

**CROSSRAIL BROADGATE TICKET HALL AND ASSOCIATED  
WORKS**  
**Liverpool Street Station**  
**London EC2M**  
**ARCHAEOLOGICAL POST-EXCAVATION ASSESSMENT**  
**THE MEDIEVAL AND POST-MEDIEVAL SEQUENCE (AFTER C AD**  
**1200)**

**MOLA XSM10 PXA02\_rev.2.0**

This document does not include the osteological assessment of the New Churchyard which is covered by a separate report – MOLA XSM10 PXA02a



Site codes XSM10 and XSL10/XTB12  
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## Executive summary

This report (Crossrail Document No. [C257-MLA-T1-RGN-CRG03-50101](#) or **MOLA XSM10 PXA02**) constitutes a post-excavation assessment (PXA) document and presents the results of an archaeological investigation by MOLA (Museum of London Archaeology) at the site of the Crossrail Central Broadgate Ticket Hall, Liverpool Street, London EC2M, City of London (Museum of London (MoL) sitecode XSM10). The fieldwork comprised a series of watching briefs (targeted and general), evaluations and excavations, conducted between 20/02/11 and 09/10/15. These were undertaken in response to the redevelopment of the site as part of the Crossrail station at Liverpool Street: excavation of the site area to a depth of 25 metres below street level was necessary to provide below-ground concourses and booking halls and escalator access to the platforms. This report also incorporates the results of archaeological investigation by the Museum of London Archaeology (MOLA) at the Crossrail 11–12 Blomfield Street site, EC2, in the City of London (sitecodes XSL10/XTB12). These investigations comprised a series of watching briefs (Targeted and General), evaluations and excavations conducted between 24/05/2011 and 23/01/2014.

The Crossrail Broadgate Ticket Hall site produced multi-period archaeology ranging from early Roman through to post-medieval. The largest component of the archaeological sequence was the post-medieval burial ground documented as the 'New Churchyard' (also known as the Bedlam burial ground). The osteological analysis of the human remains from the post-medieval burial ground has been considered in a separate **MOLA XSM10 PXA02a**/Crossrail Document No. No. [C257-MLA-T1-ASM-CRG03-50001](#) (Crossrail 2015e) which concentrates exclusively on the osteological tasks.

The Roman and earlier medieval sequence (before c AD 1200), is covered by a separate PXA – **MOLA XSM10 PXA01**/Crossrail Document No. [C257-MLA-T1-RGN-CRG03-50099](#), which reflects the fact that the site will be published as two complementary but distinct volumes. This document concentrates exclusively on the non-osteological aspects of the medieval and post-medieval sequence (after c AD 1200) but the publication synopsis (see 8.2) represents an updated version and both incorporates and supersedes that presented in **MOLA XSM10 PXA02a**/Crossrail Document No. No. [C257-MLA-T1-ASM-CRG03-50001](#) (Crossrail 2015e).

The report is designed to inform the reader of the results of the excavation for the periods defined above and describe what post-excavation work has been done so far, what work still needs to be done and why, and how and where the results of the excavation will be made public. All three PXA documents additionally incorporate the results of archaeological investigations of 1985–6 by the Department of Urban Archaeology (DUA) at the Broadgate development site (sitecode LSS85: Dyson et al 1987).

The post-Roman to medieval sequence is largely characterised by a series of marsh deposits, during which time the sites appear to have been unused. Reclamation of the marsh occurred during the 12th–early 15th centuries, a period characterised by a canalisation of the Walbrook channel and a series of large boundary/drainage ditches. Archaeological and documentary evidence shows that the XSM10 and LSS85 sites were used as gardens in the early post-medieval period.

The burial ground documented as the 'New Churchyard', (also known as variously as the Old Bedlam or Bethlem burial/burying ground/place) was in use 1569–1739. The archaeological investigations at XSM10 and LSS85 involved the excavation of c 3750 skeletons, as well as boundary walls and burial structures associated with the burial ground. The sites became increasingly developed from the mid-18th century following the closure of the burial ground. In the 1770s, the lands of the burial ground were converted into gardens or yards for the use of Broad Street Buildings (built in 1737) and No.1 Brokers Row. Greater

changes occurred in the 19th century, including the construction of a new road called 'Liverpool Street' in 1823–24, then the near complete redevelopment of the sites in the 1860s and 70s, which followed the construction of Broad Street Station and Liverpool Street Stations.

This assessment report describes the current understanding of the site and details a schedule of work to complete the analysis of these provisional results and to lead to the publication of the archaeological evidence.

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# 1 Introduction

This document is catalogued within the Crossrail system as C257-MLA-T1-RGN-CRG03-50101. Within MOLA terminology it is **MOLA XSM10 PXA02**.

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.

All work carried out on this project at assessment level has been, and all proposed analysis tasks will be, subject to the health and safety policy statement of MOLA as defined in the MOLA Health And Safety Policy. 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.

All work has also been carried in accordance with the generic Crossrail Written Scheme of Investigation (WSI) (Crossrail Document No. CR-XRL-T1-GST-CR001-00003) and the Site-Specific WSI (Crossrail Document No. C138-MMD-T1-RST-C101-00001 Rev. 3.1) and addendum (Document No. C502-XRL-T1-RST-C101-50002 rev. 2). Specific site methodology was also iterated in the MOLA method statement for the watching brief and excavation of the Crossrail Broadgate Ticket Hall site Areas 1–6 (Crossrail Document No. C257-MLA-T1-GMS-C101-50002; MOLA 2015).

## 1.1 Textual conventions

- MOLA employs a single context excavation system. Contexts are defined on site and remain the basic unit of archaeological stratification throughout. Context numbers are always presented within square brackets [1] ... etc.
- Environmental sample numbers, usually a subsample of a context, are defined by curly brackets {1} ... etc.
- Accession numbers given to particular categories of find are shown as <1> ... etc.
- During post-excavation work, contexts are amalgamated into larger units or subgroups (sgp 1 ...), which are then progressively built up, initially by grouping them together in groups (gp 1, etc), into land-use (LU) entities (described as Open Areas (OA1, ...) or Structures (S1, ...)) and chronological periods, as defined by both stratigraphic and dating evidence.
- Conventionally, a cut, the coffin within it, the human remains and any associated fill will be treated as a subgroup and mapped directly to a group. Multiple individuals within one inhumation event are represented by multiple subgroups mapped to one group.
- Topographical heights in this report are given throughout as m ATD, or metres above tunnel datum. Tunnel datum is –100m OD (Ordnance Survey datum). **The sole exception is the plan drawings which are annotated in m OD. This is to avoid confusion should these plans be compared in isolation from the text with other plan data for adjacent sites.**

## 1.2 Site background

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The XSM10 site is being developed by Crossrail Ltd in order to create a new, sub-surface ticket hall beneath Liverpool Street, City of London, EC2, to serve new platforms being inserted in tunnels beneath Liverpool Street station. The approximate site centre lies at Ordnance Survey National Grid Reference (NGR) 533050 181610 (Fig 1). The Museum of London (MoL) sitecode is XSM10. Henceforth in this report the Broadgate Ticket Hall site is referred to as either 'XSM10' or 'site A'.

The site was occupied until recently by the roadway and pavement of Liverpool Street east of the junction with Blomfield Street, and lay to the south and west of the disused former Broad Street ticket hall/sub-station.

Archaeological excavation at 11 and 12 Blomfield Street (MoL sitecodes XSL10 and XTB12, with the majority of the work undertaken under the second sitecode) are also included (Fig 1). This site is bounded to the north by the TfL District/Circle line railway cutting, to the south by buildings fronting onto Blomfield Street, and to the east by the western end of Broad Street Avenue. The approximate centre of the site is at NGR 532990 181570. Crossrail development on this site involved the demolition of the existing properties prior to the installation of a 40m deep shaft to accommodate ventilation, electrical, mechanical and systems/equipment for the new Crossrail station. In this report, the Blomfield Street site is referred to as either 'XTB12' or 'site B'.

## 1.3 Planning background

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The legislative and planning framework within which the excavation took place has been set out previously elsewhere (Crossrail 2011). In brief, the construction of the railway and its infrastructure has been undertaken by Crossrail Ltd under the authority of the Crossrail Act of 2008. 'The act gives the nominated undertaker 'deemed' planning permission for the authorised works, subject to conditions set out in Schedule 7 which requires additional plans and specifications for the design to be approved by relevant local planning authorities. Over-site development is not covered by the Act and is subject to the normal [Local Authority] planning approval process' (<http://www.cityoflondon.gov.uk/services/transport-and-streets/transport-planning/transport-infrastructure-projects/Pages/Crossrail.aspx> – accessed February 2016). The overall framework within which archaeological work is undertaken is set out in the Environmental Minimum Requirements (EMR) for Crossrail (Crossrail 2012a), under which any contractors were required to implement certain control measures in relation to archaeology before construction work began.

Schedules 9, 10 and 15 of the Crossrail Act (2008) concern matters relating to archaeology and the built heritage and allow 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-applies their existing rights to the Crossrail project. Notwithstanding these dis-applications, it is intended that agreements setting out the detail of the works and requiring relevant consultations and approvals of detail and of mitigation arrangements will be entered into by the nominated undertaker with the relevant local planning authorities and English Heritage in relation to listed buildings and with the Department of Culture, Media and Sport (DCMS) and English Heritage in relation to Scheduled Ancient Monuments.

The LSS85 excavations were funded by Rosehaugh Stanhope Developments PLC.



## 1.4 Scope of the excavations and report

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The overall aim of archaeological work on the Crossrail site was to identify the extent and survival of archaeological deposits, to record and excavate remove those to be impacted upon by the development (preservation by record) or, where appropriate and possible, to preserve these remains *in situ*. The aim of the project is also to put the results into a wider context, whether local, regional, national or international and the proposed publication project will address these issues and introduce updated research aims and objectives raised by the discovery of evidence on site. This report, Crossrail Document No. C257-MLA-T1-RGN-CRG03-50101, was commissioned from MOLA by Crossrail Project Archaeologist Jay Carver on behalf of Crossrail Ltd and covers the Crossrail sites at Liverpool Street (XSM10) and Blomfield Street (XSL10 and XTB12). It also incorporates the results of archaeological works within trench TP7, and other selected areas, undertaken by the then Department of Urban Archaeology (DUA) of the MoL between 10/08/85 and 25/03/86 at the Broadgate development site, Liverpool Street, between 1985 and 1986 (Rosehaugh Stanhope Developments Plc). This site carries MoL sitecode LSS85 (Fig 1; Dyson et al 1987).

The combined archaeological excavations at the sites produced a record of multi-period activity ranging from early Roman through to late post-medieval. The largest component of the archaeological sequence was the post-medieval burial ground documented as the 'New Churchyard' (also known as variously as the Old Bedlam or Bethlem burial/burying ground/place), in use 1569–1739 and it is on this material, and the documentary evidence relating to the New Churchyard – including that deriving from the Crossrail volunteer programme, that forms the largest part of this assessment.

This document is one of three post-excavation assessment documents (PXAs) produced to cover the results of archaeological works undertaken 2011–2015 by MOLA at the site, which recorded multi-period activity ranging from early Roman to late post-medieval. It focusses on the medieval and post-medieval sequence after c AD 1200, outlines its significance and potential and proposes a schedule of further analytical work to lead to the publication of these periods as a volume in the Crossrail Archaeology Series. As it cover the chronologically later strata and finds, this document is carries the MOLA reference identity **MOLA XSM10 PXA02**. The Roman and medieval sequence up to c AD 1200 (from which human remains were also recovered) is covered separately as **MOLA XSM10 PXA01**; Crossrail Doc. No. C257-MLA-T1-RGN-CRG03-50099. The analysis of the osteological data derived from the New Churchyard is already underway and following a schedule of tasks defined in a separate, previously issued **MOLA XSM10 PXA02a**, Crossrail Doc. No. C257-MLA-T1-ASM-CRG03-50001 (Crossrail 2015e).

## 1.5 Circumstances and dates of fieldwork

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In the following sections, cited references are reproduced in the style in which they appear in the bibliography.

All work was carried out in accordance with both the generic Crossrail WSI (Crossrail 2012c) and the Site-Specific WSI (Crossrail 2010) and their addendums.

Crossrail, 2010, *Liverpool Street Station, Site-specific Written Scheme of Investigation* (Doc. No. C138-MMD-T1-RST-C101-00001, Rev.3.0) [SS-WSI]

Crossrail, 2012c *Archaeology Generic Written Scheme of Investigation* (Doc. No. CR-XRL-T1-GST-CR001-00003) [WSI]

Crossrail, 2013e, *Crossrail Central Archaeology Updated Project Design for Post-excavation Works* (Doc. No. CR-XRL-T1-STP-CR001-5001) [UPD]

Site A/XSM10

The sequence of archaeological work undertaken at Site A is tabulated at Table 1. Fieldwork conducted between 20/02/11 and 07/11/14 has been previously reported in:

- Crossrail, 2012d *C257 Fieldwork Report Archaeological Evaluation & Watching Brief Broadgate Ticket Hall (XSM10)* (Doc. No. C257-MLA-X-RGN-CRG02-50064, Rev.2.0), unpub MOLA report for Crossrail
- Crossrail, 2013b *C257 Fieldwork Report Crossrail Broadgate Ticket Hall Excavated Evaluation and GWBs, (XSM10)* (Doc No. C257-MLA-X-RGN-CRG02-50113, Rev. 2.0), unpub MOLA report for Crossrail
- Crossrail, 2015b *C257 Fieldwork Report Archaeological Excavation and Watching Briefs Broadgate Ticket Hall Utilities Combined Report 2013 (XSM10)*(C257-MLA-T1-RGN-CRG03-50014, Rev.2.0), unpub MOLA report for Crossrail
- Crossrail, 2015c *C257 Fieldwork Report Crossrail Broadgate Ticket Hall Pile Line General Watching Brief (XSM10)* (Doc. No. C257-MLA-T1-RGN-CRG03-50072, Rev.2.0), unpub MOLA report for Crossrail

Specific site methodology has also been iterated in the appropriate MOLA method statements. The versions listed below superseded all previous versions and were those in place while works were undertaken on site:

- Crossrail, 2011 *C257 Method Statement Archaeological Evaluation and Watching Briefs Broadgate Ticket Hall* (Doc. No. C257-MLA-X-RGN-CRG02-50002, Rev.4.0), unpub MOLA report for Crossrail
- Crossrail, 2012e *C257 Method Statement Archaeological Watching Brief, Evaluation, and Sample Excavation Broadgate Ticket Hall* (Doc. No. C257-MLA-X-RGN-CRG02-50046, Rev.4.0), unpub MOLA report for Crossrail
- Crossrail, 2013a *C257 Method Statement Archaeological Excavation and Watching Briefs Broadgate Ticket Hall Utilities Corridor* (Doc. No. C257-MLA-X-GMS-C101-50001, Rev.3.0), unpub MOLA report for Crossrail
- Crossrail, 2014a *C257 Method Statement Archaeological Excavation and Watching Briefs Broadgate Ticket Hall Pile Line* (Doc. No. C257-MLA-T1-GMS-C101-50001, Rev.1.0), unpub MOLA report for Crossrail
- Crossrail, 2014b *C257 Method Statement Archaeological Excavation and General Watching Brief Archaeological Targeted Watching Brief Broadgate Area 5 West* (Doc. No. C257-MLA-T1-GMS-CRG03-50002, Rev.3.0), unpub MOLA report for Crossrail
- Crossrail, 2015a *C257 Method Statement for the Watching Brief and Excavation of the Crossrail Broadgate Ticket Hall Areas 1–6* (Doc. No. C257-MLA-T1-GMS-C101-50002, Rev.4.0), unpub MOLA report for Crossrail

*Table 1 XSM10 fieldwork conducted between 20/02/11 and 09/10/15 (see also Fig 2)*

<b>XSM10 Task</b>	<b>Principal Contractor</b>	<b>Date</b>
• GWB (General Watching Brief), structural trial pit in the basement of the Railway Tavern	C243 JP Riney	07/03/11
• Evaluation, trenches 5, 6 and 9	C243 JP Riney	20/02/11 to 14/03/11
• Excavated Evaluation, trenches 1, 2, 7 and 13	C243 JP Riney	07/03/11 to 27/07/11
• Evaluation, Pit 4	C503 VCUK [Vinci Construction UK Limited]	13/10/11 to 26/10/11
• GWB, southern pile line (preliminary ground reduction, clearance of human remains by exhumation contractor). Included Pits 1, 2, 3, 4a, 5, 6, 7, 8, 9, 9a and 10.	C503 VCUK	26/10/11 to 07/02/12
• GWB, Trench 15, within the pavement south of the UBS building (ground works trial pit)	C503 VCUK	11/01/12 to 20/01/12
• GWB, UKPN utility diversions (installation of new utility ducts)	C503 VCUK	11/01/12 to 03/02/12

XSM10 Task	Principal Contractor	Date
• Excavated Evaluation, Trench 14, in the N pavement of Liverpool Street	C503 VCUK	10/02/12 to 01/03/12
• TWB (Targeted Watching Brief), Pit 11 (ground works trial pit)	C503 VCUK	08/02/12 to 19/03/12
• Excavation (and associated watching briefs), the Utilities Corridor	C503 VCUK	GL1 to GL8: 19/03/13 to 25/04/13 GL8 to QVT: 14/08/13 to 16/09/13
• GWB, 200mm water trial trench	C503 VCUK	13/06/13
• GWB, 180mm gas main trial trench	C503 VCUK	14/06/13
• GWB and TWB, Sewer Shaft MHS1	C503 VCUK	15/07/13 to 18/10/13
• GWB and TWB, Sewer Shaft MHS2-100	C503 VCUK	05/08/13 to 30/08/13
• GWB and TWB, Open Cut Sewer	C503 VCUK	12/04/13 to 09/05/13
• GWB, Heading from MHS2-100 to Blomfield Street sewer	C503 VCUK	10/09/13 to 03/10/13
• GWB, demolition of Manhole X	C503 VCUK	09/12/13 to 13/12/13
• TWB, Manhole MHS2	C503 VCUK	20/01/14 to 03/02/14
GWB, northern pile line (preliminary ground reduction and clearance of human remains by exhumation contractor). Included trench TB1-TB8, TB2b, TS1-TS2, TB2.3-TB2.14)	C502 LOR [Laing O'Rourke]	19/06/14 to 07/11/14
• GWB and Excavation, Area 5	C502 LOR	Area 5 West: 18/07/15 to 30/07/15 Area 5: 02/02/15 to 11/03/15
• GWB and Excavation, Area 2/3	C502 LOR	20/02/15 to 08/05/15
• GWB and Excavation, Area 1	C502 LOR	13/07/15 to 09/10/15

#### Site B/XSL10/XTB12

The sequence of archaeological work undertaken at Site B is tabulated at Table 2. Fieldwork conducted between 24/05/2011 and 23/01/2014 has been previously reported in:

- Crossrail, 2012f *Central Section Project, Fieldwork Report, Archaeological Evaluation at 11–12 Blomfield Street (XSL10)* (Doc. No. C257-MLA-X-RGN-CRG02-50126, Rev.1.0), unpub MOLA report for Crossrail
- Crossrail, 2015d *C257 Archaeology Central Fieldwork Report Blomfield Box Site Archaeological Watching Brief and Excavation Blomfield Box (XTB12)* (Doc. No. C257-MLA-X-RGN-CRG03-50017, Rev.1.0), unpub MOLA report for Crossrail

As with Site A, all work was carried out in accordance with both the generic Crossrail WSI (Document No. CR-XRL-T1-GST-CR001-00003) and the Site-Specific WSI (Doc. No. C138-MMD-T1-RST-C101-00001 Revisions 1-3.0) and their addendums. The MOLA method statements in place while works were undertaken on site are:

- Crossrail, 2012a, *Watching Brief & Detailed Excavation – Blomfield Worksite – (XTB12) Blomfield Box* (Doc. No. C502-XRL-T1-RST-C101-50001, Rev.1.0) [WSI Addendum] (this supersedes the earlier addendum C138-MMD-T1-RST-C101-00005), unpub MOLA report for Crossrail
- Crossrail, 2013c *C257 Archaeology Central, Method Statement, Archaeological Targeted Watching Brief, Blomfield Box, 11–12 Blomfield Street* (Doc. No. C257-MLA-X-GMS-C101-50002, Rev.1.0), unpub MOLA report for Crossrail
- Crossrail, 2013d *C257 Archaeology Central, Method Statement, Archaeological Excavation, 11–12 Blomfield Street* (Doc. No. C257-MLA-T1-GMS-CRG03-50001, Rev.1.0), unpub MOLA report for Crossrail

**Table 2** XSL10 / XTB12 fieldwork conducted between 24/05/2011 and 23/01/2014

XSL10 / XTB12 Tasks	Principal Contractor	Programme
• Trial trench evaluation (3 trenches)	J F Hunt Demolition and C243 JB Riney	24/05/2011–26/07/2011
• General Watching Brief on Obstruction Removal	C502 LOR	Collectively: 20/08/2012– 05/04/2013
• General watching brief on site wide ground reduction to 106.74m ATD	C502 LOR	
• Targeted Watching Brief within the Main Box on ground reduction to 106.70m ATD	C502 LOR	
• Excavation in Grout shaft (13m x 7m x c 2.6m deep)	C502 LOR	06/11/2014–23/01/2014

LSS85

The excavation of trench TP7 consisted of full controlled excavation of the burial ground horizon and later sequence, but earlier archaeological deposits were recorded under watching brief.

LSS85 fieldwork results have been previously documented by unpublished DUA reports (Dyson et al 1987) and a popular book (Hunting et al 1991). The site archive is lodged at the MoL Archaeological Archive.

**Table 3** LSS85 principal fieldwork included in this report, conducted between 1984 and 1985 (see also Fig 2)

LSS85 Task	Principal Contractor	Date
TP7, open area excavation (4m x 18m) was targeted for the controlled excavation	Bovis Construction Ltd	10/08/85 to 25/03/86

## 1.6 Organisation of the report

As per section 1.4 above: ‘Notwithstanding these dis-applications, it is intended that agreements setting out the detail of the works and requiring relevant consultations and approvals of detail and of mitigation arrangements will be entered into by the nominated undertaker with the relevant local planning authorities .....’

Consequently, despite the statutory framework of the planning background, this report adopts the standard structure of a MOLA PXA/UPD submission for a site within the City of London which is the relevant planning authority for the site. The principle underlying the concept of post-excavation assessment and updated project design were established by English Heritage (now Historic England) in the *Management of Archaeological Projects 2* (MAP2; English Heritage 1991). More recent Historic England Greater London Archaeological Advisory Service (GLAAS) guidance defines a *Post-excavation assessment and updated project design report* as intended to ‘sum up what is already known and what further work will be required to reach the goal of a well-argued presentation of the results of recording and analysis’. It emphasises the need for this stage to be seen as ‘brief and transitional’, the document acting as a ‘gateway’ to further analysis and eventual publication (EH, GLAAS, 1999 VI/1). Other recent Historic England guidance, superseding MAP2 but embodying the same principles, is contained in Historic England’s *Management of Research Projects in the Historic Environment* (MoRPHE) Project Planning Note (PPN) 3.

The updated project design and proposed publication outline have been formulated in response to the Crossrail Central Archaeology Updated Project Design for Post-excavation Works (Doc. No. CR-XRL-T1-STP-CR001-5001) and proposed publication output (Crossrail work stream ref CRL11 ‘Roman and Medieval Broadgate and Blomfield Street’).

The report begins with a brief archaeological and historical background to the site and surrounding area, based on knowledge prior to the excavation of the site (Section 2) and then presents the original research aims (Section 3) that were formulated on the basis of that information. The interim results of the excavation are described in Section 4; this information is presented using context information and is again organised chronologically by period and incorporates archaeological evidence from neighbouring sites.

The quantification and assessment section details the stratigraphic and specialist (finds and environmental) archive (section 5). The discussion of the potential of the site (section 6) combines stratigraphic and specialist information. The degree to which the original research aims can be realised is also discussed, along with the varying significance of the data recovered (section 7). Revised or new research aims and a publication synopsis for proposed dissemination of the results based upon these research aims are stated in section 8, together with method statements for, and tabulation of, the tasks and resource requirement that that publication would entail.

## 2 Topographical, historical and archaeological background

The natural topography and archaeological sequence before c AD 1200 are covered by **MOLA XSM10 PXA01**/Crossrail Document No. [C257-MLA-T1-RGN-CRG03-50099](#). Other than brief background information on Walbrook drainage, only medieval and post-medieval information, relevant to the results included in this assessment, has been included below.

### 2.1 Archaeological background (after c AD1000)

The construction of the masonry defensive wall around London between c AD 180 and c AD 225 was one of a number of factors that impeded the drainage of the Walbrook stream and its associated drainage system. Although the stream itself was conducted through the wall in a culvert, an area of marshy land began to form in the valley north of (outside) the city wall. At least the lower parts and foundations of the Roman defensive enceinte survived substantially intact and were reused in the medieval City wall. The survival of the wall meant that Walbrook drainage remained impeded and that the Walbrook valley to its north remained marshy, marginal, open land, and became known as Moorfields. Later medieval urbanisation north of the City wall was initially limited to ribbon development along Bishopsgate, to the east. However, some drainage of Moorfields had been implemented by the 15th century when an additional gate, Moorgate, was cut through the wall, though 16th and early to mid-17th maps (Fig 3; Fig 4; Fig 5;) continue to show it as an essentially undeveloped area.

The site lies within the 'New Churchyard', which had been established by the City of London in 1569 as the first of the early-modern non-parochial churchyards. The new burial ground, which covered an area of c1 acre, lay within the western part of what had been until the Dissolution the precinct of the priory of St Mary Bethlehem (founded 1247). From the second quarter of the 14th century onwards the priory included a hospital, which by the 15th century increasingly specialised in accommodating those deemed mentally unstable. At the Dissolution the administration of the hospital and priory lands passed to the City of London. Therefore, the New Churchyard was established on land already controlled by the City and lay immediately west of the hospital, which the City maintained on this site until 1676. Consequently, the burial ground was commonly known as the 'Bethlehem Church Yard' or 'Old Bethlem Burying Ground'. Despite this name, the New Churchyard was from the first intended not for the exclusive use of the hospital but as an 'overflow' area, relieving pressure on the increasingly crowded burial grounds elsewhere within the City. An outbreak of plague in 1563 had demonstrated that lack of capacity was becoming a severe problem.

The New Churchyard remained in use nearly 170 years, closing in March 1739, and consequently its location and extent is shown on the City maps and plans that became more common from the later 17th century onwards (Fig 4; Fig 5; Fig 6; Fig 7). The site is located within the south-western part of the burial ground.

In 1737, Broad Street Buildings and New Broad Street (now Old Broad Street) were built together as the northward extension of Broad Street across London Wall and out of the City. The properties on the south and west sides of Broad Street Buildings were built immediately adjoining the north and east boundary walls of the New Churchyard. By 1773, the site had been converted to act as the gardens of these buildings. In 1823, the road 'Old Bethlem' was widened at its west end, encroaching over the southern part of the burial ground, and renamed 'Liverpool Street' (Fig 11) and most of the northern part of the burial ground was subsumed beneath Broad Street Station in 1863-65 (Fig 12).

In 1985, excavations at Broad Street Station (Fig 1; LSS85) investigated burials which had survived the construction of the station. The excavation was located under what had been the taxicab ramp, immediately in front of the station building itself and over 400 partial or complete burials were encountered at a density of up to 8 per m<sup>3</sup> of ground. A further 200 were recorded in test-pits (Dyson et al 1987). More recent excavations continued to confirm the presence of human remains within the Broadgate Ticket Hall site (LVB06 and XRF09).

## 3 Original research aims

The original research aims (ORAs) were previously listed in WSIs (Crossrail 2010; 2012c), where they were identified as having the potential to contribute to London-wide research themes (Museum of London 2002):

- Evidence relating to the medieval Bethlehem Hospital precinct and cemetery (BG208), bisected by Liverpool Street, and may provide data relevant to the following themes:
  - i. Understanding the differences, if any, between burial practices in the city and outlying [Municipal] cemeteries;
  - ii. Understanding life expectancy, origins and belief, seen through studying health, diet and disease, and preparing models for future research;
  - iii. Considering the relationship between cemeteries and major or minor roads, in terms of symbolism, status, privacy and convenience; and
  - iv. Synthesising data on known religious sites and buildings, their chronology, use and influence locally, regionally and nationally.

The site-specific ORAs were previously presented in Crossrail 2011 and Crossrail 2015a, where those relevant to the medieval and post-medieval sequence are sub-numbered RM1 et seq (early-medieval), BB1 et seq. (Bethlehem Burial ground) and PM1 et seq. (post-medieval) etc. Additional aims were formulated during the course of fieldwork (RM9, BB12, PM5, RM10—RM13). Here, they are prefixed with ORA to distinguish them from revised research aims (RRAs) presented later in this document.

Research aims ORA-RM 1–ORA-RM 2, ORA-RM 4–ORA-RM 7, and ORA-RM 7-ORA-RM 12 are covered by assessment document **MOLA XSM PXA01** ([C257-MLA-T1-RGN-CRG03-50099](#)), and ORA-BB 8–ORA-BB 11 by osteological assessment (MOLA XSM10 PXA02a ([C257-MLA-T1-ASM-CRG03-50001](#))) and so are not addressed by this report. The fulfilment or otherwise of the ORAs is discussed at Section 6.1 below.

### 3.1 Roman and medieval:

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**ORA-RM 3** *Determine if the ditch found in Pit 11/Trench 1 [and Area 2] is the canalised eastern edge of the Blomfield Street Walbrook channel or not.*

**ORA-RM 8** *What evidence is there for reclamation of the area in the medieval or post-medieval period? Is there evidence for land stabilisation and agricultural use/refuse disposal in the medieval period?*

**ORA-RM 13** *What evidence is there for further medieval industry in the area of the site?*

### 3.2 New Churchyard/Bedlam burial ground:

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**ORA-BB 1** *Characterise and date the sequence of late medieval and early post-medieval dumping and reclamation associated with the establishment of the burial ground. What evidence is there for the original boundary of the burial ground, its subsequent rebuilding and any intra site spatial organisation?*

**ORA-BB 2** *Characterise and refine the sequence and dating of burials. How was the burial ground filled? Is there evidence for intermittent import of other soils referred to in historic documents or hiatus? Is there structural evidence for the alleged pulpit?*



- ORA-BB 3 *Can different burial practices be defined? Use of shrouds, coffins, mass burial pits? How does it change spatially and chronologically? What indication is there for formal organisation/management and zoning? Can burial episodes be related to historic events such as documented plagues?*
- ORA-BB 4 *Is there a zone of multiple or pit burials in the northern part of the site around Trenches 13 and 14, and the 1985 excavations?*
- ORA-BB 5 *What date did the burial ground go out of use and how was the site prepared for subsequent re-use as gardens and then development? Can the gradual encroachment of Georgian buildings and plots in the 18th century be phased and dated?*
- ORA-BB 6 *Can gravestones or marker/ledger slabs provide evidence which will identify individuals, and can these be correlated with documentary sources?*
- ORA-BB 7 *What evidence is there for coffin use, construction type, furniture and coffin plates?*
- ORA-BB 12 *What structures were constructed within the burial ground whilst it was in use, eg a historically-attested pulpit, or structures similar to those seen on maps of 1658 and 1676?*

Other post-medieval:

- ORA-PM 1 *What is the date and taphonomy of the deposition of the important worked bone assemblage? For example, do these dumped deposits post-date the burial ground deposits, or do they represent intermittent deposition during and after the use of the burial ground?*
- ORA-PM 2 *Can any spatial and chronological patterns of the different types of bone artefact be identified in different parts of the site? How do these relate to any zonal patterning in the burial ground?*
- ORA-PM 3 *Can documentary research identify evidence for the activities and industries in the surrounding area that are likely represented by waste materials dumped in the burial ground?*
- ORA-PM 4 *How was the burial ground location treated in the Georgian and Victorian eras with reference to the character and date of the structural remains relating to 18th and 19th-century urbanisation and development?*
- ORA-PM 5 *How did Liverpool Street develop in the 19th century, notably with the construction of the former Broad Street ticket hall and associated structures, and sewerage beneath the roadway?*

## 4 Site sequence: interim statement on field work

Aspects of the site earlier than c AD 1200 are covered by **MOLA XSM PXA01 (C257-MLA-T1-RGN-CRG03-50099)**. From the 3rd century AD until the beginning of the medieval period, marsh formed in the Walbrook valley north of the city wall. There is no archaeological evidence for use of the site after the 4th century AD and the site produced no pottery dated to the 5th–10th centuries. The continued marshy nature of the site during this period is evidenced by the build-up of a soil horizon of peaty humic deposits.

### 4.1 Medieval to early post-medieval c AD 1200–1569

The earliest post-Roman features can be dated to the medieval period. These features included a series of linear pits ([6550], [6554], [6568], [6558], [6571], [8289] and [8300]), an E–W ditch [2046]/[1313] and a timber land tie assembly [1293–95] (Fig 13). This horizon also produced bone ice skates. FitzStephen describes the use of these skates in Moorfields in the late 12th century (Thornbury 1878, 196). One of the linear pits was provided with a *terminus post quem* (TPQ) of AD 1080 for infilling from pottery spot dating.

#### The medieval Walbrook

The course of immediately pre-Roman, Roman and medieval Walbrook ran below modern Blomfield Street and its eastern side was located during the Crossrail Broadgate excavations. During the medieval period, the course of the stream was reflected followed by the western boundary of the parish of St Botolph without Bishopsgate.

By 1247 this part of the Walbrook stream channel was known as the ‘Deep Ditch’ which suggests that it may have become at least partially canalised or revetted by this date and medieval references to it describe a prominent feature separating Moorfields (now Finsbury Circus) from land to the east (now Liverpool Street). The ‘Deep Ditch’ is mentioned as the west boundary of the lands of St Mary Bethlehem in the foundation charter of 1247 (Dugdale 1830, 622). The Walbrook probably fed into the ditches outside the City wall, which underwent work in 1211–13 (Stow 1994, 50).

The eastern end of a land tie assembly (‘land anchor’ or ‘back brace’) [1293]–[1295] was found on the western edge of the site. Construction techniques evident in the timber suggest a date of 1400 or later for this structure (see 5.12). This land tie indicates the presence of a substantial c NNE–SSE aligned revetment located c 3m further west (outside the side), below what is now the east side of Blomfield Street, which would have formed the eastern side of a large channel. Given its date and location, this land tie assembly is most likely part of efforts to canalise and revet the Walbrook in the 15th century. Stow records that the ‘Deepditch by Bethlehem’ was one of the ditches improved during ditch works in Moorfields in 1415 (Stow 1994, 388).

The formation of further peaty humic deposits which sealed these features indicates the reassertion of at least partially marshy conditions and could be evidence that initial drainage efforts were not entirely successful. Nevertheless, by the c late 15th to early 16th century adequate drainage appears to have been sufficiently established through a network of large ditches on N–S and E–W alignments (Fig 15 and Fig 16) to allow for the creation of gardens, as evidenced by a cluster of bedding trenches, pits and possible tree bowls in XSM10 Area 2/3 (Fig 14). These features were located within lands owned by St Mary Bethlehem.

## The recut 'Deep Ditch'

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During the 16th century prior to the foundation of the burial ground, the landscape of the site was dominated by a very large, NNE-SSW aligned ditch, 12.3m wide by c 2.5m deep and traced across the XSM10 site over a distance of c 27m, running approximately parallel to, but east of, modern Blomfield Street (contexts [710]/[988]/[1050]/[1069]/[6581]) (Fig 16). John Stow records that the ditches of Moorfields area, including the City ditch, were 'new cast and cleansed' several times during the 15th and early 16th centuries (Stow 1994, 50–51, 387–88) and it is most likely that this substantial feature dates to this time period and superseded the original Walbrook channel, which must be assumed to have become irretrievably blocked and congested by this date. It is this new 'casting', and not the original Walbrook channel, which can be seen on mid-16th century maps (Fig 3) separating Moorfields (now Finsbury Circus) and Old Bethlem (now Liverpool Street) now acting as the principal ditch/drain of the Moorfields area.

The upper disuse fills date to the mid–late 16th century and show that by the end of its life the ditch had been used for rubbish disposal and effectively an open sewer. Stow records how the City ditch suffered the same fate in the late 16th century, specifically 'Moreditch', to the south of both 'Petty France' and the sites (Stow 1994, 180).

### 4.2 Post-medieval after 1569

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All excavated cemetery features are shown on (Fig 17).

#### The New Churchyard (1569–1739)

The reclamation of the site in order to establish the burial ground is described in various City records. In late July 1569, orders were issued to raise and level the ground 'because it lies near the City's ditch and is somewhat low', this involved the import and dumping of 'earth from all cellar and well diggings' as well as 'rubbish' over a six week period (Hunting et al 1991, 33). A soil horizon formed of building rubble and silt dumps, characterised by crushed brick and mortar, of this description and date was found across both the XSM10 and LSS85 sites (Fig 18). Generally, this horizon was thicker in the west, where more dumping was as the topography dipped towards the Walbrook, by this date represented by the 'Deep Ditch'.

#### The cemetery boundary walls

A substantial, NNE-SSW aligned brick wall ([915]/[1103]/[1105]/[1457]; Fig 17) was constructed on a foundation of elm piles. The brick used can be dated as pre-1666 in manufacture. A second wall, set on timber piles of which three ([1354]/[1406]/[1468]) were within the LOE was found on the south edge of the site. Most of this wall had been removed by the 19th-century cellars of 1–14 Liverpool Street and/or 20th-century utilities. Modern truncation had also removed any stratigraphic relationship between these and the cemetery burial horizon but their location conforms to the earliest south and west boundary walls of the cemetery to be recorded on historic maps (Fig 4; Fig 5; Fig 6; Fig 7; Fig 8; Fig 9).

Wall ([1215]/[1144]/[1145]) (Fig 17; Fig 19), also substantial and constructed with an elm pile foundation, was parallel to, and c 2.5m to the east of, NNE-SSW aligned wall [915] et al. This wall cut through coffined burials - burials that were relatively high in the stratified sequence of inhumations - and several further burials were made against it, on a NNE-SSW alignment, after its construction. This wall is late 17th to early 18th century in date and marks a replacement of the original west boundary wall of the cemetery: the archaeological evidence conforms with mid-18th to mid-19th century maps which show the revised boundary alignment (eg Fig 10).

### Primary burials

Primary burials, at the base of the stratified sequence, were not in coffins (the term 'uncoffined' is used henceforward) and relatively sparsely distributed. Some at the northern end of the site (including LSS85) were sealed by dumping/makeup layers, suggesting that the first interments in the burial ground whilst the ground raising associated with the laying out of the New Churchyard was still being undertaken.

### Mass graves

At both XSM10 and LSS85, the primary burials were cut by a series of pit interments containing 4–16 individuals. These pits were wide enough to accommodate two individuals side by side, with further interments in layers above, and contained, almost exclusively uncoffined burials. Their stratigraphic position and the absence of coffins, suggest a late 16th or early 17th century date. (Given the poor survival of wood at cemetery levels on site it remains possible, though unlikely, that the occasional coffin had been present: there was demonstrably a total absence of coffin furniture). The pits clustered to the north of the excavated areas, a zone that would have lain in the western centre of the burial ground (Fig 17). This style of interment could be evidence of pauper's graves or reflect a response to a sudden increase in mortality rates, such as during an epidemic. There were severe plague outbreaks in 1593 and 1625. Provisional documentary research confirms that the New Churchyard was used as an emergency burial ground during the 1625 and 1665 plague epidemics (LMA, COL/CA/01/01/044, 203b; LMA COL/CA/01/01/074, 156).

Two mass graves ([3601]–[4803] and [7482]/[8473]) (Fig 17; Fig 20), which differ from the pits cited above in scale (they contained 21 (21 contexts) and 44 individuals (46 contexts), respectively), in being more densely filled and in that the majority of the burials were in coffins, indicate a later phase of pit burial – the style of coffin and coffin furniture (grips) from both are provisionally dated to post-1650. Mass grave [3601]–[4803] was stratigraphically located at the top of the burial ground sequence. Mass grave [7482]/[8473] was both truncated by and sealed by coffined burials.

In the case of [7482]/[8473], the coffins had been placed in an alternating head-to-toe pattern, with occasional coffins even positioned perpendicularly, to more efficiently use the available space. Both pits could indicate a catastrophic episode(s) occurring between the late 17th century and 1739, such as the Great Plague of 1665. Alternatively, they could be mass graves for the burial of the poor with the large pits accommodating the maximum number of interments at a time when the available space was running out.

Among the XSM10 and LSS85 interments there were examples of burials containing more than one individual. Several burials contained two skeletons in one grave or coffin, exclusively a neonate or infant interred with an adult, most probably the burials of mothers with their children.

### Brick burial vaults

A total of four brick burial vaults were excavated, two at LSS85 (LSS85 [1540] and LSS85 [556]; Fig 17; Fig 21) and two at XSM10 ([58] (Fig 17; Fig 22) and [7158]). All were of a similar construction, with floors and walls of red brick bonded by light yellow sandy mortar and foundations consisting of layers of prepared sand. Vault [7158] had been demolished, largely robbed out and then sealed by later burials. All the extant vaults were stratigraphically at the top of the burial ground sequence

Vault [58] contained a single *in situ* coffined burial (skeleton [3000]/coffin [3001]) which had been badly disturbed and truncated by later construction activity (wall [1642]/[1648]). The vault contained sufficient internal space for a second burial to have originally been placed to the north of [3000]/[3001]. A second layer may have then been placed above these, as in LSS85 vault [1540].

Vault LSS85 [1540] was aligned E–W and LSS85 [556] NW–SE. The larger, later vault (LSS85, [556]), containing six lead coffins in which were finely decorated wooden inner coffins (Fig 21) replaced (LSS85, [1540]): its orientation was reversed and its entrance was therefore directly over that of the earlier vault. In the main body of vault [1540], slots were inserted in the brickwork along the E–W walls, possibly to carry cross beams so that a second layer of coffins could be placed in the vault. The vault would have been able to contain a maximum of four coffins, two on each level.

Masonry structures [1510]/[1511], [1512] and [1639]/[1640] (Fig 17) truncated the burial ground horizon and are dated by bricks to post-1666. Based on the shape, size and orientation of these structures, they are likely to be the remains of late 17th or early 18th-century brick lined burials or chest tombs, rather than post-burial ground structures, such as or outbuildings.

### Gravestones

By James Wright and Adrian Miles

#### <3052>

A single grave marker or gravestone <3052> was in two pieces. It measured 0.40m by 0.53m wide (maximum dimensions) by up to 75mm thick. The edges are smoothed, while the rear is rough-hewn, suggesting it was probably originally laid flat. Neither the original top nor bottom of the stone survives. Four lines of a partial inscription survived, all inscribed in capital letters (full capitals

37mm (1½ inches) high, small capitals 25mm (1 inch) high):

JOHN BA...  
BAIL FA...AGED 25  
WEEKS DYED YE 13D OF  
APRILL 1664

This is likely to be a family grave marker, as it is possible that more than one individual is mentioned and it would be unusual to have a grave marker for a 25 week old infant alone. However, the partial nature of the stone makes this difficult to be certain. The top surviving line mentions John Ba... which it is safe to assume is Bail (or Ball) as in the next line, where it appears to be a middle name, with Fa(c/o/g?)...being the surname.

#### [1115]

Context [1115] consists of three fragmentary pieces of slate similar to that quarried at Berwyn, Denbighshire. The fragments all interlock, but do not represent a complete stone. On the reverse face, the stone has a chamfer cut along one side and the entire face has been dressed roughly, indicating that it was never intended to be seen. The thickness and surface wear suggests that the stone was a ledger slab, which was laid horizontally, flush with the ground level around it.

Subsequent wear may therefore relate to footfall, which has polished the surface and reduced the inscription to a very truncated appearance which is not coherently legible. A partial inscription reads:

HERE ALSO  
W[?]LLI  
OF CABT[?]IA  
& SAMVELL  
PACK &

The use of the words “HERE ALSO” along with the wear on the upper part of the stone suggests that several people were memorialised by this stone and that alongside the principal incumbent, there may be up to three other individuals represented here: one

probably called William, another with the first name Samvell and a third with the surname Pack. The use of the letter “V” in “SAMVELL” is an archaic form of “U”.

No date appears on the ledger however the use of the double-V version of the letter W indicates that this stone was cut during the second half of the 17th or very early-mid- 18th century. Given the re-use of the stone in an 18th-century wall along with context [1115], the balance of probability suggests that this ledger is also 17th-century. The double-V version of the letter W may also have an apotropaic function of warding off evil spirits from the grave and may reflect the folk beliefs of either the mason or patron or possibly both.

