

A POSSIBLE EARLY ROMAN SETTLEMENT BOUNDARY AND THE MEDIEVAL CITY DITCH: EXCAVATIONS AT ST BARTHOLOMEW'S HOSPITAL, LONDON EC3

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With contributions by Enid Allison (insect remains), Ian Betts (building materials), Julian Bowsher (coins), Nigel Cameron (diatoms), Anne Davis (plant remains), Michael Henderson (human bone), Michael Marshall (accessioned finds), Jacqui Pearce (post-Roman pottery, glass and clay tobacco pipes), Matt Phelps (iron working and industrial debris), Alan Pipe (animal bone), Rob Scaife (pollen), Amy Thorp (Roman pottery), John Whittaker (ostracods) and Virgil Yendell (geoarchaeology)

SUMMARY

This paper presents the results of archaeological fieldwork carried out between 2005 and 2011 at St Bartholomew's Hospital in the City of London in locations known to partially overlie the extramural defensive ditch(es) to the north of the Roman and medieval city wall. The most significant new finding was an additional and previously unrecorded east-west aligned ditch, clearly a substantial landscape feature, which produced a 1st- to early 2nd-century AD radiocarbon date, although ceramics suggest it was only backfilled c.AD 140–200. The ditch is discussed in terms of current understanding of the early boundaries of Roman London. The later city wall (c.AD 200), its north face c.25.5–33.5m to the south, lay on a slightly different alignment, but the earlier ditch may nonetheless have had some continuing influence on the extramural landscape as it was recut twice, probably in the 3rd century AD.

Two trenches were also excavated through the Saxo-Norman and medieval defensive ditch, which followed the line of the city wall. This feature had re-

moved any trace of a Roman predecessor, though this has been identified at other sites. A complex sequence of fills and recuts was subject to detailed geoarchaeological and environmental investigation and analysis, and can be compared with similar sequences in other parts of the defensive circuit. Although the cutting of the ditch and its initial silting are effectively undated, slightly later fills are dated to the 10th or 11th century by radiocarbon determination and to c.1050–1170 by pottery. Remains of two wattle fences had collapsed into the ditch, while well-preserved finds include a number of bone ice skates, a spearhead and an arrowhead. In this location the latest ditch fills are dated to the 12th century, although this reflects a sequence truncated by later construction. Later medieval consolidation deposits, refuse pits and cesspits illustrate the encroachment on to the ditch of yards and gardens belonging to suburban properties to the south of the hospital of St Bartholomew, a process that continued into the post-medieval period. Buildings were constructed over the infilled ditch in the 17th century.

At the time of writing, archaeological fieldwork is underway on the final phase of the Bart's hospital re-

generation programme. It is anticipated that the results will be available in 2017 or later. Preliminary evaluation at this site in the south-west corner of the hospital suggested that the 'new' east-west aligned Roman ditch may survive here, though the defensive medieval extramural ditch is unlikely to.

INTRODUCTION

This article presents the results of the first two (of three) phases of archaeological excavation by MOLA (Museum of London Archaeology) carried out on the site of St Bartholomew's Hospital, City of London, EC3 to mitigate the impact of a major programme of regeneration affecting the southern and eastern half of the hospital. Due to the scale of the redevelopment, and because of the need to maintain a live hospital site throughout, there is a very extended programme of works (c.10–15 years). The excavations reported here took place between 2005 and 2011; demolition in Phase III is expected to start in late 2014, with all archaeological fieldwork completed by 2015 and final reporting by c.2017.

The hospital is bounded by the Merrill Lynch Financial Centre to the south, Giltspur Street to the west, Little Britain to the east and West Smithfield to the north. The Ordnance Survey National Grid Reference for the centre of the development area is 531970 151510. The redevelopment area lies along the southern and eastern boundaries of the hospital site, on land previously occupied by a variety of hospital buildings and access routes (Fig 1).

The hospital site lies immediately outside London's Roman and medieval defences, between Newgate and Aldersgate. No recent archaeological synthesis is available, although Maloney (1983) remains a useful introduction for the Roman period. The city wall is located c.16m to the south of the hospital property, with the extramural defensive ditch passing through the southern edge of the site. Roman burials, part of the so called 'western cemetery' (RCHM(E) 1928, 161–3; Hall 1996, 58–64), are recorded to the north and west, some within the hospital boundary. These include the 20 3rd- to 4th-century AD inhumations from the site of the former St Bartholomew's Hospital Medical School (BAR79; henceforth referred to as

the Medical School site; Bentley & Pritchard 1982), and further inhumations, probably Roman, were exposed during evaluation work (SBQ14) associated with the third phase of the hospital redevelopment (Pfizenmaier 2014; S Pfizenmaier, pers comm).

In the medieval period, most of the hospital site lay within the precinct of the Augustinian Priory and Hospital of St Bartholomew, which was founded in 1123 (Reddan 1909, 520–5; Moore 1918; Power & Waring 1923, 5–7), apart from a c.30m-wide strip along the southern boundary, including the city ditch, which lay within the parish of St Botolph's-without-Aldersgate (Lobel 1989, London c.1520 map 2). The southern part of the precinct was mostly given over to horticultural and cemetery use (*ibid*). Around the edges of the precinct, suburban development began to spread towards the site in the late medieval period, along Vitrie Lane from the west and Britten Street in the east (Carlin & Belcher 1989, 67, 97).

The hospital, as distinct from the priory, was refounded as St Bartholomew's Hospital following the Dissolution and passed to the mayor, commonality and citizens of London (Reddan 1909; Power & Waring 1923, 80). The wider historical and archaeological context is considered in more detail in the discussion sections of this report (below).

The archaeological works reported here consisted of several separate interventions over more than six years, between February 2005 and July 2011. The first phase of work was carried out under the site code BPP05 ('site A' in this report) and the second phase was carried out under the site code BOJ10 ('site B' in this report) (Figs 2 and 3). Assessment and evaluation indicated that archaeological survival was generally severely compromised by modern foundations and basements, with little or no surviving horizontal stratigraphy, and so large parts of both sites A and B were monitored under an archaeological watching brief. Within each site, however, an area of controlled excavation was targeted on the projected alignment of the defensive city ditch. Ditch fills were fully excavated and subject to detailed geoarchaeological investigation. Both excavation trenches included an area

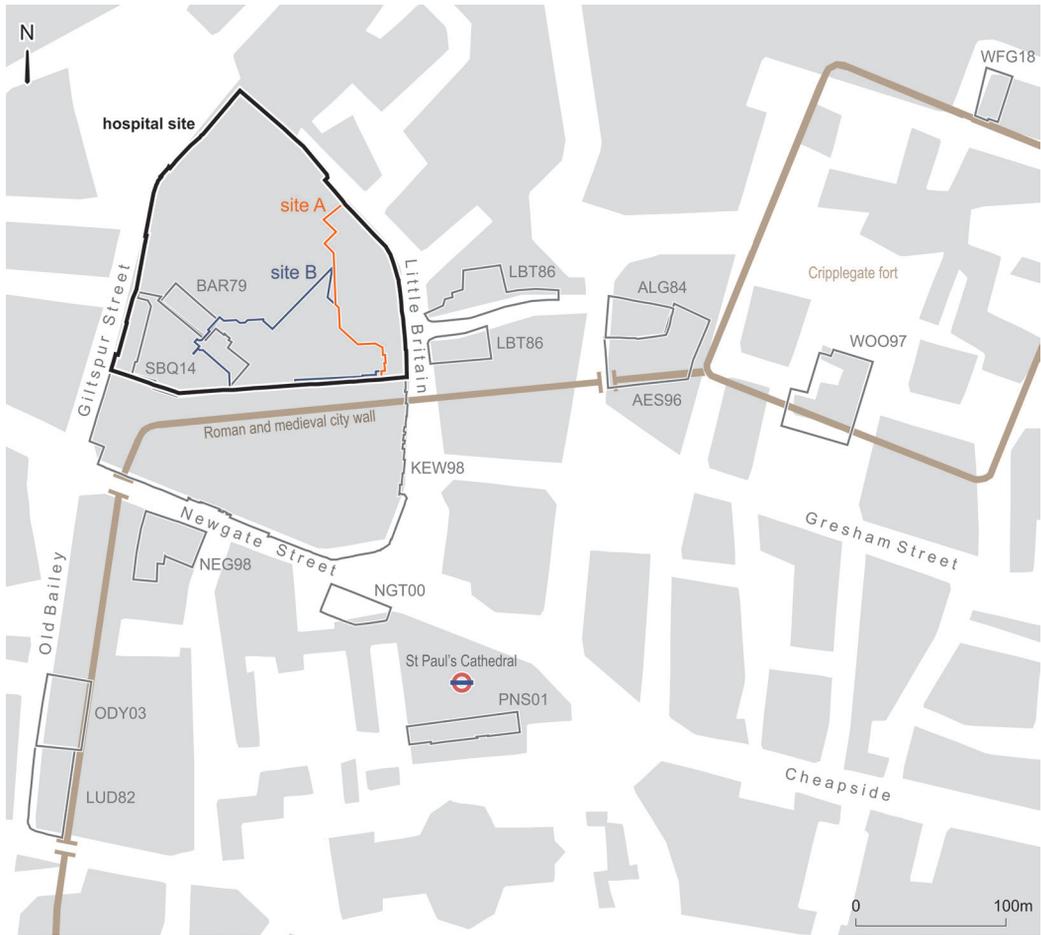


Fig 1. The hospital site in relation to the modern street plan and the Roman and medieval city wall, and sites referred to in the text (scale 1:5000)

to the north of the projected line of the city ditch in order to investigate any surviving evidence for land use beyond the defences.

This article presents the results of the investigations as a chronological narrative, supplemented by discussions of the more significant aspects. The archaeological sequence is organised by period and land use, beginning with the earliest material. Key findings of specialist analyses have been integrated into the narrative, but in most cases it has not been possible to include the full reports here; these are available in the project archive (Allison 2013; Betts 2012; Cameron 2013; Davis 2013; Henderson 2013; Marshall 2012; Pearce 2012; Phelps 2012;

Pipe 2012; Scaife 2012a; 2012b; Whittaker 2012; Yendell 2013a; 2013b) stored at the Museum of London Archaeological Archive (formerly LAARC) at Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED under the site codes BPP05 and BOJ10. This article employs standard Museum of London codes for ceramics and building materials. Detailed descriptions of the building material fabrics and complete lists of the pottery codes used in this report, their expansions and date ranges, are available online.¹ The expansions for pottery codes are given at the first mention in each section. The clay tobacco pipes were classified according to Atkinson and Oswald's (1969)

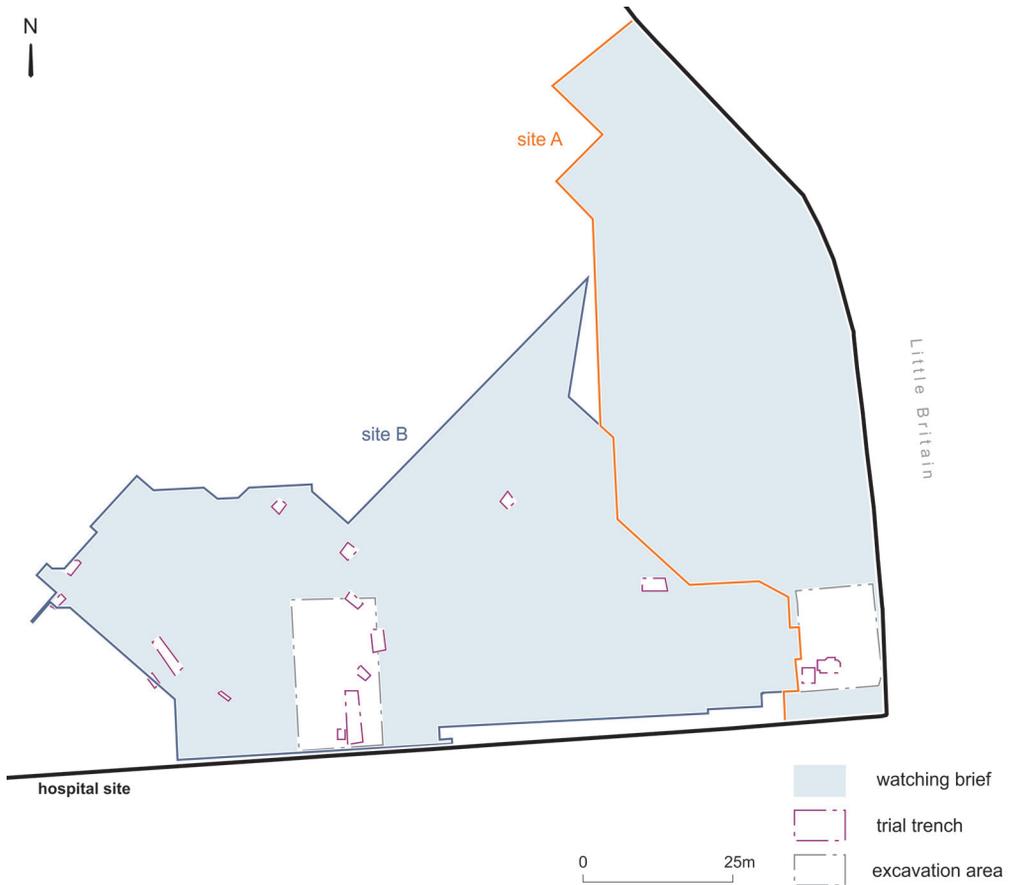


Fig 2. Location of archaeological interventions at St Bartholomew's Hospital, 2005–11 (scale 1:1250)

classification (AO). Contexts are numbered in square brackets, preceded by the site prefix letter to distinguish the individual site, thus: A[100] for context 100 on BPB05 and B[100] for context 100 on BOJ10. Site prefixes are used in the same way for sample {100} and accession <100> numbers. Certain finds selected for illustration are numbered by category: <C1> (coin), <CP1>–<CP2> (clay tobacco pipe), <G1>–<G3> (glass), <P1>–<P28> (pottery), <S1>–<S5> (accessioned finds), <T1>–<T2> (ceramic building material) and <WP1> (wall plaster). A concordance to the site archive is provided as an appendix to the report (Table 4). Land-use entities consist of Buildings (B), Roads (R), Structures (S), such as the various phases of the city defences, and Open Areas

(OA). The sites (and codes) referenced in the report refer to MOLA excavations unless specified otherwise. County names refer to historic counties.

NATURAL GEOLOGY, TOPOGRAPHY AND THE PREHISTORIC ENVIRONMENT (PERIODS 1–3)

The solid geology, Eocene, London Clay (period 1), was exposed in the deepest parts of the excavation. The overlying drift geology consisted of Pleistocene, Thames gravel terraces (period 2, OA1). Over much of the area the gravels are capped by a sandy silt known as brickearth (period 3, OA2), which formed during the late Devensian stage (32,000–10,000 BP). Terrace gravel



Fig 3. Site B excavation trench, covered by a moveable roof for weather protection, looking north

was recorded at a maximum height of 11.82m OD on site A, where it was truncated and no undisturbed brickearth survived, and at 13.60m OD on site B. The highest observation of natural brickearth on site B was at 14.21m OD.

In the City of London the gravel terraces and brickearth capping were cut through by the River Fleet to the west of the site, and by the River Walbrook to the east. St Bartholomew's Hospital is situated on relatively high ground between these two rivers, on the crown of the hill to the east of the Fleet. The modern ground surface within the hospital site is generally flat, falling slightly from $\approx 17.2\text{m}$ OD in the south-east to $\approx 16.5\text{m}$ OD to the north. A sharp fall to the west of the site reflects the presence of the east side of the Fleet valley. To the south of the site there is a more gradual fall towards the Thames. Three tributary streams

of the River Fleet are projected to run on to the hospital site (Lyon 2007, 10–11, fig 11; Pitt 2006, 46–8, figs 55–7), although their courses remain uncertain and subject to debate due to extensive modification in the Roman and later periods and limited opportunities for detailed investigation (*eg* Bentley 1987; Pitt 2006, 47–8, fig 57; Watson 2012; Askew 2014). No traces of such streams were identified during the phases of work reported here.

Discoveries of prehistoric features and finds in the City are relatively few, but there is a growing corpus of excavated data, including a pit containing a Late Bronze Age bucket urn of post-Deverel-Rimbury type on 1–4 Giltspur Street, 100m north-west of the site (Schofield 1998, 298–9). A residual Neolithic flint scraper was recovered from a later context on site A, indicative of low-level non-specific background activity.

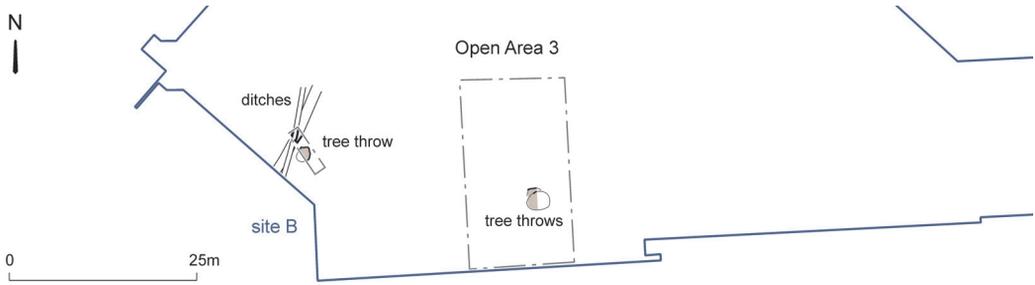


Fig 4. Early Roman features on site B, c.AD 50–90 (period 4) (scale 1:1000)

ROMAN (PERIODS 4–8)

Early Roman Features (OA3), c.AD 50–90 (Period 4)

The earliest features on site B comprised three irregular pits, interpreted as tree throws created when the land was cleared, and two ditches (OA3; Fig 4). The fill of the northern tree throw is dated to c.AD 70–160 by a single sherd of Highgate Wood ware C (HWC).

A north–south aligned drainage ditch, B[110], possessed a U-shaped profile and the fill yielded 1st-century AD pottery including a fine micaceous reduced ware ovoid beaker dating to c.AD 55–100. The ditch cut through the period 3 brickearth into the natural gravels beneath and possibly also formed a field or property boundary. At some stage after it was backfilled it was recut at a higher level (cut B[101]), sharing the western edge but was narrower to the east. However, at the north-east end it was considerably deeper, although filled with the same material. The fill contained pottery dating the disuse of the feature to c.AD 70–90; this date is based on sherds from two Verulamium region white ware ring-necked flagons with flared mouth (VRW 1B2) and sherds of several Highgate Wood ware B (HWC) vessels. Also present was the base of a La Graufesenque samian Dragendorff form 27 cup (SAMLG 6DR27, B<64>) stamped by the potter Mommo, dating to c.AD 60–85.

On site A no features of this early date were noted due to intensive truncation by later activity rather than lack of features. However, there was a substantial layer of

redeposited brickearth, A[218] and A[228], over part of the trench, up to 0.70m thick, which directly overlay the gravels in period 2 (not illustrated). Ceramic building material from this deposit comprised a few pieces of red and cream roofing tiles and bricks. The cream tile (fabric 2454) is of 1st-century AD date, the red tile (fabric group 2815) dates to c.AD 50–160.

Discussion (Period 4)

The site was cleared of trees during the late 1st century AD and evidently some further activity occurred. The presence of the north–south drainage ditch may indicate a field or a property boundary, and it is possible that it was associated with the early Roman building found to the north-west (see discussion of period 5 below). Redeposited brickearth, as found on site A, is a common feature of 1st-century AD Roman London and could indicate preparatory levelling of the area or, given the distance of the site from the core of the early settlement, upcast from quarrying (Wallace 2014, 44).

A Substantial Ditch (S1) c.AD 90–180 (Period 5)

A substantial east–west aligned ditch (S1) with a shallow, U-shaped profile was recorded on sites A and B in the main excavation trenches and beyond them, under watching brief conditions (Fig 5). At over 6m wide and 1.15m deep it was a significant feature observed over a length of c.100m. The base of the cut was recorded

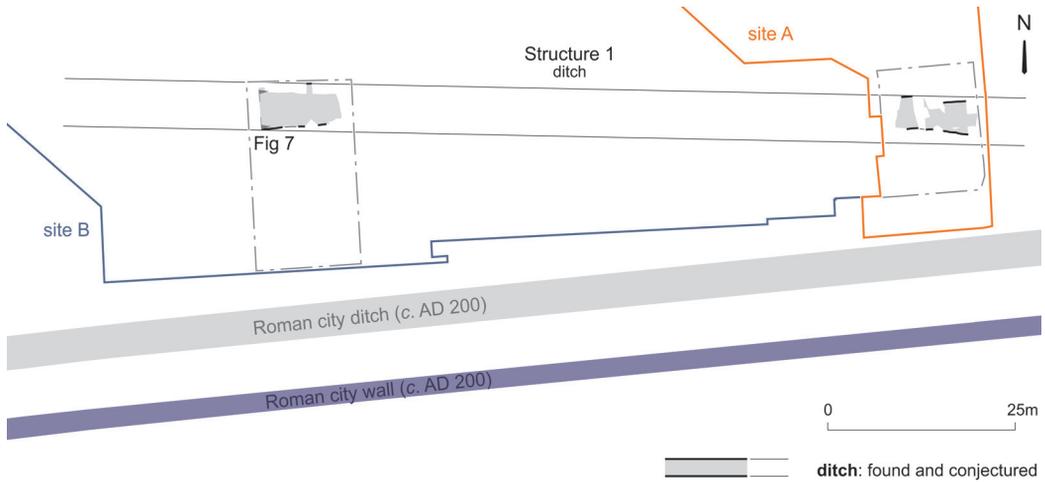


Fig 5. Ditch (S1), c.AD 90–180 (period 5), and the reconstructed line of the Roman city wall and ditch (c.AD 200) (scale 1:1000)

at 11.54m OD on site A and at 12.05m OD on site B, suggesting that if it played any role in drainage it fell away from the River Fleet, possibly towards the more easterly of the three (by this date probably modified) tributary streams thought to have existed in the area (above). Taking account of the (truncated) height of natural brickearth observed at site B, the ditch would have been more than 2.15m deep when first dug. The analysis of the fills revealed two major depositional phases prior to it being recut in period 6 (below).

The primary fill of the ditch, B[391], is dated to c.AD 40–100 on a single sherd of Highgate Wood ware B (HWB). This is the only potential evidence that the ditch might have originated in the 1st century AD. The consistent occurrence of Hadrianic and early Antonine material in subsequent fills, however, suggests that the main period of its use or disuse was the early to mid-2nd century AD. Residual material is also present, including characteristic early Roman sand tempered wares and Highgate wares, probably reflecting period 4 land use (above).

The largest pottery assemblage was recovered from one of the lower fills and is dated to the early Antonine period (c.AD 140–60) by a single sherd of a Verulamium

region coarse white-slipped ware ring-necked flagon (late cupped variant) (VCWS 1B7–9) alongside further Verulamium and Highgate products. Abrasion was frequently evident in this assemblage and it is notable that groups from higher fills, despite having fewer sherds, are of comparable total weight. The latest assemblage dates to c.AD 140–200 on the rim and neck of a further VCWS 1B7–9.

A large quantity of ceramic roofing tiles and bricks was found in the fills of the ditch. Most were London-made red roofing tiles, but a 1st-century AD cream brick from north Kent (fabric 2455) was also present. Based on their thickness, all the bricks are of *bessalis*, *pedalis* or *lydion* type (Brodribb 1987, 3). Other material includes a combed box-flue tile of probable early–mid-2nd-century AD date and a small piece of what may be a lamp chimney or finial. Two pieces of painted wall plaster were also present, one showing an area of plain black, whilst the other is a border area painted in black, cream, white, dark red and green (Fig 6, <WP1>).

Registered finds included a bone needle or hairpin shaft, B<95>, and some scraps of iron and copper alloy. A small assemblage of Roman vessel glass included the handle of a pale green conical jug dating to between the last third of the 1st century AD and the

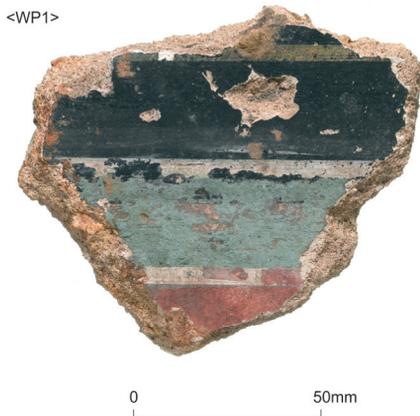


Fig 6. Decorated wall plaster <WP1> from the ditch (S1) (scale 1:2)

3rd quarter of the 2nd century AD (Price & Cottam 1998, 152–7).

