Excavations Along the M25

Prehistoric, Roman and Anglo-Saxon Activity between Aveley and Epping, Essex

Edward Biddulph and Kate Brady

With contributions by Enid Allison, Sheila Boardman, Sandra Bonsall, Lisa Brown, John Cotter, Mike Donnelly, Damian Goodburn, Elizabeth Huckerby, Kath Hunter, Lynne Keys, Cynthia Poole, Lena Strid, Ian Scott, Ruth Shaffrey and Helen Webb

Illustrations by Markus Dylewski, Magdalena Wachnik, Hannah Kennedy, Julia Collins and Charles Rousseaux

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Cover illustration. Artist's impression of the middle Iron Age to early Roman settlement at Passingford Bridge. Drawing by Mark Gridley. © The Highways Agency

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1 INTRODUCTION

BACKGROUND TO THE INVESTIGATION

Oxford Archaeology carried out a programme of archaeological evaluation and strip, map and sample recording on land along the M25 carriageway between Junctions 27 and 30 as part of the M25 Widening Scheme Section 4 (between NGRs TQ 4701 9999 to TQ 5757 8006; Fig. 1). The fieldwork, which was completed between December 2008 and December 2011, was commissioned by Skanska Balfour Beatty (SBB) on behalf of the Highways Agency. The scheme passed through the county of Essex and the London Borough of Havering. The archaeological investigations formed part of a mitigation strategy implemented alongside the construction programme for the M25 DBFO (Design, Build, Finance and Operate) Widening Scheme, Section 4.

A total of 29 sites were investigated along a route that transected the districts of Epping Forest, Brentwood and Thurrock in Essex and the London Borough of Havering, passing through the ancient parishes of Epping, Theydon Garnon, Theydon Mount, Stapleford Tawney, Navestock, South Weald, Great Warley, Upminster, Cranham, South Ockendon and Aveley (Fig. 2). Principal sites were identified at Hobbs Hole (Junction 29) and Passingford Bridge Widening and Flood Alleviation Area, although significant archaeological remains were also uncovered at Upminster Bund, Codham Hall Bund and Pond 1812. In addition, archaeological features of interest, largely charcoal-rich pits and isolated prehistoric pits, were recorded at ponds 1605, 1609, 1615, 1683, 1791, 1824 and 1835.

A middle Bronze Age ring-ditch, located on the floodplain of the River Roding and probably representing the remains of a barrow, was the earliest feature recorded at Passingford Bridge. During the middle Iron Age, a settlement of roundhouses and enclosures was established on the higher ground of the gravel terrace, while two rows of post-holes – interpreted as the remains of a series of four-post structures or possibly a monumental avenue – were seen on the floodplain. The settlement continued into the late Iron Age, at which time an extensive field system was laid out. There was a reduced level of activity in the early Roman period, but from the later 2nd to 4th century, field boundaries, water-holes and quarries were dug.

At Hobbs Hole, a hollow was assigned to the middle Bronze Age–early Iron Age. A small group of cremation burials was dated to the late Iron Age, while in the Roman period, enclosure and field boundaries were laid out. Tree-holes concentrated in the southern part of the site are likely to relate woodland clearance in the Roman period. Early Saxon pottery was collected from the upper fills of late Roman features, but also from a pit tentatively identified as a sunken-featured building.

Archaeological remains recorded at Upminster Bund included an alignment of irregular pits dated by pottery collected from a number of features to the early-middle Iron Age, although a middle-late Saxon date cannot be ruled out on the basis of a radiocarbon result from a single pit. Sequences of late Iron Age and medieval ditches were uncovered at Codham Hall Bund. Early Saxon charcoal-rich pits were also recorded. These may relate to industrial activity, possibly charcoal-burning. Field and enclosure ditches at Pond 1812 were dated to the late Saxon/early medieval period.

Table 1 presents a list of sites investigated along the scheme. The accompanying national grid reference is an approximate centre point at each site or, where these comprise multiple areas, a centre point in relation to the group of areas. Site codes are listed and were generated in a numerical sequence according to the order that each site was first investigated. The sequence starts at 001 with each code preceded by M25 and followed by the year that the code was generated separated by a full stop. Codes issued by the Museum of London (MoL) varied slightly from those issued for Essex sites and have been included alongside the standard site code.

The underlying solid geology of the M25 Section 4 consists predominantly of Eocene London Clay. Between Junctions 28 and 29 the London Clay is in part overlain by the silts and sands of the Claygate Beds. The solid geology beneath Section 4 is masked by a succession of Quaternary drift deposits comprising alluvium, terrace gravel, brickearth, head, glacial gravel, boulder clay and pebble gravel. Alluvium is associated with a number of rivers that traverse Section 4 between Junctions 27 and 28 and Junctions 29 and 30. From Junction 27 to 28 the alluvium is primarily associated with the Roding Valley and Weald Brook. Terrace gravel (Taplow Gravel) is indicated at Junction 30. Brickearth is the dominant drift deposit between Junctions 29 and 30, masking much of the solid geology along this section of the route. Head deposits are present to the immediate east of Junction 27. Glacial deposits consisting of boulder clay cap the higher ground traversed by the M25 between Junctions 27 to 28 at Navestock Common. Pebble gravel and Claygate Beds form ridgelines north of Junction 29.

The route was subject to a detailed assessment of the cultural heritage and is discussed in detail in the environmental statement (Highways Agency 2007). The environmental statement defines much of the route as crossing a relatively undeveloped rural landscape and, therefore, containing only a limited number of known excavated sites of archaeological interest, the majority of which are located within the more developed belt on the Thames terraces to the south of Junction 29. The initial specification for evaluation and subsequently the section-specific final archaeological designs identified the reasons for archaeological investigation at each site. Subsequently a Pleistocene period specific background was also presented as part of an assessment produced by OA (2009). Detailed backgrounds are not reproduced here and the original documents that form part of the project archive should be referred to.

EXCAVATION METHODOLOGY

As outlined above, the only area subject to trial trench evaluation was Junction 29 Compound at Hobbs Hole. Here trenches were arranged within the compound boundary to provide an evenly distributed 4% sample of the site by area.

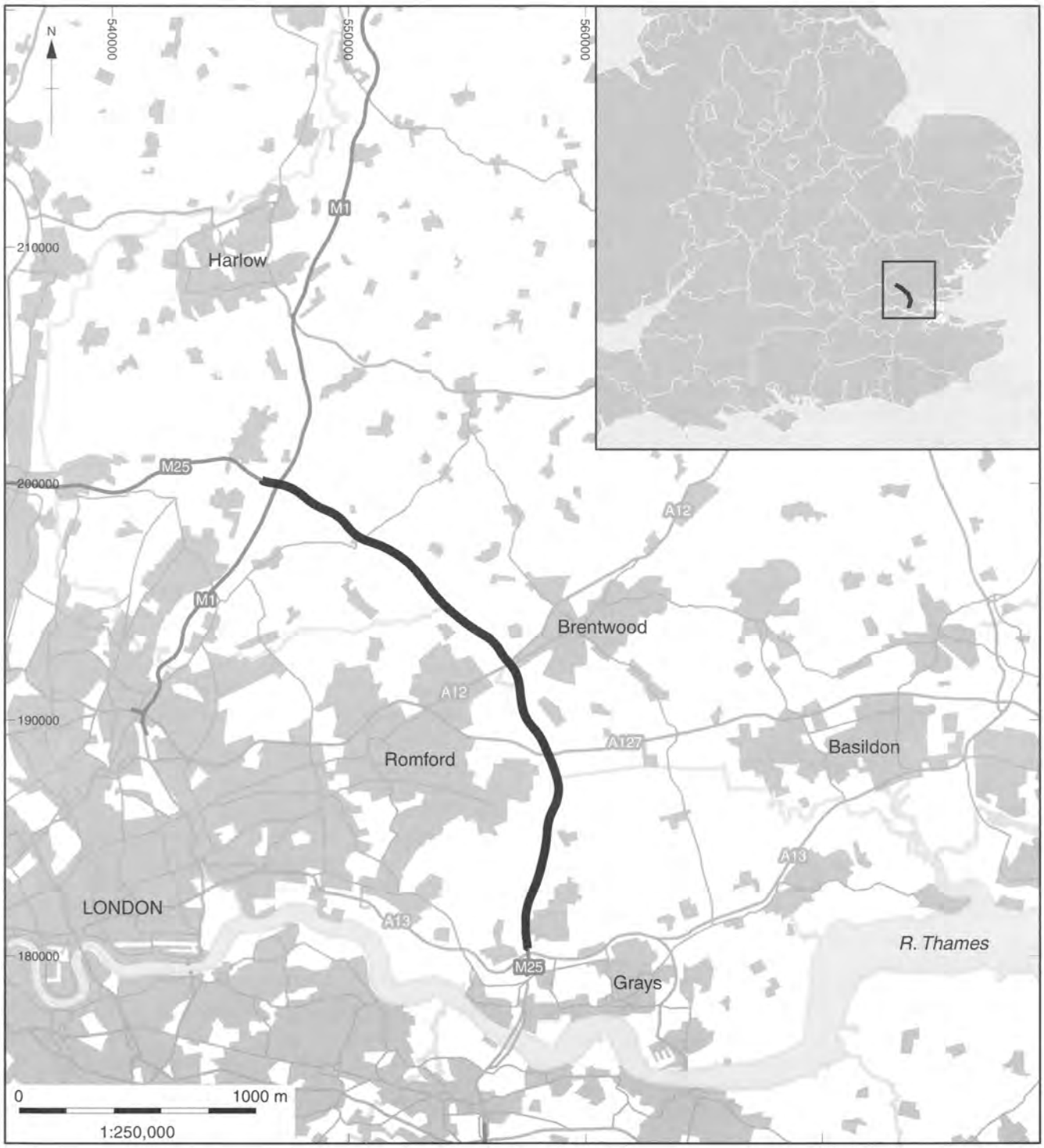

FIGURE 1: Location of M25 Widening Scheme Section 4

These were excavated under archaeological supervision using a mechanical excavator fitted with a toothless bucket to the first archaeological horizon or the surface level of undisturbed geology (drift or solid) depending upon which was encountered first. The exposed archaeological deposits were investigated by hand-excavation and the results were presented as a summary interim document, that included spot dates, to the planning archaeologist at Essex County Council in order to facilitate a rapid decision with regard to further mitigation requirements. This led to areas of excavation defined within the compound for which a detailed excavation written scheme of investigation was produced. This outlined a two-stage approach to the detailed investigation at this site; in the first instance this was limited to stripping, mapping and characterisation, followed by detailed excavation. This method formed the basis for all further archaeological works along the route following the agreement to remove the evaluation stage in favour of stripping the full area of each identified potential site.

Sites subject to SMS investigation were stripped under close archaeological supervision using a mechanical excavator fitted with a toothless bucket for the removal of the topsoil. Each machine stripping topsoil and underlying deposits to the archaeological horizon was supervised by an individual archaeologist. Machine excavation ceased on

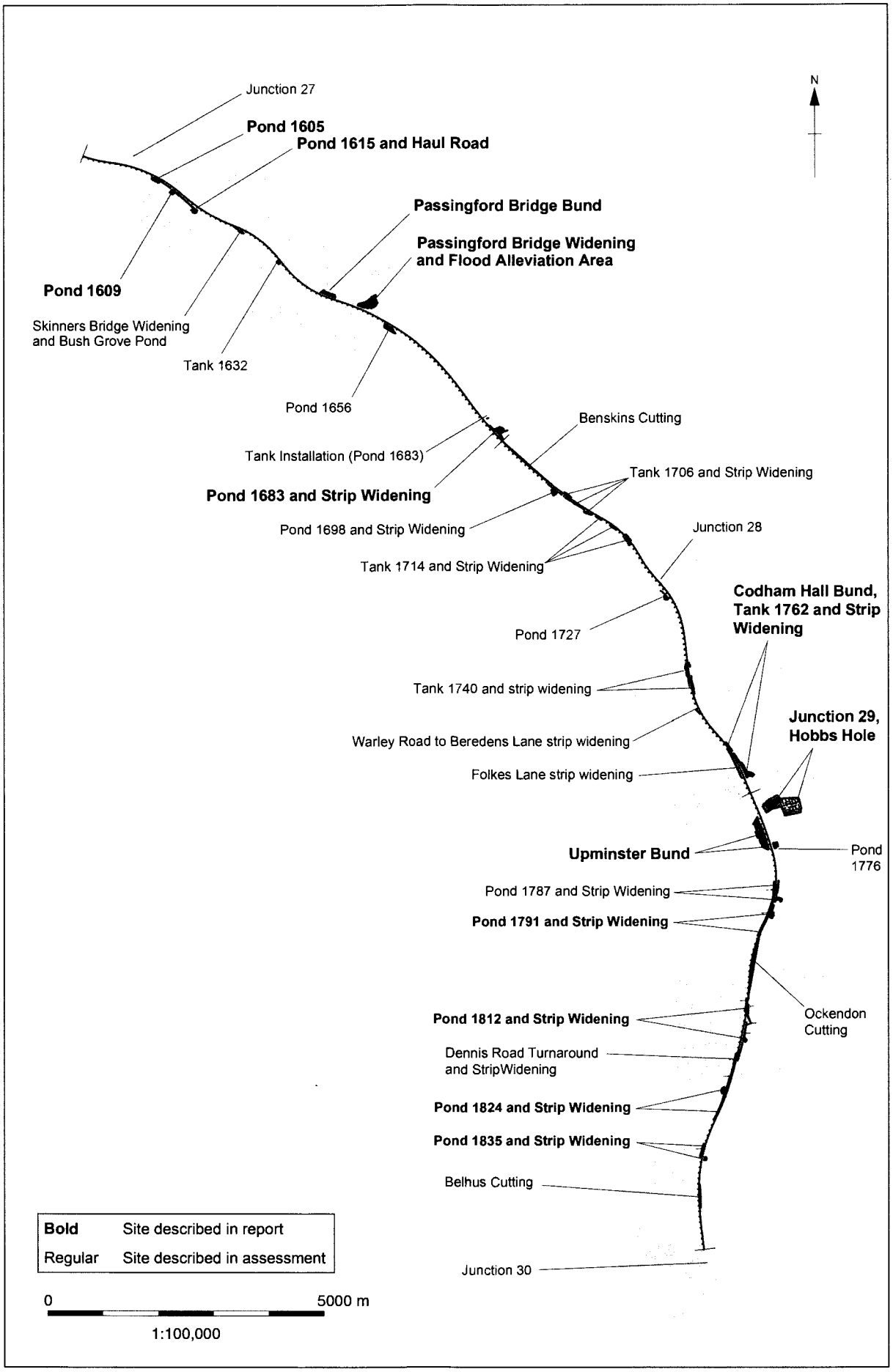

FIGURE 2: Location of investigated sites

Site name	NGR	Site code	MoL site code
Pond 1605	TQ 4762 9972	M25006.09	–
Pond 1609	TQ 4794 9951	M25003.09	–
Pond 1615	TQ 4834 9915	M25004.09	–
*Skinners Bridge Strip Widening and Bush Grove Pond	TQ 4910 9882	M25009.10	–
*Tank 1632	TQ 4986 9820	M25029.11	–
Passingford Bridge Bund	TQ 5078 9762	M25002.09	–
Passingford Bridge Widening and Flood Alleviation Area	TQ 5150 9746	M25002.09	–
*Pond 1656	TQ 5182 9706	M25005.09	–
Pond 1683 Strip Widening, Topsoil Storage, Recovery Compound and Tank installation	TQ 5385 9516	M25010.10	–
Pond 1683	TQ 5388 9515	M25007.09	–
Benskin's Cutting Palaeolithic Watching Brief	TQ 5441 9444	M25016.10	M25-016 10
*Pond 1698 and Strip Widening	TQ 5486 9403	M25013.10	M25-013 10
*Tank 1706 and Strip Widening	TQ 5537 9373	M25011.10	M25-011 10
*Tank 1714 and Strip Widening	TQ 5615 9316	M25017.10	M25-017 10
*Pond 1727	TQ 5687 9212	M25019.10	–
*Tank 1740 and Strip Widening	TQ 5724 9076	M25015.10	M25-015 10
*Warley Road to Bereden's Lane Strip Widening	TQ 5743 9006	M25014.10	M25-014 10
*Folkes Lane Strip Widening	TQ 5812 8910	M25012.10	M25-012 10
Codham Hall Bund, Tank 1762 and Strip Widening	TQ 5831 8895	M25018.10	–
Junction 29, Hobbs Hole Evaluation	TQ 5881 8841	M25001.08	–
Junction 29, Hobbs Hole Excavation	TQ 5881 8841	M25001.09	–
Upminster Bund	TQ 5860 8785	M25008. 09	M25-008 09
*Pond 1776	TQ 5885 8762	M25021.11	–
*Pond 1787 and Strip Widening	TQ 5890 8666	M25020.11	M25-020 11
Pond 1791 and Strip Widening	TQ 5869 8620	M25023.11	M25-023 11
*Ockendon Cutting Palaeolithic Watching Brief	TQ 5846 8558	M25026.11	M25-026 11
Pond 1812 and Strip Widening	TQ 5827 8412	M25024.11	M25-024 11
*Dennis Road Turnaround and Strip Widening Chainages 181300–181700	TQ 5813 8388	M25022.11	–
Pond 1824 and Strip Widening	TQ 5793 8325	M25025.11	–
Pond 1835 and Strip Widening	TQ 5756 8192	M25028.11	–
*Belhus Cutting Palaeolithic Watching Brief	TQ 5750 8100	M25027.11	–

TABLE 1: M25 Widening Section 4: Sites investigated. Key: * Sites not described in this report

exposing archaeologically significant deposits or the surface level of undisturbed geology (drift or solid) depending upon which was encountered first. Machine excavation generally produced a clean surface that did not require substantial hand cleaning. However, where archaeological deposits were encountered these were hand cleaned as necessary prior to excavation to define the extent of the feature/deposit and inform an interpretation. The recording methodology followed a two-stage approach. The initial investigation was limited to the production of a plan and characterisation excavation to produce data to inform a second phase of more detailed excavation. The scope of the second phase detailed excavation works at each site was agreed by means of on site meetings with the relevant planning archaeologist.

2 STRATIGRAPHIC DESCRIPTION

Descriptions of the sites are presented below by site name and in geographical order from the north (Junction 27) to the south (Junction 30). Sites that contained post-medieval field boundaries only or were devoid of any archaeological remains are not examined below. However, a description and site plan for each is included in the assessment report and updated project design (Biddulph et al. 2012a), which is available as a download from the OA digital library (http://library.thehumanjourney.net/2586). In addition, reports on sites investigated for their Pleistocene deposits, principally Belhus Cutting, will be available on the Archaeology Data Service and prepared for publication in *Quaternary Science Reviews*. All these sites are identified in Table 1 by an asterisk.

POND 1605

Pond 1605 was stripped of topsoil to the Thames clay. A small, shallow, charcoal-filled pit (6) within the eastern part of the pond area was excavated and measured 0.4m in diameter and 0.2m deep. There was no evidence of *in situ* burning, as the sides and base of the pit had not been heat-affected. No finds or other dating evidence was present. A 1.4m wide and 0.27m deep ditch (4) aligned NE–SW across the site was excavated and is recorded on early Ordnance Survey mapping. The excavation of this did not produce any dating material to establish an origin although a medieval or, more likely, a post-medieval date for this field boundary seems probable.

POND 1609

The existing ploughsoil and an underlying buried ploughsoil horizon were removed across the site revealing the natural deposit of Thames clay. In total, 24 features were located along the western side of the site parallel and adjacent to a Roman road. Nineteen of these were small charcoal-filled pits measuring up to 0.4m in diameter and 0.04m deep. An attempt to radiocarbon date charcoal from one of the pits (1014) was made, but no result was achieved. No other dating evidence was recovered. No cremated remains were found, although the features had been heavily truncated by the plough. The degree of truncation was demonstrated by five linear features, which when excavated proved to be deep ruts or plough scars which had truncated other possible pits.

POND 1615 AND HAUL ROAD

Across the whole site a deposit of modern ploughsoil and a buried ploughsoil were both removed to reveal Thames clay. In the area for the haul road, a shallow pit (4) measuring 0.65m in diameter and 0.2m deep was excavated. This contained sherds belonging to a Bronze Age urn overlain by a dark, charcoal fill. A radiocarbon date of 1195–980 cal. BC (95.4%; 2890±29, SUERC-43722) was obtained from a sample of charcoal. The function of the pit is unclear, but the vessel appears to have been deposited as an already fragmented vessel, rather than as a complete urn that was subsequently truncated. A post-medieval field boundary ditch (7) was located, but not excavated, as it was recorded on early Ordnance Survey mapping. A further ditch (8) of similar appearance was also recorded to the west and parallel to ditch 7. This does not appear on the same edition of the map but is most likely to derive from the same period and arrangement of field boundaries.

PASSINGFORD BRIDGE BUND AND PASSINGFORD BRIDGE WIDENING AND FLOOD ALLEVIATION AREA

Phase 2: Middle Bronze Age–early Iron Age (1500–400 BC)

Ring-ditch (Figs 3 and 6)

Ring-ditch 2100 was situated on the floodplain in the southern part of the excavation area where the River Roding arcs around from a north–south course to an east–west flow. A radiocarbon date of 1434–1299 cal BC (3097±29 BP, 95%; SUERC-43686) was obtained from charcoal collected from the single fill of segment 2138, although it should be noted that the ditch was very shallow, and modern roots were noted on excavation, reducing the reliability of the dated sample. Given its stratigraphic relationship with two rows of post-holes (2101; see below), the ring-ditch is at least of middle Iron Age date or earlier. An assemblage of worked flint was recovered from the feature, but it included a blade component suggestive of a late Mesolithic, and therefore residual, date. The ring-ditch was annular in form, with an internal diameter of *c.*7.8m. The ditch measured 1m in width and 0.10m–0.16m in depth, and had a flat base. It was filled with pale grey silt. No central burial, or indeed any other contemporary feature, was identified within the ring-ditch, and it is not certain whether the feature represents a plough-levelled barrow or another type of ritual monument.

Other features (Fig. 3)

Other features assigned to this phase were widely dispersed and most were small, representing either post-holes or small pits. Some 30 sherds of late Bronze Age–early Iron Age pottery were recovered from 2870. A possible four-post structure, defined by post-holes 2698, 2901/3, 2919 and 2994, was uncovered near the northern part of the excavation area. The post-holes formed a rectangle approximately 2.5m by 2m. Fragments of a shouldered jar and carinated bowl suggest a late Bronze Age or early Iron Age date for deposition. Post-hole or small pit 4085 was situated in the central part of the site. It was oval in plan and measured 0.9m in diameter and 0.6m in depth, and was filled with compact dark brown silty clay that contained a sherd of flint-tempered pottery dated to the late Bronze Age or early Iron Age.

The remains of a shallow, NW–SE-aligned ditch (2198) survived in the far south of the site. It survived to a length of 13m, extending beyond the southern limit of excavation, and measured 0.47m wide and 0.06m deep. The grey and orange mottled sandy silt fill was dated by six sherds of flint-tempered pottery dated broadly to the Bronze Age or earlier Iron Age. Its very shallow profile raises the possibility that related stretches of ditch belonging to a wider system of prehistoric land division had not survived. More potential Bronze Age features were recorded to the east of the ditch. Features 2373 and 2374 were small spreads of burnt unworked flint and charcoal. They

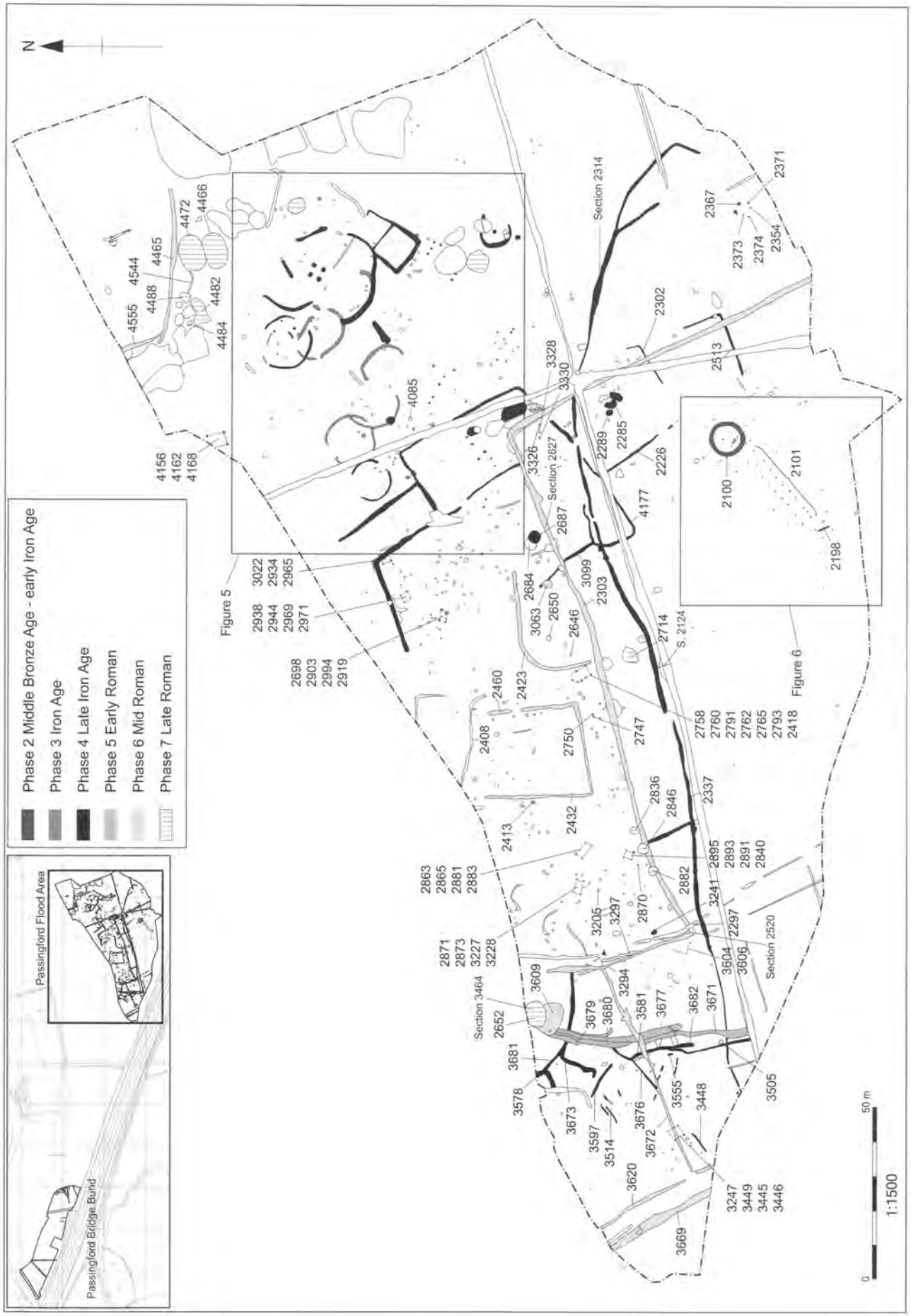

FIGURE 3: Plan of prehistoric and Roman-period features at Passingford Bridge Widening and Flood Alleviation Area (M25002.09)

were adjacent to three pits (2367, 2371 and 2354), which also contained burnt flint and charcoal. The spreads may once have belong to a single, more extensive spread, which had subsequently been truncated by the plough. The features are undated, but it is possible that they are the remains of a burnt mound, a type of feature which is characteristic of the Bronze Age.

Phase 3: Iron Age (*c.*700 to 50 BC)

Passingford Bridge Bund (Fig. 4)

The earliest remains comprised a single pit of possible middle to late Iron Age date just within the western limit of the site. Pit 1020 contained four small sherds of shell-tempered pottery dating to the early Iron Age, although Roman-period ceramic building material also from the pit suggests that the pottery was residual at the time of deposition. The pit had a rounded base and measured 1.4m in diameter and 0.46m deep. Function remains unknown.

Flood Alleviation Area

An unenclosed settlement defined by roundhouses and curvilinear gullies was established during the early to middle Iron Age (Figs 5 and 8). One of the earliest structures was roundhouse 4016, located in the north-east corner of the area of excavation. The ditch defined an area *c.* 14m in diameter. It had moderately-sloping sides and a flat base, and measured between 0.32m and 0.66m in width and between 0.08 and 0.4m in depth. This variation is likely to be due to varying degrees of horizontal truncation, and much of its western side had been removed by a post-medieval ditch. The gully was filled by a single mid to dark grey-brown silty clay from which five sherds of sand-tempered pottery of early-middle Iron Age date was recovered. A 2.5m gap in the gully on the south-eastern side was almost certainly an entrance, and an opposing entrance, 4.5m wide, faced north-west. Evidence for a doorway or porch-like structure is provided by a pair of post-holes inside the south-east-facing entrance and a post-hole at the north-west-facing entrance.

Roundhouse ditch 4016 was cut by curvilinear ditch 4095. The ditch marked the western side of the structure. The eastern ditch had either been completely removed by later activity or, more plausibly had never been set out. The distance between the termini of 4095 was 14m, and the width of the ditch varied between 0.37m and 0.52m in diameter, again partly owing to differential levels of horizontal truncation. The gully had a moderately steep profile and flat base. Twelve sherds of glauconitic pottery of middle Iron Age date were recovered from the ditch. A group of four post-holes (including 4026, 4132, 4117) situated in the internal area of the roundhouse may mark division of space. Post-hole 4132 contained sand-tempered pottery of middle-late Iron Age date.

A curvilinear ditch (4377) to the east of 4095 represents the remains of another structure. The ditch measured between 0.51 and 0.94m in width and between 0.23m and 0.42m in depth, and the distance between termini was 13m. The profile of the ditch was concave and had steep sides. The fill was relatively stony in composition. A fragment from a jar or bowl in a glauconitic fabric was recovered from the ditch.

Enclosure 4310 was located to the north-east of 4016 and 4377. The oval-shaped enclosure comprised three linear segments, which considered together measured between 0.51m to 0.83m in width (with most interventions showing the gully at the upper end of this range) and between 0.2m and 0.47m in depth. The gaps between the segments on the north, east and west sides are likely to be entrances. The gully was filled by mid-greyish brown silty clay with moderate gravel inclusions. Fragments of a bowl in a smooth, fine fabric dated to the late Bronze Age or early Iron Age were recovered from one intervention, though this is likely to be residual, given that the enclosure's spatial association with settlement features dated more certainly to the earlier Iron Age. This is potentially supported by the fragments of a shouldered jar and an ovoid jar dated to the early-middle Iron Age recovered from pit 4361, dug within the gap on the enclosure's east side and possibly associated with it.

A remnant of another enclosure ditch or roundhouse was recorded to the south of enclosure 4310. Ditch 4409 was the terminus of a curving ditch and measured 1.2m wide and 0.2m deep. It had a shallow profile with an uneven base. Fragments of an early to middle Iron Age flint-tempered shouldered jar were recovered from the feature. The ditch was cut by Phase 4 enclosure ditch 4251, which may have followed, and extended, the line of the earlier feature.

In the far south of the site two rows of post-holes (group 2101) appeared to form an avenue *c.*45m long, between 3m and 4m wide (averaging 3.1m between the north and south rows), and orientated NE–SW (Figs 3 and 6). Alternatively, the post-holes can be organised to form an array of eight four-post structures. A more certain four-poster (2142), measuring 3m by 3m, was situated just to the west of the western extent of the line and is likely to be at least broadly contemporary with the post-holes of the alignment. The post-holes were all of a similar size, measuring up to 0.45m in diameter and 0.25m in depth. Pottery – two flint-tempered body sherds – was recovered from just one post-hole, 2152. Radiocarbon dates were obtained from samples from two post-holes. Charred grain from post-hole 2161 offered a date of 400–211 cal BC (2276±27 BP, 95%; SUERC-43687), and charred grain from 2152 was dated to 406–233 cal BC (2303±29 BP, 95%; SUERC-43688). The middle Iron Age dating is supported by stratigraphy. The post-holes towards the northern end of the alignment, which either cut into ring-ditch ditch 2100 or the space within the ditch, were notably shallower, typically measuring between 0.07m and 0.09m in depth, suggesting that they were cut from a higher level, perhaps through the remnants of a mound central to the ring-ditch and possibly also an external bank. In addition, post-hole 2106, belonging to the sixth structure from the west, cut ring-ditch 2100. A number of post-holes loosely aligned with the array were also dated to this phase.