[1135]

Four interlocking fragments [1135] of Portland base bed limestone from Dorset do not represent a complete stone (Fig 24). The reverse face of the stone is fair faced and was clearly meant to be visible. The thickness and decorative scheme on the front face suggests that the stone was a vertical headstone.

The inscription reads:

SARAH LONG  
                                   N  
 WIFE OF S[E]FTO  
 LONG WHO DYED  
 MAY TH[E] [?]2  
 1672 AIG[ED]  
 [17?] WITH

The use of the word “WITH” at the end of the inscription indicates that Sarah Long may have been also buried with another person(s), or may be part of a formulaic phrase such as “WITH HOPE” etc.

The stone is approximately 80% complete and is characteristic of the very low headstones of the late 17th and early 18th century which were laid directly into the earth. Such stones often featured two or three carved scrolls above the lettering. There is an indication of this in the breakage scarring of the stonework, as well as a complete carved ring in the centre immediately above the name. The lettering panel also has evidence of a sunken channel running around it, which would have given emphasis to the text.

The date is very precise and probably read “MAY THE [1]2” or “[2]2” 1672. Sarah Long, wife of Sefton Long, ‘founder’, has recently been identified in the burial records for the inhabitants of the parish of St Giles Cripplegate (Marit Leenstra, pers comm), in preliminary stages of a Crossrail documentary research project for the Broadgate burials.

The letter-cutting is very crude and belies some evidence that the mason was illiterate given that the letter “N” on three occasions is reversed and in the case of the word “SEFTON” the mason was unable to resolve the spacing satisfactorily and placed the “N” above the “O”.

The double-V version of the letter W occurs on three occasions and may also have an apotropaic function of warding off evil spirits from the grave. It may reflect the folk beliefs of either the mason or patron or possibly both.

Coffin plates

The only readable coffin breastplates from either site came from within brick vault LSS85 [556] (Fig 21). They provided the following biographical information for 8 individuals buried within it.

*Table 4            named burials within vault LSS85 [556]*

Ann Farrington	Died 1714 Born 1666	Age 48 years
Williams	Died 1708 Born -	Age -
Frances Williams (nee Jenkes)	Died 1714 Born 1680	Age 34 years

Francis Jenkes	Died 1686 Born 1640	Age 46 years
Elizabeth Jenkes	Died 1694 Born 1669	Age 25 years
Harbert Jenkes	Died 1696 Born -	Age 56+ years
Sarah Jenkes	Died 1698 Born 1675	Age 23 years
Ann Halford	Died 1712 Born 1631	Age 81 years

### Coffins carrying upholstery stud adornment

In addition to gravestones and breastplates, coffin lid stud adornment is the only other archaeological source for biographical information. There are **six** XSM10 burials with coffin lids carrying letters formed by arrangements of upholstery studs:

Unfortunately, the lids were often distorted, disturbed and/or truncated. Nevertheless, some reconstruction has been attempted.

The location of missing studs can be conjectured from staining or holes left by the studs (see for example Fig 26; Fig 27) and from a comparison with contemporary typography. In the following transcriptions, letters reconstructed from inferred stud positions are shown in brackets ().

Coffin lid [4693] (skeleton [4692]):

**ML or LM**  
**88**

Coffin lid [5587] (skeleton [5586]) (Fig 26):

**R + R**  
**1·6·7·4**

Coffin lid of [4910] (skeleton [4909]):

(missing letter) **M**  
**(1692)**

Coffin lid [5696] (skeleton [5695]):

**R – (H)**  
**1 6 7 6**

Coffin lid [5194] (skeleton [5193]) (Fig 25):

**P·W**  
**1·6·7·6**

Coffin lid [7163] (skeleton [7162]):

**R(C)** (missing letter)  
**16(9)** (missing number)

A coffin [1646] from the XSM10 watching brief, with no associated skeleton, carried the letters:

(missing letter) **W** or **W** (missing letter)  
**1 6 8 1**

Two LSS85 coffin lids had upholstery studs:

Coffin lid LSS85 [895]:

**P**  
**7**  
**5 (or S?)**

This inscription was positioned length ways along the approximate centre of the lid. The meaning of this inscription is unclear, although it may represent an unusual arrangement of initials and date, for example TP 1715, arranged:

**(T)P**  
**(1)7**  
**(1)5**

Coffin lid LSS85 [677] (Fig 27):

**(E)P**  
**(1)(6)(8)8**  
**1 7 2 1**

This is the only example on which the year of both birth and death remained extant.

While all the studwork dates to the late 17th–early 18th century, only five provide a precise (and unconjectured) date, and its potential is limited by its generally poor and incomplete condition. Further analysis of burial registers may provide matches to named individuals.

However, given how many parishes used the burial ground, it may only be possible to narrow down potential matches to a small number of individuals.

### Overview of the New Churchyard

The New Churchyard was in use for nearly 170 years between c July 1569 and March 1739.

The average thickness of the cemetery soil across the site was c 1.3m. Burials occurred at c 109.4–111.5 m ATD at XSM10 and at c 109.6–111.7m ATD at LSS85: the very slight variation probably represents a slight rise in the cemetery ground level to the north. No contemporary burial ground surface(s) had survived but the general pattern of burial levels suggests that prevailing contemporary ground level during the use of the New Churchyard fell c 0.6m from north to south and from east to west.

No *in situ* gravestones were found – these would almost certainly have been taken down and removed sometime between the closure of the burial ground in 1739 and the establishment of gardens on the site in the 1770s. Nevertheless, the site did produce a total of 9 incomplete gravestones, which had survived only because they had been reused in the foundations of later masonry structures. Of these 9, the inscriptions of 7 contain enough biographical detail to identify individuals and can potentially be correlated with parish registers and other documentary sources, which will be pursued in further analysis.

### Overall extent/population

Based on the location of the boundary walls, as seen archaeologically and on mid-18th to mid-19th century maps, the total area of the burial ground has been provisionally calculated as c 3350m<sup>2</sup> (0.828 acres) and 3290m<sup>2</sup> (0.813 acres), before and after the rebuilding of the west wall, respectively.

Aggregating the interventions at XSM10 and LSS85, the total area of the burial ground archaeologically excavated was c 760m<sup>2</sup>, of which c 500m<sup>2</sup> (or c 15% of the total area of the burial ground) contained extant, *in situ* burials (c 3750 individuals). Given that burials intercut, were truncated and may otherwise have been completely removed (which latter category would survive, if at all, in the archaeological record as disarticulated remains or charnel), estimations of density of inhumation can never be precise; however, initial estimates suggest an average density across XSM10 and LSS85 of 6–8 individual burials per cubic metre. If these figures are typical of the whole burial ground, then the New Churchyard as a whole would contain at least 25,000 individuals.

### Patterns of distribution/alignment

Preliminary work has revealed some patterns within the cemetery population:

- Orientation: the lower burials in the sequence were generally orientated E–W and, therefore, aligned with the south boundary wall. However, at some point in the later burial sequence, there was a marked shift in orientation; after which the majority of burials appear to be orientated approximately NW–SE and, therefore, aligned perpendicular to the west wall. The stratigraphically later burial structures LSS85 [556] and XSM10 [1510] both seem to parallel this alignment. In addition, whilst the vast majority of burials had head located in the west, those burials with the head to the east appear to be concentrated in the south-east of XSM10 Area2/3 and in Area 1, stratigraphically in the top of the burial sequence. In Area 1, some rows were characterised by alternating head orientation. On many other sites, occasional burials have been found with the head in the east and in most cases this was to maximise the use of available burial space in grounds which were reaching full capacity.
- There may be some association between the position of burial structures and the gates of the burial ground, with burials structures placed close to and flanking the south and west gates of the burial ground. Late 16th- to mid-17th century maps show



the south gate located at the centre of the south wall. Late 18th-century maps show the west gate located at the centre of the west wall and no south gate.

- Coffins with breastplates/decoration/furniture appear to cluster which may reveal a zoning of the wealthier individuals in areas of LSS85 TP7, as well as XSM10 Area 5 and the north third of Area 2/3. The location of burials with upholstery stud lid inscriptions also seems to conform to this pattern.
- So far, only two examples of prone burials have been identified from the LSS85 and XSM10 burials (stacked burials [612] and [622] from XSM10 Trench 2).
- The majority of the charnel pits encountered were cutting the top of the burial ground sequence and are likely to be associated with the reburial of remains disturbed during uses of the burial ground area after its closure (Fig 28). Those few charnel pits stratified within the burial sequence occurred near its top, later in the cemetery's life when any new interment was more likely to disturb an earlier burial. The presence of burials post-dating the charnel pits shows that the cemetery was still very much in use.
- There is an absence of charnel pits within the lower parts of the burial sequence. This may suggest that, for much of the 170 years in which the burial ground was in use, the favoured method of dealing with disarticulated bone was simply to re-deposit these remains *ad hoc* within new graves. This would account for the high density of disarticulated human bone found within identifiable grave fills and throughout the general burial ground horizon in all phases of use.
- Any overcrowding problems later in the use of the burial ground would only have been exacerbated by the building of the new west wall in the late 17th to early 18th century, which reduced the total area of the ground by 60m<sup>2</sup>.

#### A building in the southwest corner of the cemetery

Historic maps first show a building in this area in 1676 (Fig 6) and this conforms to the excavated evidence (Fig 28; Fig 29; Fig 30; Fig 31). Stratigraphic and building material evidence dates the original construction of this building to the mid-17th century. Given the location of the structural remains in the south-west corner of the burial ground, it seems very likely that the building was associated with the administration of the ground, perhaps the house of the burial ground keeper(s). Several individuals associated with the administration of the burial ground have been provisionally identified within documentary sources. However, further work is needed at analysis stage to clarify how the administration and management of the ground was conducted. This building had more than one archaeologically attested phase of use.

#### Post-burial ground development (1739–1863)

Documentary and archaeological evidence show that the building in the southwest corner of the burial ground (Fig 29; Fig 30; Fig 31) remained in use after the cemetery closed. Maps show it being modified and extended several times during the 18th century (Fig 7 and Fig 8). By 1799 this building had become known as No.1 Brokers Row (now Blomfield Street) (Fig 9). Two cess pits ([4765] and [3479]) associated with this building have TPQs for their disuse of 1750 and 1780, respectively, based on provisional finds dating. Both cess pits contained large assemblages of 18th century domestic rubbish, almost certainly associated with the building's occupants.

Several structural features have been dated to the period 1823–1863 (Fig 32). A large E–W brick wall [1642]/[1648] has been identified as part of the south garden boundary wall of Broad Street Buildings, and was built to the north of the original south wall after the widening of 'Old Bethlem' (the road) in 1823–4. The new road was named 'Liverpool Street' and is first shown on Greenwood's map of 1824. This wall is contemporary with wall [1632], which is

part of a building also shown on this map (Fig 15). A linear series of charnel pits were found in a roughly E–W alignment just to the south of wall [1642]/[1648] and may be associated with its construction, or perhaps with later utility works within the carriageway of Liverpool Street

*Late 19th-century to early 20th-century (Fig 33; Fig 34)*

The remains of two walls associated with the approach road of Broad Street Station were found (formed of [1014], [1454], [1505], [1507], [1627], [1647], [1624], [1787], and [1820], and [1506], [1508], and [1509]) (Fig 33). These structures can be seen on OS maps from the late 19th century to late-20th century (Fig 12), though whether they form part of the original station in c 1863–5 or are late 19th to early 20th century modifications is unclear.

At the Blomfield site (XTB12), railway tracks and brick structures (Group 308) were found near the north edge of the site and may represent a track siding and pit associated with the Metropolitan Railway. The Metropolitan Railway would have operated trains in the tunnels to the immediate north of the site from c 1874 to 1933.

An E–W egg shaped brick culvert ([535]/[1342]), part of a larger sewer network, crossed the entire XSM10 site. The culvert had been constructed with a tunnel and a series of intermittent shafts from ground level. The culvert had an approximate crown level of 108.80m ATD in the west (MHS1) and 109.5m ATD in the east (east edge of Area 1). It was connected to numerous tunnelled ceramic drainage pipes which, though no longer active, would once have connected to 19th century properties to the south (now 1–14 Liverpool Street). The culvert may have been rendered redundant by the construction of the Queen Victoria tunnel in c 1874, which truncated the culvert at the west end of the site.

A late 19th or early 20th-century underground public toilet [1450] was found associated with contemporary culvert [1449] (Fig 34). This culvert was a replacement for culvert [535]/[1342] and had also been constructed with a tunnel and a series of intermittent shafts from ground level. The culvert had an approximate crown level of 108.00m ATD in the west (MHS1) and 107.40m ATD in the east (east edge of Area 2/3). Numerous connections had been made to this culvert by pipes tunnelled from Broad Street Station to the north and 1–14 Liverpool Street to the south. This culvert was still live until c 2014–15.

Further documentary research should reveal more details about the construction and date of these features, as well as the character of the site in the 19th and 20th centuries.

## 5 Quantification and assessment

### 5.1 Post-excavation review

The following elements of the post-excavation process for XSM10 have been completed:

- site records have been ordered and checked
- site context matrix has been compiled, checked and established digitally on ArchEd and BONN.
- all site data inputted onto the Oracle database
- subgroups allocated
- subgroup matrix completed and checked
- provisional group structure has been completed
- provisional land use structure has been completed
- plans digitised in AutoCad and transferred to ArcMap GIS
- all photographs digitally ordered, labelled and stored
- osteological assessment has been completed (see **MOLA XSM10 PXA02a** Doc. No. C257-MLA-T1-ASM-CRG03-50001 (MOLA 2015e).
- all building material processed and assessed
- all clay tobacco pipe processed and assessed
- all ceramic material processed and assessed
- all glass processed and assessed
- all coins processed and assessed
- all accessioned finds processed and assessed
- all iron working remains processed and assessed
- all environmental material processed and assessed
- all leather and textile processed and assessed
- all animal bone processed and assessed
- all conservation requirements assessed

Further XSM10 work required for the next stage of analysis:

- complete final dating
- complete and establish the final group structure
- complete and establish the final land use structure
- inputted group and land use structure descriptions onto the Oracle database
- assessment of coffin furniture to be completed
- assessment of worked stone to be completed
- complete a database of coffin attributes (furniture, alignments etc)
- complete a database of skeleton attributes (position, alignments etc)

The following elements of the post-excavation process for XSL10 / XTB12 have been completed:

- site records have been ordered and checked
- site context matrix has been compiled, checked and established digitally on ArchEd and BONN.
- all site data inputted onto the Oracle database
- subgroups allocated
- subgroup matrix completed and checked
- group structure has been completed
- provisional land use structure has been completed

- plans digitised in AutoCad and transferred to ArcMap GIS
- all photographs digitally ordered, labelled and stored
- all building material processed and assessed
- all ceramic material processed and assessed
- all accessioned finds processed and assessed
- all environmental material processed and assessed
- all conservation requirements assessed

Further XSL10 / XTB12 work required for the next stage of analysis:

- complete and establish the final group structure
- complete and establish the land use structure
- inputted group and land use structure descriptions onto the Oracle database

The following elements of the post-excavation process for LSS85 (TP7) have been completed:

- site records have been ordered and checked
- site context matrix has been compiled, checked and established digitally on ArchEd and BONN.
- all site data inputted onto the Oracle database
- all photographs digitally ordered, labelled and stored
- assessment of coffin furniture processed and assessed
- all environmental material processed and assessed
- all accessioned finds processed and assessed

Further LSS85 work required for the next stage of analysis:

- complete and establish subgroup structure
- complete and establish group structure
- complete and establish land use structure
- inputted group and land use structure descriptions onto the Oracle database

## 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.

*Table 5 XSM10 stratigraphic archive*

Type	Description	Quantity	Notes
Contexts	Total across all areas	7410	Context numbers between 1 and 10,000 (gaps)
Plans	MOLA Archive-standard drawing sheets –various scales (Note, many plans cover more than one sheet)		All parent contexts (4292) digitised
Sections	MOLA Archive-standard drawing sheets	64	
Matrices			Digital and paper copies
Photographs	Site and finds	11166	Total number of digital photographs, images on Oracle

**Table 6** XSL10 / XTB12 stratigraphic archive

Type	Description	Quantity	Notes
Contexts	Total across all areas	43	
Plans	MOLA Archive-standard drawing sheets –various scales (Note, many plans cover more than one sheet)	21	All parent contexts (42) digitised
Sections	MOLA Archive-standard drawing sheets	8	
Matrices		3	Digital and paper copies
Photographs	Site and finds	142	Total number of digital photographs, images on Oracle

The LSS85 stratigraphic archive is held at the Museum of London Archaeological Archive (<http://archive.museumoflondon.org.uk/laarc/catalogue>)

### 5.3 Site archive and assessment: finds and environmental

The Table below contains a summary of finds and environmental material which will be retained as part of the site archive.

**Table 7** XSM10 finds and environmental archive general summary

Category	Description	Weight
Building material	Five crates of ceramic building material (bulk of material discarded after assessment) 65 brick samples (not weighted) 12 shoe boxes and 2 flat boxes of bulk BM retained	277.3kg
Prehistoric pottery	4 sherds	8g
Roman pottery	7517 sherds	193.367kg
Medieval pottery	162 sherds	3.8kg
Post-medieval pottery	4937 sherds	195kg
Accessioned finds (excluding glass, leather and textiles)	3169 items	
Bulk leather	Approximately 8 full crates bagged leather	Bulk leather
Accessioned finds (leather)	104 items	Accessioned finds (leather)
Accessioned finds (textile)	12 items	Accessioned finds (textile)
Numismatica	159 (3 missing) medallion, coins, jettons and tokens	
Post-medieval glass (XSM10)	650 fragments, 517 ENV	25974g
Clay tobacco pipe	528 fragments (406 bowls, 116 stems, 6 mouthpieces)	N/A
Iron working remains - Roman: 60-200AD	Undiagnostic Fe slag (1129g), smithing hearth bottom (1899g), vitrified hearth lining (397g)	3425g
Iron working remains - Late Roman: 250–400AD	Undiagnostic Fe slag (503g), smithing hearth bottom (390g), vitrified hearth lining (55g)	948g
Iron working remains - Post-med: 1500–1800AD	Undiagnostic Fe slag (209g), smithing hearth bottom (226g), vitrified hearth lining (0g)	535g
Bulk Soil Samples	Flots from 56 samples; sub-samples from unknown number of samples retained unprocessed.	6 boxes
Animal bone	Estimated 5369 fragments	215.454 kg/equivalent to 75 standard archive boxes
Human Bone	Estimated no. of individuals: 3354 No. of boxes: 916 (see PXA02a)	
Coffin furniture and plates	11 flat boxes of bulk finds (plus c 45 accessioned items (including 1 textile)) – tbc at analysis	

**Table 8** XSL10 / XTB12 finds and environmental archive general summary

Category	Description	Weight
Building material		
Roman pottery	37 sherds	1055g
Accessioned finds (excluding worked stone)	3 items	
Worked stone	3 items	

Table 9 LSS85 finds and environmental archive general summary

Category	Description	Weight
Medieval pottery	74 sherds	0.7kg
Post-medieval pottery	2601 sherds	54.8kg
Post-medieval glass	434 fragments, 287 ENV	4194 g
Clay tobacco pipe	1151 (316 bowls, 804 stems and 31 mouthpieces)	N/A

## 5.4 The building material

By Ian M. Betts

### 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.

### Medieval ceramic building material

#### FORMS

##### **Floor tile**

##### *'Westminster' (1250–1300)*

There are both plain and decorated 'Westminster' tiles from the site. This include a clearer example of Betts (2002) design W18 (context [507] <193>) and an unpublished design (context [492] <129>).

##### *Penn (1350–90)*

##### *Fabric 1810, 2894, 3076*

There are a number of decorated Penn tiles from the site, including a tile ([1017] <359>) with Eames (1980) design E2536 which appears to show a clearer pattern than her published drawing. Two further tiles ([651] <221>; [6377], <2484>) have unpublished designs. One plain glazed example is also present.

##### *Low Countries 'Flemish' (14th to 16th century)*

##### *Fabrics 1678, 2320, 2323, 2497, 2504, 3082*

There are a number of Low Countries floor tiles. These seem to be a mixture of medieval and post-medieval types, although their precise date has still to be established.

##### **Roofing tile**

##### *Peg tile*

##### *Fabrics 2271, 2273, 2586, 2587, 2816*

There are a number of medieval peg roofing tiles, some with splash glaze attached. These are all of two round nail hole type.

##### *Ridge tile*

##### *Fabric 2271*

There are two fragments of medieval ridge tile, one with splash glaze.

### **Brick**

#### *Fabric 3031*

Of probable 14th-late 15th century date is a yellow Low Countries brick from context [1347]. This is unusual in having a large deep hole, of uncertain purpose, in the top surface.

### Post-medieval stone building material

#### **Moulded stone**

There is a Portland stone moulding from context [20]. Other moulded stones are discussed in a separate worked stone assessment report.

#### **Roofing**

What may be slate roofing was found with 1550–1750 finds in context [1719].

### Post-medieval ceramic building material

#### FORMS

#### **Floor tile**

##### *Low Countries 'Flemish' glazed (late 15th to 16th century)* *Fabrics 2850, 3063, 3246,*

There are a number of yellow and brown glazed Low Countries in silty fabrics (types 2850, 3063, 3246) dating to the period 1480–1600. A number of plain glazed calcareous floor tiles may also date to the same period.

##### *Low Countries 'Flemish' unglazed (late 16th to 18th century)* *Fabric 2318*

What may be an unglazed Low Countries floor tile was present in context [1521].

##### *Tin-glazed (late 16th to mid-17th century)* *Fabric 2196, 3067*

There are two tin-glazed floor tiles from the site. One (context [3010] <2485>) has a polychrome design similar to Betts and Weinstein (2010) no. 104, whilst the other has the popular 'Tudor rose' design in blue on white. The latter (context [4] <176>) is unusually thin for a floor tile, measuring only 10–11mm in thickness.

#### **Wall tile**

##### *Tin-glazed* *Fabric 3067, 3086*

There are a number of plain and decorated tin-glazed 'delftware' tiles from the site. The decorated examples mainly show landscape scenes, although there is also a tile showing a mounted figure and another with a flower vase design. The majority of tiles are blue on white, but there are also tiles in purple, blue and white. Most are probably of 18th century date.

##### *Victorian* *Fabric 3314 variant*

There is a small piece of reddish-orange coloured wall tile from context [1045]. This is of Victorian or 20th-century date. Of similar date, is a very unusual tile with black and yellow decoration on a bright white background (context [4485] <2488>). The decoration has been applied over a pink clay layer containing abundant cream and red clay inclusions.

#### **Roofing tile**

#### *Peg tile*

*Fabrics 2271, 2276, 2586, 3201?*

There are a large number of post-medieval peg roofing tiles. These have two round, two square or two diamond nail holes and are unglazed.

#### *Pantile*

*Fabrics 2275, 3090, 3202*

There is a partly complete pantile from a brick and tile drain (context [7001]).

#### *Ridge tile*

*Fabric 2276*

There are a small number of ridge tiles used on both peg tile and pantile roofs.

### **Brick**

*Fabrics 3032, 3033, 3035, 3046*

The site contains a mixture of pre- and post-Great Fire (of 1666) bricks. Samples were collected from various, mainly 18th–19th century, brick walls, as well as brick floors, brick burial vaults and brick-lined culverts.

Most bricks derive from brickyards in the London area. The only definite exception is the 19th century, or later, yellow London stock brick (fabric 3035) from context [535]. One probable Victorian or Edwardian London-made brick (fabric 3032) has an unusual 'tree' shaped symbol in the frog base (context [535] <231>). This may be a kind of trade mark used by one particular brickyard.

### **Drain**

*Fabric 3257*

A partly complete rectangular drain with a semi-circular depression running down the tile centre was recovered from context [1154]. This has a possible lime-scale deposit in the drain base, suggesting it may have carried away hot/warm water. The drain is 153mm in length by 82–83mm in height. Similar shaped drains are known from elsewhere in London, but are uncommon.

### **Water pipe**

*Fabric 3302*

Part of a 19th century or later stoneware water pipe was recovered from context [1034]. This context has been dated to 1550–1575, so it may represent later contamination.

## **5.5 Worked stone**

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By James Wright and Adrian Miles

#### *Introduction/methodology*

All of the worked stone has been recorded using the standard worked stone recording forms used by MOLA. The stones were photographed and where appropriate a 1:1 or 1:2 profile drawing was made; or 1:1 rubbing or a scaled plan drawing was made. Fabric analysis was undertaken with a x10 binocular microscope and a comparison was made with the MOLA stone library. The information on the recording forms has been added to an Oracle database

#### XSM10

#### Moulded stones



[1296] A fragment of moulded oolitic limestone similar in character to that quarried at Grange Hill and Oathill in Gloucestershire. The stone is fragmentary and its original function unclear, though it may be part of a door jamb. It is weathered. Its size and moulding suggest a medieval or early modern date, although to be later than the first quarter of the 17th century. A possible V-shaped banker mark was recorded on a face with a corona moulding.

[1299] A fragment of moulded oolitic Bath limestone, similar to from Box (Wiltshire). It is a very heavily weathered and fragmented section of a window mullion, retaining a recognisable external nose moulding as well as its internal rebates. The glazing channels have both been weathered away and no longer survive. Its size and moulding forms suggest a medieval or early modern date, although to be later than the first quarter of the 17th century.

#### Ashlar masonry

[1297] A fragment of ashlar masonry in Lower Carboniferous Crag Hill sandstone quarried at Hazeldean in Northumberland. The stone is very weathered on its face, although there is evidence of a batted finish. Part of the joint survives and has a bolstered tooling. The area of the stone that is fractured also displays heavy weathering, which is indicative of its re-use.

#### XTB12

[46] <2> A fragment of moulded Middle Jurassic oolitic limestone similar in character to the "Hard White" bed quarried at Ancaster in Lincolnshire. The stone is a very badly damaged piece of door or window surround with associated integrated string course above.

[46] <3> A fragment of moulded Middle Jurassic oolitic limestone similar in character to the "Hard White" bed quarried at Ancaster in Lincolnshire. The stone is so fragmentary that its purpose is unclear although it may be part of a fireplace or door/window lintel. The presence of modern cement upon the top bed of the stone is indicative of its age as are three drill holes and the rust corrosion associated with a metal plate fixing.

[46] <4> A fragment of moulded Middle Jurassic oolitic limestone similar in character to the "Hard White" bed quarried at Ancaster in Lincolnshire. The moulding is very delicate and suggests a use in a location that was very visible from head-height such as a fireplace or lintel. The presence of modern cement within the joint of the stone is indicative of its age.

#### Assessment work outstanding

Table 10 Outstanding worked stone assessments

Sitecode	Context	Material	Type	Period / Century	<acc>
XSM10	0	Stone	Gravestone Or Tombstone	Post-med	2267
XSM10	20	Stone	Moulding	Unknown	48
XSM10	231	Stone		Unknown	Bulk
XSM10	431	Stone	Moulding	Post-med	200
XSM10	431	Stone	Moulding	Unknown	199
XSM10	431	Stone	Unidentified	Unknown	197
XSM10	431	Stone	Unidentified	Unknown	202
XSM10	494	Stone	Gravestone Or Tombstone	Post-med	198
XSM10	494	Stone	Gravestone Or Tombstone	Post-med	201
XSM10	507	Stone	Hone	Post-med	196
XSM10	714	Stone	Mortar	Roman	226
XSM10	715	Stone		Unknown	Bulk
XSM10	919	Stone	Hone	Medieval	1264
XSM10	1036	Stone	Hone	Unknown	502
XSM10	1301	Stone		Unknown	Bulk
XSM10	1311	Stone	Mortar	Roman	450
XSM10	1314	Stone	Hone	Roman	451
XSM10	1318	Stone		Unknown	Bulk

Sitecode	Context	Material	Type	Period / Century	<acc>
XSM10	1642	Stone		Unknown	Bulk
XSM10	1719	Stone		Unknown	Bulk
XSM10	2049	Stone	Unidentified	Unknown	1265
XSM10	2050	Stone		Unknown	Bulk
XSM10	2053	Stone		Unknown	Bulk
XSM10	3010	Stone	Counter	Unknown	2522
XSM10	3352	Stone		Unknown	Bulk
XSM10	3475	Stone		Unknown	Bulk
XSM10	3479	Stone		Unknown	Bulk
XSM10	3704	Stone	Handle	Post-med	2164
XSM10	3704	Stone	Hone	Post-med	2527
XSM10	3704	Stone	Quern	Roman	2539
XSM10	3704	Stone	Unidentified	Post-med	2523
XSM10	3704	Stone	Unidentified	Post-med	2537
XSM10	3704	Stone	Unidentified	Post-med	2538
XSM10	3704	Stone	Unidentified	Post-med	2541
XSM10	3849	Stone	Alley	Post-med	2581
XSM10	3849	Stone	Alley	Post-med	2582
XSM10	4001	Stone		Unknown	Bulk
XSM10	4701	Stone		Unknown	Bulk
XSM10	4705	Stone	Gravestone Or Tombstone	Post-med	2542
XSM10	4764	Stone	Stylus	Post-med	2521
XSM10	4765	Stone	Gravestone Or Tombstone	Post-med	2543
XSM10	4765	Stone	Gravestone Or Tombstone	Post-med	3053
XSM10	6339	Stone	Hone	Medieval	2526
XSM10	6536	Stone	Mould	Post-med	2524
XSM10	6636	Stone	Mortar	Post-med	2520
XSM10	6716	Stone	Quern	Roman	2540
XSM10	6730	Stone	Hone	Roman	3158
XSM10	6737	Stone	Hone	Roman	2525
XSM10	6777	Stone		Unknown	Bulk
XSM10	8282	Stone		Unknown	Bulk
XSM10	8287	Stone	Hone	Roman	2926
XSM10	8287	Stone		Unknown	Bulk
XSM10	8313	Stone		Unknown	Bulk
XSM10	8325	Stone	Hone	Unknown	2925
XSM10	8325	Stone		Unknown	Bulk
XSM10	8369	Stone		Unknown	Bulk
XSM10	8383	Stone	Unidentified	Unknown	2927

## 5.6 The pottery

By Nigel Jeffries

*Medieval (c 900–1500)*

### Methodology

The medieval pottery from LSS85, XSM10 and XTB12 and the post-medieval pottery from LSS85 and XSM10 was examined macroscopically, using a binocular microscope (x 20) where appropriate, and recorded on paper and computer, using standard Museum of London codes for fabrics, forms and decoration. The numerical data comprises sherd count (SC), estimated number of vessels (ENV) and weight (by grams) and entered onto the ORACLE database.

The pottery from LSS85 (2601 sherds) was spot-dated in full although it should be noted that the following text is focused only on the pottery retrieved from Test Pit 7 (contexts after [500], 2392 sherds) which contained burials associated with the Bethlehem burial ground. The pottery from XSM10 and XTB12 has been spot dated in full. The ceramic crucibles from LSS85 and XSM10 are discussed in the registered finds report in this document.

### Summary/Introduction

This text considers the medieval pottery from LSS85, XSM10 and XTB12. In comparison to the large quantities of later post-medieval pottery and other artefacts retrieved, the medieval pottery from LSS85 was limited to 74 sherds (761g weight) from an estimated number of 65 vessels (ENV) in 29 contexts. A larger assemblage of medieval pottery was found from XSM10 with the 162 sherds from up to 124 ENV (3816g weight) spread among 66 contexts.

Taken together, the character and condition of the medieval pottery from both sites is poor. No complete or reconstructable vessels or profiles were found and with the exception of the better preserved vessels in [6639] (XSM10), the overwhelming majority of contexts with this material yielded only a few fragmented sherds.

The majority of this medieval material was however found alongside later post-medieval pottery and other finds. Over two thirds of the medieval pottery by sherd count from XSM10 is therefore residual. For LSS85, the picture is more pronounced, with just eight sherds in five contexts that might present evidence of medieval landuse. These figures are, however, further reduced as stratigraphically this medieval pottery is located in contexts associated with the consolidation dumping required for the establishment of the Bethlehem burial ground (in 1569) or are in the fills of the burials themselves. The data in Table 11 therefore presents the 18 sherds from just seven contexts in XSM10 that can be phased with confidence to the medieval period, with most associated with fills related to the use of various drainage ditches (including the north-south orientated 'Deep Ditch') that cut across the site. All of the eight sherds of medieval pottery found in isolation from LSS85 are in fills securely attributed to the Bethlehem burial ground.

*Table 11 Medieval pottery from XSM10*

Context	TPQ	TAQ	Size	Sherd count	Weight
1044	1270	1500	S	2	36
6388	1270	1350	S	3	29
6541	1340	1450	S	2	195
6579	1080	1200	S	7	214
6690	1080	1350	S	1	16
8297	1080	1200	S	2	89
8305	1050	1150	S	1	11
				<b>18</b>	<b>590</b>

The five sherds of medieval pottery from XTB12 were found in contexts [16] and [18], both of which yielded a range of hand-built coarsewares in sources of supply and fabrics (MOL fabric codes EMS, EMSS, EMSH, and ESUR are represented) common to London during the Saxo-Norman period. The medieval pottery in [16] (dated 1050–1150) was found alongside Roman dated material and questions of residuality and intrusiveness of both periods will need to be addressed.

### Fabrics and forms

Given the limited quantity of medieval pottery this material is not described further in this assessment. There is nothing exceptional about the fabrics and forms from both sites and a summary of this material will instead be presented on a landuse or period based text for publication.

Post-medieval (c 1500–1900)

This text evaluates the character and the date range of both of the post-medieval pottery assemblages from LSS85 and XSM10, before discussing this material under the three key landuse sequences identified on both sites: the pre-burial ground sequence characterised by localised marsh reclamation dumps and the filling of the Deep Ditch during the 15th to late 16th centuries (SGs up to 1000), the establishment of the Bethlehem (Bedlam) burial ground in 1569 until its closure in 1739 and the urbanisation that followed (SGs 10,000 plus) to the construction of the Broad Street railway station in 1864–65.

Summary/Introduction (LSS85)

Only the 2392 sherds of pottery in the 162 contexts related to the burial ground sequence in Test Pit 7 (contexts after [500]) are considered further for LSS85. Comprising 1867 vessels (41732g weight), most of the post-medieval pottery is mid to late 17th century in date.

The pottery assemblage can be further sub-divided by size, as determined by the quantities of sherds present in each of the 162 contexts. Statistically viable medium and larger groups (MPRG 2001, 19) contributed up to 1287 of the 2392 sherds of post-medieval pottery, retrieved from 11 contexts, with several medium (contexts containing between 30 and 99 pottery sherds) and three large (between 100 and 499 sherds) and one very-large-sized group (500 sherds plus) found (Table 12).

However, with the recorded sequence in Test Pit 7 related to the Bethlehem burial ground (founded in 1569), most of the vessels in the groups in Table 12 are in a poor fragmented state, distributed among cemetery soils, coffins and graves. Similarly the two groups in [501] and [560] are derived from disturbed external dumps and make up layers that covered or levelled various grave sequences. The exception to this otherwise low potential material is the discrete group of well preserved and reconstructable Essex-type black-glazed ware and German stoneware drinking vessels found in [595], although unfortunately it is not possible for this context to have a landuse interpretation applied.

*Table 12 Statistically viable post-medieval pottery groups from LSS85 by context, size, number of sherds and landuse*

Context	Pottery assemblage Early date	Pottery assemblage Late date	Ass. Size	Sherd count	Landuse interpretation
501	1680	1700	L	112	External dump
560	1670	1700	VL	519	External dump
566	1680	1700	M	64	Grave
595	1580	1650	L	124	N/A
596	1690	1700	M	40	Coffin
633	1690	1730	M	34	Grave
681	1680	1700	M	44	Grave
709	1720	1740	M	69	Pit
1319	1550	1575	M	67	Pit
1519	1550	1575	M	38	Grave
1526	1670	1700	L	176	Make up
				1287	

The remaining 151 contexts with post-medieval pottery are characterised by small-sized groups (between one and 29 sherds) and are generally 17th–century dated. Consequently, like the statistically viable groups of the same date discussed above, the condition of the assemblage is often fragmented, characterised by body sherds, and or base or rims surviving per vessel.

Table 13 *Post-medieval pottery by statistical averages per context*

No. of contexts	Total no. of sherds/ENV/weight (in g)	Average no. of sherds (per context)	Average no. of vessels (per context)	Average total pottery weight per context (in g)
162	2392/1867/41732	15.2	11.1	252

Disturbance is also apparent in the amount of sherds from the same vessel (s) found spread among different contexts. Joining sherds were identified between [615] and [681], and [1342] with [1356] and [1489], all deposits related to different cemetery soils/grave fills etc.

### Summary/Introduction (XSM10)

Comprising 4937 sherds from 2569 vessels (195489g weight) most of the post-medieval pottery from XSM10 is mid to late 16th to late 17th century in date, although significant mid–18th century groups are also present.

Table 14 *Statistically viable post-medieval pottery groups from XSM10 by context, size, number of sherds and landuse*

Context	Pottery assemblage Early date	Pottery assemblage Late date	Ass. Size	Sherd count	SG	Landuse interpretation
1	1763	1800	M	52	5001	Make up
3	1720	1750	M	78	5003	Make up
4	1701	1711	M	63	5004	Make up
20	1763	1800	L	215	0	N/A
211	1550	1600	M	54	223	Make up
212	1550	1575	M	45	222	Make up
217	1748	1775	M	42	5013	Make up
327	1720	1780	M	46	5220	Non-structural cut
492	1630	1650	M	91	5313	Make up
493	1630	1650	M	43	5314	Make up
507	1580	1600	M	83	5022	Make up
651	1580	1600	M	37	5413	Make up
733	1720	1750	M	55	603	Make up
919	1680	1711	M	67	5015	Make up
925	1701	1711	M	41	5016	Make up
1017	1580	1600	M	32	472	External dump
1034	1550	1575	M	68	471	Ditch
1156	1580	1600	M	37	5736	Make up
1521	1660	1680	M	90	5014	Make up
3010	1660	1680	L	243	3299	Make up
3704	1760	1780	VL	506	10074	Cesspit
3849	1750	1780	M	44	10073	Cesspit
4201	1700	1725	M	35	7015	Pit Ossuary
4485	1550	1600	M	43	7187	Make up
4764	1750	1760	VL	902	10080	Cesspit
6543	1480	1575	M	33	150	Ditch
6637	1550	1600	M	60	172	Ditch
6638	1550	1600	L	137	172	Ditch
6639	1550	1600	L	302	172	Ditch
7000	1670	1700	L	172	8667	Make up
8236	1550	1600	M	82	416	Ditch
8250	1630	1650	M	45	549	Ditch
8279	1580	1600	M	39	550	Pit refuse
8280	1580	1600	M	52	550	Pit refuse
8286	1580	1610	M	30	548	Ditch
			<b>Total</b>	<b>3964</b>		

The pottery assemblage can be further sub-divided by size, as determined by the quantities of sherds present in each of the 261 contexts ([1]–[8305]: Table 14). Statistically viable medium and larger groups (MPRG 2001, 19) contributed up to 3964 of the 4937 sherds of

post-medieval pottery, found in 35 contexts, with 28 medium (contexts containing between 30 and 99 pottery sherds) and five large (between 100 and 499 sherds) and two very large-sized groups (500 sherds plus) retrieved.

Most of the medium-sized groups dated to the 17th century are, however, fragmented and from various consolidation layers laid down immediately prior to the development of the site as the Bethlehem burial ground (in 1569) which occupied the site until the early 18th century. This pattern contrasts to the exceptional condition of the mid 18th-century pottery discarded during the abandonment of two cesspits (for example [3704] and [4764]) that served properties built after the cemetery had closed. Similarly the pottery in contexts related to the filling [6543] and [6637–39] of the Deep Ditch prior to the cemeteries foundation also contained high potential material.

The remaining 226 contexts with post-medieval pottery are characterised by small-sized groups (between one and 29 sherds) and are generally 17th-century dated. Consequently, like the statistically viable groups of the same date discussed above, the condition of the assemblage is often fragmented, characterised by body sherds, and or base or rims surviving per vessel.

*Table 15 Post-medieval pottery by statistical averages per context*

No. of contexts	Total no. of sherds/ENV/weight (in g)	Average no. of sherds (per context)	Average no. of vessels (per context)	Average total pottery weight per context (in g)
261	4937/2569/195489	18.9	9.8	749

Sherds from the same vessel (s) found broken and spread among different contexts was also identified on six occasions between [1149] and [1150], [6533] and [6535] with [6543], [3864] and [3849] and possibly between [1521] and [1958], and [3908] and [4201].

Fabrics and forms (LSS85 and XSM10)

Overall Table 16 demonstrates little difference in the % quantities of broad ware-types of the sources of pottery supply from both sites, with both LSS85 and XSM10 consistent in yielding the 16th and 17th-century products of the London (delft and red wares), and Surrey-Hampshire pottery industries. The various fabrics represented by these types account for around two thirds of this post-medieval assemblage by sherd count.

The noticeable difference between the two sites is a result of the survival of an 18th-century sequence on XSM10 and the exceptional groups of mid-century pottery found in the disuse fills (for example, [3704] and [4764]) of a few cesspits found here. These groups contained larger quantities of Chinese porcelain, English porcelain, and white salt-glazed stonewares and consequently ware-types in Table 16 such as Far-eastern imported wares, 'fine' stoneware and English porcelain are far better represented than from LSS85.

**Table 16** *Ware types for the post-medieval pottery found from LSS85 by sherd count, ENV and weight*

Ware type	No of sherds	No of sherds as %	ENV total	ENV total as %	Weight (in g)	Weight (as %)
Delftware (London made)	332	12.7	246	12.4	3549	6.4
Essex red wares	98	3.7	44	2.2	2926	5.3
Imported (Continental)	255	9.8	212	10.7	5232	9.5
Imported (Far-eastern)	20	0.7	20	1.0	177	0.3
Imported (other)	2	0.07	2	0.1	21	0.03
Industrial finewares	120	4.6	68	3.4	3375	6.1
Non local earthenwares	150	5.7	98	4.9	3214	5.8
Red wares (London made)	1121	43.0	903	45.5	25250	46.0
Stoneware (fine)	14	0.5	12	0.6	211	0.3
Stoneware	91	3.4	68	3.4	2936	5.3
Surrey-Hampshire border ware	398	15.3	308	15.5	7962	14.5
<b>Total</b>	<b>2601</b>	<b>100</b>	<b>1981</b>	<b>100</b>	<b>54853</b>	<b>100</b>

**Table 17** *Ware types for the post-medieval pottery found from XSM10 by sherd count, ENV and weight*

Ware type	No of sherds	No of sherds as %	ENV total	ENV total as %	Weight (in g)	Weight (as %)
Delftware (London made)	666	13.4	289	11.2	18799	9.6
Essex red wares	118	2.3	73	2.8	4698	2.4
Imported (Continental)	623	12.6	399	15.5	24720	12.6
Imported (Far-eastern)	444	8.9	83	3.2	6688	3.4
Industrial finewares	203	4.1	26	1.012	6123	3.1
Miscellaneous	6	0.1	6	0.2	626	0.3
Non local earthenwares	158	3.1	87	3.3	5623	2.8
Porcelain (English)	25	0.5	11	0.4	560	0.2
Red wares (London made)	1895	38.3	1127	43.8	98160	50.2
Stoneware (fine)	208	4.2	35	1.3	6927	3.5
Stoneware	84	1.7	58	2.2	4721	2.4
Surrey-Hampshire border ware	511	10.3	375	14.5	17844	9.1
<b>Total</b>	<b>4941</b>	<b>100</b>	<b>2569</b>	<b>100</b>	<b>195489</b>	<b>100</b>

## Discussion

This next section is divided into discussing the pottery from both LSS85 and XSM10 that relates to the pre-burial ground sequence characterised by localised marsh reclamation dumps and the filling of the Deep Ditch during the 15th to late 16th centuries, as the Bethlehem burial ground from 1569 and then the urban development of the area that followed its closure in the early 18th century.

### Pottery dated c 1480–1569: Ceramics related to pre-burial ground stratigraphy (subgroups 0–1000)

Pottery with the pre-burial ground sequence (XSM10 SG <1000) comprised 1035 sherds from up to 461 vessels (35442g weight). For this period of the site pottery provides the main chronological framework for a significant proportion of this landuse, in a period before bottle glass and clay tobacco pipes are common. Whilst small groups of material were found within various non-structural cuts, make-up dumps and a small range of pitting, the most significant pottery assemblages (up to 800 of the 1035 sherds) were found within a discrete cluster of use and disuse fills associated with a series of ditches, which included the 'Deep Ditch'. The sources of supply here are remarkably consistent and present a mid 16th–century framework for this ditch filling.