Animal bones were relatively sparse, but single examples of adult cattle (*Bos taurus*) first and third phalange (basal and terminal ‘hoof’ toe joints), a fragment of sheep-sized lumbar (lower back) vertebra, a fragment of adult cattle femur (upper hind-leg) and a complete adult cattle second phalange (middle toe joint) were recovered.

The ditch also produced iron-working debris, including a dense piece of fayalitic slag with a core of corroded iron and with some charcoal and hearth lining adhering. The slag was undiagnostic but was probably material derived from iron smithing. It was in a dumped deposit and therefore only indicative of iron working in the general vicinity (Phelps 2012).

Geoarchaeological and Environmental Analysis

The fills of the ditch were geoarchaeologically analysed to determine the processes by which it filled up and the local environment during its use and disuse. The fills have broadly been separated into two facies (or series of deposits, which are representative of certain depositional modes or environments) numbered N1–N5, although only facies N1 and

N2 are dated to period 5. A section across the whole ditch with the facies annotated is shown in Fig 7a, while sampling locations are shown on a detail of the same section in Fig 7b.

In facies N1, the coarse lithology and microfossil remains of the basal fills of the ditch, B[362] and B[354], indicate that they originate from the loose sediments at the side of the ditch and possibly the land adjacent to the ditch. Pollen taphonomy within ditch sequences is very complex, but indicated predominantly grass and possibly cereals growing adjacent to the ditch (Scaife 2012a, 1–2, 4). The primary fills therefore indicate an initial collapse of the loose ditch sediments at the side of the ditch with some input through soil erosion as a result of adjacent agricultural activity.

In contrast to N1, the silty clay, upper fills of facies N2, B[371] and B[353], represent finer, waterlain deposition within the ditch over this period when it was occasionally wet with muddy, pooling water. There is, however, an increasing likelihood of sedimentary input from agricultural related erosion coupled with the periodic dumping of rubbish. The nature of the sediment and dumping coupled with the low flow rate of the water within the ditch suggests the abandonment or at least the absence of maintenance of the ditch during this period. Terrestrial seeds recovered from the upper portion of B[371] were radiocarbon dated and provided a date of 20 cal BC to cal AD 130 (BETA-340817; Table 1; Fig 7b), but this does not accord well with the 2nd-century AD pottery dates.

The ditch was comprehensively sampled for environmental data (Fig 7b). Of the 21 samples taken from the lower fills of Structure 1, four were analysed for plant macrofossils: two taken from the section (B[354], B[38]; B[371], B[39]; Fig 7b) and two from elsewhere in the ditch (B[363], B[41]; B[435], B[81]). All contained large and well-preserved assemblages of waterlogged plant remains, including stems, wood fragments and moss as well as diverse seeds.

The majority of identified plant remains came from the species that inhabit disturbed (including cultivated) and waste-ground

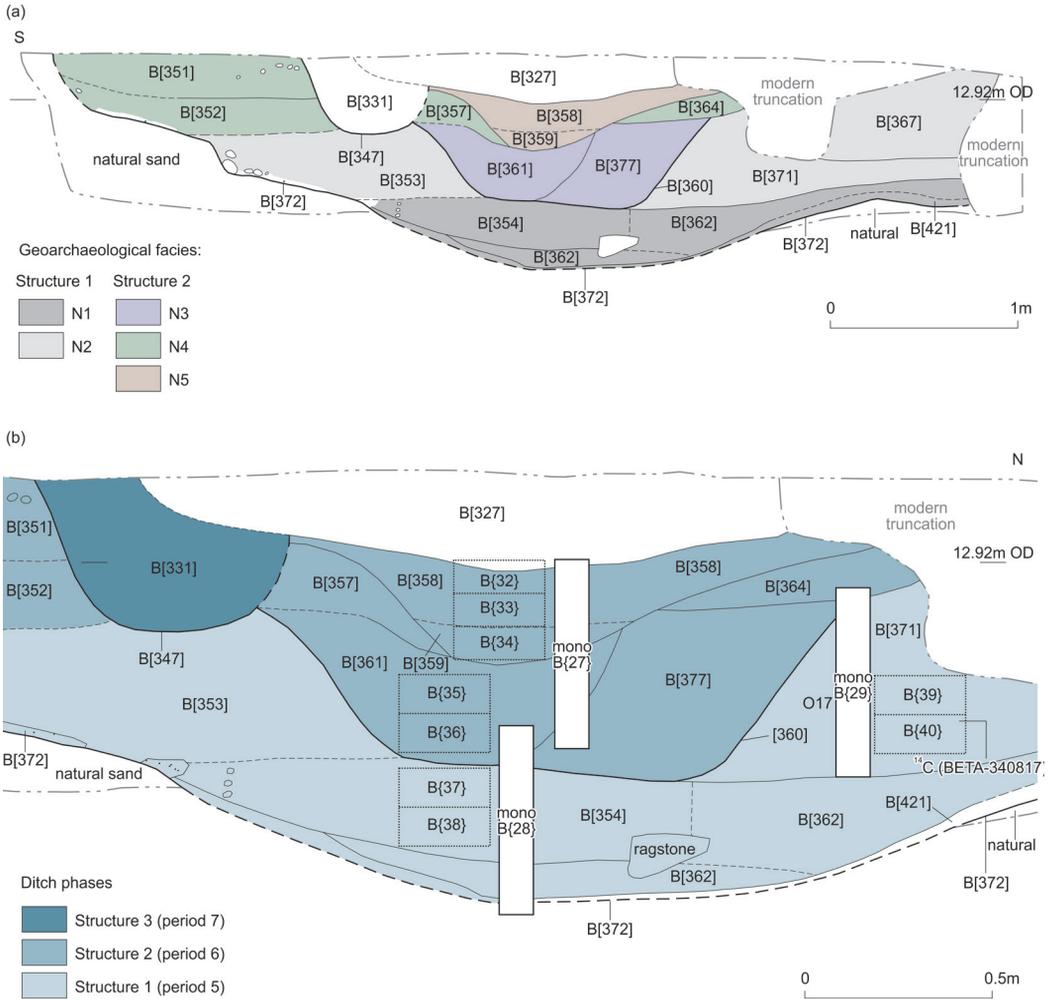


Fig 7. East-facing section of the Roman ditches (S1–S3): (a) showing geoarchaeological facies (scale 1:40) and (b) detail of the same section showing monolith (mono) and bulk sample locations (scale 1:20)

Table 1. Radiocarbon date from the period 5 ditch (Structure 1); result is calibrated using OxCal 4.2 (Bronk Ramsey 2009) and IntCal13 (Reimer et al 2013) and rounded outwards as recommended by Mook (1986)

Context	MOLA sample reference	Laboratory no.	Material; pre-treatment	$^{13}\text{C}/^{12}\text{C}$ ratio (%)	Radiocarbon age (BP)	Calibrated date (95% confidence)
B[371]	BOJ10-40	BETA-340817	Arctium sp seeds; acid/alkali/acid	-26.4	1940 ± 30	20 cal BC to cal AD 130

habitats which are common on all urban sites, and would have grown around the ditch banks where conditions were relatively dry. Many of these taxa, such as hemlock (*Conium maculatum*), stinging nettle (*Urtica dioica*), red/glaucous goosefoot (*Chenopodium rubrum/glaucum*) and burdock (*Arctium* sp), whose seeds were abundant in all these samples, are characteristic of soils with high nitrogen levels (Davis 2013). These conditions would no doubt have been created by the decomposition of vegetation growing *in situ* and on the ditch banks, as well as any dumped organic matter.

Evidence that the base of the ditch contained water on a regular basis was reflected in the wide range of species from aquatic and wetland habitats. These included seeds of several plants, such as duckweed (*Lemna* sp), watercress (*Rorippa nasturtium-aquaticum*) and pondweed (*Potamogeton* sp) that grow floating or submerged in water as well as others, including waterplantain (*Alisma* sp), celery-leaved crowfoot (*Ranunculus sceleratus*) and gipsy-wort (*Lycopus europaeus*), which thrive in wet or periodically flooded environments but will tolerate periods of dryness.

Although not abundant, a wide range of grassland plants was also represented, with seeds of sheep's sorrel (*Rumex acetosella* agg), lesser stitchwort (*Stellaria graminea*), hairy and other buttercups (*Ranunculus sardous*, *R. acris/repens/bulbosus*), wild parsnip (*Pastinaca sativa*) and wild grasses (Poaceae) found in all samples.

These remains paint a picture of a ditch containing water for most, if not all, of the year, with banks supporting grassy areas as well as persistent ruderal plants above the water line. A number of wheat (*Triticum* sp) glume bases in three samples suggest that some crop-processing waste may have been discarded in the ditch, or perhaps wheat may have been cultivated in fields adjacent to the feature. Apart from this, the plant assemblages included very few food remains, and indicate that domestic food waste was not regularly dumped here at this time. The abundance of seeds from relatively bulky, and in some cases prickly or stinging, plants such as brambles (*Rubus cf. fruticosus*), thistles (*Carduus/Cirsium* sp), burdock and stinging nettles suggests that human access

to the ditch, and consequent clearing of the vegetation, was rare (Davis 2013).

Discussion (Period 5)

Establishing a definitive function for the ditch (S1) is not straightforward. It seems rather large to represent a standard field, drainage or property boundary ditch, implying that it was either a major demarcation feature or a defensive work. Potentially it could represent an outer ditch comprising part of a double-ditched arrangement with a 'killing ground' between. Any inner ditch would have been removed by the later, deeper medieval ditch. Such a defensive system could have enclosed the entire settlement or just a part of it; alternatively, it could be a defensive outwork related to the Cripplegate fort (probably constructed in the AD 120s; Howe & Lakin 2004, 39).

The presence of any adjacent bank remains unproven. It is tempting to infer that the basal fills (facies N1), which were loose and coarse, represent the erosion of an adjacent bank, but the evidence is not compelling and the material could derive from the initial erosion of the ditch edges (above). Either possibility could account for the early radiocarbon determination (above), if the seed that was dated derived from the pre-ditch ground surface.

Alternatively, the ditch may be a structure independent of the city defences. The most persuasive argument against a defensive function is the shallow, U-shaped profile which is unlike the V-shaped ditches familiar in other early Roman 'civil' or military defensive works (Fig 8). There was certainly no indication of an 'ankle-breaker' or cleaning slot in the base. Additionally, although the ditch might at first sight appear to anticipate the position of, and run parallel to, the later city wall and ditch, it is in fact on a significantly different alignment (Fig 5).

Ceramic dating suggests that the ditch (S1) was in use in the early to mid-2nd century AD. The radiocarbon determination from the basal fills (above; Table 1) seems to indicate a 1st-century AD date, and although this could result from the selection of residual material the later part of the range does overlap the ceramic date range.



Fig 8. The period 5 ditch (S1) under excavation, including the east-facing section, looking north-west

Indeed, the thin primary fill produced only a single sherd of 1st-century AD pottery, perhaps indicating that the ditch was cut in the very late 1st century AD and it continued in use well into, and perhaps throughout, the 2nd century AD. The feature clearly pre-dates the Roman landward city wall, the construction of which is often cited as c.AD 200, although a range of c.AD 190–230 (Rowsome 2008, 30–2) or c.AD 185–225 (Lyon 2007, 40–1) is more accurate. What is sometimes overlooked is the scale of the logistics involved in the construction of the Roman city wall, such as the quarrying and shipping of 86,000 tonnes of Kentish ragstone. The work was likely to have taken a number of years, which could explain the chronological range of the associated dating evidence (Merrifield 1983, 160–4).

Plant remains from the upper fills indicate that the ditch contained or drained water for at least part of the year and was poorly maintained. It lay within or adjacent to

waste ground with only a few food plants represented, probably resulting from refuse dumping and local, but not immediately adjacent, agriculture. This is perhaps not surprising, given that the area lay some distance from the nearest roads and well away from the core of the 2nd-century AD settlement. On balance the ditch seems likely to be a boundary feature, possibly part of a pre-wall boundary of the Roman settlement (discussed further below), or perhaps marking an enclosure associated with the late 1st-/mid-2nd-century building found at the Medical School site less than 100m north-west of the site B excavation trench (Bentley & Pritchard 1982, 136–8, fig 3).

The Recut Ditch (S2), c.AD 180–270 (Period 6)

After Structure 1 had silted up, it was recut as a smaller linear feature, B[360] (S2), 2.1–2.5m wide, running roughly along the

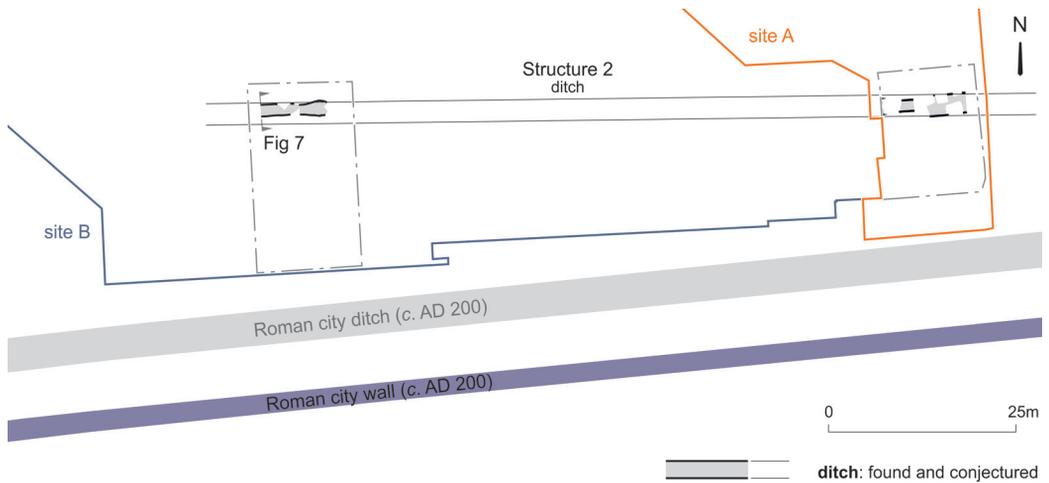


Fig 9. The recut ditch (S2), c.AD 180–270 (period 6), and the reconstructed line of the Roman city wall and ditch (c.AD 200) (scale 1:1000)

central axis (Figs 7 and 9) of the earlier feature. The recut was present on both sites, but on site A it was far less clearly defined, and was only identified as a distinct feature during post-excavation analysis.

The pottery retrieved from the recut fills is slightly less in quantity than that from period 5. The dating is mixed and suggests an element of residuality and/or deposition over a long period. The earlier material is comparable with that from the period 5 ditch (S1), with a small-sized group of Flavian date and a further small assemblage of Hadrianic/early Antonine date.

Aside from a medium-sized assemblage from the deepest fill, B[388], dated to c.AD 170–200 (not represented in the illustrated sections, Fig 7), the more substantial groups date to the 3rd century AD. However, all of these assemblages still include a noticeable proportion of material datable to the early–late 2nd century AD. Contexts B[361] and B[377] contained medium-sized assemblages dated to c.AD 250–300 by sherds of late Roman black-burnished ware vessels. The former assemblage is probably most indicative of the date of the recutting.

The recut of the ditch also produced a number of pieces of Roman ceramic roofing tiles and bricks, including a silty fabric example (fabric 3018). Also present were a

few mortar fragments and a solitary piece of combed box-flue tile. From the fill of the Roman ditch on site A, a tegula belonging to the calcareous group (fabric 2457) was recovered. These were imported into London from an unknown source around AD 140–300 (Betts & Foot 1994, 31–2). In the same context was another roofing tile (fabric 3060B) provisionally dated to the early–mid-3rd century AD. The building material dating suggests that the Roman ditch was beginning to fill up in the 3rd century AD, concurring with the pottery evidence.

The fills produced a few sherds of colourless and naturally coloured Roman vessel glass. This included B<39>, a base fragment from a green-blue bottle of Isings form 50, dated to c.AD 43–200 (Price & Cottam 1998, 194–8).

A rectangular fragment of sawn antler waste, B<104>, was probably intended to be worked into a plate similar to those used as components in composite combs.

Animal bone fragments included food species such as pig (*Sus scrofa*), cattle, sheep or goat (*Ovis aries/Capra hircus*) and domestic fowl. A red deer (*Cervus elaphus*) antler represented wild species. Small animals present, included a femur (upper hind-leg) of frog or toad (*Rana sp/Bufo sp*), single fragments of juvenile frog or toad fore-leg

and mouse (species) or vole (Microtinae) innominate (pelvis) (Pipe 2012).

Geoarchaeological and Environmental Analysis

The fills were examined geoarchaeologically for depositional data. Fill B[361]/B[377], which forms facies N3, is a fine grained, probably waterlain deposit of a channel cut through N2 (Fig 7). As opposed to the fine-grained sediments of the other ditch fills, however, the microfossil evidence from this deposit indicated a consistently waterlogged environment with evidence for duckweed and sedges (*Carex* spp) growth along with more permanent water levels. The occasional finds and the eutrophic conditions suggested by the ostracods (Whittaker 2012) suggest the use of the ditch for periodic refuse disposal continued during this phase. Notably, grape (*Vitis vinifera*) (a Roman import) pollen, recorded within B[377], is most probably of secondary origin from waste food products (raisins) associated with rubbish dumping, although viticulture locally is a possibility (Scaife 2012a, 2).

The deposits B[351], B[352], B[357] and B[364] that form facies N4 consist of natural sand and brickearth material common to much of the site (Fig 7). It is likely that this facies forms a series of tip deposits spread across the ditch during this period. It is possible that this material was derived from the slighting of a bank forming a defensive feature to the north of the original ditch, but even if that was not the case, it appears to indicate that the feature was deliberately backfilled.

The remaining fills, B[358] and B[359], that form facies N5 accumulated in a hollow left by the slumping and compression of the underlying deposits (Fig 7). Facies N5 consisted of waterlain fills with signs of (at least temporary) standing water and an organic-rich, stagnant fluvial environment. The higher incidence of finds within the upper deposit suggests an increased use of the ditch for waste disposal.

Sample B{9} from primary fill B[361] (not illustrated) produced a small wet-sieved group of amphibian bones largely derived from juvenile and adult frogs plus a toad skull and an upper and lower

leg. It also contained a small group of fish bones including a dermal spine of roker or thornback ray (*Raja clavata*) and a fragment of eel (*Anguilla anguilla*) cleithrum (gill area). Major domesticated bones included single fragments of sheep/goat sheep-sized cervical (neck) vertebra and rib, foetal or neonate sheep/goat metacarpal (fore-foot) and pig tarsal (ankle). Together this indicates that food waste was being deposited here, albeit in small quantities. Non-consumed domesticated remains comprised only a thoracic vertebra of a cat (*Felis catus*) (Pipe 2012).

Four of the sampled fills from Structure 2, the recut of the Roman ditch, were studied for plant remains, samples B{36}, B{35} and B{9} from the primary fills and B{32} from a later fill (all but B{9} located on Fig 7b). In most aspects the assemblages were similar to those from the earlier (S1) fills, with further evidence from both plants and invertebrates for standing water, probably for much of the year, as well as periodic flooding. Evidence for grassy areas alongside the ditch was much reduced in these samples, however, and that for shrub or small tree cover increased, particularly in samples from a primary fill. These contained large quantities of wood fragments, twigs and thorns, as well as numerous seeds of elder (*Sambucus nigra*) and bryony (*Bryonia dioica*), a climber which grows in scrub and hedgerows, and occasional buds and seed capsules of willow (*Salix* sp). As in the earlier period, little dumping of domestic food waste seems to have taken place, but a number of flax (*Linum usitatissimum*) seeds in the latest fill (B{32}) could have come from this source, or from agricultural activities close to the ditch (Davis 2013).

Discussion (Period 6)

The dating for this period is variable, and it would seem that the ditch filled up over a long period of time, culminating in the latest fill being deposited in the mid-late 3rd century AD. The earliest pottery must be residual, but it is likely that the recut occurred in the late 2nd century AD, based on the date of c.AD 170–200 from an early fill. Potentially it was dug when the defensive wall and ditch were being constructed to

the south (see period 5 discussion above). A series of brickearth and gravel fills were deposited after *c.*AD 250, demonstrating that after a usage period of over 50 years the ditch may have been deliberately backfilled and any associated bank slighted, leaving a shallow linear depression which was allowed to silt up.

The environmental evidence, including the presence of frog/toad bones as well as botanical remains, indicates that the ditch remained wet for much of the year, as it did in period 5. The surrounding area had also become more overgrown with trees and shrubs replacing the earlier grassland, suggesting that the area was no longer maintained either as a clearing in front of the defensive circuit or as fields.

It should be noted in passing that the known Roman defensive ditches in front of the city wall were not located. Traces of these ditches have been found on various nearby sites (LUD82: Rowsome 2014, 233–4, fig 5; KEW98: Lyon 2007, 40–5, 47–8; AES96: Butler 2001, 50–2; Fig 1). Both the earlier V-shaped ditch and the late Roman U-shaped ditch are predicted to lie beyond the southern boundary of the hospital site.

A New Ditch with a Terminus (S3), c.AD 270–300 (Period 7)

A considerably smaller ditch, B[347] (S3), was dug along the south side of the backfilled Structure 2 ditch, partially truncating the fills and partly dug into natural gravels (Figs 7 and 10). It extended beyond the western limit of the trench but it ended in a rounded, butt-ended terminus at the east end. It was 0.42m deep from the truncation level of the trench.

The fill of Structure 3 yielded Roman pottery comparable with the material from Structure 2, with a date of *c.*AD 120–60 based on two sherds of a black-burnished-style ware jar (BBS 2F) and a single sherd of Verulamium/London region white ware (VRW). This material is clearly residual and probably derives from the fill of the earlier ditch. Similarly, the ceramic building material in the ditch is probably 1st–mid-2nd century AD in date, including a slightly silty tile which may be from north Kent (fabric 3238) and a relief-patterned box-flue tile

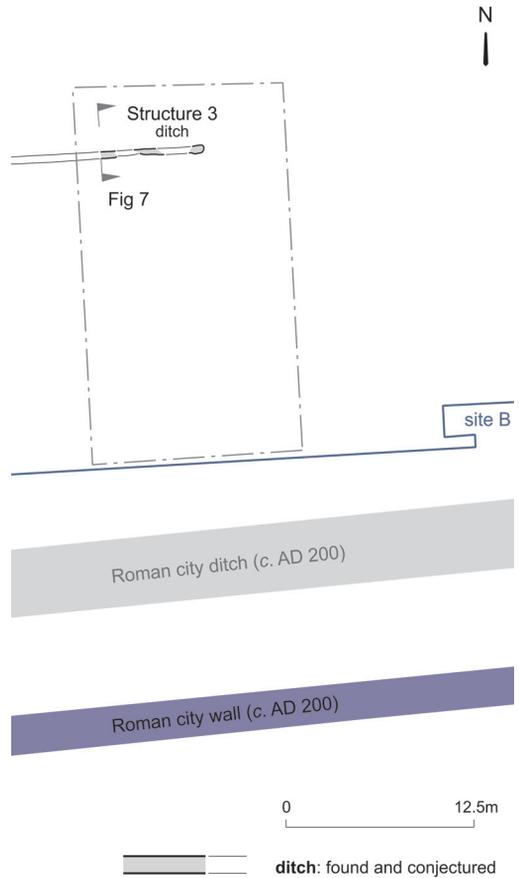


Fig 10. The late Roman ditch (S3), *c.*AD 270–300 (period 7), and the reconstructed line of the Roman city wall and ditch (*c.*AD 200) (scale 1:500)

keyed with die 16A. Flue tiles keyed with the same wooden roller are known from other London sites, as well as sites in Essex, Kent and possibly Staffordshire (Betts *et al* 1997, 89).

The fill also produced a small group of animal bones derived largely from single fragments of cattle tooth, mandible (lower jaw), atlas vertebra, rib and foot. Also recovered were single fragments of juvenile pig and dog (*Canis lupus familiaris*) femur (thigh), and mouse or vole teeth (Pipe 2012). As with the ceramics, these finds could well be residual material derived from Structure 2.

Discussion (Period 7)

Structure 3 was much smaller and shallower than its predecessors. Therefore, it was more likely to have served as either a drainage feature or boundary marker parallel with the Roman city ditch, which it appears to have post-dated. It was stratigraphically later than Structure 2, the latest fills of which post-date c.AD 250. It is therefore likely that this phase of ditch dates from the later 3rd century AD, as it is sealed by post c.AD 300 material (below).

Later Roman Activity (OA4), c.AD 300–400 (Period 8)

A mixed deposit of grey silty clay (not illustrated) was recorded over some parts of the ditches on site B, but survival was limited as it was at the top of the sequence beneath modern truncation level. It occurred mostly in the north-west corner of the trench and was observed in section covering the fills of both Structures 2 and 3, and is interpreted as material accumulating or dumped in an open, extramural area (OA4, not illustrated).