A number of features have been assigned to the earlier Iron Age on the basis of pottery recovered from their fills. A four-post structure near the northern edge of excavation in the central part of the site consisted of post-holes 2938, 2944, 2971 and 2969, which were on average 0.2m in diameter and 0.3m deep. Sand-and-flint-tempered pottery was recovered from 2938. Post-hole 2729 may also have belonged to a four-post structure. A possible four-post structure (2934, 2965 and 3022) was cut by Phase 4 ditch 3308. No pottery was recovered from the post-holes, but on stratigraphic grounds the structure is tentatively placed in Phase 3. A post-built rectangular structure, located close to the centre of the area of excavation,

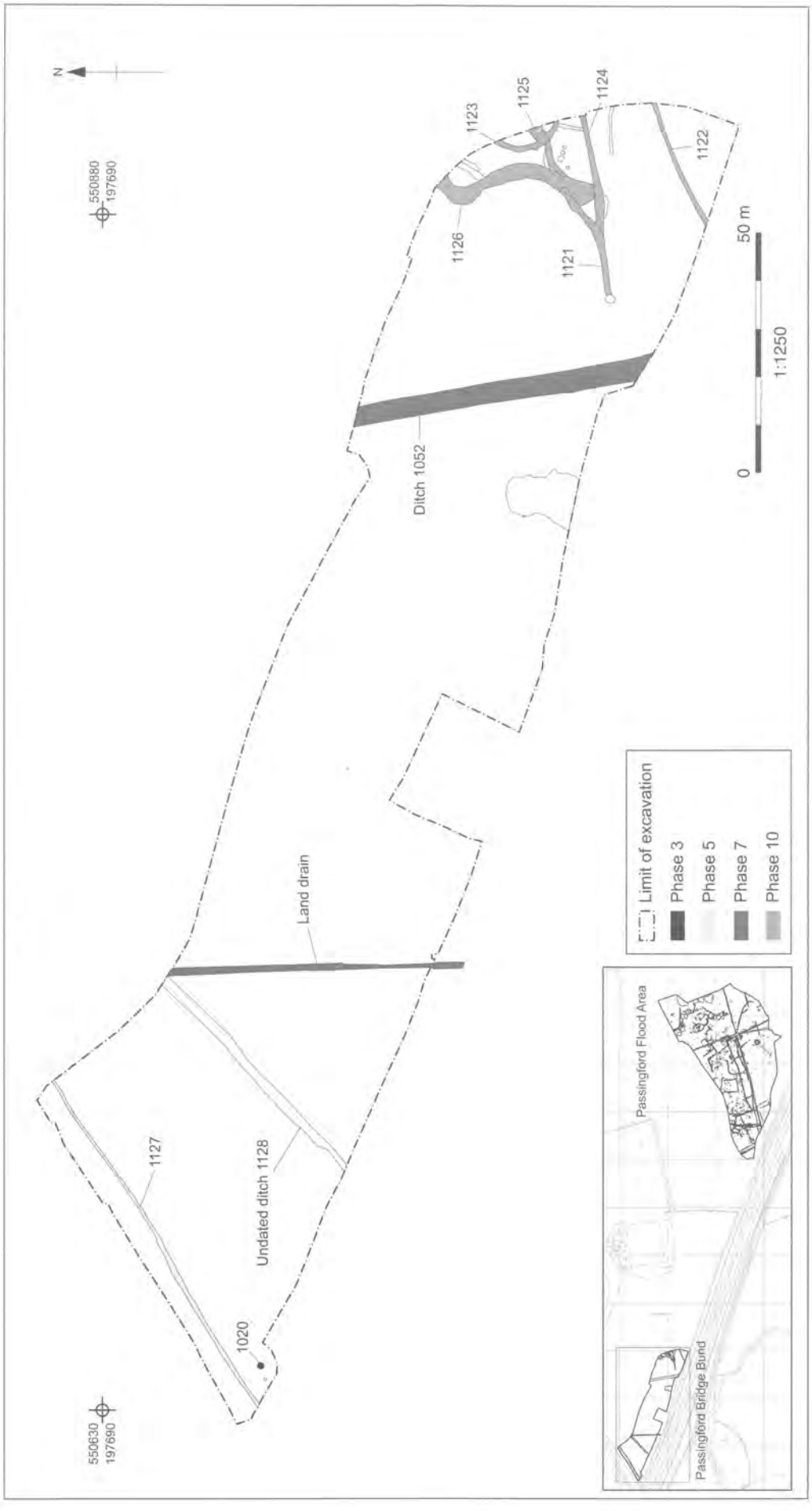

FIGURE 4: Plan of Passingford Bridge Bund (M25002.09)

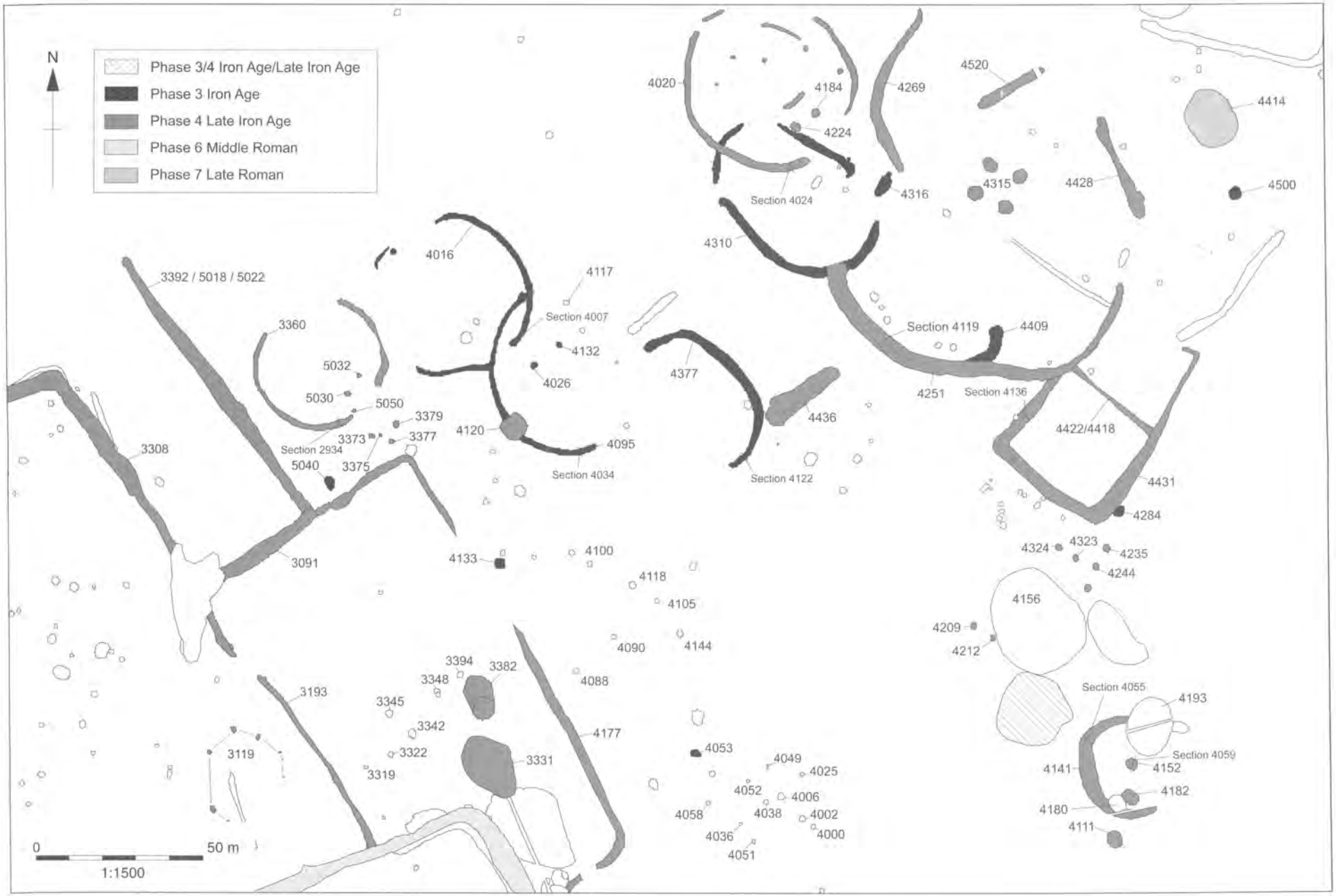

FIGURE 5: Plan of the middle and late Iron Age settlement, Passingford Bridge Widening and Flood Alleviation Area

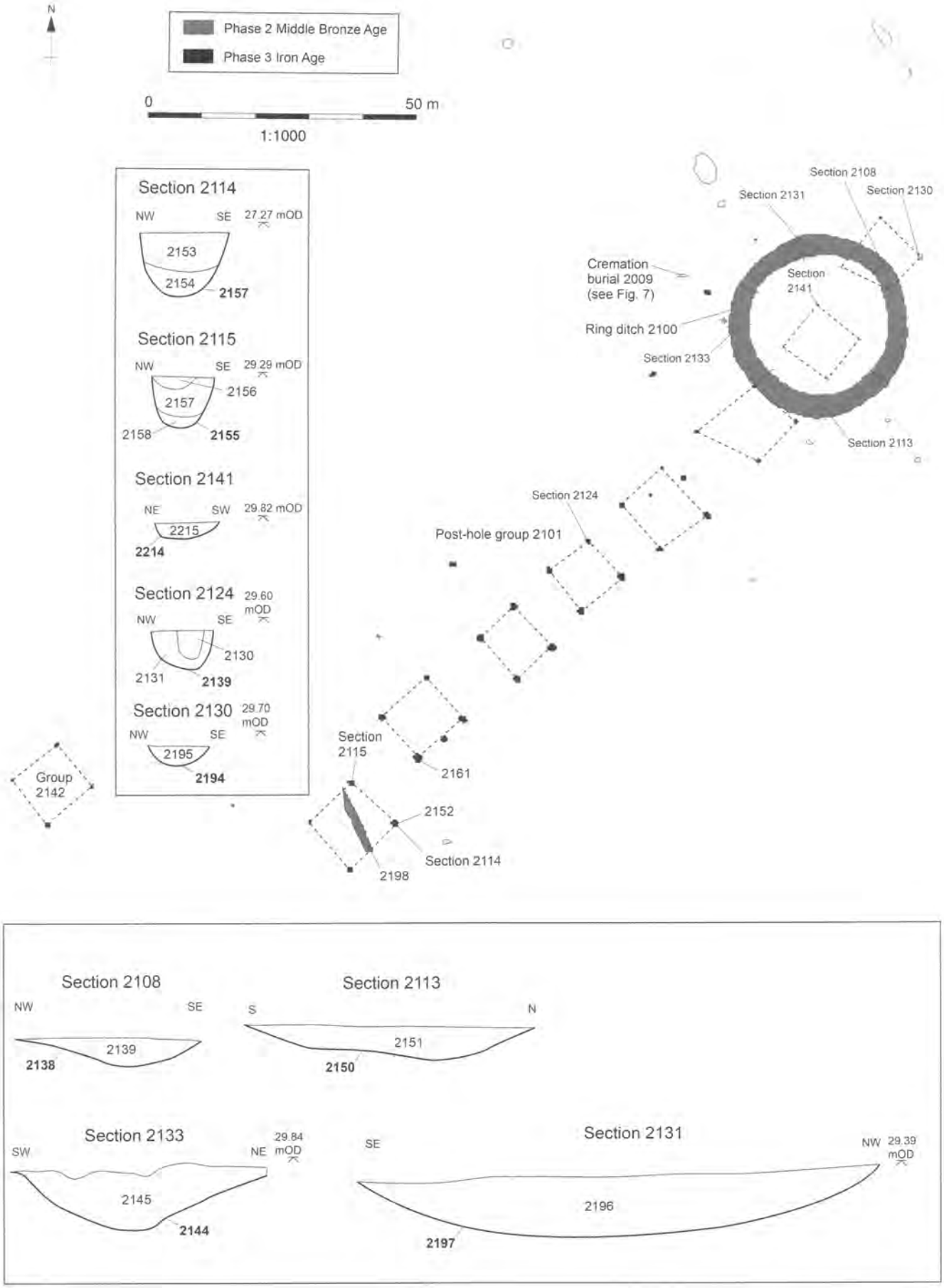

FIGURE 6: Plan of ring-ditch 2100 (Phase 2), and post-hole alignment 2101 and structure 2142 (Phase 3), Passingford Bridge Widening and Flood Alleviation Area

was defined by seven post-holes – four (2758, 2760, 2791 and 2762) on its west side, two (2418 and 2793) on its east, and one (2765) that projected the northern side – and measured *c.* 5m long and 3m wide. The latest pottery recovered from the features included a carinated bowl in a fine glauconitic fabric dated to the early Iron Age. A four-post structure (post-holes 2840, 2891, 2893 and 2895) further west formed a square 2.5m wide. Pottery in a fine glauconitic fabric was collected from one of the post-holes. Pairs of post-holes extended between these structures. The length between the post-holes of each pair ranged from 1m to 3.5m. Few post-holes contained dating evidence, but one pair, 2747 and 2750, which measured up to 0.46m in diameter and 0.24m in depth, contained sand-and-flint-tempered pottery dating to the early-middle Iron Age. Post-holes or small pits found closer to the settlement included 4053, 4500, 4133, 4284 and 5040. Pottery recovered from them suggested an early-middle Iron Age date. Pit 5040 contained the substantial remains of a single sand-and-flint-tempered jar with an upright rim dating to the early-middle Iron Age, and significant amounts of single vessels were also collected from pits 4053 and 4500. Pit 2413 in the north-central part of the site was over 1m wide and 0.4m deep, and was filled with mid-greyish brown silty clays, from which sand-and-flint-tempered pottery was recovered.

Phase 4: Late Iron Age (*c.*50 BC–AD 43)

Flood Alleviation Area

Occupation of the settlement continued into the late Iron Age, and a number of structures and enclosures were laid out during this phase (Figs 5 and 8). Roundhouse ditch 3360 measured up to *c.* 12m in diameter. The ditch was slightly irregular in profile, though generally had moderate to steep straight sides and a flat base, with the gully measuring between 0.3m and 0.45m in width and 0.11m and 0.18m in depth. Seventeen sherds of grog-tempered and shell-tempered pottery recovered from the ditch were deposited during the late Iron Age or later. A south-east-facing entrance was 3.4m in width. Three post-holes inside the structure held timbers that helped to support a roof, or defined a division of space inside the entrance. The post-holes (5032, 5030 and 5050) were all circular and measured between 0.46m and 0.57m in diameter and were filled with mid-brownish grey silty clay and small amounts of burnt flint and charcoal. On the exterior side of the entrance, a further four post-holes (3373, 3375, 3377, 3379) may represent a porch-like structure, although their non-symmetrical arrangement, variable size and distance from the entrance argue against this interpretation. The post-holes measured 0.34m and 0.66m in diameter and between 0.13m and 0.23m in depth. All were filled with mid-brownish grey silty clay. Another, opposing entrance, north-west facing and 7m wide, was recorded.

Roundhouse ditch 4020, to the north-east, cut earlier enclosure 4310. The ditch enclosed an area 14.3m in diameter and had a south-east facing entrance. The ditch was concave in profile, measuring between 0.3m and 0.65m in width and between 0.07m and 0.28m in depth, the variation most likely owing to varying levels of horizontal truncation. The ditch had steep sides and was filled by a mid- to dark-greyish brown sandy silt from which grog-tempered pottery was recovered. A gap in the south-eastern portion of the gully measured 5.17m wide. However, the terminal on the north-eastern side of this gap had a very shallow profile resulting from later truncation. The width of the entrance is attested by two large post-holes (4184 and 4224), which marked a doorway or porch 1.5m wide on the internal side of the entrance. Fragments of a residual jar in glauconitic pottery were recovered from 4184, and more glauconitic sherds were found in 4224. Several features were situated in the internal area of the ring-ditch but none contained any material dating them with confidence to this phase.

Ditch 4251, another curvilinear gully that cut Phase 3 gully 4310, extended to the south-east and curved towards the north. The ditch had steep sides and a broadly flat base measuring between 1m and 1.8m in width and between 0.3m and 0.72m in depth. It was filled by two fills of dark greyish brown silt, with occasional flint nodules and charcoal inclusions. The termini produced over 200 sherds of pottery, the latest of which are jars in grog-tempered ware, dating deposition to the late Iron Age. The post-holes from a four-post structure (4315) were recorded inside enclosure 4251. The post-holes formed a *c.* 3m by 3m square and averaged 1.2m in diameter and 0.3m deep. No dating evidence was recovered from the group, but the proximity of the post-holes to the enclosure suggests that the two were associated. A second four-post structure, comprising post-holes 4162, 4168 and 4156 (the fourth lay beyond the edge of excavation), and measuring 3.5m by 5m, was uncovered north of the settlement. Its association with the settlement is uncertain, however, as no dating evidence was found. Ditch segments 4269, 4428, and 4520 to the north of 4251 may have formed part of the same enclosure. Ditch 4269 averaged 0.8m wide and 0.5m deep, ditch 4428 measured 1.3m wide and 0.57m deep, while 4520 averaged 0.9m wide and 0.2m deep. The substantial remains of a late Iron Age Age shell-tempered bead-rimmed jar was recovered from ditch 4269. The relationship between 4409 and 4251 could not be discerned.

Ditch 4431 was on average 0.6m wide and 0.16m deep, and had steep sides and a concave base. It defined a rectangular structure or enclosure that measured *c.* 10m along its north-western edge and *c.* 15m along its south-eastern edge. A narrow ditch or gully (4422/4418) joined the two sides to form a square with internal dimensions of *c.* 9m by 9m, although the gully had been cut by 4431 and was possibly an unrelated feature. Ditch 4431 was turn filled by up to two deposits before curvilinear ditch 4251, which cut 4431, was dug. A storage jar and bead-rimmed jar, both in grog-tempered ware, were recovered from the ditch and dated deposition to the late Iron Age.

A number of features uncovered within the settlement area were dated to this phase by pottery. A rectangular feature (4436) west of 4251 measured 7.5m long, 1m wide and 0.45m deep. It was filled with two deposits, the upper fill being a mid-brown-black silty clay which contained over 200 sherds of mainly grog-tempered pottery, a near-complete crucible in a sandy fabric, and some 20g of hammerscale flakes and spheres. The deposit indicates that metalworking took place nearby, probably within the settlement (hammerscale was also collected from enclosure 4251) and utilising feature 4436. A horseshoe-shaped enclosure (4141) to the south-east enclosed an area 10.2m long by 8.8m wide and was open on the eastern side. The ditch, from which grog-tempered pottery was recovered, measured 1.22m wide and 0.55m deep.

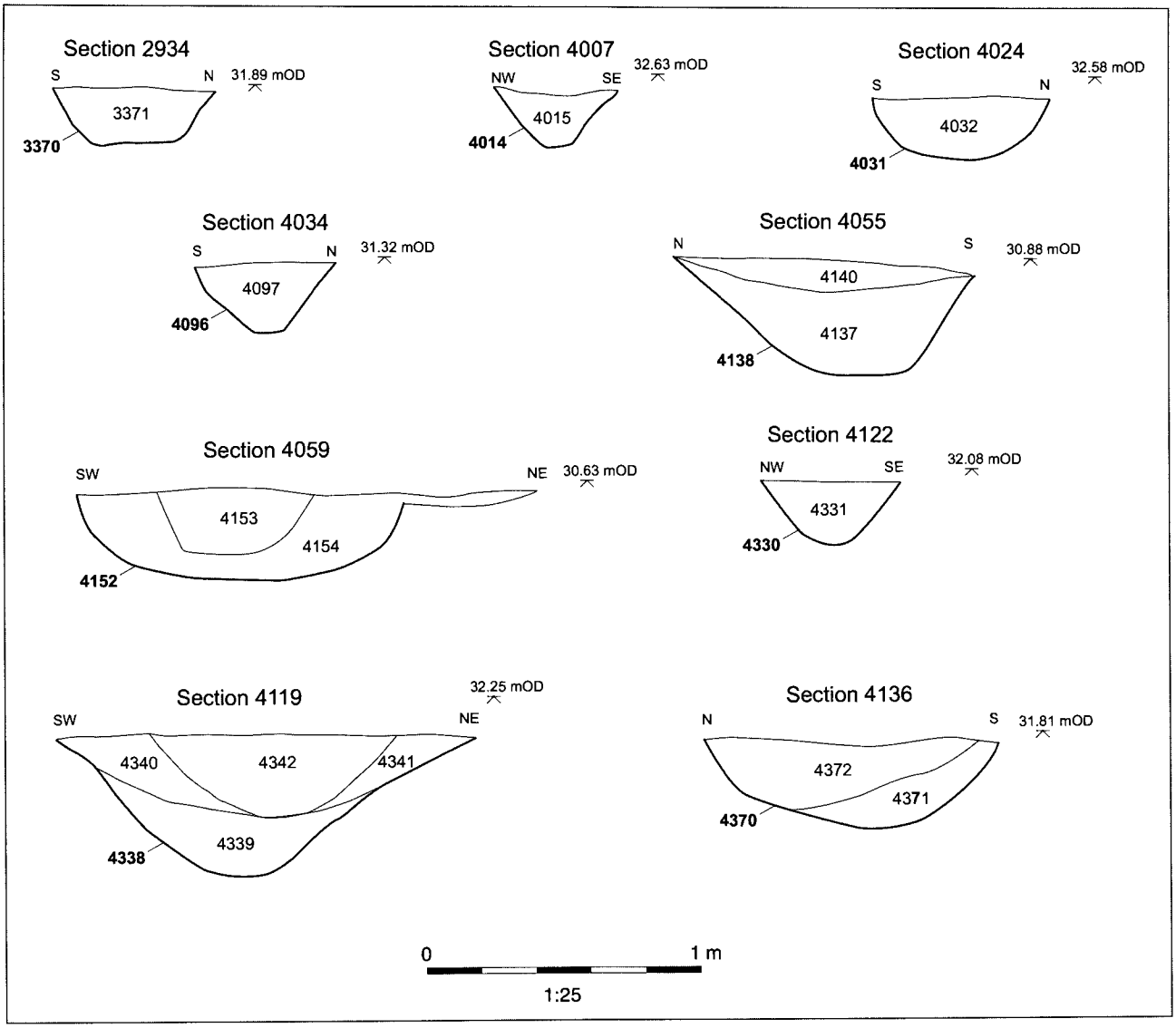

FIGURE 8: Sections through roundhouses and other settlement features, Passingford Bridge Widening and Flood Alleviation Area

Features associated with the enclosure included pit 4152, which was 1.8m in diameter and 0.33m deep, and contained grog-tempered pottery. Feature 4111 appeared to be a shallow depression in the natural soil rather than a deliberately dug feature, but contained grog-tempered pottery. Pit 4182 may also have been associated with the feature, though could not be dated, while pits 4180 and 4193 cut the ditch and were later features. Pit 4120, which cut Phase 3 ring-ditch 4095, is tentatively placed in Phase 4, though produced no further dating evidence.

A series of ditches immediately west of the settlement defined field boundaries or large enclosures (Figs 3, 5 and 9). Ditch 3308 measured 28m WSW–ENE before turning to the south and extending for a further 29.5m, where it terminated. The ditch measured a maximum of 1.5m wide and 0.44m deep and was filled by up to three fills of mid-yellowish brown to mid-greyish brown sandy silt. Some 80 sherds of grog-tempered and shelly-ware pottery recovered from the ditch dated deposition to the late Iron Age. The boundary continued as ditch 3193, which measured 18m in length, 0.37m in width and 0.19m in depth. Another field was defined by ditches 3091 and 4177. Ditch 3091, *c.* 1m wide and 0.25m deep, extended north-east from ditch 3308 (the relationship between them had been obscured by a later feature) for *c.* 22m, then turned to the south-east and extended for a further 8m before disappearing as a result of later truncation. The ditch resumed as 4177, which extended for *c.* 21m before turning to the south-west and continuing intermittently (as a result of truncation) for some 50m. Ditch 3099, which extended from this enclosure, was 0.98m wide and 0.36m deep. Grog-tempered and shelly-ware pottery was recovered from interventions along the entire length of the boundary. A 25m-long ditch (interventions 3392, 5018 and 5022), orientated NW–SE, extended north from 3091. Its southern end was cut by 3091, but grog-tempered and shelly-ware pottery recovered from the ditch indicates that it filled during the late Iron Age, and thus joins 3091 in Phase 4.

A number of features were enclosed by the ditches and may have been associated with them. Pit 3382 was oval in plan with vertical sides and a flat base. It measured 1.84m long, 1.3m wide and 0.4m deep. The pit contained two fills, the upper of which contained a high-shouldered jar in grog-tempered ware and bead-rimmed jar in shelly ware. Grog-tempered pottery was also collected from a large pit to the south, 3331. This was some 8m long and 5m wide, but shallow; interventions

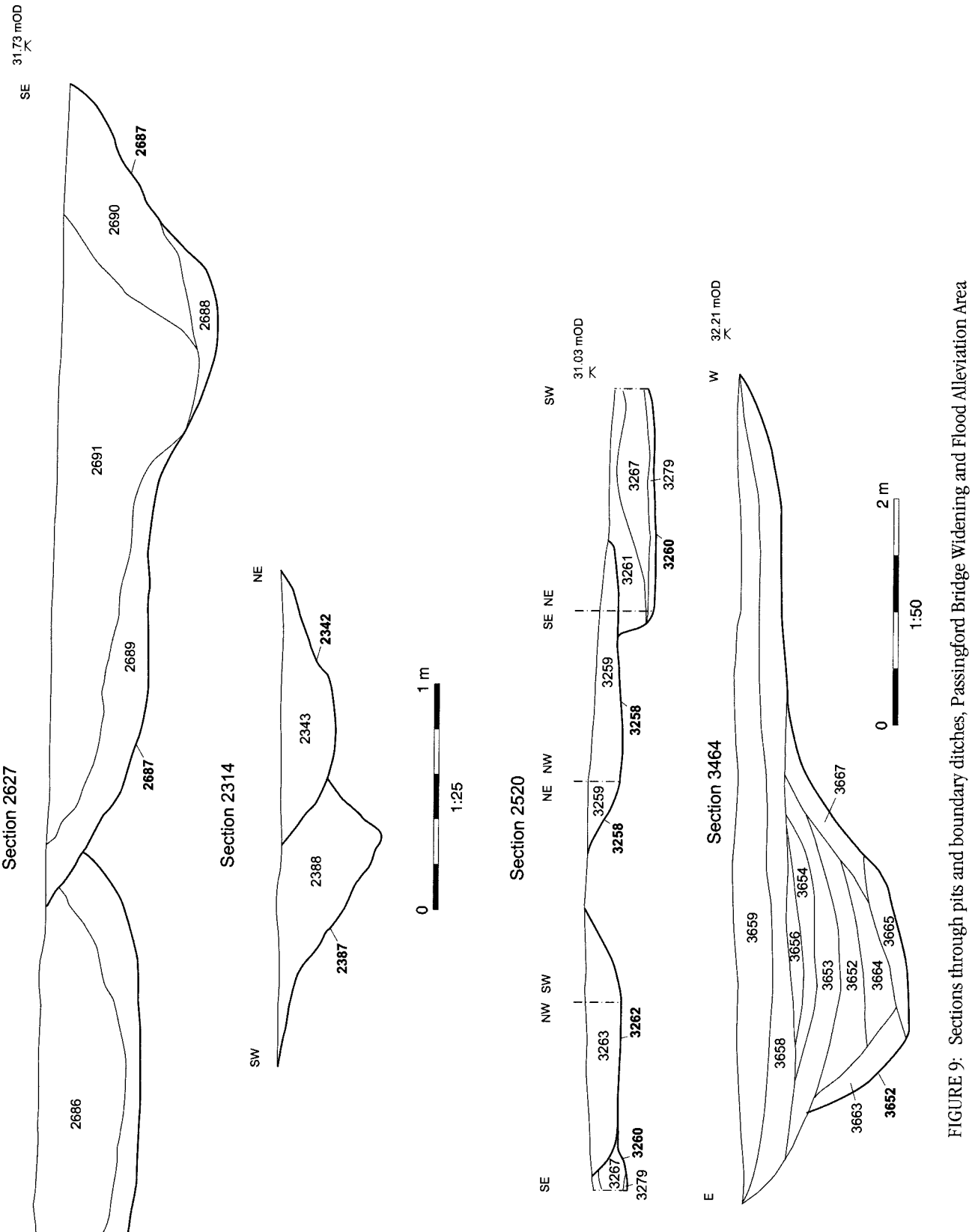

FIGURE 9: Sections through pits and boundary ditches, Passingford Bridge Widening and Flood Alleviation Area

made in the pit recorded a depth of *c.*0.45m. Two more pits were dug further to the west closer to ditch 3099. Pit 2684 was oval in shape with moderate to steep sides and a concave base. It measured 3.58m long, 2.44m wide and 0.45m deep. Its upper fill contained grog-tempered ware and a barrel-shaped jar in shelly ware. The feature was cut by pit 2687, which was circular in plan and had steep, stepped sides and a concave base. The pit was up to 1.93m long and 0.7m in deep, and its upper fill contained a butt-beaker and high-shouldered jar in grog-tempered ware. The stepped profile of this feature suggests an original function as a water-hole.

The field system extended to the south. Ditch 2226, extending for *c.*20m from 4177 (the relationship was unclear), measured 0.5m wide and 0.1m in deep and had a concave profile. The southern part of the ditch had been removed by later activity, but it is likely to have been related to 2513 further to the south. Ditch 2513 extended for some 20m towards the north-east before turning at right angle to continue for *c.*11m towards the north-west. The ditch measured 0.7m wide and 0.23m deep. Ditch 2302, located between 2226 and 2513, extended for *c.*13m on a SW–NE alignment, then turned at right angle to continue for at least 5m towards the north-west. It measured 0.34m wide and 0.1m deep and had a concave base. Grog-tempered pottery was recovered from all three features (over 200 sherds from 2302), pointing to a late Iron Age date for deposition. Two tree-throw holes, 2285 and 2289, within this field can be placed in this phase of activity on the basis of pottery recovered from them.

Several coherent groups of post-holes were noted among the mass of (largely undated) post-holes recorded within the field system. These include a circular structure (3119) some 6.5m in diameter, a line of post-holes (3319, 3322, 3342, 3345, 3348, and 3394) *c.*12m long, and a row of post-holes (3330, 3328 and 3326). Grog-tempered and shell-tempered pottery, and occasional residual earlier Iron Age pottery, were recovered from all these groups, pointing to a late Iron Age date for deposition. Other groups, including the two rows (post-holes 3300, 3302, 3304 and 3306) that formed a right angle south of ditch 3193, a smaller grouping south of it (3196, 3198 and 3316), two intersecting rows of post-holes (4088, 4090, 4100, 4105, 4118 and 4144), post-holes (4209, 4212 and 4244) that may define one or more structures immediately south of enclosure 4431, and another possible structure (including 4000, 4002, 4006, and 4008) east of ditch 4177, contained no dating evidence, but given their location may belong to this phase.

A more irregular group of ditches was recorded at the west end of the Flood Alleviation Area. The northernmost element comprised three intercutting ditches, which broadly curved from north to east. The earliest of these (3681) measured 0.8m wide and 0.3m deep. It was cut by two L-shaped ditches (3578 and 3673) that may have formed opposing sides of a funnel shaped enclosure entrance, widening from 6.2m to *c.*12.5m. Short gullies (group 3514 and 3597) were recorded immediately south of the funnel entrance. Grog-tempered pottery collected from 3681 offers a late Iron Age date for deposition. A loose grouping of ditches to the south included ditch 3676/3448, which was NE–SW-aligned and measured *c.*40m long (broken by a 17m-wide gap), 0.59m wide and 0.42m deep. Ditch 3581, measuring *c.*35m long, 0.5m wide and 0.13m deep, extended south from 3676. It was replaced by 3682, which was wider and straighter, measuring 0.75m wide and 0.35m deep. The southern part of the ditch had been removed by later activity. Late Iron Age grog-tempered pottery was recovered from all elements; ditch 3682 contained the largest assemblage, some 79 sherds. Ditch 2851, tentatively placed in this phase, was 16m long and orientated NW–SE. It measured 1.2m wide and 0.9m deep and had moderately sloping sides and a flat base. No pottery was recovered from the fill, but the ditch was aligned with the boundaries to the east and had been cut by later ditches 2303 and 2337.

Pits associated with this field included pit 3555, which was situated close to ditch 3581. It was oval in shape and measured 1.52m long, 0.54m wide and 0.13m deep, and had an irregular profile. Its function is unknown, but some 50 sherds of pottery, including grog-tempered ware and a bead-rimmed jar in shelly ware, were recovered from it. Pit 3505, further to the south, was oval in plan and measured 1.3m long, 1m wide and 0.12m deep, with a profile of moderately sloping sides and an irregular base. Its silty clay fill contained 22 sherds of grog-tempered pottery. Pit 3241 was oval in plan, measured 1.7m long, 1.32m wide and 0.25m deep, and had shallow sides and a flat base. Fourteen sherds of grog-tempered, shelly and oxidised sandy pottery were collected from the feature. Pit 3288 was oval in plan, with shallow concave sides and an irregular base. Its clay-silt fill contained a relatively large assemblage of 70 sherds of grog-tempered pottery. Grog-tempered and shell-tempered pottery was also recovered from pit 3467 (0.5m wide, 0.1m deep) within this area. A number of post-holes recorded in the western part of the excavation area may belong to this phase. These included a four-post structure (3247, 3443, 3445 and 3446), 3m by 3m, which was adjacent to ditch 3448/3676 and was cut by Phase 6 ditch 3672.

The field system was redefined by a boundary (2337) that extended across the southern part of the excavation area. It separated the two topographic zones – the gravel terrace and floodplain – and cutting elements from the earlier enclosures (4177 and 3581). The ditch extended for 200m on a NE–SW alignment, curving towards the south-east to continue for a further 80m where, after a sharp dog-leg turn to the south-west, it terminated. The ditch varied greatly along its length, probably owing to differing levels of horizontal truncation, but the maximum measurements recorded values of 1.28m wide and 0.46m deep. The ditch had a moderately sloping profile and a concave base and was filled by silty clay from which 32 sherds of grog-tempered pottery were recovered. Ditch 3683 extended the ditch towards the west and beyond the western limit of excavation. It measured 0.5m wide and 0.21m deep.

A grave (2009) was situated to the west of ring-ditch 2100 (Figs 6 and 7). The cut (2003) was oval in plan and measured 0.3m long, 0.15m wide and 0.13m deep. Its lower fill (2008) was a black-grey silt containing charcoal and burnt bone. Above this were the broken remains of a cremation urn (2005, sf 2000), a butt-beaker in grog-tempered ware, and an accessory vessel (2006, sf 2001) comprising a fine red-surfaced grog-tempered ware beaker dating to the first half of the 1st century AD. Deposit 2007, within urn 2005, comprised a mixture of cremated bone, charcoal and silt. Loose cremated bone fragments and charcoal were also present in the upper and lower fills of the grave, probably having originated in the urn but displaced by later disturbance, probably the plough. The placement of the cremation burial close to

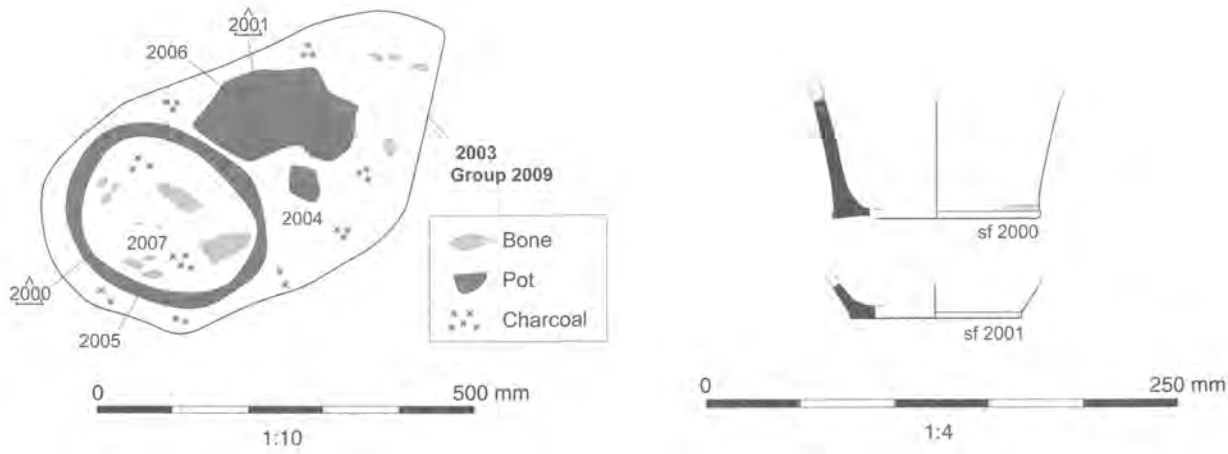

FIGURE 7: Plan of cremation grave 2009, Passingford Bridge Widening and Flood Alleviation Area

ring-ditch 2100 suggests that the monument was still visible at this time. The cremated bone comprised the remains of an adult individual, whose age and sex could not be estimated. Potential ordering of the bones within the urn is suggested by the fact the surrounding fills contained high proportions of skull fragments, while no skull fragments were recovered from the deposit within the urn (Chapter 4).

Phase 5: Early Roman (*c.*AD 43–150)

Passingford Bridge Bund (Fig. 4)

An isolated Roman boundary ditch (1127) was encountered along the western edge of the site. This was parallel to the existing historic London Road and between the road and the Iron Age pit. The ditch was not closely dated although it produced numerous sherds from a single early or mid-Roman vessel.

Flood Alleviation Area (Fig. 3)

A new boundary was set out across the western end of the site. Ditch 3671, which measured 0.9m wide and 0.3m deep, extended for *c.*30m on a broadly north–south alignment, continuing towards the north as 3680, which was 1.2m wide and 0.4m deep. The boundary cut Phase 4 ditches 3673 and 2337, and was recut by 3677, which extended north–south for some 35m and measured 2.2m wide and 0.69m deep. The ditch was recut on its western edge by 3679, which was 1m wide and 0.22m deep. Pottery recovered from the boundary was dominated by grog-tempered and shell-tempered pottery, but post-conquest black-surfaced ware from 3680, as well as the boundary's stratigraphic relationships, suggests that deposition continued, or began, during the third quarter of the 1st century AD. In the central area of the site a single isolated pit was assigned to this phase. Pit 2415 was oval in shape, measuring 1.6m in length, 0.9m in width and 0.36m in depth. It had a single dark greyish brown silty sand fill dated to AD 40–150 by its pottery.

Phase 6: Mid Roman (*c.*AD 150–250)

Flood Alleviation Area (Fig. 3)

An extensive system of fields defined by boundary ditches was laid out during the 2nd or early 3rd century. The most substantial field occupied the south-central part of the excavation area. The field was defined by ditch 2303, which measured *c.*155m along a NE–SW alignment, turning at right angle to continue for a further *c.*100m on a south-east alignment into the southern edge of excavation. The ditch was steep sided and concave in profile and measured *c.*1.4m wide and 0.4m deep. It was filled by up to three silty clay fills, the lowest tending to be stony. Pottery from the single fill of intervention 2854, including Hadham reduced ware, suggests that the ditch began to fill from the late 2nd century onwards, and remained open and functional to some extent well into the late Roman period. The latest pottery from the upper fill of intervention 3260 contained Hadham oxidised ware and Hadham reduced ware with so-called 'Romano-Saxon' decoration, potentially dating the final episodes of filling to the second half of the 4th century.

An L-shaped ditch (2423) defined the west and north sides of a smaller enclosure that used ditch 2303 to form its northern side. The enclosure was open at its eastern end. The ditch had a shallow profile with a flat or rounded base and was on average 0.96m wide and 0.2m deep. Pottery recovered from the feature was broadly dated to the Roman period, but its relationship with 2303 tentatively places it in Phase 6. A pit found within the enclosure is likely to be associated with it. Pit 3063 was some 2.5m in diameter, and 0.3m deep. It had stepped sides and a concave base, and contained seven fills deposited in a sequence of clay-silt and relatively stone-free fills followed by more sandy and stony deposits, the sequence commencing with a clay-silt deposit. Pottery recovered from the penultimate fill included Nene Valley colour-coated ware, dating the final stages of deposition at least to the late 2nd century or later.

A rectangular enclosure (2432/2460) was recorded immediately north-west of 2423. It comprised two sides orientated north–south and up to 30m long and a southern edge *c.*25m long. There was an entrance *c.*2.5m wide through the eastern side, and the enclosure was open on its northern side. The ditch measured on average 0.7m wide and 0.25m deep and had a gently-sloping profile and concave base. The feature was filled with a single silty deposit, which contained, among other pottery, Hadham reduced ware and bead-rimmed dishes dating to the late 2nd or first half of the 3rd century. A number of post-holes and pits were recorded within the enclosure, including a row of post-holes running parallel with the enclosure's eastern side. None offered any dating evidence.

but the features may be associated with the enclosure on spatial grounds. A more sinuous and potentially related ditch (2408) to the north of the enclosure also remained undated.

A field was uncovered at the western end of the excavation area. It was defined by ditch 3672, which shared the alignment of 2303. The western terminus of 3672 was met by the eastern ditch of a NW–SE-aligned trackway (3670), while the eastern side of the field was defined by ditch 3294, although this appears to have been a later addition, as it cut both 3672 and 2303. Ditch 3672 measured *c.* 64m long, 0.7m wide and 0.22m deep and had a shallow profile. It cut Phase 5 ditches 3671 and 3677, and the latest pottery recovered from the single fill of intervention 2010 included Hadham reduced ware, offering a late 2nd century or later date for deposition. Ditch 3294 was aligned NW–SE and measured *c.* 43m long, 1.1m wide and 0.5m deep, and had steep sides and a narrow concave base, perhaps originally being V-shaped. It was filled by a dark greyish brown silty clay with orange mottled patches. The latest pottery included Hadham oxidised ware, dating to the 3rd or 4th century. A short length of ditch (3297) adjacent to 3294 and aligned NNW–SSE may have been related to ditch 3294, to which it was adjacent, or relate to an earlier boundary cut when 3672 was originally dug. Ditch 3297 measured *c.* 12m in length, 0.9m in width and 0.3m in depth and had a steep V-shaped profile. It was filled by a mid-grey-brown silty clay, which contained Hadham oxidised ware.

Two parallel ditches west of 3672 defined a trackway. Ditch 3670 was the easternmost of the two and measured at least *c.* 35 in length, extending beyond the northern and southern limits of excavation. It was 0.7m wide and 0.3m deep. Ditch 3669 was parallel to 3670 and *c.* 4.5m to the west. It survived to a length of 8.5m and measured 0.94m wide and 0.17m deep. Both were filled with mid-grey brown sandy silt. Grog-tempered pottery, probably residual, was recovered from 3669. Ditch 3668, immediately west of 3669, ran parallel with the trackway and may also have served to define it. The ditch was, however, much broader at up 3.3m wide and deeper, at 0.78m, while none of the 260 sherds of pottery recovered from it dated later than the mid-1st century AD, and it remains a strong possibility that the ditch belongs to an earlier field system, which continued to influence the laying out of the later ditches.