Different products of the London area red ware industry of the Tudor period are the dominant category. Made in kiln centres located in Woolwich and Deptford the last divide between early post-medieval red ware (PMRE) and its slip-coated decorated derivative with either a clear (PMSRY) or green glaze (PMSRG). Further red wares (PMBR) characterised by distinct areas both of clear lead glaze, usually internal, and of green lead glaze coloured by the addition of copper (usually external) also feature. All are from heavy duty vessels, mainly associated with the storage, preparing, cooking and serving of food. The whitewares (BORDG and BORDY) made by kiln centres clustered around Farnham in the Surrey-Hampshire border area provided only 71 sherds, a low number compared with the evidence from other domestic sites in London from this period, where it is more frequent. From this phase of the site, these whitewares are found as dishes, drinking jugs and mugs, with a few sherds skillets and money boxes. Other English ware types comprise Cistercian ware (CSTN), an industry which made a range of different shaped and glossy glazed mugs during this period.

Most of the Continental imports are Rhenish stonewares from Raeren (RAER) which provided a further range of durable drinking vessels but German whitewares (GERW), and a reasonable quantity of Dutch redwares (DUTR) are also present in pipkin and cauldron forms. Most of the DUTR is located in the fills of the 'Deep Ditch'. One or two sherds each of Beauvais sgraffito ware, Montelupo tin-glazed ware and South Netherlands maiolica (all over blue) provide the remainder of the imports.

### Pottery dated c 1569–1739: ceramics related to the New Churchyard (subgroups 5000–9999)

From XSM10, the majority of the 1729 pottery sherds from up to 1327 vessels (65221g weight) in this phase are from contexts related to various make-up dumps phased to the Bethlehem burial ground (1280 sherds from 1065 vessels) and includes many of the statistically viable groups listed in Table 14. The vast majority of the pottery in contexts in Test Pit 7 from LSS85 (which yielded 2392 pottery sherds) is related to various cemetery soils, coffin and grave fills. Only a small selection of this material is derived from pit features. There are also significant quantities of residual 16th–century pottery (notably PMRE and RAER) in LSS85 in later dated contexts both of which are thought to have ceased being made by the turn of the 17th century.

The condition of the pottery from both LSS85 and XSM10 from the Bethlehem burial ground is poor, with body sherds common, sometimes with complete bases and/or substantial rims and upper profiles surviving. Some pottery displayed evidence of being burnt, or are abraded and laminated. The sources of supply represented are nevertheless remarkably consistent, with an overwhelming emphasis London made red wares in cooking vessels such as cauldrons and tripod pipkins, dumped relatively quickly, as part of the soils imported to level the land just prior to its use as the cemetery in 1569.

Later 17th–century sequences can be easily isolated by the presence of the various products of Southwark's delftware pothouses (LSS85: 321 sherds; XSM10: 177 sherds) in



various deposits and where possible these wares have been further catalogued according to the decorative styles employed to characterise the products of this industry (Orton 1988; Orton and Pearce 1984). Contexts are dated c 1612–50 by the presence of sherds with polychrome and darker blue painted vessels presenting geometric or fruit and flower designs (TGW A) mostly in dish or charger forms. Polychrome dish or chargers and drug jars in delftware styles dated to the second quarter of the 17th century (TGW D), or tin-glazed wares with plain white glaze (TGW C) are used to date numerous contexts to c 1630–80.

It is the later 16th to 17th-century dated products of the London red ware industry (London-area post-medieval red ware: PMR) made in centres located on the south bank of the Thames - from Woolwich, Deptford to Lambeth - that are the most common fabric type found in the Bethlehem burial ground sequence (LSS85: 411 sherds; XSM10: 353 sherds). PMR is among the standard pottery for everyday use in the kitchen and storeroom during this period and overall cooking vessels such as cauldrons, tripod pipkins and porringers are common in contexts, together with storage jars. This source of supply is otherwise supplemented by small quantities of the glossy-glazed red wares and black-glazed ware drinking vessels (PMFR and PMBL respectively), made at kilns around Harlow in Essex. PMBL describes vessels covered inside and out with a lustrous black glaze found as cylindrical and flared mugs. The only significant group of pottery from this source of supply are the few reconstructable mugs from LSS85 in [595].

Continental imports are not common to both sites with a small selection of French stoneware (MART) and various Spanish and Netherlandish maiolicas and tin-glazed wares found. Individual vessels of note otherwise include the Isabella polychrome (ISAB) dish that is spread among a number of contexts and the Ottoman sourced porcelain teabowls in [560] and [616] in LSS85. The largest single source of imported wares remain however Rhenish, with Frechen stoneware (FREC) drinking jugs and pitchers featuring. None of the imports described are isolated or clustered to a particular context or found (for example) in the fill of one pit.

Whilst the bulk of the pottery is dated to the mid 17th century, certain deposits have a *post terminus-quem* of c 1680 arrived at through the small quantities of later delftware decorative styles (fabric codes TGW F and TGW H) and forms (plates and flanged rounded bowls) together with Staffordshire brown salt-glazed ware (STBRS) and London stoneware (LONS) gorge mugs and tankards found. The *terminus ante-quem* of c 1700 is provided by the consistent presence of white fired Surrey-Hampshire border wares and Essex red wares (METS, PMBL and PMFR) whose production ceased around this time.

Of note is the deliberate placement of a whole TGW plate decorated in the 'Chinaman among grasses' decorative style (TGW F: last quarter of the 17th century) in a burial [5613]. The vessel is placed face down over the pelvis area of the skeleton and represents a highly unusual practice for this period (Fig 35).

#### Pottery dated c 1730–1800: Ceramics related to buildings, or drainage and CESSPITS features (SG'S 10000 PLUS)

Whilst only a small number of contexts with pottery from XSM10 are related to the urban development that followed the closure of the burial ground, the filling ([3704] [3849] and [4764]) of two cesspits produced the most significant groups of pottery from the site. Discarded during the abandonment and disuse of these features, these deposits contained 1452 sherds from a small number of vessels (188) all of which were exceptionally well preserved, and can be tightly dated to the 1760s. These rich assemblages of some status represent the model 'clearance group' (Pearce 2000) and comprise quantities of Chinese porcelain tea drinking and dining wares in a number of different decorative styles (CHPO BW, CHPO IMARI, CHPO ROSE and CHPO VERTE), in addition to English porcelain (ENPO) serving the same functions, with the patterns and makers marks attributed to factories such as Worcester and Lowestoft. White salt-glazed stonewares (SWSG) are

common, in a range of forms from plates for dining, teabowls, tankards and coffee cans for drinking, to ointment and chamber pots that served as hygiene and sanitary wares. This pottery has potential, and overall significance is enhanced as they are found alongside quantities of glass bottles and drinking cups and clay tobacco pipes.

## 5.7 The accessioned finds (excluding glass and coins)

By Beth Richardson and Michael Marshall

*The post-Roman accessioned finds (excluding glass, leather and textiles)*  
**UNKNOWNNS ARE LISTED IN THE ROMAN ASSESSMENT**

	Roman	Medieval	Post-med	Not known	Total	Comments
Flint	0	0	0	1	1	
Stone (excludes BM)	3	0	0	8	11	
Ceramic (excludes BM, stamps)	10	9	2	0	21	
Glass	138	1	6	5	150	
Iron	5	3	2	7	17	
Copper alloy	60	5	5	15	85	
Lead	0	0	0	3	3	
Bone	10	0	1	3	14	
<b>Total</b>	<b>226</b>	<b>18</b>	<b>16</b>	<b>42</b>	<b>302</b>	

Table 18 Summary of XSM10 accessioned finds (not coins) by material and period

	Roman	Medieval	Post-med	Not known	Total	Comments
Ceramic (excludes BM, stamps)	1	0	0	0	1	
Lead	0	0	0	1	1	
Iron	1	0	0	0	1	
<b>Total</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>3</b>	

Table 19 Summary of XSL10 / XTB12 accessioned finds (not coins) by material and period

### Introduction/methodology

The post-Roman finds have been accessioned and partially catalogued on Oracle in accordance with MOLA procedures and the records are held on the Oracle database. The catalogue is to be completed at Analysis stage. The iron, copper-alloy and composite metal artefacts have been X-rayed. All objects were examined individually, with the aid of X-rays where appropriate.

This assessment focusses on XSM10: there was a single accessioned 'small find' a fragment of lead sheet <1>, [16] from XTB12. It is corroded and relatively undiagnostic. Similar fragments are often associated with demolition and destruction layers.

### Medieval

Some date identifications may change following integration of the finds with the stratigraphic data.

### Stone

There are pieces from two imported schist hones. At least one of these (from [6639]) may be post-medieval.

### Iron

The 7 iron finds consist of a rove, a socketed pricket candlestick, a wall-hook, part of a possible key, a lock-bolt, a possible casket-mount and a tool which may be a leather-working knife, stamped with a fleur-de lys stamp (<2917>).

### Copper alloy

A single copper alloy item, a fragment from a mount with decorative openwork may be medieval (<1302>).

### Lead

The 9 lead finds consist of 6 cloth seals, part of a secular or pilgrim badge <2936> which may be early post-medieval, a piece of waste and a vessel leg, possibly from a cauldron, from a grave. Some or all of the cloth seals may also be post-medieval.

### Bone

The 5 bone finds consist of three skates, two from the same context ([230]), a near-complete parchment-pricker <1758> (from a grave) and part of a possible small flute, made from a goose ulna and broken across the sounding hole (<2561>).

### Post-medieval

Some date identifications may change following integration of the finds with the stratigraphic data.

### Stone

The eight post-medieval stone finds include a decorative semi-precious stone handle (<2164>), a small piece from a possible white marble mortar (<2520>), part of a two-piece mould made from fine-grained stone (<2524>), two pieces from hones, a slate pencil and two alleys (marbles).

### Ceramic

The 20 ceramic post-medieval finds include five (generally) 18th-century dumbbell-shaped wig-curlers, two alleys (marbles) and 11 mainly small fragments from glass- and metal-working crucibles.

### Iron

The 150+ iron finds fall into the following functional categories: dress-accessories, knives, kitchen equipment, tools, security equipment, trade items, horse equipment, arms and armour and fixtures and fittings.

Most dress accessories are made from copper-alloy or, more rarely, lead, but there are 15 iron buckles, 7 of which are small circular shoe-buckles, and an eye from a hook and eye fitting. There are 12 knife blades, at least one of which (<1034>) is stamped with a maker's mark. Tools include two pairs of scissors (one complete <802>), two pairs of shears, part of a saw blade, and two awls. There is also part of a possible stirrup suspender for a pair of scales <2372>, part of a strainer and two tenterhooks, used for drying textiles. Security equipment consists of 14 slide and rotary keys, over half of which are complete or near complete.

A piece of possible chain mail (<345>) (unseen) seems to have textile backing and is a rare survival; it could be a purse lining (see 'Copper-alloy' below). Horse equipment consists of two rowel spurs and 7 complete and fragmentary horseshoes. The fixtures and fittings category includes structural fittings such as hinges, pintles and strapping as well as pieces from 12 mounts, some of which are decorated and may come from furniture or caskets.

### Copper alloy

The largest categories of copper-alloy finds are lengths of copper-alloy wire and pins, most of which were found in the fill of the deep boundary/drainage ditch [6581], sealed in 1569. There are over 100 pieces/longer lengths of copper wire and approximately 120 pins from 97 accessions (58 of which are from the deep ditch). The wire may have been used for pin-making, an aspect of the finds to be explored at analysis stage. Most pins are small and plain with wire-wound heads but at least 16 are a type used for holding women's headdresses in place and are much larger with decorative heads; nine of these have very standardised biconical or 'lentoid' shaped heads, a shape which was popular in the early to mid- 16th century.

Other copper alloy finds include 21 lace-chapes which were used sometimes decoratively on laced clothing as well as on shoe-laces, and 19 wire loops, 14 of which are a specific type of small ring made from twisted wire made to be joined in a mesh to reinforce and protect textile purses from cut-purse thieves (Egan 2005, 62-4). Four highly decorative hooked clasps would have been used in pairs on short chains or straps to secure decorative accessories together (eg on clothing); all four have near parallels from late 15th and 16th century London sites and the Thames foreshore (eg Egan ibid 42-7, Figs 25, 27). Many of the 23 mounts are also extremely decorative, including two figurative mounts from the 16th century 'deep ditch' (<1453>; <1454>, one (<1454> with an image of St George). Other copper-alloy items include 17 plain rings (not finger rings), nine of which are from context [3010], and eight thimbles, most of which are early to mid- 16th-century.

### Lead

There are 95 lead finds, 35 of which are cloth seals. Other finds include 7 badges, 6 of which are complete or more fragmentary examples of the crescent-moon-shaped The Virgin/Our Lady of Willesden pilgrim badges, common in London and often found in early 16th-century contexts (Egan ibid 205-6). There are also two decorative hooked clasps –one very similar to the copper-alloy examples (<2069>, <2084>), one brooch (<2947>), two seals (<2080>, <2081>) and 4 spoons, one of which <2065> is complete and has an acorn-shaped decorative knob. Other lead finds include pieces of window came, waste and a weight.

### Bone, ivory, shell and tortoiseshell finds and working waste

(Michael Marshall incorporating material identification observations from Liz Goodman, Alan Pipe and Richard Ward)

The site has produced a very large assemblage of post-medieval finds made from skeletal materials (tabulated at Appendix 2), some of which can be associated with the 16th-century 'deep ditch' but most of which are later in date. This later material is overwhelmingly comprised of bone and ivory working waste and it is not yet clear which of the fragmentary finished or near finished objects may relate to this activity and which may derive from contemporary domestic rubbish disposal. As such the range of finished objects present will be discussed first followed by the working waste at which point objects that are obviously being made by the local workshop(s) will be highlighted.

Few dress accessories are made of bone but two beads (<2584> and <3163>) probably derive from jewellery or rosaries and further examples are present within a necklace of mixed material beads noted below. Equipment related to toilet / personal hygiene include two tooth brush with integral picks (<1697> and <1907>), a small scoop <1710> and 9 one-

piece double-sided ivory combs. Fans in bone ivory and tortoiseshell are also present. The bone back of a slightly larger brush without a handle <1731> may be from a nail brush or a similar small personal brush such as a clothes brush.

An ivory plaque in the shape of a fish <1850> is an 18th-century gaming counter found widely and probably used in a variety of games including simple games of chance such as lotto as seen in the references to the loss and winning of fish in Jane Austen's *Pride and Prejudice*.

Cutlery and cutlery handles are normally common finds on post-medieval sites in London and the present assemblage is no exception with those retaining their iron blades described under composite below. There are 7 one-piece ivory handles including forms with simple tapering circular and polygonal sectioned grips most with slightly swelling rounded butts some forming the pistol grip profile particularly typical of the 18th century. A plate from a scale tang knife handle <249> was also found. Two other implements are represented by a long slender bone handle, perhaps from a paint brush <195> or textile working tool and a bone knife with the handle and blade made in one-piece <1908>, [3010]. Implements of this type are not uncommon in the 18th and 19th centuries variously described in the literature as 'feather curlers', 'letter openers' and 'page turners' and may have served different functions depending on their precise form.

Seven pinner's bones from the site, tools used in the manufacturing of wire pins, are made from cattle and horse metapodials. They come from contexts ranging from at least the 16th to 18th century and close attention to their associations and distribution will be required to determine if they relate to one or more episodes of activity. Some come from the deep ditch alongside substantial assemblages of pins and wire and as such may form part of a wider pin making assemblage.

The large bone and ivory working waste from the site is of exceptional importance and represents the largest assemblage from London excavations of any period and one of the largest and most diverse from Europe for the 17th/18th century providing very detailed insights into the raw materials, technology and working practices and some of the end products of workshops. This material has the potential to substantially improve our knowledge of this industry in London which is largely based upon much smaller site assemblages (Yeomans 2007).

The current description of the assemblage is based on recording c 30% of the assemblage in detail and scanning c 90% of it. Full recording will take place at analysis. Much of this material seems to have been dumped in the burial ground during its use life and may represent a mixture of 'fly-tipping' and perhaps opportunistic burial of waste alongside human remains. Initial spot dating suggests that the major chronological focus was in the late 17th and first half of the 18th century but some fragments derive from contexts with earlier or later dates and the exact span of activity will be defined more closely at analysis after phasing.

The most important raw materials were cattle metapodials and elephant tusks but much smaller quantities of sheep / goat metapodials, tortoise shell and a few fragments of ivory which may belong to other species were also present. Many of the cattle metapodials have holes drilled in the proximal end a feature that may indicate they have passed through a tannery (Yeomans 2007) and were sold on to the bone workers.

Technologically speaking it is clear that many of the waste relates to lathe working and documentary resources describe that Spinning Wheel Alley which border the burial ground to the south was famous for its turners and furniture makers the name of the street itself perhaps referring to lathes which in the 18th century had large drive wheels as seen in Diderot and d'Alembert's 18th-century encyclopedia, where a paternoster's workshop is depicted (see Moreno-Garcia et al 2010, 188).

In the following preliminary description of the chaîne opératoire involved the types of diagnostic waste observed relating to each stage are noted in parenthesis and can be cross references to table X.

The working of metapodials began by sawing off and discarding the epiphyses (SAWN OFF METAPODIAL ENDS) leaving the mid-shaft (SAWN SHAFT SECTION). The shaft could then be sawn to length and lathe turned in its own right to create hollow cylindrical products or radially split into rods or plaques of varying width and shape to form blanks/roughouts for solid products.

The unsplit shaft sections designed for lathe turning seem to have had their exterior surfaces whittled with a blade (WHITTLED SHAFT SECTION; TRANSVERSE MP SHAFT OFFCUT), and in some instances scraped with a file or rasp, to produce a more cylindrical section before lathe turning (LT CYLINDER WASTE AND PRODUCTS). Identified lathe turned products present in a part finished state include telescopes, needlecases and small ring fittings (LT TELESCOPE WASTE; LT RING WASTE).

The splitting of shaft sections seems to have variably been achieved with a saw or a blade depending on the degree of precision required and could take the form of a wide flat strip, frequently made from the posterior face of metacarpals, radially split flat strips and narrow square / rectangular sections sectioned strips (SPLIT SHAFT WALL SECTION; STRIP AND SPLIT WALL STRIP; SQUARE PEG BLANKS). The radially split wall strips were probably further worked into long flat objects the products are not certain but might include fan sticks, scale tang knife plates and inlay. The other types could go through at least one more intermediate stage of roughing out.

Flat strips were often then sawn and filed to produce large circular roughouts for lathe turning (DISCS) while some have smaller roundels bored out of the centre in a manner typically related to button, counter and bead production. Part finished products for discs include telescope lens / optical compendia lens caps and eye pieces and threaded discs for closing the end of lathe turned cylindrical objects with internal threading. The narrow square sectioned strips were whittled to a faceted peg shape (WHITTLED PEG) ahead of lathe turning. The whittled pegs come in a relatively wide range of shapes and sizes. Small needle cases are definitely amongst the products and a number of dully or part lathe turned pegs with elaborate baluster mouldings are also known although their precise function is unclear. Other possible products are lace bobbins and paternoster / rosary beads, similar blanks being known from several paternoster workshops in France and Spain (Moreno-Garcia et al 2010, 185 – 185, groups 3 and 4).

The working of elephant tusks normally seems to have begun with the removal and discard of the base of the tusk. Here the tusk is hollow and the wall thins to the point where it is unusable. Offcuts from this area (TUSK BASE OFFCUT) are common and in some instances are marked with a transverse groove and one or more crosses inscribed onto the exterior. A number of ½ circle, ¼ circle, sub-triangular and other miscellaneous ivory offcuts reflect the routine squaring off of circular sectioned tusks to make blanks. There were probably several different ways to achieve this depending on the products and the types of waste can be matched to those in different schemes based upon previous ivory working assemblages from London and Amsterdam (Rijkelijhuizen 2011).

Perhaps the most unusual and historically important products are bone optical compendiums. These were sets of varying complexity in use in the late 17th and 18th century which might include fixed focus Galilean telescopes, flea-glass microscopes and other lenses. These reflect the growing interest in lens, microscopy etc during the Enlightenment and may have been designed in part for a general audience as they are much less powerful than more complex specialist contemporary instruments. Complete examples are known from several museum collections but as they have rarely been identified in the archaeological literature until recently it is probable that many incomplete fragments of

cylinders with threaded screw ends have been identified as needle cases or other cylindrical.

### Wood

The 19 wood finds include pieces from 6 combs, a basket, two beads and a counter. Most of these were well-preserved in the fill of the 'deep ditch' or other ditch fills.

### Composite

Forty nine objects are composite, made from two or more materials. Nineteen of these are knives with ivory, bone and wood handles. There are also 8 leather straps with buckles. Some unusual or particularly well-preserved items include a two-armed iron curry comb with a wooden handle (<2559>), a bone toilet set with hinged arms (<1761>) and a mounted gemstone (<1015>). A necklace made from glass and painted bone beads (<171>) was found within a coffin.

### The burial finds

There are 112 possible burial finds from post-medieval graves, grave cuts and coffins, although the actual quantity may prove to be substantially less (see 6.1).

Items include a bone parchment pricker, a glass rod, a shoe, 6 coins, 6 buckles, a clasp, 4 ivory combs and a knife as well as 21 unidentified items and 34 pieces of corroded metal which may be identifiable from x-ray. Some of these are personal items or items related to funerary textiles (eg hair combs, pins) while others may be items deposited for traditional, religious or other reasons.

Confirmed examples of burial goods include:

- A glass and bone bead necklace <171> discovered in situ with the skeleton of an infant [349].

A complete London delftware plate of 'chinamen among grasses' style, dated c 1670-90, placed in the coffin face down over the stomach/lower torso area of skeleton [5613] (

- Fig 35).
- A pewter plate <2085> placed on the stomach/lower torso area of skeleton [5265] (Fig 36).

Medieval and post-medieval burial finds are rare and these finds will need full integration with the stratigraphic and osteological data as well as discussion within the Burials publication.

### Functional analysis

Most of the medieval and post medieval finds were deposited as rubbish in large 16th-century drainage/boundary ditches and therefore have very mixed functions (eg household, trade, transport, horse equipment, dress accessories). Others also have mixed functions but are from features related to specific (later) properties. A highly important large assemblage of 17th/18th century bone and ivory-working waste is thought to originate from local workshops.

The burial finds are either associated with funerary textiles (eg pins), personal items (eg hair-combs) or items deliberately placed with burials for traditional, religious or other reasons (eg coins).

### Provenance of objects

The majority of the finds are from the large drainage/boundary ditch on the site ('the deep ditch'), sealed in 1569. Many others are also from contemporary or near contemporary drainage ditches and will also be closely datable. There are also finds from later 17th- and 18th-century features.

112 burial finds were found in medieval or post-medieval graves, grave cuts and coffins. These will require a full catalogue listing and analysis with the skeletal and grave information. Some of the coffins had disintegrated or spilt open so absolute numbers may change.

### List of objects for investigative conservation

Copper alloy 26 items

Lead 61 items

Iron 25 items

Composite 2 items

Bone/ivory/tortoiseshell c 30 including a c 25% contingency. Mostly repairs for split ivory objects ahead of photography.

**Total (maximum) c 134 objects**

## 5.8 Glass

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By Jacqui Pearce

### Introduction

The post-medieval glass from XSM10 was recorded in accordance with current Museum of London Archaeology procedure, using established codes for colour, technology, vessel, rim and base form. The data were entered onto the Oracle database, along with quantification by fragment count (FC), estimated number of vessels (ENV) and weight in grams. Post-medieval glass recovered during excavation at LSS85 was also reviewed by Lyn Blackmore and recorded on Oracle to current standards.

### Finds from XSM10

The earliest glass identified on the site is the base of a rounded tankard in colourless glass with *vetro a fili* decoration in opaque white – it comes from context [5563] (<2160>) and dates to c 1500–50. A rare find on English sites, the vessel was made in Venice (Willmott 2002, 56). Several contexts have been broadly dated to c 1650–1750/1800+, and all are very small, with fewer than 12 sherds in each, which limits the possibility of chronological refinement. They include small fragments from cylindrical and other phials in natural green or green-blue glass, non-diagnostic fragments from green glass wine bottles, small pieces of window glass and fragments of glassmaking waste (discussed further below). Although a TPQ of c 1650 has been assigned by default, some or all of these contexts could be dated earlier in the 17th century. An unusual find is part of an alembic, used in distillation (six fragments), although this is unfortunately unstratified.

More closely datable glass was recorded in context [7000] (19 fragments, 671 g, c 1680–1700), with a similar date assigned to the smaller contexts [919] and [7080]. This is based on the presence of several fragments from green glass wine bottles of onion shape, found with cylindrical phials in natural green and colourless glass, small fragments of glassworking waste and the base of a lobed pedestal bowl or dish in colourless glass from [7000].

Ten contexts have been given a TPQ in the 18th century, and these include the largest groups of glass recovered from the site. Context [3010] (91 fragments, 3691 g) has been



dated to c 1700–60 on the basis of bases from three onion bottles. There is also a single armorial seal from a green glass wine bottle of unidentified form (<2156>), as well as a number of globular and cylindrical phials. Part of a heavy inverted baluster stem of quatrefoil section in blue glass may come from a rummer (<2248>), and there are fragments from a squat beaker in natural green glass with optic-blown bosses and radiating ribs under the base (<3088>). Two stoppers from decanters or flasks are more unusual finds. One is spherical with multiple tears arranged in a radial design (<2168>) and the other is tiered with optic-blown vertical ribbing (<2169>). The latest item in the context is part of a short ale glass with a funnel bowl and single knob stem. The context also includes 57 fragments of glassmaking waste (2976 g), one of the largest collections from the site. These divide into glass slag, pulls, gathers, slag and a singlemoil, with one large lump of pot metal still retaining fragments of crucible wall (441 g). There is a fairly wide date range for the context, from the 17th to the mid 18th century, and the glass waste could have come from any time within this period.

Contexts [1521] and [4764] are both dated to the mid 18th century and of reasonable size. There is some glass waste in [1521] (805 g amongst a total of 62 fragments, 1071 g, dated to c 1730–1800), including slag, gall, pot metal and pulls, alongside fragments from cylindrical phials and green glass bottles. No glassworking waste was found in the larger context [4764] (111 fragments, 1643 g, dating to c 1740–60), but there is a notable selection of good-quality table glass that includes 14 wine glasses (three of them possibly short ale glasses), many of which are in a good state of preservation or completeness. Dating chiefly to the mid 18th century there are examples with rounded funnel, funnel or conical, bell and trumpet bowls and a variety of stem designs. Two glasses have air twist stems and one near-complete glass has wrythen ribbing round the bowl with a flammiform edge and an acorn stem (<2247>). Five glasses have teared stems and there is also part of a possible jelly glass. Other glass includes cylindrical phials and fragments from five green glass wine bottles (55 g), including part of a bladder onion bottle. There are also 38 tiny turquoise beads (<2162>, <2163>).

Five contexts have been given a TPQ between c 1750 and 1770, including two medium/large groups of glass: [3704] (179 fragments, 13325 g) and [3849] (70 fragments, 2990 g). Neither of these contains any glassworking waste – the latest context in which this is recorded is [1521], which is dated to c 1730–1800. Context [3704] (c 1770–90) consists mostly of fragments from wine bottles and phials. These include at least 31 early cylindrical, squat cylindrical and true cylindrical wine bottles in green glass, and the base of a bladder onion bottle. Five early cylindrical forms are complete, as well as two true cylindrical bottles. This is a considerable collection of wine bottles in one context and will make a valuable contribution to our understanding of activity/occupation on the site in this period, especially when considered alongside other finds from the same feature. The context also includes fragments from cylindrical and hexagonal phials, a rounded funnel wine glass and a tumbler, although wine bottles predominate. Context [3849] is dated to the same period and again includes mostly wine bottles (cylindrical and squat cylindrical), as well as phials and window glass.

The latest contexts recorded are [1504] and [6796]. The former includes part of a medicine bottle of rectangular shape with chamfered corners in aquamarine glass, and the other yielded a fragment of colourless plate glass from a window. Both are dated to the mid to late 19th century.

Glassworking waste forms an important component of the Broadgate assemblage, amounting to 125 fragments, with a total weight of 4410 g (19.3% of all fragments, 16.9% by weight). Although these do occur in 18th-century contexts ([3010] and [1521]), they are chiefly found in earlier groups. The glass is predominantly green or natural green in colour, high-lime low-alkali (HLLA) and includes a wide range of waste – pot metal, pulls, gathers, slag etc. It is known that the Mansell glasshouse was situated nearby, making vessel glass and window glass from 1616 up to the 1650s, though not much after (Willmott 2005, 95,

107). One of Mansell's two glasshouses in London was situated in Austin Friars, Broad Street, set up to make 'crystal' or clear, good-quality drinking glasses. Mansell himself lived nearby and the glasshouse was staffed by Venetians. Excavations by MoLAS in a section of the City ditch at Broad Street in 1990 (BRO90) uncovered a great quantity of glassmaking waste (ibid 100), including moils and paraison ends from goblets in soda-rich glass, decorated with opaque white rods (ibid, fig 62).

The finds from XSM10 appear to represent a different type of glass manufacture, with no evidence from the site for the kind of fine table glass that Mansell is known to have been making at Austin Friars. This poses the question of whether the Mansell glasshouse was also making other kinds of glass into the 1650s, or whether the Broadgate finds represent waste from another glasshouse operating in the vicinity. These questions will form an important part of the analysis proposed here. Comparison of the XSM10 waste with finds from other excavated 17th-century glasshouses will also prove fruitful (eg John Baker's glasshouse in Vauxhall, site code VBN89: Tyler and Willmott 2005).

#### Finds from LSS85

The great majority of contexts excavated on the site (51 out of 59) yielded fewer than 10 fragments of glass, and most of these were very small. These are only broadly datable to the 17th/18th century as there are too few diagnostic features to allow for closer dating. Three contexts have been given a possible medieval date, although their small size makes it difficult to be certain. Contexts [909] and [1319] both include single fragments of green window glass in very poor condition, both of which could be medieval potash glass. Context [1534] has part of the conical foot of a goblet in natural green glass that could date as early as the mid 14th century. Otherwise, all contexts have been dated to the post-medieval period, and specifically to the 17th and 18th centuries, coinciding chronologically with the glass recovered from XSM10. The majority of the contexts given a TPQ in the 17th century yielded only one or two small fragments of glass, mostly glassmaking waste of various kinds, including pot metal, pulls, gathers and slag, as found on XSM10, but in much smaller quantities. There are also scattered fragments from phials, case bottles, window glass and drinking vessels (chiefly goblets), but too little to allow for closer dating.

Eleven contexts have been given a dating of c 1680–1760, and include two with a larger number of fragments (although their overall weights are low): [501] (80 fragments, 267 g) and [709] (26 fragments, 87 g). These include some glass waste, but are dated by the presence of green glass wine bottles of onion and mallet form, as well as a few fragments from case bottles, globular flasks, cylindrical phials and window glass.

Thirteen contexts have been dated to the 18th century, two of them medium/large in size: [654], dating to c 1730–1800 (39 fragments, 45g) and [560], dated to c 1770–1800 (107 fragments, 895 g). These again include some glass waste, found with squat cylindrical and mallet wine bottles and phials. The larger [560] has few wine bottle fragments (11 in all) and several cylindrical phials, as well as some glass waste. To this extent it differs from XSM10, where no waste was recorded in later contexts. The latest context on the site is [762], dated to c 1870–1900 by part of a codd bottle.

Overall, the finds from LSS85 make a marked contrast with XSM10. This largely relates to the small size of glass fragments recovered from the earlier excavation, with glassmaking waste spread through 17th- and 18th-century contexts, and no large groups of complete or near-complete bottles and other forms, and few drinking vessels.

## 5.9 Coins

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By Julian Bowsher

### Introduction and methodology

#### The coins and tokens

The coins and tokens have been conserved by Elizabeth Goodman and examined and assessed by Julian Bowsher. All of which have been processed in accordance with MOLA procedures, with the occasional aid of x-radiographs. Details of the objects – some preliminary – are held on the MOLA Oracle database. The draft archive catalogue of the coins and tokens prepared during the course of assessment (see Appendix 3) will assist form the basis of the final catalogues.

There are two gold coins (<328> Venetian and <1014> Portuguese) and four silver coins (medieval and post-medieval). Five of the medieval tokens are lead but all the remaining coins, tokens and jettons are copper-alloy.

The coins range from 1st century AD Roman to 18th century English. To date the following categories comprises 10 English coins, 1 early medieval coin, 1 post medieval Venetian coin, 1 post-medieval Portuguese coin, 3 Low Countries jettons, 1 Gelderland token, 1 Tournai jetton, 16 Nuremberg jettons, 2 uncertain medieval / post-medieval jetton / tokens, 5 English tokens, 1 French token, 6 ?English lead tokens, 2 uncertain post-med ?English tokens. Although a number that remain illegible, there are a few that remain to be identified. The general condition is poor.

In the following assessment report the finds are firstly discussed by period. All references in this assessment refer to accession numbers <>. The <C > numbers are at present used to define numbers though they will eventually for a chronological sequential numbering.

#### Medieval

The small silver medieval assemblage also needs to be checked against context but <1195> might be an early example and the coins of Richard III and his successor Henry VII are scarce. There are a number of lead tokens and jettons from this period which need further study.

#### Post-medieval

The most important of the post medieval coins are the two foreign gold coins. The half ducat of Leonardo Loredan <328>, Doge of Venice came from an upper fill [1034] of the 'Deep Ditch', a late medieval to early post-medieval ditch, seen on the Copperplate and Agas maps. This, as well as the general garden landscape seen in the maps, was covered by the burial ground after 1569. Thus it might be nearly contemporary although as it has been pierced for suspension so was no longer used as currency. The ducat, later called the *zecchino*, and its 'half' were gold coins minted in Venice from the late 13th to the late 18th century. The obverse legend is an abbreviation of '*Leonardo Lauredano, Dux, sacra moneta Venetiae*' (Leonardo Loredan, Doge, Sacred Money of Venice). St Mark is the patron saint of Venice and he is shown passing the flag of office to the Doge. The obverse legend '*ego sum lux mundi*', (I am the light of the world) is from Jesus' discourse with the Pharisees (John 8:12). Leonardo Loredan (1436-1521) was elected Doge in 1501, the same year his famous portrait was painted by Bellini (National Gallery, London). Curiously, his silver coins (soldini) are extremely common in Britain whence they were brought by Venetian sailors and were known here as 'galley ha'pennies'. The second gold coin <1014> is a 400 *reís* piece of King João (John) 5th dated 1721 minted in Lisbon. Most of these however, were minted in Brazil – the source of most Portuguese gold. It was found in a fill [3704] of a brick cess pit belonging to a house of the early to mid 18th century, built over and into the Bedlam burial

ground. Interestingly, quite a lot of Portuguese gold circulated in early 18th century London (Kent 2005, 73–5).

The small corpus of post-medieval English coins begins in the later 16th century and comprises mostly of small change – even including counterfeit 18th century examples – but there are two silver sixpences. There are also five distinctive 17th century ‘trade tokens’. Though most are in poor condition the two legible ones relate to Londoners, Sarah Paggan from Dowgate <794> to the west and Ephraim Clitherow <1206> who hailed from ‘the Sun in Bedlam’ which is virtually within the excavation area – in fact the family has been traced there over a long period. Quite a lot of the jettons and other late med to 16th century coins came from the upper fills of the Deep Ditch, or from roughly contemporary boundary/drainage ditches.

The corpus of foreign tokens and jettons is, as usual, dominated by the 16th / 17th century Nuremberg assemblage, ranging from late 15th century French types <1186> up to a rare late 17th century English type. There are, however, earlier pieces such as that from Tournai <1190> and the ‘Venus Penny’ <1227> from the Low Countries. An unusual piece here is the 1636 token from Gelderland <1225> in the Netherlands. It is likely that the majority of these post-medieval issues came from the burial ground, perhaps originally as grave goods but long since disturbed. It might be noted that the seven coins and jettons found at LSS85 which adjoined XSM10 to the north, comprised Nuremberg jettons and English small change of the 17th and 18th centuries all from mixed burial layers.

## 5.10 Accessioned and bulk leather and textiles

By Beth Richardson

### Introduction/methodology

Ten plastic crates of bagged accessioned and bulk leather from XSM10 Areas 1, 2/3 and 5 were examined while the leather was wet (before conservation). The leather was recorded on paper by context. Most of it is bulk leather (non-accessioned post-medieval shoe parts, Roman sole fragments and post-medieval waste) but there are also 104 accessioned items (complete Roman soles, post-medieval shoes with fastening details and/or decoration, post-medieval non-shoe items (eg bags) The great majority of the leather is early post-medieval and early- to mid- 16th-century. There are also an estimated 4 boxes of Roman nailed and sewn sandal soles, most of which are fragmentary but include 14 accessioned complete soles and upper fragments.

There are 12 accessioned pieces of textile, currently in conservation.

*Table 20 Summary of leather by material and period*

	Roman	Medieval	Post-med	Not known	Total	Comments
Leather	14	0	76	14	104	
Textile	1	0	8	3	12	
<b>Total</b>	<b>15</b>	<b>0</b>	<b>84</b>	<b>17</b>	<b>116</b>	

### Post-medieval

#### Leather

##### **Shoes**

The majority of the post-medieval leather consists of shoe-parts: vamps, quarters, top-bands, toe-puffs, heel-stiffeners, rand, welt, mid-sole edging, insoles, outer soles, clump soles. There are also a few complete and near-complete shoes and pieces from (rare) ankle

boots. More shoes may be reconstructed when the leather is re-examined after conservation.

The footwear is early to mid 16th-century and very similar to style to the complete shoes from the Mary Rose wreck of 1545 (Gardiner et al 2005). Unlike the Mary Rose assemblage it includes women's and children's shoes, which are identical in style to the men's, although the children's shoes tend to be more simply and robustly made. Most of the shoes are quite utilitarian with high vamps (fronts) with lace-holes or straps from lace or instep buckle fastenings (eg <3114> [6639]) but some have more fashionable low long-winged buckle-fastened vamps with wide 'cow-mouth' toes or pronounced corners at the toe ('eared toes') (eg <495> [1347]), often with slashed or raised horizontal strip decoration (eg <525> [1034]). There are also a variety of construction techniques, with examples of turnshoes made inside-out with single soles, some with evidence for additional outer soles ('turn-welted') as well as (for this transitional period) the more common welted shoes with inner and outer soles and midsole packing pieces.

### **Other items**

Other items (all accessioned) include two semi-circular drawstring purses or pouches (<2608> [6638], <2613> [6639]), generally used for money and worn suspended from a belt at the waist (eg Gardiner et al 2005, 107-112; Goubitz 2007). They are rare survivals. There is also one plain knife-sheath (<2601> [6638]), a tassel (<2605>, [6639]), four plain straps and ten unidentified pieces of leather, some of which are large and too fragile to examine while wet but may be pieces from garments. A strip of leather embossed with gold-leaf decoration is another rare survival (<2702>, [8280]).

### **Waste**

There is very little waste from shoe-making and other activities. It includes one unusual item: a piece of hide pierced with rows of regular holes (<3125> [6639]).

### **Textile**

There are 12 small pieces of textile, eight of which are from early to mid 16th-century fills of the deep ditch [6581]. The three textiles currently of unknown date and one provisionally identified as Roman may also be post-medieval; their date will be finalised at Analysis stage.

### Functional analysis

The Roman and post-medieval leather shoes and textiles are all items of clothing (footwear) with two dress accessories (purses or pouches) and pieces from four possible belt-straps.

### Provenance of objects

#### Post-medieval

The majority of the post-medieval leather is from the upper fills of the 'Deep Ditch', a massive drainage/boundary ditch, particularly [6639] (about 4 crates of leather came from here), also large quantities from [6637], [6638]. There is also leather from the fills of other drainage/boundary ditches and rubbish pits (eg [8283]).

### List of objects for investigative conservation

All the leather and textiles are being conserved.

## 5.11 The iron working remains

By Matt Phelps

### Introduction/Methodology

The Crossrail, Liverpool Street Station site (XSM10) yielded small quantities of iron working remains amounting to almost 5 kg. The remains were assessed using visual analysis based on colour, texture and morphology, as well as density and magnetic susceptibility, with the aim of identifying the metalworking processes occurring on site. This assessment will describe the material by period, before discussing the potential significance and recommendations for further work. The material sorted by type and period and a full sample catalogue is presented in Table 21.

**Table 21** Catalogue of samples - Post-medieval 1500-1800AD

3010	1	83	undiag Fe slag	black, quite glassy
3023	1	34	undiag Fe slag	siliceous, glassy, embedded fragment of coal
3849	13	100	cinder	low density vitrified ceramic. Unknown high temperature process
6637	1	226	SHB fragment?	partial fragment?; black, high density; 9 by 7 by 4 deep
6637	1	92	undiag Fe slag	

### Results

Small quantities of material were recovered from post-medieval contexts amounting to 209g of undiagnostic Fe slag, some with embedded coal fragments, and a single SHB (226g). In addition, 100g of cinder was identified but this was from an unknown high temperature process. None of the remains were *in situ*, with material coming from burial ground soil – [3010] and [3023] – and cesspit and ditch fills – [3849] and [6637].

### Conclusions, significance and recommendations

This was a small assemblage of material associated with the smithing of iron. The vast majority of remains were confined to the Roman period dating 60-200AD. There is no evidence for *in situ* smithing from any period, and the material found was most likely dumped from nearby smithing sites. There was no evidence for other metalworking activities.

## 5.12 The timber

By Damian Goodburn

### Introduction

As is common in much of the Walbrook Valley zone of the City of London, the wet peaty soil has been variously compressed by the later overburden and slow dewatering. This can be seen in the considerable distortion of some of the smaller timbers found, such as the roundwood stake [6753] which appears squashed into a zigzag form.

### General range of woodwork found

The excavated woodwork summarized in this report includes structural items, such as posts and stakes and small woodwork found in deposits, including some small objects and diagnostic woodwork debris are also briefly summarised.

### Methodology

The woodwork found was planned at 1:20, basic context descriptions were made and photographs taken. The large post-medieval foundation piles were recorded on-site but *ex situ*, but the other woodwork was washed and recorded off-site at MOLA stores.

The detailed timber records were made following established procedures laid down in the Museum of London Excavation Manual which is in-line with the procedures laid out in the English Heritage Guidelines on Waterlogged Wood (Spence 1990, Brunning 1996). The records include pro-forma 'Timber sheets' and detailed scale drawings on gridded film. Following recording, a sub-sample of seven oak timbers suitable for tree-ring study (with over 50 annual rings) were slice sampled and six have been dated (Tyers 2013). For those items without enough tree rings, 3 C14 samples were taken for dating if required. Two species ID samples were taken of two smaller roundwood elements that could not easily be visually identified as oak or one of the elms.

As phasing details are just becoming available for this project, some fine dating revision may be required after further post-excavation work but the broad sequence should remain the same and the tree-ring dates cited will not change.

### Saxo-Norman and Medieval woodwork

Although cut features indicating the use of structural woodwork such as stake holes were found and recorded in medieval contexts no solid woodwork survived.

### Post-medieval woodwork

#### Structural woodwork

There was occasional evidence of structural posts surviving *in situ*. These include a small box quartered (0.32m long by 160x 140mm) isolated pile or driven oak post ([1266]), which carried surviving sapwood and enough tree-rings to be viable for dating. A larger, boxed heart, square section (225 by 240mm), oak post ([8246]) had been heavily truncated but retained sapwood on one corner and a flat, possibly axe hewn base. This may also be viable for tree-ring dating. A fragment of radially cleft oak board [6798] from a post-medieval ditch fill may have been a displaced piece of pale fencing.

#### Fragments of a c 16th century oak trellis [6761]

A group of interlaced laths ([6761]) represent part of a fallen or dumped garden trellis. The surviving area of trellis was c 1.15m long by 0.5m wide and formed of cleft oak laths c 36–41mm wide by 5–8mm thick. At each intersection, the laths were secured with small iron nails, sometimes two, and at least one was locked by turning back the tip twice. The context indicates a 16th-century date and horticultural woodwork of this date is exceptionally rare.

#### Fragments of coffins

Although all the excavated coffins were poorly preserved it was possible to sample small sections of some examples for species identification. The recent English preference is for elm but it is already clear that the XSM10 examples include some made of thin conifer boards and some oak elements. One oak board survived just well enough to provide a potentially viable tree-ring sample [6239]. Some of the elm coffin boards were pierced with doomed headed copper alloy studs eg [3846].