The activity is dated to at least c.AD 250–300 by a large pottery assemblage (116 sherds, 1.4kg), the date deriving primarily from a combination of sherds from Alice Holt/Farnham ware (AHFA) and east Gaulish samian (SAMEG) vessels. However, as with the assemblages from the earlier ditches (S2 and S3), there is still a considerable amount of 2nd-century AD material present.

Building material from Open Area 4 included various pieces of probable fine sandstone roofing and what may be paving cut from the same stone. Stone roofing material was used predominantly in the second half of the 4th century AD after supplies of ceramic building material from Harrold, Bedfordshire, had ceased around AD 350. Earlier residual ceramic roofing tiles and bricks were also present, including a tegula of c.AD 120–250 (fabric 2459B). Other artefacts included an undecorated copper-alloy strap end, B<13>, found amongst the dumped material, and a fragment of cattle tarsal (ankle).

Evidence of iron working was recovered from Open Area 4. A smithing hearth bottom was found, most likely constituting

a single smithing event. It measured 125mm in diameter, 50mm in depth, weighed 520g and exhibited a depressed top side, convex underside containing charcoal impressions and some adhering hearth ceramic. This type of material is produced by the accretion of hammerscale, slag and fuel in the hearth during smithing. No associated hammerscale was noted, and the amount of slag was small, so it is unlikely that smithing was performed *in situ*. There was no other evidence of iron smelting (Phelps 2012).

Discussion (Period 8)

The dumping in Open Area 4 may have been a levelling deposit intended to counteract slumping of the earlier ditch fills. Alternatively, it may have been upcast from episodes of cleaning or recutting of the main defensive ditches to the south. This deposit was probably subsequently cultivated. The finds were very mixed, but the late Roman stone roofing slates indicate a 4th-century AD date for this activity.

No equivalent contexts were observed on site A. No evidence was uncovered on either site for activity in the period AD 400–900.

Roman Finds from Later Contexts

The medieval city ditch fills yielded a considerable quantity of residual Roman finds. Indeed the sheer number of such artefacts from the feature on site A led to the earliest city ditch cut being erroneously interpreted as Roman prior to the excavation of site B. Period 10 (S5) and period 11 (S6) (below) were particularly rich in Roman finds.

A total of 228 sherds (6,297g) of Roman pottery of variable date and spanning the whole Roman period were retrieved from Structure 5. The three largest assemblages are all of late Roman date, the latest of which contained 35 sherds dating c.AD 270–400 from two Oxfordshire red/brown colour-coated ware mortaria (OXRC 7).

Roman pottery was still dominant in the final fills of the city ditch, Structure 6, showing the strong presence of residual material. A total of 441 sherds (8,965g) were present across 16 contexts. The material is, as with previous fills of the ditch, from across the whole Roman period. However, in the

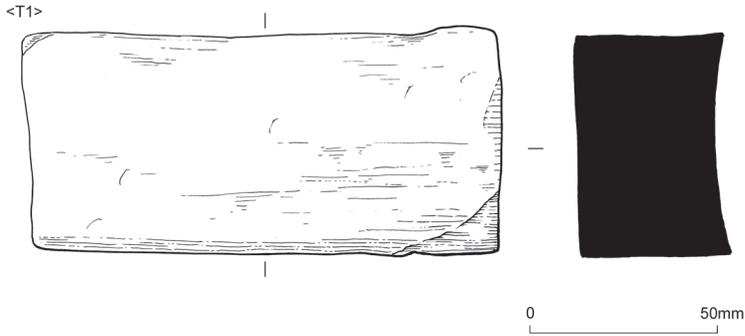


Fig 11. Unusually sized Roman brick <T1> from Structure 5 (scale 1:2)

case of period 11 there is a predominance of residual Hadrianic and Antonine assemblages. The largest assemblage of 231 sherds from context B[326] is dated to *c.*AD 270–300, from sherds of OXRC and east Gaulish samian (SAMEG) vessels.

A large amount of residual Roman ceramic tile was also recovered from the city ditch fills. A brick in Structure 5 from Harrold is made from distinctive shelly clay, as is a combed box-flue tile from Structure 6 from the same tiler. Both date to *c.*AD 270–350. An unusual, small Roman brick (fabric group 2815) measuring 126mm in length by 56–57mm in breadth (Fig 11, <T1>) was recovered from Structure 5. The length and breadth is comparable to that of *opus spicatum* brick paving but not its thickness. The brick is 38–43mm thick which compares with a thickness range of 19–30mm obtained from the measurement of 62 *opus spicatum* bricks in the same fabric from Southwark (Pringle 2009, 197, table 34). There is also no indication that the brick was ever used as paving.

Further residual Roman material included a decorated bone handle with a waisted end, B<46>, along with some heavily corroded fragments of copper alloy from Structure 5 (Marshall 2012). One of the post-medieval wells, Structure 9, also produced a single residual Roman find, a bone hairpin, B<47>, of Crummy type 2 (1983, 21).

The residuality of the finds within the medieval ditch is not particularly surprising. Potentially some material was derived from the dumping of unwanted soil from building works or pitting within the City. Much of the remainder could have come from the

late Saxon and medieval recutting of the Roman city ditch to the south, and from the subsequent erosion of its exposed fills.

SAXO-NORMAN AND MEDIEVAL (PERIODS 9–12)

The City Ditch

A specific research aim of the archaeological work at St Bartholomew's Hospital was to locate, record and date the City's extramural ditch. The ditch was identified on site A and, in the absence of any later finds, it was assumed that the earliest ditch was Roman. The data from site B and consideration of the wider context has led to the conclusion that the north edge of even the wider, U-shaped, late Roman defensive ditch would have lain to the south of the southern boundary of the hospital site (see period 6 discussion above). Due to a combination of modern truncation and the southern limit of excavation, only the basal portion of the northern half of the Saxo-Norman and medieval city ditch survived within the site perimeter. No attempt has been made to tie the archaeology to Stow's (1956, 19–21) statements concerning the dimensions or chronology of the city ditch, which others have shown to be little more than indicative of the necessity for frequent maintenance and clearance (*eg* Butler 2001, 43, 54–5), and no detailed investigation of the documentary sources was undertaken as part of this project.

Two profiles across the ditch (referred to as 'west-facing section' (Fig 13) and 'east-facing section' (Fig 14), below), approximately 9m

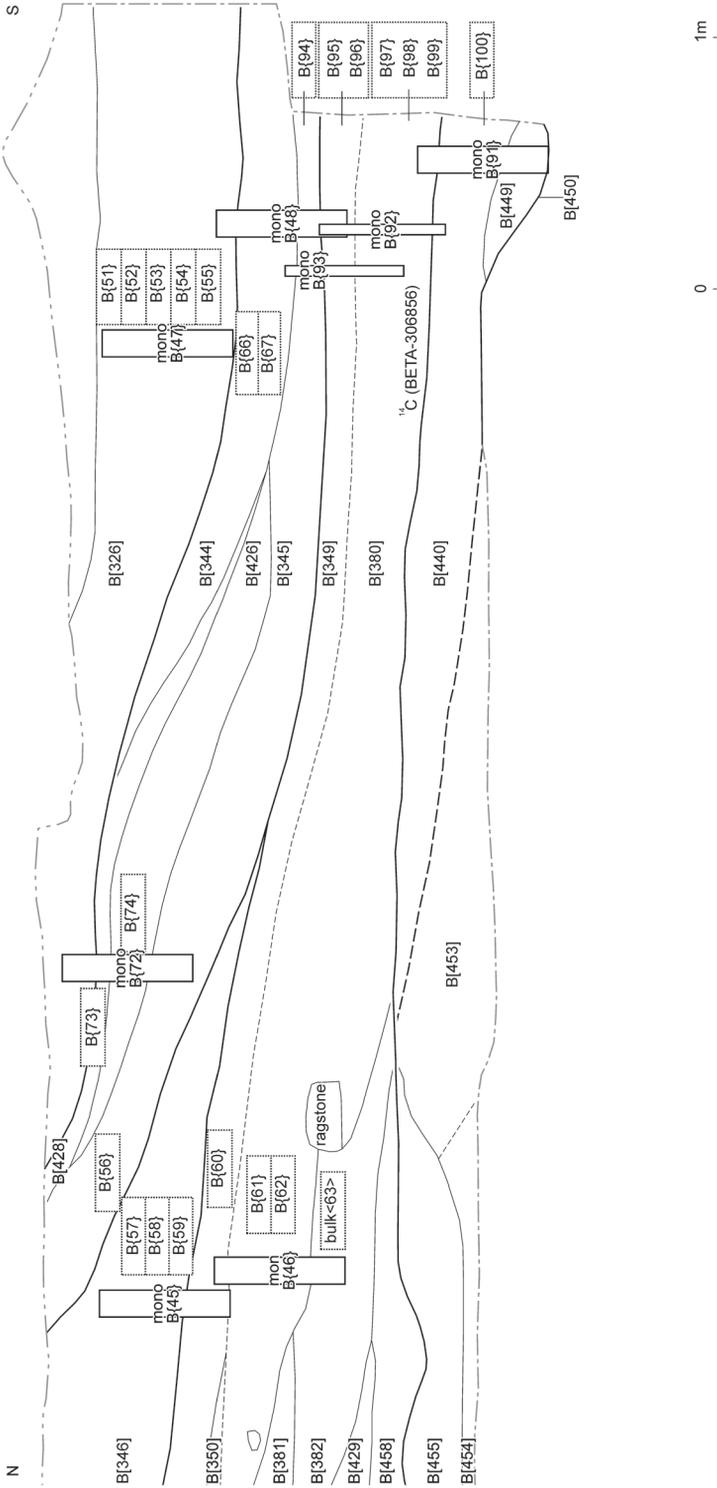


Fig 13. Detail of west-facing section of the city ditch shown in Fig 12a, with sample locations (scale 1:30)

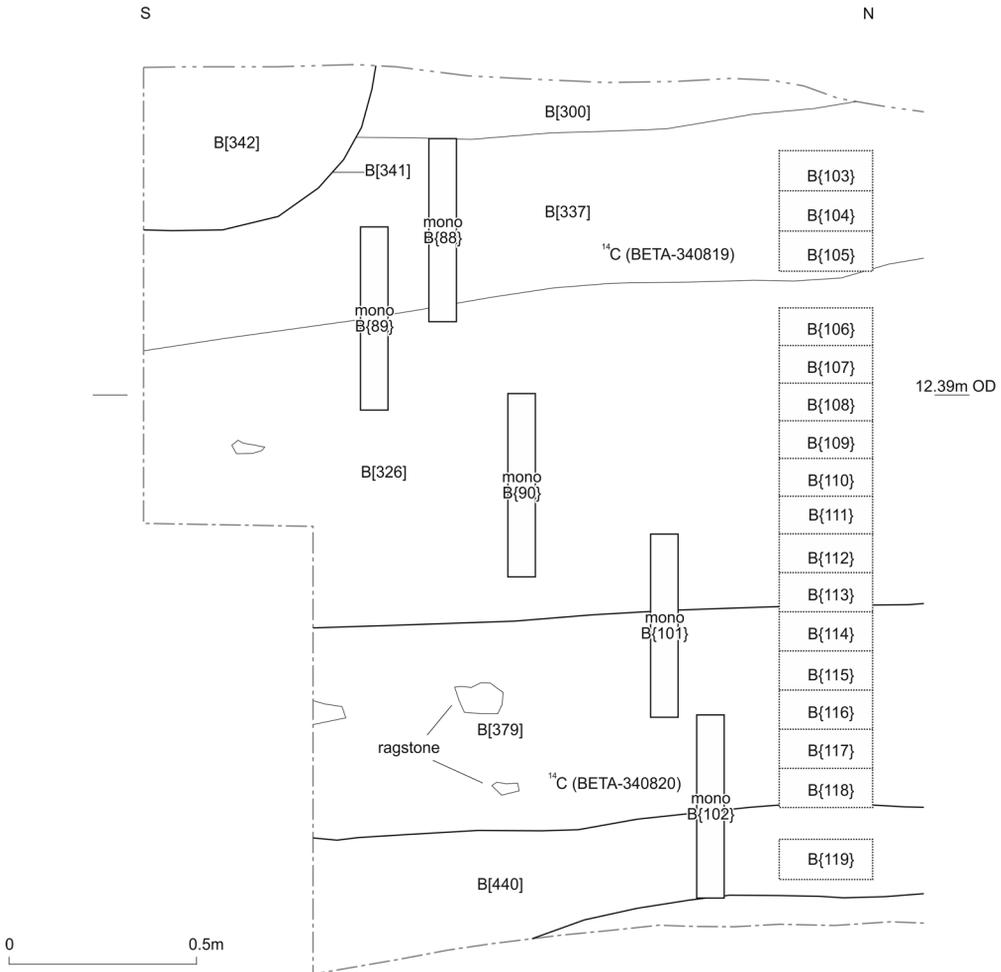


Fig 14. Detail of east-facing section of the city ditch shown in Fig 12b, with sample locations (scale 1:20)

lay beyond the area of excavation. On site A, a width of up to 6.50m remained and on site B over 8m of its width survived within the trench, representing approximately the northern half of the feature. The ditch survived 2.05m deep, its base at 11.05m OD on site B and at 10.72m OD on site A. Given the maximum observed height of (truncated) natural brickearth on site B (above) and in view of the uncertainty as to the elevation of the Saxo-Norman and medieval ground surface, it seems likely that the ditch was between 3.5m and 4m deep when first dug.

The north edge of the ditch was relatively straight in plan, but its side was somewhat irregular and steeply sloping. It approached

vertical in places, but was much more gradual in other locations, and the profile appeared stepped. Some areas, particularly the upper portions which cut through brickearth and gravels, showed evidence of slippage and collapse. The base was irregular, with a gradual break of slope from the north side. The earliest ditch cut as recorded on site A was not completely excavated for logistical reasons, but it mirrored the site B ditch in alignment, size and shape.

At the extreme southern end of the site B excavation trench, and therefore probably close to the central axis of the ditch, two cut features were revealed. The first, B[450], was a linear trench 0.25m deep, which was

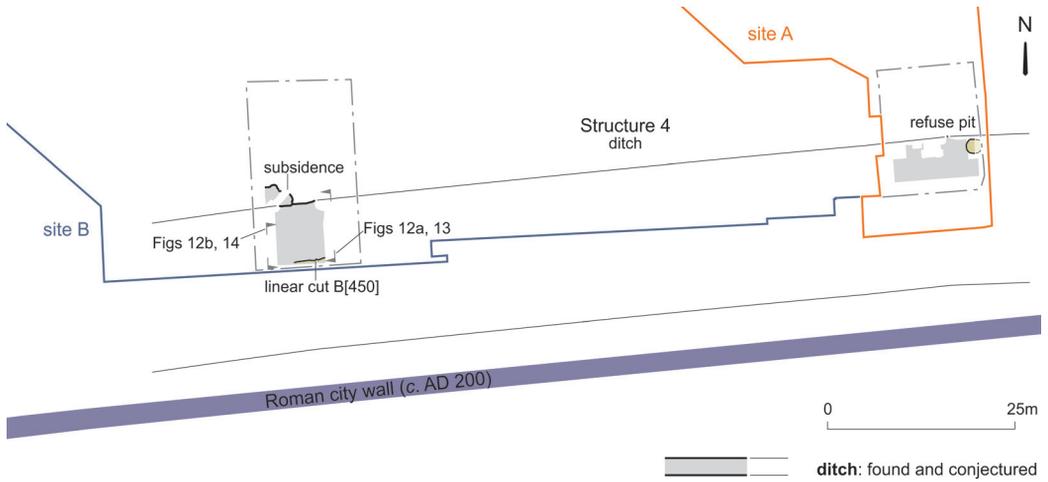


Fig 15. The city ditch (S4), c.AD 900–1000 (period 9), and the reconstructed line of the Roman city wall (c.AD 200) (scale 1:1000)

present along the whole exposed base of the ditch, although its south edge lay beyond the excavation edge (Figs 12a, 13, 15). A second cut, B[448] (not illustrated), was an irregular hollow adjoining part of the north edge of B[450] and filled with the same material; it must have been open at the same time.

No pottery was recovered from the ditch fills assigned to this period, while all the associated Roman ceramic building material is residual. One primary fill, B[440], produced a bone ice skate, B<87> (Fig 20; Table 3), a horseshoe fragment, B<91>, and a complete iron object, possibly a spearhead, <S1> (Fig 16), all of early medieval date (Marshall 2012). This fill also produced a distinctive group of animal bones derived mainly from cattle, sheep/goat and, to a lesser extent, pig, but also including goat (*Capra hircus*) and a significant component of roe deer (*Capreolus capreolus*) (Pipe 2012).

Geoarchaeological and Environmental Analysis

Facies C1 constitutes the primary fills, B[440] and B[449], of the early medieval phase of the city ditch, B[446], and the linear feature, B[450] (Figs 12–14). The initial ditch fills have been dated to the late Saxon period by radiocarbon dating of terrestrial seeds and by ceramics recovered from deposits of the overlying facies (C2) in the west- and

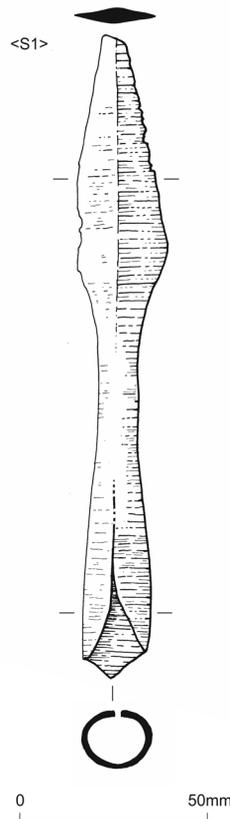


Fig 16. Iron spearhead <S1> from the period 9 city ditch (S4) (scale 1:2)

east-facing sections (below, period 10). The environmental remains originated from the base of the ditch or, more accurately,

the disturbed and trampled surface of the London Clay present at the base of the ditch. The pollen record preserved in the disturbed London Clay was mixed with a number of poorly preserved pre-Quaternary plants (*in situ*) and Holocene plants recorded (*ex situ*), which would have been introduced during the construction and trampling of the basal London Clay. Typically, for example, pollen from cereal taxa was found in conjunction with intestinal parasites and therefore was introduced as refuse rather than being grown nearby (Scaife 2012b). Even at this early stage the ostracod and diatom evidence begin to indicate that the ditch was an organic-rich and stagnant environment, again attesting to its use for occasional refuse disposal (Cameron 2013). Notable insects recorded also suggestive of waste disposal were *Latridius minutus* group and *Enicmus*, which are associated with relatively dry decomposing matter and regularly form part of a fauna characteristic of ancient buildings, as well as *Aphodius erraticus*, which exploits various types of domestic animal dung (Allison 2013). The levels of grass pollen suggest a dry grassy environment on the banks of and probably adjacent to the ditch,

whilst sedge and duckweed pollen along with the diatom remains suggest waterlogged conditions existed within the ditch, although there is evidence for distinct periods of drying out and evaporation (Scaife 2012b; Cameron 2013).

The plant assemblage from sampled fill B[440] (B{100}, Fig 13), included taxa from a variety of disturbed and grassy habitats. The majority of identified dry-ground taxa represent relatively small, herbaceous plants, suggesting a fairly open environment around the ditch. Conditions in the base of the feature were frequently waterlogged, and some of the most abundant macrofossils were from nodding bur-marigold (*Bidens cernua*) and celery-leaved crowfoot which characteristically grow on the muddy banks of seasonally flooded, nutrient-rich ponds and ditches (Ellenberg 1988, 612). No evidence was seen for the dumping of plant food remains during this period (Davis 2013).

Discussion (Period 9)

The ditch was clearly the expected massive defensive feature surrounding the city walls (Fig 17). Excavated deeply into London



Fig 17. Recording the lower fills in the west-facing section of the city ditch, looking east

Clay, it contained water for at least part of the year. This may have been intentional, as the base of the ditch was irregular and fell to the east, whereas local topography falls towards the Fleet River to the west and the Thames to the south. The environmental data also suggest that the ditch existed in an open grassy environment and was used occasionally for refuse disposal.

A feature not encountered on site A was the linear cut, B[450], running along the base of the ditch. Unfortunately the south side of this feature was outside the limit of the site B excavation trench and therefore its width and full depth are unknown. One possibility is that it was a deeper continuation of the same ditch cut, but it may have been the truncated remnant of an earlier phase of ditch.

The earliest cut of the ditch on site A was at first believed to be Roman as no later finds were recovered from it. However, although this was true of the pottery and building material on site B, three registered finds of definitively post-Roman date were retrieved from one of the earliest fills, B[440]. The date was supported by the radiocarbon dates obtained from the overlying deposits (see period 10). There is therefore no accurate date for the cutting of the ditch, save for the fact that it is post-Roman and earlier than the facies C2 fills of the 11th–12th century.

The Recut City Ditch (S5), c.1000–1170 (Period 10)

The second phase of the city ditch, Structure 5, was effectively maintenance or scouring out of the original feature. The size and profile of the ditch altered little, but there was evidence of truncation of the primary fills, particularly on the north side where accumulation of the earlier clay deposits was removed by recutting. Thereafter the fills accumulated over a long period of time.

A notable discovery in the ditch fill on site B was the remains of two robust wattlework structures, B[432] and B[441] (Fig 18). The most substantial, B[432], was 2.50m long and 1.20m high. All elements were roundwood (species not identified) with the bark or bark edge present, and the stakes were sharpened to a point. The second fragment of wattle was less intact, with four stakes lying flat and most of the wattling dispersed. The structures had clearly been designed as an upright wattle fence with the stakes driven into the ground, but had collapsed into the ditch. A similar, apparently contemporary, wattle structure was found on site A (Fig 19, A[178]). Here the upright stakes, which were provisionally identified as hazel (*Corylus* sp) (Goodburn 2007), formed an east–west alignment and the wattle around them had decayed into fragments. The position and size (up to 45mm

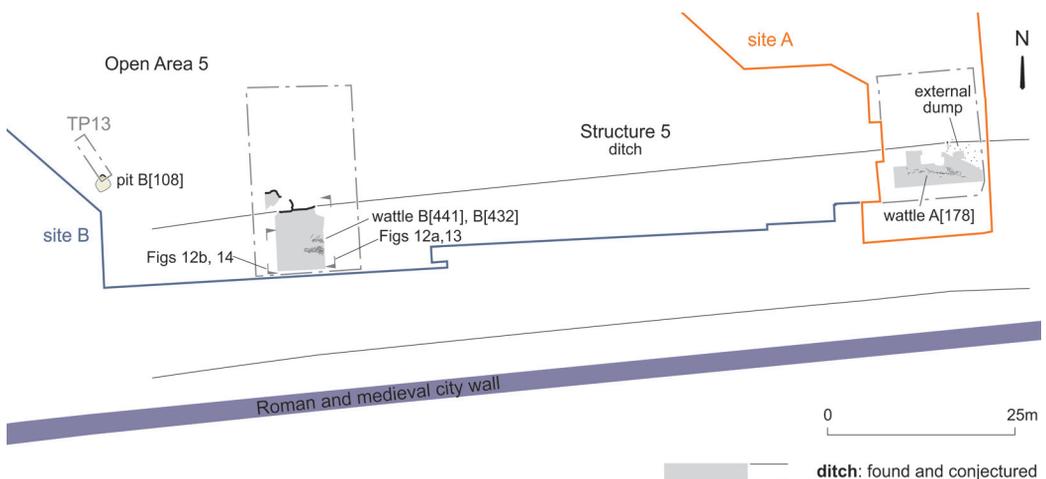


Fig 18. Wattle structures in the city ditch (S5) and a pit in Open Area 5, c.1000–1170 (period 10), and the reconstructed line of the Roman and medieval city wall (scale 1:1000)



Fig 19. Collapsed wattle structure A[178] in the city ditch (S5), c.1000–1170 (period 10), looking north (0.5m scale)

in diameter) of these uprights implies either encroachment of a property or other fenced enclosure into the partially filled ditch or, less likely, the use of wattlework torevet its sides.

Four sherds of pottery (63g) from Structure 5 on site B are dated to c.1050–1170 by spouted pitchers in London-area grey ware (LOGR) and Andenne-type ware (ANDE) from the Low Countries.

A total of 149 sherds were recovered from three fills on site A, dated to c.1080–1150 (Pearce 2012). These include jugs or pitchers, bowls and cooking pots in coarse London-type ware (LCOAR) (Fig 20, <P1>) and various early medieval handmade wares. Part of a spouted pitcher in LOGR has a pronounced collared rim with rouletted decoration around the outside edge and the shoulder (Fig 20, <P2>; cf Vince & Jenner 1991, fig 2.64, no. 177). The rim form can be paralleled in early 12th-century London-type ware (LOND) spouted pitchers (eg Pearce *et al* 1985, fig 21, no. 40).