A water-hole (3609) north of ditch 3672 was dated to Phase 6. It was sub-circular in plan and had a very shallow profile. It measured 9.6m in diameter and was excavated to a depth of 1m. The feature cut Phase 5 ditch sequence 3670/3677/3679 and was filled with a sequence of five very stony mid-brownish-grey silty clay fills, the earliest of which contained Hadham reduced ware, which dated initial filling to the late 2nd century or later.

Two ditches in the far north-eastern corner of the site may have defined another enclosure. Ditch 4555 was aligned NNW–SSE and measured 12.4m in length, extending beyond the northern limit of excavation, up to 1.34m in width and 0.3m in depth. It was filled with a mid-greyish brown silty clay, which contained pottery dated to AD 100–400. Ditch 4465 measured 44.6m in length, up to 1.4m in width and 0.16m in depth, and was dated to AD 170–400 by Hadham reduced ware and other pottery collected from it.

Ditch 2303 restricted the distribution of the many post-holes that formed fencelines and structures to the area north of it. A four-post structure (post-holes 3604 and 3606), marking a 3m-wide square, was recorded at the western terminus of 2303. A four-post structure north of 2303 comprised post-holes 2863, 2865, 2881 and 2883, which defined a 5m by 2m rectangle. Another rectangular structure (2871, 2873, 3227 and 3228) to its west measured 3m by 2m. No dating evidence was recovered from these structures, and it is possible that they share an earlier, Iron Age date, but a Phase 6 date is tentatively offered on spatial grounds. A large number of post-holes that potentially defined other structures, fences or small enclosures were concentrated in the eastern part of the area enclosed by ditches 2303 and 3294, and again may belong to this phase.

Phase 7: Late Roman (*c.*AD 250–410)

Passingford Bridge Bund (Fig. 4)

A sinuous ditch or hollow-way (1126) was recorded in the eastern part of the site. The feature measured 2.5m–3.5m wide and 0.25m–0.3m deep and had a gravelly lower fill that may represent deliberate metalling. It extended for at least 35m, petering out at the southern end and continuing to the north beyond the edge of the excavation area. The ditch was cut by two ditches (1124, 1125) that lay on converging ENE–WSW alignments and extended into the excavation area for 40m before terminating. Ditch 1125 was cut by curving ditch 1123. Most of the curving ditch lay beyond the limit of the excavation, and only approximately a quarter of the circumference lay within the area of the investigation. It is unclear if this is a complete enclosed ring or a penannular ditch. The gully had a projected diameter of *c.* 12m and was V-shaped in profile, measuring 1.2m wide and 0.45m deep. Ditch 1124 was in turn cut by curving ditch 1121, which extended for some 24m. The ditch was 1.2m wide and 0.3m deep, and had moderately-sloping sides and a flat base. The ditch may have been a recut of the entrance to a track or droveway defined by 1124 to the north and ditch (1122) that lay on a parallel alignment *c.* 15m to the south. Late Roman pottery, including a grey ware dropped-flange dish, was recovered from ditch 1126, and pottery recovered from stratigraphically later ditches are consistent with a late Roman date.

Flood Alleviation Area (Figs 3 and 5)

The features attributed to the late Roman period on ceramic grounds generally respected the boundaries that had been established during Phase 6, suggesting that these boundaries were still in use and defined by surface features, even though the corresponding ditches had silted up. The only alterations to the existing boundaries comprised the creation of a boundary ditch (2297) that roughly corresponded with Phase 6 ditch 3294. The boundary extended in a broad NW–SE alignment across the western part of the site, continuing beyond the northern and southern limits of excavation. The ditch was intermittent, particularly in the south, and this may be due to later disturbance rather than representing the original form of the ditch. One segment appears to have been cut by Phase 4 ditch 2337, although the relationship was not investigated in section and is likely to be false; stratigraphic relationships recorded along 2337 points to 3294 being the later feature; 3294 cut Phase 6 ditch 2303, which in turn cut 2303. Grog-tempered pottery recovered from 3294 is residual.

Water-hole 3652 to the west of the northern extent of ditch 3294 cut Phase 6 water-hole 3609. The later water-hole was not fully bottomed. It measured 7.2m in diameter and at least

1.5m in depth, and had a shallow profile. A sequence of 13 silty clay, and in places gravelly, deposits was recorded. The feature was rich in artefactual and environmental evidence, which included some 180 sherds of pottery (Chapter 3), waterlogged wood that may have belonged to a fence surrounding the feature or a nearby pile of fuel wood (Chapter 3), charred plant remains and insects (Chapter 5). Pottery from the lowest recorded fill included Oxford red colour-coated ware, Hadham oxidised ware and late shell-tempered ware, indicating that the feature was available for deposition during the second half of the 4th century AD.

A row of three large pits (2852, 2846, 2836) cut Phase 5 ditch 2303. Pits 2852 and 2846 were similar in size, being around 3m in diameter and 0.8m to 0.9m in depth, and had similar steep-sided profiles. Pit 2836, however, was irregular in plan and profile and shallower at 0.2m deep, and may have been a tree-throw. Pottery recovered from 2836 was broadly Roman in date, while early Roman pottery was collected from 2846, but given their stratigraphic relationship with 2303, a late (or possibly middle) Roman date is indicated. Water-hole 2714 was situated *c.*47m to the east of the three pits. It was circular in plan and 4.5m in diameter with moderately sloping sides. The feature was not bottomed owing to the high level of water within it. The feature contained seven dark grey-brown silty clay fills, only the upper of which contained pottery, including a dropped-flange dish in Hadham oxidised ware, pointing to deposition after AD 250.

A number of features located in the north-eastern part of the excavation area were dated to Phase 7. A possible quarry pit (4414), measuring 4m in diameter and 0.6m deep, contained two fills. The earliest mostly comprised naturally derived gravel, while the upper fill – a mid- to dark-brown silty clay – was dated to *c.*AD 350–400 by 135 sherds of pottery, including Oxford red colour-coated ware, an Oxford white-ware mortarium, and Hadham oxidised ware. Two large adjacent pits to the north (4466 and 4472) – again interpreted as possible quarry pits – were both oval in plan and relatively shallow for their size, measuring 6.5m to 7m long, 1.3m wide and 0.4m deep. Both were filled with mid-greyish silty sand fills. Pit 4466 contained no dating evidence, but dropped-flange dishes in sandy reduced wares dating to after AD 250 were recovered from 4472, which abutted 4466. Further potential areas of quarrying, characterised by several irregularly-shaped features, were recorded to the west of the pits. Two features (4482 and 4484) contained pottery consistent with Phase 7; dropped flanged dishes in black-surfaced ware and a wide-mouthed jar in Hadham oxidised ware were recovered from pit 4482, while 4484 contained Hadham oxidised ware and broadly-dated reduced ware. A gully (4544) which extended between pit 4472 and a smaller feature (4488) was interpreted as a quarry pit. The gully was *c.*7.1m in length, 0.48m in width, 0.14m in depth and had an irregular profile. It was filled with a mid- to dark-brown silty clay with frequent inclusions of pottery, glass and burnt bone, suggesting that it had been deliberately backfilled with domestic rubbish. The pottery recovered, including late shell-tempered ware, dated the infilling to the second half of the 4th century.

Phase 10: Post-medieval/modern (AD 1500 onwards)

Passingford Bridge Bund

A post-medieval former field boundary ditch (1052) extended across the excavation area west of the main concentration of Roman ditches. This corresponds to a field boundary depicted on late 19th-century Ordnance Survey (OS) maps.

Flood Alleviation Area

There were no features or layers dated to the Saxon or medieval periods (Phases 8–9) identified on this site. In the post-medieval period, the excavation area was crossed on north–south and east–west alignments by ditches that corresponded with boundaries recorded on late 19th century Ordnance Survey mapping and which produced modern artefacts that indicated that they had been backfilled during the late 20th century.

POND 1683 AND STRIP WIDENING

Three pits, all containing a charcoal-rich fill, were excavated. The natural clay beneath all the pits showed evidence of scorching, suggesting that the charcoal was burnt *in situ*. The pits each measured around 0.6m in diameter and 0.1m deep. Two (1005 and 1007) were to the north-east of the site and in close proximity to each other; the other (1012) was further to the south. There was no obvious use or dating for the pits, although one of the pits contained flint flakes consistent with an early prehistoric date, as well as burnt flint. Two ditches extended NE–SW and NW–SE and were machine excavated (ditch group 1014). The ditches were *c.*2m wide with evidence of root-disturbance around both sides. The ditches appear on 19th-century OS mapping and form part of the field boundary arrangement with ditch 1 described above. This map shows trees flanking the sides of both ditches consistent with the root disturbance recorded on site.

The strip widening areas were excavated parallel to the clockwise carriageway of the motorway, to the south-east and north-west of Pond 1683, and close to an additional topsoil bund to the south of the drain. The modern ploughsoil and a buried ploughsoil were excavated to a combined depth of 0.4m. A ditch (1) was excavated and recorded within the north-western extent of the strip widening area. This did not produce any artefacts although it corresponds to a field boundary seen on early OS mapping. The ditch contained five struck flints, but these are likely to be residual. A small area, located *c.*220m upslope of pond 1683 at 80m aOD and measuring 0.02ha, was excavated for the installation of a drainage tank. No archaeology was encountered.

CODHAM HALL BUND, TANK 1762 AND STRIP WIDENING (Fig. 10)

Phase 1: Neolithic to Early Bronze Age (*c.*4000–1100 BC)

The earliest activity identified was represented by a single piece of flint, a horseshoe-shaped end-scraper dating to the Neolithic or early Bronze Age. It was found in isolation on the horizon between the natural geology and the modern ploughsoil.

Phase 4: Late Iron Age (*c.*50 BC–AD 43)

The first evidence for occupation was concentrated in the south-west corner of the excavation area. Here, a series of

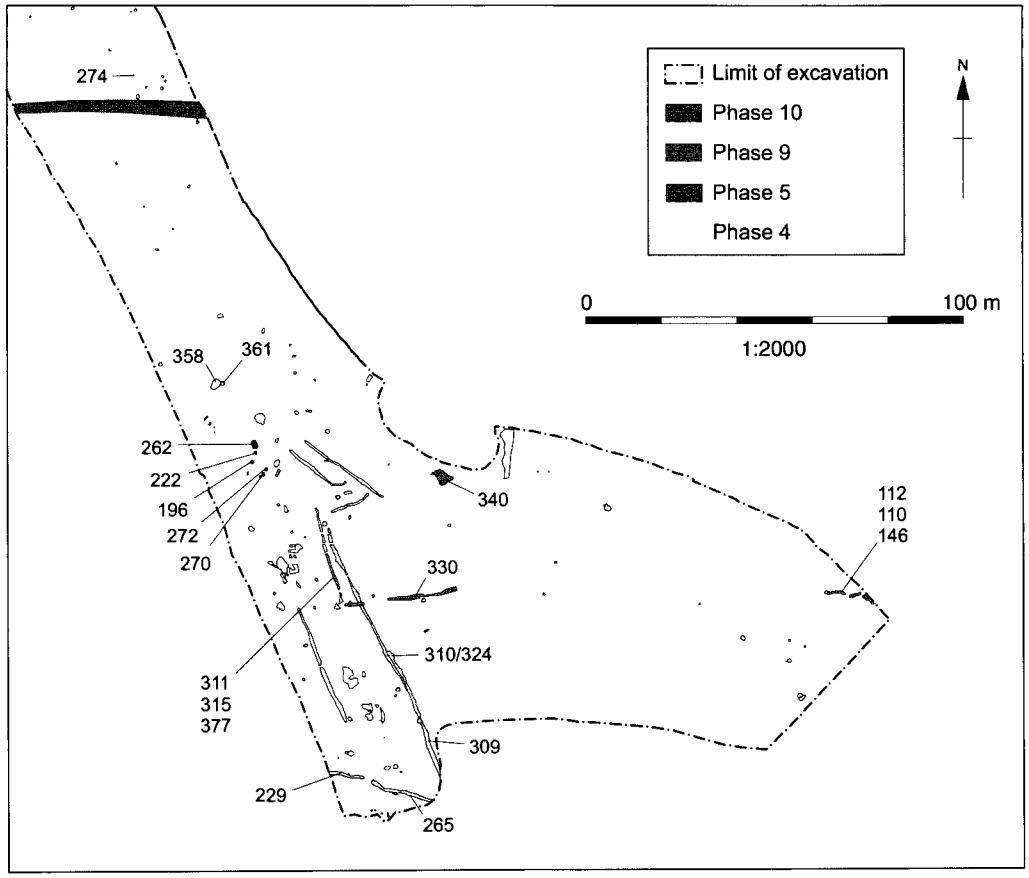

FIGURE 10: Plan of Codham Hall Bund (M25018.10)

ditches appears to have enclosed an area of activity which is likely to have extended beyond the western edge of the excavation. Ditch 229 extended NW–SE from the western limit of excavation and measured 9.2m in length, 0.7m in width and 0.16m in depth with moderate to steep sides and a concave base. After a gap of 1.8m the boundary continued as ditch 265, which extended beyond the south-eastern limit of excavation. This ditch had a very similar concave profile to that of 229 and both were filled with up to three deposits. A small amount of late Iron Age pottery, including grog-tempered ware and shelly-ware bead-rimmed jars, was recovered from the feature.

A deep ditch (310), seen in section, extended on a NW–SE alignment to form the eastern side of the enclosure defined on its southern side by ditch 229/265. It measured 0.88m wide and 0.68m deep. Towards the north, the ditch was steep-sided and had a concave base; further south, its profile was more V-shaped. The ditch had at least eight orange-brown clay fills, which were dated to Phase 4 on the basis of grog-tempered and shell-tempered pottery recovered from them. This ditch was recut by ditch 324, which continued on the same alignment for some 45m. It had a very similar profile, and measured 0.95m wide and 0.56m deep. The ditch was filled by up to four deposits, which contained grog-tempered and shell-tempered pottery. The southern end of 310/324 was in turn cut by ditch 309, which extended some 35m on a NW–SE orientation from the southern edge of excavation to its northern terminus. The ditch was shallower, measuring on average 0.9m wide and 0.4m deep. The ditch contained over 100 sherds of late Iron Age pottery, including bead-rimmed jars in grog-tempered and shell-tempered wares.

Phases 5–7: Roman (*c.*AD 43–410)

Occupation on the site appears to have ceased by the mid-1st century AD. Between this date and the early 11th century the only activity was the deposition of what may have originally been a near-complete Roman grey ware jar (Going 1987, type G24) in a small pit (274). The feature contained a fill rich in charcoal (alder/hazel and oak). Often such a deposit would be associated with a cremation grave, but no cremated remains were present within its fill. The pottery jar is broadly dated to the 2nd–4th century AD. Another shallow feature (196) to the south was filled with oak charcoal. It measured 0.9m in diameter and 0.12m in depth and contained four sherds of Roman pottery. Two pits (270 and 272) situated just to the east of pit 196 contained lesser amounts of charcoal in their fills, and were also assigned to this phase on the basis of Roman pottery recovered from them. That said, all these features except 274 were located close to charcoal-rich pit 222, which was dated to Phase 8. In addition, there were in this area a number of other pits, albeit undated, which also contained abundant charcoal and, in two cases (pits 358 and 361), were heat-affected. It is possible, given that these features form a coherent cluster of charcoal-rich pits, that all these pits belong to a single phase of activity within the Anglo-Saxon period, and that the Roman pottery is residual.

Phase 8: Anglo-Saxon (*c.*AD 410–1066)

A number of charcoal-rich pits were uncovered in the central part of the main excavation area. Pit 222 was located in the central part of the site. It measured 0.85m across its widest extent and was 0.3m deep. The pit had vertical sides and a flat base and was filled with deposits of charcoal (mainly oak, plus

hawthawn-type and willow/*Salix*). The edges and base of the pit were slightly heat-scorched, suggesting that the wood had been burned *in situ*, or that hot charcoal was deposited in the pit. A radiocarbon date of cal. AD 410–540 (95%; 1596±29 BP, SUERC-43697) was obtained from *Fraxinus* sapwood, placing deposition in the early Saxon period. An undated pit (262) north of 222 measured 1.5m long, 1.2m wide and 0.15m deep. As with pit 222, the pit contained abundant charcoal, and the natural soil around and below the cut was extensively heat scorched to a dark orangey red colour.

Phase 9: Medieval (*c.*1066–1500)

Evidence for activity during the early medieval period (late 11th to early 13th century) was in the form of a small number of east–west aligned ditches and at least one pit (340). Unfortunately these features lie at the periphery of an area which has been heavily truncated by an extensive area of modern quarrying, and this may have removed more extensive evidence.

Ditch 330 was the longest surviving length of ditch of this phase. It extended for *c.*30m, although part of this had been removed by later disturbance. The ditch had a moderate to steep profile and a flattish base and contained some 100 sherds of sand-tempered pottery dated AD 1050–1200. The west end of the ditch met a north–south-aligned ditch (311/315/377) at right angle, and together may have formed an enclosure, although no dating evidence was recovered from the north–south ditch, which was badly truncated. Three short lengths of ditch (112, 110, 146) close to the south-eastern corner of the site may have formed an irregular segmented boundary. The ditches had moderate to steep sides and concave bases and measured *c.*0.35m wide and 0.2m deep. The ditches contained two fills, an orangey grey silty clay, followed by a grey clay. Pottery recovered from these ditches totalled 72 sherds, the latest pottery dating to 1150–1225. Pit 340 was irregular in shape and had an uneven profile and measured 5m long, 3.85m wide and 0.5m deep. The feature contained four fills, the upper of which was dated to AD 1050–1200 by 12 sherds of pottery.

Phase 10: Post-medieval/modern (AD 1500 onwards)

Two narrow gullies crossing the site from east to west were on the same alignment as a track shown on an OS map of 1921 (sheet 80, scale 6 inches to 1 mile) and may represent ruts made by cart wheels. A number of pits were excavated in the narrow northern portion of the site but these were very dispersed and mainly undated.

JUNCTION 29, HOBBS HOLE (Figs 11 and 12)

The site was located to the south-east of Junction 29 of the M25 and occupied a broad, shallow valley through which a stream flows from east to west. The base of the valley lies at *c.*25m OD, from which the ground rises gradually to the north and a little more steeply to the south to a maximum height of *c.*30m OD. The underlying geology comprised London Clay.

Phase 2: Middle Bronze Age–early Iron Age (1500–400 BC)

A wide shallow hollow (5112/5131) was located at the north-eastern tip of the northern area, at the top of the north slope of the valley. The hollow measured 4m wide and at least 25m in length and continued beyond the edge of the excavation area. To the south, the feature appeared to bifurcate before becoming more diffuse and petering out beyond the break of slope, where it may have been destroyed by modern ploughing. Flint-tempered pottery of late Bronze Age–early Iron Age date was recovered from the fill. The hollow was cut by a later, though undated, quarry pit (5139). Excavation of the pit revealed the base of a smaller pit (5140) that had been truncated by 5139. Pit 5140, which measured 0.74m wide and 0.2m deep, contained a fragment from a rounded cylindrical fired clay object of middle Bronze Age type.

Phase 4: Late Iron Age (*c.*50 BC–AD 43)

Graves 5069, 6092 and 6094 were located at the top of the valley side (Fig. 13). Cremation burials 6092 and 6094 lay within the enclosure represented by ditch 5007, although it is not certain whether the features were contemporaneous. The burials were extremely truncated, and comprised only the bases of apparently unurned burials, the remains having been deposited direct into a shallow pit. The dating of the cremation burials is not conclusive, and is based on a radiocarbon date obtained from one burial (6092). However, given that they share characteristics and location, the graves have been treated as a single group and assigned to Phase 4.

Unurned cremation grave 5069 was oval in plan with irregular sides and a concave base, and measured 0.27m long, 0.2m wide, and 0.03m deep. It was filled with deposit 5070, a mottled dark blue-grey/grey-brown silty clay with charcoal fragments and burnt bone (total weight 0.4g). Oval in plan with moderate sides and concave base, grave 6092 measured 0.25m long, 0.16m wide, and 0.03m deep. It contained deposit 6093, a dark blue-grey clay silt with charcoal, traces of grain and chaff and burnt bone (total weight 6.4g, fragment size 4mm–10mm), which was radiocarbon dated to 60 cal. BC–cal. AD 65 (91.5%; 2010±29 BP, SUERC-43685). Unurned cremation grave 6094 was circular in plan with irregular sides and concave base. It measured 0.16m in diameter and 0.08m deep. It was backfilled by 6095, a dark blue-grey clay silt with occasional charcoal and burnt bone (total weight 3g; fragment size less than 10mm).

Pit 6083, south-west of the cremation graves, was oval in plan, *c.*2.5m wide and 0.3m deep and had a profile of steep sides and concave base. Grog-tempered and sandy pottery was recovered from the upper of its two silty-clay fills. The pit was cut by Phase 5 pit, 6086.

Phase 5: Early Roman (*c.*AD 43–150)

Northern area

A small number of features were dated to Phase 5. Pit 6086 was oval in plan and measured 2.84m along its maximum length, 2.05m in width and 0.52m in depth. It had a steep concave profile and was filled by three dark green-grey silty clay deposits, the upper of which contained 16 sherds of pottery, including black-surfaced ware, a bead-rimmed jar in grog-tempered ware, sand-tempered oxidised ware, and shell-tempered ware. Collectively this material dated to the third quarter of the 1st century AD.

A group of ditches (5022, 5024, 5054, 5058, and 6091) east of ditch 6039 may have represented the remains of a small enclosure. The ditches were relatively short or severely

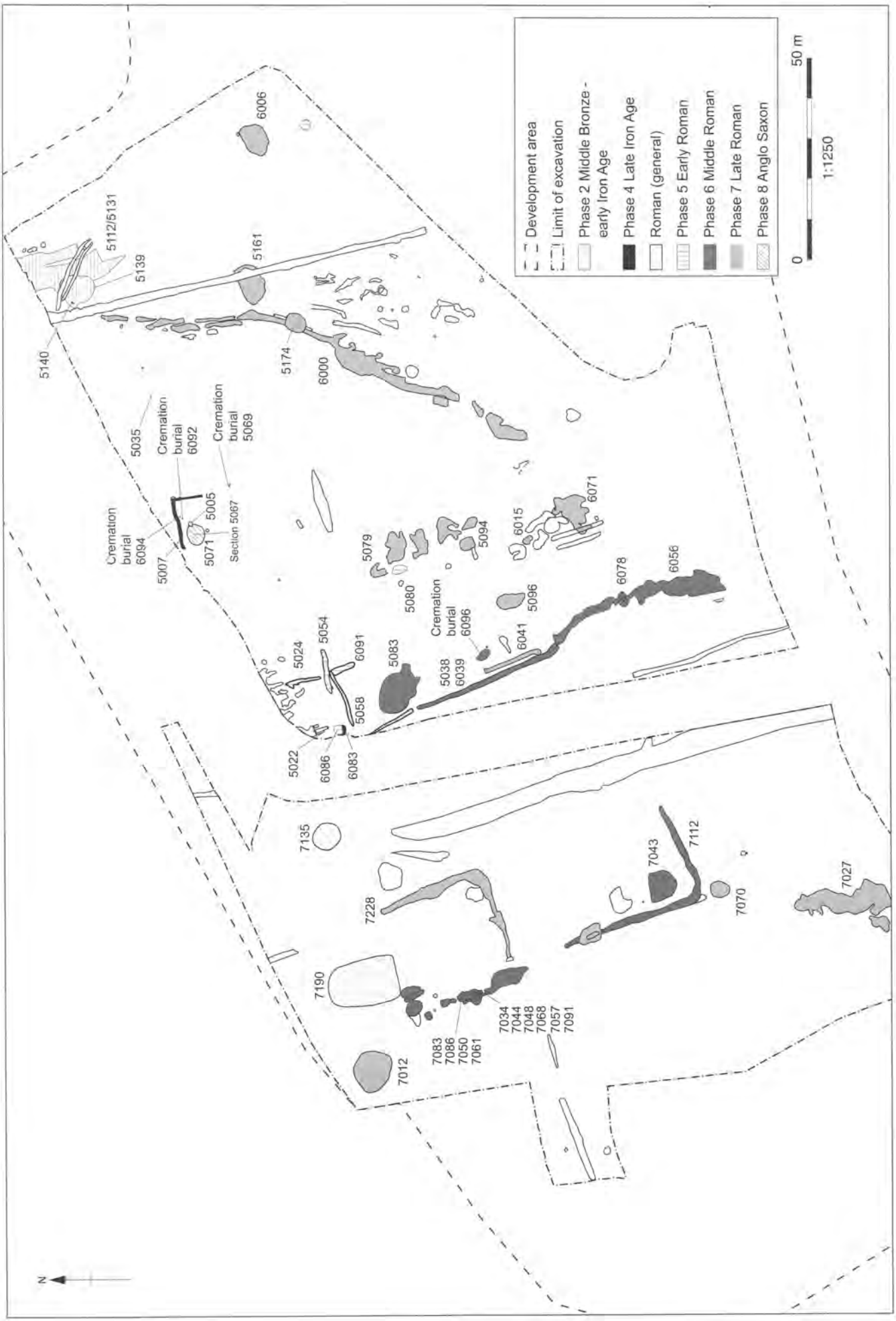

FIGURE 11: Plan of Junction 29, Hobbs Hole, northern area (M25001.08/09)

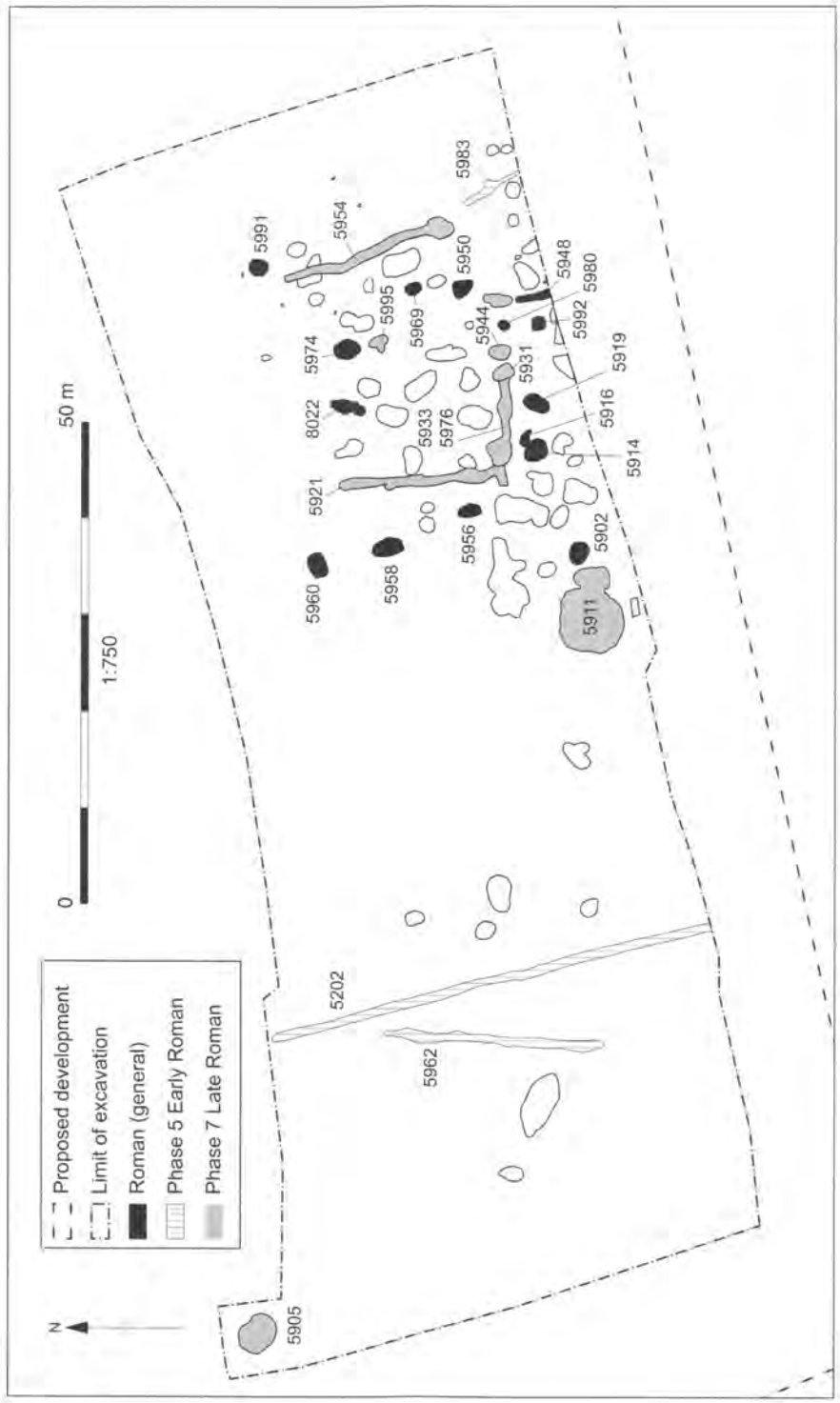

FIGURE 12: Plan of Junction 29, Hobbs Hole, southern area (M25001.08/09)

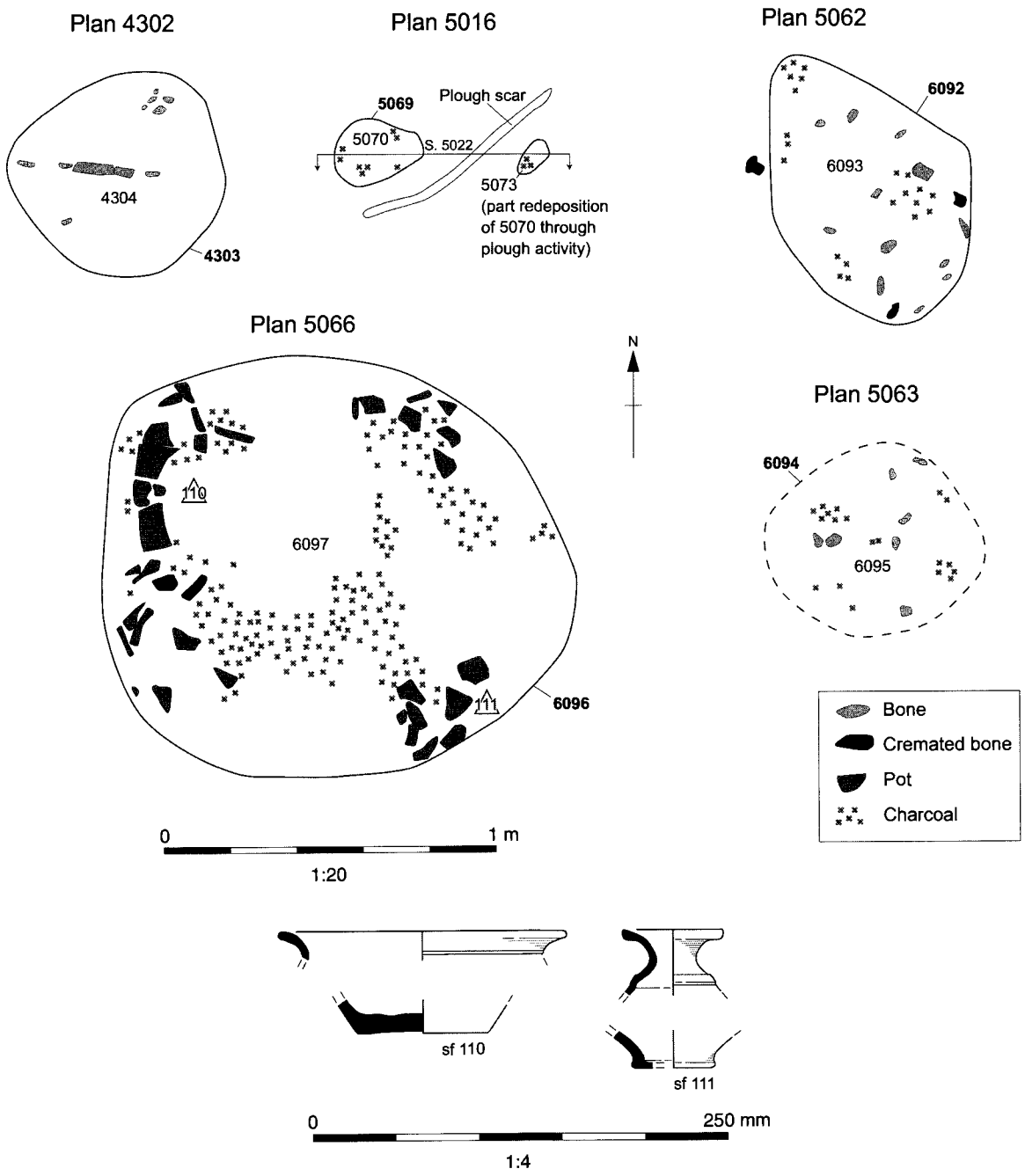

FIGURE 13: Plan of cremation graves, Junction 29, Hobbs Hole

truncated, and ranged from 0.75m to 1.3m wide and 0.1 to 0.25m deep. Pottery recovered 5058 was broadly Roman in date, but a single sherd of grog-tempered pottery collected from 5022 was dated to the late Iron Age or third quarter of the 1st century, and together the pottery tentatively places the group in the early Roman period. Pit 5035 towards to the north-east corner of the northern area contained two ceramic vessels – a grey ware jar and a fine grey ware poppyhead beaker (both labelled SF101 in the field) dating to the late 1st or early 2nd century date – which were fragmentary and had been damaged by the plough. The feature, which was circular in plan and had an irregular profile measuring 0.9m in diameter and 0.36m deep, was a suspected cremation burial, but no trace of human bone was found.

Southern area

A ditch (5983) recorded in the south-east corner of the southern area of excavation has been assigned to Phase 5 on the basis early Roman pottery recovered from it. Aligned NW–SE, the feature measured *c.*0.6m wide, 0.2m deep and at least 7m long; its southern terminus was not seen, as the ditch continued beyond the limit of excavation. Ditch 5202, on the western side of the southern area, was also aligned NW–SE, and extended for *c.*47m across the excavation area. It measured 0.96m wide and 0.38m deep. It was filled by a dark brownish black deposit. One sherd of pottery – South Gaulish samian ware dating to the later 1st century AD – was recovered from its dark silty clay fill, permitting the feature to be tentatively placed in this phase. A ditch (5962) immediately west of 5202 may also belong to this phase. It was aligned

NNE–SSW and measured at least 22.8m long, 1.2m wide and 0.3m deep. It contained two mid-brown-grey silty clay fills, from which 16 sherds of pottery dating largely to the 1st century AD were collected. A single sherd of Hadham oxidised ware typically dating to the 3rd or 4th centuries was also collected, but this is regarded as intrusive.

Phase 6: Mid Roman (*c.*AD 150–250)

The early or mid-Roman periods were characterised by the establishment of rectilinear enclosures and other boundaries, although the remnants are patchy with only parts of the ditches that define the fields surviving. No structural evidence for domestic occupation was found, and it is likely that the enclosures were associated with agriculture or the management of livestock.

A field boundary was defined by a long shallow ditch (5038/6039), which extended NW–SE across the central part of the northern excavation area and beyond the limit of excavation. A small gap was recorded along its length. The ditch measured 50m long, 1.4m in width and 0.2m in depth. It was filled by a dark blackish grey silty clay from which almost 60 sherds of pottery were recovered. The assemblage included Hadham oxidised ware and bead-rimmed dishes and lid-seated jars in sandy grey ware, dating deposition to the first half of the 3rd century or later. The ditch may have continued towards the south as 6056, a very irregular feature measuring 44m in length and of variable width and depth (a maximum of 4.2m and 0.4m respectively). The broad alignment of this feature reflects that of 5038/6039, and it is possible that it represents a disturbed ditched boundary. Pottery broadly dated to the Roman period was recovered from the feature, but it cut a pit, 6078, which contained bead-rimmed dishes and oval-bodied jars in sandy reduced wares dating infilling to the mid-Roman period.

The south-west corner of the excavation area contained an L-shaped ditch (7112), which extended NW–SE for *c.*35m, then turned at right angle and continued north-east for a further 23m before terminating. The ditch had moderately sloping sides and a flat base and was filled by up to two deposits. A group of 45 sherds of pottery was recovered and was dated to the early Roman period by diagnostic forms and fabrics, although a number of fine grey ware fragments resembled Hadham reduced ware, which if identified as such would date deposition to the late 2nd century or later.

The northern part of the western arm of the enclosure was marked by a series of inter-cutting pits. The features were only clearly distinguishable in section, but varied in size, with smaller ones in the south perhaps being post-holes. These possible post-holes (7034, 7044, 7048, 7068, 7057 and 7091) measured between 0.5m and 0.7m in diameter and between 0.2m and 0.48m in depth. They were filled by very similar mid-greyish brown silty clays. Pottery recovered from 7034 included a lid-seated jar in North Kent grey ware dating to the 2nd or early 3rd century, and more North Kent grey ware was collected from feature 7068. Five larger pits (7083, 7086, 7050, 7061, 7086) were roughly circular in plan with concave profiles and were also filled with mid-grey-brown silty clay. Pottery recovered 7050, the earliest pit of the sequence, was dated to the first half of the 3rd century on the basis of a funnel-necked beaker in Central Gaulish Rhenish ware and bead-rimmed dishes in black-burnished ware. Pottery collected from other pits in the sequence was consistent with this date.