#### Diagnostic woodwork debris and small woodwork

It is clear that some of the post-medieval ditch fill deposits included distinctive waste from local workshops of several kinds including woodworking debris. Fill [6639] produced sawn off-cuts of oak and conifer timber from carpentry or large scale joinery work, and some

debris of species yet to be identified together with some oak lath fragments. At least one example of waste from the whittling of a small oak peg suitable for fine joinery or furniture making was also found in fill [6639]. The debris in ditch fills [6639] and also [6638] also included sections of coopers' work such as offcuts of oak and conifer stave ends and two tub or bucket end boards. Part of a turned elm disk pierced with a perimeter hole might have been from a lantern base.

Finally, fill [6639] also contained a well-preserved offcut of roundwood, possibly a fruitwood such as cherry; the bark was still extant on this piece. It is quite likely that fruit trees were grown close by.

### Revetment

Fragments of a land tie assembly (or 'land anchor', or 'back brace') including three oak timbers (Fig 13) are diagnostic of a simple support for a substantial structure revetting the east bank of the medieval Walbrook. Its form and size implies a revetment of at least 1m depth, most likely to be a relatively simple structure of driven vertical timbers with pile and plank or wattlework walls.

Timber [1293], the long horizontal main land tie beam, was a box-quartered, squared oak with sapwood extant on one corner and clear pit-saw marks on at least two faces. The landward end was partly bevelled which may be relict from the felling cut. The beam had a square through-hole which held horizontal, sawn oak, lock bar [1294]. This assembly would have been anchored to the land behind the ditch with at least one pair of small piles. One of these [1295] was lifted for more detailed recording and sampling. This timber was sawn out of a knotty, squared baulk of oak, ending up 'box quartered'. Each face had clear surviving pit saw marks, a technique of sawing currently thought to be adopted in London c 1400 but which became more common from the 16th century (Goodburn and Minkin 2002; Blatherwick and Bluer 2009, 101). Part of the taper of the pile was formed by sawing with only the very tip being axe hewn. The pile had its original sawn top and a total length of 1.34m and cross section of 160mm by 110mm. Although the sampled timber had around 80 annual rings and full sapwood, a tree-ring date could not be obtained.

From the perspective of the woodworking technology the assembly is likely to be 16th–17th-century in date.

### Elm pile group

The bulk of the post-medieval timbers were wall foundation piles that below the west cemetery wall (Fig 17) of probable later 16th-century date. A total of eight were exposed: it was possible to lift four large and somewhat irregular, examples ([1359], [1360], [1363] and [1362]). The shape and dimensions varied considerably with the longest [1362] surviving 1.85m long and the largest in cross section being [1360] at c 360x200mm. The method of conversion used also varied, but for all involved pit sawing sections of timber from axe hewn baulks of elm, which still had rounded 'waney' natural corners. The axes used had blades up to 100 mm wide. In one case the taper had been partially formed using the pit-saw and the final tip was axe hewn to a square cross section.

The use of elm foundation piles and sill planks for masonry walls in this way is well known across the wet zones of Greater London from the 16th–early 18th centuries. It was rarely used before this period, probably because of endemic elm diseases, such as those common today but it provided a durable alternative to oak. Elm is not suitable for tree ring dating because of its irregular lateral growth habit but on technological and species grounds, a 16th–early 17th century date is most likely.



### Assessment work outstanding

For selected small objects remain to be accessioned, the temporary reference sub numbers on records and bags should be replaced by accession numbers with the assistance of the MOLA finds processing team.

### Conclusions

The amount of waterlogged historic woodwork found during this project was modest but has considerable potential to add to both the story of the historic use of the site just outside the historic core of London and a number of other areas. The post-medieval woodwork mainly informs aspects of the development of the site but also provides evidence of how new materials such as elm and the technology of pit-sawing were applied to civil engineering in timber.

## 5.13 The plant remains

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By Karen Stewart and Anne Davis

### Introduction/Methodology

169 environmental samples, ranging from five to 40 litres in volume, were taken during excavation at Broadgate. They represent a variety of context types and periods, from prehistoric waterlain deposits to post-medieval garden features. This report summarises the organic remains from the samples dating to the post-Roman phases of activity at the site. Summary results of the botanical remains can be seen below in Appendix 4.

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 any flots which contained waterlogged organic material were stored in water. All other flots were dried. All flots were then scanned briefly, using a low-powered binocular microscope. Many of the flots were very large and subsamples of c 100 ml were assessed in these cases. The abundance, diversity and general character of the plant, animal and artefactual remains present within the samples were recorded on the MOLA Oracle database, and the botanical information is summarised in Table 7.

Plant remains were preserved primarily by waterlogging, with some preservation by charring and mineralisation.

Results from previous phases of assessment work have been included in this report.

### Charred remains

Charcoal was recovered in about two-thirds of the samples dating to this phase. In most cases charcoal was record in very low amounts but in five samples it was recorded as 'abundant'.

### Waterlogged and mineralised remains

Waterlogged preservation of organic material in the samples was excellent, with abundant and diverse assemblages in 33 of the 56 samples. Wet ground taxa were very well represented with aquatic taxa such as pondweed (*Potamogeton* spp.) and hornwort (*Ceratophyllum* spp.) recorded in many samples, alongside wet ground or channel edge plants like celery-leaved crowfoot (*Ranunculus sceleratus*), bur-marigold (*Bidens* sp.) and gipsy wort (*Lycopus europaeus*). Wood fragments, twigs, stems and leaves were also quite common in the samples, which suggests some wood- or shrubland near the site.

Food remains were also common, with cherries (*Prunus avium/cerasus*), plums (*Prunus domestica*), grapes (*Vitis vinifera*), figs (*Ficus carica*) and mulberry (*Morus nigra*) all

represented. Low numbers of mineralised remains were recorded in 3 samples in low concentrations.

Signs were seen in a few samples of textile industries in the neighbourhood, with seeds of flax (*Linus usitatissimum*) and hemp (*Cannabis sativa*) in several samples and also flax seed capsules in {74} [1312]. Sample {10} [283], an organic deposit thought to date from the post-medieval period, contained many stem fragments and numerous seeds of hemp (*Cannabis sativa*), along with mainly weeds of arable and/or waste ground. Hemp was cultivated for the use of its stem fibres in textile manufacture, and its seeds were crushed to extract oil. Many seeds of teasel (*Dipsacus* sp.) were seen in sample {44} [1034]. The spiny seed-heads of this plant were used for raising the nap on woollen cloth, and cultivated teasel grounds are known to have existed to the east of Bishopsgate during the medieval period.

Occasional finds of cultivated garden plants were also present in some of the samples, including seeds of ornamental plants such as marigold (*Calendula* sp.), opium poppy (*Papaver somniferum*) and leaves of box. Numerous hop (*Humulus lupulus*) seeds, seen in samples {69} [1150] and {71} [1177] may also result from garden crops grown for home brewing in the post-medieval period.

#### Faunal remains

Freshwater molluscs were very common in the samples taken from the site, occurring in almost all of the samples. In most cases these were in low to moderate numbers, but occasional samples with abundant molluscs were noted.

Animal bones were also common from the samples at the site, again mostly in low numbers, though there were a number of exceptions to this, such as the abundant bird bone recorded in {408} [8264]. Mammal, bird and fish bones were all recorded. All animal bones from sampling are assessed in the animal bone assessment report (5.14)

Fragments of beetle exoskeleton occurred frequently in the samples. In most cases these were in low to moderate numbers. Larval cases of caddis fly (Trichoptera) and leech eggs were also recorded in a number of samples, both of which are good indicators of wet habitats.

#### Artefactual remains

Artefacts were recorded in all of the 56 samples. In many cases these were in very low quantities, but both clinker and ceramic building material was recorded in greater amounts than any other artefact type. Pot, leather, iron objects and glass were all recorded with some frequency and these have been assessed by the relevant specialists.

## 5.14 The animal bone

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By Alan Pipe and Vicki Ewens

#### Introduction and methodology

This report deals with 160 selected context and sample bone groups dated as post-Roman at time of writing; it includes a small number of context and sample groups considered in earlier assessment and evaluation reports. Hand-collected animal bone from 128 contexts and wet-sieved animal bone from 32 samples was described and recorded onto the Museum of London Archaeology Oracle animal bone assessment database. This was undertaken in reference to weight (kg), estimated fragment count, faunal composition, measurable and complete bone, modification, recovery of evidence for age at death, epiphyses and mandibular (lower jaw) tooth rows.

Context and sample groups were generally small; ranging between 0.005-1.000 kg and 1-50 fragments, but mainly less than 0.1 kg with fewer than 30 fragments. Particularly large

groups were recovered from subgroup 472 external dump [1017]/5.95 kg; subgroup 471 ditch fill [1034]/4.650 kg; subgroup 7454 pit fill [4915]/9.400 kg; subgroup 160 [ditch fill [6505]/5.950 kg; subgroup 172 ditch fills [6637], [6638] and [6639]/46.400 kg; subgroup 416 ditch fill [8236]/35.500 kg; and subgroup 550 rubbish pit fill [8280]/8.750 kg.

The animal bone context and sample groups are summarised at Appendix 5.

The selected post-Roman assemblage produced a very large assemblage, 215.450 kg, estimated 5369 fragments, of fragmented hand-collected and wet-sieved animal bone generally assessed as in 'good' preservation with surface damage insufficient to obscure fine surface details or to prevent identification of species, skeletal element or body side.

#### Bone groups

The bone groups largely represent post-consumption and butchery waste derived from preparation and consumption of beef, mutton, lamb and pork, with sparse recovery of non-consumed domesticated species and only occasional fragments of wild 'game'. It was quantitatively dominated by adult cattle *Bos taurus* (115 context/sample groups) and adult sheep/goat (90 context/sample groups) including sheep *Ovis aries* with no definite recovery of goat *Capra hircus*, with substantial representation of adult and juvenile pig *Sus scrofa* (44 context/sample groups). Recovery of very young animals was negligible with single fragments of foetal or neonate domesticates from only seven context/sample groups.

#### Poultry

Fragments of poultry were recovered from 31 context/sample groups each of which produced fragments of chicken (domestic fowl) *Gallus gallus*. Goose, probably domestic goose *Anser anser domesticus*, was much sparser; recovered from only eight context/sample groups in pit and ditch fills; dove, probably domestic pigeon or feral rock dove *Columba livia domestica* was recovered from subgroup 172 ditch fill [6639]; subgroup 5731 make-up [1150] and subgroup 5743 external deposit [1169]. There was no recovery of mallard or domestic duck *Anas platyrhynchos*.

#### Domestic animals

Non-consumed domestic mammals were well-represented; they mainly comprised adult and juvenile horse *Equus caballus* (31 context/sample groups from pit, ditch, dump and make-up deposits) with sparser recovery of dog *Canis lupus familiaris* (16 context/sample groups mainly from dump and pit deposits) and cat *Felis catus* (eight context/sample groups from ditch and rubbish pit deposits).

#### Wild game

Evidence for exploitation of wild game was sparse; indicated by single fragments of crane, probably common crane *Grus grus* (ditch fills subgroup 471 [1034] and subgroup 639 [1343]); swan, probably mute swan *Cygnus olor* (ditch fills subgroup 152 [6541]; and subgroup 639 ditch fill [1343]); red deer *Cervus elaphus* (subgroup 527 marsh [299]; subgroup 10074 cess pit fill [3704]; and subgroup 172 ditch fills [6637] and [6638]); fallow deer *Dama dama* (subgroup 471 ditch fill [1034]; subgroup 5753 external dump [1186]; subgroup 5758 external deposit [1191]; subgroup 172 ditch fill [6639]; and subgroup 550 rubbish pit fills [8279] and [8280]; rabbit *Oryctolagus cuniculus* (eight dump, ditch, pit, make-up and external context/sample groups); and a single recovery of hare, probably brown hare *Lepus europaeus* from subgroup 172 ditch fill [6639].

There was no recovery of wild 'scavenger' species. Very small wild mammals, including rat *Rattus sp* from subgroup 142 fill [6341], were sparsely represented as occasional fragments in subgroup 471 ditch fill [1034]; subgroup 5743 external deposit [1169]; and subgroup 142 fill [6341] only. An estimated total of 62 amphibian, probably frog and/or toad, bones were

also recovered mainly from subgroup 650 quarry pit fill [1373] and subgroup 247 alluvium [1430].

### Fish

Fish produced a substantial assemblage, approximately 508 fragments, almost entirely derived from marine/estuarine species; roker/thornback ray *Raja clavata*, conger *Conger conger*, cod family Gadidae including cod *Gadus morhua*, plaice or flounder Pleuronectidae, mackerel *Scomber scombrus* and gurnard Triglidae. A migratory species, eel *Anguilla anguilla* was also recovered from subgroup 471 ditch fill [1034] only. No freshwater fish species were identified.

### Crustaceans

Fragments of crustacean exoskeleton, probably edible crab *Cancer pagurus*, were recovered from subgroup 172 ditch fill [6639] {349} and subgroup 10073 cess pit fill [3849] {304} only.

The assemblage offers considerable potential for further determination and study of age at death, with 1397 epiphyses and 305 mandibular (lower jaw) tooth-rows. Metrical evidence was also very substantial, with 439 measurable bones including 293 complete limb long bones suitable for calculation of estimated stature.

### Butchery and gnawing marks

Butchery marks were present on estimated 522 fragments of cattle, sheep/goat and pig. Evidence for industrial activity was also substantial, with an estimated 182 fragments showing a range of tool marks, mainly including transversely chopped and/or sawn cattle and sheep/goat horn cores indicating preliminary preparation for removal of the horn layer for further manufacture. Sawn fragments of cattle metapodial (foot bone) from subgroup 10091 fill [1133]; subgroup 5730 make-up [1149]; and subgroup 10090 ditch fill [1154] indicated waste pieces from preliminary bone-working. A fragment of deer, possibly red deer, antler from subgroup 10074 cess pit fill [3704] had been sawn.

Evidence of burning and canine and rodent gnawing was negligible with burning noted on only 34 fragments and gnawing on 23 fragments. Evidence for pathological change was also very sparse and present only on seven context/sample fragments.

## 5.15 The geoarchaeological samples

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By Virgil Yendell

### Introduction

This specialist report provides the results of the geoarchaeological assessment of section 306 – possible medieval retting ditches or pits, and section 16 – medieval ‘Deep Ditch’. The location of the sections described is provided on the topographic plot of the surface of the underlying gravels is presented in **MOLA XSM10 PXA01 (PXA01 Fig 4)** and a transect representing a schematic section of the site’s deposit sequence within the Walbrook valley is to be found in that report (**PXA01 Fig 5**). MOLA XSM10 PXA01 also carries the data from samples from section 303 – late to post-Roman marsh, which though it may overlap with the post c AD 1200 sequence, is principally Roman in date.

### Onsite methodology

On site, monolith tins were placed vertically into the side of sections exposed during the excavation to retrieve continuous stratigraphic samples. The number of tins used was dependent upon the depth and/or significance of the stratigraphic sequence and the suitability of the stratigraphy for sampling. Each monolith tin was plotted on the section

drawing and related to Above Tunnel Datum (m ATD). Preliminary interpretation of the soil and sediment characteristics of the sequences was made and an overview of the stratigraphy produced that characterises the sequence. All the sediments examined were described according to standard sedimentary criteria loosely following Jones et al (1999) and Tucker (1988) (relating to colour, compaction, texture, structure, bedding, inclusions, and clast-size). The monolith samples were sealed and labelled and taken to MOLA geoarchaeology laboratories to be kept in controlled storage during the assessment and analysis stages of the work.

Offsite methodology

Suitable deposits within the sequences were sub-sampled and sub-samples of key deposits were submitted to an external specialist for rapid ostracod assessment, in order to identify the preservation quality, range and abundance of environmental remains and their potential for past environment reconstruction. A report on the ostracods is included at the end of this section.

The assessed sequence of deposits were logged in table format and entered into a digital database (Rockworks15), which was used to compare and correlate the stratigraphy across the site. Cross-sections were drawn through the data points and correlations were made between key deposits which were then interpreted into facies (a series of site-wide deposits which are representative of certain environments). The Rockworks data was then transferred to Arc GIS v.10.1 through which the topographic plot of the early Holocene surface was created. These programmes give an approximation of the topography of the site as it existed at the beginning of the Holocene period (ie the early Mesolithic, c 10 000 years ago) and its development over time.

The section logs assessed

The logs for the assessed sections are as follows and contain more detailed descriptions of contexts from laboratory examination.

*Table 22 Section 306 north: possible medieval retting ditches or pits section log*

XSM10 Section 306 north				<b>Easting</b>	533057
				<b>Northing</b>	181606
<b>Depth (m bgl)</b>		<b>Elevation (m ATD)</b>		<b>Description</b>	<b>Samples</b>
<b>Top</b>	<b>Base</b>	<b>Top</b>	<b>Base</b>		
0	0.2	110.20	110.00	[6467] Moderate/compact, mid grey/orange, gritty gravelly sandy silt	Facies 8 late to post-medieval marsh and dumping
0.2	0.8	110.00	109.40	[6548] Moderate soft, mid to light brownish grey, silty clay, occasional CBM, very occasional oyster shell	Facies 7 fills of medieval features and ditches
0.8	0.85	109.40	109.35	[6549] Soft, dark blackish brown, degraded timber, lining of possible tanning pit	
0.85	0.91	109.35	109.29	[6556] Very soft, light brownish grey, clay, possible lining of retting pit	

*Table 23 Section 306 north: possible medieval retting ditches or pits section log (continued)*

XSM10 Section 306 north				<b>Easting</b>	533057
				<b>Northing</b>	181606
<b>Depth (m bgl)</b>		<b>Elevation (m ATD)</b>		<b>Description</b>	<b>Samples</b>

XSM10 Section 306 north				<b>Easting</b>	533057
				<b>Northing</b>	181606
<b>Depth (m bgl)</b>		<b>Elevation (m ATD)</b>		<b>Description</b>	<b>Samples</b>
<b>Top</b>	<b>Base</b>	<b>Top</b>	<b>Base</b>		
0.91	1.2	109.29	109.00	[6602] Firm, dark brownish black, sandy clay, moderate CBM fragments, moderate angular stones, moderate charcoal fragments	

**Table 24** Section 306 south: possible medieval retting ditches or pits section log

XSM10 Section 306 south				<b>Easting</b>	533056
				<b>Northing</b>	181603
<b>Depth (m bgl)</b>		<b>Elevation (m ATD)</b>		<b>Description</b>	<b>Samples</b>
<b>Top</b>	<b>Base</b>	<b>Top</b>	<b>Base</b>		
0	0.3	110.20	109.90	[6467] Moderate/compact, mid grey/orange, gritty gravelly sandy silt	Facies 8 late to post-medieval marsh and dumping
0.3	0.6	109.90	109.60	[6572] compact to friable, green grey, silty clay, frequent gravel, animal bone, human skull	Facies 7 fills of medieval features and ditches
0.7	0.7	109.50	109.50	[6573] compact well-humified friable matrix of dark brown humic silt with compact fibrous organic and woody inclusions. Horizontal bedding noted (organic-rich / peaty feature fill)	
0.9	1.1	109.30	109.10	[6574] Very clear / sharp boundary with compact dark brown - black humic silt clay. Very homogenous and fine-grained with few to no inclusions. Darkened root channels visible (stagnant / standing water body ditch fill)	
1.1	1.5	109.10	108.70	Beneath cut [6571] compact very coarse yellow-orange brown sand and fine gravel with dark grey / black silt clay in matrix. Coarse horizontal bedding noted. Small CBM and charcoal inclusions and occasional larger gravel clasts	

Table 25 Section 16: medieval deep ditch section log

XSM10 Section 16 centre				Easting	533048.69
				Northing	181603.51
Depth (m bgl)		Elevation (m ATD)		Description	Facies
Top	Base	Top	Base		
0	0.5	111.3	110.8	[1034] Firm dark grey clayey sand with gravel, occasional bone , CBM , mortar, shell and straw	Facies 7 fills of medieval features and ditches
0.5	2	110.8	109.3	[1035] Firm mid grey to black slightly organic silt with sandy element	
2	2.25	109.3	109.05	[1036] Thin band of gravelly medium sand	
2.25	2.5	109.05	108.8	[1037] Light brown grey clayey silt with Manganese staining root channels and occasional molluscs.	Facies 5 Roman to medieval marsh with some waste dumping
2.5	3.5	108.8	107.8	[1045] Dark grey silty clay with peat lens.	
3.5	3.6	107.8	107.7	[1032] dark brown Peaty layer	
3.6	4.5	107.7	106.8	[1048] Dark grey sandy gravelly clay.	Facies 1 Pleistocene sediments

### Ostracods

Dr John E. Whittaker, Natural History Museum

### Introduction

A total of three sections (16, 303 and 306) were sampled from the post-Roman phases at the Crossrail Broadgate Ticket Hall site, East London (XSM10), for post-excavation assessment. Comprising 11 samples, they are listed with their respective monolith numbers, elevation (m ATD) and weight processed under Materials & Methods below. The purpose of this assessment was to analyse any ostracods (or any other “organic remains”) that might be present, that might further our understanding of the environments of deposition, asking such questions as to whether any might reflect running water. As this was to be a Rapid Assessment with no other specialist analysis undertaken at this stage because of time constraints, the information provided herein aims to be as comprehensive as possible under the circumstances. The site contains sediments of varying dates, from late Roman/post-Roman marsh deposits (section 303), and medieval ditch sequences (sections 306 and 16), underneath what was known as the New Churchyard or Old Bethlem burial ground, dating to the 16th–18th centuries.

### Method

Ostracod sample details are shown in Table 26. The samples were broken into small pieces by hand, placed in ceramic bowls, and dried in an oven. Boiling-hot water was then poured over them, with a little sodium carbonate added to help disaggregate the clay fraction. Each was left to soak overnight. Washing was with hand-hot water through a 75 micron sieve, the remaining residue being returned to the ceramic bowl for final drying in the oven. Most gave a good breakdown, but one or two hard silty peats required processing several times. The residues were then stored in labelled plastic bags. For examination, each sample was placed in a nest of sieves (>50, >250, >150 microns, and base pan) and thoroughly shaken.

Each grade was then sprinkled onto a picking tray, a little at a time, and viewed under a binocular microscope. It was fortuitous that almost all the microfauna was contained in the >500 and >250 micron fraction, which speeded up examination and logging. “Organic remains” were recorded on a presence(x)/absence basis and are shown in the uppermost section of Table 27–Table 28, which accompanies this report.

**Table 26** Ostracod assessment samples

	Monolith and ostracod sample number	Elevation (m ATD)		Weight processed (g)	Context
Section 303	325_O4	109.98	109.96	110	4855
	325_O3	109.72	109.70	110	6496
	326_O2	109.38	109.36	110	
	327_O1	109.12	109.10	110	6582
Section 306	357_O3	108.67	108.65	45	6574
	357_O1	108.37	108.35	55	
Section 306	359_O5	108.61	108.59	85	6548
	359_O3	108.51	108.49	70	6556
	414_O3	107.69	107.67	110	
	414_O2	107.57	107.55	110	
	414_O1	107.51	107.49	150	-
415_O5	107.55	107.53	45		
Section 16	39_O2	109.07	109.05	60	1034
	39_O1	108.81	108.79	85	1035
	41_O2	108.36	108.34	70	1036
	41_O1	108.20	108.18	85	1037

The abundance of each species of freshwater ostracod, on the other hand, was estimated semi-quantitatively (one specimen, several specimens, common and abundant) by experience and by eye. This information is provided on the lower sections of Table 27–Table 28. For archive purposes, a representative fauna of ostracods was also placed in labelled 3x1” faunal slides. At some later stage the residues can be made available for further analysis, if required.

The results of the microfaunal Assessment of the three sections examined are given below with their age (as understood at present): 303 (late Roman/post Roman), 306 (Medieval), and 16 (Medieval). They are shown in tabular form in Table 27–Table 28 respectively. Freshwater ostracods (colour-coded light blue) were found in 9 of the 11 samples. These assemblages, where they occur, were all very similar with species which can live virtually anywhere. These are, with their preferred ecology (after Meisch, 2000), as follows:

*Cyclocypris ovum* – Found in almost every type of aquatic habitat, both permanent and temporary. From ditches to the littoral of lakes, springs and swamps.

*Cyprina ophthalmica* – Widespread and tolerant of a wide range of environmental factors – both permanent and temporary waterbodies, stagnant and flowing waters – (littoral of) lakes, ponds, springs; quite acid bogs; waters with decaying vegetation. Has been termed the “slum ostracod”.

*Ilyocypris bradyi* – prefers springs, slow waters flowing from springs and ponds fed by springs. Both muddy and sandy substrates.

*Pseudocandona* spp. (including *compressa* and *rostrata*) – both live in permanent and temporary small waterbodies, ponds, shallow lakes, ditches, bogs; also in springs and streams.



*Candona neglecta* – widespread in springs, ponds and brooks connected to springs; shallow littoral zone of lakes; pools and ditches; permanent and temporary waters.

Table 27 Section 306: possible medieval retting ditches or pits ostracod assessment results

ORGANIC REMAINS				
MONOLITH	357		359	
Elevation ( ATD)	108.67-108.65m	108.37-108.35m	108.61-108.59m	108.51-108.49m
Sample	357_O3	357_O1	359_O5	359_O3
charcoal	x	x	x	x
plant debris + seeds	x	x	x	x
freshwater molluscs	x	x	x	x
fish remains (scales, bone)	x	x		
cladoceran ehippia	x	x	x	x
freshwater ostracods	x	x	x	x
charophyte oogonia	x	x	x	
insect remains	x	x	x	x
shell (oyster)				x
brick/tile				x
Ecology	Vegetated, (for the most part clean), spring-fed shallow permanent pool			
FRESHWATER OSTRACODS				
MONOLITH	357		359	
Elevation ( ATD)	108.67-108.65m	108.37-108.35m	108.61-108.59m	108.51-108.49m
Sample	357_O3	357_O1	359_O5	359_O3
<i>Candona neglecta</i>	xx	x	x	x
<i>Cypria ophthalmica</i>	xx	x	x	
<i>Cyclocypris ovum</i>	xx	x	x	xx
<i>Pseudocandona rostrata</i>	xx	xx	xx	xx
<i>Ilyocypris bradyi</i>	x		xx	
Organic remains are recorded on a presence (x)/absence basis only				
Ostracods are recorded: x - several specimens; xx – common				
Charophytes require shallow, clean, well oxygenated, still or at most, slow-flowing water				

In most cases *Cyclocypris ovum*, *Cypria ophthalmica* and *Candona neglecta* occur together (with or without *Pseudocandona*) and would seem to suggest muddy, vegetated ditches and pools. Only in monoliths 357 and 359; Section 306 (Table 27) and Monolith 41; Section 16 (Table 28) does *Ilyocypris gibba* occur in addition, which may indicate these sediments, at least, were laid down in spring-fed waterbodies. In order to answer the two questions of first, water quality and secondly, whether there was still or flowing water, the occurrence of charophyte oogonia is highlighted in light-orange on the charts. Assuming these are not reworked/redeposited, charophytes require shallow, clean, well-oxygenated, still or at most, slow flowing water. This in turn, may need some reconciliation with human (food and industrial) waste (evidenced by bone, shell, brick/tile and slag and charcoal) which has been dumped or has accumulated in several of the samples.

Table 28 Section 16: medieval deep ditch ostracod assessment results

ORGANIC REMAINS				
MONOLITH	39		41	
Elevation ( ATD)	109.07-109.05m	108.81-108.79m	108.36-108.34m	108.20-108.18m
Sample	39_O2	39_O1	41_O2	41_O1
charcoal	x			
tile/brick/slag	x			
bone (mammal/fish)	x	x		x
shell (oyster)	x			
plant debris + seeds	x	x	x	x
insect remains	x	x	x	x
freshwater molluscs		x	x	x
cladoceran ehippia		x	x	
freshwater ostracods		x	x	x
charophyte oogonia			x	
Ecology	<i>Polluted stagnant pool</i>		<i>Clean, shallow permanent vegetated (spring-fed) pool</i>	
FRESHWATER OSTRACODS				
MONOLITH	39		41	
Elevation ( ATD)	109.07-109.05m	108.81-108.79m	108.36-108.34m	108.20-108.18m
Sample	39_O2	39_O1	41_O2	41_O1
<i>Cypria ophthalmica</i>		xxx	xx	x
<i>Cyclocypris ovum</i>		xx	xx	x
<i>Candona neglecta</i>		x	xxx	x
<i>Pseudocandona rostrata</i>		x	x	x
<i>Ilyocypris bradyi</i>			xx	

SECTION 306: MONOLITHS 357, 359 (possible medieval linear pits, Table 22)

Two samples each were examined from monoliths 357 (357\_O3 and 357\_O1) and 359 (359\_O5 and 359\_O3). They are from the interval 108.67-108.35m ATD, with some overlap between the two monoliths. Plant debris (and seeds), charcoal, freshwater molluscs, cladoceran ehippia (eggs-cases of water-fleas), insect remains and freshwater ostracods occur in all four samples. Charophyte oogonia occur in three samples, fish scales and bone (including eel vertebra) in two, with brick/tile and rare shell (oyster) only in 359\_O3. This section appears to be much less “polluted” than 303, and the charcoal may even be from natural fire. The occurrence of the ostracod *Ilyocypris bradyi* here, in association with charophyte oogonia may indicate a vegetated (clean for the most part), spring-fed shallow permanent pool filled ditch.

SECTION 16: MONOLITHS 39, 41 (medieval deep ditch, Table 25)

The final four samples are 39\_O2 and 39\_O1 from Monolith 39, and 41\_O2 and 41\_O1 from Monolith 41. These sediments cover the interval 109.07-108.18m ATD and come from the utilities corridor of the XSM10 site. The lower three samples contain a rich assemblage of freshwater ostracods of four species, with a fifth (*Ilyocypris bradyi*) in 41\_O2. Coincidentally this also contains charophyte oogonia and would suggest here the water was clean, quite shallow, permanent, still or at most slow flowing. The same three samples contain plant remains (with plentiful seeds), insect remains and freshwater molluscs (bivalves, pond snails and planorbid gastropods), thus reinforcing the cleanliness and permanence of the pool

(perhaps also spring-fed). In contrast, the uppermost sample (39\_O2 contains charcoal, tile/brick/slag, oyster shell, and animal bone and the pool/ditch seems to have become if not a dumping ground for waste then to have accumulated that waste through run-off from surrounding human/industrial activities. There are no ostracods in this sample as well.

### Summary and conclusions

In conclusion, this rapid microfaunal analysis may have answered some questions about the likely environment at the site from Roman, post Roman to medieval times, but at a later stage when there is more time, other specialist analysis is much needed to enhance and clarify the scenario presented here. From what has been discovered in the “organic remains” a palynological analysis, an examination of the macro-plant remains, the rich insect remains, and the molluscs would be recommended at the very least, and would surely add greatly to the reconstruction.

### Geoarchaeological discussion

The site lies within the floodplain of the Walbrook Valley, on Taplow Terrace Gravels and London Clay. The surface of the London Clay and the overlying Pleistocene sandy gravels rise outside of the site to the east and west (c. 111–113m ATD) and towards the higher edges of the valley. Within the site the surface of the Pleistocene gravels range from c. 106.5-109m ATD with variable alluvial deposits sealing them. The palaeo-ecological results for the assessed sections (section 306: possible medieval retting ditches or pits, section 16: medieval deep ditch) will be discussed below within a broad preliminary understanding of the site wide deposit sequence, the landscape and site formation processes. The complex site wide deposit sequence has been separated into groups (facies), representing formation processes and/or natural environments whilst also attempting to impose distinct chronological periods as understood at this stage of the assessment. Reference to archaeological features will be relatively general and will predominantly relate to supposed contemporary landscape features, elevation and environment.

### Facies 6 Medieval alluvial silting and dumping

Deposits grouped within this facies were broadly recorded between c 109 and 110m ATD and represent a return to the alluvial silting seen during the later Roman period (facies 4 MOLA XSM10 PXA01) and the associated regional trend for rising water levels as a result of relative sea level rise (RSL) and landscape instability. There still appears to be a degree of waste artefactual material within the silting deposits and the fluctuating levels of human activity could be commented on further to some degree as part of future work by other specialists. As before the alluvial silting appears widespread across the floodplain and similar to other areas of the Thames valley and facies 4 here the deposits fill in many of the depressions in the underlying marshland surface which would have contained pools or routes of very sluggish flow. Therefore many tidal creeks, natural channels and man-made drainage ditches cut through the earlier deposits are usually found to be now filled with clays/silts.

The ostracod assessment from section 16 recorded an increase of contamination from human waste dumping compared to the cleaner freshwater pools in facies 5 (MOLA XSM10 PXA01). In addition and even though this transition to alluvial silting and mudflats is usually associated with changes in salinity, increased water flow and/or depth little evidence is recorded in the ostracod remains to coincide with the change in the lithology of the sediments. The waterscape is at most pools of water, which are again likely to be shallow, permanent and still or at most containing a slow flow of water. The ostracod assessment once more highlighted the survival of seed, and insect remains for future analysis, which could provide a valuable insight into the environment and development of the alluvial mudflats.

### Facies 7 Medieval features

Facies 7 represents a broad group of medieval features (mostly ditches) recorded in section between 107 and 111.5m ATD. All the features cut into the facies 6 alluvial deposits and many cut through the upper most facies 8 marsh deposits (see below) as well. With a return to a periodically flooded alluvial floodplain (facies 6, see above) permanent occupation of the floodplain by medieval groups would have been unlikely due to the frequency of flooding although human activity nearby is suggested by the artefactual waste material found in the alluvial deposits (facies 6, see above). The ostracod assessment for facies 7 focused upon the fills of one of the larger ditches (section 16, see above) and two of the smaller features that were initially thought to be retting pits (section 306, see above). Retting pits require flowing water and the ostracods indicated little or no flow so the features are unlikely to be retting pits. Interestingly though they did appear to contain fish scales and eel vertebra whilst also containing ostracods that suggested the features were clean freshwater spring fed ditches. Their use is unclear but perhaps they were small ditches or ponds for catching or storing fish? The features contained a lot of insect remains which may be of some future use in ascertaining their purpose.

In contrast the ostracod assessment for the larger ditches (section 16, see above) recorded an initially cleaner sluggish flowing freshwater environment which became increasingly stagnant and polluted as waste material (charcoal, tile, slag, oyster shell and animal bone) was dumped into the ditch.

The alluvial floodplain would have been suitable for some agriculture activities such as pasturing animals or specialised arable practices (e.g. osier beds, retting pits). The ditches may have had a number of uses (e.g. defensive, marking field boundaries) but would certainly aided efforts to drain the land to increase its usefulness and reclaim it. The preference for agricultural activity in the resource-rich wetland ecotone has been previously noted (Sidell *et al* 2000) and would have become increasingly in competition with the encroaching effects of RSL rise and these ditches may reflect this. Eventually, the increased regional waterlogging probably caused a generalised relocation of agriculture away from the preference for sectional wetland up toward the higher ground (Yates 1999, Dark 2006 and Grant *et al* 2011).

As increased waterlogging drove a general trend of abandonment of activities on the marginal floodplains the ditches would have become decreasingly maintained allowing for their silting up, use for waste disposal and eventual in filling. Occasionally concerted dump layers may signify deliberate infilling but on the whole the fills appear relatively fine grained (natural silting and erosional layers) and organic (standing or sluggish water and vegetation growth) despite evidence for varying levels of artefactual remains (occasional waste disposal) noted in the larger deeper ditches.

### Facies 8 Late to post medieval marsh and dumping

The deposits of this facies were encountered between 109.5 and 111.5m ATD. On the whole they represent a similar environmental change to that recorded in facies 5 with a transition from periodically flooded alluvial mudflats to a waterlogged but stable vegetated landscape. The deposits differ slightly to the Roman marsh (facies 5 MOLA XSM10 PXA01) being generally less organic indicating less well developed wetland vegetation; and the layers appear to contain slightly coarser particles in the deposits suggesting flood events or surface run off depositing eroded sediments. Disconcertingly little difference is recorded in the ostracod assessment between this and the underlying facies with evidence of vegetated freshwater pools of shallow, permanent and still or at most containing a slow flow of water but this may be a result of the low resolution and rapid assessment undertaken.

Again a cessation of river levels rising due to RSL rise or a reduction of human activity could have driven this transition and radio carbon dating may provide a better chronology for this marsh development across the site, possibly tying it to regional trends or looking at the

amounts of waste artefactual material may indicate fluctuating levels of significant human activity as another cause.

The ostracod assessment highlighted the survival of seed, and insect remains for future analysis, which could provide a valuable insight into the environment and development of the marsh allowing comments on the cause of its formation and comments on the effect of a reduction or change in human activity in the vicinity if its development is associated with the medieval management or abandonment of the area.

### Conclusion and recommendations

The site wide post-Roman deposit sequence has been characterised into 4 facies summarised below.

- Facies 6 represent a broadly medieval return to the alluvial silting seen in facies 4 (MOLA XSM10 PXA01) and the associated regional trend for rising water levels as a result of relative sea level rise (RSL) and landscape instability the few remaining tidal creeks, natural channels and man-made drainage ditches on the floodplain would have been gradually filled with clays/silts. The assessment once more highlighted the survival of seed, and insect remains for future analysis, which could provide a valuable insight into the environment and development of the alluvial mudflats.
- Facies 7 represents a broad group of medieval features (mostly ditches) that cut into the facies 6 alluvial deposits and many cut through the upper most facies 8 marsh deposits as well. The features may have had multiple uses but many probably aided the drainage and use of the floodplain. Some of the assessed remains did record some kind of fishing activity in spring fed ditches. These features contained a lot of insect remains which may be of some future use in further ascertaining their purpose. In contrast the larger ditches which recorded an initially clean sluggish flowing freshwater environment became increasingly stagnant and polluted as they silted up and their original uses were abandoned, with waste material (charcoal, tile, slag, oyster shell and animal bone) dumped into them.
- Facies 8 on the whole this facies represents a similar environment change to that recorded in facies 5 (MOLA XSM10 PXA01) with a transition from periodically flooded alluvial mudflats to a waterlogged but stable vegetated landscape. The deposits differ slightly to the Roman marsh having generally less well developed wetland vegetation and suggesting flood events or surface run off depositing eroded sediments. Again a cessation of river levels rising due to RSL rise or a reduction of human activity could have driven this transition. The assessment highlighted the survival of seed, and insect remains for future analysis, which could provide a valuable insight into the human and natural causes of the development of the marsh.

The facies give an outline of the landscape evolution of the site. Further work will entail a range of palaeo-environmental work (i.e. pollen, diatoms, plant macrofossils and radiocarbon dating) being undertaken on the medieval marsh deposits. The results will be summarised and accessibly presented on an interpretative cross-section of the site and Walbrook valley noting environments and human activity through time.

## 5.16 Documentary sources

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For the purposes of this assessment, the availability, quantity and character of available documentary sources have been assessed, but not their content. The documentary research for pre-1569, given the limit nature of records for this period, will most certainly be heavily reliant on late 16th and 17th century histories, such as John Stow's Survey of London which includes description of the local area, and other historic documents, such as charters and maps of the mid-16th century.

The historical records which may be accessed include:

*London Metropolitan Archive (formerly Greater London Record Office) (LMA)*

*Parish registers*

London Metropolitan Archives (LMA) holds the register collections of over 800 parishes dating from 1538, including almost all of the ancient parishes of the Diocese of London (including the former counties of London and Middlesex but excluding the ancient City of Westminster).

While the parish registers are one of the best ways to obtain information on a buried population or biographical information about living local inhabitants, the available information can be quite variable between parishes and also over time within the same parish.

Although a date of birth was not normally given, a pre-1813 register baptism entry usually recorded the date, name, names of parents as a minimum. Occasionally the entry also noted father's occupation and/or a place of residence. The maiden name of the mother, if married, was never entered, nor was the names of the grandparents, god-parents or sponsors.

Pre-1754 marriage entry gave the date and the names and surnames of the bride and bridegroom. Occasionally, the occupation of the bridegroom was noted.

Until the end of 1812, burial entries were generally brief and only recorded the date and the name of the person to be buried. However, additional notes were occasionally made, including family relationships, such as wife of or son, and if the burial was that of a child or baby or from the workhouse (pauper or poor). In rare cases the occupation of the deceased was also recorded.

The level of survival for each record is also greatly variable, many having been lost over the centuries, for example during disasters like the Great Fire of 1666 and the Blitz.

Crossrail's 'Bedlam Burial Ground Register' project has compiled the first extensive list of people buried at the New Churchyard, taken from entries in the historic burial registers from over 74 London parishes. Parish burial registers examined as part of this volunteer programme have to date identified over 7200 individuals known to have been sent for burial at the site (<http://www.crossrail.co.uk/sustainability/archaeology/bedlam-burial-ground-register>).

Of course, the list is not exhaustive and suffers from the limitations mentioned above. Nevertheless, analysis of this resource correlated with osteological and archaeological results will be vital in understanding of burial practice and population studies. It may, via a select subsample of perhaps one or two parishes, also be possible to make demographic comparisons between those being sent for burial at the New Churchyard, outside of their parish, and those being buried within their parish.

*Other parish records, particularly the parish of Saint Botolph, Bishopsgate*

References to the New Churchyard and the local area may be found in the records of the parish of Saint Botolph, Bishopsgate, City of London. The archive dates from the 16th century, with parish registers (baptisms, marriages, banns, burials) from 1558, churchwardens' accounts from 1567 and vestry minutes from 1616. Poor rate and tithe rate assessments are particularly well represented, with a number of extensive and comprehensive series spanning 1703-1946.

*Royal and Sun Alliance Insurance Group, Policy Registers (CLC/B/192/F/001)*

These records hold information about insurance policies taken out for buildings on the site or in the surrounding area.

*Middlesex Sessions: Sessions Papers*

These records hold information about crimes committed on the site or in the local area in the 18th century.

*Freedom admissions papers, 1681–1925 (COL/CHD/FR/02)*

These records hold information about the occupations and trade of the inhabitants of the site and surrounding area in the 17th to 19th centuries.

*Corporation of London*

For contemporary plans of the site, including:

- COL/PL/01/076/D/005 Plan of Bethlem Burying Ground, c 18th century
- COL/PL/01/076/D/006 Plan of Bethlem Burial Ground, 1773

*Comptroller and City Solicitor Records*

For contemporary plans of the site, including:

- COL/CCS/PL/02/089 Bethlehem Burying Ground 'Mr Hall's Plan', c 1767
- COL/CCS/PL/02/142 Bethlehem Burying Ground: 'A Plan of Old Bethlem Burying Ground', 3rd Sept 1767
- COL/CCS/PL/02/149 Moorfields: Plan for letting 3 lots East of Moorfields behind a gated wall and north of the ground and building late belonging to Mr Farr and west of the churchyard, 3rd Feb 1762
- COL/CCS/PL/02/177/C Moorfields: 'A Plan of Mr Jonathan Farr's house in Moorfields [East of Moorfields] and of the new tenements adjoining thereto which new tenements are erected upon ground not contained in his lease, 28th Feb 1761
- COL/CCS/PL/02/209/A-D Bethlem: Elevation of corner premises with shop on ground floor and two floors above one being in the roof, 1775
- COL/CCS/PL/02/270 'Plan of the City's Estate in Broad Street Buildings', Old Bethlem, New Broad Street, Spinning Wheel Alley & the Brokers Row, 1793
- COL/WD/03/007 Large scale Ward plans by Samuel Angall and Michael Meredith, 1855-1858; 4" = 200 ft. (Secondary's plan, Bishopsgate Without, March 1858)

### *Court of Common Council and Court of Aldermen records*

These records hold entries related to the administration of the burial ground, including records relating to the opening of the ground, orders associated with the ground, appointments to the Keepership of the burial ground, and complaints/petitions against the ground. These records also hold significant information relating to the inhabitants and use of the site during and after the burial ground. They include:

- Letter Books (50 vols., 1275–1689) (COL/AD/01)
- Repertories (77 vols. cover 1495–1672) (COL/CA/01)
- Journals (46 vols. Cover 1416–1669) (COL/CC/01/01)
- City Lands Committee Journals (COL/CC/CLC/01)

### *Trade directories,*

These directories hold biographical information about the inhabitants of the site and local area during the early 18th to 19th century. Focus will be those streets and buildings on or immediately surrounding the site.

*COLLAGE (City of London Library and Art Gallery Electronic; part of the former Guildhall Library's print room collection):*

*London County Council Photograph Library and Main Print Collection*

For historic photographs and engravings of Liverpool Street in the 19th and 20th centuries.

### *Bethlem Hospital archives*

*General Admissions book, from 1683*

*Minutes of Board of Governors, 1559-1955*

*Maps and Plans of land Bethlem in Bishopsgate, London*

### *Guildhall Library, City of London (GL)*

*Broadsides*

*Bills of Mortality: 1657-1859*

*The Proceedings of the Old Bailey: 1674-1913*

*Livery Company Records*

These record hold information about the occupations and trade of the inhabitants of the site and surrounding area in the 17th to 19th centuries.

