated with the disturbance of burials from a cemetery at the head of the Walbrook (Harward et al forthcoming) and as isolated elements which have been individually redeposited.

No further work is required on the assemblage.

5.10 The animal bone

By Alan Pipe

	Weight (g)	Fragments	Boxes
Animal bone XRZ10 (hand-collected)	nil	nil	nil
Animal bone XRZ10 (wet-sieved)	230	39	1 partially-filled standard archive box
Animal bone XSP10 (hand-collected)	17271	395	11 standard archive boxes
Animal bone XSP10 (wet-sieved)	469	87	1 partially-filled standard archive box

Table 21 Contents of animal bone archive

Introduction/methodology

This report identifies, quantifies, interprets and assesses the animal bone from Finsbury Circus (XRZ10) and 8 Moorfields/87 Moorgate (XSP10). It incorporates and replaces all earlier work (Morris 2011; Pipe 2013a and 2013b) and includes all available animal bone from both sites.

Each context and sample group was recorded directly onto the MOLA Osteology Oracle animal bone assessment database in terms of weight (kg), estimated fragment count, faunal composition, carcase-part, preservation, modification, and the recovery of epiphyses, mandibular tooth rows, measurable bones, complete long bones, and very young sub-adult age groups. Individual fragments were not identified to skeletal element unless particularly visually distinctive. All identifications referred to the MOLA reference collection; Cannon 1987; Cohen & Serjeantson 1986; and Schmid 1972. Fragments not potentially identifiable to species or genus level were generally included in the fragment counts for the faunal summary categories; ‘fish’, ‘amphibian’, ‘bird’, ’very small mammal’, ‘small mammal’, ‘medium mammal’ and ‘large mammal’ as appropriate. Each context and sample assemblage was then grouped with available dating and feature description and tabulated in the Appendix (Table 27). XRZ10 data are shown in red; XSP10 data are shown in black. This table gives a summary of the hand-collected context groups and wet-sieved sample groups in terms of weight (kg), estimated fragment counts, preservation, faunal composition, modification and the recovery of evidence for ageing, stature and very young sub-adult animals.

Summary

This assemblage produced a total of 17.974 kg, estimated 521 fragments, of hand-collected and wet-sieved animal bone from XSP10 and XRZ10 distributed between Periods 200, 201, 202, 300, 400 and 500 (Table 2).

XRZ10 produced 0.230 kg, estimated 39 fragments, from wet-sieved samples {7} and {8} of marsh deposit [14]; and sample {5} of external dump [16].

XSP10 produced a much larger hand-collected and wet-sieved group, 17.744 kg, estimated 482 fragments, derived largely from marsh deposits and pit and ditch groups.

Preservation was generally good with a maximum hand-collected fragment size generally between 25 and at least 75 mm.

The bulk of the hand-collected bone derived from adult and juvenile cattle *Bos taurus* with smaller groups of sheep/goat *Ovis aries/Capra hircus*, pig *Sus scrofa* and horse *Equus caballus.* There was no definite recovery of goat *Capra hircus*. Recovery of poultry was comparatively sparse, from only four context and sample groups, but comprised domestic fowl (chicken) *Gallus gallus* and goose, probably domestic goose *Anser anser domesticus*; with no recovery of domestic duck *Anas platyrhynchos* or domestic pigeon *Columba livia*. Game species comprised only single recoveries of roe deer *Capreolus capreolus* from Period 300 Open Area 5 [104]; and rabbit *Oryctolagus cuniculus* from Period 400 Open Area 7 [103]; there was no recovery of game birds.

Non-consumed domesticates, particularly horse *Equus caballus* and dog *Canis lupus familiaris*, were moderately common throughout the assemblage, although cat *Felis catus* was identified only from a juvenile mandible from Period 300 Open Area 5 [104].

Wet-sieved samples from Period 300 Open Area 6 [14] {7} and Period 400 Open Area 7 [103] {28} produced a sparse assemblage of fish, estimated as only 25 fragments, derived from marine and migratory species with identified recovery of herring family Clupeidae, cod family Gadidae including cod *Gadus morhua*, mackerel *Scomber scombrus*, eel *Anguilla anguilla* and gurnard Triglidae. There was no recovery of very small mammals such as shrews, mice or rats; and only a single fragment of amphibian bone, from Period 300 Open Area 5 [104] {23}. No human bone was identified.

Very young animals were represented by only one example, a foetal or neonate calf skull fragment from Period 300 Open Area 5 [104].

Clear evidence of butchery was seen on cattle, sheep/goat and pig throughout the assemblage with Period 202 Open Area 4 dump [16] {5} (XRZ10 see Fig *8*) producing a small but distinctive group of highly fragmented cattle bone possibly derived from further bone processing, possibly for grease extraction after butchery. Tool marks associated with industrial activity were sparse with two fragments of worked bone from Period 300 Open Area 5 [44] and chopped horn cores from Period 300 Open Area 5 [104], [129] and [139]; and Period 400 Open Area 7 [130]. Evidence of other modification was sparse with only very occasional gnawing, burning or pathological change.

The group produced only moderate evidence for age at death of the major domesticates with estimated counts of 16 mandibular tooth rows and 135 epiphyses; metrical evidence was also substantial with an estimated count of 37 measurable bones including 21 complete long bones suitable for calculation of estimated stature.

5.11 Conservation

By Liz Goodman

	Material	No. registered	No. conserved	No. to be treated
Inorganics	Ceramic	10	0	0
	Glass	1	0	0
	Stone	1	0	0
Metals	Copper alloy	3 (0 coins)	0	1
	Iron	4	0	0
	Lead alloy	1	0	0

Organics	Bone	3	0	1
	Leather	1 + bulk	1 + bulk	0

Table 22 Summary of conservation work

Introduction

The following is an assessment of conservation needs for the registered and bulk finds from the Crossrail excavations at Moorgate and Finsbury Circus in accordance with currently accepted standards of best practice (as defined in MAP2, now incorporated within MoRPHE) for the transfer of the assemblage to the receiving organisation. It also incorporates conservation tasks needed to fulfil the requirements laid out in 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.

Methodology

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 preventive 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.

All leather was pre-treated with glycerol, freeze dried to stabilise it and then packaged for long term storage.

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.

Finds analysis/investigation

The registered finds were assessed by visual examination of both the objects and the X-radiographs, closer examination where necessary was carried out using a binocular microscope at high magnification. The registered and general finds were reviewed with reference to the finds assessments by Beth Richardson (registered finds, leather and glass), Ian Betts (CBM), Jacqui Pearce (CTP), Nigel Jeffries (Post Roman pot) and Amy Thorpe (Roman pot).

A Roman copper alloy nail cleaner and bone needle were identified as requiring conservation input to clarify detail.

5.12 Clay Tobacco Pipe

By Jacqui Pearce

Introduction/methodology

The clay tobacco pipes from XSP10 and XRZ10 were recorded in accordance with current MoLAS 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), prefixed by the letters AO. Quantification and recording follow guidelines set out by Higgins and Davey (1994; Davey 1997).

Quantification

A total of 11 clay pipe bowls were recorded in two contexts: context [5] at XRZ10 and context [25] at XSP10. Full details are given in (Table 23). No pipe stems were recorded, and no mouthpieces. There is no evidence for manufacture nor any pipes imported from outside the London area, and there are no marked or decorated pipes.

Total no. of fragments	11
No. of bowl fragments	11
No. of stem fragments	0
No. of mouthpieces	0
Accessioned pipes	0
Marked pipes	0
Decorated pipes	0
Imported pipes	0
Complete pipes	0
Wasters	0
Kiln material fragments	0
Boxes (bulk\accessioned)	2 bags bulk

Table 23 Quantification of the clay tobacco pipes

Character of the pipe assemblage

The clay pipe assemblage consists entirely of unmarked, undecorated bowls ranging in date from *c* 1640 to 1760. It is derived from two contexts only. The earlier of these (XSP10 [25]), which is dated to *c* 1660–80 includes common shapes of pipe bowl current at this date (types AO13 and 15). There are also slightly earlier types current *c* 1640–60 (one each of types AO9 and 10). They were most likely discarded in the early 1660s. Almost all the pipe bowls are fully milled although only one is burnished (of poor quality). All have been smoked and are typical of London manufacture.

The later context (XRZ10 [5]) yielded two pipe bowls only, and is dated to *c* 1730–60 by a single type OS11. The other pipe is a type AO22, current *c* 1680–1710. Both are unmarked and undecorated and have no milling (which was going out of favour at the end of the 17th century).

No further work is recommended on the assemblage.

5.13 Timber

By Damian Goodburn

Prehistoric	None clearly dated found
Roman	Two small stakes of Roman date were found in the lower fills of a ditch dated by associated finds to the Roman period
Medieval	The remains of the outer hoop elements of a reused cask were found in a truncated pit lining
Post-Medieval	Woodwork of this period included a softwood post and sawn softwood plank and a pile or stake tip

Table 24 Summary of timber by date

Material	**Length**	**Volume(approx)**	**Count**	**Count as % of total**
Timber	All under 1.5m long	c. 1 small wheelbarrow load	5 structural items	By number <40% but much more bulk than roundwood
Roundwood	c. 0.85m long	c. ½ bucket	Total 7 cask hoops	Approx 60 % by number but not bulk

Reused			All the cask hoops.	C. 60%

Table 25 Summary of woodwork

Introduction

This brief report sets out to summarise the woodworking details of the woodwork found such as, species range, methods of working, and possible function etc. For the lay out and stratigraphic position of the woodwork discussed here readers must consult the main site assessment report.

Methodology

The woodwork found was excavated by the MOLA field team in several different phases of work. After the usual plans at 1:20, basic context descriptions were made and photographs taken. This writer examined site records and several of the lifted items at MOLA facilities to complete the recording and sampling. Work was carried out in accordance with the Museum of London Archaeological Site Manual woodwork recording section and English Heritage Guidelines on Waterlogged Wood.

Roman woodwork

Early stakehole alignments associated with ditches and two surviving wooden stakes [50] and [101]

A group of stake holes without surviving woodwork was found along the south edge of east–west ditch [157] in Area A. It is likely that these are traces of fencing alongside a drainage ditch.

Surviving stakes [50] and [101] were found sealed in the lower fills of east–west ditch cut [49]. Stake [50] survived only as a tip under 0.1m long x 80 x 30mm and was trimmed from a half pole. Stake [101] survived 0.87m long by 40 mm dia., had been driven into compacted gravels. This stake was rather decayed.