Two quarry pits began to fill during this time. Pit 5083 in the central part of the northern area was irregular in plan, measuring 11m across its widest extent. The feature was not bottomed, but was deeper than 1.2m. The lowest recorded fill contained pottery dated to the 3rd or 4th century, but pottery from the fill above that included bead-rimmed dishes and a lid-seated jar in reduced wares dated some deposition to the first half of the 3rd century. The pit, however, remained available for deposition well into the 4th century, as Oxford red colour-coated ware and late shell-tempered ware recovered from an upper fill suggests. Pit 7043 was located in the corner of L-shaped ditch 7112, and like the ditch received material during the mid-Roman period. The pit was roughly circular, measuring 7m across, and was again deeper than 1.2m. As with 5053, pottery suggests that the pit was filling during the mid-Roman period, probably between the late 2nd and first half of the 3rd century, and deposition may have occurred earlier in the 2nd century; the lowest fill dated by pottery contained Highgate Wood grey ware, dating to the late 1st or first half of the 2nd century. The uppermost fill contained Oxford colour-coated ware, dating final deposition to the later 4th century.

A single grave was dated to Phase 6. Grave 6096 (group 6104) was circular in plan with a steep, though irregular, profile; it was 0.4m in diameter and 0.17m deep (Fig. 13). Two ceramic vessels were deposited. A necked jar (SF110) served as the cinerary urn and was accompanied by a flask in North Kent grey ware (SF111). Cremated human bone (total weight 493.5g) was recovered mainly from inside the jar, with smaller amounts collected from the yellow-brown silty clay backfill (6097) and the flask. The bone was identified as the remains of an adult. The pottery dated the grave to the later 2nd century.

Phase 7: Late Roman (*c.*AD 250–410)

Northern area

The Phase 6 enclosure in the western part of the northern area of excavation was sub-divided by a second L-shaped ditch, 7228, which extended east from the intercutting pit sequence for *c.*23m, turning at right angle to continue for a further 26m to the north. The ditch varied in width and depth, perhaps due to differing levels of disturbance or truncation, but it measured a maximum of 3.4m wide and 0.8m deep and was filled by a dark grey-brown silty clay. Pottery recovered from the bottom fill of intervention 7231 was dated by a dropped-flange dish to the late 3rd century or later. Deposition continued into the second half of the 4th century, as suggested by a bowl in Oxford red colour-coated ware from the upper fill of intervention 7223.

A curving discontinuous boundary (6000) extended diagonally some 110m across the valley side. The boundary appeared to comprise an array of short linear segments and pits. Its width varied greatly along its length, but it was widest – up to 5m wide – and most irregular in plan at its southern end. The boundary measured up to 0.5m in depth. Pottery recovered along its length was largely of broad Roman date, but a flanged bowl in Hadham oxidised ware from intervention 6000 suggests that the ditch was filling from the late 3rd century onwards, and this is supported by an incipient bead-and-flanged dish and bead-rimmed dish from intervention 5195, which offer a mid to late 3rd century date for deposition.

A group of irregularly shaped pits (5079, 5080, 5094, 6071 and 6015) located west of the boundary may have been associated with it; pottery recovered from the features was also of late Roman date. A wide, shallow linear feature (7027), situated in the south-west corner of the northern area at the base of the valley side, bears some similarity with feature 6000. The feature was 23m long, up to 8m wide, and 0.2m deep. Hadham oxidised ware points to deposition in the 3rd or 4th century.

Ditch 6041, which extended parallel with Phase 5 ditch 6039, was 14m long, though is likely to have been longer, its northern end having been removed by later activity, probably ploughing. The feature was 1m wide and 0.2m deep and contained a Nene Valley white-ware mortarium dating to *c.*AD 250–350.

A number of quarry pits in the northern area (5096, 5161, 5174, 6006, 7012/7020, and 7070) were available for deposition during the late Roman period. The pits were generally oval or irregular in plan and ranged between 5m and 10m in width. Most were deeper than 1.2m, the depth at which excavation ceased, although pit 6006 was augered to a total depth of 2.4m. Pottery including Hadham oxidised ware and Alice Holt grey ware recovered from the lower fills dated after AD 250, and pottery from the upper fills of some of the pits contained Oxford red colour-coated ware, pointing to continued deposition during the second half of the 4th century. Pit 5174, which, at 0.4m deep, was much shallower than the other pits, had been cut into boundary 6000, and itself contained pottery dating to *c.*AD 350–410.

Southern area

Two quarry pits were recorded in the southern area. Pit 5905 was oval and 4m long. It was 1.06m deep and had a variable profile – steep to the north, and gentle elsewhere and with an irregular base. The earliest pottery recovered from the feature included late shell-tempered ware and Oxford red colour-coated ware, dating deposition to the second half of the 4th century. Pit 5911 was irregular in plan, but measured 9m across its widest extent. It was greater than 1.4m deep and had a concave profile. Pottery dating after AD 250 was collected.

A small enclosure was uncovered in the south-eastern corner of the southern area. Its east side was defined by ditch 5954, which extended for at least 20m on a NW–SE alignment; it was *c.* 1m wide and 0.3m deep. Ditch 5921 marked the western side of the enclosure. It was 17m long, 1.2m wide and 0.3m deep and had concave sides and flat base. Both sides may have been connected by an east–west orientated ditch (5933/5976), of which traces were recorded. The ditch had concave sides and a very irregular base, showing signs of plough damage. It measured 0.7m in width and 0.28m in depth. Late Roman pottery was recovered from all three ditches. Three pits (5931, 5944, 5995) recorded around the enclosure contained late Roma pottery and may be associated with it.

Roman

A number of features produced assemblages of Roman pottery that were not sufficiently diagnostic to enable them to be attributed specifically to any individual phase. These features included two large quarry pits in the north of the site (7135, 7190). Pit 7190 was the largest quarry pit within the excavation area and measured 17m by 11m. Its full depth could not be established, but it exceeded 1.2m. Pit 7135 was 6.4m wide and 1.1m deep.

A large concentration of pits was situated in and around the late Roman enclosure in the southern area. A sample of these was excavated and some contained pottery of broad Roman date (5960, 5958, 5916, 5914, 5902, 5948, 5950, 5956, 5991, 5992, 8022, 5974, 5980, 5969, and 5919). The pits were relatively slight, some irregular in form, and depths rarely exceeded 0.3m. It is possible that at least some of these features were tree-throw holes and that a wooded area had been cleared of trees to prepare for the creation of the small enclosure.

Grave 4303 (Fig. 13) was uncovered in evaluation trench 43 between the southern and northern areas of excavation. The grave was circular in plan with shallow sides and concave base. It measured 0.15m in diameter and 0.02m in depth and was filled by a dark grey-black silt (4304) containing charcoal and human bone (total weight 12.8g, fragment size 4mm–10mm) belonging to an adult. Two body sherds in sandy grey ware (SF 100; not illustrated), which dated broadly to the Roman period, may be part of a very fragmented funerary vessel.

Phase 8: Anglo-Saxon (*c.*AD 410–1066)

Anglo-Saxon pottery was recovered from a number of features at the top of the north slope of the valley. The sand-tempered pottery was recovered mostly from the upper fills of ditches 5132 and 6056 (or 1104 as recorded in the evaluation). The ditches were established in the Roman period, the pottery indicating that the features were available for deposition between the 5th and 7th centuries. The only feature that appeared to have originated during this period was pit 5071, which had sand-tempered pottery of 5th to 7th century date in its lower dark orange-yellow clay fill. The pit was large, measuring 5.8m in length, 4.2m in width and 0.72m in depth (Fig. 14). Interpretation is uncertain; excavators viewed the feature as a quarry, but its size, shape and profile are consistent with a sunken-featured building (cf. Hamerow 1993, 10–11) although no associated post-holes were noted.

Phase 10: Post-medieval/modern (*c.*1500 onwards)

Two ditches exposed in the western and northern areas extending up the northern slope of the valley corresponded with field boundaries depicted on the first-edition Ordnance Survey map of 1881 and are likely to be fairly modern in origin. Several ditches identified within the evaluation trenches to the east of the northern area also correspond to boundaries shown on the 1881 map.

UPMINSTER BUND (Fig. 15)

Upminster Bund was located to the west of the M25 at Junction 29. The site sloped gently from the north at 25m aOD towards the south-east to *c.* 17m aOD. Prior to excavation, the site was in use as agricultural arable land. The natural deposit was revealed as London Clay, and silt-and-sand with an overlying superficial deposit of head formation.

Phase 2: Middle Bronze Age–early Iron Age (1500–400 BC)

An isolated cremation burial (1166) was situated *c.* 5m to the east of the eastern arm of the pit alignment. The burial was in very poor condition owing to plough damage, but was at least

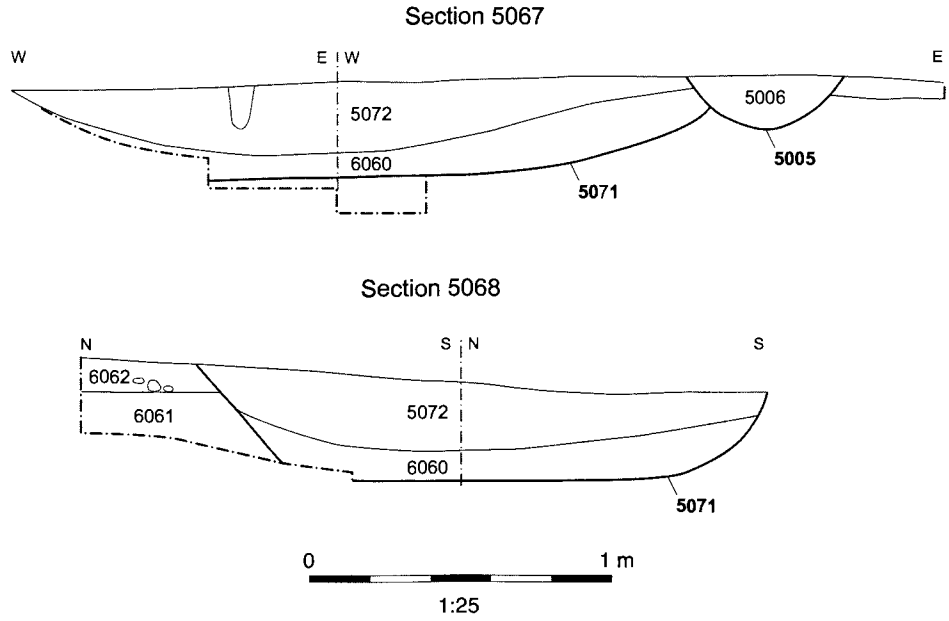

FIGURE 14: Sections through features from Junction 29, Hobbs Hole

0.75m in diameter and 0.3m deep. It was backfilled by brown-orange clay/organic fill containing charcoal and fragments of human bone less than 10mm long (total weight 5.5g). The bone was tentatively identified as adult. A radiocarbon date of 1266–1051 cal. BC (95.4%; 2949±29 BP, SUERC-43695) was obtained from the bone.

The main focus of archaeological activity was within the southernmost portion of the site, where a 'pit' alignment was identified. It extended more than 100m on a NW–SE orientation before turning 90°, probably in the unexcavated portion north of the southernmost area, to continue for over 22m to the south-west. The features that formed the alignment were irregularly shaped, and occasionally elongated to form short lengths of irregular ditches. (Indeed, features that formed part of the alignment were recorded variously as ditches, pits and tree-throws.) The pits measured between 0.6m and 1.65m in width and length and were between 0.1m and 0.3m deep. Of the pits that were excavated, 26 (including those labelled on Figure 14) contained pottery. Flint-tempered fabrics dominated, and these were supplemented by sandy fabrics. Few forms were recognised, but they included a carinated bowl and a jar with an upright rim and fingertip decoration. Overall, the pottery is consistent with an early to middle Iron Age date.

Phase 8: Anglo-Saxon (*c.*AD 410–1066)

Pit 1168 was located among the pits of the western arm of the alignment. It was 1.06m wide and 0.4m deep and was filled with two clay-silt deposits. Charred grain from the upper fill was radiocarbon dated to cal. AD 690–881 (95.4%; 1230±27; SUERC-43696), pointing to a middle-late Saxon date for deposition. The pit brings some uncertainty to the Iron Age date for the alignment, and it is possible that the feature more properly belongs to the Saxon period, with the earlier pottery being residual.

Phases 9 and 10: Medieval and Post-medieval/ modern (*c.*AD 1066 onwards)

Medieval or post-medieval ridge and furrow was seen extending east–west across the site, both over the Bronze Age boundary and in the area to the north. Post-medieval field boundaries were also recorded and these were visible on all OS mapping until 1961.

POND 1791 AND STRIP WIDENING

A single cremation burial (109) was recorded. This measured *c.*0.9m in diameter and 0.13m deep. Its dark silty clay backfill (109) contained charcoal and cremated bone (total weight 46g). The burial was dated to the middle to late Bronze Age; a radiocarbon date of 1262–1050 cal. BC (95.4%; 2942±29, SUERC-43698) was obtained from the bone, which was tentatively identified as adult. A linear ditch or hedgerow (111) aligned north to south was recorded at the southern end of the site. No dating evidence was present within the ditch. A former field boundary ditch (107) of post-medieval or modern origin was also identified within the strip widening area to the north. A second phase of works comprised the strip widening to the west of the carriageway. It was clear that the majority of the area had been truncated by the excavation of the existing M25 drainage ditch, and no archaeological remains were encountered.

POND 1812 AND STRIP WIDENING (Fig. 16)

A single pit (219) was excavated towards the south of the site. The feature was circular, but heavily truncated. It contained the remains of a flint-tempered jar dating to the middle Bronze Age and significantly truncated to both the top and side by ploughing and a field drain. The feature was initially interpreted as cremation grave, but no cremated bone was recovered. No other Bronze Age features were identified across the site.

A series of ditches, aligned NE–SW and NW–SE, were excavated. Some 70 sherds of pottery, predominantly

FIGURE 15: Plan of Upminster Bund (M25008.09)

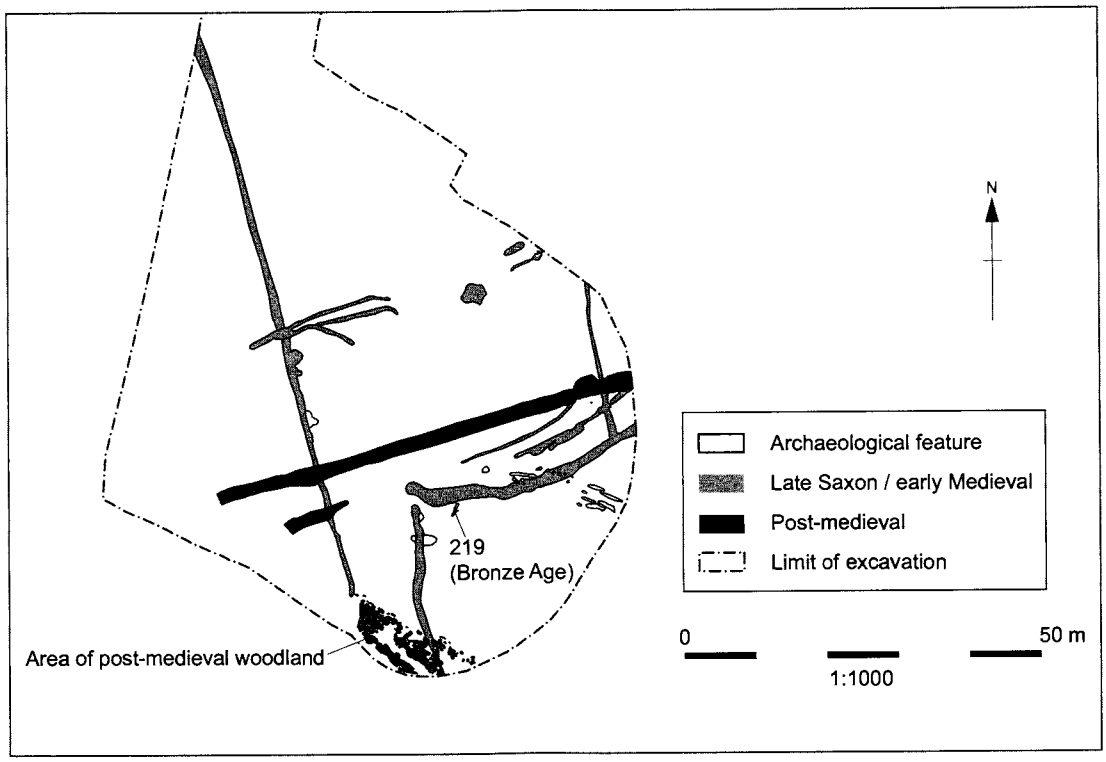

FIGURE 16: Plan of Pond 1812 (M25024.11)

shelly-ware jars and bowls, recovered from these features dated to the late Saxon and early medieval period (10th–12th century). The ditches form enclosures and paddocks and possibly a trackway. Few other finds were collected from these features, but fragments of fired clay and smelting-related microslags were recorded. Pits and post-holes, also producing late Saxon/early medieval pottery, were recorded among the ditches. Four post-medieval ditches, visible on the Ordnance Survey map of 1866, were excavated. Two ditches were within the strip widening area immediately north of the pond site and two were in the pond site. Glass and pottery dating to the 19th century were recovered from a tree-throw hole in the southernmost point of the pond site. The feature was part of a larger area of similar features, and it is likely that the area represents the remains of post-medieval woodland.

POND 1824 AND STRIP WIDENING

Pits (127, 129, 130, 132, 135 and 137) were located around the western part of the excavation area and appeared to form a broad arcing NW–SE alignment extending for *c.* 100m. The pits measured between 0.5m and 1.1m in diameter and *c.*0.25m deep. All contained flint, dating from the late Neolithic to early Bronze Age, pottery of Bronze Age date, and charcoal and charred plant remains were recovered from three pits. One of the pits (130) contained charred grain, which was radiocarbon dated to 1495–1316 cal. BC (95.4%; 3133±29, SUERC-43702), offering a middle Bronze Age date for deposition.

Ditches aligned either NE–SW or NE–SW to form enclosures in the northern part of the site were dated to the post-medieval period by finds and map regression. Some of the ditches were also clearly visible as extant earthworks within the pasture fields to the north and west. One ditch contained a single sherd of flint, a Mesolithic microlith, which is clearly residual.

POND 1835 AND STRIP WIDENING

The natural London Clay was cut by a pit (107) and a tree-hole (105). The tree-hole measured 1.9m by 0.9m and may be the result of the deliberate uprooting of a tree. The pit, possibly another tree-hole, contained a quantity of burnt flint and charcoal waste. A piece of worked flint of Mesolithic or early Neolithic date was collected from the subsoil (101). A ditch or hedgeline (103) had an irregular profile to its base and was aligned NE–SW across the site. Although no finds were recovered it was thought to be a post-medieval field boundary.

3 THE FINDS

THE FLINT by Mike Donnelly

Introduction

The fieldwork brought to light seven mostly very small assemblages from 18 separate archaeological investigations. Some of these works were very small but the general lack of flint from Section 4 is of note with the scheme yielding a total of just 280 struck flints. Only one assemblage was noteworthy, with the remaining six numbering around 2–10 flints each. The Passingford Bridge excavations yielded a moderate assemblage of 252 pieces. The remainder of the sites produced very small assemblages ranging from 10 pieces from the Hobbs Hole excavations to two pieces from both the Codham Hall Bund and Tank 1714 sites.

The flints recovered span the Mesolithic through to the late Bronze Age. Other than one heavily patinated double-backed blade, no other unequivocal Mesolithic flintwork is present, but three of the assemblages contain blade forms and rejuvenation pieces typical of the Mesolithic to early Neolithic periods. Definite early Neolithic material was present on one site, with generic Neolithic items and late Neolithic-early Bronze flint work originating from three sites. Artefacts specific to the Bronze Age were rare and found only at the Passingford Bridge Flood Alleviation Area. These include an early Bronze Age barbed and tanged arrowhead and several mid-late Bronze Age broad, hard-hammer struck flakes, which were surprisingly rare along the Section 4 scheme. Two main foci of flintwork from Passingford Bridge appeared to be split between a Mesolithic–early Neolithic component and late Neolithic/early Bronze Age material.

The artefacts were catalogued according to broad artefact/debitage type, with retouched pieces classified according to standard morphological descriptions (Bamford 1985, 72–7; Healy 1988, 48–9; Bradley 1999, 211–27; Butler 2005). Additional information was recorded on condition (rolled, abraded, fresh, burnt and broken) and degree of cortication.

Raw material and condition

Flint was the only raw material utilised here. This material varies greatly in surface condition and degree of post-depositional edge damage. The flint was probably sourced from local gravel deposits and is of a similar quality along the route. The raw material is generally of reasonable flaking quality, but thermal fractures and flaws are present. The distinctive Bullhead Beds flint is absent from these assemblages (Dewey and Bromehead 1915). The majority of the assemblage has either light surface cortication or is free of it, but some pieces exhibits a moderate or heavy, white surface cortication. The pieces from Passingford Bridge are generally in fairly good condition. However, the majority of the remaining assemblages are in a far poorer condition reflecting the fact that the bulk of them originated from topsoil, subsoil or colluvial layers.

Junction 29, Hobbs Hole

The Hobbs Hole excavations generated ten struck flints from 10 separate contexts, widely spread across the site. One or two of the pieces are fresh but most exhibit some degree of edge damage, in two cases quite heavy. They are generally lightly patinated/corticated but two display heavy patination. Two of the pieces were retouched and include some very fine work on a complex tool fashioned on an elongated distal trimming flake. This piece is backed down its left edge, with a retouched and centrally notched right side and with two further piercer projections at either side of its distal terminus. The other retouched form is a fairly crude denticulate. Both could belong to a range of periods, but a Neolithic date is most likely. The remaining pieces are unspectacular and include one or two flakes typical of later prehistoric knapping strategies with plain platforms, broad and squat forms and hard-hammer struck. Another flake displays a heavily faceted platform and is most probably of late Neolithic date. The assemblage suggests very limited activity at this site dispersed across a broad span of early and later prehistory.

Pond 1683 and Pond 1683 Strip Widening

Pond 1683 produced just five flints, two flakes from the topsoil and three chips and 13 pieces of fragmentary burnt flint from sieved residues. The flakes are generally undiagnostic and both are plough damaged. One piece displays parallel negative scars more typical of early prehistoric knapping. The Strip Widening site yielded six pieces, including three retouched items. Faceted platforms, common in the late Neolithic period are present on two examples, one of which is an edge retouched flake with 'knife-like' retouch, and two more pieces display platform edge abrasion. The remaining two retouched pieces consist of a combination side scraper/piercer and an awl on a side trimming flake. These pieces could originate from a range of dates. However, it could equally be argued that all the items belong in a late Neolithic–early Bronze Age context.

Upminster Bund

Only three pieces of struck flint were recovered from this site. The assemblage consists of a preparation flake, a plough-damaged core fragment and a complex tool with crude denticulate and scraper retouch on its alternate edges alongside a piercer projection at its distal end. Such combination tools feature in assemblages of many dates but a later Neolithic date is probably the most likely. This site also yielded very small amounts of burnt flint from eight contexts amounting to 13 pieces weighing 162g.

Codham Hall Bund

Codham Hall Bund yielded only two flints. One is an end scraper on an elongated blade-like flake blank while the other is a fairly squat hard-hammer flake typical of later prehistoric knapping. The scraper displays well executed retouch and has parallel blade-like negative scars on its dorsal surface, and is likely to be of Neolithic to early Bronze Age date. This site also yielded 35 pieces of burnt unworked flint weighing 478g from six separate contexts.

Tank 1714

Tank 1714 yielded two flints, a flake and an atypical core focussing on the production of flakes and narrow blades, worked almost in a similar fashion to a 'levallois' discoidal

core. Both pieces display moderate patination and are either lightly or moderately edge damaged. The flake is undiagnostic, while the core is of early prehistoric date, most likely early Neolithic, although an earlier date of the late Mesolithic is also possible. All flintwork, however, was residual in post-medieval deposits.

Pond 1835

This site produced a single blade of flint and six pieces of burnt unworked material. The blade was found in the subsoil and represents a fairly regular piece displaying heavy platform abrasion. It appears to have been struck from a thermally fractured nodule, has a hard hammer bulb of percussion and has a distinct hinge termination. It almost certainly dates to the Mesolithic or early Neolithic periods.

Passingford Bridge Flood Alleviation Area

A total of 252 struck flints, eight natural flints and 4672 pieces of burnt unworked flint (weighing 34.67kg) was recovered from excavations at Passingford Bridge (Table 2). A small number of diagnostic artefacts were recovered, including two arrowheads. The technological characteristics of the remaining flake and blade debitage confirm activity during the Neolithic and early Bronze Age, albeit with the probability of small amounts of residual earlier material. Later prehistoric knapping is almost entirely absent and may only be represented here by a few squat flakes.

Flintwork was recovered from 68 contexts, though the distribution of flints was far from uniform, many contexts (34 of 68, or 50%) only produced single examples, and nearly every context had fewer than five examples (85%). Only four contexts contained between five and 10 flints (6%), while five contexts had more than 10 (7%). These larger assemblages account for 121 flints or around half the total assemblage (48.02%). However, three of these larger groups are known only from sieved material that usually consist of fine shatter and other forms of microdebitage.

The largest assemblage of 41 pieces originated from context 2455, a fill in linear ditch group 2460, which was an extension of rectilinear ditch group 2432 (Table 3). Thirty-four of these pieces are chips of less than 10mm in length, while the remainder of the assemblage consist of a single piece of large irregular waste, four flakes and two blade-like flakes. Fill 2446 originated from ditch group 2432 and had a very similar assemblage to 2455, as had the assemblage from post-hole

Type	Total
Flake	114
Blade	10
Bladelet	8
Blade-like	10
Irregular waste	15
Sieved Chips 10–4mm	26
Sieved Chips 4–2mm	46
Tested nodule/bashed lump	2
Single platform blade core	1
Multi platform flake core	2
Core on a flake	1
Scraper end	3
Scraper end of blade	1
Arrowhead leaf-shaped	1
Arrowhead barbed-and-tanged	1
Awl	1
Knife other	1
Microdenticulate	1
Retouched blade	2
Retouched flake	6
Total	252
Burnt unworked flint No./g	4762 (34666g)
No. burnt (exc. chips) (%)	5/180 (2.78%)
No. broken (exc. chips) (%)	22/180 (12.22%)
No. retouched (exc. chips) (%)	17/180 (9.44%)

TABLE 2: The flint assemblage from Passingford Flood Alleviation Area (M25002.09)

Type	2103 (Ring ditch 2100)	2105 (Ring ditch 2100)	2446 (Ditch 2432)	2455 (Ditch 2460)	2896 (Posthole 2895)
Flake	7	21	5	4	4
Blade		1			
Bladelet	1	1			2
Blade-like		3	1	2	
Irregular waste	5		1	1	2
Sieved Chips 10–4mm	8	1	5	6	
Sieved Chips 4–2mm			3	28	8
Tested nodule/bashed lump	1				
Sieved %	72.72	70.37	100	100	100
Total	22	27	15	41	16
No. burnt (exc. chips) (%)	1/22 (4.54%)	0	0	0	4/16 (25%)
No. broken (exc. chips) (%)	2/22 (9.09%)	4/27 (14.81%)	1/15 (0.67%)	1/41 (2.44%)	2/16 (12.5%)
No. retouched (exc. chips) (%)	0	0	0	0	0

TABLE 3: The flint assemblage from Passingford Flood Alleviation Area (M25002.09) by context

2895. Context 2105 from ring-ditch group 2100 differed from these chip-dominated assemblages in that it mainly contained waste flakes. However, context 2103 from the same ring-ditch had another chip-dominated assemblage. None of these larger groups contains any retouched forms despite retouch being common in the overall assemblage, although one blade-like flake from context 2105 had been utilised. Other interventions and samples from ring-ditch 2100 yielded another 25 flints, giving it 74 in total (Table 3). This assemblage is dominated by flakes (44 out of 74, or 59.46%), but blades are also well represented (7.57%), giving a blade component to the removal assemblage of 22.8% (13/57), slightly low for Mesolithic material, but fairly indicative of earlier Neolithic knapping (Ford 1987). Ditch group 2432 produced flints from one other intervention, giving it 23 flints in total while group 2460 was only represented by fill 2455. However, together the groups represent 64 pieces or 35.56% of the assemblage total. This combined assemblage is dominated by small chips, clearly genuine knapping waste. However, the assemblage also contains 10 flakes and four blade forms, again possibly indicating an early Neolithic or possibly even Mesolithic element to the assemblage (29%). These flints were found over 50m north-west of ring-ditch 2100 and the intervening archaeology did not yield any significant flint assemblages, so it is quite probable that these two small scatters may be unrelated and also of potentially different ages.

All three assemblages would appear to relate to blank production and perhaps even tool production given the levels of microdebitage, these knapping episodes appear to have been very limited in nature and may simply represent *ad hoc* activities occurring away from any settlement foci.

The raw materials exploited at Passingford Bridge would have originated from secondary gravel sources, such as those found on or near the site. The flint displays a range of colours and conditions, mostly translucent greys and browns. The material is fairly fresh, much of the fine knapping debitage is fresh or slightly edge-damaged while some of the larger pieces are moderately edge damaged. Many of the pieces recovered in the ring-ditch may be close to *in situ*, while ditches 2432 and 2460 may have truncated an area of *in situ* knapping activity. There are a few rolled and glossed pieces indicating lengthy exposure and considerable reworking. The flint displays a very light to moderate patina; very few pieces are heavily patianted/corticated and these are either in poorer condition or are idiosyncratic to the assemblage as a whole (for example, double-backed blade 80 from pit 4541).

Pond 1824

A very small assemblage of 24 flints was recovered from this site (Table 4). These flints originated from five contexts, mostly clustered at the eastern end of the site where three pits/tree-throws yielded 10 (context 138, feature 137), nine (context 131, feature 130) and two flints (context 133, feature 132). Two flints were recovered from a ditch (context 104, feature 103) in the identified field system but are certainly residual finds.

The assemblage can be broken into two main components. The first and earliest part dates from the early Mesolithic and is represented by a broken obliquely blunted microlith recovered from ditch fill 104. Several blades from the pits identified in the eastern part of the site may also date to this period,

Category type	Number
Flake	13
Blade	3
Bladelet	1
Microlith	1
Irregular waste	1
Tested nodule	1
Multiplatform, discoidal core	1
Total	21
No. burnt (exc. chips) (%)	1/21 (4.76%)
No. broken (exc. chips) (%)	3/21 (14.29%)
No. retouched (exc. chips) (%)	1/21 (4.76%)

TABLE 4: Flint from Pond 1824 (M25025.11)

although they could equally belong to the later Mesolithic or early Neolithic. The blades were discovered as residual material in features containing later prehistoric struck flint. Each of the blades appears slightly more edge-damaged and patinated than the later material which is generally fresh. The blades and the bladelet display soft hammer struck butt ends, with edge abrasion and all appear to have been removed from single platform blade cores.

The later prehistoric component of the assemblage includes two cores and several flakes but lacks fine knapping waste. The flakes are typical of later prehistoric knapping, and display hard hammer bulbs with plain or cortical platforms and a lack of preparation. They often also display noticeable spurs and are squat and thick. One of the two cores is a crude, tested nodule with one or two flake removals while the other is a more complex, multi-platform flake core, possibly even a discoidal example. Such a piece could date to the late Neolithic–early Bronze Age but the remainder of the assemblage is probably later in date and it would seem logical to suggest the same date for this group of similarly conditioned material. One of the flakes appears to have been heavily utilised along its distal end but retouch is absent. Another flake has been calcined.

Chronological summary

One definite Mesolithic artefact was recovered from Passingford Bridge. This piece is a fairly large, heavily patinated blade, backed down one edge and trimmed along the other. Its ends have suffered edge damage and it is not clear if they have also been modified through oblique blunting. While it is possible that this may represent a stray find of upper Palaeolithic date, an early Mesolithic date seems more appropriate. Other diagnostic Mesolithic material was absent here. Blades and blade-orientated cores were present on two sites and may indicate a limited Mesolithic presence. However, the bladelet core from Tank 1714 is more likely to date to the early Neolithic period. The blade industry represented at Passingford Bridge does appear to have strong Mesolithic affinities and is probably late Mesolithic in date. It displays soft hammer bulbs and there are numerous narrow blades and bladelets present here. Possible late Mesolithic activity was also present at Pond 1683.

The earlier part of the Neolithic period is well represented at Passingford Bridge and includes a leaf-shaped arrowhead,

complex-cubic blade cores and a microdenticulate. Numerous other blade and blade-like flakes from this site along with many regular thin flakes displaying platform abrasion also probably belong here. Possible early Neolithic activity was also present at Hobbs Hole, Codham Hall Bund, Pond 1683 and at Tank 1714, albeit in very small numbers.

Probable late Neolithic or early Bronze Age material was recovered from Passingford Bridge and Pond 1683 Widening with possible material originating from Hobbs Hole, Codham Bund and Upminster Bund. A definite early Bronze Age artefact was recovered from Passingford Bridge in the form of a fine barbed-and-tanged arrowhead.

No definitive pieces from these periods were identified and only a very few probable later prehistoric broad squat flakes were recovered. Passingford Bridge did contain some, and another typical broad squat flake was observed from Hobbs Hole and Codham Bund, but these could also represent poorly worked earlier pieces.

Discussion (Fig. 17)

The assemblages are generally of little note and show a very low to almost non-existent suite of flint-related activities here during prehistory. That is not to say that humans were absent from these localities, only to state that the activities carried out here did not leave behind considerable quantities of flint. The sole exception to this was the site at Passingford Bridge. Most notably from this site is the high incidence of blade forms (blades, bladelets and blade-like flakes) in the assemblage at 20% of all removals. This is raised to 23% for ring-ditch 2100 and 29% for the assemblages recovered from ditch groups 2432/2460. All these figures imply an assemblage in which blades are important (Ford 1987), but are not as high as expected for blade-dominated Mesolithic assemblages. However, Ford's figure of 34–40% is rarely reached and many unequivocal Mesolithic assemblages only reach figures of around 20–25% (Champness et al. forthcoming). Many of the flakes and some of the cores recovered highlight the importance of blade reduction with parallel negative scars evident on their dorsal surfaces.

Other factors regarding the assemblage also indicate an early date. Many of the pieces display platform edge abrasion/preparation to varying degrees. This has been noted on 59 of 141 pieces with intact butt ends, or 42% of the assemblage, and this figure clearly indicates the importance of the technique here. Soft hammer reduction is also present and was observed on 47 of 143 recorded examples (33%), 46 were hard-hammer struck (32%) and 50 were indeterminate (35%). Many of the initial stages of reduction in any period are likely to have been conducted with a hard hammer, but the high instance of soft hammers, coupled with the extensive use of abrasion/preparation and the incidence of a fairly narrow blade technology all indicate a late Mesolithic or early Neolithic focus to the assemblage (Fig. 17.5).

Some of the tools recovered support this view. A fine microdenticulate on a blade (Fig. 17.1) was recovered from pit 5040 along with a bladelet and snapped blade. This feature also contained pottery of middle Iron Age date and the flints are likely to be residual and may indicate another smaller foci of late Mesolithic or early Neolithic activity. A partially flaked or more likely unfinished leaf-shaped arrowhead of Green's type 3C (Green 1980) was recovered from hillwash horizon 3245 (Fig. 17.2). Other tools of early date include an end scraper on a partially crested blade from ditch group 3308 (Fig. 17.6) and an end of flake scraper from Iron Age pit 2903 (Fig. 17.7). While end of flake scrapers are not diagnostic in general, the form of the blank and the parallel blade-like negative scars on its dorsal surface indicate an early date.

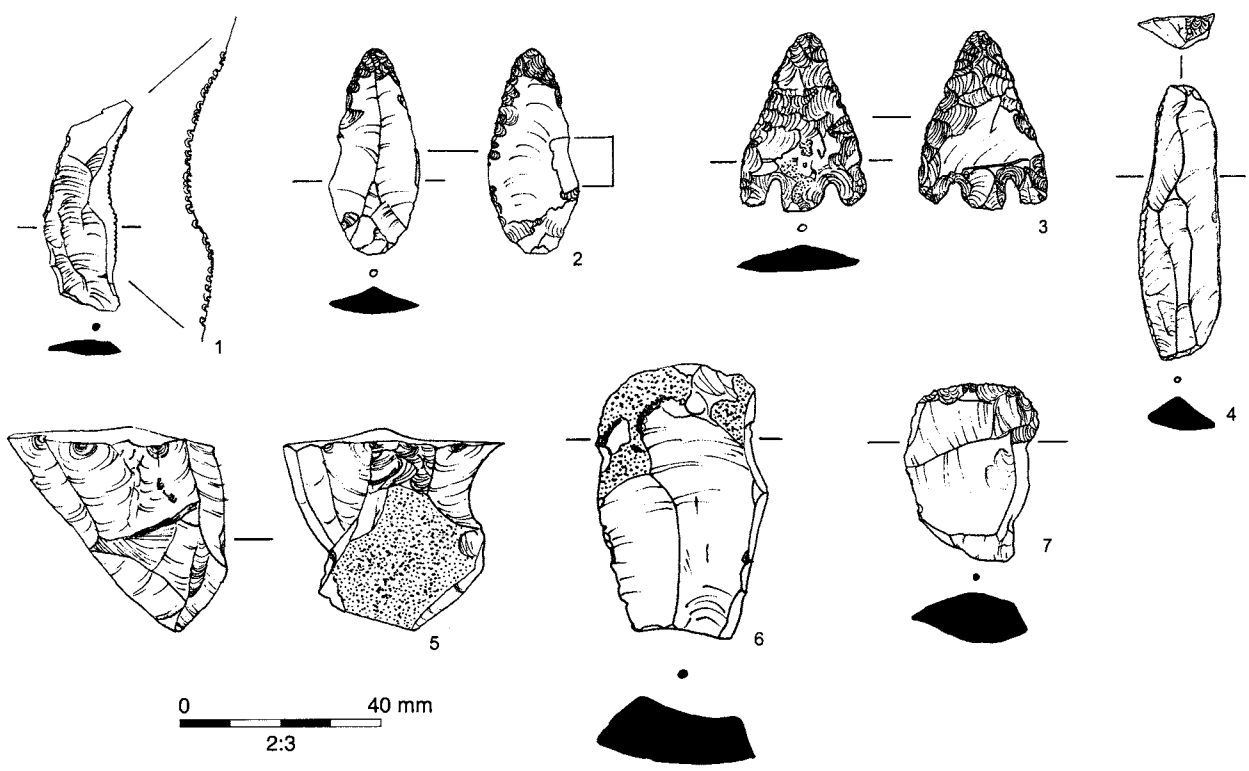

FIGURE 17: Flint

The most striking find is of later date, a fine barbed and tanged arrowhead of probable Conygar Hill type (BF, Green 1980) was recovered from ditch group 3668, fill 3404 (Fig. 17.3). This piece is clearly of early Bronze Age date but arrowheads are, given their very nature, often found as stray finds in later features and the intervention in question was not associated with significant quantities of flint debitage but was only loosely associated with a small retouched flake. Finely made, so-called fancy arrowheads are often viewed as ceremonial/ritualised objects. However, they also do occur as stray finds and there is no evidence here to imply that this piece originated from a truncated grave or cremation deposit.