### *The National Archives (TNA)*

*Board of Stamps: Apprenticeship Books, 1710-1811*

*Great Eastern Railway Company, minutes, reports, stock and share registers, deeds, agreements, specifications,...1862-1923, RAIL 227*



### *Prerogative Court of Canterbury Wills*

The wills of people buried at excavated burial ground sites are normally found by tracing them from named burials. While, the wills of 16th to 18th century Londoners are likely to contain many references to individuals who requested burial at the New Churchyard, the number of named burials from XSM10 and LSS85 is small and, therefore, the potential of will research for studying the burial ground population is low.

Searching the will records without the benefit of archaeologically identified/named burials is beyond the scope of this assessment/publication and would have to be undertaken by a large volunteer program such as the Crossrail's 'Bedlam Burial Ground Register'.

Nevertheless, several wills associated with the site have so far been found, including those of individuals known to have:

- requested burial at the ground;
- been buried at the New Churchyard;
- been associated with founding of the burial ground;
- been involved administration of the burial found; and
- been local residents and/or had a direct association with the buildings on the site during the 18th and 19th centuries.

Wills include:

- PROB 11/52 will of Sir Thomas Rowe, 1569 (founder of the New Churchyard)
- PROB 11/68/494 will of Thomas Randall, 1585 (keeper of the burial ground)
- PROB 11/95/133 will of Mary Randall, 1599 (keeper of the burial ground)
- PROB 11/95 will of Thomas Eaton, 1599 (requested burial at the ground)
- PROB 11/240/148 will of Katherine Wykes, 1654 (gravestone found at the site)
- PROB 11/357/197 will of Benjamin Clitheroe, 1678 (keeper of the burial ground)
- PROB 11/863/414 will of Jonathan Farr, 1761 (owner/resident at No.1 Brokers Row and Keeper of the burial ground after its closure)
- PROB 11/1183/217 will of Charles Poynes, 1789 (turner of Old Bethlem)
- PROB 11/1110/309 will of Joseph Woollams, 1783 (turner of Old Bethlem)
- PROB 11/1503/325 will of Sarah Bentham, née Abbott, 1809 (owner/resident at No. 1 Brokers Row and No.20 Broad Street Buildings, and Keeper of the burial ground after its closure)
- PROB 11/1802/123 will of Benjamin Wilson, 1832 (owner/resident at No.1 Brokers Row)

The content of these wills is yet to be fully examined or transcribed. Once this is done, further biographical information may be revealed, as well as perhaps other individuals associated with burial ground and the later development of the site.

#### English Heritage NMR

For historic photographs of Broad Street Station.

#### London Transport Museum (LTM)

##### *Photographic collection*

For historic photographs of Liverpool Street and Broad Street Station, c 1884-1976.

#### National Railway Museum (NRM)

For historic photographs of Broad Street Station.

#### British Library (BL)

The newspaper archives below are likely to hold adverts and articles related the use of the burial ground as well as later 18th to 19th century inhabitants of the site. These newspapers archives are also the best resource for historical evidence relating to grave robbing.

*The Times newspaper 1788- present*

*Burney Newspapers Collection: 17th-18th Century Newspapers*

*British Newspapers: 1800-1900*

*Thomason Tracts*

*Crace Collection*

For further maps or plans related to the site.

*Museum of London (MoL)*

*Museum of London Library*

For items relating to the Great plague of 1665.

*Social History Collection*

Obj. No. 7192 Limestone sign with thick paint layers, 'Broad Street Buildings 1737'

*Victoria and Albert Museum, Department of Design, Prints and Drawings, London (V&A)*

Acc no. e997 to E1011-1903 (M 63e) 1783 trade catalogue of Tuesby and Cooper of Southwark

14435:60 Trade card: depicts the interior of Christopher Gibson's upholstery shop in St Paul's Churchyard, London, c 1730-1742

*British Museum (BM)*

*Department of Prints & Drawings*

Holds trade cards related to the historic residents of the site, as well as other relevant occupations such as undertakers and nightmen.

*Other printed and secondary works*

Modern and historic accounts/histories.

## 5.17 Conservation

By Liz Goodman

### Introduction

The following is an assessment of conservation needs for the registered and bulk finds from the excavations at Broadgate and Blomfield Street, 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 MOLA (Museum of London Archaeology). Records of conservation carried out at the fieldwork stage are held in the conservation department of the Museum of London and any reports are copied to the site project directory. Copies of these records are transferred to the receiving organisation at archive deposition.

*Table 29 Summary of conservation work*

	<b>Material</b>	<b>No. registered</b>	<b>No. conserved</b>	<b>No. to be treated</b>
Inorganics	Ceramic	268	1	7 + bulk
	Glass	173	0	0
	Stone	41	0	0
Metals	Copper alloy	714 (134 coins)	136	57
	Gold	2 (2 coins)	0	0
	Iron	407	6	136
	Lead alloy	224 (7 coins)	7	75

	Material	No. registered	No. conserved	No. to be treated
	Plated	6 (6 coins)	0	0
	Silver	9 (9 coins)	22	0
Organics	Bone	794	211	5 + to be decided
	Fibre	12	12	0
	Ivory	279	73	9 + to be decided
	Leather	104	104 + bulk	17 + hide ID
	Tortoiseshell	6	3	0
	Wood	50	47	0
Composite		59	10	12
Unknown		8	0	0

### Methodology

Conservation treatments at the fieldwork stage includes the stabilisation of vulnerable materials and composites such as wet organics and lifted assemblages, X-radiography and cleaning of coins for dating purposes according to archaeological priorities. Treatments are carried out under the guiding principles of minimum intervention and reversibility. Whenever possible preventative rather than interventative conservation strategies are implemented. Procedures aim to obtain and retain the maximum archaeological potential of each object: conservators will therefore work closely with finds specialist and archaeologists.

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

Due to the anoxic nature of the site, a large quantity of organic objects was found on site. All leather was pre-treated with glycerol, freeze dried to stabilise it and then packaged for long term storage. In the case of wood, the species was identified and treatment decisions made from this information.

The textiles and fibres were carefully washed with natural sponges and soft brushes under running water and underwent controlled air drying for several days.

Due to the large quantities of bone, ivory and wet inorganic objects found, the objects were treated within their context groups and were dried according to best practice.

A number of objects were also conserved for a small exhibition to showcase the archaeology found during the Crossrail excavations.

All conserved objects are packed in archive quality materials and stored in suitable environmental conditions. All object treatment work is recorded on the Museum of London collections management system (Mimsy XG) and on record cards, stored at the Museum of London. Detailed conservation or analytical reports are filed on the site project directory and transfer with the site archive.

### 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 up to 40x magnification. The registered and general finds were reviewed with reference to the finds assessments by Beth Richardson and Michael Marshall (registered finds), Ian Betts (CBM), Julian Bowsher (coins), Jacqui Pearce (CTP), Nigel Jeffries (post Roman pot), Amy Thorpe (Roman pot) and Damian Goodburn (structural wood).

The majority of the objects included in this assessment are in good condition and identifiable. A large proportion of the object has been excavated from waterlogged contexts and only has minimal soil and/or corrosion present. However the metal objects excavated from the dry contexts tend to be heavily encrusted with hard corrosion mixed with stones.

The estimated time reflects the mix of preservation types, with the waterlogged materials requiring only a small amount of time and the dry concreated objects requiring considerably more to conserve the objects identified by the specialists.

*Work required for illustration/photography*

A considerable number of metal items have been identified by the finds specialist as requiring illustration and photography. It is assumed that photography will be used in most cases, if some of the finds are drawn instead, less time may be required to prepare them for illustration.

*Preparation for deposition in the archive*

The majority of the objects excavated from this site appear to be stable, however 15 iron, one copper alloy and one lead alloy accessions are exhibiting signs of active corrosion and need conservation input to stabilise them before deposition.

The rest of the finds from this site are appropriately packed for the archive.

## 6 Potential of the data

### 6.1 Realisation of the original research aims

The overall objectives of the investigation were to establish the nature, extent and state of preservation of surviving archaeological remains impacted upon by the development.

Specific Original Research Aims were addressed as follows:

#### *Medieval:*

The realisation of research aims ORA-RM 1–ORA-RM 2, ORA-RM 4–ORA-RM 7, and ORA-RM 7-ORA-RM 12 have been described in the assessment document **MOLA XSM10 PXA01** (C257-MLA-T1-RGN-CRG03-50099), and consequently are not addressed here.

**ORA-RM 3** *Determine if the ditch found in Pit 11/Trench 1 [and Area 2] is the canalised eastern edge of the Blomfield Street Walbrook channel or not.*

**Realisation** This feature was interpreted as the natural Roman period Walbrook stream channel during the 1985 LSS85 excavations (LSS85, TP7, section No. 102 - Dyson & Malt 1987). However, recent excavations have confirmed that this channel recorded in previous XSM10 excavations (MHS2-100, the Utility Corridor, Trench 1 and Pit 11 (Contexts [710]/[988]/[1050]/[1069]/[6581])) was not the natural Walbrook channel but a large ditch, 12.3m wide by c 2.5m deep and was aligned NNE–SSW, approximately parallel to modern Blomfield Street. It was traced across the XSM10 site over a distance of c 27m. It was cut at some time in the late 15th to early 16th century and was deliberately infilled as part of the reclamation dumping to establish the New Churchyard in 1569. It is perhaps the later of possibly two features historically known as the ‘Deep Ditch’ and can be seen on 16th century maps separately Moorfields (now Finsbury Circus) and Old Bethlem (now Liverpool Street)(Fig 3). The latest pottery groups in the upper fills of this feature date its disuse to mid- to late 16th century, and therefore conform to documentary sources which record that the New Churchyard was founded in 1569.

**ORA-RM 8** *What evidence is there for reclamation of the area in the medieval or post-medieval period? Is there evidence for land stabilisation and agricultural use/refuse disposal in the medieval period?*

**Realisation** Provisional stratigraphic analysis has not yet identified any ground raising/dumping events in the medieval period, although several large medieval pits appear to have been deliberately infilled (see ORA-RM 13 realisation below), perhaps as a measure to improve the condition of area and make it more agreeable for use.

**ORA-RM 13** *What evidence is there for further medieval industry in the area of the site?*

**Realisation** A group of large linear pits are dated to the medieval period. A TPQ of AD1080 for the infilling of one of these features is provided by spot dating a limit number of pottery sherds. However, while the function of these features is not clear, the primary fills appear to have formed by natural silting up processes in standing water, showing that the features were left open for a considerable time. These pits may have been intended as open ‘tanks’, perhaps used as fish ponds or for other unknown industrial processes which required water.

New Churchyard/Bedlam burial ground:

The realisation of research aims ORA-BB 8–ORA-BB 11 has been discussed in the osteological assessment document (**MOLA XSM10 PXA02a**; Doc. No. C257-MLA-T1-ASM-CRG03-50001) and consequently are not addressed here.

**ORA-BB 1** *Characterise and date the sequence of late medieval and early post-medieval dumping and reclamation associated with the establishment of the burial ground. What evidence is there for the original boundary of the burial ground, its subsequent rebuilding and any intra site spatial organisation?*

**Realisation** Building rubble and refuse dumps, some extending over the entire site XSM10 and LSS85 sites, immediately preceded the burial ground. Unfortunately, definition and dating of this horizon is problematic. It survived in a very fragmented and disturbed state because of the many grave cut truncations. The same factors mean that the potential for intrusive finds within this horizon is high.

Archaeological evidence was found for the original west and south boundary walls. There is also clear evidence that the west brick boundary wall was rebuilt in the 17th or early 18th century, on the same alignment but c 2.5m east of its original position.

Initial analysis suggests that there may be some association between the position of burial structures and the gates of the burial ground. There is also a potential clustering of coffins with breastplates/decoration/furniture which may reveal a zoning of the wealthy. Burials with upholstery stud inscriptions form an approximate E-W line on the north edge of XSM10 Areas 1 and 2/3.

Whilst some contexts from LSS85 and XSM10 contained later medieval pottery, all of this material appears residual in burial sequences. The narrow range of fabrics and dates combined with a low sherd count and high fragmentation of the pottery found in the burial ground, demonstrate that this material is probably no more than the result of an accumulation of frequent local refuse disposal. The pottery can be viewed as just one part of the many different materials once discarded here, presumably an example of secondary refuse re-deposited. The post-medieval pottery could be derived from a number of sources in the area, or simply rubbish brought out of the city.

**ORA-BB 2** *Characterise and refine the sequence and dating of burials. How was the burial ground filled? Is there evidence for intermittent import of other soils referred to in historic documents or hiatus? Is there structural evidence for the alleged pulpit?*

**Realisation** Clearly, documentary sources can be used to date the use of the New Churchyard to between 1569 and 1739. Attempts to refine dating within this range, with the aim of phasing of burials, will be undertaken during a programme of analysis.

Whilst most of the pottery from the burial ground is fragmented, pottery and other material recovered from the burial ground sequence appear to compliment the dates for the general period of usage of the burial ground (1569–1739).

Unfortunately, it is unlikely the burial deposits will allow close dating or phasing due to the unusually high density of burials and intercutting graves. Such conditions made the identification of sealed contexts, e.g. grave fills, largely impossible. The action of grave cutting has meant that there was frequent re-deposition of soils over the life time of the burial ground; this is likely to mean that a high proportion of the finds within the burial horizon are residual or intrusive in nature. However, pottery and other finds may be

usefully employed for dating in a small number of grave cuts. Specifically, grave cuts which occurred near the base of the burial sequence, where they were found to cut pre-burial ground deposits and their fills were reliably distinguishable. Relative dating can be confidently and usefully applied in some cases, however, it is also limited due to the same conditions mentioned above.

The best dating evidence from post-medieval burial grounds is usually in the form of markings on coffin lids. Unfortunately, due to their extremely poor condition, the coffin breastplates seen and/or recovered from both XSM10 and LSS85 have currently yielded nothing in terms of dating, except perhaps stylistically. Analysis of inscriptions has so far proved negative. It is another form of coffin marking which offers the site's best dating evidence for the burial sequence: dates of death written in upholstery studs on the lid of the coffin, which, in a few cases, survived sufficiently for deciphering. Burials may also be loosely dated by other general coffin furniture and types.

No clear evidence of the intermittent import of other soils during the use of the burial ground was identified. It is conceivable that any such deposits would have quickly become mixed with the surrounding soil due to the ongoing reworking of the ground by the action of digging graves.

No archaeological evidence for the burial ground pulpit was found, documentary evidence indicates that the pulpit was located at the centre of the burial ground, to the north-west of and outside the limits of both the LSS85 and XSM10 sites.

**ORA-BB 3** *Can different burial practices be defined? Use of shrouds, coffins, mass burial pits? How does it change spatially and chronologically? What indication is there for formal organisation/management and zoning? Can burial episodes be related to historic events such as documented plagues?*

**Realisation** The site included several modes of burial, these included: single graves, multiple graves, stacks, as well as multiple and mass graves (pits).

Uncoffined burials were largely restricted to the lower and lowest parts of the burial ground sequence. It is likely that most uncoffined burials were originally wrapped in shrouds. However, no shroud remains survived, and the only evidence of this practice was the rare survival of shroud pins or skeletal staining indicating their original presence.

The range in the type and quality of coffins seen on site likely reflects the wealth of the occupant rather than religious preference.

Initial analysis has revealed a few potential spatial trends during the use of the burial ground, including in layout, as well as the distribution and orientation of coffins. Further analysis of the burial ground stratigraphy combined with mapping of burial orientation and coffin furniture will help to understand these trends. So far, only two examples of prone burial have been identified from the LSS85 and XSM10 burials. There is no evidence to suggest that these were anything more than as a result of error on the part of a grave digger with an unmarked coffin.

See ORA-BB 12 below for vaults and tombs.

Grave goods discovered at the site can be placed in two categories: items placed in the coffin and jewellery. In most cases, finds found with grave fills or near skeletons/coffins cannot be confidently interpreted as grave goods but are almost certainly represent residual material. At this stage, only three

burials have associated finds confidently identified as grave goods. These include:

- A glass and bone bead necklace <171> discovered in situ with the skeleton of an infant [349].
- A complete London delftware plate of 'chinamen among grasses' style, dated c 1670-90, placed in the coffin face down over the stomach/lower torso area of skeleton [5613].
- A pewter plate <2085> placed on the stomach/lower torso area of skeleton [5265].

All of these burials were coffined. The coffin of skeleton [5613] was of the same stylistically similar to coffins [5194] and [5587], dated by stud inscriptions to 1676 and 1674, respectively.

Post-medieval charnel pits were found within and at the top of the burial ground sequence.

Whether grave robbing practices are evident in the archaeological record is a question which has received little previous consideration (Molleson and Cox 1993, 203). However, several archaeological features found during the XSM10 excavations may be evidence of grave robbing or of the measures employed against it. XSM10 burial [3999] was of particular note. The coffin was filled with sand and large stones had been placed on the lid and within the grave fill. The filling of the coffin with sand may have simply been a method, albeit unusual, to absorb the smells and fluids of putrefaction, however, the presence of the sand *and* stone suggests it is more likely an anti-grave robbing measure. Late 18th and early 19th century precautions against grave robbing are well documented and include: anti-grave robbing devices such as iron coffins, coffin collars, mort-stones, mort-cages, and mortsafes, as well as simpler measures such as putting branches within grave fills or heavily compacting grave fills (Richardson 1988, 75–99). In 1844, Joseph Smith (1805–1844), the American religious leader and founder of Mormonism and the Latter Day Saint movement, was buried in a sand filled coffin to prevent theft of his revered remains (Brown 2012, 300). In addition, several coffins were found to be reinforced with iron straps (see ORA-BB 7 below). It has been suggested that the presence of iron straps bolted into and wrapped around coffins might represent a measure designed to prevent the coffin from being easily opened after it had been filled or interred (Molleson and Cox 1993, 205). Finally, XSM10 charnel context [4746] was discovered packed into an empty coffin [4747]. There is some early 19th century evidence of grave robbers and undertakers substituting bodies for weights after having removed them from coffins before internment (Richardson 1988, 65). A possible archaeological example of this practice was found at Spitalfields, where a coffin was found to be full of building rubble (Molleson and Cox 1993, 205). Contexts [4746]/[4747] are potentially evidence of the same practice, perhaps in this instance performed by a grave digger. On the other hand, this may simply be evidence of a grave digger opportunistically using a void left by a partially decayed coffin as a readymade charnel 'pit', although this scenario does not explain the complete absence of an *in situ* skeleton.

Although a few examples of empty coffins were noted on both the XSM10 and LSS85 sites, this should not be used as evidence of grave robbing because of the high levels of disturbance and intercutting.

Past documentary research on grave robbing has almost exclusively focused on late 18th to early 19th century activity (Richardson 1988, 52–72), however,



further analysis of documentary sources may provide additional examples dated to within the use of the New Churchyard.

Two phases of pit burial at the XSM10 and LSS85 sites have the potential to be associated with the plague epidemics of the late 16th to early 17th century (1593 and 1625) and the late 17th century (1665). Although, currently, the archaeological evidence could equally support the interpretation of these features as paupers graves or mass graves associated with another high mortality event(s) (e.g. famines or other diseases).

*ORA-BB 4 Is there a zone of multiple or pit burials in the northern part of the site around Trenches 13 and 14, and the 1985 excavations?*

**Realisation** Initial analysis appears to support this. The stratigraphically earlier XSM10/LSS85 pit burials appear to be clustered across the LSS85 site and in the north half of the XSM10 site (the north third of Areas 1 and 2/3 as well as Area 5) (Fig 17). No meaningful pattern of distribution can be formed for the two stratigraphically later pit burials.

*ORA-BB 5 What date did the burial ground go out of use and how was the site prepared for subsequent re-use as gardens and then development? Can the gradual encroachment of Georgian buildings and plots in the 18th century be phased and dated?*

**Realisation** Initial examination of documentary sources show that the burial ground was closed in March 1739. Provisional spot dating of burials and finds from the burial ground deposits appear to be in line with this.

Several deposits found sealing the burial ground have been provisionally dated to the late 18th century. These are likely related to post-burial ground levelling and landscaping. Historic plans show that the burial ground had been converted to gardens/yards by 1773 (LMA, COL/PL/01/076/D/006, plan not illustrated, and Fig 9–Fig 10). Only a few features potentially located within these gardens have been identified, for example cess pit [3479] (see below) in XSM10 Area 2/3.

Provisional analysis of the various masonry structures found in the south-west corner of the site/burial ground indicate a multi-period building or buildings dated to between the 17th and 19th centuries, both within and after the use of the burial ground.

One large brick wall [1642]/[1648], seen running E–W across the majority of the site, is part of the south garden boundary wall of Broad Street Buildings, which was built to the north of the original south wall after the widening of the road in 1823–4. This wall is likely associated with another wall of c 19th century date and a linear series of charnel pits, which were found in a roughly parallel alignment just to the south (Fig 32). Further analysis of the stratigraphic sequence correlated with documentary research will clarify the precise circumstances and date of the closure of the burial ground, as well as the subsequent change of use. A combination of archaeological and historic evidence will refine the understanding the phase of construction of the building(s) in the south-west corner of the site/burial ground, the character of the building(s), and any biographic information related to the various owners/inhabitants.

*ORA-BB 6 Can gravestones or marker/ledger slabs provide evidence which will identify individuals, and can these be correlated with documentary sources?*

**Realisation** Provisionally, from a total of the nine recovered gravestones, the inscriptions of seven contain enough biographical detail to identify

individuals and can be correlated with parish registers and other documentary sources, which will be pursued in further in analysis.

**ORA-BB 7** *What evidence is there for coffin use, construction type, furniture and coffin plates?*

**Realisation** The coffins seen at the site were generally consistent with those at LSS85 (Malt & Spence 1988). Although the majority of the c 17th to 18th-century burials on the site appear to have been coffined (approximately 66%), the site conditions meant that the preservation of coffins was usually very poor. It is likely that the number of recorded coffins is an underrepresentation, due to the poor preservation conditions. Furthermore, all surviving coffin examples showed varying degrees of collapse, distortion and decay. The wood from all excavated coffins was poorly preserved and only in a few cases could suitable samples be retained for species identification. The colouration of surviving traces of wood suggests that the majority of examples were made of elm. From the c 18th century, it is known that elm (*Ulmus* sp) was the standard wood used in coffin construction (Litten 1991, 90). However, it is already clear the XSM10 examples included some made of thin conifer boards and sometimes included oak elements. One of these oak boards survived just well enough to provide a potentially viable tree-ring sample [6239]. The coffins ranged from simple and plain to well-made and highly decorated. Where identifiable, the vast majority of coffin types were of the 'single break' or 'kite' form, with the shoulders sometimes formed by kerf cuts. Fixings included nails and bolts. Coffin handles or grips were seen on some coffins and initial observations suggest that they are predominantly of a Type 3 form (c 1650 to 18th century). A few unusual examples of coffins with iron straps around the body of the coffin were also found. Other decoration was occasionally seen, with edges of some coffins highlighted with upholstery studs and various motifs or patterns formed of studs were found on some coffin sides and/or lids. Approximately seven coffins at the XSM10 site included biographical details marked with studs, including the initials and year of death of the occupant marked on lids. However, while in all cases there is at least some indication of initials and/or dates, in many cases the markings were rendered mostly illegible due to truncation, disturbance, distortion or decay, or a combination thereof. Most examples of coffin stud markings seen at LSS85 were not sufficiently legible for potential identification (Malt & Spence 1988), except in a few cases which have been recently interpreted. Coffin breastplates of iron and tin were also present on a number of XSM10 and LSS85 burials but all were corroded beyond legibility.

No lead coffins were found on the XSM10 site. However, one burial vault [556] found on the LSS85 site contained six lead coffins of late 17th and early 18th century date. The wooden inner coffins were finely decorated and of a sufficient state of preservation to allow constructional details of the coffins to be recorded (Malt & Spence 1988).

**ORA-BB 12** *What structures were constructed within the burial ground whilst it was in use, eg a historically-attested pulpit, or structures similar to those seen on maps of 1658 and 1676?*

**Realisation** See ORA-BB 2 above re. the pulpit. Archaeological and documentary evidence dates the construction of a building within the south-west corner of the site/burial ground to the mid to late 17th century.

A combined total of four burial vaults were excavated in XSM10 and LSS85 (XSM10 [58] and [7158]; and LSS85, [1540] and [556]). Other XSM10

masonry structures ([1510]/[1511], [1512] and [1639]/[1640]) may represent brick lined burials or chest tombs.

Other post-medieval:

**ORA-PM 1** *What is the date and taphonomy of the deposition of the important worked bone assemblage? For example, do these dumped deposits post-date the burial ground deposits, or do they represent intermittent deposition during and after the use of the burial ground?*

**Realisation** Unfortunately, due to the nature of the burial ground stratigraphy, only a minority of the worked animal bone was found within sealed contexts. The majority of the material was found residually within the general soil of the general burial ground horizon. However, deposit (4410), a dump that contained worked animal bone, was found between coffined burials in Area 2/3. This clearly shows that this material was being deposited while the burial ground was in use. The sheer volume of items discovered, together with the fact worked bone was found in all areas of the excavated burial ground, strongly indicates that the deposition of this material must have been a very long lived arrangement and not simply the result of isolated and opportunistic instances of 'fly-tipping'. Thus, it seems almost certain that those complicit in the deposition of this material were in charge of the administration of the burial ground or, at the very least, were those digging the graves.

Initial spot dating suggests that the major chronological focus was in the late 17th and first half of the 18th century. Charnel pit [4203] contained hundreds of examples of worked animal bone waste and was provided a TPQ of c 1660–80 by clay pipe dating.

The full potential of this assemblage will be address in analysis. It is hoped that documentary research will help reveal the source of this assemblage and refine dating.

**ORA-PM 2** *Can any spatial and chronological patterns of the different types of bone artefact be identified in different parts of the site? How do these relate to any zonal patterning in the burial ground?*

**Realisation** The worked animal bone was found in all excavated areas of the burial ground in both XSM10 and LSS85. Some assemblages of worked animal found in discreet features, such as charnel pit [4203], did show a strong bias toward one or two specific items. However, initial analysis of the location of this material has not revealed any significant pattern to its distribution. This will be further address in analysis.

**ORA-PM 3** *Can documentary research identify evidence for the activities and industries in the surrounding area that are likely represented by waste materials dumped in the burial ground?*

**Realisation** The character of the local inhabitants between 1569 and 1739 may be difficult to define through documentary sources, particularly before 1700, due to the relative paucity of records for these periods. For example, the first London trade directories to have entries with location information did not appear until the c mid-18th century. However, some reference to the industries and shops in the area during the use of the burial ground may be found in late 17th to early 18th century newspaper adverts, editions of the Survey of London and other 18th century histories of London.

**ORA-PM 4** *How was the burial ground location treated in the Georgian and Victorian eras with reference to the character and date of the structural remains relating to 18th and 19th-century urbanisation and development?*

**Realisation** Excavations have shown that the burial ground was extensively and variously truncated by construction activity dated post-1739 to modern. In some cases the disarticulated human bone may have been re-deposited on site in small charnel pits. However, in most cases, the remains were simply re-deposited opportunistically and randomly within backfills, for example in 20th century utility trenches.

Documentary research is likely to date this activity more closely and reveal any restrictions placed on the local residents against building or otherwise disturbing the burials, as well as any violations of those restrictions or encroachments.

The clay pipes provide good dating evidence for 18th-century activity and the development of the site during this period, especially when taken in conjunction with other finds and documentary sources. There are several large pipe-rich contexts on both XSM10 and LSS85, and a good number of marked pipes that have potential for chronological refinement.

There are large assemblages of artefacts including glass wine bottles and drinking vessels from XSM10 dating to the mid to late 18th century. Considered together with other finds from the same groups these throw light on the character of the neighbourhood at this date, suggesting the presence of domestic establishments of comfortable means.

**ORA-PM 5** *How did Liverpool Street develop in the 19th century, notably with the construction of the former Broad Street ticket hall and associated structures, and sewerage beneath the roadway?*

**Realisation** Remains associated with the Broad Street Station (constructed in 1863-65) belong to modifications made to the station in the late 19th century and early 20th centuries. The two sewers found during excavations are dated mid to late 19th century and relate to the development of the sight between c 1860 and 1900. Some notable early 20th century activity was also found during the excavation, such as an underground public toilet, dated c 1900.

Further documentary research should reveal more details about the circumstances, creation/construction and date of these features, as well as the character of the site in the 19th and 20th centuries.

## 6.2 General discussion of potential

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The works covered by this report at XSM10, LSS85 and XSL10/XTB12 have provided a corpus of archaeological results which cover a complete archaeological sequence from the medieval to 20th century. This indicates the potential of the site data to help answer research questions relating to the development and reclamation of the Moorfields marsh, the establishment and use of the New Churchyard, the encroaching post-burial ground development, and the widespread alterations to the area that occurred from the mid-19th century.

The broad-brush picture that has been painted in this assessment therefore offers considerable scope for refinement as the integration of stratigraphic and finds evidence proceeds. In particular, the potential of post cemetery assemblages will only be fully defined once periodisation is complete.

### *The medieval and post-medieval pre-dating the cemetery – fills of the 'deep ditch'*

Given the small quantities of medieval pottery from both LSS85 and XSM10 is largely residual, characterised by highly fragmented body sherds, this material has little potential. Only the medieval pottery in Table 11 can contribute towards providing a chronology for the use of this site during the medieval period and characterising the deposits it was found in.

One of the three XSM10 accessioned assemblages with unusually high research and publication potential is the large group of early to mid-16th-century finds from ditch fills and pits, particularly the 'deep ditch' [6581], sealed in 1569. This group can be directly compared with the Tudor finds from riverside sites in Southwark, published (Egan 2005) as a corpus of material culture. The Broadgate finds are particularly well-preserved and closely dated, and have the potential to add new typological and dating information to the existing corpus. A group of nine identical pilgrim badges from the shrine of Our Lady of Willesden is of particular interest and provides further evidence for the popularity of this shrine in London. Analysis of the large quantity of copper wire and pins from these ditches and other landuses may provide evidence for early post-medieval pin manufacture in this part of London.

The deep ditch also contained a very large, well-preserved and particularly well-dated assemblage of post-medieval leather including 16th-century footwear and other much rarer items such as garment-pieces, purses and a piece of leather decorated with gold-leaf. For all these reasons the leather assemblage has particularly good research and publication potential both for a popular illustrated book and more academic journal paper(s). Like the Roman shoes the post-Roman shoes also have gender and demographic research potential, and as part of a larger group of 16th-century metal, bone and other objects have the potential to be discussed with these other finds in a wider socio-historical context. The shoes can also be dated with some precision (most are identical or very similar to styles of shoes found in the 1545 wreck of the Mary Rose) and they can be used for dating the contexts in which they were found. There is potential to reconstruct complete or near-complete shoes once the leather has been freeze-dried and the bulk and accessioned items are examined together (by context) at analysis stage.

The animal bone recovered from the pre-cemetery ditches and pits is an of sufficient size of the assemblage to allow worthwhile intra-site comparison of the species, skeletal element, age and modification in the faunal groups derived particularly from ditch, dump and pit deposits and therefore allow analysis of spatial distribution of activity and disposal. The spatial distribution of non-consumed domesticates, in comparison with that of post-consumption waste, may provide an insight into the local distribution of carcass disposal practice. The sparsity of small ground-living wild vertebrate species such as amphibians and very small mammals, prevents any definite interpretation of local conditions or habitat. Recovery of tool-mark evidence for industrial activity; particularly for preliminary working of cattle and sheep horn core and cattle bone, may be sufficient to allow analysis and intra-site interpretation.

The medieval tokens and jettons have some potential to illuminate trading and commercial aspects of the area.

### *The New Churchyard*

To briefly reiterate the potential of the osteological assemblage, the excavation of cemeteries of this period on this scale is very rare and the New Churchyard burial ground, including the 3354 burials from XSM10 and c 400 burials from the LSS85 site, provides one of the largest collections of post-medieval human remains excavated under archaeological conditions in Britain. The potential of this site to the study of burial practice and past populations cannot be overstated. Comparisons can be made to known 16th–18th-century burial grounds in London. Comparison in terms of burial characteristics (eg alignment, posture and burial clothes) has the potential to greatly enhance our understanding of 16th to 18th-century burial practices.

### Documentary sources

Perhaps inevitably, the analysis of documentary sources related to the New Churchyard will form the bulk of the documentary research. Typically, records associated with a parochial burial ground or graveyard would form a corpus of material usually collected by and retained at a single parish church, including, for example, registers of burial, records related to fees and the administration of the ground. Unfortunately, due to the non-parochial nature of the New Churchyard, no such collection of records is available for the site. Instead, any surviving records associated with fees and burial at the site are dispersed among those of a large number of London parishes that sent people for burial at the site. This makes any documentary research related to the New Churchyard an unusually large and problematic task. The use of the burial ground for nearly 170 years only compounds this task further.

Nevertheless, while late 16th to mid-18th century documentary sources are sparse when compared with the more extensive late 18th to 19th century records, particularly for burial grounds, the importance of this resource to research in a post-medieval excavation of this nature cannot be overstated. Furthermore, there is a large collection of 18th and 19th century documentary sources which can be correlated with archaeological evidence of the same periods, and these will provide significant information on the local inhabitants and events.

For the purposes of this assessment, the availability, quantity and character of available documentary sources have been assessed, but not their content.

Crossrail's 'Bedlam Burial Ground Register' project has compiled the first extensive list of people buried at the New Churchyard, taken from entries in the historic burial registers from over 74 London parishes. Parish burial registers examined as part of this volunteer programme have to date identified over 7200 individuals known to have been sent for burial at the site (<http://www.crossrail.co.uk/sustainability/archaeology/bedlam-burial-ground-register>).

### The cemetery finds

For the post-medieval pottery refinement of the site sequence and phasing are an important area to which the ceramic evidence can contribute and clearly work, in particular for refining the ground raising episodes required for the foundation of the burial ground and for identifying particular burial phases. Otherwise the pottery from the burial ground itself has little potential. The majority of the contexts spotted during this assessment from LSS85 and those small-sized groups from XSM10 is limited and in publication can be best summarised with any chronological narrative focussed on a few key groups, with photographs and illustrations highlighting the more interesting or complete vessels.

However, a considerable proportion of the pottery is related to the development of the site after the closure of the New Churchyard in 1739. This comprised two mid-18th century dated assemblages from the filling of two cesspits, which can be mapped with accuracy to the buildings or range of buildings this infrastructure once served. The relationship the pottery had with the other artefacts found discarded in these cesspits is another line of research that should yield rich results. For these features, the combination of the finds, stratigraphic and historical data should allow reasonably precise dates of deposition of the finds to be fixed, and in some cases, establish by whom. A thorough search of the available documentary records may allow ownership of the properties identified on the site to be traced. The benefits of an integrated and multi-disciplinary approaches to fully understand similar assemblages in London has been persuasively demonstrated (Owens, Jeffries, Featherby and Wehner 2010; Harward, Holder and Jeffries 2015). Given the potential and importance of the artefacts and the associated building and occupancy history and the narratives that can be weaved by integrating the data, this material would be of interest to an archaeological journal, for example as *Post-Medieval Archaeology*. This level of analysis is provided for and can supply further updated research aims (RRA-P 6 to 12).

The clay pipe assemblage from Broadgate has good potential for further work, especially when both sites are considered together (XSM10 and LSS85). They include a large number of datable pipe bowls, and a high proportion of pipes marked by their makers, which should allow for refinement of the chronology. Since there are also multiple pipes with the same mark this should be helpful in tracing preferred sources in this area of London, especially when compared with contemporaneous pipe assemblages from excavated sites nearby. In addition, it will be informative to view the clay pipes alongside other finds from the same contexts, particularly some of the larger groups, and in relation to the documentary history of the site.

Most of the burial finds can be related to specific burials and have the potential to provide important information about burial practice between the 16th and 18th centuries.

#### Local trade and industry

The glass from XSM10 has good potential for further analysis, both in relation to the development and use of the site itself and to industrial processes taking place in the vicinity. This research potential is supported and supplemented by information derived from the earlier excavation at LSS85. The large groups of wine bottles and drinking glasses dating to the 18th century are very informative regarding the lifestyles of those living in properties on the site after the time it was used as a burial ground, and should be seen as part of the total finds assemblage in order to build as complete a picture as possible of these former occupants. The quantity of wine bottles, including complete examples, and the number and quality of the drinking glasses raise the assemblage above the everyday, and this fits well with the impression gained from the pottery, and the large number of clay pipes recovered. There is considerable potential for comparative analysis of this material with finds from selected contemporaneous assemblages around London and elsewhere.

There is also an important component of glassmaking waste in the finds from both XSM10 and LSS85 (but particularly the former). This requires further analysis in relation to the processes represented by the various kinds of waste, in conjunction with external specialists, and prompts the need for research into the source of the material. Comparison with the glass waste from the large deposit in the City ditch at Broad Street (BRO90) will help in clarifying the nature of the Broadgate waste. It is uncertain whether the material came from Mansell's Austin Friars glasshouse or from another glasshouse operating in the same area and this is a question that should form a major strand in further analysis.

Detailed analysis of the exceptionally comprehensive range of bone and ivory working waste will allow most aspects of the chaîne opératoire to be understood and statistical analysis of this material will allow the raw material choices, working practices and potential products to be better characterised. Consideration of the distribution across the site may reveal chronological or functional differences within these assemblages. Further documentary and comparative research will allow the assemblage to be placed into its regional and chronological contexts and the social significance of this industry to be better understood.

#### Limited potential

The building material assemblage is typical of many central London sites. Present is a mixture of Roman, medieval and post-medieval ceramic and to a lesser extent stone building material. There are a number of post-Roman tiles from the interior of higher status buildings, notably decorated and plain medieval floor tiles and post-medieval decorated tin-glazed floor and wall tiles. These items have intrinsic interest but limited potential for informing on the site itself.

The small accessioned XSL10 / XTB12 assemblage of finds is of very limited interpretative value. As evidence for the character of construction in the area they may contribute a little to our understanding of the immediate stratigraphic environment. They should be included in any wider studies of the area but they do not merit publication in their own right and require

no further work at this stage. Of the three stones from XSL10 / XTB12, the moulding forms are common post-medieval types based on Classical designs. However, there is simply not enough left of the stones to attempt to accurately state what part of a building that they came from let alone the purpose of that structure. The stones are so very fragmentary that very little more can be gleaned on top of the basic site recording.

There are no recommendations for further work on iron working remains.

There is not a great deal of stratigraphic potential for coins and tokens of the post-medieval period as most are likely to be associated with mixed burial soils. The Bedlam token however will enhance our knowledge of the Clitherow family and its connection to the site. Nevertheless, the diverse range of such material may also illuminate connections and possibly populations beyond London.

The post-medieval structural woodwork is straightforward, including large foundation piles of elm and an oak land-tie assembly implying the proximity of a surprisingly deep water channel. The details of the working and nature of the elm timber is of interest as a sample of the changes in timber conversion technology that occurs in the 16th century. This later phase of work has added two significant oak uprights to this material more of interest for their location than woodworking features.



## 7 Significance of the data

The EH National *Research Agenda* notes that the themes it discusses 'are by no means exhaustive, but are offered as a general framework upon which to construct specific research designs'. Whilst much of the focus of the document is on the move from single-site to multi-site based synthesis it is also made clear that the 'multi-site synthesis advocated...will not abrogate the need for particular cases of site-specific research and publication'. Similarly the *Capital Concerns* document notes that the nine themes are 'presented as outline sketches, neither exhaustive individually nor prescriptive as a set' (p7).

### 7.1 High significance (national)

The large number of post-Roman accessioned finds from this site is of London, national and, in some cases, international significance. The majority are early- to mid- 16th century and deposited in the waterlogged fills of boundary/drainage ditches and pits. They are very well-preserved and closely dated and add to our knowledge of Tudor material culture. Some objects are particularly spectacular, including highly decorated mounts and clasps and a complete curry comb with wooden handle. Two groups stand out in particular:

- The bone and ivory working assemblage is of at least national if not international importance and is one of the largest assemblages of this date yet recovered from an archaeological excavation. It will not only allow for a comprehensive study of the manufacturing processes involved but also allow aspects of trade and the organisation of production to be addressed, reveal aspects of life in 17th–18th century London including the increasing popularity of scientific instruments during the Enlightenment and reflect the way in which the domestic and industrial activity around the burial ground related to and eventually supplanted it.
- The large quantity of post-medieval (16th century) leather shoes and other items from XSM10 has local, regional (London) and national significance. Large groups of leather shoes of this date are rare and these are particularly well-dated through their stylistic similarities with shoes from the 1545 Mary Rose wreck and because the majority are from a sealed context (pre-1569) on the site.

The New Churchyard burial ground contains one of the largest assemblages of post-medieval human remains archaeologically excavated in Britain, with burials spanning the 16th–18th centuries, and as such is of local, regional and national significance. The schedule for osteological analysis of the population will significantly address the absence of archaeologically excavated for this period from London and is presented in **MOLA XSM10 PXA02a**/Crossrail Document No. No. **C257-MLA-T1-ASM-CRG03-50001** (Crossrail 2015e). Crucially, the identification through artefactual dating evidence and the stratigraphic sequence of any of the pit burials or mass graves as belonging to plague events, such as 1665, would be of international significance.

Elements of the finds assemblage from the burial ground, such as the grave goods and upholstery stud inscriptions are similarly rare for the period and of national significance. The systematic study of the finds from post-medieval burial sites is a fairly recent phenomenon and these finds (which include deliberate depositions as 'grave goods') will add to a growing corpus of information about burial practice in Britain.

The quantity and the quality of the 18th-century table glass, and the large number of wine bottles, recovered from XSM10 are very telling when considered alongside other finds and when compared with contemporaneous assemblages from other sites, not only in the London area, but also nationally, raising the significance of the finds to a national level.

Large, rich assemblages of artefacts of this kind are particularly informative in many ways, quite apart from their chronological significance in relation to the site, throwing light on, for example, occupation, function, status, taste and sources of supply.

In addition to the glass artefacts, the large quantity of glassmaking waste recovered from XSM10 (and supported by finds from LSS85) is also highly significant is also nationally significant. This material derives from a nearby glasshouse, which must have been producing in the 17th century (and possibly into the early 18th century). Mansell's glasshouse is known to have been located in Austin Friars and but probably ceased production in the 1650s. Furthermore, in addition to the likely date range, either Mansell was making types of glass other than fine crystal drinking glasses and window glass, or there was another glasshouse nearby making bottles and other forms in HLLA glass. Whichever of these proves to be the case, the find is an important one in that it throws light on the history and development of glassmaking in London, and contributes to the wider picture of the industry nationally. Fruitful comparison can also be made with other excavated glasshouses working in London (for example, John Baker's glasshouse in Vauxhall: VBN89).

## 7.2 Medium significance (regional)

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The 16th century features potentially associated with the Priory and Hospital of St Mary Bethlehem, such as boundary ditches and garden features, are of at least regional significance to London, given the historic significance of that institution and the large finds assemblages they produced. The excellent preservation of organic remains in many of the samples suggests that their study will produce information of significance.

The medieval building material is mainly London-made roofing tile, but there are a small number of 'Westminster', Penn and Low Countries ('Flemish') floor tiles. These probably paved the floor of either a parish church or monastic building. A large number of plain glazed medieval and Tudor Low Countries floor tiles were also recovered from an earlier excavation on the site (LSS85), along with two decorated Penn floor tiles (design type not recorded). Most of the remaining LSS85 assemblage was roofing tile of medieval and post-medieval date. This included a few 12th–early 13th century roofing tiles and a small number of post-medieval pantiles. A probable post-medieval hip roofing tile was also present.

The coffin handles recovered during the excavation are primarily of local London significance. There is potential that further analysis can help to refine the date ranges of coffin handles generally. If this is indeed possible then further research at this level will be regionally significant. The gravestones recovered during the XSM10 work are certainly of local and regional significant.

It is the pottery groups filling the two cesspits that have the greatest significance beyond the site, as this material is characterised as being more closely dateable and in a better condition, with a higher proportion of reconstructable vessels and profiles than the pottery groups in the burial ground. The concentration of ceramic fabrics and forms, suggests a rich material culture that will certainly benefit from detailed analysis, particularly in conjunction with the other finds recovered from the same features. These groups are significant as they contribute two specific areas of interest into the archaeology of London during this period. The first is the role these artefacts in an increasingly materialistic society and this can be analysed further by assessing the different range of ceramics, their dating, condition and function against the use of this material in Georgian London. Second is dating particular changing patterns of residence (by using such well-sealed finds groups) and the evidence from the backfilling of similar features in nearby Spitalfields (Harward, Holder and Jeffries, 2015) suggests that the filling of backyard cesspits was nearly always connected to the departure of one set of residents and replacement with another.