The series of fills produced an assemblage of Saxo-Norman small finds including a copper-alloy pin or needle shaft, B<19>, from the lowest fill, a type A2 whittle tang knife, B<90> (Ottaway 1992, 562–4), a small

arrowhead, <S2> (Fig 20), similar to arrowheads from York (Yorkshire) ‘suitable for hunting small game’ (*ibid*, 2, 712–14, nos 3919 and 3921), and a group of bone skates (Fig 20; Table 3).

Direct evidence for activity to the north of the city ditch (OA5) was restricted to a single small, unremarkable pit, B[108], and a layer of dumped material A[184] on the edge of the ditch on site A (Fig 18).

Geoarchaeological and Environmental Analysis

The fills making up facies C2 are made up of several phases of coarse tip deposits at the edge of the ditch interleaved with fine silt deposits towards the centre of the ditch. From this point the west and east sections begin to differ from each other in that the west-facing section appeared to have a greater number of distinct deposits (B[350], B[349], B[382], B[381], B[380], B[429] and B[458]), whereas the east-facing section consisted of only B[379] and B[451] (Figs 12–14). The west-facing section will be discussed first (Figs 12a and 13).

Overlying the ditch cut and to the north-

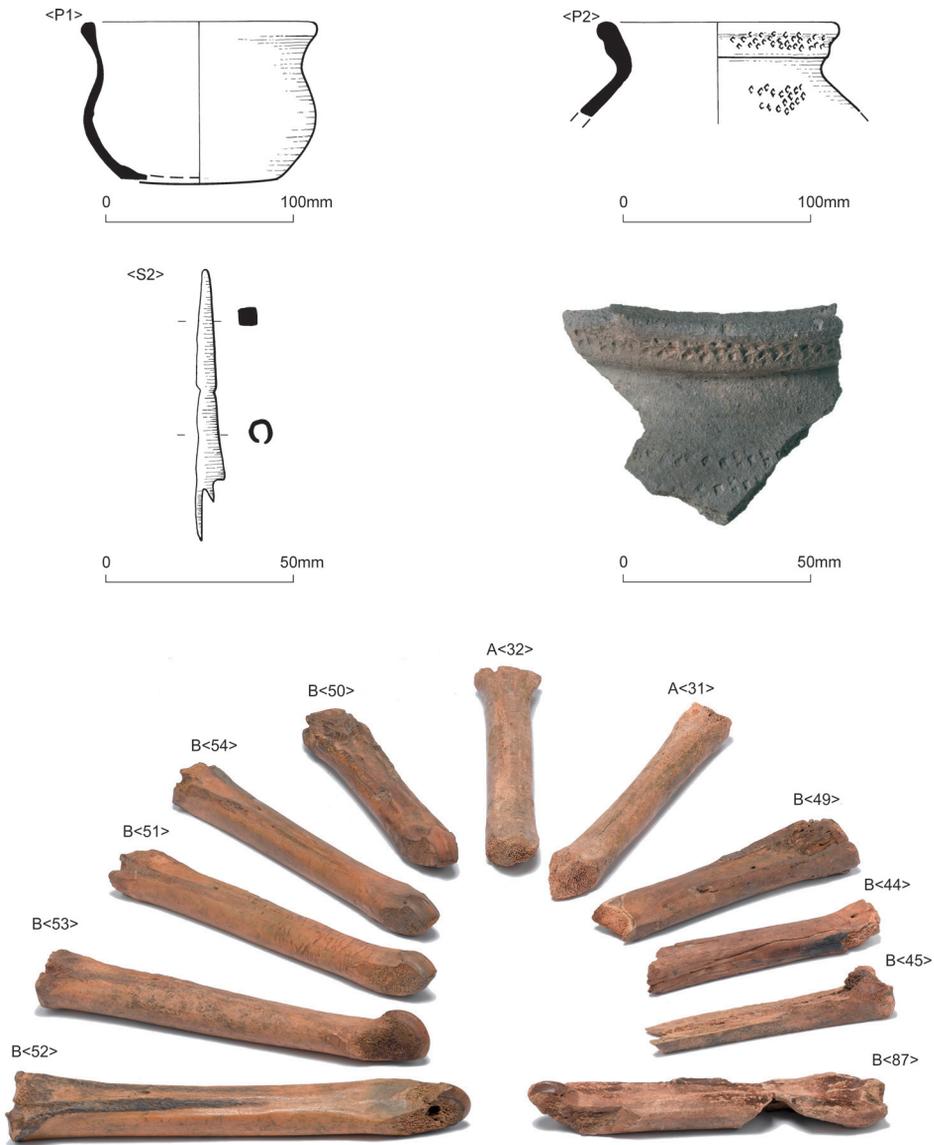


Fig 20. Finds from the city ditch (S5): coarse London-type ware (LCOAR) small cooking pot <P1> and London-area grey ware (LOGR) spouted pitcher <P2> (scale 1:4, photo 1:2); iron arrowhead <S2> (scale 1:2); and bone skates A<31>, A<32>, B<44>, B<45>, B<49>-B<54>, and B<87> (not to scale)

ern edge of the west-facing section are coarse grained tip deposits, B[458] and B[429], signifying the primary erosion of the unstable Taplow Gravels which formed part of the edge of the ditch. These sediments collapsed very quickly after construction and may have helped to stabilise the ditch edge. They are limited to the very edge of the ditch and do not extend towards its centre.

The deposits of B[458] and B[429] are sealed by fine, organic silt deposits B[382] and B[380]. The silt represents a still or slow flowing water environment, with pollen and insect evidence of duckweed and water boatmen (Corixidae), respectively, reflecting this. However, this was not an idealised pond environment as the ostracod and insect data also indicate muddy waters and a very

Table 2. Radiocarbon dates from the city ditch (S5 and S6); results are calibrated using OxCal 4.2 (Bronk Ramsey 2009) and IntCal13 (Reimer et al 2013) and rounded outwards as recommended by Mook (1986)

Context	MOLA sample reference	Laboratory no.	Material; pretreatment	¹³ C/ ¹² C ratio (%)	Radiocarbon age (BP)	Calibrated date (95% confidence)
B[379]	BOJ10-118	BETA-340820	<i>Avena sp</i> grains; acid/alkali/acid	-23.9	1020 ± 30	cal AD 900–1150
B[337]	BOJ10-105	BETA-340819	<i>Onopordum acanthium</i> seeds; acid/alkali/acid	-22.6	1020 ± 30	cal AD 900–1150
B[345]	BOJ10-94	BETA-340818	<i>Agrimonia eupatoria</i> seeds; acid/alkali/acid	NA	990 ± 30	cal AD 980–1160
B[380]	BOJ10-99-BTM	BETA-306856	seeds; acid/alkali/acid	-26.7	1050 ± 30	cal AD 900–1030

eutrophic and stagnant setting. Beetles indicating the introduction of waste from within buildings and those derived from the cleaning or processing of fleeces or wool rather than the penning or close proximity of sheep were also present (Allison 2013).

Context B[381] signifies a change in the depositional environment, as the bands of sandy silt within the finer grained silt matrix suggest regular seasonal deposition as a result of surface flow into the ditch. This deposit is overlain by the larger and wider spread of a fine grained organic deposit, B[380]. It overlies the majority of the tip deposits to the edge of the ditch (as mentioned above) and also directly covers the disturbed London Clay, B[440], in the centre of the ditch. This deposit seemed to form over a longer duration and may even be contemporary with the primary and secondary tip deposits to the edge of the ditch. The base of B[380] was radiocarbon dated to cal AD 900–1030 (BETA-306856; Table 2; Figs 12a and 13), earlier than the pot date. It marks a return to a similar environment as that recorded in B[382], with signs of erosion at the ditch edge with a (seasonally) wet and highly organic deposit at the ditch centre. The diatom and insect remains indicate a muddy water-filled ditch containing reeds, duckweed and rushes and anthropogenically disturbed ground outside it (Cameron 2013; Allison 2013). Paradoxically, the pollen suggests little evidence of wetland vegetation although this may be a result of short-lived

fluvial environments (Scaife 2012b). The insect remains continue to suggest human activity nearby with indication of wooden structures, manure waste/animal skin processing and human faecal waste.

At this point the fills left a shallower ditch, about half its original depth. Despite the shallow gradient toward the edge, more tip deposits such as B[350] still occur. Once again, however, the deposition or collapse of the coarser sediments subsides enough for a successive phase of finer grained silting, B[349]. The diatoms indicate some wetland vegetation and permanent shallow water during this period. The pollen evidence also shows an abnormally high degree of cereal pollen representing continued disposal of faecal matter and organic waste in the ditch (Scaife 2012b).

The east-facing section (Figs 12b and 14) also records tip deposits and primary erosion into the ditch until the edge stabilised. In the east-facing section deposit B[451] is very similar in form and composition to B[458] and B[429] in the west-facing section, and in a similar way would have formed very soon after the recutting of the ditch.

The basal deposit, B[451], is overlain by an organic silt deposit, B[379], which produced a radiocarbon date of cal AD 900–1150 (BETA-340820; Table 2; Fig 12b). Paradoxically, the environmental remains present at the base of B[379] give indications of both shallow standing water with significant evaporation (diatoms) and a permanently wet ditch,

which did not dry out (insects). This situation could be explained by the ditch periodically drying out on a seasonal basis, but remaining wet the rest of the time. Similar to the other profiles, the pollen evidence suggests local land clearance and cereal production. Fish and bird bones were recovered from the insect sample further suggesting waste disposal in the ditch. Toward the top of B[379] the increased numbers of intestinal parasite eggs in the pollen samples indicate that the grass and cereal pollen is likely associated with increased waste disposal into the ditch. Again grape (*Vitis*) features and as before is most probably of secondary waste origin (Davis 2013). Still pools of water in the ditch are indicated by the insects and aquatic/wetland plant pollen (Allison 2013; Scaife 2012b). Interestingly, flax (*Linum*) is abundantly evident in the pollen record for B[379] (Scaife 2012b), which may well come from the cultivated form (below).

The difference between the two sections could result from a number of factors. Whatever activities occurred adjacent to the ditch in the vicinity of the west-facing section had a very localised effect thus producing the successive tip deposits seen. It may be that the cause of the erosion into the ditch either from increased arable agriculture or from the unconsolidated nature of the subsurface geology was better protected against erosion in the vicinity of the east-facing section (*ie* by fences). It is also possible that the majority of the evidence for the tip deposits was removed or obscured by the modern truncation evident in the east-facing section. On the whole, however, this facies represents prolonged disuse or absence of maintenance of the ditch with the fills alternating between relatively rapid erosional events forming the tip deposits to the edge of the ditch and the more drawn out silting up events occurring across the width of the ditch.

Three samples (B[382], B[63]; B[380], B[62]; B[349], B[60]; Fig 13) from Structure 5 produced very similar assemblages of plant and invertebrate remains. By far the largest component of all three were the very high concentrations of seeds and seed capsules of cultivated flax (*Linum usitatissimum*), along with stem fragments believed to have come from the same plant (see period 10 discussion below).

Other remains suggested that the environment around the ditch (S5) remained similar to that encountered in the previous period (S4), with the ditch itself supporting a variety of wetland and aquatic plants consistent with periodic and probably long-term flooding. Rigid hornwort (*Ceratophyllum demersum*), watercress (*Rorippa nasturtium-aquaticum*) and duckweed, whose seeds were all found in small numbers, are plants which require constant or almost permanent water to survive, suggesting that conditions in the ditch may have been very suitable for flax retting (Davis 2013).

A further sample (B[398], B[76]) of material surrounding the wattlework (above; Fig 18) contained a mass of compressed grass, along with two pieces of wood, one identified as oak (*Quercus* sp) and one as hazel (*Corylus avellana*), presumably from the wattle structure.

Discussion (Period 10)

The ditch was still functioning as a defensive feature around the City in the later 11th and 12th century and contained standing water for the majority of the time. Whether the wattle structures found in the bottom were intended to be a fence, possibly to prevent animals from crossing the ditch, or a lining to retain the unstable sides of the feature is not clear, but they would not have performed any serious defensive function. Their presence in both trenches suggests that they were a continuous feature along the base of the ditch. It is possible that they were divisions within the ditch associated with flax retting, which may also explain the discrepancies in the make-up of the two analysed sections. They appear less substantial than the better-preserved wattle fence which ran across the 13th-century ditch at 1–6 Old Bailey (LUD82; Rowsome 2014, 233–6, fig 6), but potentially indicate civilian encroachment on the open ditch at an earlier date.

High concentrations of cultivated flax such as those seen here might be expected where retting was being carried out in the shallow water of a ditch. Flax was widely cultivated for both its seeds (linseeds), used for oil and as food, and the fibres extracted from its stems for the manufacture of linen. In order to separate these fibres it is necessary to soak

the bundles of uprooted plants in water for ten to 14 days to decompose the surrounding stem tissues (Baines 1985, 4), a process called retting. After this the flax is dried and subjected to various beating (scutching) and combing (heckling) procedures to remove the straw and align the fibres before spinning and weaving.

Retting, however, is notoriously odorous and produces foul effluent. Curiously, the insect evidence for water quality was equivocal since most of the aquatic beetles and bugs recorded from the ditch fills are tolerant of some degree of pollution, particularly diving beetles (Dytiscidae) and water boatmen which were both well-represented throughout the sequence. Added to this, the records from all samples examined in this study indicate that water conditions in the ditch were regularly clean enough for substantial populations of water fleas to develop. This may indicate that flax retting was a low-level activity and/or seasonal fluctuations in water level may also have offset pollution to some extent, if water refilling the ditch periodically was relatively clean (Allison 2013).

Flax-processing remains have been found in many archaeological contexts where still or slow-moving water provided a suitable environment for retting, including at King Edward Buildings (Davis 2007, 176–80),

close to the current site. Flax seeds and fruits occurred in almost all samples from the medieval city ditch fills there, though in smaller numbers than at the current site. Another concentrated deposit of flax seeds, stems and capsule fragments was found in an early medieval ditch fill at St Mary Spital, just outside the City to the north-east (Davis 1997, 18), suggesting that flax processing may have been commonplace in the areas immediately outside the City. Flax was often grown as a garden crop during the medieval period (Greig 1988, 122), and could have been cultivated in this way by households situated just outside the city boundaries, resulting in numerous small-scale retting operations in the regularly water-filled city ditch. Seeds of wild plants in these fills included a range of arable weeds, including corncockle (*Agrostemma githago*), wild radish (*Raphanus raphanistrum*), cornflower (*Centaurea cf cyanus*) and corn spurrey (*Spergula arvensis*), all of which were rare or absent in other ditch fills, and would almost certainly have formed part of the harvested flax crop.

The Later Medieval City Ditch (S6), c.1170–1250 (Period 11)

The period 11 city ditch (S6, Fig 21), filled up fairly rapidly, partly through natural

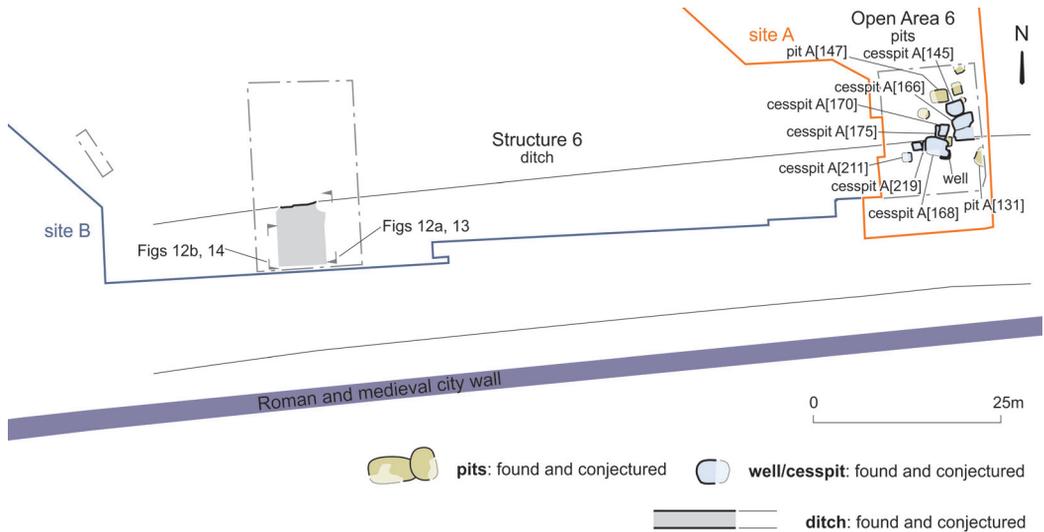


Fig 21. The city ditch (S6) and an area of pitting (OA6), c.AD 1170–1250 (period 11), and the reconstructed line of the Roman and medieval city wall (scale 1:1000)

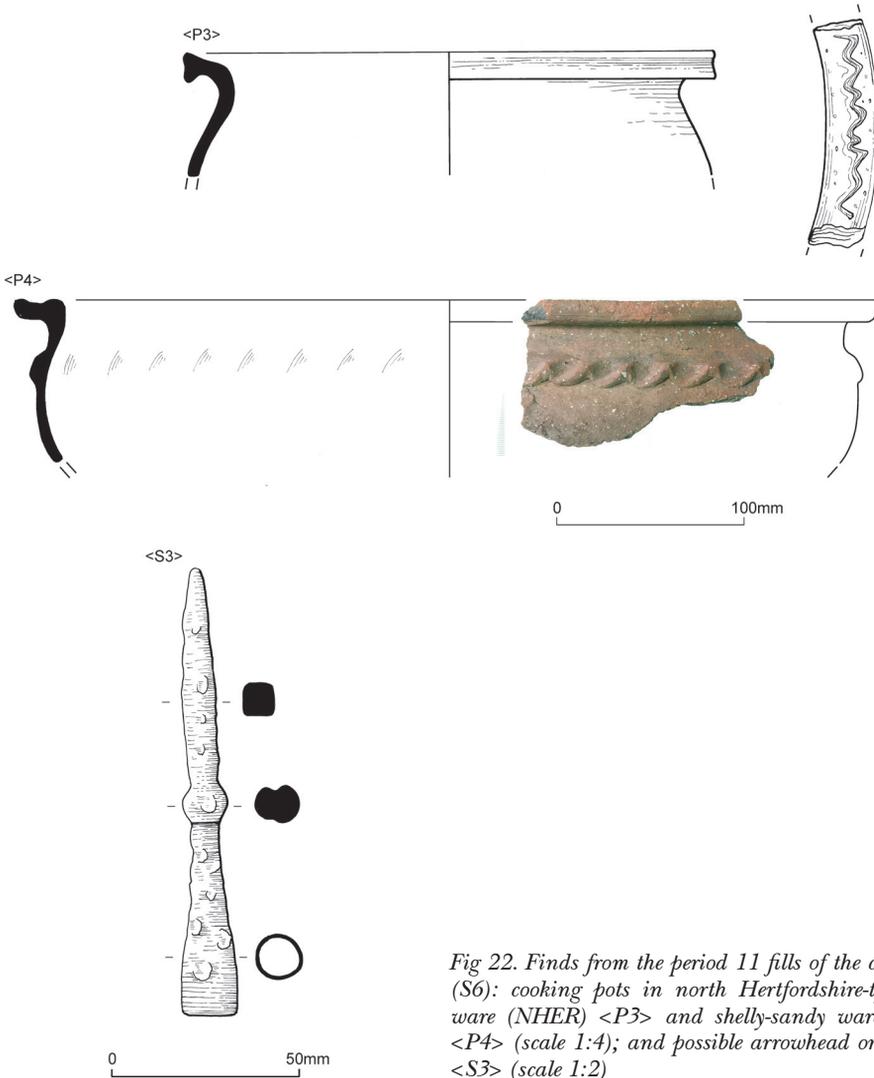


Fig 22. Finds from the period 11 fills of the city ditch (S6): cooking pots in north Hertfordshire-type grey ware (NHER) <P3> and shelly-sandy ware (SSW) <P4> (scale 1:4); and possible arrowhead or pole tip <S3> (scale 1:2)

processes and partly due to deliberate dumping. By the end of this period the ditch appears to have gone out of use.

Pottery from Structure 6 on site B is dated to c.1170–1200 by jugs or pitchers in coarse London-type ware (LCOAR) and calcareous London-type ware (LCALC), as well as cooking pots in south Hertfordshire-type grey ware (SHER), with early medieval handmade wares and imported Andenne-type ware (ANDE). On site A the fills can be dated to c.1140–1200, with sherd links recorded between context A[155] and the large context A[169], part of the fill of a cesspit (in OA6) (Pearce 2012).

The earlier ditch fills are dated by jugs, pitchers and cooking pots in LCOAR, London-type ware (LOND) and LCALC. These include early rounded jugs with white or red slip decoration typical of the second half of the 12th century (Pearce *et al* 1985, figs 12–17). No later London-type wares were identified, suggesting deposition before c.1200. The thumbed rim of a cooking pot in a wheel-thrown north Hertfordshire-type grey ware (NHER) (Fig 22, <P3>) can be compared to types used on the manorial site of Caldecote, Hertfordshire (L Whittingham, pers comm). London-area grey ware (LOGR) is relatively common in the ditch fill

(96 sherds from cooking pots and spouted pitchers). Five sherds from cooking pots in shelly-sandy ware (SSW; c.1140–1220) include one with an applied, thumbled shoulder cordon and an incised wavy line around the rim (Fig 22, <P4>). Other fabrics include early medieval handmade wares, as well as imported ANDE and red-painted ware (REDP). There are also sherds from two metalworking crucibles in early medieval coarse white ware (EMCW).

Early medieval ceramic roofing tiles and shouldered peg tiles were recovered from this phase of the ditch. All these roofing tile types were made in London. Shouldered peg tile was found associated with residual pottery of c.1050–1150 suggesting it is of early- to mid-12th-century date. This would make it contemporary with the use of the flanged/curved roofing system in London (Betts 2007, 430–1).

Three bone skates (Table 3), including two small examples suitable for use by children, a horseshoe, B<23>, and a possible iron arrowhead, <S3> (Fig 22), were recovered from the period 11 ditch fills on site B (Marshall 2012). The arrowhead is unparalleled in the major typologies (Ward-Perkins 1940; Jessop 1996) and may alternatively be a finial or pole tip.

Geoarchaeological and Environmental Analysis

Facies C3 contains a single specific deposit, B[346], on the west-facing section (Figs 12a and 13). It was redeposited brickearth mixed with a significant quantity of ceramic building material. The presence of the ceramic building material, the high elevation relative to the ditch edge and the thickness of the deposit suggest that the brickearth was dumped rather than eroded; the redeposited and coarse grained nature of the deposit meant that provenance and preservation of environmental remains would not be useful and therefore it was not sampled.

Much like facies C2, facies C4 is made up of rapid erosional events represented by tip deposits alternating with more prolonged silting up events towards the centre of the ditch. This facies only exists on the west-facing section where facies C3 splits facies C2 and C4 (Figs 12a and 13). The basal deposit is

organic silty deposit B[345]. Terrestrial seeds from the upper portion of B[345] provided a wide radiocarbon date range from the late Saxon through to the late Norman period (cal AD 980–1160; BETA-340818; Table 2; Fig 12a). The pottery dating, however, suggests that even the latest part of this range is too early to be contemporary.

Layer B[345] would have formed as a flat, waterlain deposit but has undergone very acute post-depositional slumping. The environmental remains from this deposit once again indicate an alternating seasonal to permanently wet, highly organic ditch. The pollen records high cereal pollen, again probably the result of faecal matter and organic waste disposal in the ditch. Insect evidence shows stagnant conditions in the ditch with woody vegetation nearby or household rubbish dumping in the ditch. The ditch water was likely to be muddy with abundant plant litter. Although the cereal pollen is probably derived principally from waste material, cultivation of a range of plants associated with cereal production such as blue cornflower (*Centaurea cyanus*) is indicated by the pollen from the vicinity of the ditch (Scaife 2012b).

Deposit B[345] is overlain by the more rapid erosional events signified by B[426], which was probably eroded from the brickearth dump B[346], facies C3. The ostracod and insect remains from B[426] suggest that significant amounts of sediment eroded into a relatively wet ditch making the temporary waters muddy. The high organic nature of B[426] suggests that the eroded sediment mixed with the organic detritus at the base of the ditch.

The final deposit of facies C4 is another erosional deposit B[344] which, instead of forming a tip deposit, fills the much narrowed base of the ditch. The lithology of the deposit suggests it was soil washed into the ditch during periods of increased agricultural activity in the area. Overall, C4 like that of facies C2 represents a period of disuse or, at least, absence of maintenance of the ditch, with the fills alternating between rapid erosional events and a single more drawn out silting up event.