Another striking find is a fine blade, more heavily patinated than any other piece from the assemblage found in pit 4541. This piece is double backed/trimmed and may have been obliquely truncated at each end although plough damage is evident there also. It is in form and style more indicative of the early Mesolithic although some small chance remains that it is upper Palaeolithic in date (Fig. 17.4).

The assemblage from Passingford Bridge represents a small yet significant focus of early prehistoric activity. It is very difficult to be certain which periods are represented. However, the debitage studies strongly indicate a focus in the late Mesolithic or earlier Neolithic, albeit with some stray artefacts dated to the early Bronze Age and possibly the middle-late Bronze Age. The lack of associated features could imply that much of the material originated from hillwash or other forms of buried soils, but it is possible that some contemporary pits may be present. The flint assemblage is most probably the result of a mix of small scale *in situ* knapping, middening of material and possibly its later incorporation into pits or pit groups.

Scheme summary

While there is some possibility that an upper Palaeolithic artefact was recovered from the Passingford Bridge Flood Alleviation Area, it is equally probable that it may belong to the early Mesolithic. The Mesolithic period may be represented at Passingford Bridge. However, a lack of typical bladelet cores or microliths/microburins prevents certainty in this assumption. This material may all belong in the early Neolithic which is unequivocally present at Passingford Bridge and may also be present at a number of other sites. The A282 scheme near Dartford and south of Section 4 appeared to be dominated by Neolithic/early Bronze Age flintwork with particular emphasis on the early Neolithic, where clusters of Neolithic material were identified associated with pits and natural hollows (Mullin 2011). The A2 scheme, also in north-west Kent, yielded three small early-middle Neolithic assemblages, only one of which was associated with any negative cut features (Anderson-Whymark and Donnelly 2012).

No definite middle-late Bronze Age flints were recovered along the route, although some squat, hard-hammer flakes probably belong to this period. This is quite unusual for major infrastructure schemes in the south-east of England. The A2 (Anderson-Whymark and Donnelly 2012) and HS1 projects (Harding 2006), for example, both yielded considerable assemblages from these periods, often far in excess of the earlier material. While their absence here may be accurate, it may also be the case that many of these objects have been overlooked. Put simply, flakes and cores dated to these periods lack many of the characteristics which would attract the attention of field staff unused to working with flint assemblages (Butler 2005). They do not display complex platform margins, have no obviously regular flaking pattern and can often be amorphous in form. Other factors in regards to these assemblages also indicate a degree of selectivity (such as the high incidence of retouch) and it is thought that this may also be the case here and that middle-late Bronze Age flintwork might be under-represented.

PREHISTORIC POTTERY by Lisa Brown

Introduction

The excavations produced 1569 sherds of prehistoric pottery weighing 8243g. Owing to the fragmentary nature of the collection and a dearth of diagnostic sherds, characterisation by ceramic tradition and date was difficult. However, it seems clear that the pottery spans a period from the middle Bronze Age to the middle Iron Age, and that the bulk of it is of early to middle Iron Age date.

By far the most productive features were pits and ditches, with over 40% of the pottery recovered from pits and 38% from ditches and gullies. Almost 10% of the group came from post-holes, the remainder from a scatter of tree-throw pits and unclassified features, a cremation burial and a hollow-way.

The pottery was recorded on an Access database. Fabrics were identified with the aid of a hand lens and binocular microscope at 20× and 10× magnification and classified using an alpha-numeric dominant inclusion code, further subdivided by size and frequency of the inclusions, following the recommended guidelines of the Prehistoric Ceramics Research Group (PCRG 2010).

The pottery was recorded within context groups and all fragments counted and weighed. The following characteristics were entered in separate fields: fabric, form, surface treatment, decoration, degree of abrasion, and date. Degrees of abrasion were based on three broad categories: 3 (high; surface survival minimum, breaks heavily eroded); 2 (moderate; surface somewhat preserved but clearly worn; and 1 (slight, little indication of wear apparent).

Condition

The pottery is in generally a poor condition, with a mean sherd weight (MSW) of only 5g. Some 57% of sherds have been recorded as highly abraded and only 3% as well-preserved. Interestingly, most of the few sherds in fresh condition were recovered from ditch fills rather than pits, and overall the MSW of the pit assemblages at 4g is slightly lower than for ditches (5g). The scrappy character of the pit groups reflects the insubstantial nature of many of these features, which resembled shallow scoops. Notably, the MSW for the post-hole assemblage is relatively high at 9g, this figure biased by the occurrence of large fragments belonging to single vessels almost certainly deliberately placed in a number of these features, including Phase 2 or 3 post-holes 2698, 2840, 4053, 4500 and 5040 from Passingford Bridge Flood Alleviation Area.

Fabrics and forms

Fabrics

Fourteen distinct fabrics within four ware groups were identified. The group is dominated by sandy fabrics (48% by sherd count / 51% by weight), followed closely by fabrics incorporating varying quantities of flint (42.5% by sherd count / 38% by weight). The other ware groups are represented by very few sherds (Table 5). No petrological analysis was undertaken, but it is likely that the raw materials for the fabrics were acquired relatively locally. The geology underlying the sites consists of London Clay and pebble gravel and terrace gravel, which largely consists of flint and chert, a likely source for the flint temper present in almost half of the fabrics.

Predominantly Quartz Sand

Q1 Fine to medium grade quartz sand with glauconite
Q2 Coarse grade quartz sand, no or few inclusions
Q3 Sparse to moderate quantity of coarse rounded quartz sand in a smooth, soapy clay
Q4 Fine grade sandy clay with soapy texture, other inclusions rare but some vesicles from organic matter
QF1 Glauconitic sandy fabric with moderate quantity of fine–medium white flint pieces <3mm
Q1F1 Very fine glauconitic sandy fabric incorporating sparse to moderate frequency of fine white flint pieces <2mm
Q2F Very coarse quartz sand with rare white flint pieces <3mm
QSH1 Glauconitic sandy clay incorporating rare fragments of platy fossil shell

Predominantly Flint Inclusions

F1 Soapy smooth fabric with moderate frequency of fine–medium white flint <3mm
F2 Abundant small white flint chips in a lightly sanded micaceous fabric
F3 Moderate–abundant frequency of well sorted white calcined flint pieces 1–3mm in a medium grade sandy clay
F4 Moderate ill-assorted calcined flint up to 4mm in a fine sandy micaceous clay. Possibly Bronze Age fabric

Smooth Fine Clay

SM1 Smooth fine clay, few or no visible inclusions

Fabric	No. sh	Wt g	% Count	% Wt
Sandy	731	4186	48	52
Q1	182	874	12	11
Q2	4	29	0.5	0.5
Q3	9	42	0.5	1
Q4	7	17	0.5	1
QF1	261	1177	17	14
Q1F1	236	1801	15	22
Q2F	29	199	2	2
QSH1	3	47	0.5	0.5
Flint	645	2957	46	41
F1	114	394	7	5
F2	255	1091	16	13
F3	61	409	4	5
F4	302	1499	19	18
Fine clay	71	481	5	6
SM1	71	481	5	6
Vesicular	17	30	1	1
V1	17	30	1	1

TABLE 5: Quantification of prehistoric pottery fabrics

Vesicular

V12 Fine soapy, micaceous clay with elongated vesicles indicating plant matter

Vessel forms

Urns

Middle to late Bronze Age urns of poorly-defined form, as all three examples are very fragmentary.

Bowls

Low profile carinated vessel (BA) with elongated or flaring rim. One example is decorated.
Late Bronze Age–early Iron Age.
Occurrences: ditches 1076, 4031 (incised linear dec.), 4072, 4304, 4357; post-holes 2418, 2698, 4386, 4430; pit 4106

Jars

Shouldered jar with upstanding rim (J1), the rim sometimes slashed or the rim and/or shoulder decorated with fingertip or fingernail impressions.
Late Bronze Age–early Iron Age
Occurrences: ditches 3170, 3255; post-holes 2698, 2870; pit 1007

Shouldered jar with plain upstanding rim and undecorated shoulder (J2–3)
Early–middle Iron Age
Occurrences: ditches 1009, 3405, 4254, 4256, 4301; gully 4031; post-hole 2870; pits 4193, 4361 (×2), 4381

Jar with slightly emphasised slack shoulder and short-upstanding rim (J4)
Early–middle Iron Age
Occurrences: post-hole 2435; pit 5037

Ovoid jar with squat upstanding rim (J5)
Early–middle Iron Age
Occurrences: ditch 3391; pit 4361

S-profile jar with everted rim and rounded shoulder (J6)
Middle–late Iron Age
Occurrences: ditches 5046; gully 5022; tree-throw (or hollow) 7093; pits 7072

Pot

Straight-sided pot with no shoulder emphasis and slightly incurving simple rim (P)
Early–middle Iron Age
Occurrences: post-holes 2840, 2870

Bases

Simple flat base, may be slightly kicked-out (Bs1)
Base with low pedestal (Bs2)

The particularly fragmentary assemblage from M25 Section 4 produced no examples of complete vessels or complete profiles, and only 45 sherds could be assigned to a general or specific vessel type and 10 to a basal form. These represent only about 5% of the total assemblage (Table 6).

Within this small group some fragments are identifiable only broadly as belonging to a jar (J) on the basis of sherd size and thickness. Nonetheless, it is possible to note that jars dominate the assemblage, with 27 individual examples identified. Shouldered jar forms with upstanding rims (J1–J4) of probable late Bronze Age/early Iron Age date conform, as far as it is possible to compare them, with a range of jar forms from lowland England classified by Barratt (1980). Small fragments of two open vessels with straight walls and simple, slightly incurving rims (P) are too small to precisely characterise, but they resemble post-Deverel-Rimbury Plainware jars (Barratt 1980, Class I), and were both recovered from post-holes on

Fabric	Form											Total
	BA	J	J1	J2–3	J4	J5	J6	P	Urn	Bs1	Bs2	
Q1				4			6	1		2		12
QF1	4	1	2	2							2	11
Q1F1	2	1	1		2	1		1				8
Q2F						1				1		2
QSH1				1								1
F1			1	1						1		3
F2	2			2					2	2		8
F3		1	1	1								3
F4										1		1
SM1	3										1	4
Total	**11**	**3**	**5**	**11**	**2**	**2**	**6**	**2**	**2**	**7**	**3**	**54**

TABLE 6: Prehistoric pottery form by fabric. Quantification by vessel count

the Passingford Bridge Flood Alleviation Area, one of them associated with a J1 jar. Eleven examples of low bowls with carinated bodies and/or flaring rims probably belong to a late Bronze Age/early Iron Age tradition contemporary with the early jars (Barratt 1980, Class IV).

Less common are jars with more rounded profiles and short rims (J5), of which only two have been recognised. These are more difficult to date as one was a residual occurrence in late Iron Age ditch 3391 (group 3091) and the other, although associated with a type J2–3 jar in Phase 3 pit 4361, is also associated with a pedestal base, indicative of a date in the later part of the early Iron Age, perhaps the 5th–4th centuries (see below).

Five S-profile jars with everted rims and rounded shoulders (J6), all in glauconitic sandy ware, conform to a middle Iron Age ceramic tradition in the region. Only six very fragmentary examples were recovered, all in fabric Q1, they appear to correspond both in shape and fabric to Type 10 middle Iron Age jars from Grange Lane (Site 20) and Greenfields (Site 28) along the route of the A120 (Every 2007).

Decoration

Decoration rarely features in the prehistoric pottery assemblage. A large but incomplete middle Bronze Age urn from pit 219 from Pond 1812 is decorated with an applied cordon (Fig. 18.1) and a fragment of another Bronze Age urn from pit 130 (Pond 1824) is decorated with a large impressed dimple.

The most common decorative technique seen in this assemblage is fingernail or fingertip impressions or slashing, applied either to the rim top or shoulder of coarse flint-tempered ware jars of type J1. A slashed rim sherd in Fabric QF1 was recovered from Phase 2 post-hole 2698 from Passingford Bridge Flood Alleviation Area, and another in the same fabric was residual in Roman ditch 3170 (group 2303) from the same site. A fingernail-impressed shoulder angle of a jar in Fabric F2 and a fingertipped rim in Fabric F1 came from Phase 2 pit 1007 at Upminster Bund. Another fingertipped rim in Fabric F3 was residual in Roman ditch 3255 at Passingford Bridge. From the same site, a fingertipped shoulder of a bowl or jar in Fabric Q1F1 came from Phase 2 post-hole 2870 and in the same fabric was a fingernail impressed sherd from Phase 3 pit 4258.

An unusual example of an elongated upright neck of a type J2–3 jar in Fabric F2 with vertical burnished strips was found in Phase 3 ditch 4256 at Passingford Bridge. A single example of a carinated bowl in Fabric QF1 with incised linear decoration (Fig. 18.12) from Phase 4 ring gully 4020, also from Passingford Bridge, is early Iron Age in style, and so probably residual in this context.

The pottery in context

Passingford Bridge Flood Alleviation Area

Three per cent of the assemblage by sherd count is from context-groups that are tentatively attributed to the Bronze Age or Iron Age. The material consisted exclusively of coarse flint-tempered or flint-and-sand-tempered pottery. Just two forms have been identified – a slack-shouldered jar and a bowl.

Pottery from groups dated to the middle or late Iron Age (Phases 3 and 4) accounts for 7% of the assemblage by sherd count. The period was dominated by sandy fabrics (both fine and coarse). Slack-shouldered jars (including an example with a frilly or 'pie-crust' rim) and jars with everted rims, and to a lesser extent ovoid jars and globular jars, were recorded. The pottery was accompanied by a smaller amount of flint-tempered pottery, in which slack-shouldered jars were present. This material may include residual Bronze Age or earlier Iron Age sherds. A total of 600 sherds weighing 4346g from the site represented 40% by sherd count and 56% by weight of the M25 Section 4 total. By sherd count 29% came from pits, 25% from post-holes and 34% from ditches and gullies, much of the last group and some of the pit assemblages were residual in late Iron Age or Roman-period features.

On the other hand, most of the post-holes that produced prehistoric pottery were of Phase 2–3. Some of these probably belonged to four-post structures. Several of the post-holes produced assemblages of unusually large size, and in some cases, pottery of diagnostic form. Post-hole 2870 produced fragments of at least two vessels – a pot (P) in Fabric Q1F1 and a J2 jar rim in Fabric QF1. Post-hole 2840 also yielded a P-type pot, this example in sandy ware Q1, along with a dozen other sherds in Fabrics Q1 and Q1F1, with a high MSW of 12g. The collection from post-hole 2698 contained 14 sherds (165g) of pottery, also with a MSW of 12g. This group includes fragments of a type BA bowl in Fabric SM1 and J1 jar with

slashed rim in QF1 (Fig. 18.8–9). Post-hole 2870 produced 33 sherds (169g) representing three vessels, including a J1-type jar with fingertipped shoulder in fabric Q1F1, a JB2–3 type jar in Fabric QF1 and a pot (P) in Q1F. Post-holes 4386 and 4430 each yielded a single carinated bowl fragment, in Fabrics SM1 and F2 respectively. A burnished-type J4 jar rim in Fabric Q1F1 came from post-hole 2435.

Twenty-two pits in this area of the site produced prehistoric pottery, but this material was residual in several Phase 4 or later pits: 2687, 2909, 2978, 3063, 3130, 4114, 4120, 4561 and 4558. This redeposited assemblage included little of interest, consisting of body sherds in a wide range of flint-tempered, sandy and fine clay fabrics.

Of the well-dated prehistoric pits only one, 4258 (Phase 3), yielded a collections of more than a half dozen sherds, and even this was relatively small. It contained 13 sherds weighing 201g, among them a single carinated bowl sherd in Fabric Q1F1 and a flat base with a slight foot in Fabric F2. A fingernail impressed body sherd in Q1F1 was also present in this group. Pit 4106 produced a fragment of a carinated bowl in Fabric QF1, shattered into 80 small sherds. The only other diagnostic sherd from a pit is a small upright rim fragment in Fabric Q1F1, datable only to the early-late Iron Age.

The only other assemblage of over a dozen sherds is from Phase 3 pit 4361, which produced 13 sherds (144g), including a type J2–3 jar rim in Fabric Q1, another rim in the same fabric (this one possibly belonging to an S-profile jar), an ovoid jar type J5 in Fabric Q2F, and a pedestal base in Fabric QF1. Low pedestal bases, unusual in some regional early Iron Age collections, feature in the so-called Darmsden-Linton style zone (Cunliffe 2005, 102), which occupied an area of the east of England from the Wash south to the Thames, with the type site at Darmsden in Suffolk (Balkwill 1979). This base form has parallels with La Tène forms on the Continent and could place this pit group as late as the 5th–4th century BC. That over half the sherds from this pit are in sandy ware Q1, along with the presence of the ovoid jar could also signify a date towards the end of the early Iron Age/beginning of the middle Iron Age, a time when sandy fabrics began to overtake flint-tempered wares in popularity.

A total of 189 sherds of prehistoric pottery weighing 1338g came from ditches and gullies in the Passingford Bridge Flood Alleviation Area. Most of these features were dug and filled during the late Iron Age or later, so the prehistoric pottery was residual but is indicative of late Bronze Age/early Iron Age and middle Iron Age activity in the area. Type J1 jars were collected from Phase 4 ditches 4251 and 4436 and ring-ditch 4020, and Phase 6 ditches 2303 and 3255. A carinated bowl came from Phase 4 ditch 4141 and a J4 type jar from ditch 3091. The fill of Phase 7 hollow 1076 also produced a carinated bowl fragment. Sherds from S-profile jars of middle Iron Age type were recovered from gully 4353 and ditch 5046, and another from Phase 4 ditch 5022.

Roundhouse 4016 yielded no diagnostic sherds but five sherds (42g) in flint and sand tempered ware are of early Iron Age type. A small collection of 10 burnished sherds (14g) in Fabric Q1 from curvilinear ditch 4095 could be middle Iron Age, as may be pottery from ditch 4251, an S-profile jar in the same glauconitic ware. Early Iron Age type J2–3 jar rims were recovered in association with flint-tempered body sherds from the same ditch (4251), as well as ditch 4256, which was cut by 4251 (Fig. 18.11). A well-finished carinated bowl in Fabric QF1 was found in the fill of ditch 4377 (Fig. 18.12). Pit 5037 (group 5040) contained 65 sherds of prehistoric pottery weighing 556g in Fabrics Q1F1, QF1 and SM1. This group included 62 sherds belonging to a single type J4 burnished jar in Q1F1 and a sherd with a corrugation or low cordon in Fabric QF1.

Upminster Bund

Some 466 sherds (1560g) of prehistoric pottery were collected from Upminster Bund, 242 sherds (794g) from ditches and another 196 sherds (678g) from 17 pits investigated on the site (1004, 1011, 1015, 1017, 1023, 1026, 1030, 1032, 1034, 1045, 1056, 1072, 1090, 1101, 1150, 1156, 1168). In almost every case the pit groups consist solely of body sherds, sometimes abraded to virtually crumb size. It is clear, however, that the fabrics present are predominantly flint-tempered and that the group was late Bronze Age or early Iron Age in date.

Rim sherds were occasionally seen in Fabrics Q1F1, QF1 and SM1, and conform to jars with upright rims, recorded at, for example, Mucking (Barrett and Bond 1988, type 13 or 14). A number of body sherds in sandy and organic-tempered fabrics are present. These are consistent with later Bronze Age fabrics also recorded at Mucking (Barrett and Bond 1988, 26–7). The pottery dated more broadly to the Bronze Age/Iron Age comprise undiagnostic flint-tempered pottery only. Six fragments of pottery, residual in medieval or post-medieval ditch segment 1083, are tentatively assigned to the early Iron Age. These include sherds in a sand-and-shell-tempered fabric.

Phase 2 pit 1007 produced 77 sherds/318g of early Iron Age pottery, all except one sherd in flint- or flint and sand fabrics. Among the collection of abraded body sherds are two fragments of J1 type jars, one a rim in fabric F1 (weighing only 4g) with a fingertip impressed rim top, the other a small fragment of a shoulder angle in F2 with fingernail impressions. The only other classifiable vessel from the Upminster Bund pit group is a well-smoothed flaring rim tip in fabric Q1F1, probably from a carinated bowl, from pit 1026. This was associated with four coarse flint-tempered sherds (F4). Pit 1032 is worth noting as it produced 34 joining body sherds (81g), also in fabric F4, probably belonging to a coarse urn or jar. All the other pit groups yielded very small collections of undiagnostic fragments, sometimes single sherds. Two hollows or tree-throws, 1111 and 1115, each contained small quantities of undiagnostic prehistoric pottery. In the case of 1115, there are 11 sherds (40g), most of them in Fabric QF1, probably belonging to a single vessel.

Phase 2 ditches also produced relatively sizeable assemblages of prehistoric pottery. Ditch 1009 contained 40 sherds (171g), almost all flint-tempered, and including a carinated bowl fragment in F1 and a type JB2–3 jar in F3. Ditch 1061 yielded 35 sherds (121g), all flint-tempered body sherds apart from a fragment of a flat base. Incorporated in the fill of ditch 1076 were 41 sherds (110g) including a burnished carinated bowl body sherd in Fabric F2. Otherwise, as is the case with the pits, the Phase 2 ditch assemblages are small, abraded and non diagnostic. Prehistoric pottery was also present in small quantities in the fills of Phase 9–10 ditches 1012 and 1083, and in unphased ditches 1052, 1065, 1120 and 1140.

Junction 29, Hobbs Hole

The Hobbs Hole site produced 195 sherds of prehistoric pottery weighing 959g. A great deal of the pottery was residual in Roman features or was recovered from the tops of unexcavated features. Nonetheless, this quantity of material from a relatively limited investigation attests to a prehistoric presence here. However, the pottery is of a different character overall to that from Upminster Bund and Passingford Bridge Flood Alleviation Area, possibly dating to the middle Iron Age or early part of the late Iron Age. Over half of the pottery is in flint free sandy wares, especially glauconitic ware Q1, and the only classifiable forms are four S-profile jars (J6). Again, most of the assemblage consists of small, undiagnostic body fragments in a poor condition, as a MSW of under 5g for the total group indicates. About 45% of the group came from ditch fills and only 25% from pits, the remainder collected from a few post-holes, a holloway and a number of unclassified features.

The S-profile jars all came from Roman contexts, one each from ditch 5046 and hollow 7093 (Phase 4 or later), gully 5022 (Phase 3–4) and pit 7072 (Phase 7). The jar fragments weigh between only 6g and 13g and are therefore obviously only tenuously identified and could possibly be late Iron Age or Roman. However, they are handmade and indistinguishable from other examples of the middle Iron Age ceramic tradition of rounded vessels in glauconitic sandy wares seen elsewhere in the region and further afield in Kent, Sussex and Hampshire/ Wiltshire.

Only two features were phased to the late Bronze Age or early Iron Age (Phase 2) on stratigraphic evidence. Feature 5207 produced a dozen body sherds (73g), all in flint-tempered fabrics, including six sherds in the coarsest variety (F4), which could be as early as middle Bronze Age. The fill of hollow-way 5131 yielded 10 sherds (46g) in Fabrics SM1, Q1, QF1 and F1, the latter a fragment of a flat base.

Codham Hall Bund

The only prehistoric pottery recorded from this site is a group of four sherds (8g) in glauconitic sandy ware. The sherds are well-smoothed and probably date to the middle Iron Age.

Pond 1812

The bottom part of a large truncated vessel from pit 219 was recovered in 106 fragments weighing 455g. The vessel is a flat-based middle Bronze Age urn in the coarsest of the flint-tempered fabrics, F4. Because the top part was lost the precise shape of the urn is uncertain, but it is decorated with a simple low cordon (Fig. 18.1). As there was no cremated bone found in the fill of the urn, it seems unlikely, though not impossible, that this was a cremation vessel, although any such material may have been truncated along with the top part of the vessel.

Pond 1824

A small group of 94 prehistoric sherds (332g) collected from this site is in Fabric F2 and dates to the middle or late Bronze Age. The pottery came from four small pits in the following quantities: pit 130 (48 sherds/181g), pit 132 (1 sherd/1g), pit 135 (7 sherds/8g), and pit 137 (38 sherds/142g). The sherds from pits 132 and 135 are too small to assign to form, but the pottery from pits 130 and 137 probably belonged to middle Bronze Age urns. The vessel from pit 130 is an urn with a simple upright rim, decorated with a wide impressed dimple, probably applied with a finger or thumb. The urn from pit 138 is preserved in a reasonably good condition, although only body sherds are present, one with a fine cordon.

Pond 1615

The only prehistoric pottery from the Pond 1615 site is a collection of 87 sherds weighing 436g recovered as small fragments (some no more than crumb size) from fill 5 of pit 4. The sherds are all in coarse flint-tempered ware F4 and may all belong to a single vessel, although they are too abraded to attempt refitting. All are body sherds, and the absence of rim, basal or decorated sherds preclude form classification, but it is likely they belong to a Bronze Age urn. The absence of both rim and base sections of the vessels seems to indicate that this is not a case of a complete *in situ* vessel positioned in a pit, either upside down or upright, and then subsequently truncated by later activity, as this would most likely have left a key section of the pot intact. Therefore, it may be the case that sherds belonging to an already broken pot were placed as fragments in the pit.

Chronology and affinities

The fragmentary state of the prehistoric pottery has caused major problems in characterising the material, with resultant obstacles for precise dating. That there are so few sherds diagnostic of form or decorative tradition, especially as many of the rim fragments have broken at the neck, means that the opportunities for the generally useful process of drawing correlations between form and fabrics is very restricted. Furthermore, much of the prehistoric pottery was residual in late Iron Age or later features, with very few sizeable, closed groups available for analysis and comparison. Nonetheless, the small pottery assemblage highlights the presence of settlement activity starting in the late Bronze Age/earliest Iron Age transitional period, especially apparent at Passingford Bridge Flood Alleviation Area and Upminster Bund.

Middle Bronze Age

Very limited ceramic evidence for middle Bronze Age activity was recovered from the excavations. The flint-tempered urn from pit 219 in Pond 1812 and two others from pits 130 and 137 in Pond 1824 are substantially incomplete and so can only be broadly compared to similar material in the region. Charred material from pit 130 produced a radiocarbon date of 1495–1316 cal. BC, which places it within the Phase 2-c ceramic group at Stansted (Brown and Leivers 2008, 32–6), but it was not possible to determine whether the urns best correspond to the Ardleigh tradition (Erith and Longworth 1960) or Lower Thames Valley tradition (Ellison 1975). The simplicity of decoration seen on the extant sherds suggests a closer correlation with the latter. The middle Bronze Age urns from sites along the route of the A120 are also flint-tempered and equally lacking in elaborate decoration (Every 2007, 248). None of the urns appears to have been associated with burials, but deliberate placement of complete or substantial elements of pottery vessels in domestic settlement contexts has been recorded at Mucking (Bond 1988) and North Shoebury (Wymer and Brown 1995), among other sites.

Late Bronze Age/earliest Iron Age

Pottery corresponding to a post-Deverel-Rimbury tradition, dating from approximately as early as the 9th to the 7th century BC, was being used and discarded on the site. During this early period there was a preference for the use of flint-tempered potting clay recipes, probably utilising clays and flint gravels local to the site, processed to varying levels of coarseness. From these were produced a range of coarse, shouldered jars, some rare examples decorated with fingernail or fingertip impressions or slashing, along with low carinated bowls with out-flaring rims in finer varieties of flint-tempered clays or in smooth, refined untempered clays.

The predominance of flint-tempered wares and coarseware jar forms along with a low incidence of decoration in this early period is paralleled in the assemblages from Stone Hall, Grange Lane and Greenfields along the route of the A120 (Every 2007). There, these types were thought to fall relatively early within a post-Deverel-Rimbury sequence, perhaps as early as the 10th to 8th century BC, broadly contemporary with late Bronze Age/early Iron Age pottery from Broads Green (Brown 1988a) and Springfield Lyons in Essex (Buckley and Hedges 1987a).

Early-middle Iron Age

It is more difficult to be certain of a clear progression to the use of early Iron Age pottery on the site. The identification of some jars with less well-defined profiles (J4 and J5) and two pedestal bases is consistent with elements of the Darmsden-Linton style group, centred in an area north of the Thames, in Suffolk, Essex, and Cambridgeshire (Cunliffe 2005, 102). Radiocarbon dates from Lofts Farm (Brown 1988b) and Rook Hill in Essex, and Barham in Suffolk (Martin 1993) suggest an origin for this ceramic tradition in the 8th century BC, but extending into the 5th century and later. The J4 and J5 jars were, however, single occurrences in features that included later deposits, so securing a chronological position on the site was not possible. Similar material was recorded at Strood Hall West along the A120, the only example of an early Iron Age assemblage from the site (Every 2007).

The evidence clearly points to the adoption of a new tradition in the area of the site, perhaps during the 4th–3rd centuries. This was characterised by an increase in the popularity of sandy fabrics and, to a lesser extent, organic-tempered clays, used in the production of well-finished, often burnished, rounded and S-profile vessel shapes. However, the stratigraphic evidence is again poor and there are no associated absolute dates to confirm the commencement of this trend.

This middle Iron Age stylistic development is evident elsewhere in southern England. In Kent during the 4th century or thereabouts communities moved away from flint-tempered local fabrics and began to exploit the Medway glauconitic sands for the manufacture of S-profile bowls and jars (Brown and Couldrey 2012; Morris 2006). Pottery of middle Iron Age date, again occurring mainly in sandy wares and with smaller proportions of shelly and organic-tempered wares, was recovered in reasonable quantities from several A120 sites, including Grange Lane and East of Parsonage Lane, Stone Hall, Highwood Farm, East of Little Dunmow Road and Greenfields (Every 2007). Here the range, comparable with the M25 assemblage, consists of generally well-finished sherds in a restricted range of vessel types, mainly slack-shouldered and rounded jars, mostly produced in sandy fabrics with ferrous inclusions, but also with an organic-tempered component. Notably, there is a low incidence of scored decoration, entirely absent in the M25 collection.

Primary comparanda for the middle Iron Age pottery are from Little Waltham (Drury 1978) and Woodham Walter (Rodwell 1987), where the dominance of sandy fabrics corresponds to the M25 pottery, and assemblages from Stansted Airport (Framework Archaeology 2008, 81). Shell-tempered pottery appears to be absent in the middle Iron Age assemblage of the M25 sites, as was the case at Little Waltham, and they seem generally to be restricted to the south of the county, along the Thames estuary (Sealey 1996, 50).

Catalogue of illustrated pottery (Fig. 18)

1. Middle Bronze Age urn with cordon. Fabric F4. Pond 1812. Pit 219.
2. Middle Bronze Age urn with finger-impressed decoration. Fabric F2. Pond 1824. Pit 130.
3. Type J2–3 jar with burnished decoration on neck, fabric F2. Phase 3, ditch 4256 (4257). M25002.09.
4. Carinated bowl, fabric SM1, burnished. Phase 3, ditch 4304 (4305), group 4310. M25002.09.
5. Pedestal base, fabric SM1, burnished. Phase 3, ditch 4502 (4503). M25002.09.
6. Carinated bowl, fabric Q1F1, smoothed. Phase 3, post-hole 2418 (2419). M25002.09.
7. Type J4 jar, fabric Q1F1, burnished. Phase 3, post-hole 2435 (2436). M25002.09.
8. Carinated bowl, fabric SM1, partly burnished. Phase 2, post-hole 2698 (2900). M25002.09.
9. Type J1 jar with slashed rim, fabric QF1. Phase 2, post-hole 2698 (2900). M25002.09.
10. Carinated bowl, fabric Q1F1. Phase 3, pit 4258 (4260). M25002.09.
11. Type J2–3 jar, fabric Q1, burnished. Phase 4, ditch 4301 (4303), group 4251. M25002.09.
12. Carinated bowl, fabric QF1, roughly smoothed. Phase 3, ditch 4357 (4358), group 4377. M25002.09.
13. Carinated bowl, fabric SM1, burnished. Phase 4, gully 4031 (4032), group 4020. M25002.09.

LATE IRON AGE AND ROMAN POTTERY

by Edward Biddulph

Introduction

Some 10,600 sherds of pottery, weighing 105kg, were recovered from six sites along the Section 4 widening scheme route. Most pottery belonged to two sites, Hobbs Hole (Table 7) and Passingford Bridge Bund/Flood Alleviation Area (Table 11). Codham Hall Bund (Table 15) contained some 400 sherds, while token amounts were collected from Upminster Bund (Table 14), Tank 1706 (M25011.10) and Pond 1824 (M25025.11).

Fabrics were identified using the series devised by the Essex County Council Field Archaeology Unit (ECC FAU), ensuring compatibility with other major Essex sites. Detailed fabric descriptions have not been provided, but where possible reference has been made to the National Roman Fabric Reference Collection handbook (NRFRC; Tomber and Dore 1998), where comprehensive descriptions of regionally or nationally important fabrics can be found. Broader ware codes (A for amphorae, B for black-burnished ware, and so on) have been taken from Oxford Archaeology's standard guidelines for recording Roman pottery (Booth, n.d.). Form identification follows Going's Chelmsford typology (Going 1987, 13–54), supplemented by the Camulodunum series (Hawkes and

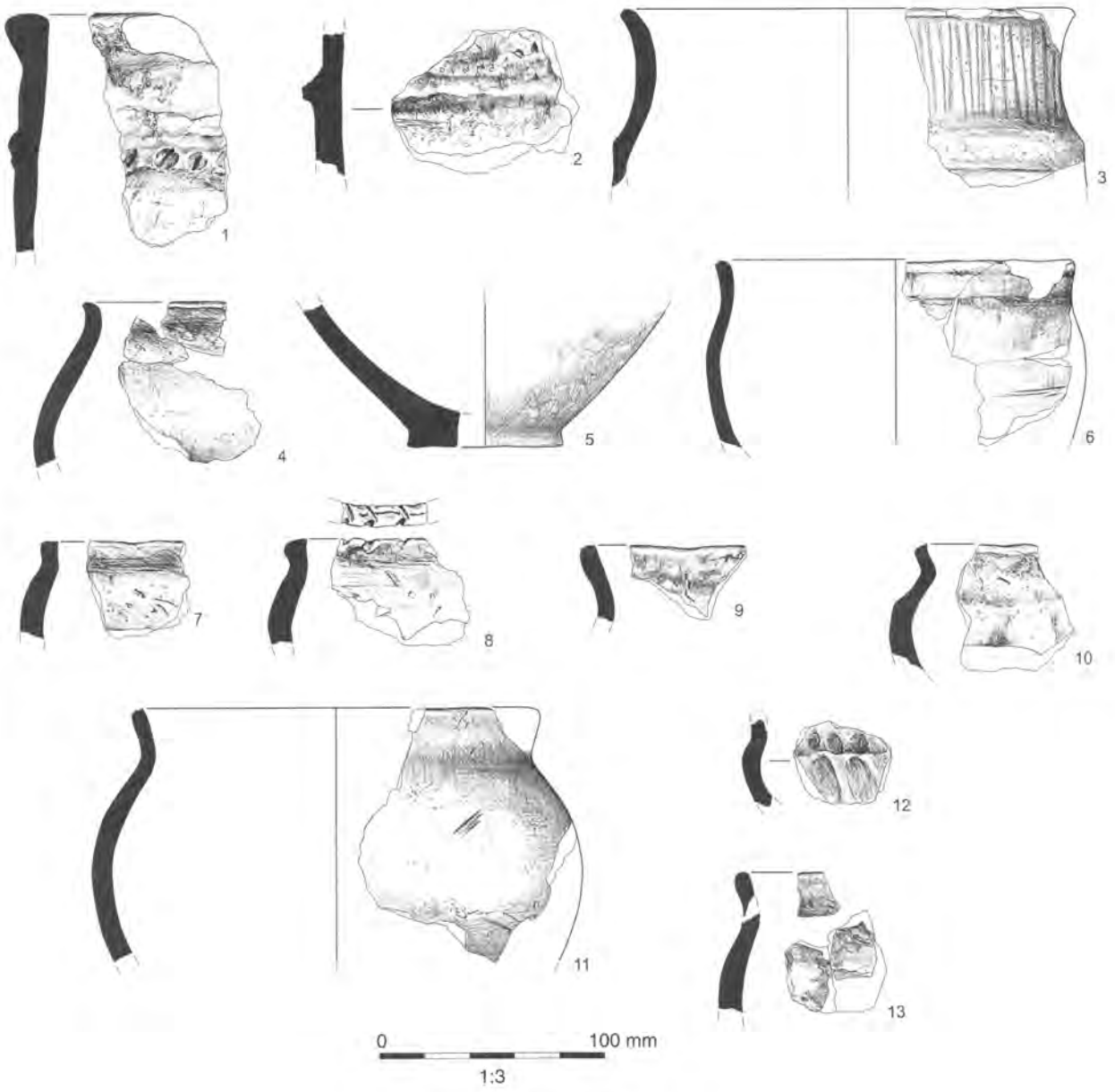

FIGURE 18: Prehistoric pottery

Hull 1947; Hull 1963; Bidwell and Croom 1999, 468–87). Throughout the report, occasional reference has been made to regional and international corpora, such as Young's Oxfordshire series (Young 1977), Dragendorff's (and other's) samian typology (cf. Webster 1996), and Dressel's amphora types (cf. Peacock and Williams 1986). For the Greater London site of Upminster Bund, forms and fabric were additionally assigned codes employed by Museum of London Archaeology (MOLA). Within each context group, the pottery was sorted first into fabrics and then into record groups – collections of sherds sharing certain characteristics, such as rims belonging to the same vessel or pieces with particular decoration, or simply a mass of undiagnostic body sherds – and then quantified and recorded, with information for each record group given an individual row in an Access database. Vessels were quantified by minimum vessel count (MV), based on a count of rims, and estimated vessel equivalents (EVE), which was calculated from percentages of surviving rims; thus 50%, or 0.5 EVE, represents half of the circumference of the rim, while 100%, or 1 EVE represents a complete rim. For the purpose of this report, EVE is expressed as percentages.