### 7.3 Low significance (local)

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The site sequence indicates that this area of Bishopsgate, the 'Moorfields marsh', was open and undeveloped extramural ground until the late 16th century, with no archaeological or historic evidence of its reclamation or utilisation before medieval period. Aspects of the sites medieval stratigraphy are of local significance.

The clay pipe evidence is certainly significant in relation to the local area, with a sufficiently large assemblage recovered to support further research into the pipe makers who supplied the original smokers who used them. To this extent the clay pipes can also be considered to have regional significance, and should be compared with finds from other contemporaneous sites in the area, particularly in relation to makers.

The ceramic evidence has site significance as it suggests a clear chronology and isolation of deposits that can be directly related to the filling of the various ditches from the pre-burial ground landuse, their separation from the more generalised dumping and burials related to the Bethlehem burial ground and the urban development that followed after the 1730s. Overall the quantity of post-medieval pottery recovered is large and can therefore supply a chronology for the site and characterise the deposits it was recovered from.

London-made roofing tiles and bricks predominate in the post-medieval building material assemblage. A number of brick samples were collected, so further analysis of these may provide information on the various brick structures encountered on site. One probable Victorian or Edwardian London-made brick has what may be a tree shaped symbol in the frog base – perhaps some kind of trade mark used by the brickyard. Higher status building material is represented by two decorated late 16th to mid-17th century tin-glazed floor tiles. These probably came from the floor of a church or, more likely, a rich merchant's house or property owned by a member of the aristocracy. Later in date are the various tin-glazed wall tiles which probably graced the fireplace of more middle-class domestic dwellings in the 18th century.

The XSM10 animal bone assemblage is of considerable local significance for interpretation of the context and sample bone groups in terms of composition of the meat diet with respect to species, carcase-part selection and butchery, and subsequent waste disposal, as well as disposal practices relating to non-consumed species and industrial activity. The recovery of evidence for modification, particularly butchery and, to a lesser extent, working, burning and gnawing may be of additional significance in terms of distribution of industrial activity and waste disposal. This assemblage has negligible significance for interpretation of local habitats and conditions

The significance of the medieval coins and tokens will be of importance in dating site activity. The tokens may be of local importance though some might be of foreign origin. Apart from comparanda, there is little wider significance. There might be some significance for post-medieval coins and tokens associated with burial deposition, particularly with the range of material. Stratigraphically however, there will be little significance due to the very mixed deposits. The Bedlam token (the other tokens are unlikely to be further identifiable) is clearly of some significance to this site. Apart from comparanda, there is little significance within a wider area though the range of British and foreign pieces might illuminate the cosmopolitan nature of early modern London.

The significance of the iron working remains from XSM10 is of low local significance.

The larger post-medieval timbers and smaller woodwork is of local significance as part of the structures and material culture of the immediate area and the sites use. Here it appears that the trellis work could be fairly considered of wider significance as the specialism of garden archaeology continues to develop.

## 8 Publication project: aims and objectives

### 8.1 Revised research aims

This post-excavation assessment has highlighted new areas of research, which have led to the following revised research aims (RA). The revised research aims relative to pre-c 1000AD sequence have been described in the assessment document **MOLA XSM10 PXA01** (Crossrail Document No. C257-MLA-T1-RGN-CRG03-50099), and consequently are not addressed here.

#### Pre-burial ground

- RRA-RM 1**     *A) Can the artefacts and ecofacts from different types of (large-scale and more localised) rubbish dumping and other forms of deposition be related to city-wide disposal or more local industrial or other activity? For example, What can the structural post-medieval woodwork tell us about the work of London's timber trade and sawyers of the 16th century? Is there change over time?*
- B) Can the composition, condition, character of the pottery found filling the Deep Ditch refine its chronology and that of the rich assemblage of artefacts from the same contexts? What can the waterlogged plant, insect and mollusc assemblages tell us about diet and the vegetation and appearance of the area.*
- C) Are the animal bone assemblages from ditch, dump and pit deposits distinctive in terms of species, skeletal element, age at death and modification; and do they suggest definite patterns of waste disposal?*

#### The New Churchyard

- RRA-BB 1**     **DATING**  
*Can the sequence and dating of burials be further characterised and refined from associated finds, including the pottery, clay tobacco pipe, glass and accessioned items? Do these items also inform on the character of the burials and is there any variation over time?*
- RRA-BB 2**     **MANAGEMENT OF THE CEMETERY**  
*A) How was the administration and management of the burial ground conducted between 1569 and 1739? Can individuals, such as the burial ground keepers, be identified from documentary sources?*  
*B) What indication is there for formal organisation/management and zoning?*  
*C) Is the potential shift in burial alignment higher in the burial sequence related to any historical events, such as a change in management or burial ground boundaries?*  
*D) Many burials directly overlie another. Can it be determined whether these represent a 'stack' of contemporary interments or repeated use of a designated plot over an extended period?*  
*E) How was the burial ground managed following its closure in 1739?.*
- RRA-BB 3**     **STATUS**  
*A) Can documentary sources reveal information on burial fees for the New Churchyard, or preferences for burial location*  
*B) Can different coffin types, furniture and fittings be identified and what quality ranges do they represent? Is the range different from other excavated London burial grounds, reflecting the status or rites of local populations?*

C) How was the burial ground filled? Were certain areas reserved for high status burials?

D) What proportions of burials were within coffins? What proportions of burials were within tombs and vaults? What does their distribution suggest about the organisation of the burial ground (see RRA-BB 1 B)?

**RRA-BB 4 DEMOGRAPHICS/BURIAL PRACTICE**

A) Can differences in gender or religion be discerned from coffin furniture or grave goods?

B) Can the burial finds be used to characterise the buried population?

C) Can the factors which influenced burial rites, types and location over time be identified and are trends discernible? For example, does the type and quality of coffin vary by period of use or location within the burial ground? Can the analysis of the coffin wood timber species help characterise the burial practices?

D) What percentage of the burials can be identified from coffin plates or gravestones and can this information be correlated with historical records?

E) How far can extended family groups be identified from the archaeological and documentary sources eg within the vaults?

F) Are their documentary references for the burial ground being used during historic events such as outbreaks of plague, and can archaeological evidence of burial episodes be related to these? Are multiple or mass graves related to outbreaks of plague or to they reflect other burial practices, such as the burial of the poor in mass graves?

G) What is the significance of the tin-glazed ware plate placed with skeleton [5613]? Can further analysis of comparable archaeological excavated examples and documentary sources reveal anything on the tradition of grave goods with burials of this period in Britain and elsewhere?

**RRA-BB 5** Do archaeological remains or documentary sources provide any evidence of 'grave robbing' at the New Churchyard?

**RRA-BB 6 BROKERS ROW (see also RRA-PM 4)**

A) Can any documentary sources be found which reveal any restrictions place on building on the burial ground, either during or after its use? Were there violations of those restrictions?

B) Was the building in the south-west corner of the burial ground (first seen on maps from 1676 and later known as No.1 Brokers Row) associated with the administration and management of the burial ground while it was used in use?

C) Can the owners and/or inhabitants of No.1 Brokers Row be identified, both during and after the use of the site as a burial ground?

D) Was No.1 Brokers Row ever two properties? When was it constructed and when was it demolished? Can evidence of the construction history, including any modifications, be found in the archaeological remains and/or documentary sources?

E) If documentary research identifies the inhabitants of No.1 Brokers Row, does the associated finds assemblage match their socio-economic status?

Local industry

**RRA-PM 1** Can the cloth seals be related to local industries?

**RRA-PM 2 GLASS WORKING**

A) Can the source of the glassmaking waste found on XSM10 (and LSS85) be identified and what are the processes represented in the finds?

B) How does the glassmaking waste compare with excavated waste

*recovered from Mansell's glasshouse at BRO90 and other sites in the vicinity?*

*C) How does the glassmaking waste compare with finds from other excavated glasshouses in the London area (eg in Vauxhall)?*

**RRA-PM 3 BONE/IVORY WORKING**

*A) Can the bone and ivory working assemblage be fully characterised? What were the full range of raw materials, working practices and products and how did this vary over time?*

*B) What was the social significance of the bone and ivory industry? Can it be related to known local episodes of activity using documentary or archaeological evidence and what are the implications of this evidence for the organisation of production and patterns of consumption?*

*Post-burial ground (Brokers Row cesspit groups)*

This section outlines the revised research aims required for the large groups of pottery found discarded in fills [3704] [3849] and [4764] if this material is to feature and translate to a journal article or presented in digital (website) format. These aims are focused on delivering the reasons why these groups were deposited and assessing the sources, function, chronology, attribution, and their use and social space within the building it served (No. 1 Brokers Row). For consistency, these are similar to those already employed in the Spitalfields publication (Harward, Holder and Jeffries 2015) and elsewhere in London (Owens, Jeffries, Wehner and Featherby 2010).

Two task lists are thus provided for the publication of the cesspits groups. One is for the summary required for the Crossrail publication and the other for a more detailed analysis required if these groups were translated to specialist archaeological journal, for example Post-Medieval Archaeology or presented in digital format.

**RRA-PM 4** *A) Can elements of material culture use within this household be reconstructed by examining the composition of the different types of materials found?*

*B) How does the function of the different elements of the finds (not just the ceramics) compare against one another in terms of function, chronologies and cost?*

*C) Can the 'life cycle' of No.1 Brokers Row therefore be reconstructed by examining the composition of the ceramics and other finds recovered from this feature?*

*Does the pottery form distinct decorative sets?*

*Can the pottery throw any light on the social status of the neighbourhood through the range, quality and diversity of fabrics and forms represented?*

**RRA-PM 5** *A) How do the 18th-century glass finds, particularly the drinking glasses and wine bottles, throw light on the development and use of the site in the years following the disuse of the burial ground?*

*B) How does the glass contribute to the overall picture of occupation on the site in the 18th century, and to the character of the neighbourhood at this date?*

*C) How do the 18th-century finds assemblages, including the glass, compare with contemporaneous groups from other sites within the London region and beyond?*

**RRA-PM 6 POST-CEMETERY USE (GENERAL)**

*Can the plant remains help reconstruct local use of gardens in the post medieval period?*

*Can documentary sources refine the character and dating of the development of the site in the 19th and early 20th centuries?*

## 8.2 Publication synopses

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The remains recorded during the archaeological investigations at the Broadgate Ticket Hall site at Liverpool Street (XSM10) illustrate the profound changes that took place from the Roman period to the present day. The publication synopses presented here propose a schema for the dissemination of the medieval and post-medieval data (ie post c AD 1200) recovered from the site and therefore also incorporates the results of the analysis work defined in the separate assessment of the osteological data from the New Churchyard (**MOLA XSM10 PXA02a**/Crossrail Document No. No. C257-MLA-T1-ASM-CRG03-50001). Thus, the scope of the publication includes the osteological evidence from site LSS85.

The primary objective of the analysis/publication work on the Broadgate site will be to produce a late medieval/post-medieval volume within the Crossrail Archaeology Series (CAS) to complement the companion work on Roman occupation and subsequent late Roman/medieval marsh formation.

However, for the medieval and post-medieval uses of the site, the vast majority of the archaeological data is associated with the New Churchyard of 1569–1739, for which there is, in addition, extensive documentary evidence. This is a significant body of material because it relates to a very rare example of an archaeologically investigated London burial ground of this date. The only true comparator would be the (much smaller) graveyard of St Benet Sherehog, near Cheapside (excavated 1994–96 during MOLA site ONE94) in, where the burials were primarily from the 16th and 17th centuries (Miles and White 2008).

For reasons of clarity and cohesion of theme, and concision, it is proposed that the CAS volume should concentrate almost exclusively on the cemetery and its population, with only brief coverage of the previous and subsequent uses of the site.

Though excavation results are dominated by the cemetery evidence, there are four other elements of the medieval/post-medieval sequence which are important by virtue of the finds and/or documentary evidence. These are the leather and other finds groups from the 'Deep Ditch' and contemporary features, the worked bone waste and glass working waste (both predominantly from cemetery soils) and the cess-pits at the rear of property in the southwest corner of the cemetery. The four 'non-cemetery' topics will each be covered by articles to be submitted to the national journal *Post-medieval Archaeology*.

Both the CAS volume and the articles will be supported by digitally available data, to be accessed through an appropriate website portal.

## 8.2.1 The CAS volume

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**Working title:** The New Churchyard: archaeological excavation at Liverpool St for Crossrail

**Principal Author(s):** Robert Hartle, Alison Telfer, Don Walker, other MOLA osteologists and specialists

**Format:** Crossrail Archaeology Series

**Total word count:** c 90–95,000

**Total figure count:** tbc but will not exceed 200 and to include stratigraphic drawings (location plans, colour phase plans, schematic illustration of the cemetery and its demographics), reconstruction of buildings and landscapes, events/people, finds illustration.

Finalised publication synopsis (the publication draft may differ in detail from this proposal)

### Setting the scene

1.1 The sites in Liverpool Street and Blomfield Street

1.2 About this book

Site archives and recording conventions used

### 2 The earlier history of the site, from the 11th century AD to c 1600

2.1 Medieval Walbrook and the Moorfields marsh

Documentary evidence

Archaeological evidence

2.2 Moorfields and the 'Deep Ditch' in the 16th century

Documentary evidence

Archaeological evidence

Selected 16th-century finds from ditches and pits

*Graphics: Historic maps and/or plans, location of features, photographs (predominantly finds).*

### 3 The New Churchyard burial ground, 1569–1739

3.1 Foundation

Documentary evidence

Archaeological evidence

3.2 The pulpit and Whit Sunday sermon

Documentary evidence

Archaeological evidence

3.3 Enclosing the burial ground and westward expansion

Documentary evidence

Archaeological evidence

3.4 Administration: the City and the keepers of the burial ground

Documentary sources

Archaeological evidence

3.5 A dynasty of keepers: the Clitherows

3.6 Industrial waste and other material disposed of in the burial ground

Waste from the bone and ivory workshops of keepers Benjamin Clitherow III and IV

Glasshouse waste

Finds from the burial ground

3.7 'now full of corpses' – the closure of the New Churchyard

*Graphics: photographs of the excavation of the burial ground, distribution plots/phases of burials, historic maps and/or plans, tables, trade cards, photographs and reconstruction of the largest mass grave.*

### 4 Funerary choices, costs and connections



- 4.1 Fees and charges
- 4.2 Nonconformists and dissenters at the ground
- 4.3 Levellers at the ground
- 4.4 Wills and funerals
  - Funeral directions through time
  - Funeral costs
  - Burial location

*Graphics: photographs of the excavation of the burial ground, distribution plots, tables, photos of vaults (internal and external) and gravestones, photos of coffin plates and upholstery stud markings, photographs and reconstructions.*

## 5 Burial practice

- 5.1 Layout and the operation of the burial ground over time
  - Phasing the excavated burials
  - Burial modes and layout
  - Grave alignment and burial orientation
  - Charnel
- 5.2 Coffins
  - Coffin manufacture, furniture and fittings
  - Coffin plates and biographic lid motifs
- 5.3 Grave goods
- 5.4 Gravestones
- 5.5 Monuments and tombs
  - Documentary evidence
  - Archaeological evidence
    - Tombs
    - Vaults
- 5.6 The named burials
  - Vault A[556]
  - Francis Jenkes
  - Harbert Jenkes
  - Elizabeth Jenkes
  - Sarah Jenkes
  - Frances Williams (née Jenkes)
  - Sarah Williams (formerly Jenkes and née Walwyn)
  - Ann Halford (née Walwyn)
  - Ann Farrington (née Halford)
  - Unnamed – ? Roger Williams
  - Skeleton A[676]/coffin A[677]
- 5.7 'rest quietly in our Graves' – anatomical study, bodysnatching and dissection
  - Documentary evidence
  - Archaeological evidence

*Graphics: photographs of the excavation of the burial ground, distribution plots, tables, photos of vaults (internal and external) and gravestones, photos of coffin plates and upholstery stud markings, photographs and reconstructions.*

## 6 Different perspectives on the burial population: burial registers and the excavated sample

- 6.1 The written record
  - London's burial registers
  - The Bedlam Register project: the results
    - Gender/biological sex
    - Age at death
    - Cause of death
    - Occupations
    - Addresses

The poor, orphans and child poverty  
Strangers  
Social outcasts  
Lunatics

Archaeological evidence  
Burying a parish's dead – the example of St Vedast, Foster Lane

## 6.2 The excavated sample: the osteological evidence

Introduction: sample strategy and sample 'value'  
Preservation and completeness of the analysis sample  
Methodology at analysis  
External sampling and analyses

## 6.3 Demographic overview

Introduction

Age at death and sex of the osteological analysis sample

Category A

Overall sex and age

Phases 1 and 2 compared

Category B

Living longer? – demographic trends in London using transition analysis

*Graphics: principally photographs, tabulation and distribution plots.*

## 7 Living and working in London

7.1 Population growth, housing and the urban environment

7.2 Environmental pollution

Neoplastic disease

7.3 Migration from the country into London

Isotope evidence on migration

7.4 Apprentices and servants

*Graphics: principally photographs, tabulation and distribution plots.*

## 8 'London, lying sicke of the plague'

8.1 The disease, origins and responses

The disease and its effects

Living with plague in the 16th and 17th centuries

8.2 Burial of plague victims at the New Churchyard

Documentary evidence

Mass graves at the New Churchyard

Pit group

Dating the phase 1 pits

Mass burial pit

Dating the phase 1 Mass pit

8.3 Ancient DNA analysis of New Churchyard burials

*Graphics: Charts, historic images, X-rays and photographs to illustrate the impact of plague on London and the plague related burials in the New Churchyard*

## 9 Other infectious disease

9.1 Introduction

9.2 Non-specific disease

Periostitis

Rib lesions

Sinusitis

Osteomyelitis

Osteitis

9.3 Specific disease

Tuberculosis  
Syphilis

*Graphics: Charts, X-rays and photographs to illustrate the pathology of the population*

## 10 Diet and dental health

- 10.1 Introduction
- 10.2 Adult stature
- 10.3 Gout
- 10.4 DISH
- 10.5 Iron deficiency
  - Cribra orbitalia
  - Porotic hyperostosis
- 10.6 Vitamin C deficiency (scurvy)
- 10.7 Vitamin D deficiency (rickets and osteomalacia)
- 10.8 Dental health
  - Enamel hypoplasia
  - Periodontal disease
  - Dental calculus
    - Analyses of dental calculus
      - Microscopic analysis
      - Chemical analysis
      - Metagenomic analysis of putative dietary DNA sequences
      - \*\*\*Metagenomic analysis of infectious disease in dental calculus
  - Dental caries
  - Periapical lesions
    - Isotope evidence of diet

*Graphics: Charts, X-rays and photographs to illustrate the pathology of the population*

## 11 Injury, disability and care

- 11.1 Trauma
  - Fractures
    - Skull fractures
    - Blunt force injuries
    - Sharp force injuries
    - Long bone fractures
    - Vertebral fractures
    - Other fracture locations
  - Soft tissue trauma
  - Dislocation
  - Risk of injury
- 11.2 Care, treatment and post-mortem intervention
  - Fracture healing and deformity
  - Congenital and developmental disorders
  - Surgery
  - Autopsy/dissection

*Graphics: Charts, X-rays and photographs to illustrate the pathology of the population*

## 12 From the cradle to the grave

- 12.1 Childhood
  - Health and mortality
  - Growth and indicators of stress
    - Cribra orbitalia
    - Porotic hyperostosis
    - Enamel hypoplasia
    - Periostitis

- Rickets
- Endocranial lesions
- Illness and injury
- 12.2 Adolescence
  - Health and mortality
- 12.3 Adulthood
  - Health and mortality
  - Marriage
  - Fertility and childbirth and maternal mortality
  - Tobacco smoking
  - Clothing and fashion
- 12.4 Old age
  - Health and mortality
  - Joint disease
    - Spinal joint disease
    - Extra-spinal joint disease
  - Paget's disease of bone
  - Osteomalacia
  - Hyperostosis frontalis interna
  - Skeletal dysplasia

*Graphics: Charts, X-rays and photographs to illustrate the pathology of the population*

### 13 The urban development of the New Churchyard (1739 to the present day)

#### 13.1 'Three Crowns and Dove': no. 1 Brokers Row

##### Documentary sources

No. 1 Brokers Row

Lessees of no. 1 Brokers Row 1740–1824

Jonathan Farr

Sarah Farr (later Abbot, then Bentham) (tenant 1761 to c 1776)

Henry Hall

Mark Daws and James Bolter (sub-subtenants c 1771 to 1778)

Mark Daws/Mark Daws and Benjamin Wilson (tenants 1778 to c 1790)

Benjamin and John Wilson (lessees c 1790 to 1823)

Brokers Row

##### Archaeological evidence

Brokers Row cesspit assemblages

#### 13.2 From the New Churchyard to the gardens of Broad Street Buildings (1739–1817)

##### Documentary sources

##### Archaeological evidence

#### 13.3 Liverpool Street (1817 to the present day)

##### Documentary evidence

##### Archaeological evidence

*Graphics: Historic maps and/or plans, photographs of structural remains, including cess pits, historic prints, trade cards, photograph of the sewer and Broad Street Station foundations, engraving of Broad Street Station dated 1865, historic photographs of Liverpool Street/Broad Street Station c 1884-1976.*

### 14 Specialist appendices

### 15 FRENCH AND GERMAN SUMMARIES

### 16 BIBLIOGRAPHY

#### 16.1 Manuscript sources

#### 16.2 Printed and other secondary works

### CAS II – digital output

Digital on-line output: archive report (methods and results), osteological tables and summaries

To include:-

- Graphics: Tables, charts, photographs, radiographs and distribution plots, comparative osteological charts and graphs
- The statistics for the Category A and B burials will be kept separate at analysis. The Category A burials formed a random sample, but the Category B burials were selected for special characteristics, and therefore formed a deliberately biased selection. The statistics for the burials from mass pit [7482] will be examined and compared to the attritional sample from Category A.

#### Osteological aims and objectives

Definition of the bio-cultural approach and the linking of osteological and archaeological data. Discussion of sub-sampling and sampling strategy. This represents one of the largest assemblages of post-medieval burials excavated in the UK and creates a robust dataset with which to conduct research. Analysis of the rarely uncovered 16th- to 17th-century burials aims to place the buried population into context through detailed historical research.

#### Nature of the evidence

Discussion regarding the completeness, preservation and recovery of skeletal remains including the intentional truncation of burials during excavation. The importance of the assemblage. This section will include illustrative figures for demonstrating completeness, preservation and possible GIS plots.

#### Methods

Full osteological methodology, including sub-sampling strategy, radiography and scientific and statistical analysis.

#### Demography

##### Stature and growth

##### Skeletal indices

##### Non-metric traits

##### Palaeopathology

- Dental health
- Infectious disease
- Trauma
- Joint disease
- Congenital and developmental abnormalities
- Neoplastic disease
- Circulatory disease
- Nutritional and metabolic disease

#### Appendix

##### Category C assessment results

## **8.2.2 article 1 The 'Deep Ditch'**

---

### Introduction (500 words)

Site location and circumstances of the excavation.

### Historical background (1000 words)

Documentary sources for the Deep Ditch and archaeological background, including discussion of dating evidence and environmental evidence for the character of the fills, for the three principle features included within the article

### The finds assemblage (max 9000 words)

Discussion of the leather, textile and related small finds from the selected features, accompanied by selective illustration of key objects.

*Graphics: location plans + historic maps and/or plans, site photographs, studio photographs and line drawings of selected artefacts. Selected tabulation.*

## Bibliography

### Separate digital output

Digital on-line output to include:

- catalogues of key finds assemblages
- studio photographs and line drawings of artefacts to support the catalogues
- supporting data as tabulation and other figures

### **8.2.3 article 2 The worked bone waste (from cemetery soil)**

---

#### Introduction (100 words)

To reference site location and discussion in article 1 as background.

#### Historical background (1500 words max)

Documentary sources for the Clitherow family and their trade.

#### The worked bone (max 8000 words)

Discussion of the assemblage accompanied by selective illustration of key objects.

*Graphics: location plans + historic maps and/or plans, site photographs, studio photographs and line drawings of selected artefacts. Selected tabulation.*

## Bibliography

### Separate digital output

Digital on-line output to include:

- catalogue of assemblage
- studio photographs and line drawings of artefacts to support the catalogue
- supporting data as tabulation and other figures

### **8.2.4 article 3 The glass making waste (from cemetery soil)**

---

#### Introduction (100 words)

To reference site location and discussion in article 1 as background.

#### Historical background (1500 words max)

Documentary sources for glass making in the vicinity.

#### The worked bone (max 8000 words)

Discussion of the assemblage accompanied by selective illustration of key objects.

*Graphics: location plans + historic maps and/or plans, site photographs, studio photographs and line drawings of selected artefacts. Selected tabulation.*

## Bibliography

### Separate digital output

Digital on-line output to include:

- catalogue of assemblage
- studio photographs and line drawings of artefacts to support the catalogue
- supporting data as tabulation and other figures

## 8.2.5 article 4 The glass making waste (from cemetery soil)

---

### Introduction (100 words)

To reference site location and discussion in article 1 as background.

### Historical background (1500 words max)

### Historical background (4500 words)

Documentary sources for the Clitherow family and archaeological background, including discussion of dating evidence and environmental evidence for the character of the fills, for the two principle features included within the article

### The cess pit contents (max 4500 words)

Discussion of the assemblage accompanied by selective illustration of key objects.

*Graphics: location plans + historic maps and/or plans, site photographs, studio photographs and line drawings of selected artefacts. Selected tabulation.*

### Bibliography

### Separate digital output

Digital on-line output to include:

- catalogues of assemblages
- studio photographs and line drawings of artefacts to support the catalogues
- supporting data as tabulation and other figures

## 8.3 Publication project: task sequence

### TASKS NUMBERED TO FOLLOW THOSE OF PX01

All tasks are being undertaken by MOLA as components of an integrated post-excavation programme for the sites at Liverpool Street and Blomfield Street as part of MOLA's contract with Crossrail Ltd.

Task No	Done by	X-rail approved grade	Task description
<b>STRATIFICATION (1) FINALISED LU/PERIOD STRUCTURE TO BE IN PLACE BY 26/02/2016</b>			
119	STRATIFICATION TEAM/AT	3	Prepare detailed <b>publication synopsis</b> . This will comprise a description of the final form with estimated word count, figure and table lists. The synopsis will be disseminated to the project archaeologist (task to initiate 08/02/2016: FY15/16)
120	STRATIFICATION TEAM/AT	3	Finalisation of all datasets and sign-off on land-use/period structure (to run from 08/02/2016: FY15/16)
121	STRATIFICATION TEAM/RH	5	burial ground documentary research and production of publication text (to run from 08/02/2016: FY15/16)
122	STRATIFICATION TEAM/AT	3	Production of detailed Landuse-period text for baseline report (to run from 08/02/2016: FY15/16)
<b>CERAMIC BUILDING MATERIAL</b>			
123	IB/MOLA CBM	8	Compare/integrate CBM assemblage with the stratigraphic sequence and all other available dating evidence
124	IB/MOLA CBM	8	Petrological identification of registered finds
125	IB/MOLA CBM	8	Incorporation of information on floor tiles and other building material from LSS85
126	IB/MOLA CBM	8	Write publication text and supporting grey literature
<b>POST-ROMAN POTTERY</b>			
127	NJ/MOLA PRPOT	8	<b>Post-med pottery:</b> 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
128	NJ/MOLA PRPOT	8	Writing a summary text for the medieval pottery in Table 3
129	NJ/MOLA PRPOT	8	Pre-burial ground: Quantification of the groups filling sections of the 'Deep Ditch' in [6535]–[6538] and [6637]–[6640] filling six boxes @ 2 boxes per day
130	NJ/MOLA PRPOT	8	Pre-burial ground: Answering the research aims identified in 1.1.3 and writing summary text
131	NJ/MOLA PRPOT	8	Pre-burial ground: Provide a summary text for the remaining post-medieval pottery from the pre-burial ground
132	NJ/MOLA PRPOT	8	Burial ground: Answering the research aims identified in 1.1.4 and writing a summary text for the pottery from the burial ground
133	NJ/MOLA PRPOT	8	Post-burial ground (Crossrail publication): Provide a summary text for the pottery in cesspit fills [3704], [3849] and [4764]
134	NJ/MOLA PRPOT	8	Post-burial ground (specialist journal article): Quantification and analysis of the large and very large-sized groups in [3704] [3849] and [4764] filling 25 boxes @ 2 boxes per day
135	NJ/MOLA PRPOT	8	Post-burial ground (specialist journal article): Answering the research aims identified in 1.1.5 and writing summary text for these groups
136	NJ/MOLA PRPOT	8	Selection, preparation and packaging of materials, providing list and attending finds review
<b>POST-ROMAN REGISTERED FINDS</b>			
137	MM/PRREG	8	<b>Post-med bone and ivory accessioned finds:</b> Complete detailed recording of the assemblage
138	MM/PRREG	8	Statistical analysis and summary of the assemblage



Task No	Done by	X-rail approved grade	Task description
139	MM/PRREG	8	Explore the distribution of the assemblage across the site and produce distribution map
140	MM/PRREG	8	Write detailed account of manufacturing evidence / processes
141	MM/PRREG	8	Research and write account of the products and the wider significance of the bone and ivory working including comparison with other published assemblages
142	MM/PRREG	8	Make final selection for photography, write find review notes and attend finds reviews
143	MM/PRREG	8	Collaborate with photographers on aspects of the photography
144	MM/PRREG	8	Discussion of the finds – (publication text), placing them within their wider context
145	BR/PRREG	8	<b>Post-medieval textiles and leather:</b> Integration of the post-medieval leather finds within the site sequence
146	BR/PRREG	8	Examination of the post-medieval leather by context/landuse. The accessioned and bulk shoe parts from each context/landuse will be recorded by size, style, decoration and construction method (using the Mary Rose Shoe type typology as a basis for this work). Context [6639] is particularly large and will be examined with other contexts from the upper fill of the Deep Ditch. 4 accessioned shoes and bulk leather from LSS85 will also be recorded. Shoes will also be reconstructed at this stage as it should be possible to match (eg) vamps (fronts) with soles and quarters (backs). This recording will provide the basis for statistical work on (eg) proportions of different sole shapes, upper styles, male/female/children's shoes, use of different construction techniques, and the basis of the publication text
147	BR/PRREG	8	Catalogue (onto Oracle data base) approximately 100-150 leather accessions. These will include new accessions identified after the leather has been re-examined after freeze-drying. Selected items from the completed catalogue will form the publication catalogue
148	BR/PRREG	8	Publication text: Research and summary of the finds within the site sequence and within their wider context; selection of finds for catalogue and illustration
149	BR/PRREG	8	Integrate the 112 <b>accessioned burial finds</b> with documentary, stratigraphic and osteological information (including position of finds in relation to the body) and generate burial finds table
150	BR/PRREG	8	Examine burial finds and undertake research on selected objects of intrinsic importance
151	BR/PRREG	8	Generate and finalise catalogue for illustrated finds, select items for illustration and create finds review box
152	BR/PRREG	8	Write short text, making comparisons with broadly contemporary finds from London and other burial sites
153	BR/PRREG	8	Post-medieval accessioned finds Integrate stratigraphic and finds information
154	BR/PRREG	8	Update catalogue entries after conservation, re-examine objects and undertake additional research on selected objects of intrinsic importance. (The cloth seals, the bone/ivory working assemblage and the burial finds are covered by separate tasks)
155	MM/RREG	8	Examine evidence for metal working and pin-making on the site including distribution of copper-alloy wire, pins, crucibles and waste; further measurement/comparison of wire/pin diameters, make selection for illustration and create finds review box
156	MM/RREG	8	Write short text on metalworking, pins and pin-making for popular publication
157	MM/RREG	8	Generate and finalise catalogue for digital finds report
158	MM/RREG	8	Write text(s) for digital report and popular publication; these will include a main text on the 16th-century finds discussing the significance of the finds, comparing them with other groups of 16th-century finds from London, and other shorter texts on specific finds or groups of finds from landuses post-dating the main 16th-century drainage system
159	MM/RREG	8	Make final selection of finds for illustration and create finds review boxes and update database
160	MM/RREG	8	Check illustrations
161	JP/PRREG/PMED GLASS	8	<b>Post-med glass:</b> refinement of the chronology in relation to the final phasing of the site sequence and to other finds
162	JP/PRREG/PMED GLASS	8	Consultation with external specialists (Colin Brain and John Shepherd or Hugh Willmott) concerning the glassmaking waste
163	JP/PRREG/PMED GLASS	8	Scientific analysis of selected glassmaking waste following recommendations of external specialists. Research into the glassmaking waste, and the processes represented by the finds, including comparison with waste recovered from other excavated sites in the vicinity and elsewhere in London (notably BRO90)
164	JP/PRREG/PMED GLASS	8	Consideration of the 18th-century glass in consultation with other MOLA finds specialists in order to gain as complete a picture as possible of the artefact assemblages

Task No	Done by	X-rail approved grade	Task description
			deposited during this period
165	JP/PRREG/PMED GLASS	8	Comparison of the glass with other large finds assemblages from contemporaneous sites in the London region and beyond
166	JP/PRREG/PMED GLASS	8	Writing report
167	JP/PRREG/PMED GLASS	8	Preparation for deposition in the archive
168	JP/PRREG/PMED GLASS	8	Research into <b>marked pipes</b> and identification of their makers, as far as possible; and comparison of pipes from the site with assemblages of the same date from other nearby sites.
169	JP/PRREG/PMED GLASS	8	Comparison of the clay pipe evidence with that of other finds from the same contexts, and refinement of the chronology
170	JP/PRREG/PMED GLASS	8	Writing publication text
171	Adrian Miles	8	<b>Coffin furniture:</b> analysis, archive report plus inputting of relevant contexts into ORACLE
172	James Wright	8	<b>Worked stone:</b> analysis plus archive report
173	tbc	8	16th and 17th century textile (10 accessions currently in conservation: not assessed, provision nominal)
174	JB	8	Refinement of stratigraphic sequence and other dating criteria to be integrated into the coin chronology. Consultation on coins <1009>, <2710>, <2712>, <1243>, <1242>, <1228>
175	JB	8	Coin report for publication
<b>ENVIRONMENTAL (3) ANIMAL BONE</b>			
176	AP/MOLA ANBN	8	Post-med <b>animal bone</b> recording onto post-assessment database
177	AP/MOLA ANBN	8	Analysis and report preparation
<b>ENVIRONMENTAL (4) BOTANY</b>			
178	KS/MOLA BOTANY	8	Post-Roman: Accessing stratigraphic data & selection of samples for study (in consultation with strat. team):
179	KS/MOLA BOTANY	8	Scanning & ID of 22 rich waterlogged samples:
180	KS/MOLA BOTANY	8	ID of plant remains from sample residues:
181	KS/MOLA BOTANY	8	Data entry, production & editing of tables:
182	KS/MOLA BOTANY	8	Analysis and research, production of archive report :
183	KS/MOLA BOTANY	8	Wood species identifications of PRREG
<b>CONSERVATION (50%)</b>			
184	CONS	8	Analysis and investigative work
185	CONS	8	Stabilisation
186	CONS	8	Detailed cleaning
<b>GRAPHICS (50%)</b>			
187	MOLA DO	8	Finds review: all staff

Task No	Done by	X-rail approved grade	Task description
188	MOLA DO	8	Production of site location plans, topographic plots, photographs, transects, sections
189	MOLA DO	8	<b>Illustration</b> of maximum 35 vessels, 13 CBM, 23 PMGLASS, 7 CTP Estimate required from drawing office
190	MOLA DO	8	Production of graphics for human bone decapitations
191	MOLA DO	8	Geoarch illustrations
192	MOLA DO	8	Photography of selected items
193	MOLA PHOTO	8	Photography for human bone
<b>PUBLICATION TEXT</b>			
194	AT	3	Integrate publication text
195	RH	5	Integrate publication text
196	RH	5	Select other figures (historic or contemporary images, historic maps) to illustrate report. Liaise with TW to initiate process of securing permissions as necessary.
<b>REVIEW AND INTERNAL EDIT</b>			
197	ME	3	Managing Editors all tech and content edit @ up to 4000 words p/d
198	STRATIFICATION TEAM	8	Authors revisions to text
199	DO	8	Revisions to figures/illustrations
200	JH	1	MOLA sign-off first draft to Crossrail
<b>PRODUCTION</b>			
201	2	TW	Design, layout, typesetting and production management
202	2	TW	Picture research, rights and acquisition
203	8	GS	Contributors proof sign off
204	3	Managing Editor	Managing Editors proof sign off
205	2	JH	Oversee project and administration
206	2	JH	Project liaison with Crossrail for publication monthly meetings and progress reports

**TASKS NUMBERED TO FOLLOW THOSE OF PXA2a**

EXTERNAL SPECIALISTS (ANALYSIS)			
Task	Contractor		Task description
(E)_21	CE (EXT)		External copy edit
(E)_22	EXT		Purchase external images
(E)_23	SPMA		Page costs (4 X articles c 9000 words with selected supporting illustration)

Task No	Done by	X-rail approved grade	Task description

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- Crossrail, 2012a *Archaeology Detailed Desk Based Assessment Liverpool Street Station* (Doc. No. CRL1-XRL-T1-ASM-CRG03-50001) [DDBA]
- Crossrail, 2012b, *Watching Brief & Detailed Excavation – Blomfield Worksite – (XTB12) Blomfield Box* (Doc. No. C502-XRL-T1-RST-C101-50001, Rev.1.0) [WSI Addendum] (this supersedes the earlier addendum C138-MMD-T1-RST-C101-00005)
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## 11 OASIS archaeological report form

<i>OASIS ID: molas1-241917</i>	
<b>Project details</b>	
Project name	Crossrail Broadgate Ticket Hall
Short description of the project	Following previous fieldwork in 2011 to 2013, a final phase of excavation and watching briefs was undertaken at the site, located at the western end of Liverpool Street. A further three large open area trenches were investigated. Remains of the Walbrook stream itself were seen at the western edge of the site, comprising bands of alluvial clay and gravel. No human activity was present in the earliest phase of these bands, but a later sequence dated to the Roman period. A shallow series of deposits containing late Iron Age pottery and burnt flint suggests prehistoric activity on the site. Evidence was found for several phases of Roman activity between the first half of the 2nd century and the 4th century; the earliest phases took the form of water management. A c mid- 2nd century road was traced across the entire site. Roman burial activity to the south of the road included up to eight articulated individuals burials, three of which showed signs of decapitation. The post-Roman to medieval sequence was characterised by a series of marsh deposits. Reclamation of this marsh occurred between the 12th and early 15th centuries, and evidence was found of the revetment of the Walbrook stream to the west of the site. This period was also characterized by a series of large boundary/drainage ditches. Post-medieval archaeological remains also included early garden features. Further remains of the 'New Churchyard' (1569-1739) were excavated, including burials, boundary walls and burial structures. Archaeological remains associated with the developed of the site from the mid-18th century were discovered, as well as remains representing the construction of Liverpool Street (the road) (1823-24) and Broad Street Station (1864-65).
Project dates	Start: 09-12-2013 End: 09-10-2015
Previous/future work	Yes / Not known
Any associated project reference codes	XSM10 - Sitecode
Any associated project reference codes	molas1-111282 - OASIS form ID
Any associated project reference codes	molas1-166476 - OASIS form ID
Any associated project reference codes	molas1-124320 - OASIS form ID
Type of project	Field evaluation
Site status	Area of Archaeological Importance (AAI)
Current Land use	Transport and Utilities 1 - Highways and road transport
Monument type	ROAD Roman
Monument type	BOUNDARY DITCH Post Medieval
Monument type	WALLS Post Medieval
Significant Finds	COINS Roman
Significant Finds	COINS Medieval
Significant Finds	COINS Post Medieval
<b>Project location</b>	
Country	England
Site location	GREATER LONDON CITY OF LONDON CITY OF LONDON Crossrail Broadgate Ticket Hall
Postcode	EC2M 7NH
Study area	2741 Square metres
Site coordinates	TQ 81610 33028 51.067225456787 0.592343408529 51 04 02 N 000 35 32 E Point
Site coordinates	TQ 81603 33054 51.067461261494 0.592256654536 51 04 02 N 000 35 32 E Point

Height OD / Depth	Min: 6.4m Max: 11.8m
<b>Project creators</b>	
Name of Organisation	MOLA
Project brief originator	Crossrail
Project design originator	Crossrail
Project director/manager	Nicholas Elsdon
Project director/manager	Simon Davis
Project supervisor	Alison Telfer
Project supervisor	Andy Daykin
Project supervisor	Greg Laban
Project supervisor	Rob Tutt
Project supervisor	Serena Ranieri
Project supervisor	Portia Askew
Project supervisor	Martin Banikov
Project supervisor	Catherine Gibbs
Project supervisor	Jez Taylor
Project supervisor	Jessica Bryan
Project supervisor	Robert Hartle
Type of sponsor/funding body	Developer
Name of sponsor/funding body	Crossrail
<b>Project archives</b>	
Physical Archive recipient	LAARC
Physical Contents	"Animal Bones", "Ceramics", "Environmental", "Glass", "Human Bones", "Industrial", "Leather", "Metal", "Textiles", "Wood", "Worked bone", "Worked stone/lithics", "other"
Digital Archive recipient	LAARC
Digital Contents	"Stratigraphic", "Survey"
Digital Media available	"Database", "GIS", "Images raster / digital photography", "Moving image", "Spreadsheets", "Text"
Paper Archive recipient	LAARC
Paper Contents	"Stratigraphic", "Survey"
Paper Media available	"Context sheet", "Correspondence", "Diary", "Drawing", "Map", "Matrices", "Notebook - Excavation", "Research", "General Notes", "Section"
<b>Project bibliography</b>	
<b>1</b>	
Publication type	Grey literature (unpublished document/manuscript)
Title	BROADGATE Liverpool Street and Blomfield Street London EC2M (XSM10, LSS85 and XSL10 / XTB12) PXA01
Author(s)/Editor(s)	Telfer, A
Author(s)/Editor(s)	Hill, J

Date	2016
Issuer or publisher	MOLA
Place of issue or publication	London
Description	Unpublished A4 PXA report
<b>Project bibliography 2</b>	
Publication type	Grey literature (unpublished document/manuscript)
Title	BROADGATE Liverpool Street and Blomfield Street London EC2 (XSM10, LSS85 and XSL10 / XTB12) PXA02
Author(s)/Editor(s)	Hartle, R
Author(s)/Editor(s)	Hill, J
Date	2016
Issuer or publisher	MOLA
Place of issue or publication	London
Description	Unpublished A4 PXA report
<b>Project bibliography 3</b>	
Publication type	Grey literature (unpublished document/manuscript)
Title	BROADGATE TICKET HALL (XSM10) Liverpool Street Station London EC2M (XSM10) PXA02a
Author(s)/Editor(s)	Walker, D
Author(s)/Editor(s)	Henderson, M
Author(s)/Editor(s)	Knox, E
Author(s)/Editor(s)	Carty, N
Author(s)/Editor(s)	Hill, J
Date	2016
Issuer or publisher	MOLA
Place of issue or publication	London
Description	Unpublished A4 PXA report
Entered by	Robert Hartle (rhartle@mola.org.uk)
Entered on	8 February 2016

## Appendix 1: management, delivery and quality control

MOLA is a 'Registered Organisation' with the archaeological professional body, the Chartered Institute for Archaeologists (CIfA). The *CIfA Register* is a rigorous Quality Assurance scheme for archaeologists. In order to be accepted, MOLA has passed a Board resolution to comply with the CIfA 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 is also currently working with a specialist consultant towards achieving the ISO9001 Quality Management standard.

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: *...archaeologists 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: Historic England, *Standards for archaeological work* (2015)
- 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).
- English Heritage, *Management of Archaeological Projects* (MAP2), (1991)
- English Heritage Centre for Archaeology, *Guidelines* (various)
- Museum of London Archaeological Service, *Archaeological Site Manual* (1994)
- Museum of London Archaeological Service, *Archaeological Finds Procedure Manual* (2006)
- 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 Northampton 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.

All written documentation, eg initial '*written scheme of investigations*' ('*wsis*'), evaluation reports, post-excavation *Assessment Reports* 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).