Medieval woodwork

<u>Traces of the reuse of a barrel or tub (vessel hoops) to line a truncated pit or small well</u>

The woodwork here was initially interpreted as the remains of a ‘wattle lining’ to a small truncated pit [108] but further examination of the records made on site show that the ‘wattle work’ [107] was actually the remains of several barrel or tub hoops (See Fig 7, MOLA, 2014 C257 Archaeology Central. Interim Statement. Archaeological Excavation and Watching Brief Moorgate Shaft (XSP10) Document Number: C257-MLA-T1-RGN-CRG03-50010 v2.0 07.03.14XSP) The vast majority of larger, historic, stave built (or ‘coopered’) vessels were bound with multiple wooden hoops, often used in several close set zones, rather than the steel bands we see today. Stave built barrels, casks and sometimes tubs, have been found reused in many types of cut features in London and elsewhere. Most commonly they were reused as well linings but have also been found lining sumps, soak ways and tank-like features such as lime slaking pits. Quite often the valuable and re-useable staves were removed from the inside after the first reuse leaving fragile roundwood hoops stuck in the back-fill of the cut first made to contain the vessel. The very clean, sharp site photograph seems to clearly show that seven hoops survived from the lowest zone of hooping in the original cask. They were clearly split and shaved ½ rods of roundwood *c* 30mm across and retained the impressions of the staves which they had once held together. Only *c* 25–30% of the circumference of the vessel was indicated due to extensive truncation. They appear to be typical of medieval cask hoops and the feature is provisionally dated to the late medieval period from associated finds. This implies occupation of the site or close by at this period.

Post-medieval woodwork

A softwood beam [32] and sawn plank [31]

Timber [31] was a thick, sawn softwood plank found set on edge running north–south. It survived 1.5m long as recorded on-site by 230mm wide and 70mm thick. A possible tenon joint was noted on site but not seen off-site. The saw marks were clearly those of pit sawing by hand suggesting it was not late 19th century or later. The beam section timber was found set at *c* 90 degrees to the plank and ran east–west. It survived 1.5m long x 180 x 170mm, almost square. The preserved end of the timber was sawn to a slight angle rather than square for some reason. The surfaces of the timber were axe hewn, though weathered, again suggesting that it probably dated to before the end of the 19th century. It is difficult to discern what this truncated structure was perhaps part of a cellar or tank revetment originally? It was also noted on-site that the timber might have been a post originally and was possibly displaced? The beam timber was slice sampled but had barely 50 annual rings so was unsuitable for tree ring dating and a wood SP ID samples was taken. The same was the case for the plank element.

On grounds of the species used and methods of working a date range of late 16th–19th century is likely though a 17th century to *c* 1800 date range is perhaps most likely.

An isolated stake or pile tip [141]

This Timber [141] survived as the slightly decayed very tip of a pile or large stake. It had a length of only 0.2m and was *c* 80mm square and hewn from a whole log. Dating is uncertain but late medieval or post-medieval is likely.

6 Potential of the data

Realisation of the original research aims

The archaeological investigations have the potential to address the following original research themes:

- Artefacts of prehistoric date redeposited in later deposits.

  A single worked flint was redeposited within a Roman dump (sgp089), the abraded nature of the material suggests it was disturbed a potentially transported from its original place of deposition.

- Remains of Roman extra-mural activity, potentially including burials.

  Roman activity on site is typical of extra-mural activity in the area, limited to linear ditch cuts, quarrying and rubbish disposal. This activity appears to be concentrated around the middle of the 2nd century AD, prior to the construction of the city wall.

- Evidence of the defensive ditch associated with the Roman and medieval City Wall

  Deposits recorded in section on London Wall, in the eastern access shaft (see Fig *2,0 and* Photo *10) were potentially associated with the City Ditch, suggesting at date for backfilling between 1580 and 1700.*

- Waterlain deposits from the Roman to medieval Moorfields marsh, with the potential for organic preservation and palaeoenvironmental evidence.

  The Roman and/or medieval marsh extended across the sites, varying between 0.02 at Moorgate (XSP10) and up to 1m in depth at Finsbury Circus (XRZ10), dependant on truncation. These deposits have been bulk sampled and in monolith tins.

- Late medieval and post-medieval drainage ditches, rubbish dumps and remains associated with the reclamation of Moorfields marsh.

  Linear ditch cut (gp030) in Area A at Moorgate (see Fig *9) can be tentatively interpreted as a late medieval (13th–15th century) attempt at land drainage. This evidentially failed, as it was filled with marsh material. No evidence of reclamation was observed, although this is not surprising as post-medieval truncation would have removed these deposits.*

The archaeological investigations also have the potential to address the original fieldwork objectives (see 3) as follows:

1. What is the character and level of the **natural geology** across the site, and can the cause(s) of these variations be deduced (truncation or topography)?

   Natural geology consisted of consistent bands of terrace gravels capped by brickearth between 108.23 and 108.95m ATD.

2. What is the nature and date of any **Roman** extra-mural activity (eg quarrying, farming, burials, etc)?

   The most striking Roman activity took the form drainage ditches associated with water management and associated stake/post holes that may delineate areas of farmland. Heavily truncated quarry pits were recorded at both sites. The vast majority of this activity seems to be confined to the middle of the 2nd century, prior to the construction of the city wall.

3. What is the character of the waterlain deposits from the Roman to medieval **Moorfields marsh**? What evidence is there for the **formation processes and date** of the marsh?

   These deposits were uniformly organic, peaty blue-brown silts with frequent inclusions of plant remains, suggesting regular periods of inundation. Finds, in particular leather shoes suggest this part of the marsh was formed during the early medieval period. However, as previously noted the process of marsh formation is not necessarily well understood by finds distribution alone, as later finds can drop down through the sequence. There was no direct evidence for Roman marsh formation across both sites. C14 dates suggest that the marsh was well formed by the late Saxon/early Norman period at sites, and that its formation had ceased/was more seasonal by the late medieval period (see 5.7)

4. Is there any evidence for remains associated with the **reclamation** of Moorfields marsh?

   Pottery from rubbish pits suggest that marsh reclamation had started by the 15th century.

5. Is there any evidence from the site to suggest early Roman occupation of this area?

   1st-century activity was not observed. The finds (pottery in particular) suggest that there was a noticeable peak in activity during the Hadrianic and early Antonine periods (AD 120–140 and AD 140–160. Very little horizontal stratigraphy survived across both sites, and there was no evidence for Roman buildings.

6. What evidence is there for activities in the area of the marsh, or in the surrounding area, represented by dumping of refuse in/on it?

   Low levels of domestic dumping of plant food remains were seen in a few period 3 samples, and some charred cereal processing waste in period 2.2. Leather fragments in 6 samples suggest the dumping of leatherworking and/or tanning waste.

7. What evidence is there for activities in the area of the marsh, or in the surrounding area, represented by dumping of refuse in/on it?

   Cereal pollen and weeds of arable and disturbed ground attest to cultivation during the Roman period with both radiocarbon and pottery dating indicating activity from the late first century early second century onward. No evidence of Roman activity as seen in the geoarchaeological assessment was related to any variations the levels of the natural geology.

8. At what date, and by under which environmental conditions, did the Moorgate marsh develop?

   After Roman abandonment and toward the beginnings of the Norman period, the sediments from sample {1} show the site area becomes very wet again with substantial ponds forming across a marsh. This environment changes again becoming drier overall (although probably seasonally wet) during the late Medieval or early post Medieval period after which made ground deposits raise the ground and finally seal marsh below during the later post Medieval period.

9. What evidence is there for activities in the area of the marsh, or in the surrounding area, represented by dumping of refuse in/on it?

   Two features were of particular interest at Moorgate (see Fig *9), perhaps significantly both were located in close proximity to the postern constructed in the 15th-century through the City wall to the south. A chalk lined pit may be associated with a structure, or possible the remains of an (unused) lime slaking pit, or a well. A wattle structure (sgp044) may also be part of a well or a lined rubbish pit. Rubbish disposal, including a pit (sgp047) was evident across both sites and was generally found within*

horizontal reclamation dumps (XRZ10) (see Fig *7). Stable refuse from XRZ10 context [14] suggests that this area of the marsh may have been utilized for farming purposes in the 16th-century.*

10. How, and when, was the marsh reclaimed, by drainage (ditches etc) and dumping (land raising and consolidation?

    The early Roman stream channel deposits showed evidence of early Roman activity and food waste and but it is not known whether the stream dried out through water management or natural river migration to become semi-terrestrial and locally cultivated. The post-Roman to Norman ponded marshland environment changes again becoming drier overall by unknown agency during the late Medieval or early post Medieval period after which it becomes an area for dumping waste until more substantial made ground deposits raise the ground and finally seal the fate of the marsh below during the later post Medieval period.

11. Is there any evidence for activities carried out in the Moorfields following reclamation of the marsh?

    No evidence survived at Moorgate prior to the 19th-century due to heavy truncation. Dumping characterised the later stratigraphic record from Finsbury Circus. No direct evidence was found that relates to documentary and cartographic sources, for i.e. skating or cloth working which were known to have been undertaken in the area.

    A large storm drain/sewer (gp009) (Photo 11), possibly pre-dating the development of Finsbury Circus survived immediately beneath a late 19th-century cellar within the gardens. Potentially it may be associated with the development of the New Bethlem Hospital that was relocated to the south of Moorfields in 1675–6.

12. Is there any evidence for the layout of Finsbury Circus gardens in the early 19th century?

    Soil horizons and modern levelling dumps recorded in open Area 9 at Finsbury Circus (see Fig 9) may be contemporary with the alterations in Finsbury Circus undertaken by William Montague between 1815 and 1819. However no evidence was found relating to structures, pathways etc, although it is possible that a large drain/sewer (gp009) related to this period.

General discussion of potential

6.1.1 The record of stratified remains has the potential to map the changing land use patterns across the sites from the 2nd Century AD through to the impact of WW2.

6.1.2 The remains on this site are located to the north of the late 2nd-century city Wall, and the majority of Roman occupation appears to pre-date its construction, with the potential to inform us as to the environmental conditions, and land use immediately prior to and after its construction. Further analysis of the dating evidence may confirm that this development took place prior to, and had entirely ceased by the construction of the city wall (post AD 180). It may now be possible to review the archaeological evidence at Moor House that tentatively identified an early 2nd century drainage ditch sealed/obscured by the 4th-century city ditch (Butler 2006, p 10). It is probable that this feature formed part of a series of similar sized ditches that shared an east-west alignment, pre-dating the city wall.

6.1.3 The pottery from this period has reasonable potential for assisting the understanding of the sequence of activity present on the site. In particularly to show

the concentration of activity occurring within a comparatively short period in the 2nd century AD. Analysis of the features alongside their dating material also offers potential to further our knowledge of utilisation in the area in addition to that associated with the nearby cemeteries. The potential of the Roman assemblage is limited by its restricted range but the identified artefacts, notably the hairpins, nail-cleaner and glass vessel can be dated relatively closely and, with the pottery, have potential to assist with the dating of features on the site. Although they could be everyday losses, the small quantities of human bone also recovered increases the likelihood that they were washed out from Roman cemeteries upstream.

6.1.4 Assessment of the early Roman samples from XRZ10 suggested that the eastern part of the site may have been dryer than the western area at this time, and perhaps continuing into the medieval period. Comparison of samples from the two sides of the site (XRZ10 and XSP10) may show differences in drainage and/or land use before and after the development of the marsh.

6.1.5 Waterlogged seeds and other plant remains were well preserved in most of the samples, and integrated study of the plant macrofossils with the various classes of invertebrate (insects, molluscs and ostracods) should add to the picture of the changing vegetation and its environmental implications from the early Roman period to the development of the medieval Moorfields marsh.