Facies C5 consists of the uppermost surviving fills of the city ditch, B[326] and B[337] (Figs 12–14). At this stage the city

ditch is less than half its original depth and width, and the final fills are predominantly slower silting up deposits. The radiocarbon date, derived from terrestrial seeds from the surface of B[337], cal AD 900–1150 (BETA-340819; Table 2; Fig 12b), again disagrees with the pottery, suggesting residuality of the source.

The main deposit of this facies, B[326], is a fine grained silting up deposit with frequent anthropogenic input such as ceramic building material, pot, animal bones, charcoal and oyster shell. The amount of artefactual material may be due to the increased activity nearby and consequent increased use of the ditch for waste disposal, or simply a factor of the reduced size of the ditch.

The diatoms indicate standing water and significant evaporation along with a high organic content (Cameron 2013). There were insect remains and bark or wood fragments indicating tanning processes possibly happening nearby with associated waste dumped in the ditch (Allison 2013). Interestingly, the west-facing section contained diatoms common in the tidal River Thames, but again this is likely associated with dumped material (Cameron 2013). An increase in dandelion types (*Lactucoideae*) in the pollen suggests drying out and poorer preservation (Scaife 2012b). Generally the environment outside of the ditch appears to be herb dominated with only small numbers of tree and shrub pollen, typical of anthropogenically disturbed ground. Notable pollen included those derived from grape and walnut (*Juglans*). Grape is most probably of secondary origin from waste food (raisins) or wine, although contemporary growth (ornamental or for fruit) cannot be ruled out. Walnut is an interesting occurrence, being regarded as a Roman introduction into Europe as a whole. There are an increasingly large number of English sites which have produced evidence of its presence including the Temple of Mithras (Scaife 1982) and notably in medieval fills of the Tower of London Moat (Scaife 2004). It seems that once introduced into this region it was maintained throughout the historic period, and studies at medieval Spitalfields (Scaife 2006) have located a source of walnut growth in its gardens.

Just prior to and at the base of B[337] the

pollen indicates a local environment change with increased evidence of agriculture in the vicinity. The ditch itself appeared to be a cleaner, aquatic environment. This might be indicative of reduced waste dumping into the ditch compared to the lower parts of B[326] where ceramic building material and pottery were found alongside animal bones. Moving up the profile of B[337] it is evident that the deposit is a mix of fine grained erosion and dumping. There is continued pollen evidence for cereal production nearby and possibly the land clearance that is exacerbating the erosion into the ditch. The ostracods indicated an aquatic environment and wet organic detritus although some possibility for drying out (Whittaker 2012). However, the pollen suggests a regime/local environment change with increased evidence of agriculture and decreased evidence of aquatic plants as the ditch possibly dried out. The majority of the beetles were *Trox scaber*, a species which is regularly recorded from urban archaeological sites where it appears to be especially associated with the floors of ancient buildings, which presumably provided a comparable habitat (Allison 2013).

Of the seven samples studied from the period 11 city ditch fills, the earliest three (B[346], B[59]; B[345], B[94]; B[426], B[74]) contained the largest and most diverse assemblages of plant remains, with that from B[94] particularly rich and rather different in composition from the others (Fig 13). In terms of wild plants the fills were similar to those from the period 10 ditch fills (S5), with seeds of waste and other disturbed-ground taxa, together with a number of grassland species, representing the dry-ground environment around the ditch. The ditch itself continued to contain water for much of the time, as evidenced by seeds of duckweed and crowfoots (*Ranunculus* subgen *Batrachium*) in all the samples, along with pondweed, water star-warts (*Callitriche* sp) and watercress in some fills. Plants of water-saturated and periodically flooded habitats were particularly common in samples B[59] and B[94] from the lower fills. Only sample B[94] contained any evidence of woody plants, with numerous twiggy wood fragments, several of which were sectioned and found to be from oak and many small

leaf fragments, probably also from oak. These remains may have fallen from a single tree growing nearby or, considering the rarity of wood in adjacent samples, may have been included in dumped material from further afield.

Evidence for plant food remains was again very rare, but sample B[94] (B[345]) resembled the Structure 5 fills (B[382], B[63]; B[380], B[62]; B[349], B[60]) in containing a number of flax seeds and seed capsules together with a group of arable weed seeds, probably from the same source.

In context B[346], the fill of the 12th- to 13th-century city ditch, a piece of vitrified furnace ceramic (112.3g) was found. Again the inside surface was black, slaggy and vitrified, the outside lining reduced and grey. The ceramic is very similar to that described from context B[397] in Structure 5 but lacking the blue surface colouration.

Suburban Activity (OA6)

Evidence for activity to the north of the city ditch consisted of a few thin dumped deposits on both sites and a cluster of pits on site A, which included a number of cesspits and a well (Fig 21). The dumps partly overlay the edges of the ditch and were probably derived from maintenance work and nearby pit digging; they are dated to *c.*1170–1200 by LCOAR and SHER.

On site A, medium to large assemblages of pottery from Open Area 6 pit fills are contemporaneous with the final filling of the city ditch in the later 12th century. Fill A[144] in cesspit A[145] yielded 329 sherds (98 ENV, 7,952g) datable to *c.*1140–70 (Pearce 2012). There are 113 sherds from cooking pots and bowls in early medieval handmade wares (early medieval shell-tempered ware (EMSH), early Surrey ware (ESUR) and LOGR). These include part of a bowl in ESUR with lug handles at the rim (Fig 23, <P5>), a rare form in the London area known also in EMSH (Vince & Jenner 1991, fig 2.47, no. 113). There is also a spike or hanging lamp in LOGR (Fig 23, <P6>), another uncommon form, sherds from at least ten cooking pots in SSW, as well as 104 sherds from a minimum of 23 cooking pots (Fig 23, <P7>, <P8>) and a large flared bowl in LCOAR (Fig 23, <P9>). Thirty-nine

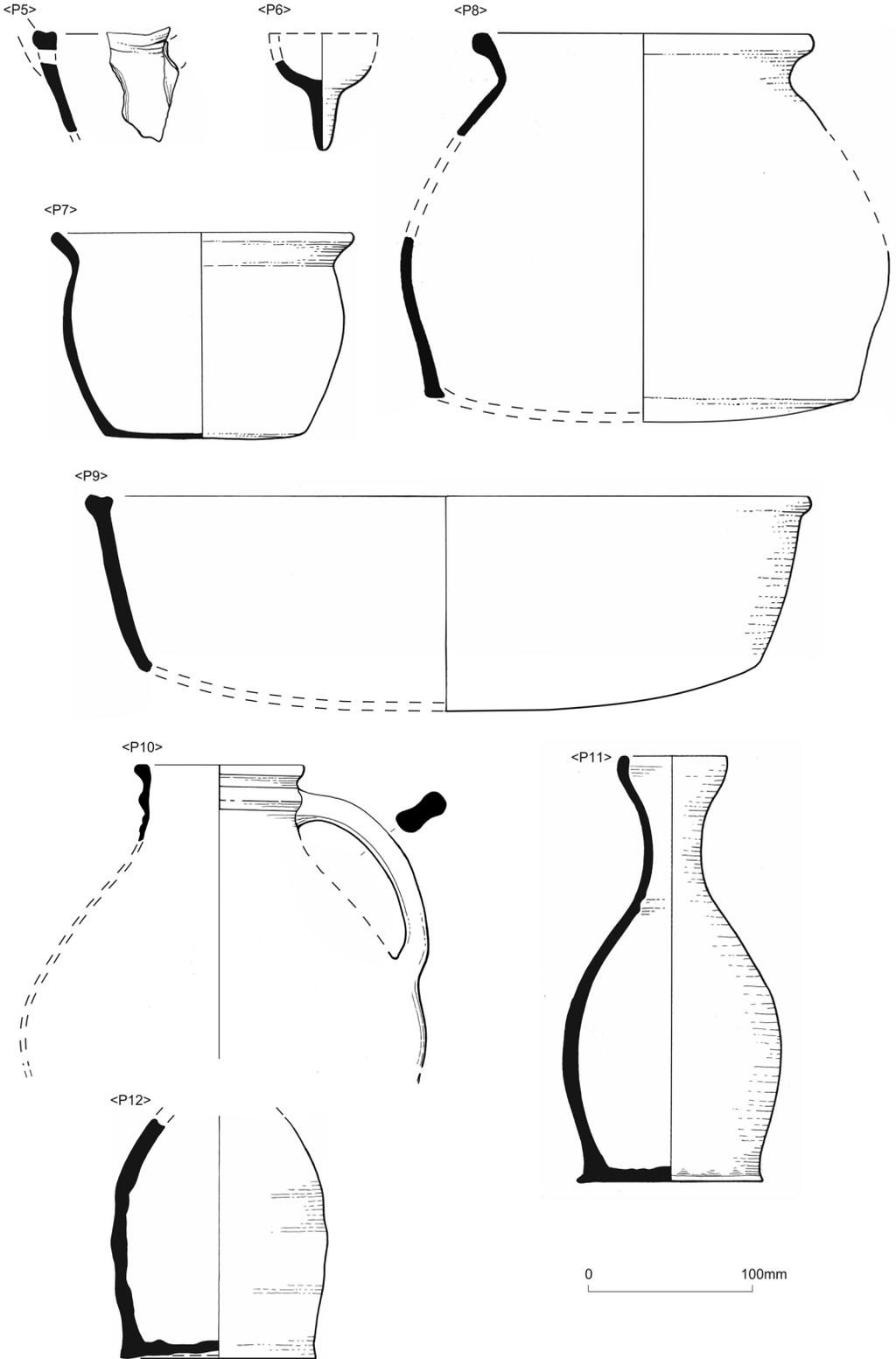
sherds from early rounded jugs in the same fabric are typical of the 12th century (Fig 23, <P10>; Pearce *et al* 1985, figs 10–18); some have white slip decoration in the 'early style' (*ibid.*, 27–8). More unusual are two large unglazed bottles or flasks in LCOAR. They are crudely formed with a flat base, and a narrow neck with flared rim (Fig 23, <P11>, <P12>). Bottles are not usually known in this fabric before the mid-13th century (*ibid.*, 41), and these larger, thick-walled vessels may have had an industrial use.

The pottery from fill A[169] of cesspit A[170] is in a similar range of fabrics and forms current during the later 12th century. These include part of a cooking pot in coarse London-type ware with calcareous inclusions (LCOAR CALC; Fig 23, <P13>) and the rod handle of a probable spouted pitcher in LCOAR, with comb-stabbed decoration, rouletting and vertical red slip strips round the body (Fig 23, <P14>; *cf* Pearce *et al* 1985, fig 21, no. 43, figs 22–3). A similar range of fabrics and forms was recovered from the fill, A[165], of cesspit A[166] (92 sherds, 35 ENV, 1,517g). Dating to *c.*1140–1200, this group consists largely of jugs in LCOAR, together with cooking pots in early medieval handmade wares. A slightly later feature, cesspit A[168], is dated to *c.*1170–1200 (82 sherds, 39 ENV, 1,356g), with numerous jugs in LCOAR, as well as SSW and SHER in its fill, A[167]. Rouen and north French-style decoration in LOND were recorded in the fills (A[129] and A[130]) of refuse pit A[131], which produced fewer sherds of early medieval wares. In each of these groups there are sherds from two metalworking crucibles in a generic medieval white ware crucible fabric (MWCR). These imply low-level industrial activity somewhere in the vicinity, but were not numerous enough to suggest a major industry nearby.

Cesspit A[170] and refuse pit A[147] also yielded medieval ceramic roofing tiles, including a flanged roofing tile and curved tile, which were made in London between *c.*1120 and *c.*1220 (fabric 2273).

Discussion (Period 11)

The steady infilling of the city ditch (S6) continued during this period. There appears to have been a variety of depositional



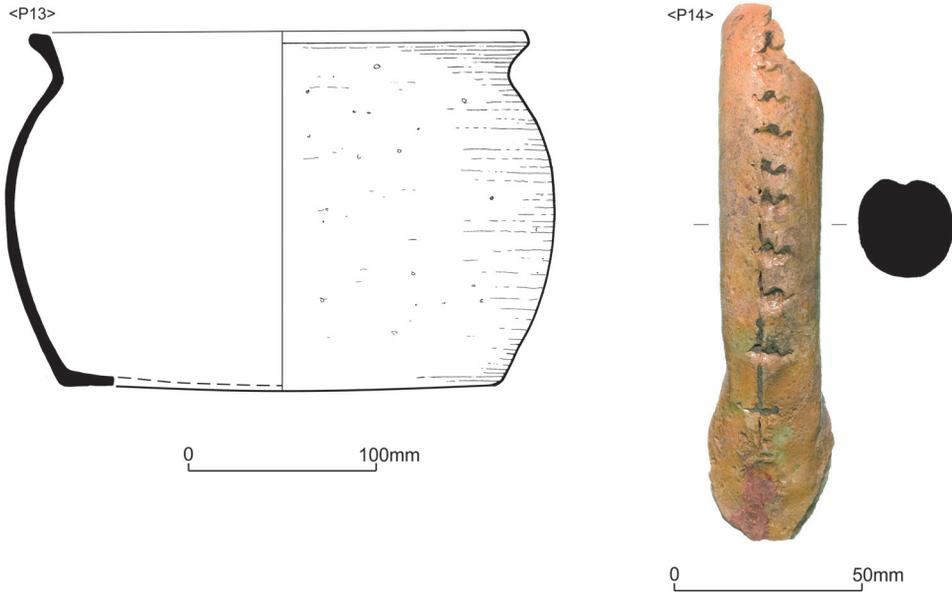


Fig 23. (facing and above) Pottery from Open Area 6: early Surrey ware (ESUR) bowl with lug handles <P5>; London-area grey ware (LOGR) spike or hanging lamp <P6>; coarse London-type ware (LCOAR) cooking pots <P7> and <P8>, large flared bowl <P9>, early rounded jug <P10> and bottles or flasks <P11> and <P12>; coarse London-type ware with calcareous inclusions (LCOAR CALC) cooking pot <P13>; and detail of calcareous London-type ware (LCALC) handle <P14>, probably from a spouted pitcher (scale 1:4, <P14> 1:2)

methods, with periods of stagnant water interspersed with erosional events, silting up and dumping. In the later fills, examined from facies C5, there is a period when local agriculture is indicated, during which time the ditch was relatively fresh and clean. This suggests a degree of maintenance but there is little other evidence of upkeep. The latest fills in facies C5, in particular B[326], produced a greater quantity of artefactual material suggesting an increase in local anthropogenic activity.

The dating evidence for the ditch fills in this period is somewhat mixed. The radiocarbon dates derived from seeds are consistently early, with the latest date being cal AD 980–1160 (BETA-340818; Table 2). However, the ceramic evidence from the city ditch suggests that the final fills were deposited after c.1140 and before c.1220, based on finds of SSW and mid–late 12th-century London-type wares. The presence of three sherds of SHER indicates final deposition in c.1170 and no other pottery introduced during the last quarter of the 12th century was identified.

The finds are consistent with ceramic usage across the City during the 12th century, dominated by cooking and serving vessels in a range of early medieval handmade fabrics and London-type wares. It is notable that the pottery dating of the later medieval ditch at the Merrill Lynch Financial Centre is the same as at the site, c.1150–1200 (Lyon 2007, 63). It seems likely, therefore, that the seeds which provided the radiocarbon dates were residual in this period and had been redeposited by erosion, bioturbation, or during deliberate (though unrecognised) clearance episodes.

The general picture for the period, therefore, is one of relative neglect, reflecting the declining use of the ditch for defensive purposes, leading to it not being scoured out and becoming infilled. Increased extramural activity as well as the lack of maintenance of the defences is indicated by the pitting on site A, which encroaches on the north edge of the city ditch. The pits may relate to activity to the rear of suburban tenements on a forerunner of Little Britain ('Brettone

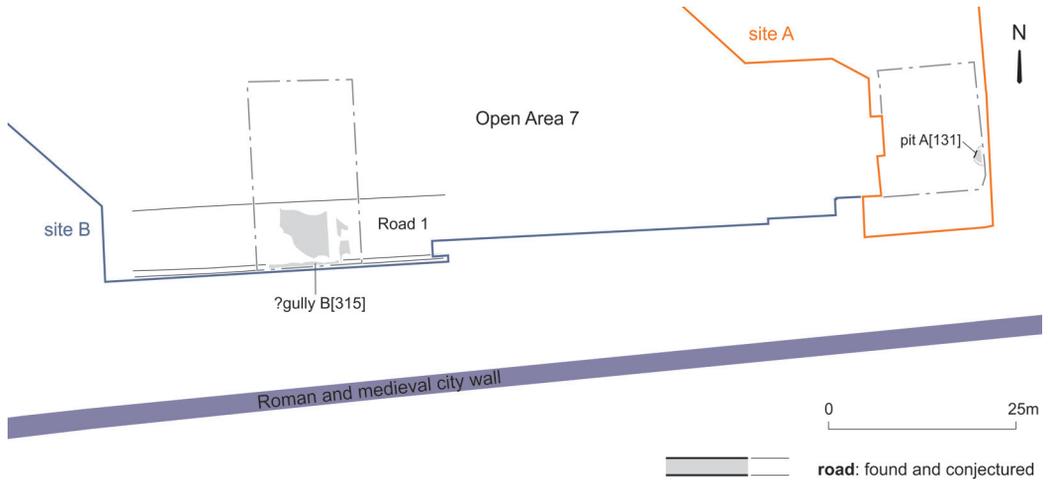


Fig 24. Road 1 and Open Area 7, c.1250–1500 (period 12), and the reconstructed line of the Roman and medieval city wall (scale 1:1000)

Strete' is documented from 1329; Carlin & Belcher 1989, 67), or to the disposal of cess and refuse from the hospital of St Bartholomew and elsewhere.

The Disuse of the City Ditch and Latest Medieval Activity, c.1250–1500 (Period 12)

Consolidation, Road or Yard (R1)

The final disuse of the city ditch on site B was marked by the construction of a metallised surface, presumably laid over the soft fills as consolidation and for use as a road or yard surface, here termed Road 1 (Fig 24). Initially a consolidation dump of mixed silts and brickearth was deposited in the slight hollow where the ditch had subsided as a levelling layer before the harder brickearth and pebbles were laid as metalling.

Suburban Activity (OA7)

To the north, the area remained open ground (OA7; Fig 24). At the extreme south end of the site B excavation trench, to the south of Road 1, was the edge of a shallow gully, B[315], cut into the latest fill of the city ditch and running east–west across the whole trench (Fig 24). Its south edge was beyond the edge of the trench, but indications were that it was shallow, at 0.40m deep, and narrow, at 0.60m wide as found. It

is unlikely to be a late manifestation of the city ditch, but its function was not entirely clear. It was possibly a drain, although the level of the base was fairly flat, or perhaps a boundary ditch. Six small sherds of medieval pottery (88g) from the fill, B[314], range in date from the 12th century to c.1350–1400. The fill also yielded a well-preserved pair of decorated copper-alloy tweezers, <S4> (Fig 25), similar to examples from 12th-/13th-century York (Ottaway & Rogers 2002, 3071, no. 12926) and 13th-/14th-century London (Egan & Pritchard 1991, 381, no. 1775).

Present in Open Area 7 was a scatter of London-made ceramic peg roofing tile (fabrics 2271, 2586, 2587). One peg tile has a round nail hole which has not been punched all the way through, a fairly common occurrence on London peg tiles.

One pit, A[131], contained a London-made 'Westminster' floor tile (A[130], A<27>) which probably dates to the second half of the 13th century or the first few years of the 14th century. This decorated tile has a published design (Betts 2002, 62, design W161). It was found with pottery dated c.1170–1240, hence the pit is assigned to period 11 (above). While this could suggest that 'Westminster' tiles may have been introduced slightly earlier than first thought, it is equally possible that pit A[131] was only finally backfilled early in period

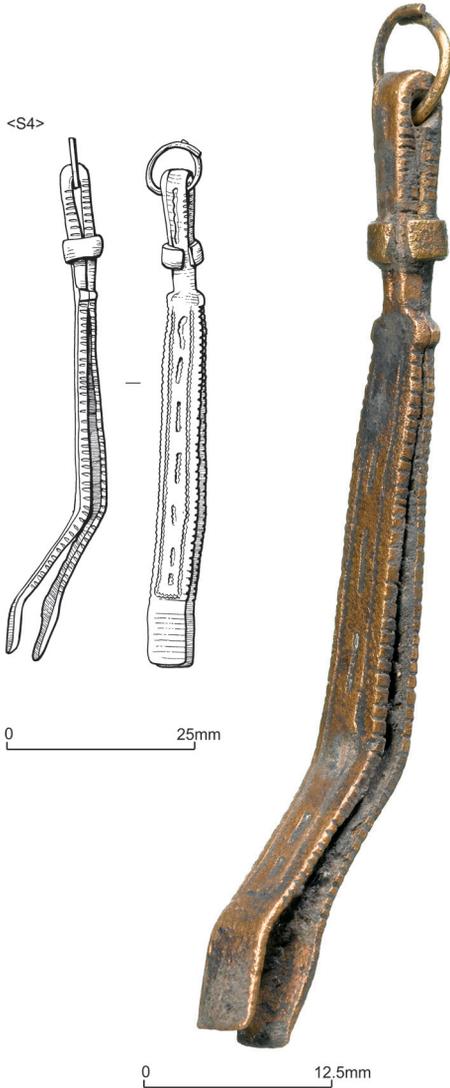


Fig 25. Copper-alloy tweezers <S4> from gully B[315] in Open Area 7 (scale 1:1, photo 2:1)

12 (Fig 24). 'Westminster' tiles have been found associated with the chancel of Temple Church in the City of London consecrated on Ascension Day 1240 (Brown 2005, 82). However, a c.1240 production date should be treated with caution as the earliest two-colour tiles currently known in Britain are those ordered from Winchester Castle (Hampshire) in 1241-2 (Allan & Keen 1984, 241). The 'Westminster' tiles found at

Temple Church could represent the remains of a later tiled floor.

The most likely source of the 'Westminster' floor tile, and the other floor tiles from the site, is the priory and hospital of St Bartholomew the Great which lay just to the north of the site. This was later split into the hospital to the west side and the Augustinian priory to the east (Thomas 2002, 49). Both have produced 'Westminster' floor tiles (Betts 2002, 63).

Discussion (Period 12)

Period 12 represents something of a hiatus on the site, at least in activity of the kind which appears in the archaeological record. The city ditch was largely disused by the end of period 11 (above); alternatively the low level of activity seen in period 12 could show that opportunistic refuse dumping was more effectively controlled from c.1250 to c.1500, and the ditch did not need to be recut. The truncation of almost all horizontal stratigraphy on both sites means that evidence for later phases of the city ditch have been lost. Whether the gravel surface (R1), really functioned as a surface designed for transport is debatable, and it may have been little more than a consolidation of the fills of the period 11 city ditch to provide a firm surface on which other activities could take place.

POST-MEDIEVAL (PERIOD 13)

The Encroaching Suburbs, c.1500-1830 (Period 13)

In 1547-8 according to Stow a postern gate was constructed in the city wall and a footbridge constructed across the largely infilled city ditch to link Christ's Hospital and St Bartholomew's Hospital (Stow 1956, 33). It is documented that in 1553 the 'town ditch' from Newgate to Aldersgate was 'stoppped up with brycke and made playne [with the] erthe' (Nichols 1852, 77). On the Agas woodcut map of London (c.1561-70), this section of the city ditch is shown as open space, but the adjoining stretch behind Giltspur Street had already been divided into various plots, implying it was in the process of being developed (Prockter & Taylor 1979, pl 8).

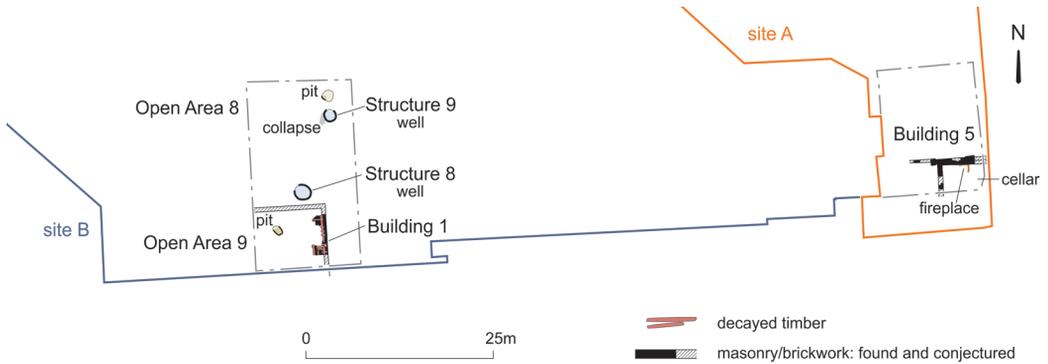


Fig 26. Post-medieval features, c.1500–1830 (period 13) (scale 1:1000)

Masonry Building (B1)

On site B, over the backfilled city ditch and the period 12 metalling (R1) the north-eastern portion of a cellared masonry building was constructed. Its foundations extended beyond the western and southern limits of excavation (Figs 26 and 27).