Fabrics

NRFRC codes are given in parentheses after entries.

A Amphorae

ABAET	South Spanish amphora fabrics (BAT AM 1–3)
AGAUL	South Gaulish amphora fabrics (GAL AM 1–2)
ATTAL	Italian black sand amphora fabric (CAM AM 1)
AMPH	Unsourced amphora fabrics

B Black-burnished wares

BB	Unspecified wheel-thrown black-burnished wares
BB1	Dorset black-burnished ware (DOR BB 1)
BB2	Colchester/Kent wheel-thrown black-burnished ware (COL/CLI/COO BB 2)

C Calcareous/shelly wares

ESH	Early shell-tempered ware
LSH	Late shell-tempered ware (HAR/ROB SH)

E Late Iron Age/early Roman wares

FLINT	Flint-tempered fabrics
GROG	Grog-tempered ware (SOB GT)
GROGC	Coarse grog-tempered ware
GROGFL	Grog-and-flint-tempered ware
GROGRF	Fine red-surfaced grog-tempered ware
GROGRS	Red-surfaced grog-tempered ware
MICW	Miscellaneous Iron Age coarse wares

F Fine wares

CGRHN	Central Gaulish Rhenish ware (KOL CC)
COLC	Colchester colour-coated ware (COL CC 2)
EGRHN	East Gaulish Rhenish ware (MOS BS)
HAX	Hadham oxidised ware (HAD OX)
LYN	Lyon colour-coated ware (LYO CC)
MIC	Unsourced mica-dusted wares
MSR	Miscellaneous slipped red wares
NVC	Nene Valley colour-coated ware (LNV CC)
OXRC	Oxford red colour-coated ware (OXF RC)

M Mortaria

COLBM	Colchester buff/white ware mortarium (COL WH)
MWSRSM	Miscellaneous white- or cream-slipped sandy red ware mortarium
NVM	Nene Valley white ware mortarium (LNV WH)
OXRCM	Nene Valley red colour-coated ware mortarium (OXF RC)
OXWM	Oxford white ware mortarium (OXF WH)
SOLM	Soller white ware mortarium (SOL WH)

O Oxidised wares

BUF	Unspecified buff/oxidised/white wares
LESTA	London-Essex stamped ware
NKO	North Kent oxidised ware
PORD	Tilford/Overwey 'Portchester D' ware (OVW WH)
RED	Unsourced oxidised wares

Q White-slipped wares

HAWG	Hadham white-slipped grey ware
HAWO	Hadham white-slipped oxidised ware
MWSGF	Miscellaneous white-slipped fine grey ware
MWSRF	Miscellaneous fine white- or cream-slipped red-buff wares
MWSRS	Miscellaneous white- or cream-slipped sandy red wares
NKWO	North Kent white-slipped oxidised ware

R Reduced wares

ALH	Alice Holt reduced ware (ALH RE)
BSW	Black-surfaced wares
GRF	Fine grey wares
GRS	Sandy grey wares
HAB	Hadham black-surfaced ware (HAD RE 2)
HAR	Hadham grey ware (HAD RE 1)
HGG	Highgate Wood C fine grey ware (HGW RE C)
NKG	North Kent grey ware (UPC FR)
NVG	Nene Valley grey ware
RET	Rettendon-type wares
STOR	Storage jar fabrics (also present in oxidised fabrics)

S Samian wares

CGSW	Central Gaulish samian wares, mainly Lezoux (LEZ SA 2)
EGSW	East Gaulish samian wares, various sources
SGSW	South Gaulish samian wares, mainly La Graufesenque (LGF SA)
TSG	Unsourced samian wares

W White wares

COLB	Colchester buff/white ware (COL WH)
NGWF	North Gaulish white fine ware (NOG WH 1–2)
NGWFS	North Gaulish white fine sandy ware (NOG WH 3)
NVP	Nene Valley parchment ware (LNV PA)
OXP	Oxford parchment ware (OXF PA)
UWW	Unsourced white wares
VRW	Verulamium-region white ware (VER WH)

Z Other fabrics

UPOT	Unidentified fabrics

Junction 29, Hobbs Hole

Assemblage composition and pottery supply

Pottery groups spanned the entire Roman period, though the late Roman period was the best represented. Just 20 sherds of pottery belonged to groups dated by pottery to the late Iron Age or earliest Roman period (*c.* 50 BC–AD 70) and assigned to stratigraphic Phase 4. The small quantity suggests that the site received little pottery during this time, but the material present, a G3 jar in grog-tempered ware (GROG) and sherd of fine grey ware (GRF), is nevertheless consistent with regional supply patterns. The level of supply marginally increased during the second half of the 1st century or first half of the 2nd. Pottery groups dated to that period and stratigraphic Phase 5 made a 4% contribution to the assemblage by EVE (Table 8). Three fabrics accounted for much of the pottery. Black-surfaced ware (BSW) was available as bead-rimmed jars (G3), necked jars, and, arriving after *c.* AD 120, bead-rimmed dishes (B2/B4). Early shell-tempered ware (ESH) was available exclusively as bead-, or club-, rimmed jars (G1, G3, G4, Cam 254). Such forms were produced at West Tilbury and Mucking and other sites on the Thames Estuary (Jones and Rodwell 1973; Drury and Rodwell 1973). The lid-seated jar, G5.1, another product of that industry, was present at Hobbs Hole only as residual finds or in otherwise poorly-dated groups, and then in relatively small numbers. It is notable, however, that the form was the principal early shelly-ware jar at Chelmsford, which was established *c.* AD 60 (Going 1987, 10), and at Stanford Wharf Nature Reserve, which had no late Iron Age phase (Biddulph et al. 2012b, 97). This tentatively restricts the deposition of groups containing shelly ware bead-rimmed jars in association with post-conquest wares to *c.* AD 43–60/70. The date is likely to have been shared by the Cam 47 bowl, an unidentified form in grog-tempered wares (GROG, GROGRS), and a fine grey ware platter (Cam 21).

Bead-rimmed jars were available in sandy grey ware (GRS), another important fabric, though were not as well represented as squat necked jars (G18) and oval-bodied jars. Of the last mentioned, examples with bifid rims and rilled shoulders (G21/G28) were recorded; these match types manufactured in sandy grey ware during the second quarter of the 2nd century at Beam Washands, Dagenham (Biddulph 2010, 127), and it is possible that the vessels at Hobbs Hole are Dagenham products. A poppyhead beaker arrived from Highgate Wood (HGG) after AD 70, and fine grey ware was also available in local fabrics (GRF) – a high-shouldered jar (G20) was recorded – and, more rarely, Hadham grey ware (HAR), which typically did not arrive in quantity until the late 2nd century onwards. North Kent potters were responsible for a small amount of grey ware (NKG), and Verulamium white ware (VRW) was also recorded, though again in minor quantities. South Gaulish samian ware (SGSW) was noted, but no forms identified.

Ceramic groups dated by pottery to the mid-Roman period (*c.* AD 130–250) and stratigraphic Phase 6 accounted again for 4% of the assemblage (Table 9). Sandy grey ware remained the single most important fabric, although forms were restricted to lid-seated jars (G5.5), a standard mid Roman form in south and central Essex, with production attested

Fabric	Sherds	Weight (g)	MV	EVE
ABAET	21	3516	2	60
AGAUL	2	57		
ALH	37	1241	3	31
AMPH	2	17		
BB	2	31	1	7
BB2	2	14	2	8
BSW	955	7048	118	1104
BUF	46	268	5	31
CGRHN	1	2	1	3
CGSW	34	256	5	36
COLB	2	12		
COLBM	2	35	1	6
COLC	6	24		
EGRHN	1	1		
EGSW	7	175	2	6
ESH	251	1939	24	168
GRF	724	5729	88	788
GROG	63	466	7	57
GROGC	8	104	1	2
GROGRF	1	3		
GROGRS	9	106	1	4
GRS	1776	18546	212	2256
HAB	1	12		
HAR	109	745	5	41
HAWG	3	19	1	8
HAWO	10	67		
HAX	202	1594	12	202
HGG	25	144	4	56
LESTA	1	1		
LSH	18	138	2	14
LYN	1	3		
MICW	4	27		
MSR	1	4	1	10
MWSGF	3	6		
MWSRF	6	67		
MWSRS	5	38	1	35
NKG	151	1338	7	131
NKO	25	206	2	16
NKWO	1	9	1	3
NVC	21	166		
NVM	2	124		
NVP	4	116	2	29
OXP	9	185	1	20
OXRC	11	153	1	10
OXRCM	1	5		
OXWM	3	99	1	10
PORD	9	112	1	5
RED	176	1036	11	79
RET	30	407	7	88
SGSW	6	9		
STOR	209	7791	15	105
TSG	10	79		
UPOT	33	54		
UWW	7	29		
VRW	7	85		
Total	**5056**	**54458**	**548**	**5429**

TABLE 7: Quantification of LIA/Roman pottery fabrics from Junction 29, Hobbs Hole (M25001.08)

at Dagenham (Biddulph 2010, 125–6), Orsett (Cheer 1998, fig. 63, no. 12), Mucking (Jones and Rodwell 1973, 22–4) and Heybridge (Biddulph et al., forthcoming). The form was also the main form in black-surfaced ware, but it was joined by bead-rimmed dishes (B2/B4) and wide-mouthed necked jars or bowl-jars (E5). Highgate Wood grey ware enjoyed a slightly larger share compared with Phase 5, although only a single vessel, a carinated beaker (H10) is represented by rim. Hadham products are also more conspicuous in Phase 6, a time when that industry began to export widely in appreciable quantity. A jar was recorded in the reduced fabric (HAR), a jar or beaker in white-slipped grey ware (HAWG), and a bifid-rimmed jar (G28) in fine oxidised ware (HAX). The last named arrived after *c.*AD 200, although an earlier version of the fabric, LESTA, reached the site during the early 2nd century, and may be residual in this phase. A necked jar was recorded in North Kent grey ware, and a bead-rimmed dish in black-burnished ware 2 (BB2) arrived from North Kent or Colchester. A necked beaker, possibly folded beaker H34, was recorded in an unsourced oxidised ware (RED), and a G44 storage jar was seen in coarse storage jar fabric (STOR).

Continental imports are represented by Central Gaulish Rhenish ware (CGRHN), and a rim from a South Spanish Dressel 20 olive oil amphora (ABAET) was recorded in a context more broadly dated to Phase 5/6, and another example was seen in a Phase 7 context. A relatively thin-walled body sherd in the Baetican fabric potentially belonged to a Haltern 70 container (again residual). South Gaulish amphorae (AGAUL), dating up to *c* AD 250, were also recorded in late Roman deposits. Unsourced samian ware (TSG), was present in the phased assemblage, but samian identified as Central Gaulish (CGSW) and East Gaulish samian ware (EGSW), though largely residual in late Roman deposits, is likely to have arrived during the later 2nd and early 3rd centuries. Plain forms in the Central Gaulish fabric included a Drag. 18/31 dish, two Drag. 31 dishes, and one Drag. 80 cup. East Gaulish potters were responsible for a Drag. 31 dish and a Drag. 32 dish, the latter tentatively identified as a La Madeleine product. In addition, a footring from a Drag. 31 is possibly in the Rheinzabern fabric, and a flange from a Drag. 38 bowl is in an orange, Trier-like, fabric.

Three decorated vessels were recorded in CGSW. Two non-joining body sherds from a Drag. 30 bowl were recovered from context 7053 (Fig. 19.a–b). The style of the decorative scheme, which includes a double-bordered ovolo, flat-beaded borders, a rosette, and a mask above a festoon, is characteristic of Doeccus i (Stanfield and Simpson 1958, pl. 149, no. 32; pl. 151, nos 58 and 62), a late Antonine potter active *c.*AD 170–200 (Hartley and Dickinson 2008, 300). Sherds from context 7105 showed the same style of beaded borders, ovolo and rosettes (Fig. 19.c) and may belong to the same vessel as the fragments in 7053. A sherd from a Drag. 37 bowl collected from context 7106 featured a hunting dog and the legs (either front or rear) of a second animal (Fig. 19.d). The motifs and their arrangement recall freestyle schemes by Mascellio i (e.g. Stanfield and Simpson 1958, pl. 146, no. 13), another Antonine potter, who used moulds by Doeccus (Hartley and Dickinson 2009, 339). The decoration on a body sherd from a Drag. 37 from context 6005 is too abraded for identification.

Over half the total assemblage by EVE (58%) comprised groups dated by pottery to the late Roman period (AD

Fabric	A Platter	B Dish	C Bowl	G Jar	H Beaker	S Misc.	Total EVE	% EVE
BSW		4		54			58	26
BUF							*	
ESH				66			66	30
GRF				6			6	3
GROG						6	6	3
GROGRS			4				4	2
GRS	3			57			60	27
HAR							*	
HGG					10		10	5
NKG							*	
RED				9			9	4
SGSW							*	
STOR							*	
VRW							*	
Total EVE	**3**	**4**	**4**	**192**	**10**	**6**	**219**	
% EVE	**1**	**2**	**2**	**87**	**5**	**3**		

TABLE 8: Hobbs Hole (M25001.08/09): Ceramic groups from Phase 5 contexts dated by pottery to *c.*AD 43–130/50.
* = fabric present, but no rims recorded

Fabric	B Dish	E Bowl-jar	G Jar	H Beaker	S Misc.	Total EVE	% EVE
BB2	5					5	2
BSW	8	4	36		5	53	23
BUF						*	
CGRHN				3		3	1
ESH			3			3	1
GRF	5			10		15	6
GROG			1			1	1
GRS			66			66	28
HAR			14			14	6
HAWG			8			8	3
HAX			8			8	3
HGG				25		25	11
LESTA						*	
MWSRF						*	
NKG			9			9	4
RED				20		20	8
STOR			7			7	3
TSG						*	
Total EVE	**18**	**4**	**152**	**58**	**5**	**237**	
% EVE	**8**	**2**	**64**	**24**	**2**		

TABLE 9: Hobbs Hole (M25001.08): Ceramic groups from Phase 6 contexts dated by pottery to *c.*AD 130–250.
* = fabric present, but no rims recorded

250–400+) and assigned to stratigraphic Phase 7 (Table 10). Sandy grey ware (GRS) increased its share from Phase 6, accounting for just over 40% of the late Roman assemblage. A wide range of forms were recorded. Jars dominated and largely comprised variations of the oval bodied necked jar, chiefly bifid-rimmed jars (G28) and hooked or thickened rim jars (G24), but also including storage jars (G42), probably residual lid-seated jars (G5.5), and necked jars with shoulder decoration (G22). Dishes became more important in this phase, too, owing mainly to the introduction of the flanged dish or bowl, B6, which replaced the bead-rimmed B2/B4 dish (cf. Going 1987, 14), although this form, still relatively important within the dish class, may have continued to be used and deposited well into the late 3rd century. Plain-rimmed B1 and B3 dishes were also recorded. Bowl-jars were represented by necked types (E5) and to a lesser extent cup-rim types (E2). An almost identical range of forms was seen in black-surfaced ware, although an incipient-beaded dish (B5) and funnel-necked beaker (H39/H41) were also recorded in the fabric. Jars, particularly G24, G42 and flask G40, were important in fine grey ware (GRF), but the fabric was more strongly associated with dishes (B1, B2/B4, B3, B5 and B6) and bowl-jars (E2, E3 and E5). A cupped-rim flagon (J7) was also recorded.

Fabric	B Dish	C Bowl	D Mort.	E Bowl-jar	E/G Bowl-jar/jar	F Cup	G Jar	H Beaker	J Flagon	K Lid	S Misc.	Total EVE	% EVE
ABAET												*	
AGAUL												*	
ALH	20						11					31	1
BB	7											7	0
BB2	3											3	0
BSW	105			42	27		443	44		3		664	21
BUF					6		6			8		20	1
CGSW	20					5						25	1
COLB												*	
COLBM												*	
COLC												*	
EGRHN												*	
EGSW	6											6	0
ESH							44					44	1
GRF	185	7		77	11		201	49	10	9	5	554	18
GROG							5					5	0
GROGC												*	
GROGRS												*	
GRS	126	15		63	18		1071			8	6	1307	42
HAB												*	
HAR	17											17	1
HAX	5				39		15		113			172	5
HGG							15					15	1
LSH							14					14	1
MICW												*	
MSR								10				10	0
MWSGF												*	
MWSRF												*	
MWSRS												*	
NKG												*	
NKO												*	
NKWO											3	3	0
NVC												*	
NVM												*	
NVP		4										4	0
OXP		20										20	1
OXRC		10										10	0
OXRCM												*	
OXWM			10									10	0
PORD							5					5	0
RED		5			6		16					27	1
RET							88					88	3
SGSW												*	
STOR							71					71	2
TSG												*	
UPOT												*	
UWW												*	
Total EVE	**494**	**61**	**10**	**182**	**107**	**5**	**2005**	**103**	**123**	**28**	**14**	**3132**	
% EVE	**16**	**2**	**0**	**6**	**3**	**0**	**64**	**3**	**4**	**1**	**1**		

TABLE 10: Hobbs Hole (M25001.08/09): Ceramic groups from Phase 7 contexts dated by pottery to *c.*AD 250–400+.
* = fabric present, but no rims recorded

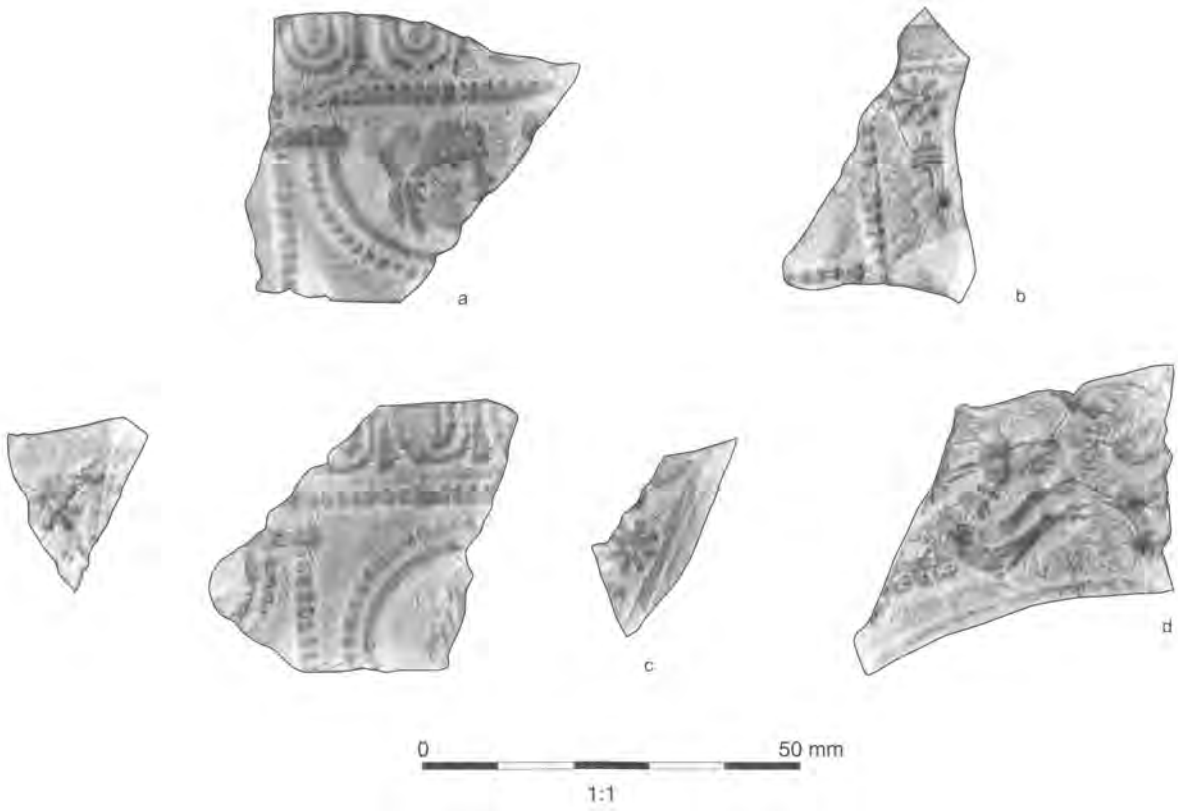

FIGURE 19: Decorated samian from Junction 29, Hobbs Hole

Other reduced fabrics made minor contributions to the late Roman assemblage. Plain-rimmed and flanged dishes and a narrow-necked jar were recorded in Alice Holt reduced ware (ALH), and a bead-rimmed dish was present in BB2. More dishes – types B4 and B6 – were recorded in Hadham reduced ware and Hadham black-surfaced ware (HAB). North Kent grey ware (NKG) and Highgate Wood grey ware (HGG) were residual in this phase. Large storage jars (G44 and G45) were present in coarse-tempered fabrics (STOR). Oval-bodied jars (G21, G24 and G28) were available in Rettendon ware, which reached the site from *c.*AD 270 onwards. Production of this distinctive flint-tempered fabric is known in central Essex, for example at Chelmsford, Rettendon and Inworth (Going 1987, 89–90).

Oxidised pottery comprised a lid (K) and a lid-seated jar (G5.5) in miscellaneous buff wares (BUF), a mortarium in Colchester buff or white ware (COLBM), probably residual North Kent oxidised ware (NKO), a bead-and-flanged mortarium (D5; Young 1977, type M17) in Oxford white ware (OXWM), bowls in parchment wares from the Nene Valley (NVP) and the Oxford region (OXP), and miscellaneous white ware (UWW). The remains of necked jars, as well as a rarer bead-rimmed jar (Fulford 1975, type 89), were recorded in Portchester D ware, a fabric that is unlikely to have reached the site much before the mid-4th century. The dating applies equally to late shell-tempered ware (LSH), in which oval-bodied jars (G27) were recorded. A range of white-slipped fabrics were present, but only one vessel was noted, a vessel not identified to type in a North Kent fabric (NKWO), although a carinated bowl or copy of a Drag. 27 cup are possibilities.

Fine wares included body sherds in East Gaulish Rhenish ware (EGRHN) and roughcast sherds in Colchester colour-coated ware (COLC), although both fabrics were recovered as residual occurrences from late 4th century deposits. No forms were identified in Nene Valley colour-coated ware (NVC), but it is possible that a bag-shaped beaker (H24) recorded in an unsourced red-slipped fabric (MSR) is a Nene Valley product. A wall-sided carinated bowl (Young 1977, type C81), recorded in Oxford red colour-coated ware (OXRC), is a relatively late product of the Oxford industry, dating to the 4th century (Young 1977, 166), and in an Essex context, is likely to have been deposited after AD 350 (cf. Going 1987, 3).

Pattern of deposition

The assemblage from Hobbs Hole was recovered from a range of feature types, though the majority (some 73% by sherd count) was collected from pits. Linear features – ditches and gullies – produced 18% of the assemblage, and the remainder was divided between natural features (mainly tree-holes), post-holes, and graves. The condition of the pottery across most feature types was remarkably consistent. Overall, the mean sherd weight (sherd count / weight) was 11g. The value for pottery from linear, natural and structural features was below average at 7–8g, while that for pottery from pits was 12g. Comparison of ware groups and vessel classes across feature types reveals no significant differences in distribution. However, chronological factors appear to be more important. The distribution of pottery based on the ceramic dates of context groups reveals that pits received most pottery during the late Roman period, while deposition in ditches was more evenly distributed throughout the period of occupation, although a slight decrease in the amount of pottery deposited over time can be noted. In general, the pottery recovered from the site is likely to have derived from an area of domestic occupation outside the boundaries of excavation. The pottery

recovered from linear and structural features reflects low-level, and largely incidental, deposition throughout the Roman period. The pottery had been subject to multiple episodes of disturbance and relocation, having been incorporated into middens or manuring spreads, before final deposition. In contrast, the pottery from pits had been deposited as relatively large sherds, perhaps along with other domestic waste, during the late Roman period, when settlement activity had intensified and was closer to the site, although its relatively small sherd size suggests that the material had nevertheless been subject to periods standing in open areas, such as middens, before being cleared into pits. Once deposited, the depth of the pits is likely to have protected the material from further breakage.

Aspects of pottery use

A number of pottery sherds offer evidence for use. A lower wall fragment from a flanged bowl, probably Drag. 38, in East Gaulish samian ware, recovered from context 6011, is worn internally. The wear may have formed during use, possibly as a result of grinding or mixing food ingredients. This type of wear is commonly associated with the form, and suggests that the bowl was used in the kitchen as a mortarium (Biddulph 2008, 98–9). Graffiti, which may represent owners' marks, were recorded on the base of two vessels. An 'X'-graffito had been scored on the exterior surface of a Hadham oxidised ware jar or bowl from context 5905, along with notches scored across the edge (Fig. 20.31). Another X-type graffito, recorded on the exterior surface of a fine grey ware beaker or jar base, was recovered from context 8018 (Fig. 20.32). A third graffito, two parallel incisions, were recorded on a storage jar body sherd in Alice Holt grey ware from context 6033 (Fig. 20.33). The incisions are incomplete, and interpretation is uncertain. It is possible that the marks were made accidentally.

Catalogue of illustrated pottery (Fig. 20)

The following ceramic groups illustrate a representative selection of pottery to convey the typological and chronological range of the assemblage. Pieces of intrinsic interest are also shown.

Context 7089, terminus of ditch 7088, phase 5

1. Jar (Cam 258), fabric ESH
2. Bead-rimmed jar (G3), fabric ESH
3. Bead-rimmed jar (G1), fabric ESH
4. Bead-rimmed jar (G3), fabric BSW

Also present: GROG, ?HAR, SGSW, STOR, VRW. Ceramic date: AD 50–70

Context 7041, fill of quarry pit 7043, phase 6

5. Dish with slight bead (B3), fabric GRF
6. Globular jar with everted rim (G8.1), fabric GRS
7. Lid-seated jar (G5.5), fabric GRS
8. Poppyhead beaker (H6; Monaghan 1987, type 2A5), fabric NKG

Also present: BSW, GROGC, HAWO, TSG. Ceramic date: AD 150–190

Context 7016, fill of quarry pit 7012, phase 7

9. Plain-rimmed dish (B1), fabric BSW
10. Bead-rimmed dish (B2/B4), fabric GRF
11. Bead-rimmed dish (B2/B4), fabric GRF
12. Dish with groove below and on top of rim (B3), fabric BSW
13. Bifid-rimmed necked jar (G28), fabric GRS
14. Necked jar (G), fabric GRS

Also present: ESH, HAX, STOR, UWW. Ceramic date: AD 200–250

Context 7108, upper fill of pit 7107, phase 7

15. Bead-rimmed jar (B2/B4), fabric BB2
16. Dish with incipient flange rim (B5), fabric GRF
17. Flange-rimmed dish (B6), fabric GRF
18. Bowl-jar or wide-mouthed jar with concave neck and rounded body (E5), fabric BSW
19. Bead-rimmed cup (Drag. 80), fabric CGSW
20. Oval-bodied necked jar (G24), fabric BSW
21. Oval-bodied necked jar (G24), fabric RET
22. Bifid-rimmed necked jar (G28), fabric BSW
23. Bifid-rimmed necked jar (G28), fabric BSW
24. Narrow-necked jar (G; cf. Lyne and Jefferies 1979, type 1B5–6), fabric ALH
25. Funnel-necked beaker (H39/H41), fabric BSW

Also present: BB2, BUF, CGSW, COLB, EGSW, ESH, GROG, HAX, MWSGF, MWSRF, NKG, RED, STOR. Ceramic date: AD 330–400+

Context 6073, lower fill of quarry pit 6071, phase 7

26. Bead-and-flanged mortarium (D5; as Young 1977, type M17), fabric OXWM
27. Oval-bodied necked jar (G24), overfired, fabric GRS
28. Bifid-rimmed, necked jar (G28), fabric GRS
29. Storage jar (G44), oxidised fabric STOR

Also present: BSW, BUF, GRF, HAX, NKO, OXRC, TSG. Ceramic date: AD 350–400+

Pieces of intrinsic interest

30. Base of colander or strainer (M2); perforations made before firing, fabric GRS. Context 7104, fill of pit 7103, phase 7
31. Base of jar or bowl with 'X' graffito scored on under-side of base and notches scored around the base edge, both made after firing, fabric HAX. Context 5940, fill of quarry pit 5905, phase 7
32. Base of beaker or jar with small complex 'X' graffito scored after firing on underside of base, fabric GRF. Context 8017, unexcavated feature 8018
33. Storage jar body sherd with two parallel incisions, scored after firing, fabric ALH. Context 6033, fill of quarry pit 6032, phase 7

Passingford Bridge Bund/Flood Alleviation Area

Assemblage composition and pottery supply

Pottery groups were largely divided between two periods – the late Iron Age and early Roman period (*c.*50 BC–AD 70) and the late Roman period (*c.*AD 250–400+). The discussion that follows draws mainly from groups exclusively dated to these periods and assigned a stratigraphic phase that is in broad agreement with the ceramic phase, in this case Phase 4 (late Iron Age/early Roman) and Phase 7 (Late Roman). Mention is also made of occasional groups dated to intervening periods.

Pottery from groups dated to the late Iron Age or early Roman period accounted for 32% of the entire assemblage by EVE (Table 12). The groups were dominated by grog-tempered wares, which took a 71% share of the phased assemblage. The fine reduced fabric (GROG) was mainly available as jars, among them squat, necked types (G15 and G19), and to a lesser extent bead-rimmed (G3) and short-necked jars (G23). Jar form Cam 264, a shouldered jar with short everted rim, is typological earlier, deriving from middle Iron Age prototypes, and was potentially deposited before AD 43. Vessels other than jars were less important in the fabric. Bowls included finely-made concave-sided cordoned bowls (Cam 210 and 211), and a flanged bowl or dish that resembled late Roman dish B6. This is undoubtedly a coincidence, as the fabric rules out a later date. A platter was also recorded, and beakers were restricted to butt-beaker form, H7. The beaker form was more strongly associated with red-surfaced grog-tempered wares

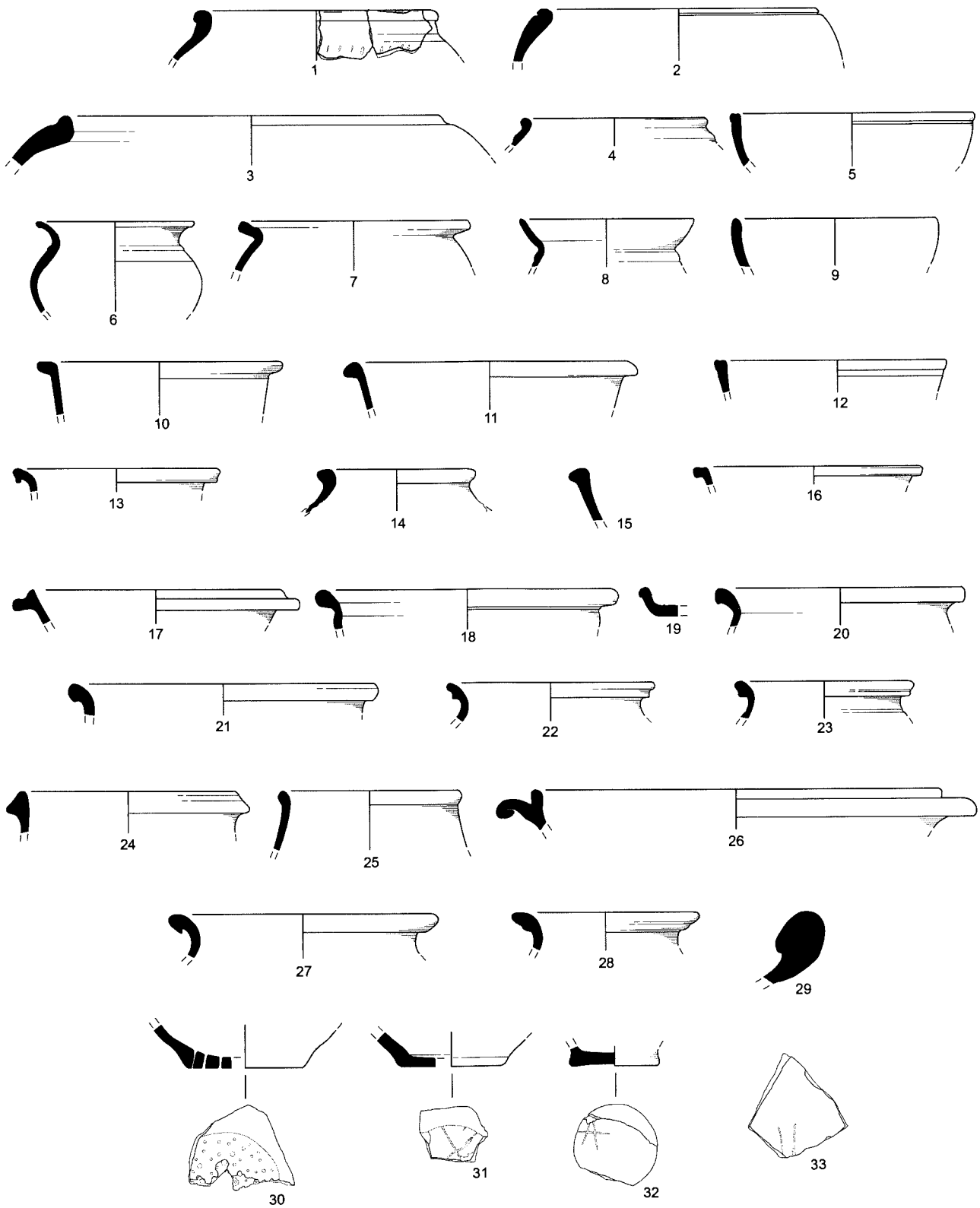

FIGURE 20: Roman pottery from Hobbs Hole

Fabric	Sherds	Weight (g)	MV	EVE
AITAL	2	55		
ALH	2	102		
BB1	3	95		
BSW	172	2257	30	285
BUF	16	74	3	17
CGSW	2	4		
COLB	2	43		
COLC	8	2		
ESH	843	5804	48	476
FLINT	20	77		
GRF	102	687	15	151
GROG	2342	14816	97	912
GROGC	548	10230	9	107
GROGFL	12	518	2	8
GROGRF	40	105	2	26
GROGRS	48	451	5	58
GRS	406	4046	47	556
HAR	21	235	4	24
HAWG	1	6		
HAWO	1	6		
HAX	92	1026	14	171
HGG	1	8		
LSH	7	37	2	17
MIC	1	1		
MICW	222	2012	2	10
MSR	1	13		
MWSGF	2	32		
MWSRS	1	2		
MWSRSM	3	203	1	17
NGWF	3	12		
NGWFS	1	18		
NKG	13	61		
NVC	6	116	2	10
NVP	1	13		
OXRC	6	101	1	6
OXWM	13	456	4	41
RED	53	476	4	21
SGSW	3	41		
SOLM	3	1360	1	15
STOR	47	2362	3	28
UPOT	77	238		
Total	**5147**	**48201**	**296**	**2956**

TABLE 11: Quantification of LIA/Roman pottery fabrics from Passingford Bridge Bund/Passingford Flood Alleviation Area (M25002.09)

(GROGRF and GROGRS), while storage jars (G44 and G45) were typical in coarse grog-tempered fabrics (GROGC and GROGFL). Early shell-tempered ware (ESH) also made an important contribution to the phased assemblage of some 21% by EVE. As at Hobbs Hole, its forms were exclusively neckless bead- or thickened-rimmed jars (G1, G3, Cam 254), and again this potentially restricts pottery deposition during Phase 4 at Passingford Bridge mainly to the first half of the 1st century AD, or a decade or two after the conquest. This is supported by the near-absence of post-conquest sand-tempered fabrics; a high-shouldered necked jar (G20) was available in black-surfaced ware (BSW), while a crucible was recorded in a sandy grey ware fabric (GRS; see below). A very small amount of continental pottery reached the site during this phase, including a Dressel 1 Italian wine amphora (AITAL), North Gaulish white ware (NGWF/S), and South Gaulish samian ware (SGSW), which are represented as body sherds only. Neither fabric, however, was found in Phase 4 contexts.