6.1.6 Assessment of the environmental material from the Roman 2nd-century ditches suggests that some kind of industrial processes may have been undertaken. Further analysis should examine whether there are concentrations of cow bones in certain pit groups. Evidence for cow carcases may suggest proximity to *in situ* butchery or related activity. The evidence may be contrasted with the results of adjacent excavations (particularly Moor House to the south) and with excavations at other sites where butchery is known to have taken place.

6.1.7 The recorded features and deposits also have potential to provide information about the formation of the Moorfields marsh and the use of this marginal area during the medieval period. However, the geoarchaeological assessment indicates the microfossil and macrofossil remains identified in this report have been fragmentary (with the possible exception of plant macrofossil data) and there is little potential in further analysis.

6.1.8 The post-medieval features, including buildings, the sewer and dumps have little potential for further analysis, being too dispersed and truncated, as well as being fairly common in forms and construction. However here the stratified sequence provided evidence for the 16th- to the 19th-century marsh development and reclamation. The medieval and later pottery found within these distinctive dumps has little potential and are representative of pottery assemblages from sites in the immediate environs. However, the Chinese porcelain vase in [1] (XRZ10) and the Valencian lusterware ‘basil-pot’ in [42] (XSP10) have potential beyond their respective sites and would be of interest to specialist audiences, and together with the Bartmann jug in [26] (XSP10) would make a good photograph.

6.1.9 Other finds such as the building material and medieval/Tudor leather footwear has little further potential beyond refining the dating of certain features on the site, likewise the clay tobacco pipes have limited potential for further analysis as the sample collected is too small and contains nothing distinctive in the form of marked or decorated pipes that would allow refinement of the dating derived from the London typology of bowl shapes.

7 Significance of the data

7.1.1 The archaeological remains from the Roman period are assessed as being of low to moderate local significance, as although the Roman ditches have not been previously recorded in this exact location, they have been documented to the south and south-west.

7.1.2 The ditch cautiously dated 13th–15th century is locally significant as there is limited evidence of activity in the area during the medieval period, and therefore is of moderate importance. The 14th-century and later cut features, and the tentative evidence for stabling in the area of Finsbury Circus are indications of the changing land use at the end of the medieval period, and broadly support documentary sources that point to widespread marsh reclamation in the 15th-century and are of low-moderate importance. Likewise the marsh deposits are of low-moderate significance, as although they have been widely recorded and sampled in this area, they may provide an opportunity to re-examine theories on the date at which the marsh formed, and its formation processes. The formation dates returned from a deep section of marsh at Finsbury Circus of 1020–1155 AD are consistent with the reestablishment of London as municipal town, following Roman abandonment.

7.1.3 The pottery assemblages, building material, accessioned finds, clay pipes, timber, human and animal bone are of local significance for characterising the deposits in which they were found and for providing the principal chorological framework by which the recorded land use can be understood. Further research into the character and distribution of the 2nd century AD assemblages will further our knowledge of the settlement of the area in this period. The full sequence of phasing and division into land uses enables comparison with sites of a contemporary period in the immediate locality.

7.1.4 The Valencian lusterware ‘basil-pot’ is of national significance; such is the rarity of these examples in both private and museum collections and in the archaeological record, with a few of these vessels found on Spanish and Italian urban sites (Ray 2000).

8 Publication project: aims and objectives

Revised research aims

This post-excavation assessment has highlighted new areas of research, which have led to the following revised research aims (RRAs):

Roman

RRA1 Can the Roman features, particularly the ditches and quarry pits, tell us more about how this area was utilised prior to the construction of the City Wall?

RRA2 Can we better understand the management of this area and the function of the drainage channels during the 2nd century?

RRA3 How does the alignment, size and date of the two ditches at Moorgate compare with those recorded to the south at Moor House?

RRA4 What is the significance of the fence alignments/ possible ditch crossings at Moorgate?

RRA5 Can the Roman and post-Roman finds assist with the dating of features on the site?

RRA6 Can the Roman finds shed light on the character of extra-mural land use in the 2nd century?

RRA7 Why was the area (of Moorgate in particular) not utilised for dumping after the mid - 2nd century?

RRA8 What are the implications for local industrial activity, particularly bone working and preliminary preparation of cattle horn?

RRA9 What can the wild plant and invertebrate assemblages tell us about the vegetation and appearance of the Moorfields area during the Roman period, and its changes as the marsh developed?

RRA10 Can the plant assemblages from Roman and later samples provide information about activities taking place in the Moorgate area?

RRA11 What can the charred, waterlogged plant remains tell us about diet and cereal use in the area of the site? Do they show change through time?

RRA12 What evidence is there for attempts to manage and/or utilise the area of the marsh during the medieval period?

Preliminary publication synopsis

It is proposed to publish the evidence for the Roman and medieval activity at the site as a short article of *c* 2500 words in the *London Archaeologist*, with a separate note (*c* 1000 words) on the significant medieval and post-medieval ceramics in either *Medieval Ceramics* or the *Journal of Post-Medieval Archaeology*.

London Archaeologist article (*c* 2500 words)

Working title:	Extramural London, a glimpse of the city hinterland
Principal Author:	Sam Pfizenmaier
Format:	Journal Article (LAMAS)

Total word count: 2500
Total figure count: max 5

- Introduction

- Chronological narrative combining stratigraphic detail with documentary research linking how the area changed within the main phases of occupation. Specialist contributions will be integrated within the narrative.
    - Extramural Londinium, drainage and farmland?
    - Flooding, neglect and marsh development
    - Evidence for medieval utilisation of the area and management of the marsh.

- Conclusions

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 2013. 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.

Stratigraphic method statement

Task 1 Review dating and finalise phasing	2 days
Task 2 Production of detailed publication synopsis and specialist fact pack	1 day
Total (stratigraphic)	**3 days**

General finds method statement

Task 3 Attendance at finds review	1.5 days
Total (finds review)	**1.5 days**

Building material method statement

Task 4 Compare building material assemblage with the stratigraphical sequence and all available dating evidence	0.5 day
Task 5 Write publication report	2 days
Total (building material)	**2.5 days**

Roman pottery method statement

Task 6 Write contributing text to chronological narrative for integration into article	1.5 days
Task 7 Comparison of overall composition of the XSP10 and XRZ10 assemblages with sites in immediate vicinity and integration of results into narrative	1 day
Total (Roman pottery)	**2 days**

Post-Roman pottery method statement

Task 8 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	0.5 day
Task 9 Write general descriptive narrative for the medieval and later pottery from both sites with a focus on the material in [26] and [103]	1.75 days
Task 10 Find parallels for the Chinese porcelain vessel in [1] (XRZ10):	0.5 day
Task 11 Research and publicise further the Valencian lusterware ‘basil pot’ in [42] (XSP10) in the form of a short note for either Medieval Ceramics or Journal of Post-Medieval Archaeology	1.5 days
Total (post-Roman pottery)	**4.25 days**

Accessioned finds method statement

The finds will be examined within their stratigraphic context using the computerised database, site plans, matrices and other information as supplied by the statigraphic analysts at MOLA. Individual items will be examined during and after investigative conservation, which should precede the finds analysis. An article will include discussion of the finds within the site sequence and comparison with assemblages from the local area.

Task 12 Integration of the Roman finds within the site sequence 0.125 day

Task 13 Integration of the medieval/post-medieval finds within the site sequence 0.125 day

Task 14 Summary of the finds within the site sequence, selection of finds for publication and illustration 1.5 days

Total (accessioned finds) **1.75 days**

Botanical method statement

It is recommended that 12 of the following samples should be selected, and subjected to full botanical analysis in order to answer the research aims listed above (see 0 revised research aims).

site	period	lu	gp	SGP	context	sample	BI
XRZ10	200	OA2	2	22	29	14	NC
XRZ10	200	OA2	2	22	29	15	NC
XRZ10	200	OA2	2	22	31	12	NC
XRZ10	201	OA3	4	17	26	9	PR28
XRZ10	202	OA4	5	11	16	5	ED
XRZ10	300	OA5	6	10	15	6	NM
XRZ10	300	OA6	7	9	14	7	NM
XRZ10	300	OA6	7	9	14	8	NM
XSP10	200	OA2	3	49	96	22	N
XSP10	201	OA3	14	15	149	32	P
XSP10	201	OA3	17	22	155	33	D
XSP10	201	OA3	19	40	110	24	D
XSP10	202	OA4	27	23	142	31	NO
XSP10	300	OA5	18	59	45	14	NM
XSP10	300	OA5	18	80	13	6	NM
XSP10	300	OA5	18	83	10	10	NM
XSP10	300	OA5	18	84	9	5	NM

Methodology will follow standard procedures in use by MOLA: waterlogged remains will be scanned and estimates made of their abundance, while charred remains will be sorted, identified and quantified numerically.

Task 15 Scanning & id of plant remains from 12 waterlogged samples 8 days

Task 16 Sorting & id charred assemblages from 1 sample 1 day

Task 17 Data entry, production & editing of tables 1 day

Task 18 Analysis of results, research & production of archive report 4 days

Total (botany)	**14 days**

Animal bone method statement

The assemblage should be recorded, as individual bones, directly onto the MOLA Oracle animal bone post-assessment database and then analysed as a discrete assemblage with reference to available stratigraphic data and to contemporary local sites. Analysis of this assemblage should focus on fully-identifiable fragments, particularly those including epiphyseal and dental evidence, and no further work should be done on unidentifiable cattle- and sheep-sized long-bone fragments.

Task 19 Recording of identifiable assemblage onto database	4 days
Task 20 Analysis of data/preparation of report/edit/archive	3 days
Total (animal bone)	**7 days**

Graphics method statement

Provisional list of objects for illustration/photography:

Maximum of 10 vessels

<3> [124] copper alloy Roman nail-cleaner

<14> [48] bone needle

<10> [109] bone pin

<11> [109] bone pin

<13> [155] (XSP10) Box-flue tile showing combing pattern

Task 21 Finds illustration	2 days
Task 22 Finds photography	1 day
Task 23 Finalise phase plans in GIS	1 day
Task 24 Drawing office preparation of final publication figures	2 days
Total (graphics)	**6 days**

Conservation method statement

The following items were identified as requiring investigative conservation to clarify form and decoration and assist with identification; unless otherwise stated, this consists of removal of surface corrosion and soil under the microscope, and surface treatment if necessary.