Initially the southern end of the wall foundation trench was consolidated with a dump of hard-packed gravel, B[204]. This deposit was compacted into the soft material beneath as extra support for the foundation. A latticed raft of timber beams was laid as

lacing beneath the masonry. The timbers had decayed leaving only dark brown stains but the voids were clear, recorded as B[200] (Fig 27). Finally, the masonry foundation was laid over and around the timber beams. Up to three masonry courses were present and the occurrence of ragstone, chalk and Reigate stone in the foundations indicates that the majority of the materials were reused from a medieval building. There were no associated finds. The footings were truncated at a height of 13.83m OD, but no contemporary ground or internal surfaces survived.



Fig 27. Building 1 under excavation, looking west

The building may date to the 17th century, when historic maps show development over the former city ditch (see Fig 35). The use of timber lacing demonstrates that the builders were aware of the underlying soft material and designed additional support and flexibility into the foundations. The city ditch fills may well have continued to sink for a number of years or even decades after it was backfilled and the addition of compacted gravel beneath the southern wall represents an additional attempt at consolidation.

Garden or Yard (OA13)

To the east, on site A, a more complete sequence preserved evidence for 16th-century dumping over the backfilled city ditch, overlain by an open area, possibly a garden, in the first half of the 17th century (OA13, not illustrated). The dumps consisted of imported demolition rubble, presumably used to counteract the effects of slumping. The deposits produced a plain 'Westminster' floor tile (fabric 2892) with an unworn mottled green and yellowish-brown glaze and a small fragment of what may be Low Countries floor tile (fabric 2316). This second tile may be Tudor in date. A fragment of medieval peg and shouldered peg roofing tile was also recovered (Betts 2012).

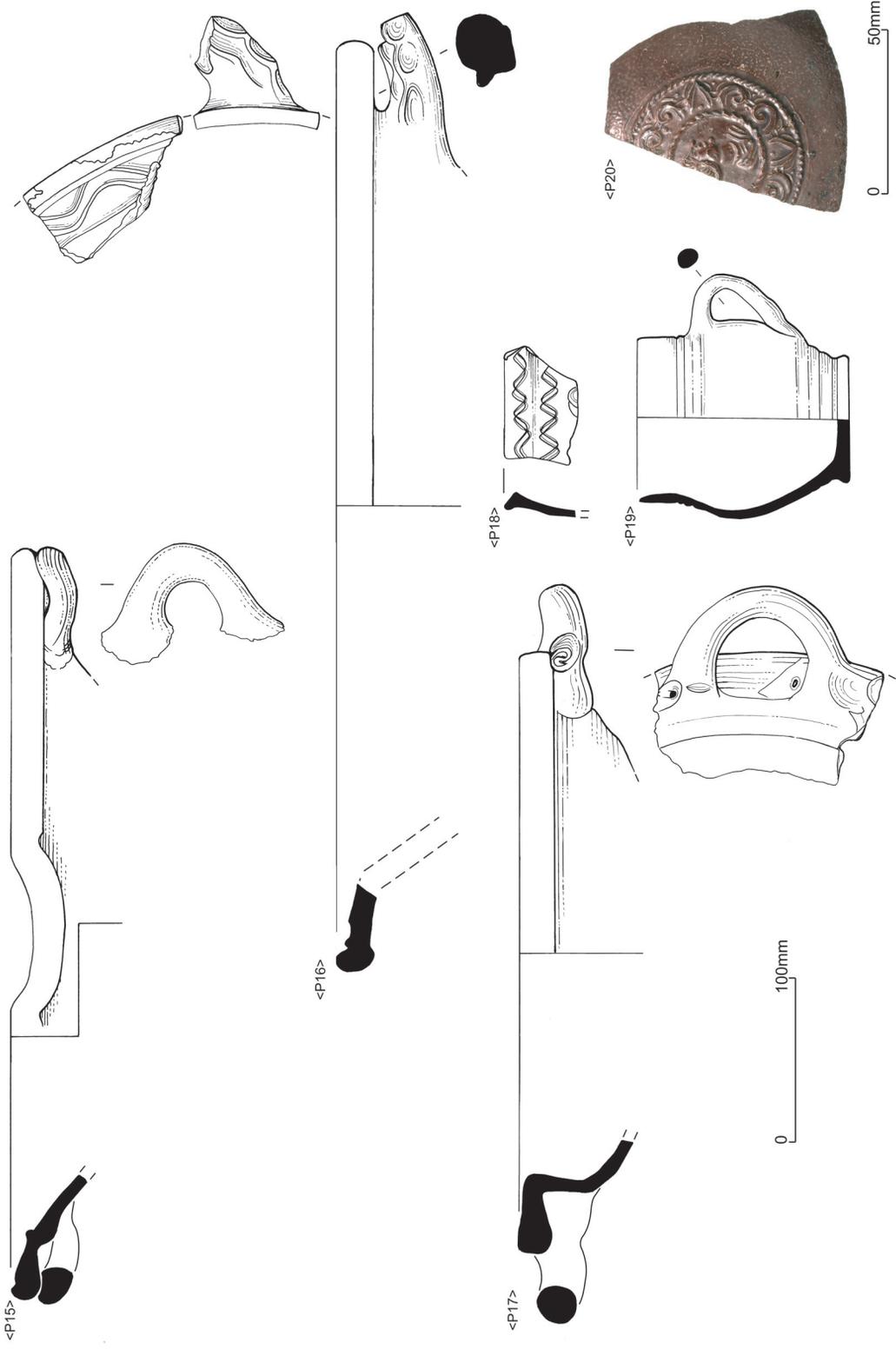
The latest of these dumps, A[124], includes 56 sherds (45 ENV, 1,591g) of residual medieval pottery dated to c.1350–1500, with 25 sherds in early post-medieval fabrics (23 ENV, 858g). The medieval wares consist mainly of coarse Surrey-Hampshire border ware (CBW), with Cheam white ware (CHEA) and earlier 13th- to mid-14th-century wares (London-type ware (LOND), south Hertfordshire-type grey ware (SHER) and Mill Green ware (MG)). The post-medieval pottery is mostly typical of 16th-century usage in London, with London-area early post-medieval red ware (PMRE) dominant, alongside Surrey-Hampshire border wares and a small number of imports including Raeren stoneware (RAER), Dutch slipped red earthenware (DUTSL) and Frechen stoneware (FREC).

Dump A[124] was cut by two pits, one a well-dated refuse pit, A[121] (not illustrated). Its fill, A[122], produced three residual plain-glazed Low Countries floor tiles. One is a

complete floor tile measuring 117–118mm square. It has lost its top surface through wear, but was almost certainly originally plain-glazed. Glaze still survives on the tile edges. The tile size and calcium carbonate rich fabric (type 2504) would suggest a 14th- or 15th-century date. Also present are two brown plain-glazed floor tiles in silty fabrics (types 1977, 3063) dating to around 1480–1600. A very large post-medieval pottery assemblage from the pit was dated to c.1630–80 (278 sherds, 140 ENV, 9,491g), and probably nearer the earlier end of this date range. This is based on two sherds of London tin-glazed ware (TGW), one plain white and the other with polychrome decoration typical of the mid-17th century.

The bulk of the later pottery from Open Area 13 (from the pits and a garden soil) consists of fabrics and forms in widespread use during the first half of the 17th century, mostly London-area red wares and Surrey-Hampshire border white wares with green (BORDG) or clear (yellow) glaze (BORDY). The latter include mostly sherds from bowls, dishes and tripod pipkins, as well as a chamber pot, skillet, costrel and moneybox. A complementary range of forms was recorded in London-area post-medieval red ware (PMR) and the white slipped variant with green or clear (yellow) glaze (PMSRG, PMSRY), including large two-handled carinated bowls and dishes of the kind used, amongst other things, for dairying, <P15>–<P17> (Fig 28). One of these, <P17>, has deeply thumbled side handles. Other forms represented are cauldrons/pipkins, jugs with bibs of white slip and two more unusual forms.

There are sherds from two bird pots, a bottle-shaped vessel attached to the wall of a house below the eaves by means of a hook through a cut-out in the base. Designed to attract nesting small birds, such as sparrows, they were fitted with a perch support on the shoulder. Examples are relatively rare on London sites, although at least 12 were recovered from the site of Church End Farm in Hendon, Middlesex (Cooper 2005). The other unusual form is the front compartment of a double dish in PMSRY. Known in the London area only in PMSR and BORD, this enigmatic vessel consists of two conjoined oval, straight-sided dishes, with the smaller



front compartment perforated. The slipped red ware forms are often decorated, as here, with sgraffito designs (eg <P18>, Fig 28). The specific purpose for which they were made remains uncertain, although it has been suggested that they were used as shaving dishes (Pearce & Straube 2001).

Other red wares in this essentially domestic assemblage come mainly from the Harlow area in Essex (Essex-type post-medieval fine red ware (PMFR) and its black-glazed variant (PMBL)). The former is represented by sherds from bowls, and a chamber pot, cauldron and jug. The black-glazed ware was reserved mainly for tablewares, with a special emphasis on mugs of various shapes, including cylindrical rounded and barrel-shaped (<P19>, Fig 28), all of which are recorded in this context. By comparison with these regional earthenware fabrics, the number of continental imports identified is very small, consisting of sherds of Frechen and Cologne/Frechen stoneware (FREC, KOLFREC) *Bartmann* jugs (<P20>, Fig 28) and part of a dish in Montelupo polychrome maiolica (MLTG). There are also sherds from two butter pots in Midlands purple ware (MPUR) (Pearce 2012).

Human Remains from Watching Brief Observations

During the watching brief, a cellar, constructed in red brick (B3; not illustrated), was recorded outside and to the north of the site B excavation trench. There were six successive backfill deposits, including a thin layer of charcoal above the primary fill indicative of a fire. The uppermost fill, B[8], produced a large quantity of disarticulated human bone suggesting the presence of disturbed burials within the immediate vicinity of the site.

A similar deposit, B[16], in the watching

brief area also contained a quantity of disarticulated human bone, potentially from the same source as that in the cellar. Because of truncation it was not possible to determine whether it was in a cellar or simply dumped into an open pit (OA10; not illustrated). A single sherd from a skillet in BORDG is dated to c.1550–1700.

Together these contexts produced a total of 484 skeletal elements. The majority of the bone displayed moderate to good levels of preservation and the occurrence of identifiable, repeated elements provided an estimate of a minimum number of 37 individuals. There was a predominance of adult elements including the cranial or pelvic bones of six males and five females. Observations of pathological bone changes included examples of dental disease, degenerative joint disease and non-specific infection. Bowed deformities to an adult femoral shaft suggested an individual had suffered from rickets at an earlier age (Henderson 2013).

It was not possible to ascertain a secure date or determine the original context of the remains or how far they may have moved from the original burial location. Presumably the disused cellar was a convenient place to bury human bones disturbed during building works in the general vicinity. The remains may have been derived from the churchyard of St Bartholomew the Less or Christ's Hospital (see period 13 discussion below; Fig 35). During 1905, when St Bartholomew's Hospital was developing part of a newly acquired strip of land along their southern boundary, part of the disused post-medieval cemetery of Christ's Hospital (founded in 1552), which had been established within part of the infilled city ditch, was encountered (Sloane & Watson 2004, 186–90). The southern part of the site B excavation trench lay within this cemetery (Fig 35), but no *in situ* human burials were found, probably due to the extent of later truncation.

Brick-Lined Wells (S8 and S9)

On site B, the disuse fills of two wells (S8 and S9; Fig 26) provide further evidence of the usage of the site during the 17th and early 18th century, broadly contemporary with

*Fig 28. (facing) Pottery from Open Area 13: two-handled carinated dish <P15> in London-area post-medieval red ware (PMR); bowls and dishes in London-area post-medieval slipped red ware with green (PMSRG) <P16>–<P17> and yellow (PMSRY) <P18> glaze; Essex-type post-medieval black-glazed red ware mug <P19>; and body fragment <P20> of the medallion from a Frechen stoneware (FREC) *Bartmann* jug (scale 1:4, <P20> 1:2)*

the excavated post-medieval buildings. It is possible that Structure 8 was constructed in the 16th century.

Well (S8)

A brick-lined well, Structure 8, was sunk on the north edge of the backfilled city ditch on site B (Fig 26). The brickwork was laid as radiating headers on to a timber frame made from two pieces of shaped oak lap-jointed together to form a circular doughnut-shaped baseplate. The bricks, which were below the level of the construction cut, were unmortared and brick wedges were used in the wide gaps at the outer edge of each course. This continued up to the top seven surviving courses, where a soft, pale yellow mortar was employed as a bonding agent. The well lining was made from London-made red bricks (fabrics 3033, 3046), including an overfired and badly distorted example of probable 16th-century date. One brick has a top edge cut away, suggesting it may originally have been used as a horizontal plinth.

The primary fill inside the shaft was a dump of waterlogged silt, B[309], at the bottom of which was a timber plank dropped down the well during use. An environmental sample (see below) suggests that this fill represented disuse as it contained waste material from cess or kitchen disposal. This fill also produced three late 15th- to 16th-century Low Countries floor tiles (fabrics 2850, 3063, 3080). These have a plain yellow and a plain yellow and brown/green mottled glaze. A complete late 16th- to 17th-century unglazed Low Countries tile is also present. This measures 259mm square by 38mm in thickness and has oval nail holes in the top of two diagonally opposite corners. Other building material in the well comprised peg roofing tile. The upper fill, another silty deposit, B[301], contained fragments of brick rubble and was clearly dumped in after the disuse of the well (Betts 2012). A sizeable collection of artefacts was recovered from these contexts. The lower fill is dated to c.1550–1700 by four sherds of BORD and the later fill is dated to c.1720–30.

The pottery includes fabrics in widespread use across London during the later 17th and early 18th century. Everyday kitchen and household wares consist of PMR and Surrey-Hampshire border white wares with

olive or clear (yellow) glaze (BORDO, BORDY) and red wares (RBOR), the latter being more numerous. A large flared dish in PMR, glazed internally, has a thickened, rounded rim, carinated below (<P21>, Fig 29). There are sherds from three more bowls, a porringer and a pipkin in RBOR, which increasingly displaced white ware production in the source area during the 18th century. A flanged dish in RBOR is decorated with trailed white slip in wavy lines around the rim and in the centre of the base (<P22>, Fig 29; cf Pearce 1992, fig 20, nos 20–3), providing an inexpensive decorative flourish amidst the more humble lead-glazed earthenwares. There are also 32 sherds from a near-complete butter pot in MPUR (<P23>, Fig 29), used for transporting dairy produce and subject to statutory regulation in size from the time of the Commonwealth (Egan 1992). Two bottles in English brown salt-glazed stoneware (ENGS) were probably made at Fulham at the end of the 17th century, and part of a possible teapot spout in Nottingham stoneware (NOTS) dates after c.1700.

The fills yielded a high proportion of London tin-glazed ware or delftware (TGW) made at pothouses in Southwark and Lambeth. Forms and decorative styles are mostly typical of the mid to late 17th century, with sherds from a plate and chamber pot with plain white glaze (TGW C), and a dish, bowl, plate and cylindrical jar with polychrome or blue and white painting (TGW D, F and H). A much more unusual find is a near-complete bowl and matching cover with polychrome painted decoration in a distinctive style associated with Lambeth and Bristol during the early 18th century (TGW G). The bowl has a rounded profile and internally lid-seated rim, 180mm in diameter (<P24>, Fig 29). It is painted with stylised

Fig 29. (facing) Pottery from the well (S8): flared dish <P21> in London-area post-medieval red ware (PMR); flanged dish <P22> in Surrey-Hampshire border red ware with slip-trailed decoration (RBOR SLTR); butter pot <P23> in Midlands purple ware (MPUR); bowl and lid <P24> and <P25> in London tin-glazed ware with 'Lambeth polychrome' decoration (TGW G); and tea bowl <P26> in Portuguese faience (POTG) (scale 1:4, <P24>–<P26> photo details 1:2)



flowers and flying insects in lappet-shaped panels interspersed with groups of four dots and stars in dark blue, deep red, yellow and green. A conical spike inside the base can be paralleled by four bowls with a central triangular spike excavated in Vauxhall in 1977/81 (Britton 1987, 66, fig 12J, fig 121, col pl M). It is suggested that they were covered butter dishes, based on evidence from the Netherlands (*ibid*, 142). The lid has a shallow domed form with an applied conical knob painted with blue stripes and surrounded at its base by a border of Chinese *ruyi* head and scroll pattern, with panels of flower and insect decoration matching that of the bowl (<P25>, Fig 29). The style is a continuation of the oriental decoration popular in the late 17th century and is based on a simplified version of Chinese patterns presented in strong colours (see Garner & Archer 1972, 36–7, fig 55C; Pearce 2012).

The only other sherd is the complete base of a tea bowl in Portuguese tin-glazed ware or faience (POTG) (<P26>, Fig 29). It has a single flower painted in blue with manganese outlining inside the base, although the vessel walls no longer remain (see Hurst *et al* 1986, 67–8).

Although the finds from the well are generally unremarkable, the presence of the delftware covered bowl lifts it above the ordinary. The item was very likely broken and discarded in its entirety, its specialised function hinting at a nearby household of reasonable means, able to afford decorative ‘luxuries’.

Three clay pipe bowls from the later fill range in date from c.1640–60 (type 9 in Atkinson & Oswald 1969, London typology, hereafter prefixed with AO) to c.1700–40 (type 10 in Oswald’s Simplified General Typology; Oswald 1975, 37–41), with one type AO20 (c.1680–1710). An early 18th-century date fits well with that suggested by the pottery. The upper fill also contained two pieces of fayalitic iron-working slag of an undiagnostic process but probably smithing (Phelps 2012).

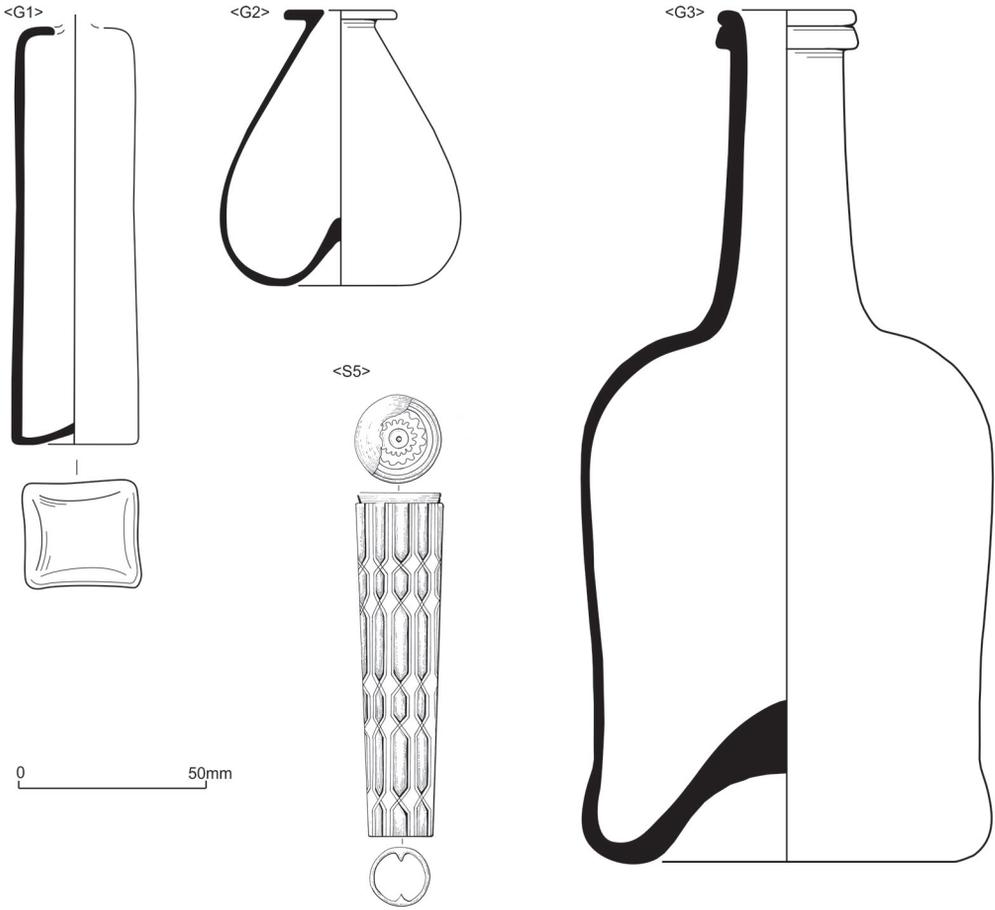
There are 76 fragments of glass from at least eight vessels from the later fill. These include fragments from two wine bottles in green glass, one of which is of squat cylindrical form, with a bevelled single string rim. The base has a slight sag, with a medium

domed kick. Bottles of this form are dated to c.1740–60 (Dumbrell 1983, 92), slightly later than the pottery and clay pipes from the same context. There are also fragments from four pharmaceutical phials in natural green glass. Two are cylindrical in form, one with a low domed kick base, short straight-sided neck and out-turned rim. This type first appeared in the second half of the 17th century and continued with little change throughout the 18th century (Willmott 2002, 26.2, 90–1, fig 117). A near-complete, tall, mould-blown phial with a square section and a low kick base is missing its neck (<G1>, Fig 30). There are also six fragments of window glass.

A much more unusual find consists of 50 fragments from two sand glasses (of which one is illustrated; <G2>, Fig 30). These would have been used as a pair fitted rim to rim in an hourglass, separated by a small perforated copper-alloy disc to regulate the flow of sand, and encased in a wooden frame. The small teardrop-shaped vessels have a flat-topped rim and no neck, and the broad base has a low domed kick (Willmott 2002, 91, fig 118). Most examples date to the 17th century, although the form continued into the first half of the 18th century (Pearce 2012).

Registered finds from the upper fill contained some structural fittings in the form of an iron pintle, B<78>, and lead comes, B<22>, which might originate from demolition material, and a range of utilitarian domestic objects such as a sandstone hone, B<61>, some copper-alloy studs and an antler tool handle, B<43>. Some material of finer quality was also recovered, such as a sherd of imported brown vessel glass with white marvered swag decoration, B<33>, a teardrop-shaped pendant with a clear glass setting from a piece of jewellery, B<12>, and a highly decorative bone knife handle, <S5> (Fig 30), all of which are appropriate for a date in the 18th century. An Elizabeth I silver shilling, <C1> (Fig 30), dated to 1560–1,

Fig 30. (facing) Other finds from the wells: mould-blown glass phial <G1>, sand glass <G2>, bone handle <S5> and Elizabeth I silver shilling <C1> from Structure 8; glass early cylindrical bottle <G3> from Structure 9 (scale 1:2, except <C1> scale 2:1)



found in the upper well fill is residual. It has a slightly abbreviated obverse legend but is otherwise not rare (Table 4; Marshall 2012).

An environmental sample from the lower fill (B[309], B[1]) contained relatively small numbers of seeds, mostly from wild plants of the disturbed and waste-ground habitats which could no doubt have been found close to the well. Occasional plum (*Prunus domestica*) and cherry (*P. avium/cerasus*) stones, walnut (*Juglans regia*) and hazelnut (*Corylus avellana*) shell and seeds of fig (*Ficus carica*) and coriander (*Coriandrum sativum*) suggest that the well was used as a cesspit or for dumping kitchen waste after it had gone out of use (Davis 2013).

Well (S9)

A second well, Structure 9 (Figs 26 and 31), of a slightly later date was recorded to the north of Structure 8. It was built using very similar bricks to the earlier well, but the structure was fully mortared to the depth observed. The bricks were laid radially, with headers facing inward and a packing of crushed chalk between the brickwork and the construction

cut. It was not possible to excavate the well to the base. The circular construction cut was 1.50m in diameter, although to the west the natural sands had collapsed as building progressed and the resulting void had been packed out with chalk blocks.

The well builders employed 16th- or possibly early 17th-century London-made red brick. Either they were reused from an earlier building, a common occurrence at this period, or the well was in use for a long period of time prior to backfilling.