No context groups were dated by pottery to the late 1st or early 2nd century, although fabrics such as North Kent grey ware (NKG) and Highgate Wood grey ware (HGG) hint at pottery supply to the area in the late 1st century or first half of the 2nd. Moreover, just 6% of the entire assemblage by EVE belonged to context groups dated by pottery to the mid-Roman period (*c.*AD 120–250). Even this, though, was largely residual in Phase 7 deposits. Limited activity in the mid-Roman period, however, is suggested by the presence of Colchester colour-coated ware (COLC), Central Gaulish samian ware (CGSW), bead-rimmed dishes (B2 and B4) in sandy grey wares (GRS) and black-surfaced wares (BSW), and a grey ware lid-seated jar (G5.5).

Pottery from context groups dated to the late Roman period by pottery and stratigraphy accounted for 29% of the entire assemblage by EVE (Table 13). Sandy grey wares (GRS) made the largest single contribution, and was available in a wide range of forms, notably wide-mouthed jars or bowl-jars (E5), oval-bodied bodied (G24) and bifid-rimmed jars (G28), and plain-rimmed (B1) and flanged dishes (B6); all forms were standard products in later Roman kiln sites across south and central Essex (Cheer 1998, 98; Going 1987, 75, 85; Jones and Rodwell 1973, 26). A similar range of forms were seen in black-surfaced wares (BSW); additional forms included cup-rimmed bowl-jars (E2) and plain-rimmed dishes with a groove below the rim (B3). Hadham oxidised ware (HAX), a fine orange fabric, occasionally with a surface burnish or slip surviving, arrived in some quantity from the Hadham region on the east Hertfordshire/west Essex border. Forms were largely restricted, however, to high-shouldered bowl-jars (E6), flanged dishes, and necked bowls. Other wares made relatively minor contributions. More flanged dishes, and to a lesser extent B1 dishes and E2 bowl-jars, were available in fine grey ware (GRF). Flanged dishes were also recorded in Hadham grey ware (HAR), along with a small everted-rimmed bowl or bowl-jar (E4). Mortaria were represented by a reeded-flange type (D14) in a local white-slipped fabric (MWSRSM), a bead-and-flanged mortarium (D7) in Oxford white ware (OXWM), and a hook-flanged mortarium from the Soller region of Germany (SOLM). Products from the Nene Valley included a plain-rimmed dish in a colour-coated fabric (NVC), and a vessel (no form identified) in white or parchment ware (NVP). The latest pottery included a red colour-coated ware (OXRC), which arrived from Oxford in the form of bowls (Young 1977, types C51, C81, C82, and C84 or C85), and a rilled jar (G27) in late shell-tempered ware (LSH), possibly from Harrold, Bedfordshire. Together, the pottery points to a date within the second half of the 4th century for deposition and the cessation of pottery supply.

Pattern of deposition

In contrast to the pattern of deposition at Hobbs Hole, the pottery from Passingford Bridge was recovered largely from ditches and gullies, accounting for 63% of the assemblage by sherd count. Twenty-two per cent of the assemblage was

Fabric	A Platter	B Dish	C Bowl	G Jar	H Beaker	K Lid	S Misc.	Total EVE	% EVE
BSW				23				23	2
BUF								*	
ESH				199				199	21
FLINT								*	
GRF								*	
GROG	6	11	74	379	96	3		569	60
GROGC				25				25	3
GROGFL				3				3	0
GROGRF					26			26	3
GROGRS				40	5	3		48	5
GRS							50	50	5
MICW				5				5	1
RED								*	
UPOT								*	
Total EVE	**6**	**11**	**74**	**674**	**127**	**6**	**50**	**948**	
% EVE	**1**	**1**	**8**	**71**	**13**	**1**	**5**		

TABLE 12: Passingford Bridge Bund/Passingford Flood Alleviation Area (M25002.09): Ceramic groups from Phase 4 contexts dated by pottery up to *c.*AD 70. * = fabric present, but no rims recorded

Fabric	B Dish	C Bowl	D Mortarium	E Bowl-jar	E/G Bowl-jar/jar	G Jar	Total EVE	% EVE
ALH							*	
BB1							*	
BSW	137			16		24	177	21
BUF	6					6	12	1
ESH						8	8	1
GRF	56			6		13	75	9
GROG							*	
GROGC							*	
GROGRS							*	
GRS	68			77	16	168	329	39
HAR	7	3		6			16	2
HAWG							*	
HAX	12	13		91	18	6	140	16
HGG							*	
LSH	2					15	17	2
MSR							*	
MWSRSM			17				17	2
NVC	10						10	1
NVP							*	
OXRC		6					6	1
OXWM			25				25	3
RED							*	
SOLM			15				15	2
STOR							*	
UPOT							*	
Total EVE	**298**	**22**	**57**	**196**	**34**	**240**	**847**	
% EVE	**35**	**3**	**7**	**23**	**4**	**28**		

TABLE 13: Passingford Bridge Bund/Passingford Flood Alleviation Area (M25002.09): Ceramic groups from Phase 7 contexts dated by pottery to AD 250–400+. * = fabric present, but no rims recorded

collected from pits, including quarry pits and water-holes. The remaining pottery was recovered from natural, structural, and funerary features. The overall mean sherd weight was 9g, pointing to an assemblage comprising small, highly fragmented sherds. There was, however, variation across feature types. Pottery from structural and funerary features had the lowest mean sherd weight of 6g. Deposition in structural features, such as post-holes and beam-slots, which could rarely have accommodated large sherds, is likely to have been incidental, while the deliberately deposited pottery in graves had suffered from severe post-depositional damage, caused mainly by the plough. The pottery from pits and ditches had

the same mean sherd weight of 9g, while sherds in quarries and water-holes were larger, at 12g and 23g respectively, suggesting that the pottery in quarries and water-holes was generally better preserved than the material in pits and ditches and had a different pattern of redeposition after original breakage and initial discard. Chronology appears to have been a significant contributory factor. Quarries and water-holes received pottery and other material after *c.*AD 250, when levels of deposition in other pits and ditches had fallen after peaking in the late Iron Age and early Roman period. The broad range of pottery recovered from these feature types is also consistent with this chronological difference. The pottery from ditches and pits was dominated by jars in shelly fabrics (which is prone to laminate and fragment) and grog-tempered wares, whereas the pottery from water-holes and quarries mainly comprised dishes and wide-mouthed jars or bowl-jars in hard-fired reduced wares. The differences in the composition of feature-type assemblages is likely to have had a bearing on its differential condition, but we can also look to different sources, and therefore depositional history. The relatively poor condition of the pottery deposited into pits and ditches is consistent with material that has been subject to several episodes of disturbance and redeposition, having been incorporated into a succession of middens or manuring spreads, before being deposited into cut features away from the settlement core. The pottery from water-holes and quarries suffered fewer episodes of disturbance and relocation, which may reflect some clearing of domestic waste into convenient holes from areas of settlement closer to the site of excavation. Once in the cut features, the pottery was reasonably well protected from further denudation.

Aspects of pottery use

No wear was noted, but some vessels had been burnt, perhaps during use. A grog-tempered necked jar (G19) from context 2911 had been burnt on its rim and shoulder, and signs of burning were recorded on a similar jar (G20), also grog-tempered, from context 3460. Both hint at the use of the jars as cooking vessels. An Oxford white ware mortarium (D7; context 3656) had been burnt on the flange and around the spout, although the burning extended into the break, and so probably occurred after breakage. A flanged bowl (C8) in Hadham oxidised ware from context 3659 had also been burnt. The burning is concentrated on the flange, and may indicate that the vessel had been used for cooking or food preparation. The vessel imitated Drag. 38 flanged bowls in samian ware, and, with the worn Drag. 38 from Hobbs Hole (above) in mind, suggests that function, as well as form, was copied. The bowl joins a growing body of similar evidence, for example at Northfleet villa in Kent, where a flanged bowl, again copying Drag. 38, had been burnt, and the Chemistry Research Laboratory site in Oxford, where a fine oxidised ware copy of Drag. 38 had been burnt both inside and out (Biddulph 2005a, fig. 7.7).

Another piece of intrinsic interest is a plain-rimmed dish in black-surfaced ware from context 3653. The vessel has at least three notches, made after firing, on its rim (Fig. 21.55). Notches like these, very often three in number and on jars and open forms, such as bowls and dishes, have been recorded at a number of sites in Essex, among them Great Holts Farm (Martin 2003, fig. 95.246), Hill Farm, Gestingthorpe (Toller 1985, fig. 43.490), and Stanford Wharf Nature Reserve (Biddulph et al. 2012b, fig. 6.49, no. 91). Quite what they represent is unclear, but they may relate to function, perhaps denoting use or the type or quantity of contents (although the varied range of forms on which notches have been recorded perhaps rules this out), marks of ownership, or a ritual function. Finally, a pedestal base in grog-tempered ware, recovered from context 5006, had been smoothed and perforated through the centre after breaking from the body of the vessel. A white, limescale-type deposit had formed over the break, and it is possible that the base had been re-used as a candlestick.

Crucible

A near-complete, though fragmented, crucible (15 sherds, 145g; Fig. 22.83) was recovered from context 4382, a fill of early Roman ditch segment 4381 (group 4436). Pottery from the deposit suggests a mid-1st century AD date for deposition. The crucible was made in a grey, slightly vesicular, sandy fabric, roughly equivalent to pottery fabric GRS. The bowl-shaped vessel has a rounded bottom, and in plan is approximately triangular, its corners being defined by simple lips for pouring. The exterior and interior surfaces are discoloured from the effects of heat, while the interior surface of the rim and upper wall is vitrified and encrusted with a thick glassy deposit.

Crucibles are reasonably common finds on late Iron Age and Roman-period sites, but the vessel from Passingford Bridge is an exceptionally well-preserved example. Its fabric is broadly comparable with the fabrics of late 1st/early 2nd century crucibles from 1 Poultry, London (Wardle 2011, 392) and Orsett, south Essex (Major 1998, 110), while its D-shaped profile and shape in plan is characteristic of later Iron Age and Roman crucibles in Britain (Tylecote 1962, 131–3, fig. 31, no. 3). Early Roman crucibles of this type are known at Springhead, north Kent (Poole 2011, 322) and Orsett (Major 1998, fig. 70, no. 15). The residue within the Passingford Bridge crucible has not been examined, but analysis of similarly described residues from the examples from London (Dungworth and Stallybrass 2011, 522), as well as others from Great Dunmow (Wickenden 1988, 53) and Woodham Walter (Evans 1987, 39–40), strongly suggests that the crucible from Passingford Bridge was used to melt copper alloys.

Catalogue of illustrated pottery (Figs 21–22)

The following ceramic groups illustrate a representative selection of pottery to convey the typological and chronological range of the assemblage. Pieces of intrinsic interest are also shown.

Context 4564, fill of pit 4561, phase 3

34. Platter (A), fabric GROG
35. Bead-rimmed jar (G3), fabric ESH
36. Storage jar (Cam 232), fabric GROG
37. Jar (G), fabric GROGRS

Also present: MICW. Ceramic date: AD 1–43

Pit 2909, phase 4

38. Bead-rimmed jar (G1), fabric ESH, context 2910
39. Squat high-shouldered necked jar (G20), fabric BSW, context 2910
40. Squat necked and cordoned jar (G19), burnt on the rim and shoulder, fabric GROG, context 2911
41. Squat necked and cordoned jar (G19), fabric GROG, context 2911
42. Jar (G), fabric GROG, context 2910

Also present: MICW. Ceramic date: AD 43–70

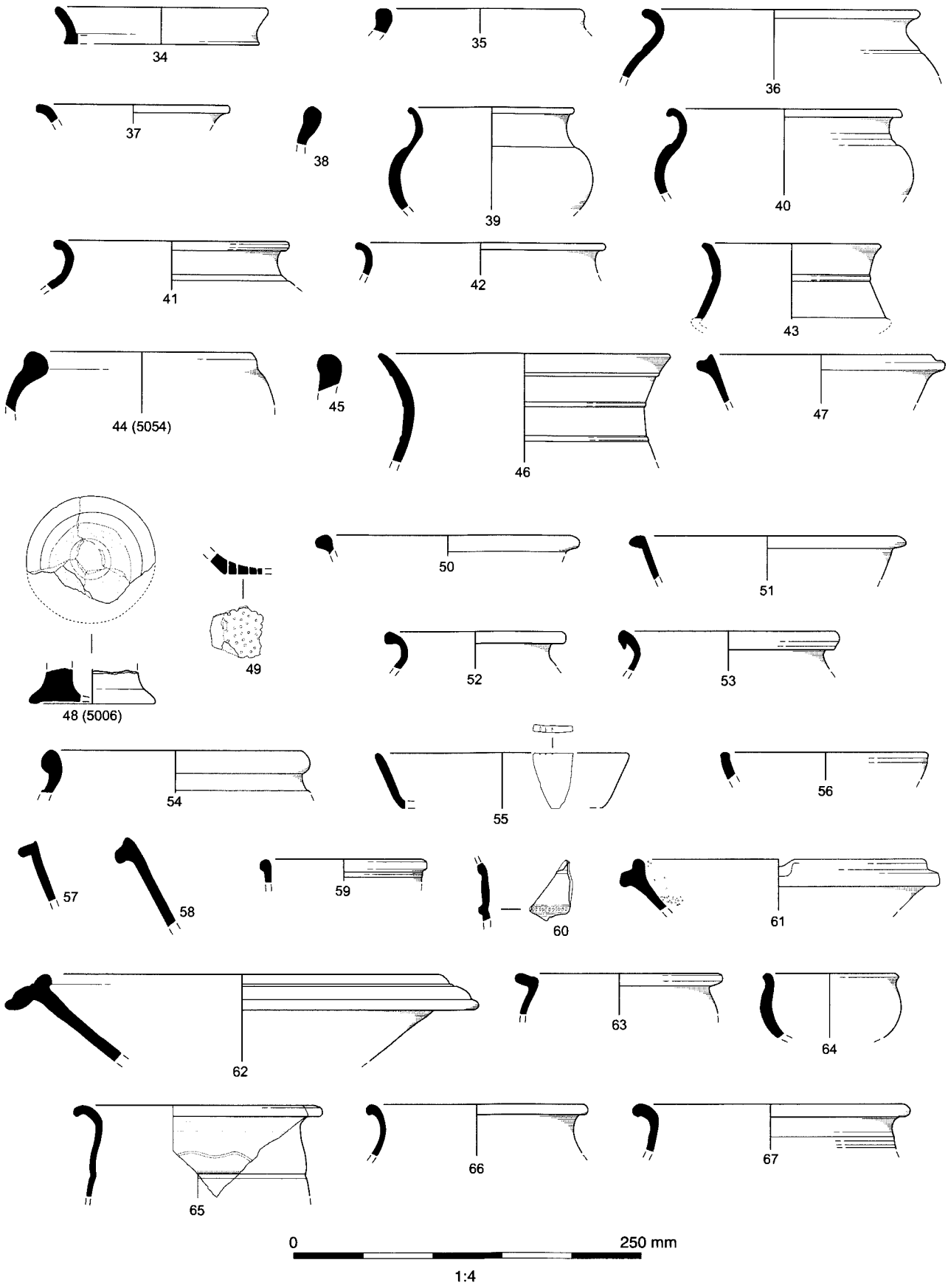

FIGURE 21: Roman pottery from Passingford Flood Alleviation Area

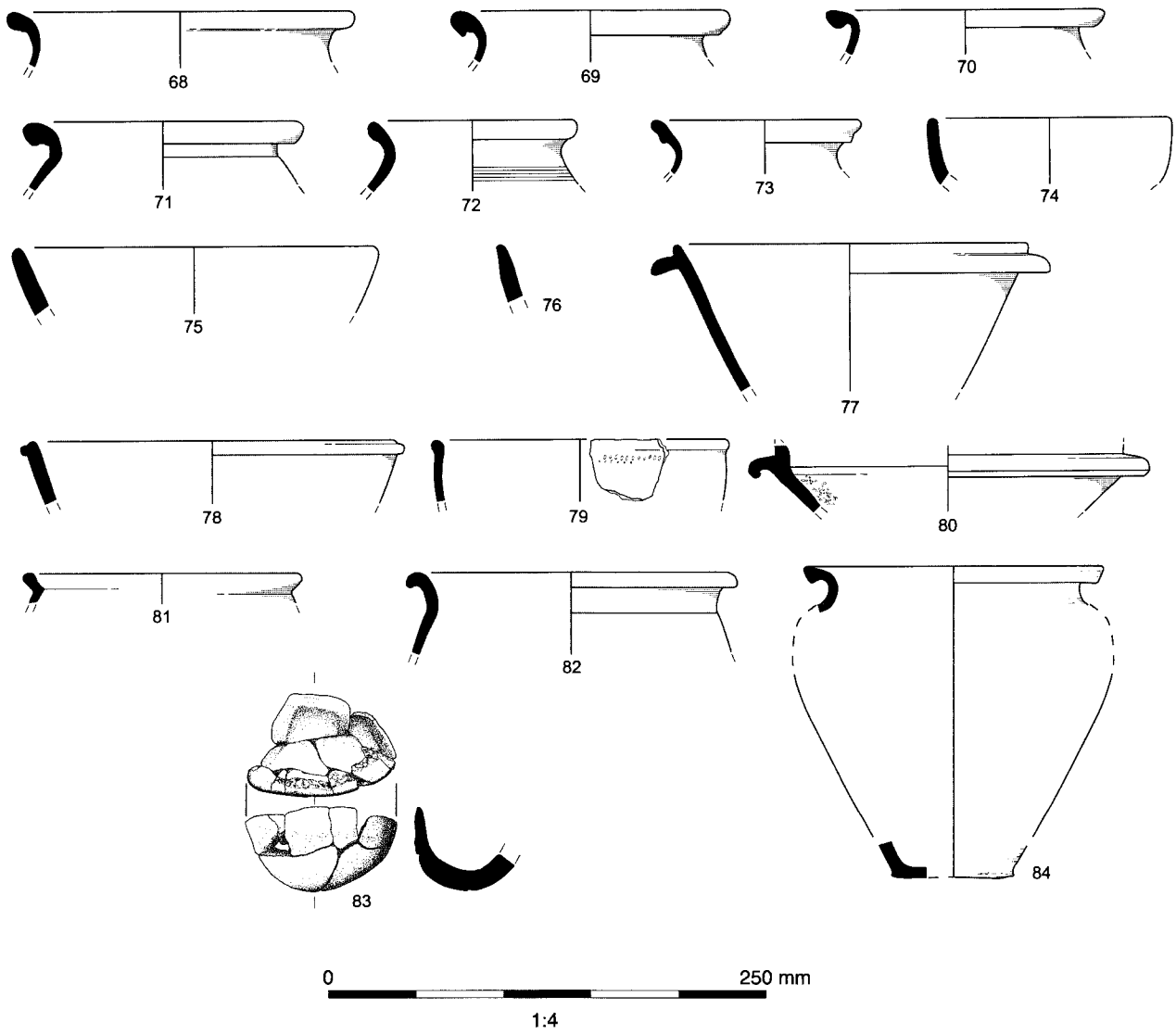

FIGURE 22: Roman pottery from Passingford Flood Alleviation Area and Codham Hall Bund

Segment 5052 of ditch 5041, phase 4

43. Carinated and cordoned bowl (Cam 212), fabric GROG, context 5053
44. Bead-rimmed jar (G1), fabric ESH, context 5054
45. Bead-rimmed jar (G1), fabric ESH, context 5054

Also present: RED. Ceramic date: AD 43–70

Context 5020, fill of ditch 3391 (group 3091), phase 4

46. Sharply carinated pedestal bowl or tazza (Cam 210), fabric GROG

Also present: ESH, FLINT, MICW. Ceramic date: AD 1–43

Context 3111, fill of ditch 3109 (group 3099), phase 4

47. Flanged bowl resembling late Roman form, B6. Possibly variant of flanged bowl C19 or carinated bowl Cam 47. Fabric identified as GROG (late Iron Age/early Roman fabric, rather than the late Roman grog-tempered ware found in Kent (cf. Pollard 1988, 212)).

Also present: MICW. Ceramic date: AD 1–70

Context 5006, fill of ditch 5005 (group 4177), phase 4

48. Base from pedestal jar, broken at junction of pedestal and lower wall; pedestal trimmed around the break and perforated through the centre; white scaly deposit on break and external surface. Re-used base. Fabric GROG

Also present: ESH. Ceramic date: AD 1–43

Context 3569, fill of ditch 3567, phase 6

49. Base of colander or strainer (M2); perforations made before firing, fabric GROG

Also present: ESH, GRF, GRS. Ceramic date: AD 43–70

Context 2029, fill of ditch 2028, phase 7

50. Bead-rimmed dish (B2), fabric BSW
51. Bead-rimmed dish (B2), fabric BUF (or burnt reduced fabric)
52. Oval-bodied necked jar (G24), fabric GRS
53. Bifid-rimmed necked jar (G28), fabric GRS
54. Necked jar with thickened bead rim (G), fabric GRS

Also present: HAWO, MIC, NKG. Ceramic date: AD 140–230

Water-hole 3652, phase 7

55. Plain-rimmed dish (B1) with at least three notches on the rim, scored after firing, fabric BSW, context 3653
56. Dish with groove below plain rim (B3), fabric BSW, context 3653
57. Flange-rimmed dish (B6), fabric GRS, context 3653
58. Flange-rimmed dish (B6), fabric GRS, context 3656
59. Bead-rimmed bowl (C), as Symonds and Wade 1999, fig. 5.54, nos 99–102; fabric HAX, with traces of red slip surviving; context 3653
60. Body sherd from bead-rimmed carinated bowl, as Young 1977, types C84 or C84, fabric OXRC, context 3656

61. Mortarium with tall bead and stubby flange (D7), burnt on the flange around the spout and on the break, fabric OXWM, context 3656
62. Mortarium with drooping grooved flange (D14.2), fabric MWSRSM, context 3653
63. Globular bowl-jar with cupped rim (E2), fabric BSW, context 3656
64. Small globular bowl-jar (E4.1), fabric HAR, context 3656
65. Bowl-jar with concave neck and rounded body (E5), fabric GRS, context 3653
66. Bowl-jar with concave neck and rounded body (E5), fabric GRS, context 3653
67. Bowl-jar with concave neck and rounded body (E5), fabric GRS, context 3653
68. Necked, high-shouldered bowl-jar (E6), fabric HAX, context 3656
69. Oval-bodied necked jar (G24), fabric GRS, context 3656
70. Oval-bodied necked jar (G24), fabric GRS, context 3653
71. Oval-bodied necked jar (G24), fabric GRS, context 3653
72. Oval-bodied necked jar with shoulder rilling (G27), fabric LSH, context 3656
73. Bifid-rimmed necked jar (G28), fabric GRS, context 3653

Also present: HAWG, NVC, RED, STOR. Ceramic date: AD 350–400+

Context 4415, fill of quarry pit 4414, phase 7

74. Plain-rimmed dish (B1), fabric NVC
75. Plain-rimmed dish (B1), fabric GRF
76. Plain-rimmed dish (B1), fabric BSW
77. Flange-rimmed dish (B6), fabric BSW
78. Flange-rimmed dish (B6), fabric BSW
79. Curving-sided, bead-rimmed bowl (C1; Young 1977, type C55 or C68), fabric OXRC
80. Mortarium with tall bead and stubby flange (D7), fabric OXWM
81. Globular bowl-jar with cupped rim (E2), fabric GRF
82. Bowl-jar with concave neck and rounded body (E5), fabric GRS

Also present: BB1, BUF, ESH, GROG, HAR, HAX, RED, STOR. Ceramic date: AD 350–400+

Context 4382, fill of ditch segment 4381, group 4436, phase 4

83. Crucible in medium–fine sandy grey fabric (GRS)

Also present: BSW, ESH, GROG, GROGC, GROGRF, GROGRS, GRS, MICW. Ceramic date: AD 43–70

Upminster Bund

Just 22 sherds of late Iron Age and Roman pottery were recovered from Upminster Bund (Table 14). All the pottery was residual in medieval features. Context 1060, a fill of ditch segment 1058, contained 15 body sherds in grog-tempered ware, shell-tempered ware, sandy grey ware, unsourced oxidised ware and North Kent oxidised ware. No forms were recognised, although the North Kent sherds may have been part of a flagon. Seven sherds from context 1121, a fill of ditch segment 1120, were also recorded. Several fabrics were noted, including shell-tempered ware, sandy grey ware, grog-tempered ware, fine grey ware and unsourced oxidised ware. A single vessel, a shell-tempered lid-seated jar (Going 1987, type G5.1), was identified by rim.

Tank 1706

A single body sherd of grog-tempered pottery, weighing 10g, was recovered from context 9, a fill of ditch segment 8. The pottery dates to the late Iron Age or early Roman period.

Codham Hall Bund, Tank 1762 and Strip Widening

Over 400 sherds of late Iron Age and Roman pottery were recovered from the site (Table 15). Based on the ceramic dating of each context group, the assemblage is chronologically split into two phases. Just under half the assemblage by sherd count (201 sherds) was recovered from groups dated to the late Iron Age or early Roman period (up to *c.*AD 70). Early shell-tempered ware (ESH), in which bead-rimmed jars and a lid-seated jar were available, accounted for much of this group. Smaller quantities of grog-tempered wares (GROG, GROGC), were also recorded. Forms were again largely confined to bead-rimmed jars. Jars unidentified to type were recorded in a buff fabric (BUF) and fine grey ware (GRF), and a base fragment from a Drag. 18 platter was identified in South Gaulish samian ware (SGSW). Fragments in coarse, mixed-tempered Iron Age fabrics (MICW) were also present.

Some 90 sherds belonged to context-groups dated by pottery to the late 2nd century or later. Sandy grey ware (GRS) made the largest contribution, and provided the widest range of forms, including a dish, a bowl-jar or wide-mouthed jar, a necked jar, and a (probably residual) lid-seated jar. A necked jar was also seen in black-surfaced ware (BSW). Miscellaneous jars were present in unsourced oxidised fabrics (BUF, RED), and a fragment of a rim from a Drag. 33 cup was recorded in an East Gaulish samian ware (EGSW), which dated up to *c.*AD 240. Hadham grey ware (HAR) was also present.

The remaining pottery was more broadly dated to the Roman period and comprised undiagnostic grey ware body sherds. Of particular note, however, was a near-complete grey ware oval-bodied necked jar, which appeared to have been deliberately inverted within the feature, pit 274. However, the vessel had been truncated after deposition and was highly fragmented; little of the base had survived. In addition, the profile of the feature was poorly defined, and there were no associated finds, such as human bone. Interpretation of the vessel and its context is therefore very uncertain.

Fabric	MOL code	Sherds	Weight (g)	MV	Rim % (EVE)	Forms
ESH	SESH	1	13	1	6	G5.1 (2A16)
GRF	FINE	1	1			
GROG	GROG	6	13			
GRS	SAND	5	22			
NKO	OXIDF	5	17			
RED	OXID	4	9			
Total		**22**	**75**	**1**	**6**	

TABLE 14: Quantification of LIA/Roman pottery fabrics from Upminster Bund (M25008.09)

Fabric	Sherds	Weight (g)	MV	Rim % (EVE)	Forms
BB1	5	32	2	10	Plain-rimmed dish (B1)
BSW	30	209	2	17	Oval-bodied necked jar (G24)
BUF	10	47	1	3	Jar (G)
EGSW	1	4	1	19	Conical cup Drag. 33
ESH	122	527	9	74	Bead-rimmed jars (G1, G3); lid-seated jar (G5.1)
GRF	15	27	2	18	Jar (G)
GROG	46	144	3	11	Bead-rimmed jar (G1); beaker (H)
GROGC	8	62	1	11	Bead-rimmed jar (G1)
GRS	164	763	9	154	Plain-rimmed dish (B1); globular, cupped rim bowl-jar (E2); lid-seated jar (G5.1); oval-bodied necked jar (G24)
HAR	4	5			
MICW	5	4			
RED	4	18	1	8	Jar (G)
SGSW	1	19			
Total	**415**	**1861**	**31**	**325**	

TABLE 15: Quantification of LIA/Roman pottery from Codham Hall Bund (M25018.10)

Context 275, fill of ?pit 274 (Fig. 22.84)

84. SF 3. Near-complete oval-bodied necked jar (G24), fabric GRS

Ceramic date: AD 100–400

Pond 1824 and Strip Widening

A single sherd of unsourced fine grey ware (GRF), weighing 18g, was found buried within the natural deposit (context 101). The base fragment has been assigned a broad Roman date (AD 43–400).

Discussion

Chronology

Taken together, the pottery recovered from five sites spanned the late Iron Age and Roman period, but differences in chronology between the sites are apparent. Supply to Hobbs Hole commenced after AD 43 and continued at low levels through the early and mid-Roman periods, but was concentrated in the late Roman period when most of the pottery was deposited. Supply to Passingford Bridge appears to have commenced earlier. Much of the pottery was deposited during the late Iron Age and earliest Roman period, probably during the 1st century AD, up to *c.* AD 70. There was a hiatus in pottery supply until the late Roman period, when the quantity of pottery deposited matched that seen in the 1st century. The pottery from Codham Hall Bund and Tank 1706 also had a late Iron Age or very early Roman emphasis, while the little pottery recovered from Upminster Bund dated largely to the early and mid-Roman period. Late Roman pottery was largely absent from these three sites. The latest pottery from Passingford Bridge and Hobbs Hole, including Oxfordshire red colour-coated ware, Portchester 'D' ware and late shell-tempered ware, suggests that the settlements continued to receive pottery into the second half of the 4th century.

Pottery from graves

Three burials from Hobbs Hole produced a small assemblage of four, possibly five, vessels, while a single burial from Passingford Bridge contained two vessels. From Hobbs Hole, small body sherds in sandy grey ware (GRS, SF 100) recovered from grave 4303 may be the severely truncated remains of a vessel deposited as an urn or accessory vessel, but too little of it survives for certain identification. A black-surfaced ware necked jar (SF 110) contained cremated bone, serving as the cinerary urn in grave 6096. It was accompanied by a flask (G40, SF 111) in North Kent grey ware (NKG), a vessel that suggests a mid- or late-2nd century date for deposition. Two vessels were deposited in grave 2003 (group 2009) from Passingford Bridge. A butt-beaker (H7; SF 2000) in grog-tempered ware (GROG) was used as the cinerary urn, while a beaker (SF 2001) in fine red-surfaced grog-tempered ware (GROGRF), possibly another butt-beaker, was deposited as the accessory vessel. The vessels suggest an early to mid-1st century date for burial.

Though just a small funerary assemblage is represented here, the selection of pottery nevertheless conforms to regional patterns. The use of jars to hold cremated bone is standard within many cemeteries from the 1st to early 3rd century (Biddulph 2005b, 27), but the choice of beakers is by no means unknown, being attested at, for example, Strood Hall (Biddulph 2007, table 3.2) in central Essex, and Verulamium's King Harry Lane cemetery (Stead and Rigby 1989). Butt-beakers especially were well suited to the task, being relatively capacious vessels. The selection of accessory vessels is consistent with the dominance of drinking-related forms – beakers, flagons, flasks, and cups – seen in burial groups across the region (Biddulph 2005b, 27–8), and in general fits with Gallo-Roman-derived traditions recorded at, among many other sites, King Harry Lane (Stead and Rigby 1989), Skeleton Green (Partridge 1981), Strood Hall (Biddulph 2007, table 3.2) and Kelvedon (Rodwell 1988), where accessory vessels are typically dining forms. This contrasts with the Belgic-style assemblages of, for example, North Shoebury (Thompson 1995), which tend to comprise robust jars, bowls and beakers (cf. Thompson 1982; Biddulph 2005b, 40–2).

Status

Pottery can be usefully employed to gain an insight into the economic and social status of the principal sites. One potential means of assessing status is samian, specifically the ratio of decorated pottery to plain forms. Steve Willis (1998, 105–11;

2005, section 7.3.2) records higher than average proportions of decorated samian at military and urban sites, and lower than average proportions at basic rural sites. Most samian was recovered from Hobbs Hole. No decorated forms were identified by rims, but three, or possibly four, vessels were attested by body sherds, which represents 7%–10% of the 40 samian vessels present in total (as identified by body, base and rim sherds). This compares well with the aisled villa site of Great Holts Farm, where 8% of samian vessels were decorated (Dickinson 2003, 157). Just five sherds of samian, none decorated, were collected from Passingford Bridge. This points to a low-status site, although the paucity of samian may be attributed, at least in part, to the apparent hiatus in pottery supply to the site during the mid-Roman period, a time associated with comparatively high levels of samian importation to region, particularly to rural sites (Willis 2005, section 6.5.2).

The relationship between open tablewares and jars provides an alternative means of ranking sites. Jeremy Evans (2001, 26–31) found that basic rural sites have relatively high proportions of jars (suggesting continuation of Iron Age cooking and dining practices) and low proportions of dishes or bowls (denoting specialist dining vessels). Urban sites tended to have higher proportions of dishes/bowls and fewer jars. Villas occupied a space in between these extremes. At Hobbs Hole, pottery from groups ceramically dated to the early Roman period had a very high proportion of jars (84% jars to 2% dishes/bowls), though this fell to 60% in the late Roman period (after *c.*AD 250), with a concomitant increase in dishes/bowls to 22%. Turning to Passingford Bridge, jars took a 78% share of the assemblage in early Roman groups, while dishes/bowls accounted for 9%. By the late Roman period, the proportion of jars had reduced to 54%, while that of dishes/bowls increased to 37%. These values appear to separate the two sites, with Hobbs Hole falling a little below Passingford Bridge. Indeed, the gap between the sites is emphasised when the values are set against those of other sites (Biddulph and Stansbie 2012a, table 2.14). Early Roman Hobbs Hole closely matches the values from early Roman Mucking, where jars accounted for 93% of the early Roman assemblage in the north-western part of the settlement, and 80% in the southern part (S. Lucy, pers. comm.; Biddulph and Stansbie 2012a, table 2.14). Passingford Bridge, meanwhile, was closer to the assemblage from Stanford Wharf Nature Reserve, a specialist salt-production site, where the early Roman assemblage comprised 79% jars and 8% dishes/bowls. In the late Roman period, Hobbs Hole matched proportions at, for example, the farmstead at Strood Hall, while Passingford Bridge moved closer to proportions recorded at the temple site at Ivy Chimneys (Turner-Walker and Wallace 1999, table 20) and the rural site of Great Holts Farm (Martin 2003).

While both Hobbs Hole and Passingford Bridge were low-status rural sites, there were nevertheless ceramic differences between the two, which may reflect slight differences in site status. The inhabitants of Passingford Bridge did not appear to be so dependent on jars for food preparation and consumption – it is notable that mortaria are better represented in the phased assemblage at Passingford Bridge than at Hobbs Hole – and may have more regularly experienced the type of cooking and dining enjoyed by the inhabitants of higher-status rural sites, such as Great Holts Farm, or specialist sites at Ivy Chimneys and Stanford Wharf Nature Reserve.

POST-ROMAN POTTERY by John Cotter

Introduction and methodology

Five sites produced post-Roman pottery, which totalled 451 sherds weighing 2099g. Additional methods of quantification are given in Tables 16–18. Pottery ranging in date from Early Anglo-Saxon to modern was recovered. Conveniently, the site assemblages fall into discrete chronological groups with little overlap between them. Hobbs Hole produced a largely Early Anglo-Saxon assemblage (69 sherds); Pond 1812 produced a late Saxon assemblage (74 sherds); Codham Hall Bund produced an early medieval assemblage (304 sherds); Pond 1683 produced a single medieval sherd, and Passingford Bridge Flood Alleviation Area produced three sherds of modern pottery.

All the pottery was examined, spot-dated and fully catalogued. For each context and fabric the total pottery sherd count and weight were recorded. Vessel form, if identifiable, was also recorded together with ENV (minimum vessel count) and EVEs (rim circumference length) if present (medieval wares only). Vessel part, decorative details, condition and traces of use were also indicated. For most of the sites the pottery fabric codes assigned in the catalogues are those of the Essex County Council medieval pottery reference collection (Cunningham 1985, 1–6; Cotter 2000, 12–3). The only exception to this is the pottery from Pond 1812 (M25024) near the southern end of the M25 Section 4 scheme. This produced pottery types more typical of the London area and was therefore catalogued in accordance with the standards of the Museum of London Archaeology Service (MoLAS) and using the system of post-Roman pottery fabric codes developed in London over several decades (LAARC 2007). For ease of comparison, however, a London-style catalogue structure was used for all five site assemblages. A number of items have been illustrated. The other vessels, however, have reasonably close parallels in existing local and regional publications (Cotter 2000; Vince and Jenner 1991).

Junction 29, Hobbs Hole

The site produced a total of 69 sherds of pottery weighing 402g (Table 16). This represents about 15 vessels. Most – or perhaps all – of this is of Early Anglo-Saxon date. The pottery is mostly

Fabric	Name	Count	Weight (g)	ENV	EVE	Form
1C	Organic and sand-tempered fabric	10	47	1		Jar
3	Saxon sand-tempered	17	165	6	16	Jar
4	Other Saxon brickearth fabrics	34	160	7	22	Jar
12	Early medieval shelly ware	8	30	1		
	Total	**69**	**402**	**15**	**38**	

TABLE 16: Post-Roman pottery from Hobbs Hole (M25001.08/09)

from the upper fills of Roman period ditches, indicating, perhaps, that this northern area of the site was occupied during the 5th century when final silting of the ditches occurred. A large quarry pit (5071) is the only feature that appears to have originated during the Anglo-Saxon period and this also produced pottery. No other features of this period were identified and any settlement may have lain further to the north outside the excavation area.