XSP10 [124] <3> copper alloy, nail cleaner – clarify if decorated

XSP10 [48] <14> bone, needle – clarify detail round eye of needle

Task 25 Analysis and investigative work	0.75 day
Total (conservation)	**0.75 day**

Background research method statement

Task 26 Review historical background from secondary sources	1 day
Total (background research)	**1 day**

Integration of publication text method statement

Task 27 Liaison with specialist contributors	1 day
Task 28 Integrated analysis, incorporating the results of the specialist assessments	2 days
Task 29 Compile final text	3 days
Task 30 Compile final site plans in GIS	1 day
Task 31 Check all images prepared and integrated correctly	0.5 days
Total (integration of publication text)	**7.5 days**

Production

Task 32 Internal editing	1 day
Task 33 Specialist edit	1 day
Task 34 Page costs (London Archaeologist @ £25 per page)	£150
Task 35 Page costs (SPMA @ £60 per page)	£120

Project management method statement

Task 36 Overall project management	4 days

Task No.	Done by	Task Description	Time required (person days)
Stratigraphic			
Task 1	SP	Review dating and finalise phasing	2
Task 2	SP	Production of detailed publication synopsis and specialist fact pack	1
Finds review			
Task 3	Specialists	Attendance at finds review	1.5
Building material			
Task 4	IB	Compare building material assemblage with the stratigraphic sequence and all available dating evidence	0.5
Task 5	IB	Write publication report	2
Roman pottery			
Task 6	AT	Write contributing text to chronological narrative for integration into article	1.5
Task 7	AT	Comparison of overall composition of the XSP10 and XRZ10 assemblages with sites in immediate vicinity and integration of results into narrative (if deemed appropriate	1
Post-Roman pottery			
Task 8	NJ	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	0.5
Task 9	NJ	Write general descriptive narrative for the medieval	1.75

		and later pottery from both sites with a focus on the material in [26] and [103]	
Task 10	NJ	Find parallels for the Chinese porcelain vessel in [1] (XRZ10):	0.5
Task 11	NJ	Research and publicise further the Valencian lusterware 'basil pot' in [42] (XSP10) in the form of a short note for either Medieval Ceramics or Journal of Post-Medieval Archaeology	1.5
Accessioned finds			
Task 12	MM	Integration of the Roman finds within the site sequence	0.125
Task 13	MM	Integration of the medieval/post-medieval finds within the site sequence	0.125
Task 14	MM	Summary of the finds within the site sequence, selection of finds for publication and illustration	1.5
Botany			
Task 15	AD	Scanning & id of plant remains from 12 waterlogged samples	8
Task 16	AD	Sorting & id charred assemblages from 1 sample	1
Task 17	AD	Data entry, production & editing of tables	1
Task 18	AD	Analysis of results, research & production of archive report	4
Animal bone			
Task 19	AP	Recording of identifiable assemblage onto database	4
Task 20	AP	Analysis of data/preparation of report/edit/archive	3
Graphics			
Task 21	DO	Finds illustration	2
Task 22	AC	Finds photography	1
Task 23	Geomatics	Finalise phase plans in GIS	1
Task 24	DO	Drawing office preparation of final publication figures	2
Conservation			
Task 25	Cons	Analysis and investigative work	0.75
Background research			
Task 26	SP	Review historical background from secondary sources	1
Integration of publication text			
Task 27	SP	Liaison with specialist contributors	1
Task 28	SP	Integrated analysis, incorporating the results of the specialist assessments	2
Task 29	SP	Compile final text	3
Task 30	SP	Compile final site plans in GIS	1
Task 31	SP	Check all images prepared and integrated correctly	0.5
Production			
Task 32	Editor	Internal editing	1
Task 33	Specialists	Specialist edit	1
Task 34		Page costs (London Archaeologist @£25 per page)	£150
Task 35		Page costs (SPMA @ £60 per page)	£120
Project management			
Task 36	LF	Overall project management	4

9 Publication project: resources and programme

Financial resources sufficient to cover the work proposed in this document will be sought via a separate document.

10 Acknowledgements

MOLA would like to thank Jay Carver for commissioning this report for Crossrail, Ian Williamson for his assistance, Chris Sharples (Crossrail) and Grant Eade (Laing O'Rourke) for his assistance on site.

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12 Appendix: management, delivery and quality control

MOLA (Museum of London Archaeology) is a company limited by guarantee registered in England and Wales with company registration number 07751831 and charity registration number 1143574. The Registered Office is Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED). It has its own independent Board of Trustees but works in partnership with the Museum of London via a Memorandum of Understanding.

MOLA is a 'Registered Archaeological Organisation' with the archaeological professional body, the Institute for Archaeologists (IfA). The *IfA Register* is a rigorous Quality Assurance scheme for archaeologists. In order to be accepted, MOLA has passed a Board resolution to comply with the IfA Code of Conduct and Standards, to demonstrate that compliance through bi-annual re-registration, to submit to regular IfA inspections, and to ensure that all MOLA activities are under the overall direction of a Member grade (MifA) 'responsible post-holder'. The Registered Organisation scheme also provides procedures for investigating and handling of external complaints.

MOLA subscribes to and abides by the general principles and specific terms of the *Code of Good Practice On Archaeological Heritage in Urban Development Policies* established by the Cultural Heritage Committee of the Council of Europe, and adopted at the 15th plenary session in Strasbourg on 8-10 March 2000 (CC-PAT [99] 18 rev 3). In particular to the following points: ….a*rchaeologists shall be aware of development costs and adhere to agreed timetables* (Para 3 'The Role of the Archaeologist'), with all work *'carried out to written statements setting out standards timetables and costs'* (para 4 ibid).

MOLA further subscribes to and ensures that its activities comply with and/or are guided by the following policies, procedures and guidance:

- Appropriate local and regional planning authority archaeology guidance – eg for London: English Heritage, Standards for a*rchaeological work* (2014)
- Appropriate Archaeological Research Framework for the region – eg for London: English Heritage Archaeology Division, *Research Agenda* (1997); Museum of London, *A research framework for London archaeology (*2002); and *Historic Environment Research Strategy for Greater London* (in prep. CBA/MoL/Rowsome).
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- National archive disposition standards including Museum and Galleries Commission, *Standards in the Museum Care of Archaeological Collections* (1992) and Society of Museum Archaeologists, *Towards an Accessible Archaeological Archive: the Transfer of Archaeological Archives to Museums: Guidelines for Use in England, Northern Ireland, Scotland and Wales* (1995)
- Relevant local archive deposition standards, eg for London, Museum of London, *General Standards for the preparation of archaeological archives deposited with the Museum of London*, (2009).

MOLA governance and organisational strategy are determined by the Senior Management Group (SMG), led by the Chief Executive Officer and comprising the Finance Director, the Head of Operations, and four Directors heading the Planning, Development Services Research & Education and Northanmpton divisions. The SMG reports regularly to an independent Board of Trustees, who oversee MOLA's performance and strategic direction. As a charitable company MOLA is monitored and regulated by the Charities Commission.

MOLA is structured to reflect its project orientation. Within Development Services the Director manages the Client Team of *c* 10 Project Managers (PMs). Individual PMs are responsible for developing new work for MOLA, and thereafter for designing, budgeting and delivering projects for clients. They remain the principal point of contact for the client for the duration of each project.

PMs drive projects through successive stages in accordance with client needs, forming project teams by drawing upon the skills available within MOLA Operations teams. PMs ensure that projects are completed to the highest standards within time and budget. Financial monitoring of projects against budget is undertaken by the Finance Director and PMs at monthly review meetings. Project management software is employed by MOLA Operations to plan resourcing and track and adhere to programme and budget. Project team meetings are held throughout the programme, allowing refinement of research strategies in the light of on- or off-site findings or analysis. Recording, excavation, and sampling strategies may be modified to provide optimum information retrieval in support of the research objectives. At post-excavation phase internal project management is normally devolved to a designated Post-Excavation Project Manager.

All archaeological field work is controlled and monitored on a day to day basis by the on-site Site Supervisor (SS), who reports to the designated Project Manager. Together with PMs and the Field Manager (responsible for H&S) they also liaise as necessary with the client's agents and principal contractors regarding all enabling works and H&S..

All written documentation, eg initial '*written scheme of investigations' ('wsis')*, evaluation reports, post-excavation *Assessment Report*s and final publications undergo stages of internal review and sign-off prior to final issue to clients. For both field and reporting work PMs and SSs meet and liaise with the client and the Local Authority's archaeological advisor or officer to ensure delivery according to wsis and to review progress, research aims, archaeological procedures, and site strategies as appropriate..

At all stages, what constitutes an appropriate archaeological response will be assessed against criteria of local, regional and national significance and within frameworks of valuable archaeological research topics identified in local or regional Archaeological Research Frameworks (where these exist).