## Appendix 2: quantified bone and ivory assemblage tabulation

Table 30 The scanned and quantified bone and ivory assemblage by type and material, quantified by number of accessions, fragment count and weight (based on c 90% sample)

Waste groupings	BONE			IVORY			TORTOISE SHELL			TOTAL		
	Acc	Frag	Wt (g)	Acc	Frag	Wt (g)	Acc	Frag	Wt (g)	Acc	Frag	Wt (g)
SAWN OFF METAPODIAL ENDS	90	686	39969.5							90	686	39969.5
SAWN SHAFT SECTION	22	53	1668.9							22	53	1668.9
FILED SHAFT SECTION	1	1	6.78							1	1	6.78
WHITTLED SHAFT SECTION	36	37	812.2							36	37	812.2
LT CYLINDER WASTE AND PART FINISHED PRODUCTS	24	25	214.47	4	6	9.07				28	31	223.54
LT CYLINDER RING WASTE	7	7	29.3							7	7	29.3
LT CYLINDER TELESCOPE WASTE	6	6	36.6							6	6	90
TRANSVERSE METAPODIAL SHAFT END OFFCUT (RELATES TO LT)	175	440	2571.02							175	440	2571.02
TRANSVERSE MP SHAFT END OFFCUT PLUGGED WITH PEG	1	1	5.5							1	1	5.5
SPLIT SHAFT WALL SECTION ROUGHOUT	177	904	9956.45							177	904	9956.45
BUTTON/COUNTER/BEAD WASTE	2	2	4.5							2	2	4.5
DISC INC ROUGHOUT AND PART WORKED	23	35	211.67	6	7	27.2	1			30	42	238.87
STRIP AND SPLIT WALL STRIP BLANKS	14	27	133.91	3	3	14.8	1	1	3	18	31	149.49
SQUARE SECTIONED PEG BLANK	17	481	2329.7	6	8	28.72				23	489	2358.5
WHITTLED PEG	64	1184	5531.6	45	80	111.4				109	1264	5643
LT AND PART LT PEGS AND UNID PRODUCTS	11	11	17.3	7	10	17				18	21	34.3
TUSK OR TOOTH TIP				1	1	5.1				1	1	5.1
TUSK TRANSVERSE SLICE				7	22	76.5				7	22	76.5
TUSK BASE OFFCUT				29	42	961.4				27	40	943.2
TUSK BASE TRANSVERSE SLICE				15	18	421.9				15	18	421.9
TUSK TRANSVERSE SLICE (PART LT)				3	3	22.8				3	3	22.8
IVORY BLANKS AND SQUARING OFFCUTS				55	86	654.55				78	140	2330.23
KNIFE HANDLE BLANK				1	1	23.4				1	1	23.4
<b>TOTALS</b>	<b>670</b>	<b>3900</b>	<b>63499.4</b>	<b>182</b>	<b>287</b>	<b>2373.84</b>	<b>2</b>	<b>1</b>	<b>0.78</b>	<b>875</b>	<b>4240</b>	<b>67584.98</b>





## Appendix 3: coins

### English Coins

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<C 1> Silver coin <1243>, [6639]

?Richard III, 1483–5; penny. Diam 15mm; Wt 0.59g. Ax ; Wr .

Obv xxxxxx, facing bust bifoliate crown, Rev , long cross with three pellets in each angle, D in centre, wedge in angle.

<C 2> Silver coin <1242>, [6639]

?Henry VII, 1485–1509; halfpenny Diam 12mm; Wt 0.34g. Ax 7; Wr C.

Obv uncertain legend, facing bust with single arched crown. Rev CIVI TAS DVN ELM, long cross with three pellets in each angle.

<C 3> Copper-alloy coin <2723>, [7000]

Charles II, 1672; farthing. Diam 23mm; Wt 5.86g. Ax 6; Wr C.

Obv CAROLVS-[A-] CAROLO -, laur cuir bust l. Rev BRITAN NIA-, Britannia seated l with spear and shield. Peck 1964, 145 nos 519–21.

<C 4> Silver coin <1205>, [3010]

William III, 1695–9; sixpence. Diam 21mm; Wt 2.44g. Ax 6; Wr D.

Obv GVLIELMVS III D[EI] GRA], laur draped, bust r. Rev JMAG BR[FRA] ETHIB RE[X]16, small lion in centre, four shields with three lions, one lion, three fleurs de lys and harp, surmounted by crowns. Uncertain if second or third bust type or harp size, bent into an S shape, ie probably made into a love token.

<C 5> Copper-alloy coin <1208>, [3010]

William III, 1695–1701; halfpenny. Diam 29mm; Wt 9.32g. Ax 12; Wr E.

Obv GVLIELMVS[ (visible on x-radiograph), laur, cuir bust r. Rev Britannia seated l.

<C 6> ? silver coin <1209>, [3010]

Late 17th / early 18th century; ? sixpence. Diam 22mm; Wt 1.54g. Ax ; Wr .

Illegible but x-radiograph suggests an English silver denomination.

<C 7> Copper-alloy coin <1213>, [3148]

George I, 1719–24; farthing. Diam 22mm; Wt 4.34g. Ax 6; Wr D.

Obv GEOR[GIVS REX], laur cuir bust r. Rev BRITA N [N]IA, Britannia seated l holding spray of leaves and spear, shield behind. cf Peck 1964, 203 (second issue).

<C 8> Copper-alloy coin <1212>, [3674]

(George III), 1772, irregular halfpenny. Diam 29mm; Wt 6.97g. Wr D.

Obv illegible. Rev Britannia seated l with spear and shield to r, 1772 in ex. underweight copy.

<C 9> Copper-alloy coin <1202>, [3352]

(George III), 1775–95; irregular. Diam 27mm; Wt 5.88g. Ax 4; Wr D.

Obv GEORGIVS [III] REX, laur, cuir bust r. Rev BRITAN NIA, Britannia seated l with trident and shield, in ex 1775.

<C 10> Copper-alloy coin <1198>, [4764]

18th c; halfpenny. Diam 28mm; Wt 5.77g. Ax ; Wr .

Obv ?bust r. Rev Britannia seated l.

### Medieval Coins

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#### Saxon or other early medieval ???

<C 11> Copper-alloy coin <1195>, [6639] **EARLY MED?**

Diam 17mm; Wt 0.49g. Ax ; Wr .

## Post medieval foreign coins

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### Venice

<C 12> Gold coin <328>, [1034]

Leonardo Loredan, AD 1501–21; *mezzo-zecchino*. Diam 17mm; Wt 1.76g. Ax 10; Wr B.

Obv LE.LAVRE DVX SMVENET, Doge r, kneeling before St Mark I. Rev EG[O] SVM LVX MVNDI, Christ standing in starred marquise shaped panel. Pierced.

### Portugal

<C 13> Gold coin <1014>, [3704]

John V, 1721; 400 reis. Diam 13.5mm; Wt 0.87g. Ax 6; Wr C.

Obv IOAN / V within wreath surmounted by crown, below 400. Rev IN HOC SIGNO VINCES, above \*1721\*, around cross with quatrefoil in each angle.

## Post medieval tokens

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### Low Countries

<C 14> Copper-alloy jetton <1227>, [3010]

Low Countries, c 1490–1550; 'Venus Penny'. Diam 29mm; Wt 2.94g. Ax 6; Wr D.

Obv illegible Lombardic legend, Austro-Burgundian shield. Rev Venus standing with long flowing hair. Cf Mitchiner 1988, 266-73.

<C 15> Copper-alloy jetton <1229>, [6639]

Low Countries, c 1490–1550; 'Venus Penny' Diam 30mm; Wt 1.98g. Ax 10; Wr C.

Obv illegible Lombardic legend, Austro-Burgundian shield. Rev Venus standing with long flowing hair. Cf Mitchiner 1988, 266-73.

<C 16> copper-alloy jetton <485>, [1369]

Low Countries, c 1490–1550; 'Venus Penny' Diam 31mm; Wt 2.66g. Ax 10; Wr C.

Obv illegible Lombardic legend, Austro-Burgundian shield. Rev Venus standing with long flowing hair. cf Mitchiner 1988, 266-73.

<C 17> Copper-alloy coin <1225>, [5373]

1636; one duit. Diam 19mm; Wt 0.96g. Ax 10; Wr D.

Obv DVC / GVL / 1636 within a wreath. Rev illegible legend (IN DEO SPES NOSTRA) around the arms of Gelderland (two rampant lions facing each other).

## Jettons,

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### Tournai

<C 18> Copper-alloy jetton <1190>, [6639]

Tournai, c 1497–1521; jetton. Diam 27mm; Wt 2.26g. Ax 5; Wr C.

Obv +AVTE[M+]TRASIENS, letters HIS across plain field. Rev DNS [ JS XPC DEVS, simple cross patty. No exact parallel but cf Mitchiner 1988, 245.

### France

<C 19> Copper-alloy jetton <1201>, [3352]

(Louis XV of France), c 1726–41; jetton. Diam 25mm; Wt 4.04g. Ax 12; Wr C/D.

Obv LVD XV DG FR ET NAV REX, crowned and draped bust r. Rev VISANIMICVM [CORP]ORE CRESCIT, Sol Invictus in front of slayed dragon.

### Nuremberg

<C 20> Copper-alloy jetton <1186>, [6639] period

Nuremberg – Burgrave type, c 1440–93; jetton. Diam 20mm; Wt 0.34g. Ax 7; Wr D.

Obv fictitious (and mostly illegible) legend, shield quarterly 1,4; hound's head l. 2, 3; three annulets. Rev fictitious (and mostly illegible) legend, fleur de lys. Mitchiner 1988, 335 no.987. broken.

<C 21> Copper-alloy coin <382>, [1034]

Nuremberg, c 1500–25; jetton. Diam 29mm; Wt 2.59g. Ax 7; Wr C.

Obv fictitious (Lombardic) legend, shield of France with three fleurs de lis surmounted by a crown which extends into margin. Rev fictitious (Lombardic) legend, imperial orb surmounted by a cross with an ornamental tressure of three arches. cf Mitchiner 1988, 355.

<C 22> Copper-alloy jetton <2708>, [+]

Nuremberg, c 1515–84; jetton. Diam 27mm; Wt 4.29g. Ax 1; Wr E.

Obv fictitious Lombardic legend, Lion of St Mark standing l, holding Book of Gospels l. Rev illegible (fictitious) Lombardic legend, imperial orb within tressure of three arches – of a special type used by Iorg and Hans (l) Schultes. Mitchiner 1988, 364.

<C 23> Copper-alloy jetton <1187>, [6639]

Nuremberg, 1490–1550; jetton. Diam 29mm; Wt 1.45g. Ax 8; Wr C.

Obv VOLGUE LA [gallee de France], profile of a ship. Rev VIVE LE ROY DE FRANCE, four fleur de lys in a lozenge. cf Mitchiner 1988, 365–6.

<C 24> Copper-alloy jetton <2722>, [7605]

Nuremberg, c 1490–1550; jetton. Diam 27mm; Wt 1.60g. Wr D.

Obv Illegible Lombardic legend, galley sailing l. Rev Illegible (probably fictitious) Lombardic legend, four fleur de lys within a lozenge., small French shield with three fleur de lys in a four arched tressure. cf Mitchiner 1988, 365–75.

<C 25> Copper-alloy jetton <1188>, [6639]

Nuremberg, c 1500–50; jetton. Diam 24mm; Wt 1.13g. Ax 6; Wr D.

Obv fictitious Lombardic legend, three crowns alternatively with three lys, arranged around a five petalled rose. Rev fictitious Lombardic legend, imperial orb surmounted by a cross, within an ornamental tressure with three arches.. cf Mitchiner 1988, 377–82.

<C 26> Tin plated copper-alloy jetton <1189>, [6639]

Nuremberg, c 1500–50; jetton. Diam 24mm; Wt 1.21g. Ax 12; Wr B.

Obv fictitious legend, three crowns alternatively with three lys, arranged around a five petalled rose. Rev fictitious legend, imperial orb surmounted by a cross, within an ornamental tressure with three arches. cf Mitchiner 1988, 377–82.

<C 27> Copper-alloy jetton <1194>, [6639]

Nuremberg, c 1500–50; jetton. Diam 23mm; Wt 1.08g. Ax ; Wr .

Obv fictitious Lombardic legend, three crowns alternatively with three lys, arranged around a five petalled rose. Rev fictitious Lombardic legend, imperial orb surmounted by a cross, within an ornamental tressure with three arches.. cf Mitchiner 1988, 377–82.

<C 28> Copper-alloy jetton <1200>, [3010]

Nuremberg, c 1500–50; jetton. Diam 20 mm; Wt 3.17g.

Lombardic lettering with possible tressure in centre. Details from x-radiograph. Corroded, broken

<C 29> Copper-alloy jetton

<4>, [3] .

Hans Kravwinckel II, 1586–1635; jetton. Diam 21mm; Wt 0.93g. Ax 7; Wr D.

Obv Rev ] GOTES RE[ICH] BLIBT [EWICK] ,three crowns alternatively with three lis, around a rose.

Rev HANNES KR[AVW]INK[ ], imperial orb surmounted by a cross, within a tressure with three arches. cf Mitchiner 1988, 441 nos.1540–42.

<C 30> Copper-alloy jetton

<1193>, [6639] .

?Nuremberg, c 1490–1550; jetton. Diam 28mm; Wt 2.04g.

Obv traces of fictitious gothic legend, otherwise illegible. Rev corroded and illegible.

<C 31> copper-alloy jetton <407>, [1121]

?Nuremberg, c 1550-1630; jetton. Diam c25; Wt 1.81g.

Illegible, corroded. Size and fabric suggests Nuremberg jetton.

<C 32> Copper-alloy jetton <1192>, [6639]

Nuremberg, 1500–25; jetton. Diam 29mm; Wt 1.39g. Ax 4; Wr C.

Obv fictitious gothic legend, shield of France with three lys surmounted by a crown. Rev fictitious gothic legend, imperial orb surmounted by a cross, within an ornamental tressure with three arches. Mitchiner 1988, 455 no.1069.

<C 33> copper-alloy jetton <408>, [1135]

Nuremberg, c 1550-1630; jetton.. Diam 23mm; Wt 1.69g. Ax ; Wr .

Obv Lombardic legend, alternate crowns and lys. Rev Lombardic legend, imperial orb within three arched tressure.

<C 34> Copper-alloy jetton <125>, [492]

?Nuremberg, c 1580-1630, jetton. Diam c 24mm; Wt 2.15g. Ax ; Wr .

Illegible and corroded but x-radiograph 10178 suggests a jetton. Edges are broken.

<C 35> Copper-alloy jetton <1210>, [3010]

Nuremberg, c 1586-1635; jetton. Diam 22mm; Wt 1.11g.

Obv Obv ]EICH GO[, three crowns alternatively with three lys, arranged around a five petalled rose.

Rev ]AVWI[, imperial orb surmounted by a cross, within an ornamental tressure with three arches.

Tentative identification to Hanns Kravwinckel II and legend Gottes segen macht reich, or similar.

Corroded.

<C 36> Copper-alloy jetton <1203>, [3010]

Nuremberg, c 1550-1600; jetton. Diam 24mm; Wt 1.33g. Ax ; Wr D.

Obv illegible legend, three crowns alternatively with three lys, arranged around a five petalled rose.

Rev illegible legend, imperial orb surmounted by a cross, within an ornamental tressure with three arches. Corroded.

<C 37> Copper-alloy jetton <661>, [1521]

Laufer (William III & Mary), c 1685-94, jetton. Diam 23mm; Wt 1.31g. Ax 12; Wr D.

Obv WILLHIII:DG:ANG:SCO:FR:ET:HI:REX, laur dr bust r. Rev MARIA:DG:ANG [ET]

SO:FRE:HI:REGINA, // LGL R. diad, dr bust r. cf Mitchiner 1988, 507 no.1802. The maker was

Lazarus Gottlieb Laufer and marked R[echenpfennig].

## XSM10 Uncertain medieval/ post-medieval jettons or tokens

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<C 38> Copper-alloy ?token / jetton <1181>, [6639]

ruler, date; denomination. Diam 12mm; Wt 3.17g. Wr D.

Obv ?plain. Rev three lys within a shield surmounted by a crown, beaded edge. Thick – at 3.3mm

<C 39> Copper-alloy coin <1228>, [6639]

ruler, date; denomination. Diam 20mm; Wt 1.41g. Ax ; Wr .

Obv heraldic quartered shield Rev fortifications in front of a river.

## XSM10 Tokens, English

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<C 40> Copper-alloy token <794>, [1628]

London trade token, 1652; token. Diam 16mm; Wt 1.22g. Ax 6; Wr C.

Obv \* SARAH PAGGAN, S P either side of a double saltire device. AT DOWGATE 1652, S P either side of a cinquefoil. Rev Dickinson 2004, 113 no. 853. Another one at MoL ID no:NN17173

<C 41> Copper-alloy coin <795>, [1500]

? post-medieval, date; denomination. Diam 25mm; Wt 3.98g. Ax ; Wr .

Illegible

<C 42> Copper-alloy token <1204>, [3010]

c 1648-73; trade token. Diam 13 mm; Wt 0.47g. Ax 6; Wr E.

Obv illegible legend, in centre \*C\* / T\*L. Rev ?ship in centre.

<C 43> Copper-alloy token <1206>, [3010]

c 1648-73; trade token. Diam 16mm; Wt 0.90g. Ax 12; Wr D.

Obv [AT] THE SVN[E IN] BEDLAM, in centre G / E C. Rev [EPHR]AIM CLITHE[ROW], in centre a sun. Dickinson 2004, 102 no.183; MoL 96.66/143.

<C 44> Copper-alloy token <2724>, [7000]

1648–72; trade token. Diam 16mm; Wt 0.75g. Ax ; Wr .  
Apart from one or two random letters, the piece remains illegible.

## XSM10 Medieval/Post-medieval lead tokens

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<C 45> Lead token <386>, [1034]  
ruler, date; denomination. Diam 20mm; Wt 1.52g. Ax 12; Wr C/D.  
Obv shield with double cross. Rev cross patty with superimposed.

<C 46> Lead token <1214>, [919]  
ruler, date; denomination. Diam 16mm; Wt 2.03g. Ax ; Wr .  
Obv stylised fleur de lys. Rev plain.

<C 47> Lead token <1236>, [6639]  
ruler, date; denomination. Diam 13mm; Wt 1.36g. Ax ; Wr .  
Obv letters . Rev quadruped standing l.

<C 48> Lead token <1237>, [6639]  
c 1425–85; token. Diam 18mm; Wt 2.06g. Ax ; Wr .  
Obv illegible. Rev cross on mound. cf Mitchiner and Skinner 1984, plate 1 no.35.

<C 49> Lead token <1238>, [6772]  
17th century; token. Diam 22mm; Wt 3.64g. Ax ; Wr .  
Obv star. Rev B B either side of a ?standard. cf Mitchiner & Skinner 1984, Plate 17 no.100.

<C 50> Lead token <1239>, [6772]  
ruler, date; denomination. Diam 22mm; Wt 2.77g. Ax ; Wr .  
Obv laur, coiffured bust r. Rev The S around a central pellet.

## XSM10 Uncertain post med

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<C 51> Copper-alloy coin <1185>, [6639]  
ruler, date; denomination. Diam 27mm; Wt 5.23g. Ax ; Wr .  
Obv . Rev reference worn smooth, chamfered edge ! 7894 nothing on xray – counter ???

<C 52> Copper-alloy coin <1191>, [6639]  
ruler, date; denomination. Diam 22mm; Wt 2.84g. Ax ; Wr D.  
Obv scribed outer and inner circles, l between. Rev blank.

## Coins from LSS85

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Copper-alloy coin LSS85 <21>, [501]  
William III, 1700; halfpenny. Diam 28mm; Wt 9.50g. Ax 12; Wr C.  
Obv GVLLIELMVS TERTIUS, laur cuir bust r. Rev BRITAN NIA, ex 1700, Britannia seated l with  
spear and branch. Peck 1964, 172, no.669

Copper-alloy coin  
LSS85 <34>, [661] .  
c 1718–70; farthing. Diam 23mm; Wt 3.54g.  
Illegible, corroded. Light weight suggests possible counterfeit.

Copper-alloy coin LSS85 <62>, [762]  
?Nuremberg, c 1500–50; jetton. Diam 23mm; Wt 0.92g. Wr E.  
Traces of Lombardic legend and design.

Copper-alloy coin LSS85 <63>, [762]  
?Nuremberg, c 1500–1600; jetton. Corroded, fragmentary. Illegible, thin.

Copper-alloy coin LSS85 <308>, [501]  
William III, 1694–1700; halfpenny. Diam 28mm; Wt 8.65g. Ax 12; Wr C.  
Obv GVLLIELMVS TERTIUS, laur cuir bust r. Rev BRITAN NIA, Britannia seated l with spear and  
branch. Peck 1964, 171–2

Copper-alloy coin LSS85 <310>, [501]

George II, 1743; halfpenny. Diam 28mm; Wt 6.19g. Ax 6; Wr C.

Obv GEORGIUS II REX, laur cuir bust l. Rev BRITAN NIA, in ex 1743, Britannia seated l holding branch and spear. Peck 1964, 212, no.873.

Copper-alloy coin LSS85 <328>, [1238]

Nuremberg, c 1461–97; jetton. Diam 30mm; Wt 5.32g. Ax 2; Wr D.

Obv

## Appendix 4: botany tabulation

Table 31 Summary of botanical assessment data (post-Roman)

A: abundance, D: diversity (1 = occasional, 2 = moderate, 3 = abundant) F: Flot, W: Residue

Sample	Context	Flot. Volume	Proc	Charred grain		Charred chaff		Charred seeds		Charred wood		W'logged seeds		W'logged misc		W'logged wood		Min seeds		Comments
				A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	
2	237	10	F									3	3	2	2					WET. WETLAND/AQU PLANTS, MOLLUSCS
3	239	100	F							1	1	3	3	2	2					WET.MOSTLY WETLAND PLANTS, SOME DRY
7	231	20	F							1	1	3	2							WET. MOD PRES. WET & DRY GRND PLANTS
7	231	20	W							1	1									
9	244	100	F							2	1	3	3	3	1					WET.ROOT? EPIDERMIS, WET & DRY GRNDSEEDS
10	283	250	F									3	2	3	2					WET. MANY HEMP SEEDS. DISTBD, FEW WET PL
20	697	10	F	1	1	1				1	1	3	3							DRY. AQUATIC/WETLAND PLANTS, MOLLUSCS
24	707	30	F							1	1	3	3	3	1					WET. AQUATIC PLANT REMS & INVERTS
25	708	100	F			1				1	1	3	3	3	3					WET.AQUATIC/WETLAND PLANTS & INVERTS
27	714	500	F					1	1	3	1	3	3	3	3					WET.WOODY, FEW FOODS,MOSTLY DRY SPP.
28	715	20	F			1		1	1	3	1	3	2	1	1					DRY. MOSTLY DRY GRND PLANTS & RANSC
32	1018	200	F									2	2	2	2					WET. V FINE-ONLY MOLLUSCS IN >2MM
44	1034	1000	F	1	1					2	1	3	3	3	3					WET. 2 BAGS. V MANY DIPSACUS SEEDS
44	1034	1000	W							1	1	1	1							MANY NUTSHELLS, SOME FRUIT STONES
58	1066	1200	F							3	1	3	3	3	3					WET. ORGANIC BUT SEEDS SPARSE. ROSEMARY
58	1066	1200	W							1	1	1	1							SOME FOODS INCL 1 OLE
69	1150	120	F							1	1	3	2	3	2					WET. MUCH CLINKER, SPARSE FOODS ETC.
69	1150	120	W									1	1							FEW FOODS
70	1169	600	F							1	1	2	2	2	2					WET. CLUMPS HAIR/FIBRE
70	1169	600	W							1	1	1	1							NUTS & FRUITS INCL ALMOND?
71	1177	150	F							1	1	3	3	3	3					WET. FOODS, HOPS, SOME WILD



Sample	Context	Flot. Volume	Proc	Charred grain		Charred chaff		Charred seeds		Charred wood		W'logged seeds		W'logged misc		W'logged wood		Min seeds		Comments
				A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	
71	1177	150	W							1	1									
72	1187	70	F							1	1	3	3	3	2					V MANY MOLLUSCS & SEEDS
74	1177	80	F									3	3	3	2					WET. MANY MOLLS. WETLND SEEDS+SOME FLAX
78	1187	300	F									3	2	3	2					WET.STRAW?, SOME ARABLE WEEDS
78	1187	300	W							1	1									
79	1345	80	F									2	1	3	1					WET. MOSTLY MOLLUSCS
80	1343	300	F							1	1	3	3	3	3					WET. STEMS, A WEEDS
80	1343	300	W									1	1							FRUIT & NUT, 4 OLE,CANS,ILEAQ,CND
81	1373	150	F							1	1	3	3	3	2					WET. STEMS, MIXED SEEDS
81	1373	150	W									1	1							FEW FOODS
82	1369	600	F							1	1	3	2	3	2					WET.STEMS & MANY GRASS SEEDS
82	1369	600	W									1	1							FEW FOODS INCL 4 OLE
112	2053	350	F							1	1	2	2	2	1					
301	3704	450	F							1	1	3	3	1	1				1	1
303	3264	80	F							1	1	3	3	2	1					
304	3849	50	F									2	2	2	1					
312	6313	25	F									1	1							POOR PRES
316	6320	25	F							1	1	2	2	1	1				1	1
317	6376	100	F							2	1	2	2	1	1					ABUNDANT CHEN
318	6341	450	F	1	1					1	1	3	3							2 BAGS
319	6397	400	F							1	1	3	3	2	1					LOTS OF ONTERESTING APIA
323	6397	150	F									2	2	2	1					
328	4855	25	F							2	1	2	2	1	1					
329	6569	50	F									2	1							
332	4764	600	F							1	1	3	3	1	1					

Sample	Context	Flot. Volume	Proc	Charred grain		Charred chaff		Charred seeds		Charred wood		W'logged seeds		W'logged misc		W'logged wood		Min seeds		Comments
				A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	
335	6587	500	F									3	3	1	1					
336	6607	80	F	1	1					1	1	1	2							337 ON BAG
337	6639	1200	F	1	1					1	1	3	3	3	2					2 BAGS
339	6737	500	F									3	3	2	1					
347	6756	40	F									1	1	1	1					
348	6758	150	F							1	1	2	2	1	1					
349	6639	700	F							1	1	3	3	3	2					
349	6639	700	W									1	1							
407	8257	1000	F							1	1			3	1					
407	8257	1000	W									2	2							
408	8264	900	F	1	1					2	1	2	1					2	1	+++BIRD BONE
408	8264	900	W							3	1									
409	8276	40	F							1	1	1	1	1	1					
410	8277	100	F							1	1	1	1	1	1					
411	8278	100	F									1	1	1	1					
412	8279		W							3	1	1	1							
413	8285	250	F							1	1	3	2	3	1					
414	8282	750	F									2	2	1	1					
414	8282	750	W									3	1							
419	8282		W					3	1			2	1							
420	6640	100	F									1	1							2 BAGS
428	6506	500	F							1	1	3	3	3	2					
429	6543	600	F							1	1	3	3	3	2					LOTS OF TWIGS/ROUNDS
431	6549	1500	F									3	3	3	1					



**Appendix 5: animal bone tabulation**

Table 32 Hand-collected and wet-sieved animal bone from XSM10 (post-Roman contexts)/catalogue

SGP	CONTEXT	SAMPLE	FEATURE	Wt (kg)	cattle	pig	dog	human	game	sheep/goat	horse	poultry	foetal/neonate	lmam	mmamm	smam	vsmam	bird	fish	amphibian	epiphyses	mandible	measurable	complete	butchery	pathology	burnt	gnawed	worked	COMMENTS	
5043	62	0	skeleton	0.01										0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5049	74	0	skeleton	0.03						Y				0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5064	104	0	skeleton	0.01										1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5066	108	0	skeleton	0.01						Y				0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0		
5081	138	0	skeleton	0.01	Y									1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0		
5083	142	0	skeleton	0.02								Y		2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0		
5085	146	0	skeleton	0.01						Y				0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
5087	150	0	skeleton	0.025						Y				0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5090	156	0	skeleton	0.01						Y		Y		0	2	0	0	1	0	0	4	0	1	1	0	0	0	0	0	chicken	
5092	160	0	skeleton	0.025						Y				0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5096	167	0	skeleton	0.05	Y					Y				2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
5131	208	0	skeleton	0.05	Y	Y								2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
223	211	0	make-up	1.7	Y	Y				Y	Y			15	6	0	0	0	0	0	3	3	1	1	5	0	0	0	0		
222	212	0	make-up	2.5	Y					Y				9	6	0	0	0	0	0	4	4	4	0	6	0	0	0	4	sheep/goat horn cores	
221	213	0	external	3.25	Y		Y			Y	Y	Y		17	0	0	0	1	0	0	6	16	4	1	5	0	0	0	8	chicken/cattle/sheep/goat horn core	
220	214	0	pit	1.8							Y			7	0	0	0	0	0	0	4	0	1	1	0	0	0	0	0		
5145	227	0	skeleton	0.02						Y				0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
5156	244	9	coffin	0.005		Y								0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0		
5172	268	0	skeleton	0.025		Y				Y				0	2	0	0	0	0	0	1	0	0	0	1	0	0	0	0		
531	283	10	marsh	0.04	Y					Y		Y		1	3	0	0	2	0	0	1	0	0	0	0	0	0	0	0	chicken	
528	298	0	dump. external	0.1	Y					Y				1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	lamb mandible	
527	299	11	marsh	0.005		Y	Y		Y		Y			3	5	0	0	0	0	0	8	1	1	1	0	0	0	0	0	red deer metatarsal	
232	700	0	pit	0.05			Y							0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0		
211	707	0	external	0.25	Y					Y				2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
472	1017	0	dump. external	5.95	Y				Y	Y				45	35	0	0	0	0	0	30	7	15	4	30	0	0	0	10	sheep/goathorn corechopped	
471	1034	0	ditch	4.65	Y	Y			Y	Y	Y	Y		55	45	0	0	6	0	0	40	5	2	2	40	1	0	0	0	crane radius/horsevertebraepath/fallow deerscapumerusmetapodial	
471	1034	44	ditch	0.15	Y				Y	Y				3	10	0	2	0	50	0	2	1	0	0	0	0	0	0	0	eel/plaicefil/dove/rabbit	
470	1035	0	ditch	0.35	Y						Y			3	0	0	0	1	0	0	1	1	0	0	2	0	0	0	0		
470	1035	45	ditch	0.001										0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	juvenile	
469	1036	0	ditch	0.25	Y									5	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0		
469	1036	47	ditch	0.1	Y	Y				Y				1	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
464	1037	0	marsh	0.005		Y								0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
461	1045	0	marsh	0.4	Y									6	0	0	0	0	0	0	2	0	1	0	2	0	0	0	0		
469	1052	0	ditch	0.35	Y									2	0	0	0	0	0	0	2	0	1	1	2	0	0	0	0		
460	1057	0	pit	0.55	Y	Y								10	1	0	0	0	0	0	1	0	0	0	5	0	0	0	0		
468	1060	0	dump. external	0.1	Y									1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
637	1066	0	dump. external	2.8	Y	Y	Y			Y		Y		15	13	0	0	1	0	0	15	2	3	2	15	0	0	0	0		
637	1066	58	dump. external	0.375	Y	Y			Y	Y		Y		4	40	30	0	35	150	0	25	0	3	2	0	0	0	0	0	cod/gurnard/chicken/rabbit	
635	1068	0	dump. external	2.95	Y		Y			Y	Y			7	7	0	0	0	0	0	10	2	1	1	5	0	0	0	0		
635	1068	59	dump. external	0.075	Y					Y				0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
634	1070	0	ditch	0.05	Y	Y								1	1	1	0	0	0	0	2	0	1	1	0	0	0	0	0	cat	
633	1071	0	ditch	0.15	Y									1	0	0	0	0	0	0	2	0	1	1	0	0	0	0	0		
633	1071	61	ditch	0.01										3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
632	1072	0	external	0.02	Y									2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
632	1072	62	external	0.005						Y				0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0		
10091	1133	0	fill	0.075	Y									1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	cattlemetatarsalsawn	
5730	1149	0	make-up	2.2	Y		Y			Y				15	15	0	0	0	0	0	15	1	5	2	10	0	0	0	3	cattlemetapodialsawn/horn core chopped	
5731	1150	69	make-up	0.35	Y	Y			Y	Y		Y		25	25	5	0	3	50	0	5	0	0	10	0	0	0	0	0	eel/conger/mackerel/dove/rabbit	
###	1154	0	ditch	0.5	Y					Y				8	1	0	0	0	0	0	4	0	2	0	1	0	0	0	8	cattlemetapodialsawn/sheep/goathorncorecut	
5736	1156	0	make-up	0.85	Y	Y								6	0	0	0	0	0	0	4	1	2	1	1	0	0	0	3	cattle metatarsal	
5743	1169	0	external	0.1	Y									4	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0		
5743	1169	70	external	0.31	Y				Y	Y		Y		30	10	1	20	25	75	0	15	0	0	0	0	0	0	0	0	roker/mackerel/chicken/dove/rabbit	
5748	1177	71	external	0.001										0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	cat juvenile	
5753	1186	0	dump. external	0.8	Y	Y			Y	Y				10	4	0	0	0	0	0	4	1	1	1	0	0	0	0	0	fallow deer metacarpal	

SGP	CONTEXT	SAMPLE	FEATURE	Wt (kg)	cattle	pig	dog	human	game	sheep/goat	horse	poultry	foetal/neonate	lmam	mmamm	smam	vsmam	bird	fish	amphibian	epiphyses	mandible	measurable	complete	butchery	pathology	burnt	gnawed	worked	COMMENTS	
5754	1187	78	external	0.025	Y				Y					2	0	0	0	1	1	0	5	0	0	0	0	0	0	0			
5756	1189	0	external	0.25	Y					Y		Y		5	5	0	0	1	0	0	5	0	1	1	2	0	0	0			
5758	1191	0	external	0.1					Y					0	1	0	0	0	0	0	2	0	1	1	0	0	0	0		fallow deer metatarsal	
5759	1192	0	dump_external	0.075	Y									1	0	0	0	0	0	0	0	0	0	1	0	0	0	0			
503	1284	0	marsh	0.05	Y									1	0	0	0	0	0	0	0	0	0	1	0	0	0	0			
502	1291	0	marsh	1.925	Y									7	0	0	0	0	0	0	4	0	0	1	3	0	0	0			
639	1343	0	ditch	4.6	Y				Y	Y				28	21	0	0	2	0	0	4	16	0	1	25	0	0	0	11	cranemetatarsal/swanulna/sheep/goathorncorechopped	
639	1343	80	ditch	0.11		Y			Y	Y		Y		30	0	1	0	5	75	0	2	0	1	1	0	0	0	0	0	rabbit	
653	1345	0	external	0.1	Y									2	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0		
640	1347	0	ditch	0.9	Y					Y		Y		5	5	0	0	3	0	0	8	3	0	0	5	0	0	0	1	sheep/goat horn core sawn	
645	1366	0	pit_quarry	0.2							Y			4	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0		
648	1369	0	pit_quarry	0.85	Y	Y								8	2	0	0	0	0	0	5	1	1	0	1	0	0	0	0		
648	1369	82	pit_quarry	0.08	Y				Y	Y		Y		2	15	5	0	10	15	0	10	0	1	1	0	0	0	0	0	0	cod/rabbit
650	1373	81	pit_quarry	0.3	Y									15	0	0	0	0	0	50	8	0	0	0	0	0	0	0	0		
271	1384	0	marsh	1.3	Y					Y				7	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
259	1391	0	alluvium	2.2			Y			Y	Y	Y		22	6	0	0	2	0	0	18	2	0	1	0	0	0	0	0	chicken	
261	1392	0	ditch	0.05	Y									2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
247	1430	90	alluvium	0.002										0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0		
5930	1437	0	alluvium	1.7							Y			8	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0		
5933	1440	0	alluvium	1.45	Y						Y			4	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0		
246	1443	0	alluvium	0.3	Y									1	0	0	0	0	0	0	2	0	1	1	1	0	0	0	0		
5941	1448	0	alluvium	2	Y						Y			16	0	0	0	0	0	0	11	0	4	5	5	0	0	0	0		
566	1503	0	make-up	0.005	Y									2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	tooth	
5014	1521	0	make-up	0.25	Y					Y		Y		2	4	0	0	1	0	0	2	2	0	0	0	0	0	0	0	chicken	
443	2042	0	ditch	0.2	Y					Y				2	1	0	0	0	0	0	0	1	1	0	2	0	0	0	0		
451	2045	0	ditch	0.55	Y						Y			9	0	0	0	0	0	0	3	0	1	0	3	0	0	0	0	vivianite	
441	2053	0	ditch	0.5	Y	Y				Y				5	5	0	0	0	0	0	5	0	0	0	7	0	0	0	0		
445	2061	0	ditch	0.2	Y									1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10074	3704	0	pit_cess	1.1	Y	Y			Y	Y				16	30	1	0	0	1	0	18	1	2	1	14	0	0	0	1	lagomorph?red deer antler worked	
10074	3704	301	pit_cess	0.1		Y				Y		Y		2	28	1	0	6	5	0	2	0	0	0	2	0	0	0	0	chicken	
10073	3849	0	pit_cess	0.25	Y			Y						3	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0		
10073	3849	304	pit_cess	0.05	Y									1	10	2	0	0	0	0	3	0	0	0	2	0	1	0	0	crustacean	
10071	3864	363	pit	0.15				Y						4	5	0	0	0	0	0	2	0	0	0	0	0	0	0	0		
6843	3908	0	pit	0.4						Y	Y			2	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0		
6922	4045	0	pit	0.5		Y				Y				0	47	0	0	0	0	0	0	0	47	47	0	0	0	0	0		
7322	4702	0	pit_rubbish	4.6	Y	Y				Y	Y			19	5	0	0	0	0	0	19	1	10	8	5	1	0	0	0		
7454	4915	0	pit	9.4	Y						Y			35	2	0	0	0	0	0	30	1	12	8	3	1	0	1	3	canine gnawing/horse scapulaextra bone growth	
142	6341	0	fill	0.15	Y					Y		Y		5	5	0	0	2	0	0	2	0	1	1	4	0	0	0	0	chicken	
142	6341	318	fill	0.55	Y	Y				Y		Y		10	30	3	1	0	2	0	5	0	0	0	10	0	0	0	1	roker/cod/chicken/rabbit/rat/sheephomcorechopped	
144	6382	0	tree hole	0.15						Y				0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0		
143	6388	0	tree hole	0.15						Y				1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0		
145	6390	0	tree hole	0.4	Y									2	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0		
133	6392	0	fill	0.5	Y					Y		Y		5	9	0	0	3	0	0	8	0	1	0	4	0	0	0	1	goose	
157	6397	0	ditch	0.4	Y					Y				0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0		
157	6397	319	ditch	0.05	Y									2	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0		
138	6405	0	fill	0.1						Y				0	3	0	0	0	0	0	1	0	0	0	2	0	0	0	0		
140	6463	0	pit_rubbish	1.5	Y				Y	Y		Y		17	23	1	0	2	0	0	13	2	3	1	12	0	0	0	0	goose/rabbit	
193	6470	0	pit	1	Y	Y				Y				3	6	0	0	0	0	0	1	3	0	0	4	0	0	0	0		
160	6505	0	ditch	5.95	Y				Y	Y				45	81	1	0	0	0	0	11	41	2	2	25	0	0	0	0	mandibles mainly sheep/goat/rabbit	
160	6506	0	ditch	1.35	Y					Y				20	100	0	0	0	1	0	10	4	0	0	15	0	0	0	2	cod/sheep/goathorncorechopped	
152	6535	0	ditch	0.25						Y	Y			1	2	0	0	0	0	0	2	0	1	1	2	0	0	0	0		
150	6536	0	ditch	0.5	Y					Y				3	4	0	0	0	0	0	0	0	0	0	5	0	0	0	2		
152	6541	0	ditch	1.25	Y				Y	Y				3	4	0	0	1	0	0	2	0	8	1	2	0	0	0	5	mute swan	
149	6544	0	ditch	2.1	Y					Y	Y			8	9	0	0	0	0	0	5	3	4	0	12	0	1	0	3		
149	6544	320	ditch	0.005		Y								0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
127	6548	0	pit	0.4	Y					Y				4	2	0	0	0	0	0	0	0	2	0	2	0	0	0	0		
126	6549	431	pit	0.02	Y									1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0		

SGP	CONTEXT	SAMPLE	FEATURE	Wt (kg)	cattle	pig	dog	human	game	sheep/goat	horse	poultry	foetal/neonate	lmam	mmamm	smam	vsmam	bird	fish	amphibian	epiphyses	mandible	measurable	complete	butchery	pathology	burnt	gnawed	worked	COMMENTS	
185	6553	0	pit	2.6	Y	Y	Y		Y	Y	Y			39	7	0	0	0	0	0	17	2	4	1	4	1	0	0	1	red deer/vivianite/dogmandible tooth loss	
185	6553	430	pit	0.005										1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
113	6555	0	pit	1.25	Y					Y	Y			19	5	0	0	0	0	0	7	0	3	1	4	0	0	0	0		
125	6556	0	pit	0.005	Y									1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
125	6556	433	pit	0.005		Y								0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
124	6559	0	pit	1.5							Y			12	1	0	0	0	0	0	5	0	3	1	4	0	0	0	0		
123	6564	0	pit	0.005										1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
122	6565	0	pit	0.5	Y						Y			5	2	0	0	0	0	0	4	0	2	1	0	0	0	0	0		
118	6574	0	pit	0.5	Y									2	0	0	0	0	0	0	2	0	1	0	2	0	0	1	0	canine gnawing	
168	6579	0	ditch	1.15	Y	Y				Y	Y	Y	Y	17	8	0	0	1	0	0	6	0	4	2	4	0	0	1	0	chicken	
167	6580	0	ditch	0.5	Y			Y		Y	Y			7	1	0	0	0	0	0	1	0	0	0	3	0	0	0	0		
109	6586	0	pit	1.3	Y					Y	Y		Y	17	8	0	0	1	0	0	6	0	1	0	4	0	0	1	0	canine gnawing	
109	6586	334	pit	0.02		Y						Y		0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	chicken	
187	6587	0	ditch	0.8	Y	Y	Y			Y				11	9	1	0	2	0	0	7	1	1	1	4	0	0	1	0	very small dog/canine gnawing	
172	6637	0	ditch	7.45	Y	Y			Y	Y		Y	Y	61	120	3	0	11	0	0	49	10	27	5	54	0	20	0	10	chicken/goose/rabbit/red deer	
172	6638	0	ditch	8.85	Y	Y	Y		Y	Y		Y	Y	110	97	5	0	2	4	0	74	8	19	9	68	1	9	2	0	gadid/chicken/goose/canine gnawing/rabbit/cat/red deer	
172	6638	355	ditch	0.6										12	12	5	0	0	2	0	8	0	4	4	5	0	1	0	0	cod/cat/rabbit	
172	6639	0	ditch	22.65	Y	Y	Y		Y	Y	Y	Y	Y	343	518	58	0	54	66	0	349	11	58	35	309	2	2	15	1	cod/plf/goose/rabbit/chicken/cat/hare/pigeon/fallowdeer/dgrdgn	
172	6639	337	ditch	0.35	Y					Y		Y		15	10	2	0	2	2	0	8	0	0	0	10	0	0	0	0	cod/goose/rabbit	
172	6639	349	ditch	1.2	Y				Y	Y		Y		15	100	5	0	5	6	0	40	0	2	2	0	0	0	0	0	edible crab/cod/chicken/rabbit	
169	6640	0	ditch	2.2	Y		Y			Y				6	3	6	0	0	0	0	8	0	2	0	1	0	0	0	0	cat	
169	6640	420	ditch	0.1	Y					Y				2	6	0	0	0	1	0	2	0	0	0	5	0	0	0	0	codcleithrum	
416	8236	0	ditch	35.5	Y	Y	Y	Y		Y			Y	215	188	0	0	0	0	0	84	96	11	8	100	0	0	0	69	sheephcotr/calfn	
413	8248	0	ditch	0.725	Y	Y	Y							4	3	0	0	0	0	0	7	0	2	0	0	0	0	0	0	0	
549	8250	0	ditch	6.2	Y	Y		Y		Y	Y	Y	Y	65	45	1	0	5	0	0	55	6	5	5	25	0	0	0	0	chicken/goose/cal/scapula	
405	8254	0	pit, rubbish	5.3	Y	Y				Y				32	28	0	0	0	0	0	46	4	2	1	25	0	0	0	2	sheep/goat horn corechopped	
404	8257	0	dump. external	0.45	Y		Y			Y		Y		7	0	0	0	1	0	0	8	1	1	1	5	0	0	0	0	chicken	
414	8264	408	pit	0.02					Y	Y		Y		0	5	0	0	400	0	0	0	0	100	100	0	0	0	0	0	chicken/goose/smallbirds++inc?quail	
402	8271	0	tree hole	0.7										8	10	0	0	0	0	0	5	0	1	0	10	0	0	0	2	sheephorncorechopped	
403	8274	0	ditch	1.2	Y					Y				10	15	1	0	0	0	0	11	0	2	1	10	0	0	0	5	sheep/goathorncorechopped/cat	
550	8279	0	pit, rubbish	2.8	Y	Y			Y	Y			Y	30	22	0	0	0	0	0	25	3	6	2	30	0	0	0	2	calfmandible/fallowdeermetatarsal3/sheephorncorechopped	
550	8280	0	pit, rubbish	8.75	Y				Y	Y	Y			59	27	0	0	0	1	0	20	12	6	1	32	0	0	0	4	fallowmetatarsal2/lambmandible/sheepgoathorncore2chopped	
412	8285	0	pit, rubbish	2	Y	Y				Y	Y			38	22	2	0	0	1	0	30	4	3	3	25	0	0	0	2	codcleithrum/catsheephorncore2chopped/calmandible	
390	8290	0	pit, rubbish	0.2							Y			2	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0		
390	8291	0	pit, rubbish	0.225	Y					Y				5	3	0	0	0	0	0	1	1	0	0	5	0	0	0	0		
390	8292	0	pit, rubbish	0.09	Y									2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0		
391	8293	0	pit	0.65	Y	Y				Y				8	3	0	0	0	0	0	8	1	2	2	0	0	0	0	0		
390	8297	0	pit, rubbish	1.35	Y	Y						Y		5	2	0	0	1	0	0	4	1	3	0	0	0	0	1	6	chicken/cattlehorn corechopped4sawn2/pigitbiacaninegnawed	
391	8299	0	pit	0.65	Y	Y				Y				8	4	0	0	0	0	0	4	2	0	0	5	0	0	0	1	cattle horn core sawn 1	
391	8304	0	pit	0.55	Y									10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0		
390	8305	0	pit, rubbish	1.65	Y					Y				20	2	0	0	0	0	0	3	2	0	0	0	0	0	0	5	cattle horn core sawn4/chopped1	
391	8306	0	pit	0.075	Y									1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0		
390	8307	0	pit, rubbish	0.6										8	1	0	0	0	0	0	3	0	1	0	2	0	0	0	0		
391	8308	0	pit	0.5	Y					Y				10	1	0	0	0	0	0	2	1	0	0	0	0	0	0	2	cattle horn core sawn	
391	8309	0	pit	0.95										10	3	0	0	0	0	0	4	0	3	0	5	0	0	0	3	cattle horn core 3 chopped	
391	8312	0	pit	0.55	Y	Y				Y				6	4	0	0	0	0	0	3	2	0	0	4	0	0	0	0		
390	8314	0	pit, rubbish	0.1	Y		Y							1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
391	8315	0	pit	0.625	Y	Y					Y			5	1	0	0	0	0	0	2	0	1	1	0	0	0	0	0		
385	8316	0	pit, rubbish	0.325	Y									1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
<b>TOTAL</b>				<b>215.5</b>	<b>115</b>	<b>#</b>	<b>16</b>	<b>5</b>	<b>25</b>	<b>90</b>	<b>31</b>	<b>31</b>	<b>7</b>	<b>1995</b>	<b>###</b>	<b>142</b>	<b>23</b>	<b>601</b>	<b>508</b>	<b>62</b>	<b>1397</b>	<b>305</b>	<b>##</b>	<b>##</b>	<b>1105</b>	<b>7</b>	<b>34</b>	<b>#</b>	<b>182</b>		