The lower fill, B[375], was dated by pottery to c.1775–1830. This consists of bowls in PMR and RBOR, a jug and bottle or jar in ENGS and part of a rounded bowl in pearlware with bands of chequered, coloured slip decoration (PEAR SLIP) (<P27>, Fig 32). The bowl was made after c.1775 and probably within the first quarter of the 19th century as part of a popular range of factory-made kitchen/household wares produced in various centres in the Midlands and the north of England. The latest wares identified in the fill come from the upper fill, B[343], dating to c.1807–30. These include sherds



Fig 31. The brick-lined well (S9), looking north-west



Fig 32. Finds from the well (S9): bowl <P27> in pearlware with slip decoration (PEAR SLIP) (scale 1:4, photo 1:2); and clay tobacco pipes <CP1> and <CP2> (scale 1:1, photos 2:1)

from bowls in RBOR and PMR, a complete cylindrical bottle in ENGS, part of a plain-rimmed plate in creamware (CREA) and a saucer in PEAR with underglaze blue transfer-printed decoration of a Chinese landscape.

A total of six clay pipe bowls, 42 stem fragments and three mouthpieces were

recovered from the lower fill of the well, dating to c.1780–1820, so according with the date suggested by the pottery. All identifiable bowls are of type AO27, and two have the moulded maker's initials 'MC' in relief on the sides of the heel (with a possible third example having only the 'C' remaining). One of the bowls also has the name 'CHARL

/ TON' stamped incuse over two lines on the back of the bowl, facing the smoker, within a circular milled surround with flourishes above and below (<CP1>, Fig 32). This pipe and the other 'MC' heel mark were made by Matthew Charlton, recorded in nearby Cow Cross Street in 1799–1807 (Oswald 1975, 134), providing a firm *terminus post quem* for the context. Two other pipe-makers are represented by initials moulded in relief on the sides of the heel. The first is marked 'IP', which may stand for John Pinkard, recorded in 1703 and 1732 (*ibid*, 143); the second is 'CB', which cannot be identified with any known pipe-maker working within the date range of the bowl type. A single stem fragment decorated with moulded leaves along its length (<CP2>, Fig 32) may have come from an imported pipe (possibly Dutch), although in the absence of the bowl it is impossible to be certain.

Further confirmation of a deposition date at the turn of the 18th century comes from the glass, with 47 fragments from at least 11 wine bottles recorded in context B[375]. Most of these are of true cylindrical form, developed in the later 18th century from the early cylindrical bottle that marks the transition from the earlier mallet form. There is one early cylindrical bottle in the same context, and this is complete except for a small hole in the shoulder. It has a low domed kick and bevelled single string rim, and the walls exhibit the typical 'sag' just above the base that is associated with this type (<G3>, Fig 30). The surface of the glass has laminated badly, and more noticeably than other glass bottles in the same context. The remaining wine bottles in this context are all true cylindrical forms (44 fragments, including nine complete necks and four complete bases). All have a bipartite or double string rim of the kind typical of the last quarter of the 18th century (Dumbrell 1983, 92). It is likely that they were discarded together over a short period or at one time.

Based on the form of the bottles alone the context can be dated to c.1780–90. However, the clay pipe evidence suggests a latest date for the context of 1799–1811, based on records relating to two known pipe-makers whose products are represented in the finds. It is entirely plausible that the wine bottles should have been discarded at this slightly

later date, since the cylindrical form was designed to allow wines to be laid down by binning horizontally. In addition, there are three fragments of window glass in the same context, one of them with a grozed edge, as well as part of a single diamond pane (Pearce 2012).

A mixed group of registered finds from the well backfills include a plain whittle tang ivory cutlery handle, B<48>, a stone alley, B<63>, and a cylindrical copper-alloy fitting with an arrow-shaped perforation, B<15>, possibly from a padlock. A few wooden objects survived in these wet conditions including a fragment of a small cylindrical lathe-turned container, B<5>. More remarkable is a very large iron door bolt, B<25>, still within its housing, which suggests that demolition material was dumped into the well (Marshall 2012). Evidence of iron working was provided by context B[375]. It contained a conglomeration of vitrified material (160.0g), dense and magnetic in places, which included vitrified ceramic, black glassy material and a piece of clay tobacco pipe stem (Phelps 2012).

17th-Century Cellared Building (B5)

Part of a substantial east–west aligned brick-built wall, A[107] and A[116], was recorded as having been built over the city ditch on site A (B5, Fig 26). It measured 8.40m long (truncated at both ends) and 0.46m wide, and it was constructed of red bricks, which date to around 1550–1666. These bricks are clearly reused as they have two types of mortar attached: a cream and a light grey mortar layer. One brick has mortar on what appears to be a worn stretcher face, suggesting it was originally used as floor paving. Bricks were often reused in London during the 16th and 17th centuries.

This wall represents the northern wall of a building of uncertain extent. A north–south aligned brick partition wall, possibly a slightly later insertion, divided the building into at least two rooms. No floor was found in the westernmost room, which had been truncated to c.15.75m OD, suggesting the room lay at ground level or was only half-cellared. The easternmost room consisted of a deep cellar, A[101] and A[102], containing the disturbed remains of a brick



Fig 33. The cellar of Building 5 under excavation, looking north-west

floor at *c.*14.48m OD and with an area of edge-set bricks indicating a possible hearth or fireplace (Fig 33). Recovered from the backfill, A[103], of the cellar construction cut was a fragment of decorated tin-glazed floor tile (<T2>, Fig 34). This has a worn star pattern in blue on white, a London design made at both the Pickleherring and Rotherhithe pothouses between *c.*1618 and *c.*1650 (Betts & Weinstein, 2010, 114–15, no. 132). Tin-glazed floor tiles are believed to have paved the floors of St Bartholomew's Hospital (Betts & Weinstein 2010, 64), which may be the origin of the floor tile from A[103]. Bricks in the cellar floor are similar in size and date to the walls, *c.*1550–1666.

The cellar backfill is dated by 22 sherds of pottery (19 ENV, 698g) to *c.*1580–1630. These consist mostly of sherds from cooking and serving vessels in London-area red ware (PMR and PMRE), and in Surrey-Hampshire border ware, with fragments

from a jug in RAER, a dish in Werra slipware (WERR) and a cauldron or pipkin in Dutch red earthenware (DUTR). Part of a frying pan or skillet in PMRE has the sides of the handle folded inwards on the top and nail-nicked along each edge (<P28>, Fig 34). This demonstrates the influence of Dutch red wares on London potters during the later 16th century, a time that saw an influx of immigrant potters into the capital from the Low Countries. As in other areas of the excavation, the finds are typical of everyday domestic use, with kitchen and storage wares predominating and little obviously high-status material identified. However, a slightly later date of deposition *c.*1660–80 is suggested by the presence of three clay pipe bowls (two of type AO15 and one of type AO18). An earlier fill, A[101], is also dated by pottery (four sherds only) to *c.*1580–1630, although a single clay pipe bowl of type AO10 dates to *c.*1640–60.

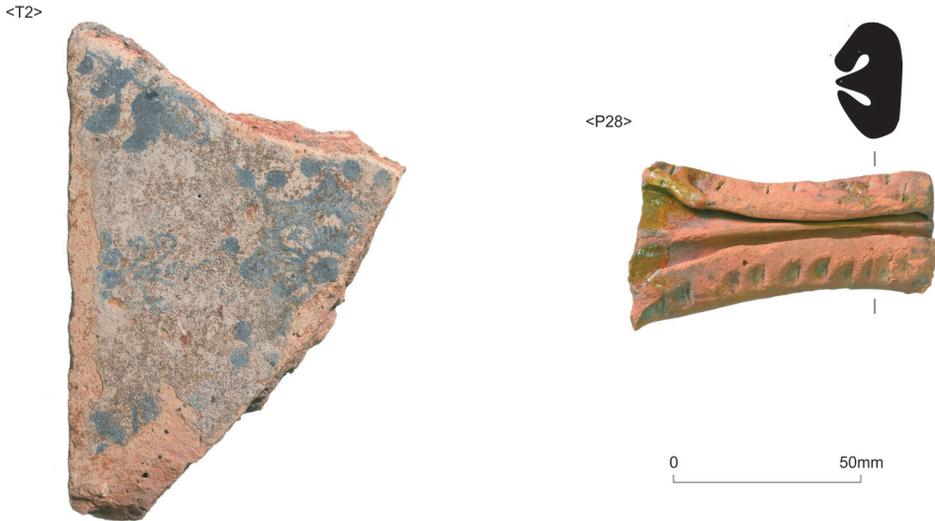


Fig 34. Finds from Building 5: decorated tin-glazed floor tile <T2>; and handle of a frying pan or skillet <P28> in London-area early post-medieval red ware (PMRE) (scale 1:2)

Garden or Yard (OA8)

An irregular pit, B[329], measuring 0.55m x 0.80m and 0.42m deep was found to the north of well Structure 9 (Fig 26). It was lined with a thin, brown, 'leathery' residue of an unknown substance, possibly some form of industrial residue. One sherd of CREA was found in the pit fill, B[328], dating to c.1760–1830. This corresponds in date with three clay pipe stem fragments that probably belonged to pipes of type AO27 (c.1780–1820). Two fragments of window glass were also recorded. This pit has been assigned to Open Area 8, which defines a garden or yard, which may have contained the broadly contemporary well, Structure 9.

Food remains, including grape (*Vitis vinifera*), apple (*Malus domestica/sylvatica*), fig, wild strawberry (*Fragaria vesca*) and gooseberry/redcurrant (*Ribes* sp) pips from fill B[332] (B{3}), some preserved by mineralisation, show that this feature had a secondary function as a cesspit. This is supported by the abundant mineralised fly (*Diptera*) puparia also seen in the sample.

A Late Pit (OA9)

A second pit, lying within the footprint

of Building 1, but thought to post-date its demolition, is assigned to the notional Open Area 9 (Fig 26). Measuring 1.15m by 0.75m and 0.35m deep, it cut into the fills of the city ditch. No finds were associated but it was, stratigraphically, the latest feature at this end of the site.

Discussion (Period 13)

Period 13 spans a relatively wide date range and is necessarily fragmentary due to the nature of the archaeology, with the survival of deeply cut features only and the high degree of truncation by modern intrusions. However, it does clearly demonstrate that the depression caused by slumping of the medieval fills of the city ditch was consolidated by the 16th century at the latest. During the 17th century private houses began to encroach on what had remained a sizeable open space within an increasingly developed suburb. The Ogilby and Morgan map of 1676 shows that the excavated parts of sites A and B lay outside the precinct of St Bartholomew's Hospital, over open areas labelled as the 'Toun Ditch' and '[Christ's] Hospitall Churchyard', with buildings occupying much of the space outside the city wall (Fig 35).



Fig 35. Detail from Ogilby and Morgan's map of 1676 (Ogilby & Morgan 1676) (scale c.1:2000)

ASPECTS OF THE ROMAN AND MEDIEVAL SEQUENCE

A Possible Pre-Wall Settlement Boundary

The late 1st- or 2nd-century AD ditch (S1) pre-dates the city wall (c.AD 190–230; see period 5 discussion above) and would clearly have marked a significant boundary. While the function of this ditch apparently was not defensive, it may have played a role in

improving drainage, but this may not have been its primary function (above).

It is generally accepted that London, unlike Verulamium or Silchester (Frere 1983, 44–9; Fulford 1983, 86–8; Wachter 1995, 71), did not have a circuit of substantial earthwork defences prior to the construction of the city wall (Hobley 1983, 79–81; Maloney 1983, 96; Bentley 1985, 129). However, since the identification of a shallow, flat-bottomed, late 1st-/early 2nd-century AD ditch at Dukes

Place near Aldgate as a possible formal boundary (the *pomerium*; probably with a low internal bank) between the urban settlement and its wider *territorium* (Maloney 1979; 1983, 97, fig 95; Bentley 1985, fig 2), there has been a tendency for any appropriately dated and aligned ditch in the vicinity of the later wall to be interpreted as part of an early settlement boundary.

Such claims have been made individually for ditches at 27 Minories (Barber & Bowsher 2000, 31, 58) in the east, at Crutched Friars, Bastion 6 (Dukes Place) and Crosswall in the Aldgate area (Marsden 1980, 46, 210; Egan *et al* 1981; Maloney 1983, 97; Perring 1991, 68–9), and at 85 London Wall and opposite 57 London Wall (Butler 2001, 46). However, no integrated programme of research has been carried out specifically on the various observations of this possible boundary.

Work by Bentley, Perring and Roskams, based on the distribution of 1st- and early 2nd-century AD burials, deviations in the courses of several roads, excavated structures and topographic factors rather than on actual ditch observations, suggests that the western boundary of the 1st- and early 2nd-century AD city would have been marked by a ditch and bank running south in line with the west side of (later) Cripplegate fort (Bentley 1985, fig 1; Perring & Roskams 1991, fig 91). Suburban development occurred to the west of the proposed boundary, mostly along the principal routes, in the 1st and 2nd century AD (Perring & Roskams 1991, 116–7; NGT00 and PNS01: Watson 2006) and in this interpretation was only incorporated into the town when the city wall was constructed. However, the physical existence of this proposed early ‘western’ boundary remains unverified by excavation.

In the 1st/2nd century AD the hospital site would have lain well to the west of (*ie* outside) the above boundary. Before considering the status of the St Bartholomew’s Hospital ditch (S1) in more detail, a few further cautions are necessary. While it is tempting to interpret similarly aligned late 1st- or 2nd-century AD ditches referred to above, lying close to and similarly aligned with the later city wall, as evidence for an early settlement boundary, the limited and widely spaced nature of the observations, the often summary form of publication (at a feature

level) and generally poor dating mean there is a danger of conjecture by wishful thinking.

For example, Hunt’s conjecture of an alternative eastern city boundary wall inside the line of the later walls (2010, 48–50, fig 6), while elegant in terms of its apparent fit with the road network, seeks to integrate widely spaced observations of dissimilar features. These include a V-shaped ditch at Baltic House, St Mary Axe conjectured as up to 6m wide and 2.45m deep, with ‘ankle breaker’ or cleaning slot, dated to *c*.AD 70–100 (Howe 2002, 7–9), an early Roman V-shaped ditch with an associated post-pit alignment along its east (*ie* external) side at 9 Northumberland Alley (Schofield 1998, 232) and three poorly dated, parallel, V-shaped ditches with wide, flat bases at 8–14 Cooper’s Row/1 America Square (Hunt 2010, 48–9, fig 5). Other writers emphasise the possibility that such ditches, if related, might indicate post-Boudican linear defensive outworks rather than a formal settlement boundary (Dunwoodie *et al* 2015).

Maloney emphasises that the *pomerium* could be more a ceremonial/ephemeral feature than a substantial earthwork (1983, 116 n3). It is also far from certain that any demarcation of the settlement boundary would have been a static feature before the construction of the defensive wall, with evidence that settlement expanded in a number of stages (*eg* Rowsome 2008). There may also have been periods of contraction, perhaps particularly in the western part of the settlement, with the abandonment of the late 1st/mid-2nd-century AD clay-and-timber building on the Medical School site (BAR79; see period 5 discussion above) and at 2 King Edward Street site (KEW98: Lyon 2007, 45), both in the second half of the 2nd century AD. Neither should it be forgotten that beyond the settled area lay a landscape divided by occasional roads, ditches and managed watercourses, but also by many ditched land divisions, defining property holdings, fields, cemetery areas, quarrying concessions and the like (*eg* Barber & Bowsher 2000, 52–4, 330–1, fig 9); some of these ditches could be quite substantial.

Structure 1 ditch was observed on sites A and B and is conjectured to be at least 100m long (Fig 5). Its extent to the west may be clarified during phase 3 of the

redevelopment, but a similarly dated and aligned, flat-bottomed ditch, up to 6.60m wide and 1.5m deep, which was recorded at 1–6 Aldersgate Street (AES96; Butler 2001, 45–9, fig 4) a further 140m to the east of the hospital site, may be part of the same feature. That ditch clearly pre-dated the city wall and was interpreted as a possible late 1st-/early 2nd-century AD *pomerium*, with the implication that the Flavian boundary extended further west than previously thought (*ibid*, 46). It also appeared to respect the corner of the Cripplegate fort, suggesting that they were contemporary features.

Further east, at 90–91 and 100 Wood Street, another substantial ditch, 2.40m wide and 1.6m deep as excavated and backfilled after c.AD 70, appeared to anticipate the alignment of the south wall of the later Cripplegate fort (WOO97: Howe & Lakin 2004, 18, 23, fig 16). This ditch was also thought to be evidence of a Flavian *pomerium*, with the fort a later annexe to the north (*ibid*, 23). It is differently aligned and potentially earlier than the ditches at both St Bartholomew's Hospital (S1) and 1–6 Aldersgate Street, possibly supporting the view that they represent a slightly later Flavian extension to the settlement boundary. However, given that buildings dated to c.AD 70–120 lay adjacent to the north and south sides of the Wood Street ditch, it is perhaps more likely to have been a boundary within the settlement.

At the time the first phase of the St Bartholomew's Hospital ditch was dug, possibly at the end of the 1st century AD (above), the site would have been largely open land, probably situated just outside the western extent of the settled area and on the edge of the western cemetery. The London to Silchester (Newgate Street) road lay some 70–130m to the south, with domestic and commercial buildings on either side (Rowsome 2008, 29–30). To the south of the road, three phases of buildings have been dated to the period c.AD 50–120, although all are post-Boudican (NEG98; Pitt 2006, 5); there were also strip buildings on the north side of the road, dated AD 70–120 (KEW98; Lyon 2007, 16–29). It seems unlikely that the suburb extended as far north as the hospital site, although a few buildings may have existed in the vicinity, given the evidence from the Medical School site (above). Otherwise

there is little evidence for contemporary land use in the immediate area, although east–west ditches at Little Britain (LBT86; Schofield 1998, 229) and north–south ditches at 7–12 Aldersgate Street (ALG89; *ibid*, 199) may indicate further subdivision of the landscape. It is notable that the pollen samples were indicative of waste ground rather than agriculture (Scaife 2012a, 2).

The size, length and longevity of the St Bartholomew's Hospital ditch (S1) suggest that it was a significant boundary. The coincidence of its alignment with that of the later city wall seems to support the idea that it may at one point formed a boundary of the western suburb or have formed part of an original or extended *pomerium*, but it is also possible that it served as a boundary of a suburban property or estate, perhaps centred on the late 1st-/mid-2nd-century AD building found on the Medical School site (above). Proper assessment of the numerous ditches claimed as possible pre-wall defences or territorial boundaries would require an integrated programme of further research on multiple site archives, accompanied by digitising of records and detailed stratigraphic and spatial analysis. The potential uncertainties in the identification of the city boundary (or the presence of a number of sequential boundaries of an expanding and contracting settlement, or even one multiple ditched boundary) can be illustrated by the fragment of another east–west ditch, tentatively dated to c.AD 150–300, and again identified as a 'pre-wall boundary' in the north of 2 King Edward Street (KEW98; Lyon 2007, 31–3, fig 31), immediately north of the later wall, but south of the St Bartholomew's ditch.

The recutting of the St Bartholomew's Hospital ditch (as S2) occurred towards the end of the 2nd century AD (period 6) and the feature may have served as a significant boundary until the end of the 3rd century AD. It is certain that the city wall was imposed on a developed landscape, and hence on occasion follows the alignment of existing boundary features. It remains unproven that the walled circuit followed an earlier ditch because it already marked the *pomerium*.

The Saxo-Norman to Medieval City Ditch

Understanding of the scale, form and development of the post-Roman city ditch at St Bartholomew's Hospital is hindered by its extensive modern truncation, the limited nature of the observations and the location of the site, which allowed the excavation of less than half of the width of this feature. While geoarchaeological and environmental analyses have enabled a detailed understanding of the local deposit sequence and changing conditions within the ditch (above), only general comparisons with other excavated city ditch sequences are attempted here.

The earliest phase of the city ditch encircling London identified to date is late Saxon (Lyon 2007, 54–5). While it is tempting to associate such a large defensive feature with the documented occupation of London by Alfred in AD 886 (Bond 2002; Lyon 2007, 56; Swanton 1996, 80), the contemporary refortification of London remains unverified by excavation, perhaps due to the scale of subsequent ditches. It is possible that the defensive ditches were dug as a response to later Scandinavian threats in the 11th century. For instance, in 1009 and 1013 London withstood sustained attacks by Scandinavian forces, so it must have been well-fortified by this date (*ibid.*, 139, 143). At St Bartholomew's Hospital the earliest phase of city ditch (period 9, S4) was not directly dated, but its primary fills were truncated by a recut (period 10, S5) which produced a radiocarbon date of cal AD 900–1030 (BETA-306856; Table 2), making it potentially one of the earliest such sequences from London.

On most London sites, the earliest phase of post-Roman city ditch can only be dated to the Saxo-Norman period, due to the broad date range of the associated ceramic assemblages. On the west side of the circuit at 1–6 Old Bailey, only the west edge of the ditch survived later recuts and is dated to c.1000–1150 (LUD82; Rowsome 2014, 233). At 7–10 Old Bailey, the rounded base of the earliest ditch is undated, but thought to be Saxo-Norman (ODY03; Askew 2014). At the north-west angle of the defences, at 2 King Edward Street, the earliest post-Roman ditch was broadly dated to c.1000–1200 and its outer edge lay more than 33m from the

face of the city wall (KEW; Lyon 2007, 55–6, fig 57). At 1–6 Aldersgate Street, deposits interpreted as fills of the extramural ditch produced pottery dated to c.1050–1150 (AES96; Butler 2001, 52). On the adjacent site, 7–12 Aldersgate Street, the outer edge of the Saxo-Norman ditch was recorded as lying at least 25m from the face of the wall (ALG84; Egan 1985). Further west, at Cripplegate (WFG18; Milne 2001) the earliest post-Roman ditch contained a large amount of early medieval pottery, most of which was datable to c.1050–1200 (Pearce 2001, 19). At Heron Tower, Bishopsgate, the earliest ditch yielded a mid-11th- to later 12th-century date (Sorapure 2017, see this volume). The outer edge of the period 9 city ditch (S4) on sites A and B lay c.24m from the face of the city wall. Allowing for truncation this is broadly consistent with the findings from Aldersgate Street, Heron Tower, Bishopsgate, and elsewhere, but it would appear that the Saxo-Norman berm was wider at the north-west angle of the defences (KEW98, above).

The discrepancies in dating and the finer variations in deposit sequences between the various observed and published city ditch profiles suggest that different scouring and recutting regimes applied in diverse parts of the City. The quantity of refuse dumped into the ditch probably reflects the density of suburban occupation and the accessibility of the site. It is possible that prominent locations adjacent to gates and thoroughfares were more frequently maintained than others – hence the large numbers of medieval and post-medieval recuts seen adjacent to Aldersgate Street (AES96; Butler 2001). The general picture of a failure or lack of necessity to control refuse dumping and encroachment is seen in most excavations on the city ditch. At St Bartholomew's Hospital only one major recut (S5) was identified, dated to c.1000–1170, and the ditch was apparently largely infilled by c.1250, earlier than on other sites. This may be a consequence of the presence of the nearby hospital and adjacent early suburban development, but the picture is incomplete due to extensive truncation of the sequence. At 7–10 Old Bailey the ditch was silting up and becoming choked with dumped waste in the late 14th to early 15th

century (ODY03; Askew 2014), while at 1–6 Old Bailey the ditch appeared to become disused in the early 14th century (Rowson 2014, 237). Other, possibly more intact, sequences, for example at 1–6 Aldersgate Street, show ongoing maintenance into the post-medieval period in the face of continued refuse dumping, and even a possible recut dating to the Civil War period. By the late 16th century this particular stretch of the city ditch had been infilled (see above). However, it was still shown as mainly open space on maps 100 years later (Fig 35), by which date almost all of the rest of it had been extensively developed, though the city wall and its gates still remained intact (Hyde 1992).

Ice Skates

A total of 12 bone ice skates were recovered from the St Bartholomew's Hospital excavations (Fig 20). Bone metapodial skates are relatively common in the early medieval period (MacGregor 1976), indeed the word 'skate' derives from the Dutch word *schaats*, meaning 'leg bone' or 'shank bone'. The ten from site B form a notable concentration from a relatively small excavation, including two, B<44> and B<105>, of appropriate size

for use by children. Two more were found on site A and other finds are known from elsewhere along the city ditch. The data are tabulated in Table 3.

The skates could have originated from a nearby workshop as they are finished, often quite crudely, to differing levels. For example, B<50> has a partially perforated toe and a few fragments of bone waste were also found in the ditch. However, all of the skates could have been used and have some degree of glossy polish on their base.