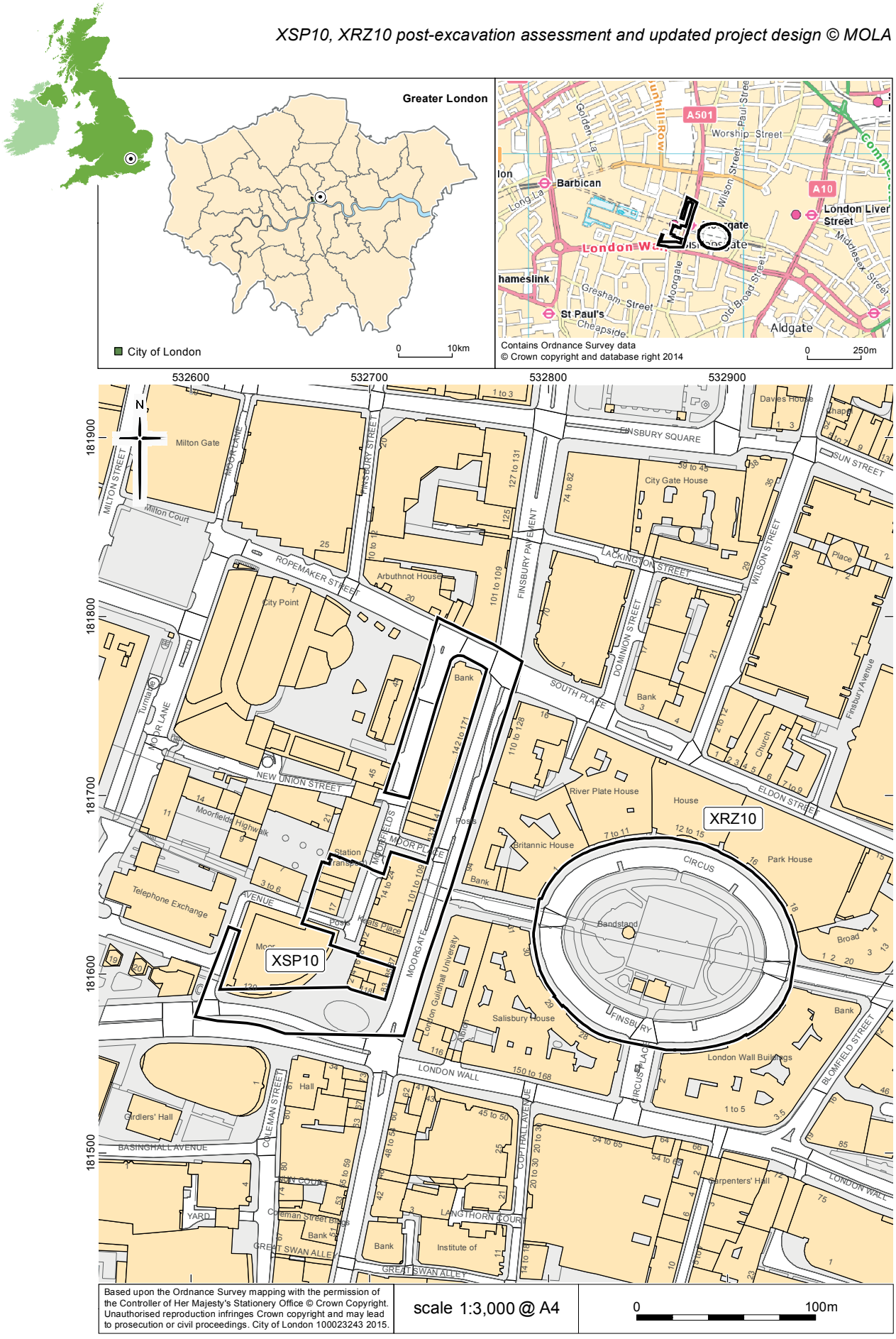

Fig 1 Site location

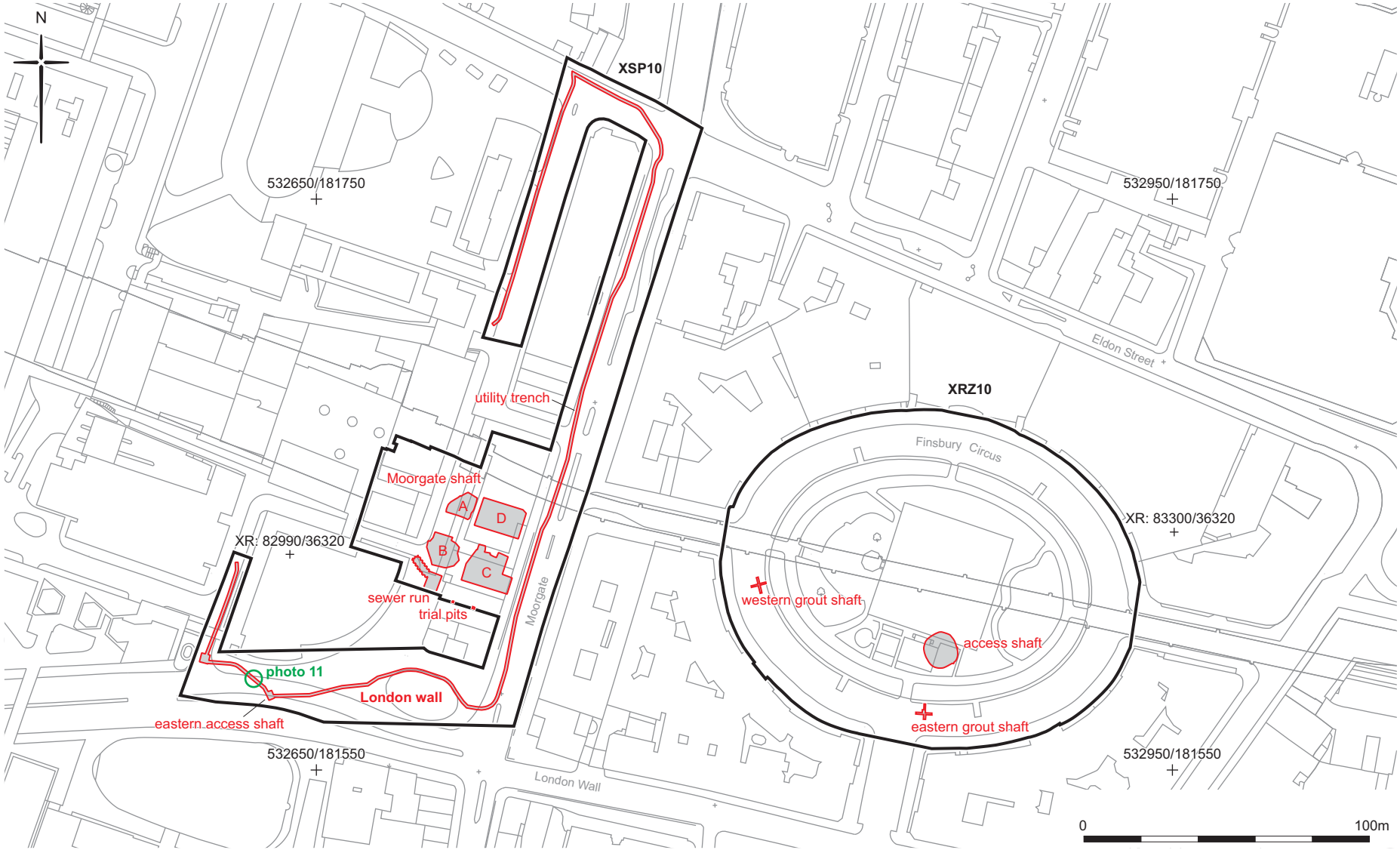

Fig 2 Areas of Excavation

XSP10, XRZ10 post-excavation assessment and updated project design © MOLA

MULTI1051PXAU15#02

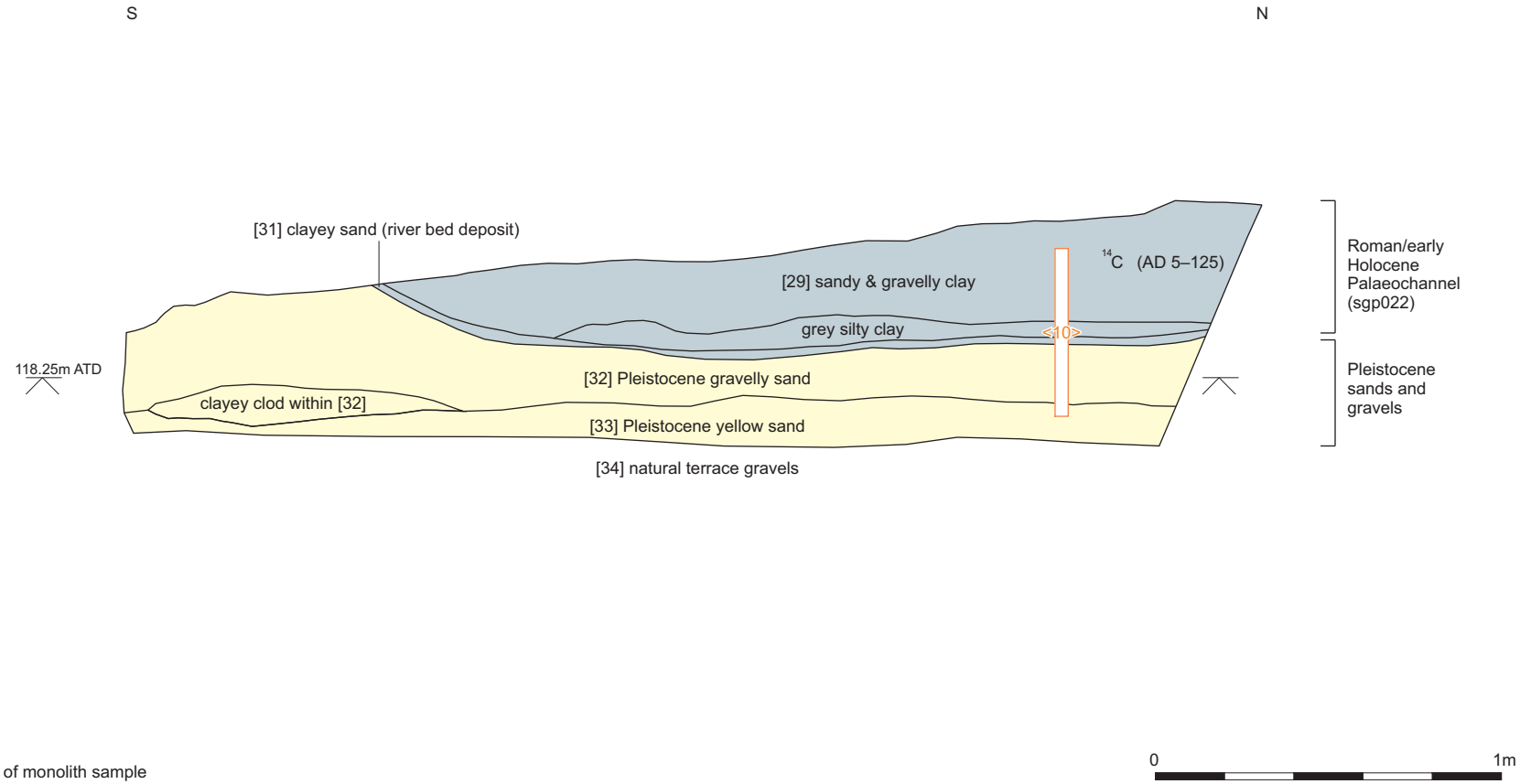

Fig 3 Section 1 Holocene/Early Roman channel (OA2) (XRZ10), east facing for location see Fig 5

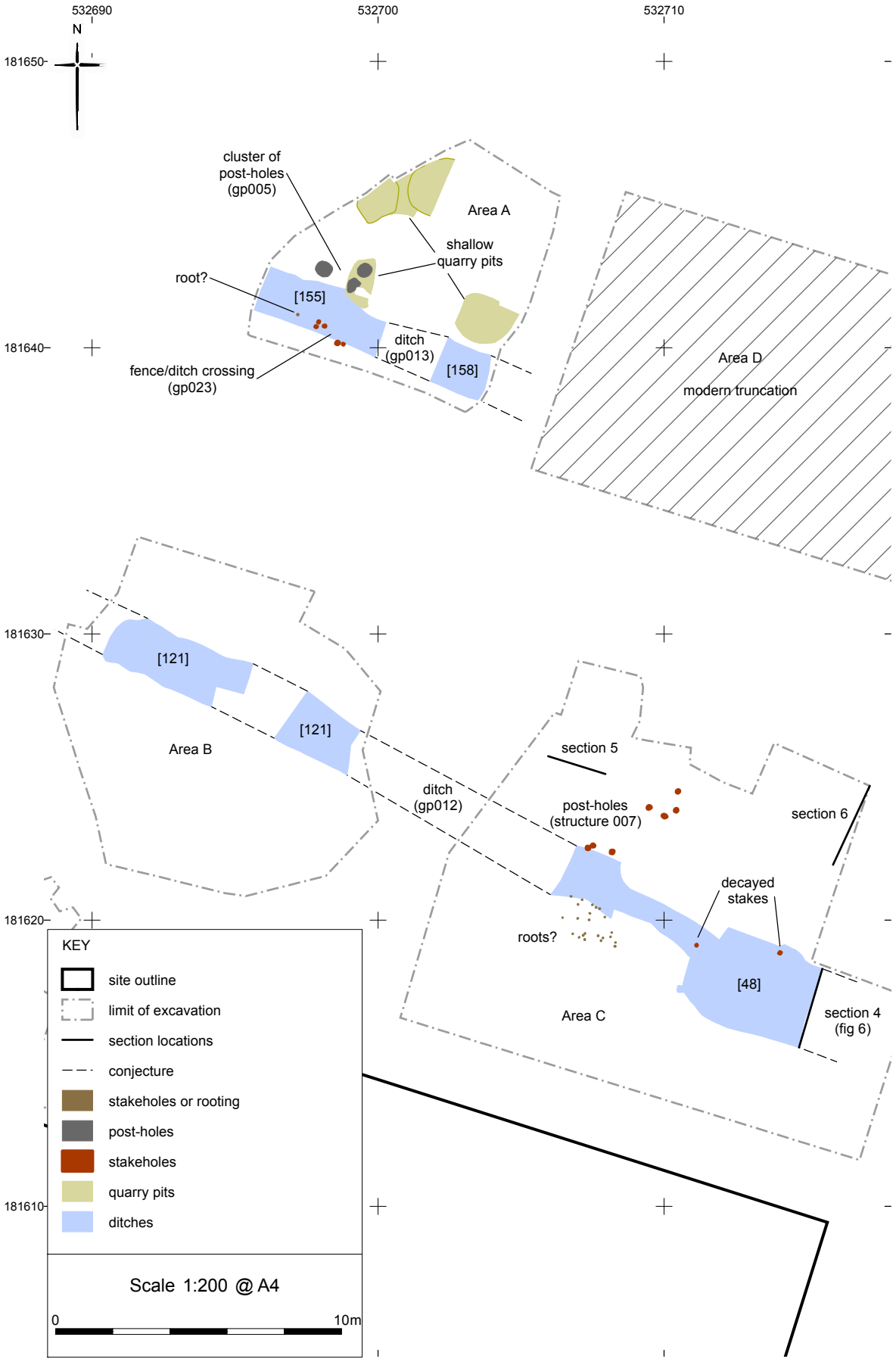

Fig 4 AD 2nd–century Roman features (XSP10)