## The figures



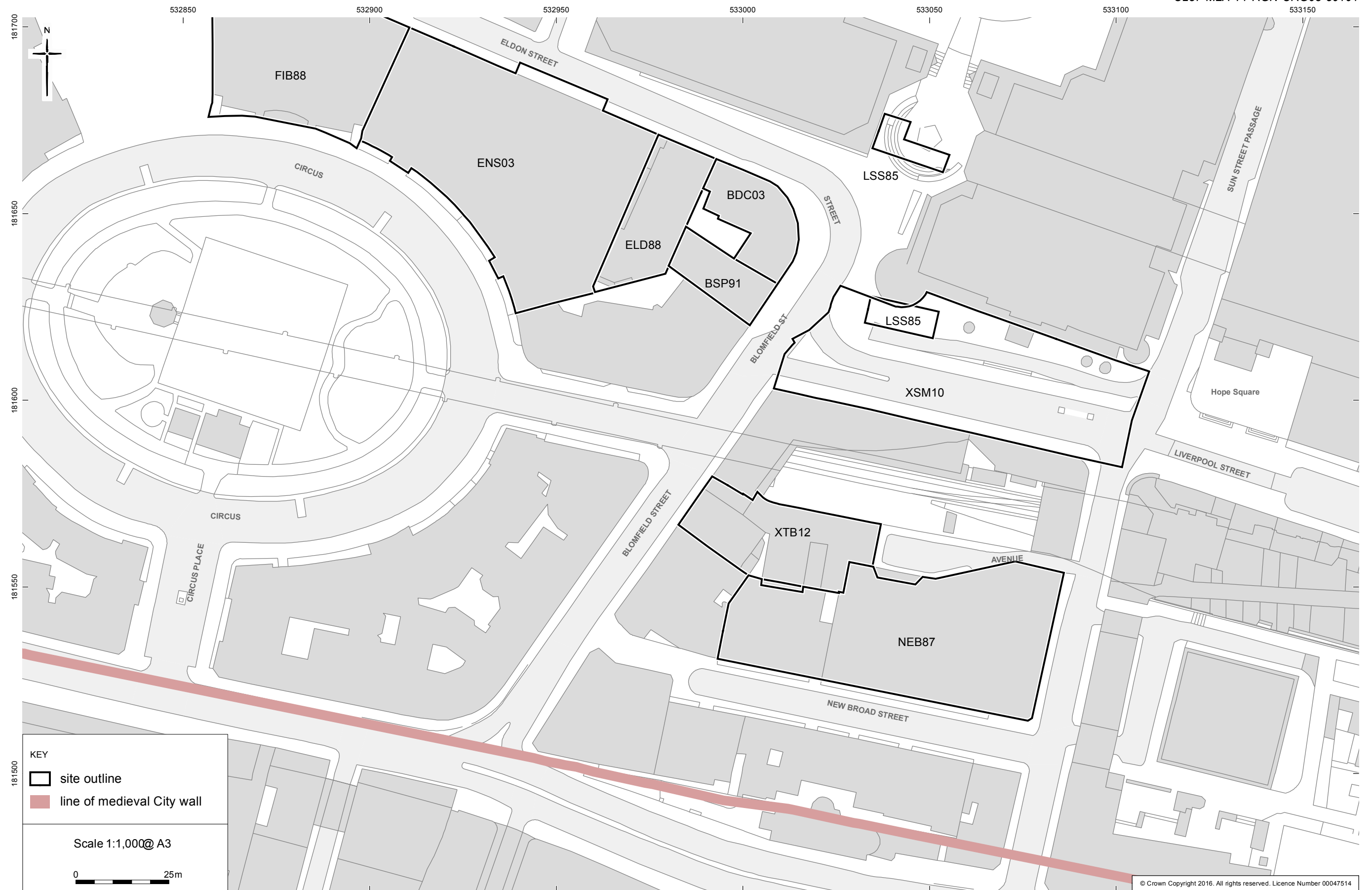


Fig 1 The study area with the modern street plan and other sites referred to in the text

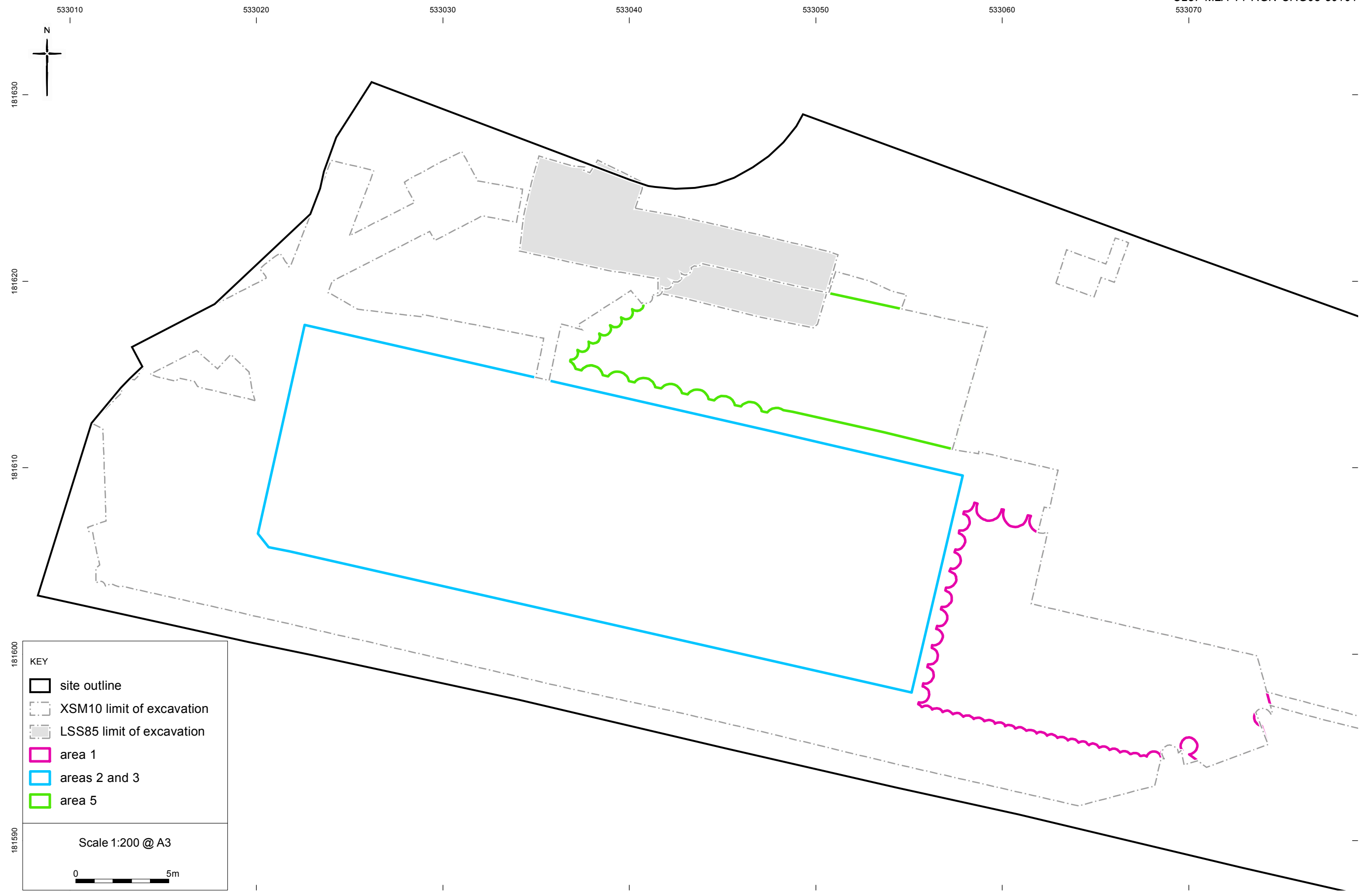


Fig 2 location of main excavation areas within the site

Fig 3 The 'Copperplate Map' of c 1553, with approximate location of the XSM10 and LSS85 sites (not reproduced to a specific scale)

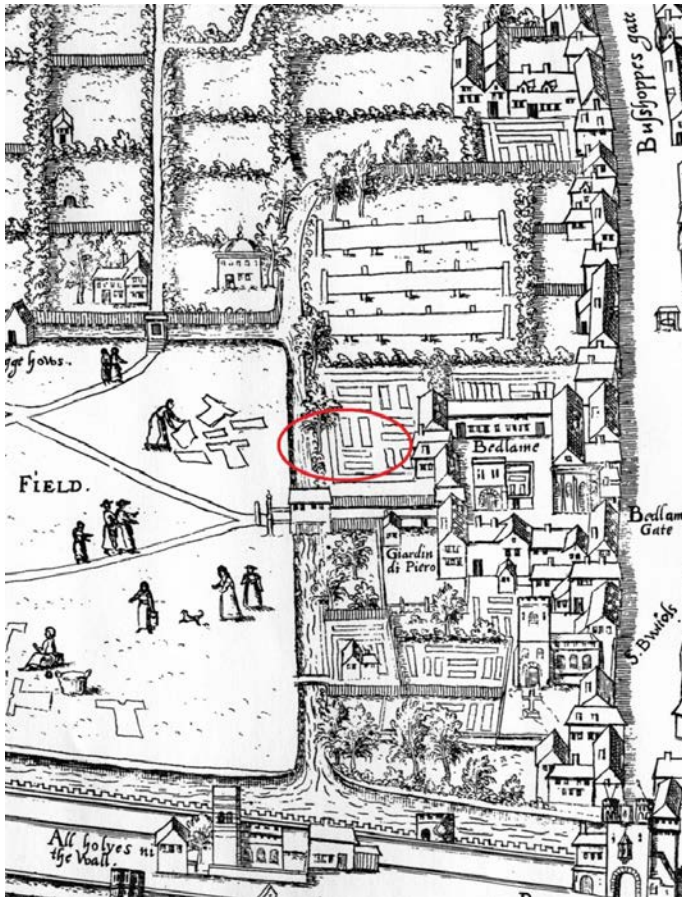


Fig 4 Augustus Ryther's 'Cittie of London', 1633 (not reproduced to a specific scale)

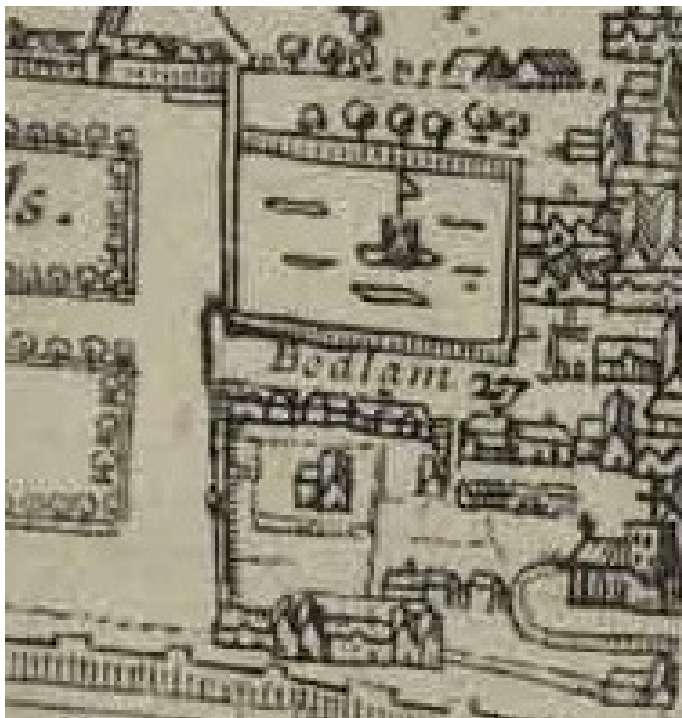


Fig 5 Faithorne and Newcourt's map of 1658 (not reproduced to a specific scale)

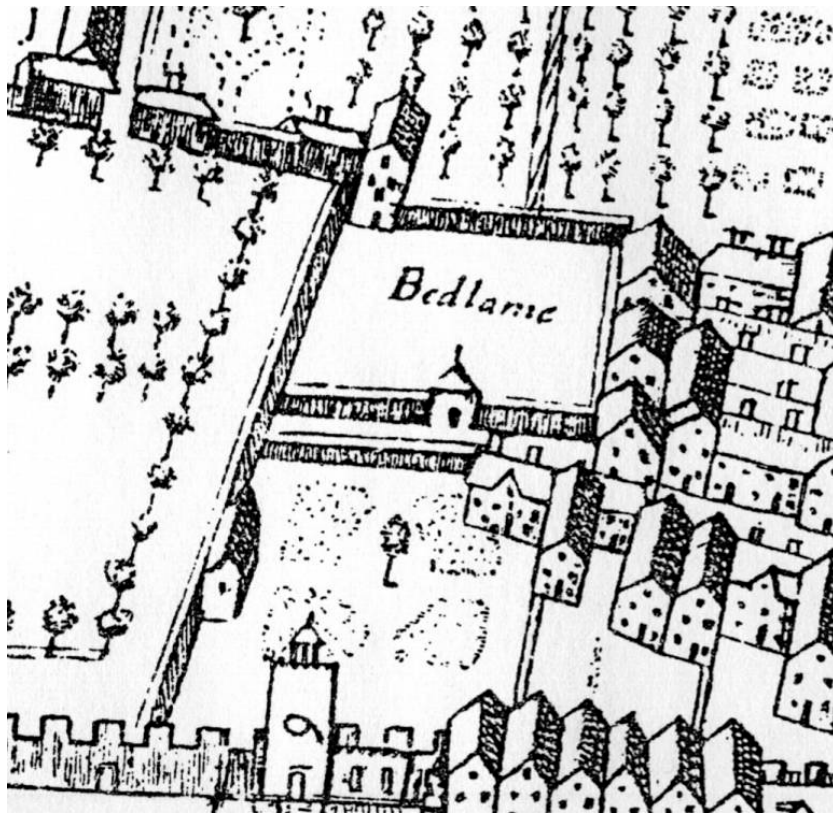


Fig 6 Ogilby and Morgan's map of 1676 (not reproduced to a specific scale)

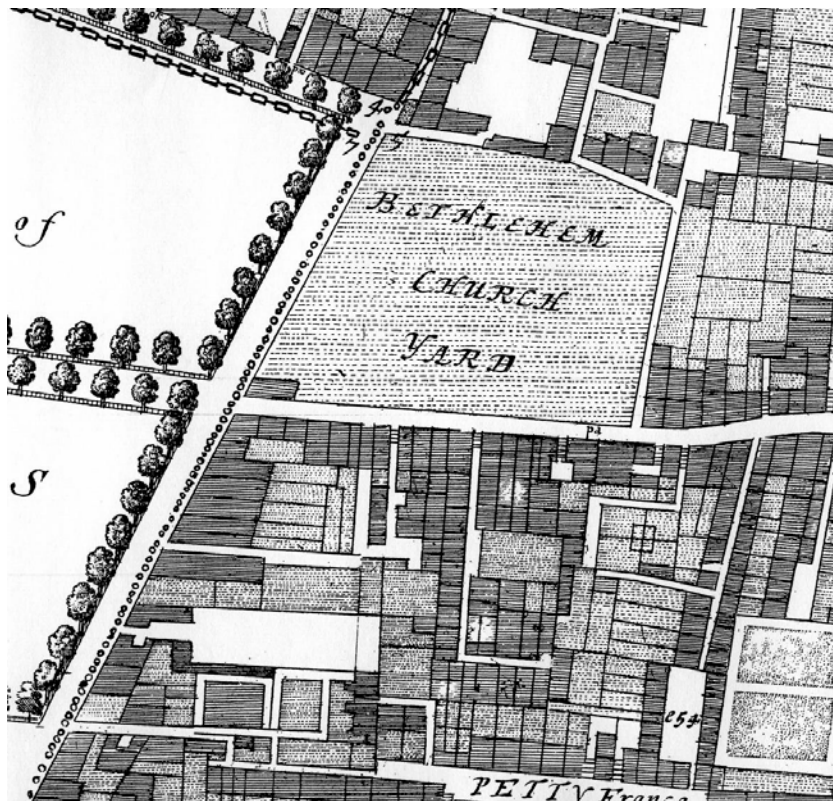


Fig 7 Rocque's map of 1746 (not reproduced to a specific scale)

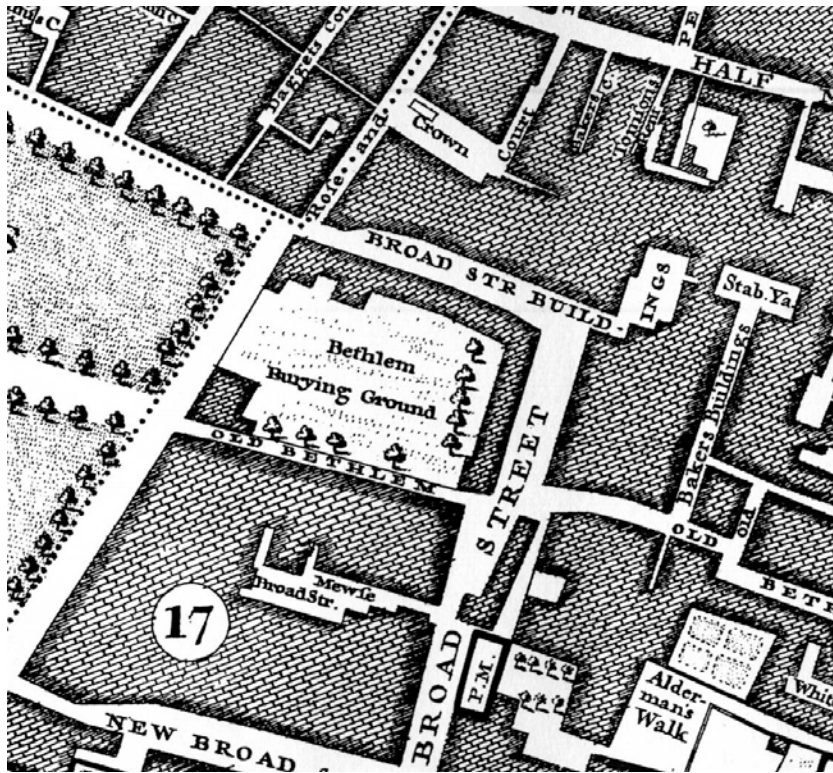


Fig 8 Bethlem Burying Ground: 'A Plan of Old Bethlem Burying Ground', 3rd Sept 1767 (London Metropolitan Archive, COL/CCS/PL/02/142) (not reproduced to a specific scale)



Fig 9 'Plan of the City's Estate in Broad Street Buildings', Old Bethlem, New Broad Street, Spinning Wheel Alley & the Brokers Row, 1793 (LMA, COL/CCS/PL/02/270)



Fig 10 Horwood's map of 1799

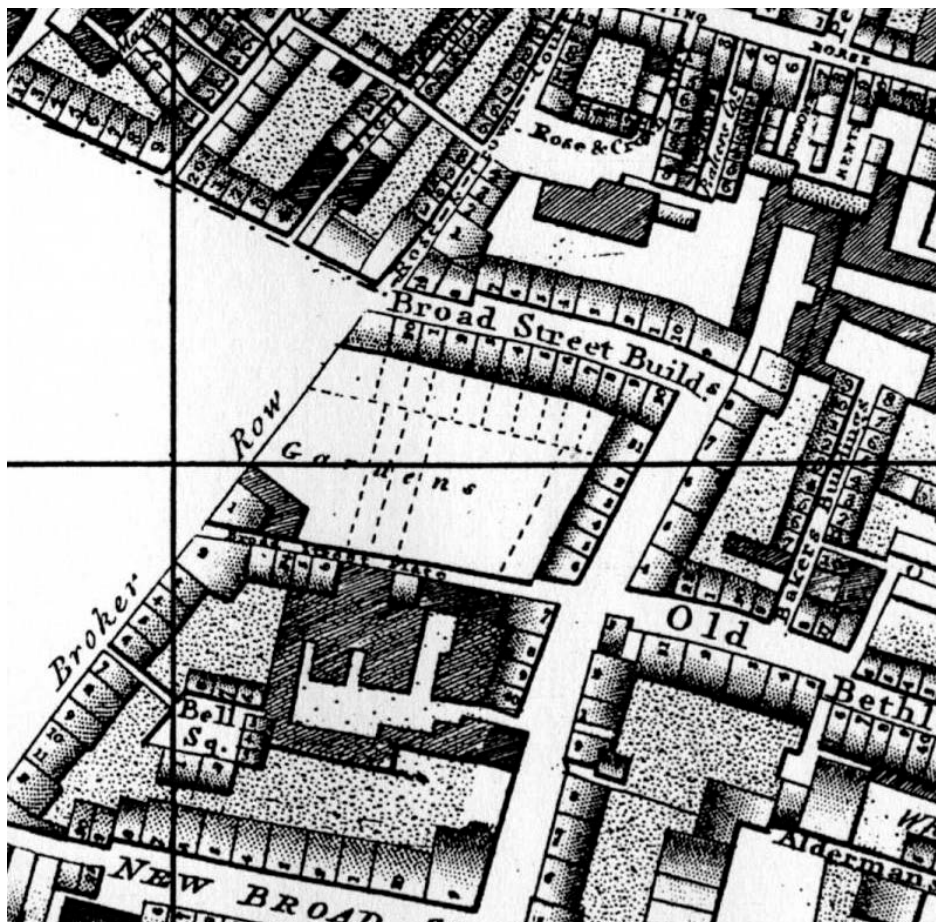


Fig 11 Greenwood's map of 1824



Fig 12 Ordnance Survey map of 1872

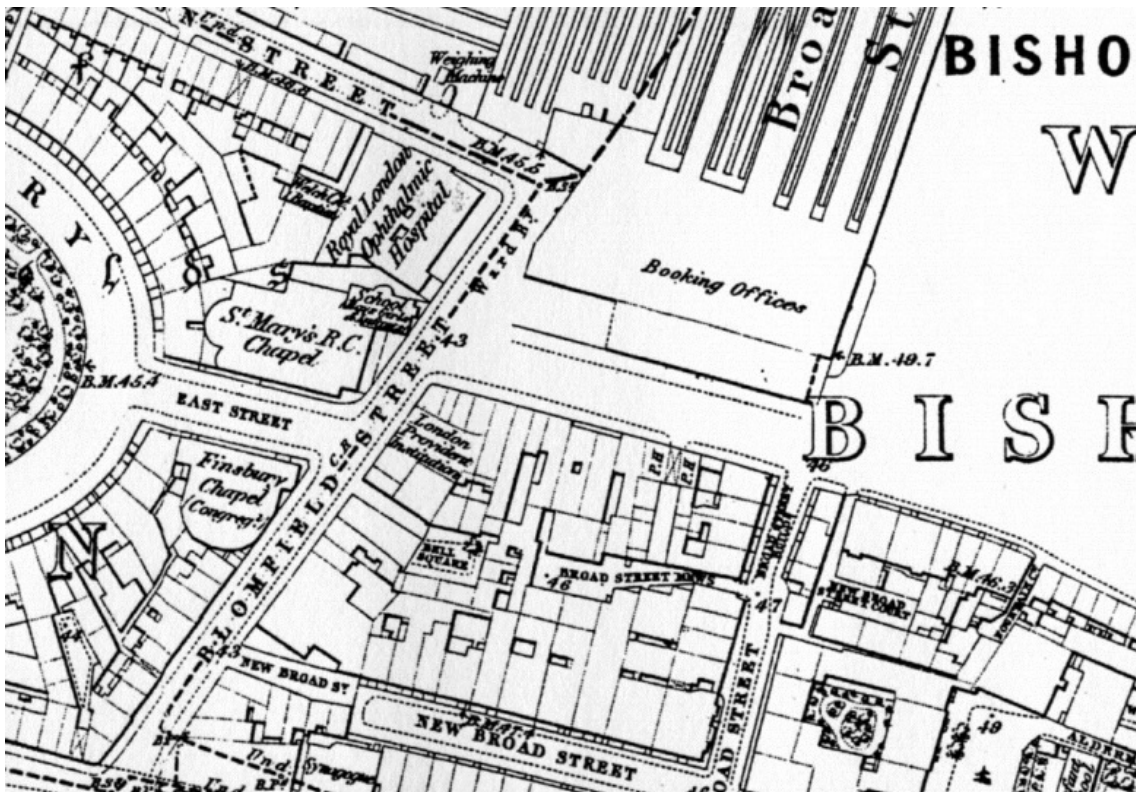








Fig 14 Late medieval/early modern features dated c 1450–1500: plan 1



Fig 15 Late medieval/early modern features dated c. 1450-1500: plan 2

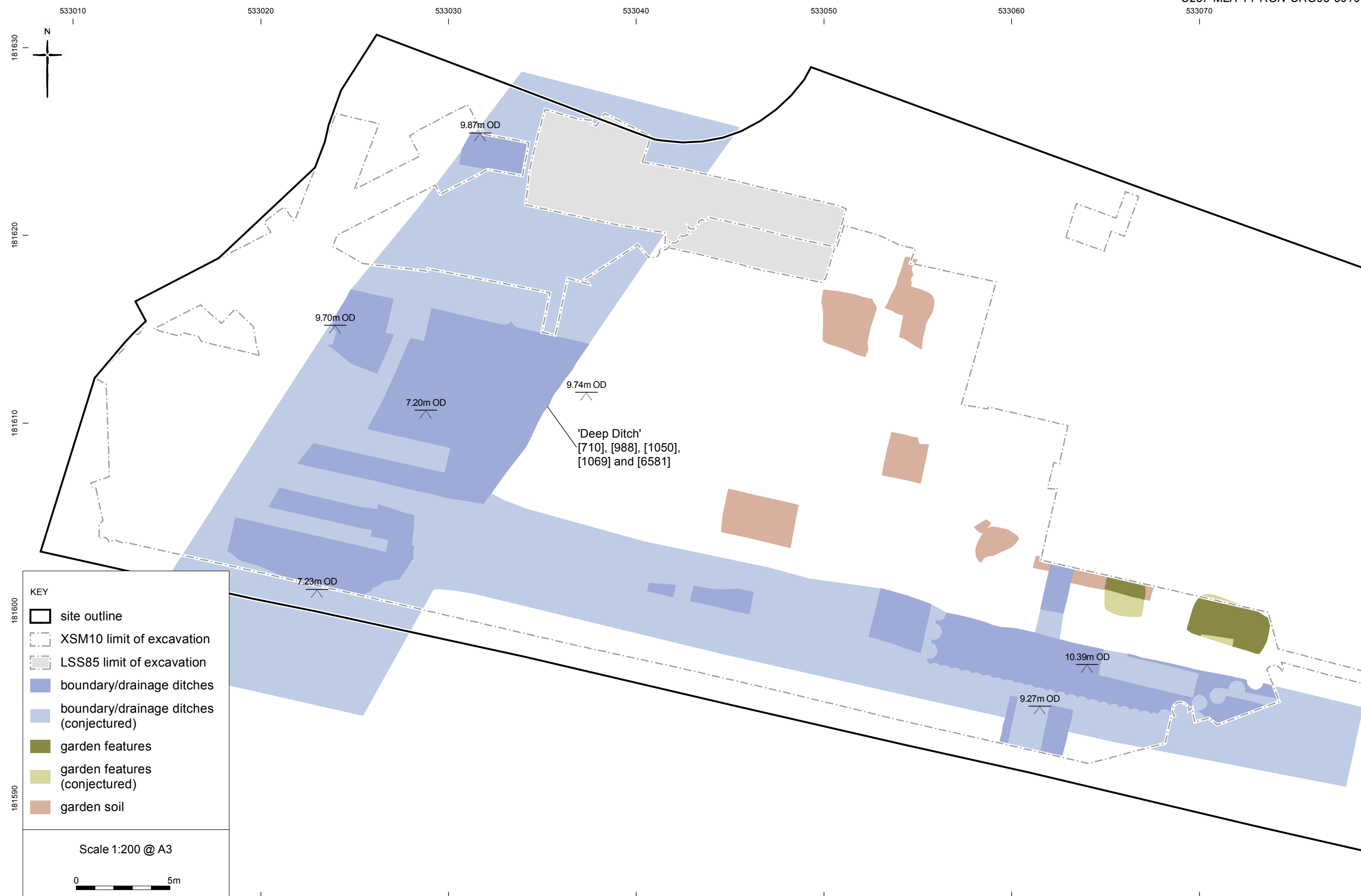


Fig 16 Features dated c 1500–1569

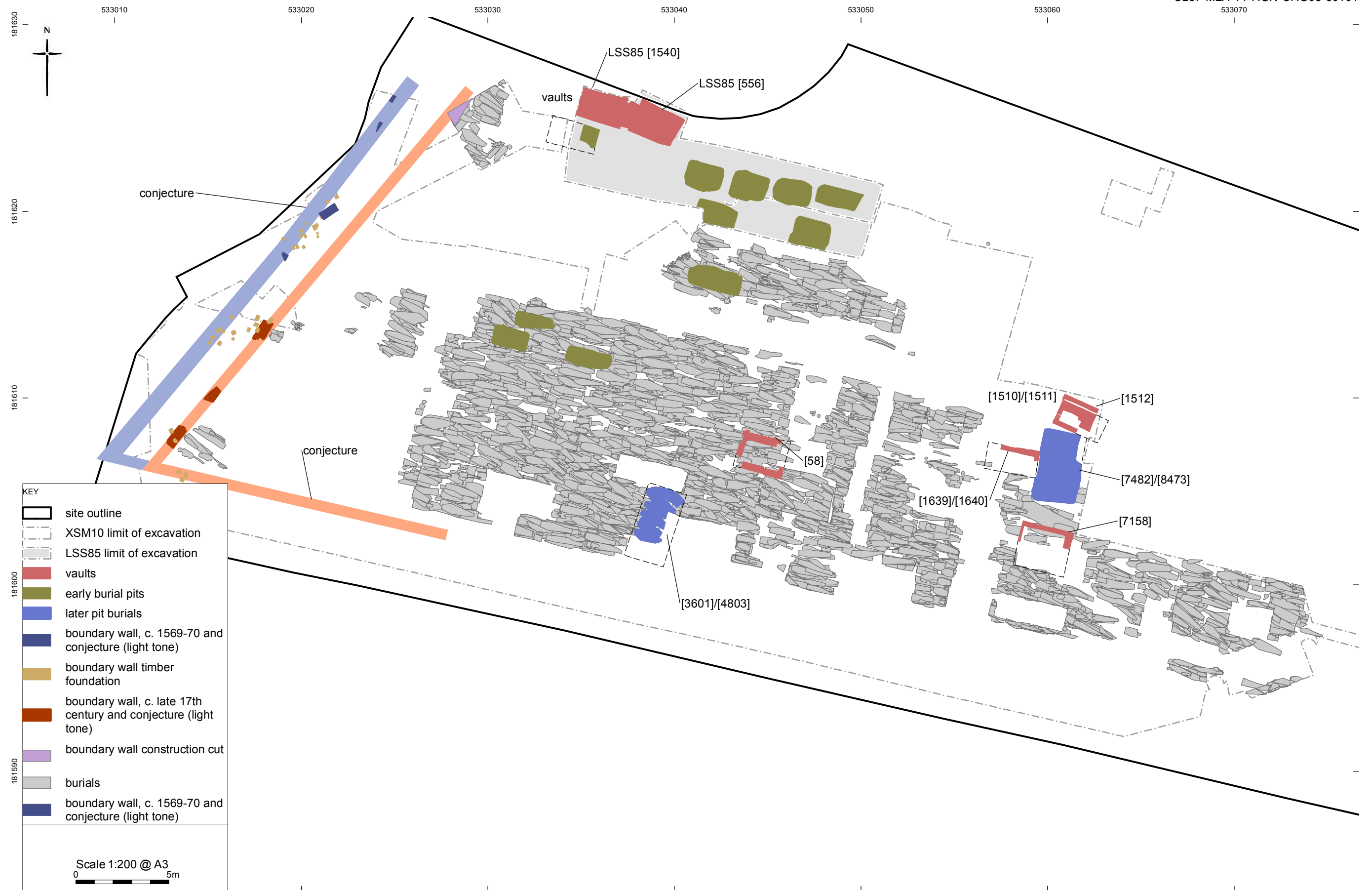


Fig 17 Multi-phase plan of burial ground features and structures

*Fig 18 Reclamation dumps associated with the establishment of the New Churchyard, as truncated by grave cuts, in evaluation XSM10 Trench 7, looking south*



*Fig 19 Wall [1215], part of the second, west boundary wall, looking SW*



*Fig 20 Mass grave [7482], looking west*



*Fig 21 Burial vault ([556], LSS85), looking SW*



*Fig 22 Burial vault [58] (XSM10)(XSM10), looking north*



*Fig 23 Intercut coffined burials in Pit 4, showing large amounts of disarticulated human bone with grave fills, looking north*



Fig 24 Gravestone <522>, found reused in the base of wall [1135] (see Fig 30)



Fig 25 Skeleton [5193] in highly decorated coffin [5194], looking west





Fig 26 Skeleton [5586]/coffin [5587] (west at top in both images)

a) as found



b) with studs highlighted



Fig 27 Stud decoration on coffin LSS85 [677]. This is the only example on which the year of both birth and death remained extant.

(E)P  
(1)(6)(8)8  
1721



*Fig 28 Charnel pit [4203], cut by cess pit [3479], looking south*



*Fig 29 Mid-17th to early 19th-century structures in the SW corner of XSM10 Area 2/3, looking east*



*Fig 30 Mid-18th-century wall [1115], looking NE*





Fig 31 Multi-phase plan of southwest corner building and possible cemetery/garden/yard structures (c. mid 17th century to 18th century)

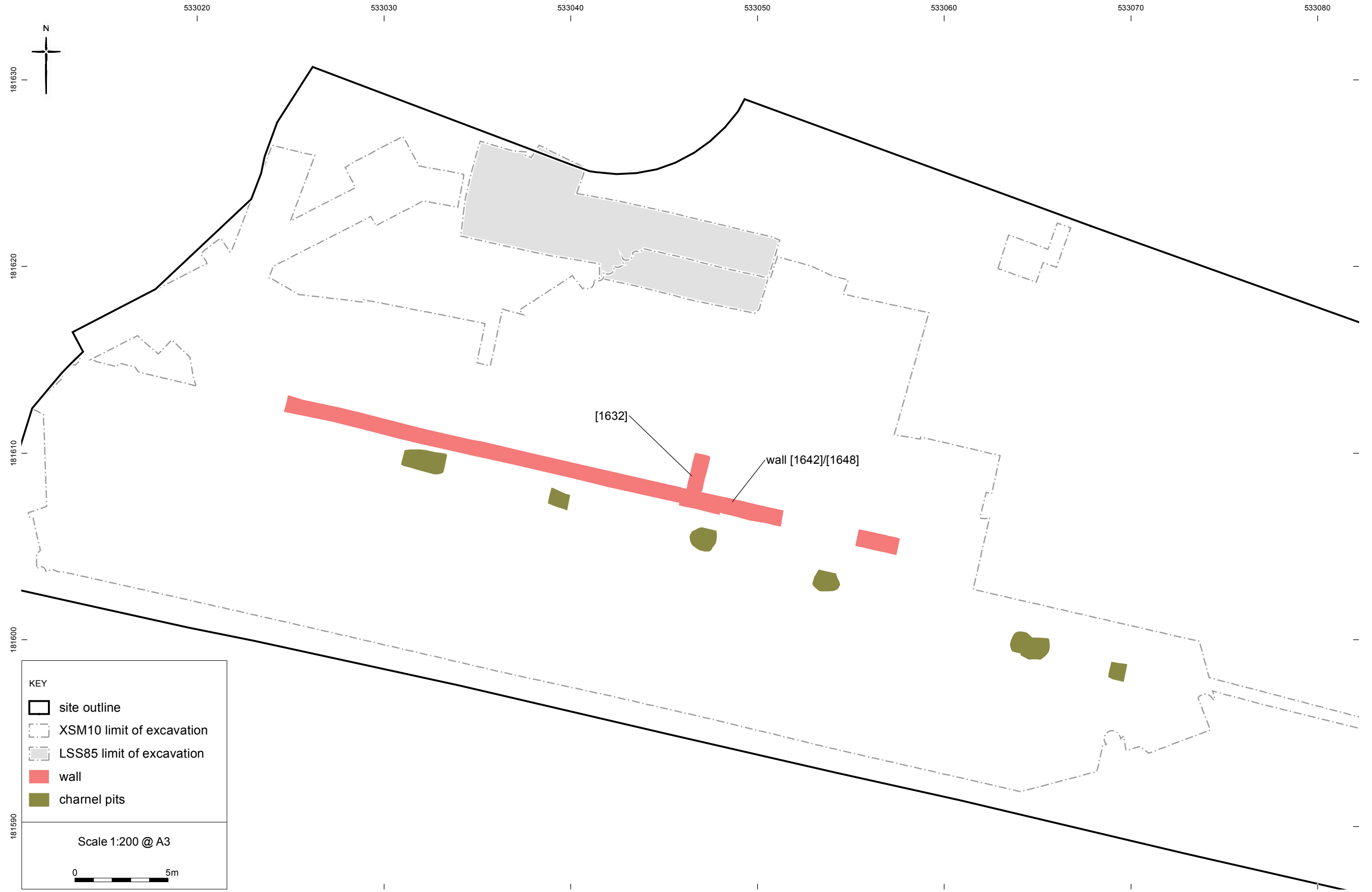


Fig 32 19th-century features (c. 1823–1863)

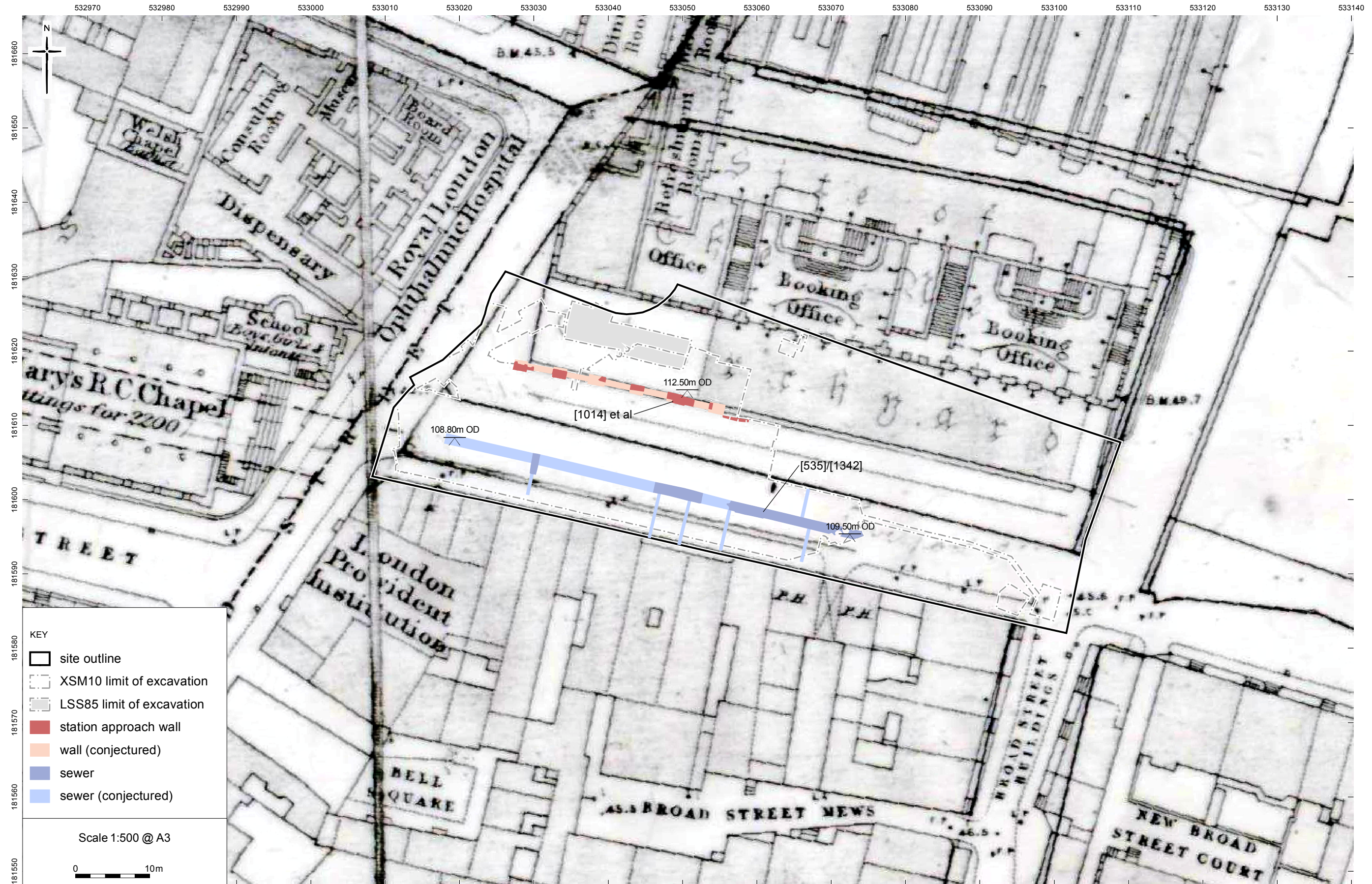


Fig 33 Late 19th-century features



Fig 34 Late 19th-/early 20th-century features

*Fig 35 Delftware plate on burial [5613]/[5614]*



*Fig 36 Pewter plate <2085> on burial [5265]/[5266]*