The presence of the skates in this quantity implies that ice skating was a common occupation in the Saxo-Norman winters. Skating is known to have occurred on 'the great marsh' at Moorfields, outside the city walls to the east of the site, in the late 12th century. In c.1170–83, William Fitz Stephen wrote in his *Description of London*:

When the great marsh that laps up against the northern walls of the city is frozen, large numbers of the younger crowd go there to play about on the ice. Some, after building up speed with a run, facing sideways and their feet placed apart, slide along for a long distance. Others make seats for themselves out of ice-slabs almost as large as mill-

Table 3. Summary of the bone ice skates

Accession no.	Context	Period	Land use	Length (mm)	Material	State	Shaped toe	Perforated toe	Perforated heel
A<31>	A[193]	9	S4	247	horse metatarsal	C	Y	N	Y
A<32>	A[193]	9	S4	244	horse metatarsal	C	Y	N	N
B<44>	B[326]	11	S6		cattle (juvenile) metatarsal	B			
B<45>	B[326]	11	S6		horse metatarsal	B			N
B<49>	B[424]	10	S5		horse metacarpal	B			N
B<50>	B[424]	10	S5	217	horse metacarpal	C	Y	P	N
B<51>	B[424]	10	S5	251	horse metatarsal	C	Y	N	N
B<52>	B[424]	10	S5	277	horse metatarsal	C	Y	Y	Y
B<53>	B[424]	10	S5	255	horse metatarsal	C	Y	N	Y
B<54>	B[451]	10	S5	252	horse metatarsal	C	Y	N	N
B<87>	B[440]	9	S4	218	horse metacarpal	B	Y	N	N
B<105>	B[326]	11	S6		dog radius	B			

Key: State: B – broken, C – complete; Presence of working: Y – yes, N – no, P – partially; Field is left blank when no information survives

stones, and are dragged along by several others who hold their hands and run in front. Moving so quickly, the feet of some slip out from under them and inevitably they fall down flat. Others are more skilled at frolicking on the ice: they equip each of their feet with an animal's shin-bone, attaching it to the underside of their footwear; using hand-held poles reinforced with metal tips, which they periodically thrust against the ice, they propel themselves along as swiftly as a bird in flight or a bolt shot from a crossbow. But sometimes two, by accord, beginning far apart, charge each other from opposite directions and, raising their poles, strike each other with them. One or both are knocked down, not without injury, since after falling their impetus carries them off some distance and any part of their head that touches the ice is badly scratched and

scraped. Often someone breaks a leg or an arm, if he falls onto it. But youth are driven to show off and demonstrate their superiority, so they are inclined to these mock battles, to steel themselves for real combat. (Stenton 1934, 28)

Fitz Stephen demonstrates that skating was undertaken for sport and leisure purposes at Moorfields, north of the city wall. Potentially the city ditch was sufficiently full of water to allow skating along its length at times. The presence of small skates found in the ditch fills on site shows that children were also involved in the sport, and the example, B<105>, made from a dog radius is highly unusual, if not unique. The mention of metal tips to the poles employed for propulsion may perhaps suggest an alternative origin of the small find <S3> (Fig 22), tentatively interpreted as an arrowhead.

APPENDIX: ILLUSTRATED FINDS

(see Table 4 opposite)

Table 4. Details of the illustrated finds

Cat. no.	Site/accession no.	Site/context	Period	Land use	Fabric	Form/type	Description	Fig no.
Coin								
<C1>	B<1>	B[301]	13	S8		silver coin	Elizabeth I, 1560-1; shilling. Diam 32mm; Wt 5.26g; Ax 6; Obv 'ELIZABETH:D:G:ANG:FR:ET:HI:RE:GINA'; crowned bust r - worn smooth; Rev 'POSVI DEV:AD IVTORE M:MEV:'; quartered shield of three lions and three fleurs, cross crosslet; <i>cf</i> North 1991, 133, no. 1985	30
Clay tobacco pipe								
<CP1>		B[375]	13	S9		AO27 bowl	'MC' moulded on heel / 'CHARL/TON' stamped in circle on back of bowl	32
<CP2>		B[375]	13	S9		unknown	leaves moulded along stem	32
Glass								
<G1>		B[301]	13	S8		PHIAL-SQUP		30
<G2>		B[301]	13	S8		SAND		30
<G3>		B[375]	13	S9		BOTT-ECYL		30
Pottery								
<P1>		A[191]	10	S5	LCOAR	CP SM		20
<P2>		A[217]	10	S5	LOGR	SPP		20
<P3>		A[155]	11	S6	NHER	CP		22
<P4>		A[164]	11	S6	SSW	CP		22
<P5>		A[144]	11	OA6	ESUR	BOWL LUG		23
<P6>		A[144]	11	OA6	LOGR	LAMP SPIKE		23
<P7>		A[144]	11	OA6	LCOAR	CP		23
<P8>		A[144]	11	OA6	LCOAR	CP		23

Table 4 (cont.). Details of the illustrated finds

Cat. no.	Site/accession no.	Site/context	Period	Land use	Fabric	Form/type	Description	Fig no.
<P9>	A[144]	A[144]	11	OA6	LCOAR	BOWL FLAR		23
<P10>	A[144]	A[144]	11	OA6	LCOAR	JUG-ERND		23
<P11>	A[144]	A[144]	11	OA6	LCOAR	BOT		23
<P12>	A[144]	A[144]	11	OA6	LCOAR	BOT		23
<P13>	A[169]	A[169]	11	OA6	LCOAR CALC	CP		23
<P14>	A[169]	A[169]	11	OA6	LCALC	JUG		23
<P15>	A[122]	A[122]	13	OAI3	PMR	DISH 2HCN		28
<P16>	A[122]	A[122]	13	OAI3	PMSRG	BOWL 2HCN		28
<P17>	A[122]	A[122]	13	OAI3	PMSRG	DISH 2HCN		28
<P18>	A[122]	A[122]	13	OAI3	PMSRY	DISH DBL		28
<P19>	A[122]	A[122]	13	OAI3	PMBL	MUG BAR		28
<P20>	A[122]	A[122]	13	OAI3	FREC	JUG-BART		28
<P21>	B[301]	B[301]	13	S8	PMR	DISH FLAR		29
<P22>	B[301]	B[301]	13	S8	RBORSL- TR	DISH FLNG		29
<P23>	B[301]	B[301]	13	S8	MPUR	BUTP		29
<P24>	B[301]	B[301]	13	S8	TCW G	BOWL RND		29
<P25>	B[301]	B[301]	13	S8	TCW G	LID DOM		29
<P26>	B[301]	B[301]	13	S8	POTG	TBOWL		29
<P27>	B[375]	B[375]	13	S9	PEAR-SLIP	BOWL		32
<P28>	B[103]	B[103]	13	B5	PMRE	FRYP		34

Accessioned finds

<S1>	B<92>	B[440]	9	S4	iron spear-head	complete; L 166mm, max W of blade 23.5mm, max Diam of socket 17mm; slightly asymmetrical pointed leaf shape outline, thin diamond section and a long socket	16
<S2>	B<80>	B[424]	10	S5	iron arrow-head	near complete; L 70mm, approx L of head 39mm, max W of head 4mm; narrow square sectioned head, which contracts very slightly at the neck before its damaged socket	20
<S3>	B<24>	B[326]	11	S6	iron ?arrow-head	complete; L 117mm. max socket Diam 14mm; iron ?arrowhead, with square sectioned head, swelling in width then contracting with a globular collar at the junction with the socket; unparallelled in the major arrowhead typologies (Ward Perkins 1940; Jessop 1996) and so perhaps actually a finial or pole tip	22
<S4>	B<2>	B[343]	12	OA7	copper-alloy tweezers	complete; L 66mm, max W 5.5mm. Wire suspension loop and collar above shouldered pincer blades; incised 'milled' decoration on edges and rocker decoration on faces; see similar from 12th-/13th-century York (Ottaway & Rogers 2002, 3071, no. 12926) and 13th-/14th-century London (Egan & Pritchard 1991, 381, no. 1775)	25
<S5>	B<3>	B[301]	13	S8	bone handle	near complete; L 93mm, Diam at butt 22.5mm, min Diam 16.5mm; circular sectioned body, made from a cattle metatarsal, which expands towards the butt; decorated in low relief with bands of elongated hexagons and short hexagons flanked by diamonds; the butt is plugged with a disc decorated with a rosette motif which is closely paralleled on a similar object, again from a late 17th-/18th-century context at Broadgate (XSM10, <133>, [492]; Hartle 2012, 93)	30

Table 4 (cont.). Details of the illustrated finds

Cat. no.	Site/accession no.	Site/context	Period	Land use	Fabric	Form/type	Description	Fig no.
Ceramic building material								
<T1>		B[410]	10	S5		small Roman brick		11
<T2>	A<25>	A[108]	13	B5		tin-glazed floor tile		34
Wall plaster								
<WP1>		B[421]	5	S1		Roman wall plaster		6

Key: Description: Ax - reverse axis; Diam - diameter; L - length; Obv - obverse; r - right; Rev - reverse; W - width; Wt - weight

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NOTES

¹ MOLA Resource Library, <http://www.mola.org.uk/resource-library> (accessed 25 August 2016).

BIBLIOGRAPHY

- Allan, J P, & Keen, L, 1984 'Medieval floor tiles' in J P Allan (ed) *Medieval and Post-Medieval Finds from Exeter, 1971–80* Exeter Archaeology Report 3, Exeter, 232–47
- Allison, E, 2013 *Analysis of Insect Remains (BOJ10)* Canterbury Archaeological Trust unpub report 2013/15
- Askew, P, 2014 'The western stream, Roman city wall and medieval city ditch at 7–10 Old Bailey, London EC4' *London Archaeol* 14, 11–18
- Atkinson, D R, & Oswald, A, 1969 'London clay tobacco pipes' *J Brit Archaeol Ass* 32, 171–227
- Baines, P, 1985 *Flax and Linen* Shire Albums 133, London
- Barber, B, & Bowsher, D, 2000 *The Eastern Cemetery of Roman London: Excavations 1983–1990* MoLAS Monograph Series 4, London
- Bentley, D, 1985 'Roman London: a 1st-century boundary' *London Archaeol* 5, 124–9
- Bentley, D, 1987 'The western stream reconsidered: an enigma of the landscape' *London Archaeol* 5, 328–34
- Bentley, D, & Pritchard, F, 1982 'The Roman cemetery at St Bartholomew's Hospital, London' *Trans London Middlesex Archaeol Soc* 33, 134–72
- Betts, I, Black, E W, & Gower, J, 1997 'A corpus of Roman relief-patterned tiles in Roman Britain' *J Roman Pottery Stud* 7, 1–167
- Betts, I M, 2002 *Medieval 'Westminster' Floor Tiles*, MoLAS Monograph Series 11, London
- Betts, I M, 2007 'Ceramic building material (and slate)' in D Bowsher, T Dyson, N Holder & I Howell (eds) *The London Guildhall: An Archaeological History of a Neighbourhood from Early Medieval to Modern Times* 2 vols MoLAS Monograph Series 36, London, 430–7
- Betts, I M, 2012 *Building Material Report (BPB05 & BOJ10)* MOLA unpub report
- Betts, I M, & Foot, R, 1994 'A newly identified late Roman tile group from southern England' *Britannia* 25, 21–34
- Betts, I M, & Weinstein, R, 2010 *Tin-Glazed Tiles from London* MOLA Surveys and Handbooks Series, London
- Bond, C J, 2002 *London Tower Postern*, MOL unpub report
- Britton, F, 1987 *London Delftware*, London
- Brodribb, G, 1987 *Roman Brick and Tile*, Gloucester
- Bronk Ramsey, C, 2009 'Bayesian analysis of radiocarbon dates' *Radiocarbon* 51, 337–60
- Brown, J, 2005 'The ceramic building materials' in J Butler (ed) *Saxons, Templars and Lawyers in the Inner Temple* Pre-Construct Archaeology Ltd Monograph Series 4, Durham, 79–84
- Butler, J, 2001 'The city defences at Aldersgate' *Trans London Middlesex Archaeol Soc* 52, 41–112

- Cameron, N G, 2013 *Diatom Analysis (BOJ10)* MOLA unpub report
- Carlin, D, & Belcher, V, 1989 'Gazetteer to the c. 1270 and c. 1520 maps with historical notes' in Lobel (ed) 1989, 63–99
- Cooper, D, 2005 'Bird pots and sparrow pie' in J Pearce (ed) *The Last Hendon Farm: The Archaeology and History of Church End Farm*, Hendon, 57–60
- Crummy, N, 1983 *The Roman Small Finds from Excavations in Colchester 1971–9* Colchester Archaeology Report 2, Colchester
- Davis, A, 1997 'The plant remains' in C Thomas, B Sloane & C Phillpotts *Excavations at the Priory and Hospital of St Mary Spital, London* MoLAS Monograph Series 1, London, 234–45
- Davis, A, 2007 'The plant remains' in Lyon 2007, 176–80
- Davis, A, 2013 *Plant Remains (BOJ10)* MOLA unpub report
- Dumbrell, R, 1983 *Understanding Antique Wine Bottles*, Woodbridge
- Dunwoodie, L, Harwood, C, & Pitt, K, 2015 *An Early Roman Fort and Urban Development on Londinium's Eastern Hill: Excavations at Plantation Place, City of London, 1997–2003* MOLA Monograph Series 65, London
- Egan, G, 1985 *Excavations at 7–12 Aldersgate Street (ALG84)* MOL unpub report
- Egan, G, 1992 'Marks on butterpots' in D Gaimster & M Redknap (eds) *Everyday and Exotic Pottery from Europe c 650–1900: Studies in Honour of John G Hurst*, Oxford, 97–100
- Egan, G, & Pritchard, F, 1991 *Medieval Finds from Excavations in London: Volume 3, Dress Accessories c. 1150–c. 1450*, London
- Egan, G, Maloney, C, & Maloney, J, 1981 *Excavations at Crosswall, London EC3* MOL unpub report
- Ellenberg, H, 1988 (1963) *Vegetation Ecology of Central Europe* 4th edn, Cambridge
- Frere, S, 1983 *Verulamium Excavations: Vol 2* Reports of the Research Committee of the Society of Antiquaries of London 41, London
- Fulford, M, 1983 'The defensive sequence at Silchester' in Maloney & Hobley (eds) 1983, 85–9
- Garner, F H, & Archer, M, 1972 (1948) *English Delftware* revised edn, London
- Goodburn, D, 2007 *Worked and Unworked Wood (BPB05)* MOLA unpub report
- Greig, J, 1988 'Plant resources' in G Astill & A Grant (eds) *The Countryside of Medieval England*, Oxford, 108–27
- Hall, J, 1996 'The cemeteries of Roman London: a review' in J Bird, M Hassall & H Sheldon (eds) *Interpreting Roman London: Papers in Memory of Hugh Chapman* Oxbow Monograph 58, Oxford, 57–84
- Hartle, R, 2012 *Crossrail, Central Section Project, Fieldwork Report, Archaeological Evaluation & Watching Brief, Broadgate Ticket Hall (XSM10)* MOLA unpub report
- Henderson, M, 2013 *The Disarticulated Human Bone from Phase II (BOJ10)* MOLA unpub report
- Hobley, B, 1983 'Roman urban defences: a review of research in Britain' in Maloney & Hobley (eds) 1983, 78–84
- Howe, E, 2002 *Roman Defences and Medieval Industry: Excavations at Baltic House, City of London* MoLAS Monograph Series 7, London
- Howe, E, & Lakin, D, 2004 *Roman and Medieval Cripplegate, City of London: Archaeological Excavations 1992–8* MoLAS Monograph Series 21, London
- Hunt, G, 2010 'Along the eastern defences: excavations at 8–14 Cooper's Row and 1 America Square in the City of London' *Trans London Middlesex Archaeol Soc* 61, 41–80
- Hurst, J G, Neal, D S, & Beuningen, H J E van, 1986 *Pottery Produced and Traded in North-West Europe 1350–1650* Rotterdam Papers 6, Rotterdam
- Hyde, R, 1992 *The A to Z of Restoration London (the City of London, 1676)* Harry Margary, Kent
- Jessop, O, 1996 'A new artefact typology for the study of medieval arrowheads' *Medieval Archaeol* 40, 192–205
- Lobel, M D, (ed) 1989, *The British Atlas of Historic Towns: Vol 3, The City of London, from Prehistoric Times to c. 1520*, Oxford
- Lyon, J, 2007 *Within These Walls: Roman and Medieval Defences North of Newgate at the Merrill Lynch Financial Centre, City of London* MoLAS Monograph Series 33, London
- MacGregor, A, 1976 'Bone skates: a review of the evidence' *Archaeol J* 133, 57–74
- Maloney, J, 1979 'Excavations at Dukes Place: the Roman defences' *London Archaeol* 3, 292–7
- Maloney, J, 1983 'Recent work on London's defences' in Maloney & Hobley (eds) 1983, 96–117
- Maloney, J, & Hobley, B, (eds) 1983 *Roman Urban Defences in the West* Council for British Archaeology Research Report 51, London
- Marsden, P R V, 1980 *Roman London*, London
- Marshall, M, 2012 *The Accessioned Finds (BOJ10)* MOLA unpub report
- Merrifield, R, 1983 *London: City of the Romans*, London
- Milne, G, with Cohen, N, 2001 *Excavations at Medieval Cripplegate, London: Archaeology after the Blitz, 1946–68* English Heritage Archaeology Report, Swindon
- Mook, W G, 1986 'Business meeting: recommendations/resolutions adopted by the 12th International Radiocarbon Conference' *Radiocarbon* 28, 799

- Moore, N, 1918 *The History of St Bartholomew's Hospital* 2 vols, London
- Nichols, J G, (ed) 1852 *Chronicle of the Greyfriars of London*, London
- North, J J, 1991 *English Hammered Coinage: Volume 2, Edward I to Charles II, 1272–1662* 3rd rev edn, repr 2006, London
- Ogilby, J, & Morgan, W, 1676 'Large and accurate map of the City of London' reproduced in Margary, H, 1976 'Large and Accurate Map of the City of London' by John Ogilby and William Morgan, 1676 Margary in assoc Guildhall Library, Kent
- Oswald, A, 1975 *Clay Pipes for the Archaeologist* British Archaeological Report (Brit Ser) 14, Oxford
- Ottaway, P, 1992 *Anglo-Scandinavian Ironwork from 16–22 Coppergate* The Archaeology of York 17/6, London
- Ottaway, P, & Rogers, N, 2002 *Craft, Industry and Everyday Life: Finds From Medieval York* The Archaeology of York 17/15, York
- Pearce, J E, 1992 *Post-Medieval Pottery in London, 1500–1700: Vol 1, Border Wares*, London
- Pearce, J E, 2001 'Pottery sequence from the city ditch at Cripplegate buildings (WFG18)' in Milne 2001, 19–24
- Pearce, J E, 2012 *Medieval and Later Pottery, Clay Pipes and Glass (BPB05 & BOJ10)* MOLA unpub report
- Pearce, J E, & Straube, B, 2001 'The double dish dilemma' *Ceram America* 1, 215–17
- Pearce, J E, Vince, A G, & Jenner, M A, 1985 *A Dated Type-Series of London Medieval Pottery: Part 2, London-Type Ware* London and Middlesex Archaeological Society Special Paper 6, London
- Perring, D, 1991 *Roman London*, London
- Perring, D, & Roskams, S P, with Allen, P, 1991 *The Archaeology of Roman London: Vol 2, Early Development of Roman London West of the Walbrook* Council for British Archaeology Research Report 70, London
- Pfizenmaier, S, 2014 *Phase III, Evaluation Report (SBQ14)* MOLA unpub report
- Phelps, M, 2012 *Iron Working and Industrial Debris (BOJ10)* MOLA unpub report
- Pipe, A, 2012 *Animal Bone (BOJ10) Phase 2* MOLA unpub report
- Pitt, K, 2006 *Roman and Medieval Development South of Newgate: Excavations at 3–9 Newgate Street and 16–17 Old Bailey, City of London* MoLAS Archaeology Studies Series 14, London
- Power, D'Arcy, & Waring, H J, 1923 *A Short History of St Bartholomew's Hospital 1123–1923*, London
- Price, J, & Cottam, S, 1998 *Romano-British Glass Vessels: A Handbook* Council for British Archaeology Practical Handbooks in Archaeology 14, York
- Pringle, S, 2009 'Building materials' in C Cowan, F Seeley, A Wardle, A Westman & L Wheeler *Roman Southwark Settlement and Economy* MoLAS Monograph Series 42, London, 187–206
- Prockter, A, & Taylor, R, 1979 *The A to Z of Elizabethan London* Topographical Society Publication 122, London
- RCHM(E): Royal Commission on the Historical Monuments (of England), *An Inventory of the Historical Monuments in London: Vol 3, Roman London*, 1928, London
- Reddan, M, 1909 'Hospital of St Bartholomew' in W Page (ed) *The Victoria History of London, including London within the Bars, Westminster and Southwark: Vol 1*, London, 520–5
- Reimer, P J, et al, 2013 'IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP, *Radiocarbon* 55, 1869–87
- Rowsome, P, 2008 'Mapping Roman London: identifying its urban patterns and interpreting their meaning' in J Clark, J Cotton, J Hall, R Sherris & H Swain (eds) *Londinium and Beyond: Essays on Roman London and its Hinterland for Harvey Sheldon* Council for British Archaeology Research Report 156, York, 25–32
- Rowsome, P, with Blackmore, L, & Harward, C, 2014 'Roman and medieval defences north of Ludgate: excavations at 42–46 Ludgate Hill and 1–6 Old Bailey, London EC4' *London Archaeol* 14, 231–8
- Scaife, R G, 1982 'Pollen analysis of urban medieval sediments' in P Mills 'Excavations at Broad Sanctuary, Westminster' *Trans London Middlesex Archaeol Soc* 33, 360–5
- Scaife, R G, 2004 'The pollen' in G Keevill *The Tower of London Moat, Archaeological Excavations 1995–9*, Oxford, 315
- Scaife, R G, 2006 *Spitalfields (SRP98): Pollen Assessment Analysis of Romano-British to Medieval Contexts* MOLA unpub report
- Scaife, R G, 2012a *Pollen Analysis of the Roman, Saxo-Norman and Medieval City Ditch Sediments (BOJ10)* MOLA unpub report
- Scaife, R G, 2012b *Pollen Analysis of the Saxo-Norman and Medieval City Ditch Sediments (BOJ10)* MOLA unpub report
- Schofield, J, with Maloney, C, (eds) 1998 *Archaeology in the City of London, 1907–91: A Guide to Records of Excavations by the Museum of London and its Predecessors* MOL Archaeological Gazetteer Series 1, London
- Sloane, B, & Watson, B, 2004 'Crossed wires: the re-dating of a group of funerary lead crosses from Newgate, London' *Trans London Middlesex Archaeol Soc* 55, 183–209
- Sorapure, D, 2017 'The medieval city ditch at Bishopsgate, Heron Tower, London EC3' *Trans London Middlesex Archaeol Soc* 67, 99–131

- Stenton, F M, 1934 *Norman London: An Essay by Professor F M Stenton, with a Translation of William Fitz Stephen's Description by Professor H E Butler*, London
- Stow, J, 1956 (1603) *The Survey of London*, H B Wheatley (ed), London
- Swanton, M, (ed & trans) 1996 *The Anglo-Saxon Chronicle*, London
- Thomas, C, 2002 *The Archaeology of Medieval London*, Stroud
- Vince, A G, & Jenner, A, 1991 'The Saxon and early medieval pottery of London' in A G Vince (ed) *Aspects of Saxo-Norman London: Vol 2, Finds and Environmental Evidence* London and Middlesex Archaeological Society Special Paper 12, London, 19–119
- Wacher, J S, 1995 *The Towns of Roman Britain* revised edn, London
- Wallace, W, 2014 *The Origin of Roman London*, Cambridge
- Ward-Perkins, J B, 1940, *Medieval Catalogue* London Museum Catalogues 7, London
- Watson, S, with Heard, K, 2006 *Development on Roman London's Western Hill: Excavations at Paternoster Square, City of London* MoLAS Monograph Series 32, London
- Watson, S, 2012 'St Paul's Cathedral: evidence for a Saxon ditch and medieval activity from excavations at Paternoster Square 2000–2001' *Trans London Middlesex Archaeol Soc* 63, 33–65
- Whittaker, J, 2012 *Ostracods (BOJ10)* MOLA unpub report
- Willmott, H, 2002 *Early Post-Medieval Glass in England, 1500–1670* Council for British Archaeology Research Report 132, York
- Yendell, V, 2013a *Phase II: Post-Excavation Geoarchaeological Analysis (BOJ10)* MOLA unpub report
- Yendell, V, (ed) 2013b *Appendix: Geoarchaeological Specialist Reports (BOJ10)* MOLA unpub report