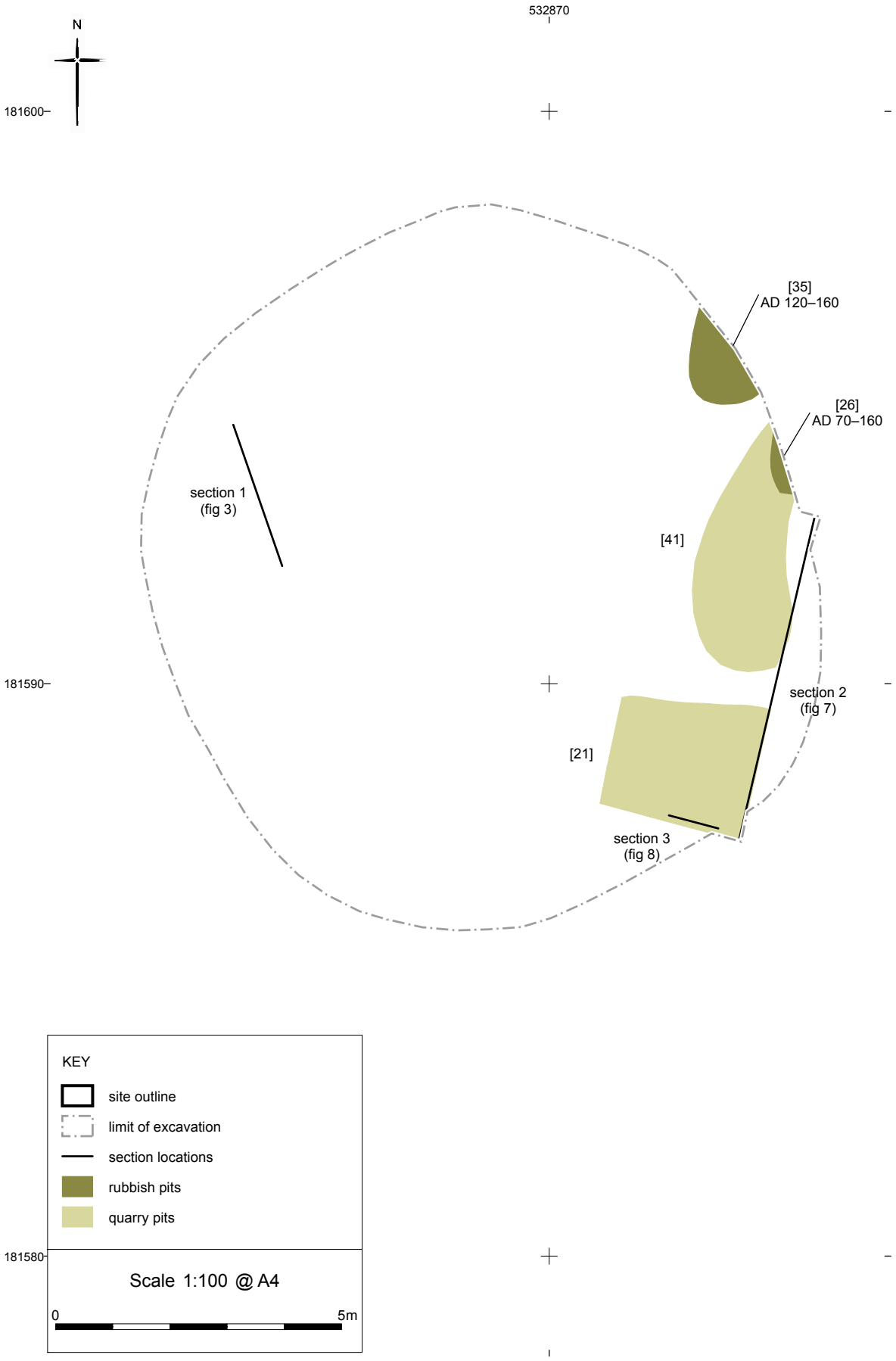

Fig 5 AD 2nd–century Roman features (XRZ10)

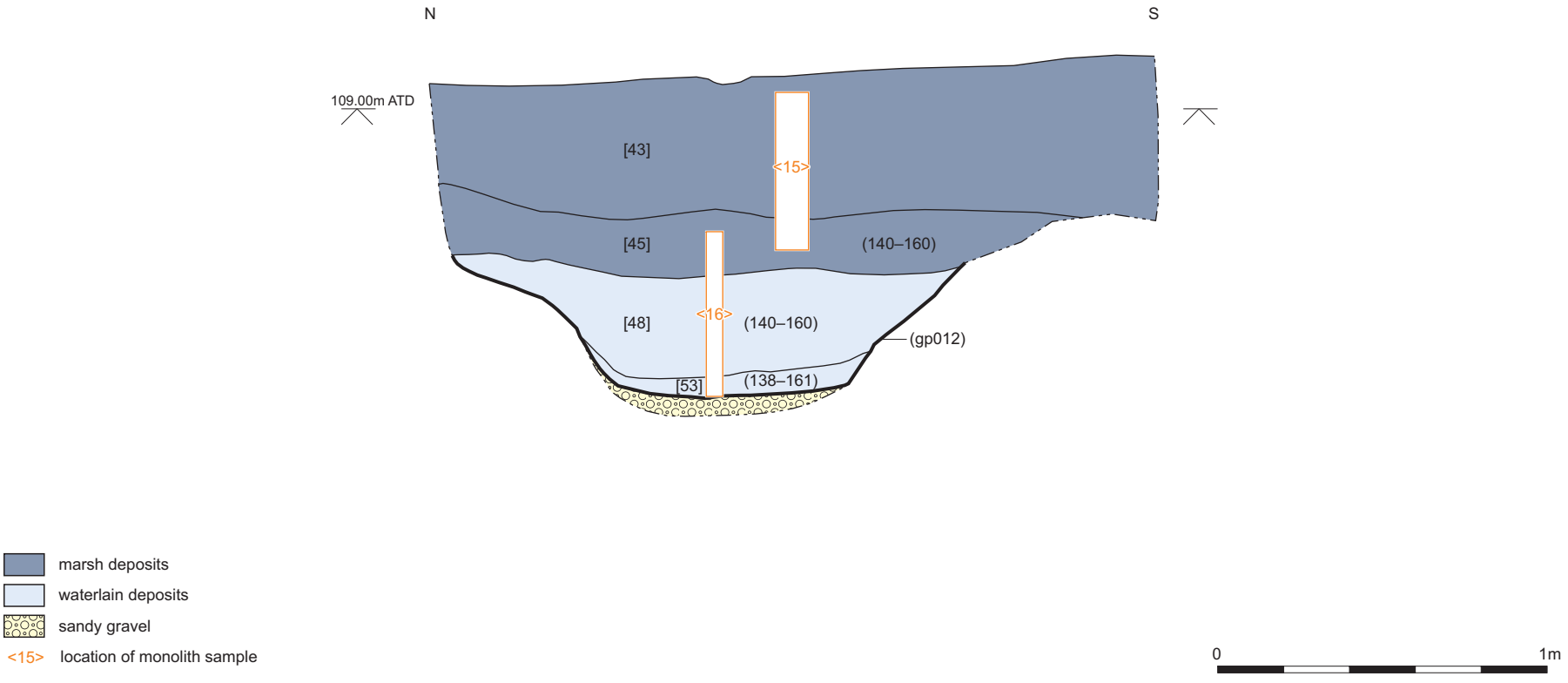

Fig 6 Section 4, Roman 2nd-century ditch (gp012), west facing (XSP10)

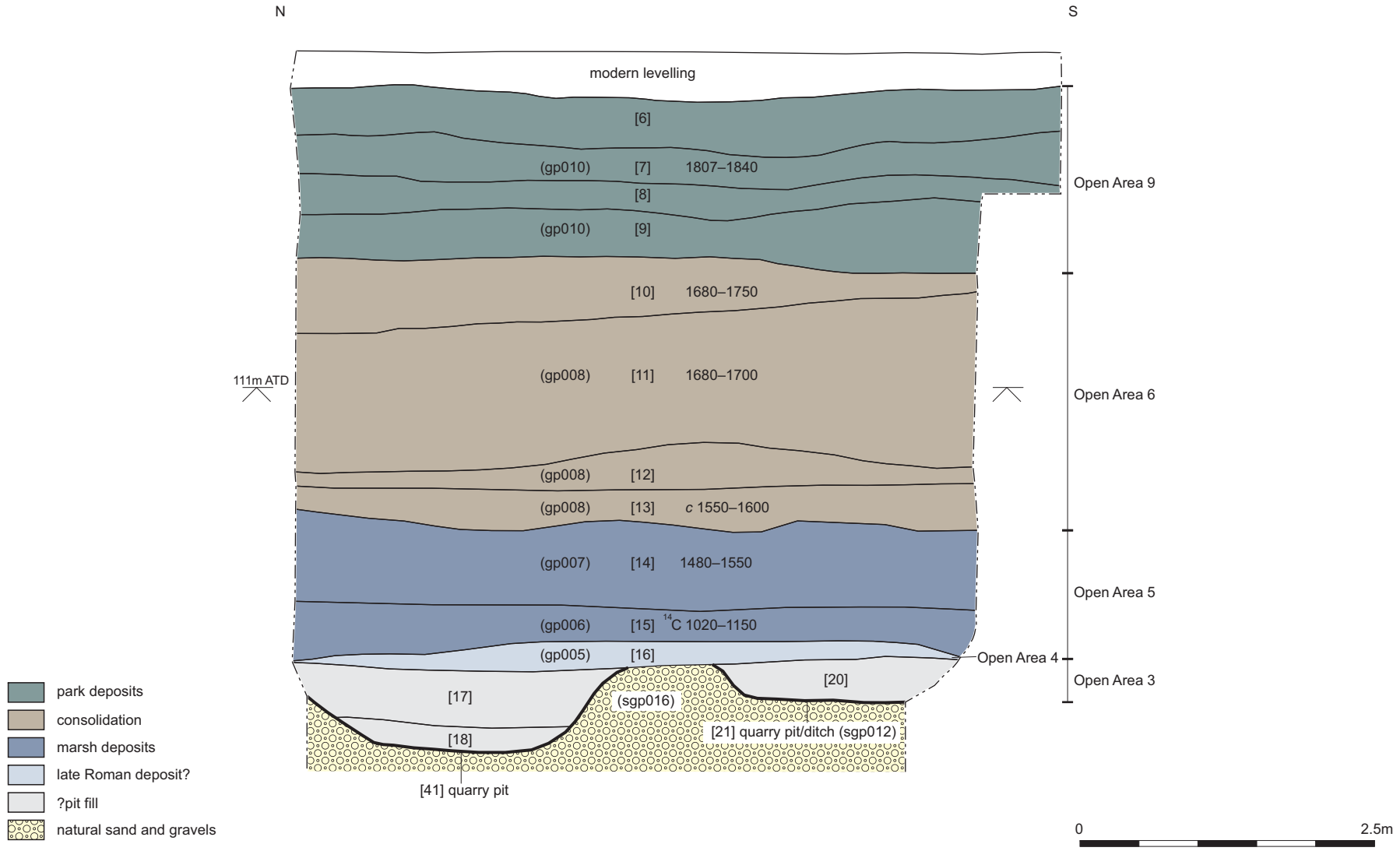

Fig 7 Section 2, west facing section detailing horizontal stratigraphy overlying Roman cut features (XRZ10) (OA3–6,9) for location see Fig 5

Fig 8 Section 3, north facing section detailing location of geoarchaeological samples (XRZ10) (OA4–6)

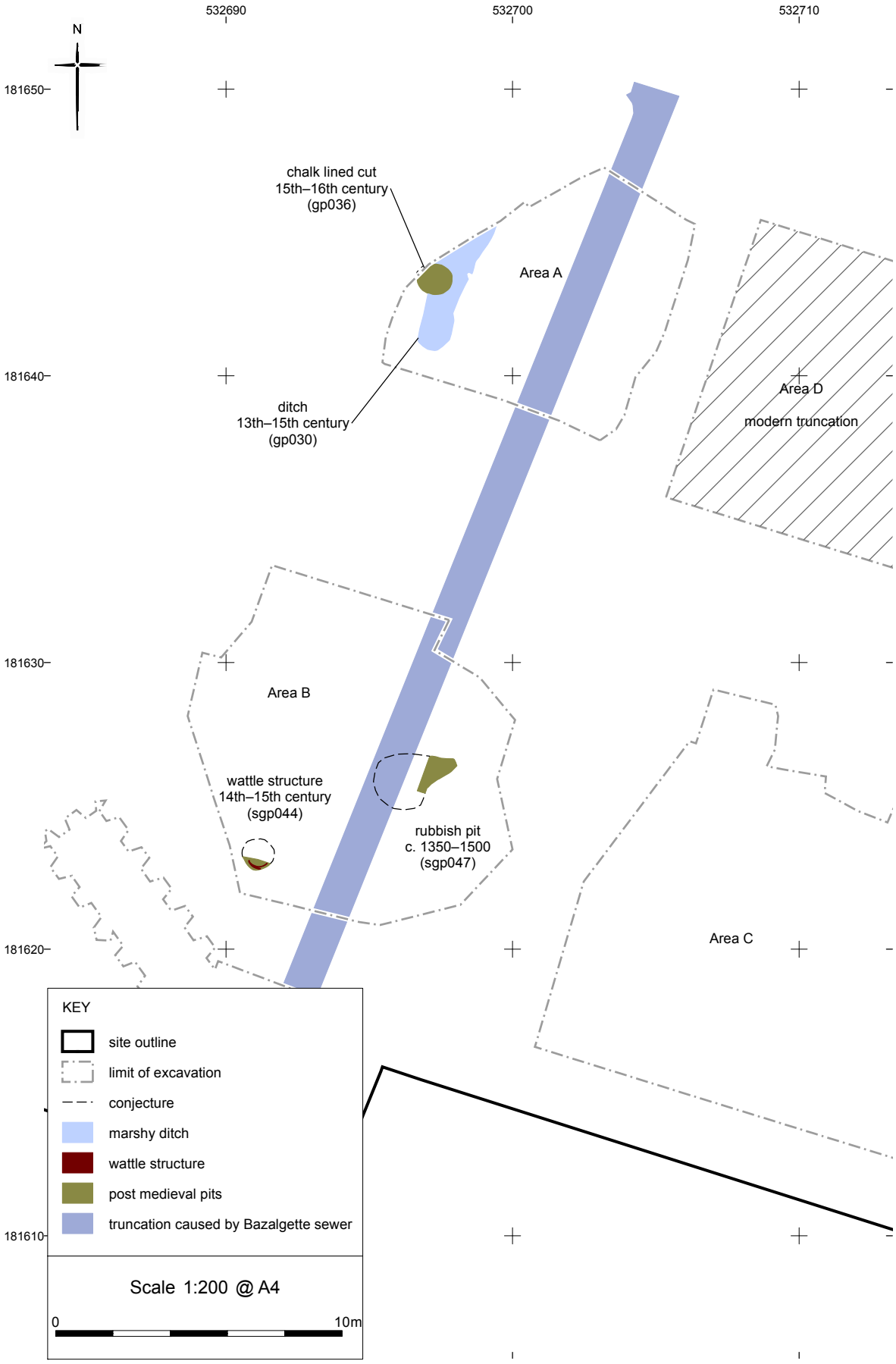

Fig 9 Medieval and post medieval features (XSP10)

13 Appendix: OASIS archaeological report form

OASIS ID: molas1-201275

Project details

Project name	Crossrail Moorgate and Finsbury Circus
Short description of the project	Four years of Interventions along the central Crossrail route between Moorgate and Finsbury Circus uncovered a possible Holocene/Roman channel, potentially a tributary of the Walbrook, waterlain clays, representing flooding prior to human activity and two parallel east-west 2nd Century drainage ditches. Associated stakes, quarry and rubbish pits were also recorded as well as postholes apparently represented fence alignments. Other shallow features had been modified by the formation of the Moorfields marsh. Later activity was limited to a failed drainage ditch (c 13th-15th-century), a late medieval rubbish pit (1350-1500), hooped structure(c 14th-15th-century), and a chalk lined pit possibly a partially robbed column/pier foundation, or the base of a well. Further south on London Wall layers of 16th- to 17th-century date may relate to the back filled city ditch. Later post-med features included a large drain and 19th-century sewer attributed to Bazalgette.
Project dates	Start: 25-11-2010 End: 20-11-2013
Previous/future work	Yes / Yes
Type of project	Field evaluation
Site status	None
Current Land use	Transport and Utilities 2 - Other transport infrastructure
Current Land use	Woodland 6 - Parkland
Monument type	CHANNEL Roman
Monument type	DITCH Roman
Monument type	QUARRY PIT Roman
Monument type	FENCE LINE Roman
Monument type	MARSH Medieval
Monument type	PIT Medieval
Monument type	MARSH Early Medieval
Monument type	PIT Post Medieval
Monument type	DUMPS Post Medieval
Monument type	DRAINS Post Medieval
Significant Finds	POT Medieval
Significant Finds	POT Post Medieval
Significant Finds	HUMAN REMAINS Roman
Significant Finds	POT Roman
Methods &	""Environmental Sampling"","Sample Trenches"","Targeted

techniques	Trenches"","Test Pits""
Development type	Rail links/railway-related infrastructure (including Channel Tunnel)
Prompt	Crossrail act
Position in the planning process	After full determination (eg. As a condition)

Project location

Country	England
Site location	GREATER LONDON CITY OF LONDON CITY OF LONDON Moorgate and Finsbury Circus
Postcode	EC2
Study area	1000.00 Square metres
Site coordinates	TQ 3259 8170 51.5181410617 -0.088808845338 51 31 05 N 000 05 19 W Point
Site coordinates	TQ 3275 8167 51.5178337763 -0.0865152422378 51 31 04 N 000 05 11 W Point
Lat/Long Datum	Position derived from charts
Height OD / Depth	Min: 7.95m Max: 8.95m

Project creators

Name of Organisation	MOLA
Project brief originator	Crossrail
Project design originator	Crossrail
Project director/manager	Louise Davies
Project supervisor	Sam Pfizenmaier
Type of sponsor/funding body	Crossrail Ltd
Name of sponsor/funding body	Crossrail

Project archives

Physical Archive recipient	LAARC
Physical Archive ID	XSP10/XRZ10
Physical Contents	"Animal Bones","Ceramics","Environmental","Glass","Human Bones","Leather","Wood","other"
Digital Archive recipient	LAARC
Digital Archive ID	XSP10/XRZ10

Digital Contents	"Animal Bones","Ceramics","Environmental","Leather"
Digital Media available	"GIS","Images raster / digital photography"
Paper Archive recipient	LAARC
Paper Archive ID	XSP10/XRZ10
Paper Contents	"Animal Bones","Ceramics","Environmental","Glass","Human Bones","Leather","Metal","Stratigraphic","Survey","Wood"
Paper Media available	"Context sheet","Drawing","Matrices","Plan","Report","Section"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	C257 ARCHAEOLOGY Central Post-Excavation Assessment and Updated Project Design Moorgate and Finsbury Circus Shafts
Author(s)/Editor(s)	Pfizenmaier, S
Date	2015
Issuer or publisher	MOLA
Place of issue or publication	London
Description	A4 client report

15 Appendix: specialist data

Table 26 Summary of botanical assessment data

A: abundance, D: diversity (1 = occasional, 2 = moderate, 3 = abundant)

											chd grain	chd chaff	chd seeds	chd wood	wlg seeds	wlg misc	
site	P	lu	gp	SGP	context	sample	BI	proc vol(l)	flot vol(ml)	proc	A D	A D	A D	A D	A D	A D	comments
XRZ10	100	OA1	1	23	32	11	NC	18	1	F					2 2	1 1	WET. MOST SEEDS RECORDED
XRZ10	200	OA2	2	22	29	15	NC	18	15	F				1 1	3 3	3 2	WET. MOSTLY GRASSY & DISTBD GROUND PLAN
XRZ10	200	OA2	2	22	29	14	NC	?	30	F				1 1	3 3	3 2	WET.GRASSY & DISTBD GRND SEEDS
XRZ10	200	OA2	2	22	30	13	NC	18	2	F				1 1	2 2	2 1	WET. MOST SEEDS RECORDED HERE
XRZ10	200	OA2	2	22	31	12	NC	18	20	F					3 3	3 2	WET.MOSS, GRASSY & DISTBD GRND SEEDS
XRZ10	201	OA3	4	17	26	9	PR28	18	50	F	1 1	1 1	1 1	2 1	3 3	3 2	WET.MOSTLY EPIDERMIS, SEEDS SPARSE
XRZ10	202	OA4	5	11	16	5	ED	20	80	F	1 1			3 1	2 2	3 1	WET. PLANT EPIDERMIS, CHARCOAL,FEW SEEDS
					16	5				W				1 1			
XRZ10	300	OA5	6	10	15	6	NM	10	1000	F				1 1	3 3	3 1	WET. PLANT EPIDERMIS,SEEDS WETLAND PLANT
XRZ10	300	OA6	7	9	14	7	NM	10	800	F				2 1	3 3	3 2	WET.STEM,EPID. SEEDS DISTBD GROUND & WET
XRZ10	300	OA6	7	9	14	8	NM	4	250	F				1 1	3 3	3 3	WET. MOSTLY STEMS. GRASSY,CULTV,WETL PLA
XSP10	200	OA2	3	49	96	22	N	40	20	F				1 1	3 3	1 1	WET. MIXED WET & DRY GRND PLANTS
XSP10	201	OA3	10	11	160	34	D	20	30	F	1 1	1 1	1 1	1 1	3 3	2 1	WET. MIXED SEEDS, OCC CHD GRAIN
XSP10	201	OA3	12	38	113	25	D	20	10	F				1 1	3 3	2 2	WET.MOSTLY AQUAT/WETLAND PLANTS
XSP10	201	OA3	14	15	149	32	P	20	20	F	2 1	3 1	2 1	2 1	2 2	2 1	DRIED. C.30 CHD GRAINS, MUCH CHAFF
XSP10	201	OA3	17	22	155	33	D	?	50	F				1 1	3 3	3 2	WET. 2 PIECES WOOD.FEWER SEEDS
XSP10	201	OA3	17	57	48	13	D	40	100	F				1 1	3 3	3 3	WET. ABU, DIV SEEDS. MIXED AQU/DRY
XSP10	201	OA3	19	40	110	24	D	40	200	F				1 1	3 3	3 2	WET.MOSTLY AQUAT/WETLAND PLANTS
XSP10	202	OA4	27	23	142	31	NO	20	300	F					3 3	3 2	WET. MOSTLY WETLAND/AQU SEEDS
XSP10	300	OA5	18	26	139	30	NM	?	150	F	1 1			1 1	3 3	3 2	WET. MIXED SEEDS, MORE WOOD
XSP10	300	OA5	18	46	104	23	NM	40	400	F				1 1	3 3	3 2	WET.MUCH INDET VEG.SEEDS INC OCC FOODS

XSP10	300	OA5	18	59	45	14	NM	40	400	F				1 1	3 3	3 1	WET. AQU/WETLAND & DRY GRND TAXA
XSP10	300	OA5	18	60	43	11	NM	40	100	F					3 3		WET.MOSTLY AQU/WETLAND PLANTS
XSP10	300	OA5	18	60	44	12	NM	40	400	F				1 1	3 3	3 2	WET. ALMOST ALL AQU/WETLAND. MOLLUSCS
XSP10	300	OA5	18	80	13	6	NM	10	500	F					3 3	3 1	AQUATIC/WETLAND PLANTS, MOLLUSCS
					13	6				W						2 1	
XSP10	300	OA5	18	83	10	10	NM	20	20	F	1 1			2 1	3 3	1 1	DRY.WETAND DRY GRND PLANTS,OCC FOOD
XSP10	300	OA5	18	84	9	5	NM	10	100	F					3 3	2 1	WET. AQUAT/WETL PLANTS + MANY MOLLUSC
					9	5				W						2 1	
XSP10	400	OA7	28	47	103	28	PR	20	150	F	1 1		1 1	1 1	3 3	3 2	WET. FEW FOODS,WET & DRY PL, C.5 GRAINS
					103	28				W					1 1		

Table 27 Hand-collected animal bone from XSP10 and XRZ10

PD	LAND	GP	CONT	SAMPLE	FEATURE	WT (kg)	cattle	pig	dog	game	s/goat	horse	poultry	foet	lmam	mmam	smam	bird	fish	amph	epi	mand	meas	complete	butchery	path	burn	gnaw	work	COMMENTS
##	OA2	11	118	0	NO	0.55	yes	yes	yes			yes			15	4	0	0	0	0	8	1	1	1	0	0	0	0	0	
##	OA2	11	118	29	NO	0.002									0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	
##	OA2	11	125	0	NO	0.15	yes								1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
##	OA2	11	117	0	NO	0.02									1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
##	OA2	2	167	0	ED	0.05	yes								2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	
##	OA2	2	182	0	NO	0.15	yes								4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
##	OA2	3	96	22	N	0.025					yes				0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	
##	OA2	7	54	0	NO	0.075	yes	yes							2	1	0	0	0	0	0	0	0	0	2	0	0	0	0	
##	OA2	7	3	0	ED	0.075		yes							0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	
201	OA3	14	149	0	P	0.01									1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
201	OA3	14	149	32	P	0.025									1	4	0	0	0	0	0	0	0	0	0	0	1	0	0	
201	OA3	4	51	0	NO	0.3	yes	yes			yes				7	4	0	0	0	0	4	0	0	0	4	0	0	0	0	
201	OA3	17	144	0	D	1	yes	yes				yes			10	1	0	0	0	0	4	1	0	0	2	1	0	0	0	
201	OA3	17	155	0	D	0.25	yes								6	1	0	0	0	0	0	0	0	0	3	0	0	0	0	
201	OA3	17	48	0	D	1.55	yes				yes	yes			14	2	0	0	0	0	2	1	0	0	6	0	0	0	0	
201	OA3	17	48	13	D	0.125	yes	yes							1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	
201	OA3	19	111	0	NO	0.075	yes								3	0	0	0	0	0	1	0	1	0	0	0	0	0	0	
201	OA3	19	110	0	D	0.15		yes				yes			4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
201	OA3	19	110	24	D	0.05	yes								1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	
201	OA3	19	109	0	D	0.75	yes	yes	yes			yes			4	2	0	0	0	0	0	0	3	0	2	0	2	0	0	
201	OA3	21	161	0	MU	0.05	yes								1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
201	OA3	21	154	0	ED	0.25	yes	yes				yes			5	1	0	0	0	0	0	1	0	0	5	0	0	0	0	
201	S1	10	160	0	D	0.18	yes				yes				1	2	0	0	0	0	4	0	0	0	2	0	0	0	0	
201	S1	10	160	34	D	0.075	yes	yes							8	1	0	0	0	0	0	0	0	0	2	0	0	0	0	
201	S4	12	122	0	D	0.075	yes				yes				1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
201	S4	12	113	0	D	0.025	yes								2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
201	S4	12	5	0	P	0.05	yes								1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
201	S5	13	150	0	D	0.1	yes	yes							1	2	0	0	0	0	5	0	0	0	1	0	0	0	0	
201	S5	13	156	0	D	0.75	yes	yes	yes		yes	yes			11	6	0	0	0	0	4	0	0	0	6	0	0	0	0	
201	S5	13	156	36	D	0.01									3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
##	OA4	5	16	5	ED	0.2	yes								25	0	0	0	0	0	4	0	0	0	10	0	0	0	0	smashed
##	OA4	27	146	0	P	0.005			yes						0	1	0	0	0	0	2	0	1	1	0	0	0	0	0	
##	OA4	27	142	0	NO	0.4	yes	yes	yes		yes		yes		15	7	0	1	0	0	4	1	2	2	0	0	0	0	0	goose
##	OA4	27	2	0	ED	0.075						yes			5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
##	OA5	18	139	0	NM	0.55	yes		yes			yes			10	4	0	0	0	0	0	2	0	0	0	1	0	0	1	dog pathology/cattle horn core chopped
##	OA5	18	158	0	PR	0.55	yes		yes			yes			10	2	0	0	0	0	3	0	5	1	2	0	0	0	0	
##	OA5	18	129	0	NM	0.95	yes	yes	yes	yes	yes				15	15	0	0	0	0	1	2	8	6	1	1	1	0	1	roe deer/cattle horn core
##	OA5	18	120	0	NM	0.95	yes	yes	yes			yes			7	2	0	0	0	0	5	1	2	2	5	0	0	0	0	
##	OA5	18	104	0	NM	1.5	yes	yes	yes		yes	yes	yes	yes	17	30	2	1	0	0	20	3	5	2	10	0	0	0	1	chicken/calf skull/cattle horn core/cat juvenile
##	OA5	18	104	23	NM	0.005							yes		0	4	0	2	0	1	0	0	0	0	0	0	0	0	0	chicken/goose
##	OA5	18	119	0	NM	0.025	yes								1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
##	OA5	18	45	0	NM	1.05	yes	yes				yes			8	2	0	0	0	0	2	0	1	1	1	0	0	0	0	
##	OA5	18	45	14	NM	0.03	yes	yes							2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	
##	OA5	18	45	17	NM	0.002									1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
##	OA5	18	43	0	NM	0.025					yes				0	1	0	0	0	0	2	0	1	1	0	0	0	0	0	
##	OA5	18	44	0	NM	0.4	yes	yes			yes				15	7	0	0	0	0	7	0	0	0	5	0	0	0	2	cattle metacarpal ice skate/drilled metatarsal
##	OA5	18	30	0	NM	0.2	yes					yes			2	0	0	0	0	0	2	0	0	0	2	0	0	1	0	
##	OA5	18	14	9	NM	0.075	yes								2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
##	OA5	18	10	0	NM	0.005									1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
##	OA5	18	9	5	NM	0.005					yes				0	1	0	0	0	0	2	0	0	0	1	0	0	0	0	
##	OA6	7	14	7	NM	0.025	yes				yes		yes		2	5	0	1	5	0	4	0	0	0	1	0	0	0	0	gurnard/plaice/herring/chicken
##	OA6	7	14	8	NM	0.005					yes				0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
##	OA7	28	136	0	P	0.15	yes				yes				2	1	0	0	0	0	1	0	0	0	1	0	0	0	1	
##	OA7	28	103	0	PR	3.25	yes	yes	yes		yes	yes			40	27	0	0	0	0	30	1	5	3	10	1	0	0	0	
##	OA7	28	103	28	PR	0.04	yes			yes	yes				1	10	1	1	20	0	2	0	0	0	5	0	0	0	0	eel/cod/gurnard/mackerel/rabbit
##	OA7	38	130	0	W	0.45	yes				yes				8	4	0	0	0	0	5	0	1	0	5	0	0	0	1	sheep horn core
500	B1	43	23	0	MU	0.01	yes								1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
500	OA10	35	133	0	P	0.02			yes		yes				0	2	0	0	0	0	2	0	1	1	0	0	0	0	0	
500	OA10	35	46	0	P	0.075	yes								3	0	0	0	0	0	0	0	0	0	2	0	0	0	0	
SUM						**17.97**									**304**	**181**	**4**	**6**	**25**	**1**	**##**	**16**	**37**	**21**	**100**	**4**	**4**	**1**	**7**	

XSP10
XRZ10