Most (or all) of the assemblage comprised handmade Anglo-Saxon pottery occurring as a mixture of fairly large fresh and worn sherds and many small sherds and scraps. A limited range of shallow jars/bowls and globular jars is present but no complete profiles (Fig. 23.1–4). No decorated sherds are present, which hinders attempts at dating with any accuracy, but one or two vessels have a fair external burnish and some sherds (in Fabric 3) have an applied external roughcast slip, which is usually a sign of early date. A few thick flattish possibly basal sherds were noted, including one with a post-firing perforation with a diameter of *c.*7mm (context 5133). Another possible base sherd from 5133 is reduced and blackened internally with a thick carbonised deposit. One or two other sherds are possibly sooted internally as well, suggesting a cooking use for at least some vessels. The predominant sand-tempered and less sandy fabrics (Fabrics 3 and 4 respectively) vary in texture from vessel to vessel. Fabric 4, in particular, includes several vessels with coarse white flint/chert inclusions giving them (particularly if worn) quite a rough prehistoric look. However, all these sherds were examined by OA's prehistoric pottery specialist and were discounted as being of this date. Flint/chert grits (up to 10mm across) and smaller-sized flint inclusions are a feature of most vessels here. In most cases this may be a natural constituent of the local clay, but in at least two or three cases the flint/chert appears to have been deliberately crushed into small angular grits and added to the clay mixture in the manner of prehistoric pottery. While not unique, the addition of crushed flint is a fairly rare trait in Anglo-Saxon pottery. More detailed fabric descriptions for Fabric 3 and Fabric 4 vessels are given in the illustration catalogue. There is a single vessel in an organic- and sand-tempered fabric (Fabric 1C) represented by ten worn body sherds and scraps from context 6060. This has a reduced black sandy brickearth fabric with a worn oxidised external surface. The fabric has moderate to abundant organic inclusions (present as voids) as well as sparse coarse angular flint, rounded quartz and fine mica. Organic-tempered fabrics are usually dominant in assemblages of the 6th–7th centuries, but occur in small quantities from the start of the Anglo-Saxon period. Although the assemblage here has few reliable dating indicators, and the fabrics present were long-lived (and variable), an Early Anglo-Saxon date – perhaps in the 5th or 6th century – would be compatible with the pottery here.

One vessel (context 6068), present as eight very small and worn body sherds, has very tentatively been identified as early medieval shelly ware (Fabric 12). This has a soft dark grey-brown fabric with a fine silty-sandy matrix and abundant coarse voids probably resulting from dissolved-out shell rather than organics, although it also has some sparse organic inclusions. If post-Roman, it could date anywhere between the middle Saxon period and the 13th century, but it might even be of prehistoric date. It may be best therefore to regard this piece as undatable.

Pond 1812

The site produced a total of 74 sherds of pottery weighing 586g. This represents about 32 vessels (Table 17). Excavation here revealed a series of Late Saxon/early medieval ditches aligned NE–SW and NW–SE. These formed a number of small enclosures and possibly a trackway. The features showed evidence of modern plough damage. The pottery fabrics present here are more typical of the London area and have been recorded using London fabric codes. Apart from the single modern sherd the three Late Saxon and Saxo-Norman pottery fabrics occurring here are fully described from excavations in London (Vince and Jenner 1991).

The Pond 1812 assemblage is mostly quite fragmentary. Some fairly large sherds do occur, however, but no vessel profiles. The predominant fabric type here is (London) Late Saxon shelly ware (LSS) which occurs in the form of globular wheel-thrown jars/cooking pot (Fig. 23.5). Many of these exhibit external sooting. A single bowl was also identified. Jars/cooking pots have neatly-made everted rims with a squared-off or bevelled lip. Rim diameters are in the 180–240mm range, but mostly around 200mm. A few sagging base sherds are also present. The single bowl has a steep straight flaring wall with a simple thickened flat-topped rim (diam. 210mm) flush with the vessel wall (context 218). In most examples the shell content has dissolved out – particularly from the internal surfaces where repeated boiling has dissolved the shell away. Most vessels are grey-brown in colour, occasionally grey or dark grey. The source of LSS, which was the commonest Late Saxon pottery type in London, was probably in the Upper Thames Valley. The fabric is known from other sites in south Essex including Barking Abbey (Vince and Jenner 1991, 49–54). Its occurrence at the Pond 1812 site in association with a few sherds of (London) early medieval sandy ware (EMS) and early medieval flint-tempered ware (EMFL) suggests a date bracket of *c.*970–1050 for activity here. The EMS and EMFL sherds are all fairly small body or sagging base sherds but some of these are fairly certainly from jar/cooking-pot forms. The London EMS fabric is not to be confused with the widespread Essex early medieval sandy ware tradition (Fabric 13), which is usually dated after *c.*1050, although there may be some overlap between these traditions in south Essex.

Fabric	Name	Count	Weight (g)	ENV	EVE	Forms
EMFL	Early medieval flint-tempered ware	4	37	4		Jar
EMS	Early medieval sandy ware	4	23	2		Jar
LSS	Late Saxon shelly ware	65	523	25	52	Jar, bowl
REFW	Plain refined white earthenware	1	3	1		
	Total	**74**	**586**	**32**	**52**	

TABLE 17: Post-Roman pottery from Pond 1812 (M25024.11)

Codham Hall Bund

The site produced a total of 304 sherds of pottery weighing 1086g. This represents about 38 vessels (Table 18). Evidence for early medieval activity here is in the form of a few dispersed ditches aligned east–west, and at least one pit (340) near the centre of the site. This area appears to have been heavily truncated by modern quarrying.

The assemblage is dominated by an almost sand-free variant of early medieval shelly ware (Fabric 12A). This is a fairly soft low-fired fabric with a soapy feel and with abundant shell voids, moderate grey-brown clay pellets, sparse angular flint grits and moderate organic inclusions including rootlets. The matrix is smooth with much very fine mica. Most vessels are a weakly oxidised orange-brown or grey-brown colour and a few completely grey. These mostly occur as worn or weathered sherds of fairly small size although this is partly due to the soft and crumbly nature of the shelly ware fabric as well as, perhaps, soil conditions and ploughing. Some fairly large and relatively fresh sherds are present as well as many small worn scraps. No reconstructable profiles survive but around a hundred smallish sherds from context 199 appear to come from a single large jar/cooking-pot profile, which appears to have been crushed and/or badly disintegrated. This shelly fabric mostly occurs in the form of typically wide-bodied early medieval jars/cooking-pots with sagging bases and a variety of simple externally beaded or thickened/flat-topped rims some of which have a sharply squared external bead or lip (similar to London EMSH: Vince and Jenner 1991, fig. 2.45.112). Rim diameters are mainly in the 200–250mm range. There is also a single jar rim diameter of 160mm (in finer fabric) and two vessels of *c.*320–340mm diameter, although these may be bowls. There is also a single fairly definite bowl rim with a diameter of 340mm. Vessels appear to be handmade but the rims of some were possibly finished on a turntable. At least three jars have traces of applied thumbed strips; in one case this occurs as a broad horizontal strip on the shoulder of the vessel. The only vessel with thumbed decoration on the rim appears to be the bowl (context 341). This is of straight-sided form with a squared down-turned rim and traces of broad thumbing along the edge of the lip. Many vessels show evidence of external sooting from use as cooking vessels. One wide diameter jar or bowl with a markedly squared-off rim has a small post-firing perforation bored through the neck, possibly for suspension (context 114).

The only other medieval pottery type present is represented by sherds from three vessels in early medieval sandy ware (Fabric 13), including a jar/cooking-pot rim which occurs in the same context as shelly ware vessels (context 114). This has a squared medieval-type rim of more developed appearance than the shelly ware rims, but with a similar pale orange-brown colour and a similar smooth matrix. The fabric has a coarse sandy texture with some angular flint and rare rounded quartzite inclusions, all probably of glacial origin. In appearance and typology it is somewhat transitional between a developed (late) Fabric 13 and an early variant of medieval Essex coarse grey wares (Fabric 20) suggesting a date of *c.*1175–1225. The shelly ware vessels are more difficult to date closely, but the squared rims on some suggest a date in the mid- or later-12th century. In combination with the few Fabric 13 sandy ware vessels a date of *c.*1150–1200/25 may be suggested for the activity at Codham Hall Bund. The tiny scrap of unglazed post-medieval red earthenware (Fabric 40) probably represents casual loss on the site at a much later date.

Pond 1683

The site produced a single body sherd (10g) in medieval sandy orange ware (Fabric 21) dating to *c.*1250–1500 (context 1000).

Passingford Bridge Flood Alleviation Area

The site produced three small sherds of 'modern' pottery (total 15g) from the same context (3132). These comprise a sherd of Staffordshire-type whiteware with blue transfer-printed decoration (Fabric 48D), which dates to *c.*1825–1900. There was also a sherd of Pearlware (Fabric 48P) dating to *c.*1780–1840 and a worn sherd of post-medieval red earthenware (Fabric 40), probably dating to the 18th or 19th century.

Catalogue of illustrated pottery (Fig. 23)

1. Hobbs Hole (M25001.09). Context 6060. Fabric 3, Anglo-Saxon sand-tempered brickearth. Small jar/bowl of loosely hemispherical form with slight shoulder and plain upright rim with flat top (diam. *c.*160mm). Crude handmade manufacture. Reduced soft fine sandy 'brickearth' fabric with sparse organic inclusions and sparse coarse angular white flint/chert (in one case up to 4mm across). Sparse rounded quartz. Smoothed external surface, rougher internally.

2. Hobbs Hole (M25001.09). Context 1105. Fabric 3, Anglo-Saxon sand-tempered brickearth. Rim/shoulder globular jar with plain slightly everted rim and external bevel (diam. *c.*200mm). Hard quartz sand- and quartz grit-tempered fabric. Black surfaces with grey core. Medium quality horizontal burnish or smoothing all over internally and externally. Abundant clear and milky quartz up to 3mm across including worn and fresh crystals, mostly sub-angular, some rounded. Rare white feldspar or calcite. Rare calcareous-lined voids.

3. Hobbs Hole (M25001.09). Context 6064. Fabric 4, Other Anglo-Saxon brickearth fabrics. Jar. Very crudely handmade. Slightly shouldered with plain upright rounded rim (diam. *c.*130mm). Fabric similar to some prehistoric fabrics. Fine silty reduced micaceous brickearth. Moderate crushed angular white flint/chert up to 4mm across. Rarer red-brown flint. Fairly hard. Smoothed externally. Sherd very fresh.

4. Hobbs Hole (M25001.09). Context 6060. Fabric 4, Other Anglo-Saxon brickearth fabrics. Globular jar with plain upright rim and round top (diam. *c.*160mm). Slightly unusual prehistoric-looking fabric. Soft fine sandy fabric with charcoal-like texture. Grey-brown colour with lighter external surfaces although original surfaces are worn-off leaving sparse

Form	Name	Count	Weight (g)	ENV	EVE	Form
12A	Early medieval shelly ware	297	1063	34	109	Jar, bowl
13	Early medieval sandy ware	6	22	3	15	Jar
40	Post-medieval red earthenware	1	1	1		
	Totals	**304**	**1086**	**38**	**124**	

TABLE 18: Post-Roman pottery from Codham Hall Bund (M25018.10)

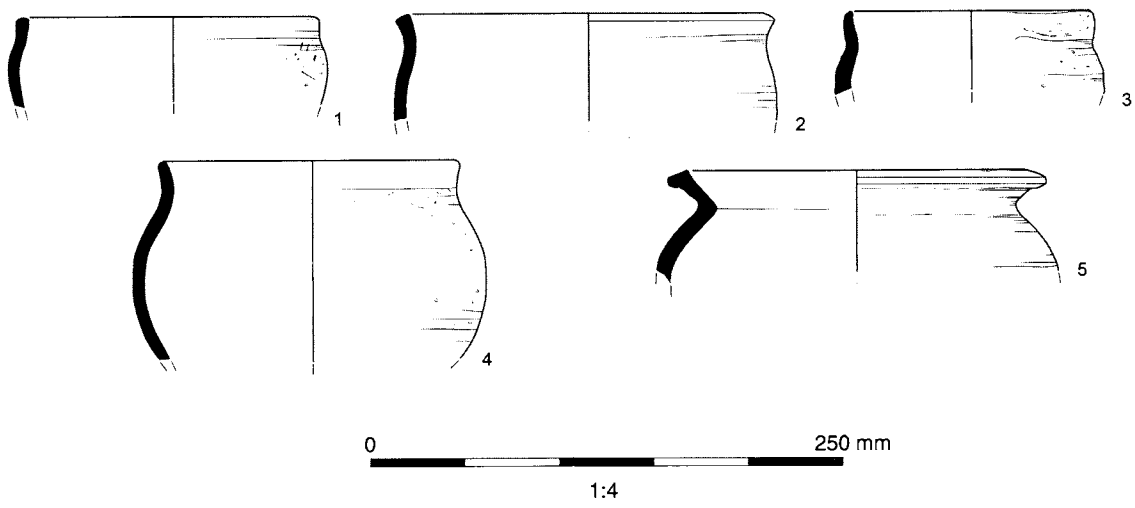

FIGURE 23: Post-Roman pottery

flint grits protruding. Fine sand probably including glauconitic sand. Moderate coarse angular (crushed?) white flint/chert grits (one grit up to 10mm across). Sparse fine organic inclusions. Fairly micaceous. Quite neatly made/regular.

5. Pond 1812 (M25024.11). Context 236. Fabric LSS, (London) Late Saxon shelly ware. Fresh joining rims and shoulder sherds from wheel-thrown jar of globular form with classic LSS jar rim, sharply angled internally, fairly straight flaring neck with thickened squared rim/lip (diam. *c.*200mm). Dark grey-brown colour externally (sooted), light brown internally. Shell inclusions mostly dissolved-out. Rare flint inclusions.

CERAMIC BUILDING MATERIAL by Cynthia Poole

Introduction

Ceramic building material (CBM) was recovered from ten sites totalling 1743 fragments (86kg), but only Hobbs Hole and Passingford Bridge Bund/Flood Alleviation Area produced substantial assemblages, both predominantly Roman in date. Insignificant quantities of medieval and post-medieval brick and tile were found on these and other sites. A few pieces of Roman tile were in prehistoric features, possibly indicative of later silting in the tops of these features. Much of the post-Roman CBM was found in unphased features, but a number of small pieces occur in features of Roman date, which must be intrusive.

All non-diagnostic pieces and poorly preserved identifiable forms were discarded during recording. While most of the assemblage was recovered by hand excavation, a quantity was found in sieved samples, almost all tiny unidentifiable scraps, which may have included fired clay. The overall assemblage has a low mean fragment weight (MFW) of 50g, though if sieved material is excluded this rises slightly to 71g. The tile is very fragmented, with no complete or near-complete items and thickness generally being the only complete dimension; height or width was estimated for a small number of tiles. Abrasion was predominately low or moderate, while a small quantity of more highly abraded fragments was largely confined to Passingford Bridge.

Roman tile fabrics

Fabrics were characterised on macroscopic features and with the use of a binocular microscope or a ×20 hand lens. The range of Roman tile fabrics was limited with three closely related types identified.

Fabric D was most common, forming 78% of the assemblage by weight. It was generally orange in colour, sometimes red, occasionally with a grey core, and consisted of a very fine sandy/silty clay with sand grains, quartz, mica and a dark coloured mineral. It could be hard fired, but some was softer and powdery.

Fabric B accounting for 5% of the tile was a variant of D, only differentiated by the presence of small dark maroon-red ferruginous grits less than 2mm size and red streaks.

Fabric C accounting for 16% of the assemblage was made in the same fine sandy clay as D, but was differentiated by the presence of medium-coarse quartz sand in varying quantity. Where this coarser element was quite sparse it may have resulted from contamination by the moulding sand. Where high densities occurred the sand was likely to be a deliberate addition to the clay matrix. A small number of fragments contained a very high density of coarser sand, but otherwise there was no reason to differentiate them from pieces with more moderate densities.

Junction 29, Hobbs Hole

This site produced 907 fragments (27681g) of CBM, summarised in Table 19 by form and fabric. Nearly 99% by weight (57% by count) was Roman, the remainder being post-medieval or undated. The major types of tegula, imbrex and brick occurred in roughly equal proportions, while flue tile formed only a small part of the assemblage. Flat tile, which is likely to derive from all forms present, formed a third of the assemblage. Fabric D formed two thirds of the assemblage, Fabric C just under a quarter, and the remaining 12% was made in Fabric B. A little less than half the assemblage had evidence of burning or reheating from re-use in ovens or hearths.

Brick

All the pieces identified as brick were characterised on general finish of edges and thickness as no corner fragments were present. Two measuring 52mm and 60mm thick are certainly brick, but the remainder which measure from 29–37mm thick are below the thickness of 40mm, generally accepted as the

Class	Nos/Wt (g)	Fabric								Total
		B	C	C/D	D	F	Mod	MoL: 2271	U	
Brick	Nos	5	7		15					27
	Wt	616	2319		2805					5940
Flat	Nos	13	43		74					130
	Wt	905	1725		5747					8377
Flue	Nos	5	2		9					16
	Wt	279	143		1418					1840
Imbrex	Nos	7	7		37					51
	Wt	312	878		3277					4467
Tegula	Nos	21	22		35					78
	Wt	769	1083		3939					5791
Tessera	Nos		2		2					4
	Wt		33		14					47
Indeterminate	Nos	11	1	151	425				2	590
	Wt	59	2	386	520				13	980
Brick	Nos	1				4	1			6
(PM)	Wt	12				31	26			69
Roof: ridge	Nos		1							1
(PM)	Wt		36							36
Roof: flat/peg	Nos				2			1		3
(PM)	Wt				74			19		93
Field drain	Nos						1			1
(PM)	Wt						41			41
Total Nos		**63**	**85**	**151**	**599**	**4**	**2**	**1**	**2**	**907**
Total Wt (g)		**3015**	**6219**	**386**	**17794**	**31**	**67**	**19**	**13**	**27544**

TABLE 19: Quantities of ceramic building material by form and fabric from Hobbs Hole (M25001.08/09). All tile is Roman except categories indicated as post-medieval (PM)

figure separating brick from other tile types. However, no other identifiable forms exceed 30mm on this site, suggesting the identifications of these as brick is sound on this occasion. The thickness suggests most of the tile represented on site was of the smaller varieties of bessalis and pedalis, while the two thicker pieces may indicate the presence of a lydion, sesquipedalis or bipedalis. A higher proportion of brick was made in Fabric C compared with other tile forms.

Roofing tile: tegula and imbrex

Tegulae were characterised by the presence of a flange at the sides and cutaways at the corners, designed to allow the tiles to interlock and overlap to provide a watertight seal. The tiles measured 15–30mm thick, but no other complete dimensions survived. Most were finished with a smooth upper surface, sometimes with fine striations visible, and the bases were generally rough and irregular with the impression of the ground or work surface. End and side edges had a rough sanded finish often with evidence of knife-trimming alongside the upper and lower angles; only rarely was the angle itself cut to a bevel.

Tegulae flanges were predominantly of Type A and B (Fig. 24.1–2), though small numbers of other common forms were present. Quantities and sizes are summarised in Table 20. Upper and lower cutaways were preserved, but most of the lower cutaways were incomplete. Nine upper cutaways were all of standard type, where a rectangular section of flange was removed to the main surface of the tile. They measure 58–85mm long, 18–22mm deep and 17–20mm wide. Lower cutaways are of two types. The most common type, with three examples, is Type C5 as classified by Warry (2006), where a rectangular recess is formed by the tile mould in the outer edge of the flange and a further wedge is cut from the lower angle. Two additional incomplete corners only has evidence of the lower cut wedge and could therefore fall either into Warry's class B or C. One example of Type D1 was identified. Warry has suggested dates of AD 160–260 for the class C cutaways and AD 240–380 for the class D cutaways.

Imbrices, which capped the gap between tegula flanges, were mostly of the type with a more angular profile. They were generally well finished with smooth surfaces and rough sanded bases. Edges were commonly concave especially ends, whilst side edges included additionally more flattened and angled forms. Tiles frequently thickened to the edges and corners, with the apex the thinnest part of the tile. Imbrices range from 12–26mm thick and where the tile survived to the apex, heights are estimated from 75–90mm and in two cases possess widths of *c.*160–180mm.

Flue tile: tubulus

The flue tile all appeared to be of tubulus or box flue-type identified by keying on the outer surface in most examples. In only one case did two adjacent surfaces survive, one vented and one with keying. The tiles measure 17–23mm thick and on the more complete example it is possible to estimate other dimensions with the width as 180mm, height *c.*180–190mm and depth of 140–150mm. The thinnest piece has a single diagonal line probably indicating scored keying, though

Flange Type	Nos	Width	Height	Comments
A	10	17–30mm	37–59mm	Includes tapered flanges; internal base angle both curved and angular; finger grooves rare.
B	9	12–26mm(top), 15–31mm (base)	30–45mm	Includes tapered flanges; internal base angle rounded and/or with finger groove; rarely angular
C	1	22mm	>40mm	Incomplete: type uncertain. Rounded base angle.
D	3	18–25mm	>42 – >47mm	All incomplete. Rounded base or finger groove along base angle.
E	1	29mm	45mm	Rectangular internal base angle
F	1	25mm	46mm	Rectangular internal base angle

TABLE 20: Tegulae flange types, sizes and characteristics, Hobbs Hole (M25001.08/09)

probably made with a pointed tool other than a blade. Scored keying was prevalent during the 1st century, but was replaced by combed keying, which was the norm from the 2nd century onwards (Black 1996). On the best preserved pieces, both have the same pattern of diagonal bands of coarse combing forming an X enclosed by a frame of bands running along all four edges (Fig. 24.5). The combs used had five and six teeth and measured 25mm and 31mm wide respectively. Only one tile produced evidence of a circular vent 50mm diameter cut in the plain face and with ridges of surplus clay encircling it.

Tessera

Four tesserae were the only evidence for flooring material. They are all orange or orange-brown in colour and included rectangular, triangular and pentagonal examples and were of medium-large size measuring from 15mm × 25mm to 28mm × 32mm. Only one has mortar surviving around the edges.

Flat tile

The plain flat tile measured between 12mm and 28mm thick and is likely to derive predominantly from imbrex and tegula, though could include flue tile. All the plain tile over 30mm thick has been classified as brick. A few pieces have knife-trimmed edges similar in finish to tegulae.

Markings

An imbrex and flat tile has imprints of finger tips from handling. A tegula has two possible rain drop impressions. A flat tile has the impression of a small paw print 30mm wide without claw marks that may be identified as cat.

Signature marks relate to the production process, being made by the tiler while the clay was soft. Their function is uncertain and open to discussion. Evidence of eleven possible signature marks was identified. Most occur on plain flat fragments (likely to be tegulae) and two on bricks. Most are only short lengths of one, or rarely two, curving or straight finger grooves, not identifiable to a recognisable pattern. One example forms a very tightly curved loop possibly OA type 5 though part of a third groove suggests it might form a zigzag (OA type 8) (Fig. 24.4). Another with two curving finger grooves probably forms a circle with crossing ends (OA type 4) (Fig. 24.18).

Discussion

The majority of the tile was found discarded in ditch and pit fills, with small quantities in other miscellaneous features. None was found in a situation indicative of its use. The tile occurred throughout all phases of the Roman period, but the majority was found in late Roman deposits. There is no significant difference between the proportions of tile forms in relation to phase.

There is no evidence of masonry structures on the site and the character of the site does not suggest that any were present in the immediate vicinity. Though the ceramic building material is clearly indicative of a building or buildings, tiled roofs, and at least one heated room, these are unlikely to be directly related to the site and the buildings could have been some distance away. It is likely that the tile has been brought in from one or more sites for re-use, probably in domestic ovens, hearths or corn-driers, judging from the evidence of burning and reheating on the tile. The fragmented character of the assemblage suggests that material obtained for re-use was already broken, perhaps being obtained during the demolition or refurbishment of buildings, possibly a local villa or urban settlement.

Passingford Bridge Bund/Passingford Bridge Flood Alleviation Area

This site produced 795 fragments (57220g) of CBM, summarised in Table 21 by form and fabric. Nearly 98% by weight (72% by count) was Roman, the remainder being post-medieval or undated. The assemblage was dominated by tegula, followed by imbrex and brick, while flue tile formed only a tiny part of the assemblage. Flat tile, which is likely to derive from all recognised forms on the site, formed a fifth of the assemblage. Fabric D formed 85% of the assemblage with Fabrics C and B forming a relatively small proportion. A little under a third of the assemblage had evidence of burning or reheating from re-use in ovens or hearths.

Brick

Only three fragments of brick had surviving corners to verify their identification, otherwise all the pieces identified were characterised on general finish of surfaces or edges. Neither could thickness be used as a diagnostic character as none measures over 40mm, the size generally accepted as the upper limit for other Roman tile forms. All fragments identified as brick measure between 30 and 40mm thick and the maximum surviving width/length was 155mm. However, no other identifiable forms exceeds 30mm on this site, suggesting the identifications of these as brick is sound in relation to this site. The thickness suggests most of the tile was of the smaller varieties of bessalis and pedalis.

Class	Nos/Wt (g)	Fabric				Total
		B	C	D	Mod	
Brick	Nos		3	34		37
	Wt		1477	4605		6082
Flat	Nos	7	24	152		183
	Wt	795	1654	7900		10349
Flue	Nos		2	6		8
	Wt		100	520		620
Curved	Nos			1		1
	Wt			574		574
Imbrex	Nos	1		130		131
	Wt	126		10561		10687
Tegula	Nos		63	151		214
	Wt		4434	23114		27548
Tessera	Nos			1		1
	Wt			13		13
Indeterminate	Nos		12	196		208
	Wt		26	438		464
Brick	Nos			1	1	2
(PM)	Wt			387	210	597
Indeterminate	Nos			2		2
(PM)	Wt			103		103
Roof: flat	Nos			6		6
(PM)	Wt			175		175
Water pipe	Nos				2	2
(PM)	Wt				8	8
Total Nos		**8**	**104**	**680**	**3**	**795**
Total Wt (g)		**921**	**7691**	**48390**	**218**	**57220**

TABLE 21: Quantities of ceramic building material by form and fabric from Passingford Bridge Bund/Passingford Flood Alleviation Area (M25002.09). All tile is Roman except categories indicated as post-medieval (PM)

Roofing tile: tegula and imbrex

Tegulae were characterised by the presence of a flange at the sides and cutaways at the corners, designed to allow the tiles to interlock and overlap to provide a water-tight seal. The tiles measure from 15–29mm thick, but no other complete dimensions survived, the maximum surviving length or width being 200mm. The majority were finished with a smooth upper surface, and the bases were generally rough and irregular with the impression of the ground or work surface. Several were noted as being very even in spite of the rough impression. A small number possibly had turf impressions on the base. The numbers with a knife-trimmed base were remarkably sparse. End and side edges had a rough sanded finish often with evidence of knife-trimming alongside the upper and lower angles; only rarely was the angle itself cut to a bevel.

Tegulae flanges (Fig. 24.6–14) are predominantly of rectangular Types A and B, and include several very narrow examples of type A3. Thin flanges are generally regarded as being of late Roman date in Essex (Drury 1978, 112). A small number of other common rounded flange forms (D, E and F) were also present. Quantities and sizes are summarised in Table 22. Both upper and lower cutaways were preserved and details of type and size are summarised in Table 23. Upper cutaways are all of standard type (Fig. 24.7), where a rectangular section of flange was removed to the main surface of the tile. In most cases this was done by an inset in the tile mould with subsequent knife-trimming to present a neat finish. Lower cutaways (Fig. 24.9–12, 20–21) fall into the three later classes B, C and D as classified by Warry (2006). Three incomplete corners could belong to either Warry's class B or C. The majority of cutaways are assigned to class C, which Warry (2006) dated to AD160–260 with a smaller number of class D dated to AD240–380. One tile has a large conical nail hole *c.*36mm diameter centred 52mm from the top edge. If the hole was placed symmetrically it would suggest total tile breadth of *c.*310–320mm.

Imbrices were generally well finished with smooth surfaces and rough sanded base. Edges were commonly concave especially ends, while side edges included additionally more flattened and angled forms. Most tended to have an angular cross-section, while a smaller number had rounded profiles. Tiles frequently thickened to the edges and corners, with the apex forming the thinnest part of the tile. Imbrices range from 11mm–25mm thick, and where the tile survives to the apex height, range from 65 to 95mm. One tile survived with a complete breadth of 160mm and for two others it was estimated to be 180 and 200mm. No complete lengths survived the maximum remaining being 220mm.

Flue tile: tubulus

The majority of the flue tile was of tubulus or box flue type identified by corners or vents. No keying survived on any of these. One small fragment with two cut edges probably formed part of a butterfly vent cut into the plain face and another had part of rectangular vent. The tiles measure 16mm–26mm, but no other dimensions survive. One piece, 28mm thick, has four

Flange type	Nos	Width	Height	Comments
A	20	13–30mm	39–53mm	Includes tapered flanges; internal base angle both curved and angular with finger groove.
A3	7	15–23mm	43–50mm	Finger groove along base angle or curved base angle.
A4	1	25mm	51mm	Finger groove along base angle
B	10	12–25mm (top), 24–34mm (base)	35–49mm	Includes tapered flanges; internal base angle rounded and angular, some with finger groove.
D	5	25–32mm	38–45mm	Sharp base angle and one rounded with finger groove along base angle.
E	2	25–29mm	46–50mm	Rectangular internal base angle on one. One with finger groove along base of flange.
F	4	15–35mm	37–48mm	Includes a tapered flange. Rectangular internal base angle; one curved angle
F2	1	25mm	47mm	Rectangular internal base angle

TABLE 22: Tegulae flange types, sizes and characteristics, Passingford Bridge Bund/Passingford Flood Alleviation Area (M25002.09)

Cutaway type (OA)	Warry class	Date (Warry)	Nos	Length	Width	Height
Upper: A2	~	~	11	28 – >55mm	15–25mm	16–30mm
C1	B6	AD100–180	1	47mm	14mm	22mm
A3	C4	AD160–260	4	50–60mm	12mm	
A3/C1	C5	AD160–260	7	42–55mm	3–12mm/15–27mm	20–37mm
A3b	D16	AD240–380	4	48–60mm	3–11mm /17–20mm	25–39mm
C1 or A3/C1	B or C	AD100–260	3			

TABLE 23: Tegulae cutaway types, sizes and dates according to Warry (2006)

incised lines seemingly forming a zigzag pattern (Fig. 24.22b), but probably formed part of a diamond pattern of scored keying on a wall tile or parietalis. Another fragment from the same context has two thin scored lines crossing (Fig. 24.22a). Scored keying and wall tiles were used for cavity walling in heated rooms during the 1st century AD, but went out of use and were replaced by more common combed box tile during the early 2nd century.

Tessera

Only a single tessera was identified: it is medium-sized measuring 23mm × 24mm × 25mm with a pyramidal form and orange in colour.

Plain tile

The plain flat tile measured between 11mm and 35mm thick and is likely to derive predominantly from imbrex and tegula, though could include flue tile. The few pieces of plain tile over 30mm thick are likely to be brick. Few pieces had edges surviving, but some of these were knife-trimmed similar in finish to tegulae. One piece 20mm thick appeared to have been deliberately shaped to form a circular disc 104mm in diameter.

There is also a single slightly curved plain fragment with a flat straight edge, measuring 30mm thick and over 150mm in breadth. The outer surface is smooth and the inner surface knife- or wire-trimmed. It could be part of a very thick box flue, which sometimes has a slightly curved exterior surface, though in this case the inner surface is also curved. Alternatively it could part of a large U-shape ridge tile.

Markings (Fig. 24.8, 12, 14–21)

Eleven tiles have some sort of accidental imprint. Seven are finger or thumb prints from handling the tile, one with sandy prints. Two tiles have paw prints, one with three separate imprints has evidence of claws indicating that they were made by a dog, and the other had a partial paw print probably of cat. One tegula had a large rounded hollow pressed into the outside of the flange that might have resulted from a heel pressing into the clay (Fig. 24.14).

Evidence of 16 signature marks was identified on tegula, flat tile and one brick. Six are of type 1, a semi-circular hoop, with one, two or three finger grooves (Fig. 24.8, 12, 15–16). One, incomplete, is a variant of this type with four finger marks of which two are crossing (Fig. 24.21); it is probable that it was made with two sets of double marks, the second set crossing the first. There is one example of a horseshoe-shaped signature (OA type 2) with two finger grooves (Fig. 24.17). One example forms a very tightly curved loop (OA type 5) or part of a zigzag (OA type 8) (Fig. 24.18–19) and is similar to the example from Hobbs Hole. Four others form a circle (OA type 4), most with a single finger groove, but one has three grooves though only one appears to form a complete circle (Fig. 24.20). A similar example of signature mark was found at Stanford Wharf (Shaffrey 2012, fig 9.1).

A tegula has a diagonal line on the end edge suggestive of a tally mark, but this may be a fold or crease in the clay fabric, not a genuine tally mark, which are most commonly associated with military production.

Discussion

During the early and middle Roman phases the tile was discarded almost exclusively in ditch and pit fills. It is only in the late Roman period that tile was found in a wider range of features, including quarry hollow fills, post-holes, working hollows and gullies. However, almost a third of the entire assemblage was found in the fill of the late Roman hollow-way 1126. This could indicate a deliberate use of tile as metalling in the track, except that the tile exhibits no greater wear than the rest of the assemblage, and the mean fragment weight (114g) is similar to that found in pits (MFW 104g), quarries (MFW 94g), water-holes (MFW 144g) and post-holes (MFW 122g). It is possible that when the track went out of use the hollow became a dumping ground for discarded refuse. By comparison tile in ditches and gullies had a much smaller MFW (44g), which may indicate that tile in this feature type did not result from deliberate disposal, but other processes, possibly related to agricultural activity and manuring.

The tile was found in features of all phases of the Roman period and there are no changes between tile forms or their proportions in relation to phase. The majority was found in late Roman deposits. Although most of the tile cannot be dated more precisely than Roman, a late phase is consistent with those pieces of tegulae and flue tile that indicate dates of mid-2nd century onwards. In addition the absence of early forms, such as tegula mammata, scored flue tiles and tegulae hammatae, suggests little tile was reaching the site during the 1st and early 2nd century. The increase in tile density mirrors the greater range of feature type in which tile was found and suggests a greater density of occupation in the vicinity and greater variety of activity in the late Roman phase.

There is no evidence of masonry structures on the site and the character of the site and the tile assemblage does not suggest any were present in the immediate vicinity. Though the ceramic building material is clearly indicative of a building or buildings with a tiled roof and at least one heated room, these are unlikely to have formed part of the Passingford Bridge site. It is likely that the tile has been brought in from one or more sites for re-use probably in domestic ovens, hearths or corn driers from the evidence of burning and reheating on the tile. The fragmented character of the assemblage suggests material obtained for re-use was already broken, perhaps being obtained during the demolition or refurbishment of buildings possibly a local villa or urban settlement.

Overview of the Roman ceramic building material

The assemblages from the two sites of Hobbs Hole and Passingford Bridge are very similar in character, suggesting that the tile on both sites derived from the same production areas. Tile fabrics from Essex are generally sandy to varying degrees, with little else to differentiate them. The tile from Rivenhall Villa, which is described as a hard orange to red slightly sandy fabric (Rodwell 1993) and from Chelmsford (Wickenden and Drury 1988) (hard red and variably sandy) are no doubt comparable to Fabrics C and D. Medium and coarser sandy fabrics, some with ferruginous inclusions, comparable to Fabric B were found on sites on the A120 excavations between Stansted and Braintree (Seager-Smith 2007). Fine sandy micaceous clay fabrics as well as coarser sandy fabrics similar to Fabrics D and C were identified at Stanford Wharf (Shaffrey 2012) in south Essex. The limited number of fabrics may indicate that similar clay sources were available over a wide area of the region. However, the differences in proportions of fabrics at Passingford Bridge and Hobbs Hole may indicate variations in proximity to production areas with differing clay sources. Other features which occur within the assemblages, such as the more rectangular flanges of types A and B of tegulae, the absence of knife- or wire-trimming on tile bases, and the frequency of fairly thin brick, may define typical characteristics of tile workshops in this region.

The character of the assemblages suggesting that the tile is of mid- to late-Roman date is consistent with the associated stratigraphic phasing. Both sites produced tegulae with cutaways and flanges dating from the mid-2nd century onwards, and the thick-walled combed flue tile is similarly late. This is supported by the near-absence of early forms such as tegula mammata, half box flue and scored or roller stamped flue tile, which were generally in use during the 1st and early 2nd century (Black 1996).

At both sites it is unlikely that the tile represents the presence of tiled and heated buildings on the immediate settlement, but was probably obtained from a higher status site such as a villa within the locality or a nearby town with masonry buildings. The tile could have been obtained for re-use during renovation, rebuilding or demolition of masonry buildings. However, the absence of mortar and low wear may imply that the tile was obtained during construction as a result of breakage, or defective or surplus material. Although the primary function of the tile was for roofing and structures for heated rooms, by the time it reached the sites at Hobbs Hole and Passingford Bridge it was probably destined for use in minor domestic and agricultural structures, such as oven, hearths and corn-driers. Although only between a third and a half of the assemblages exhibit evidence of burning or reheating, any tile built into the core of a corn-drier or wall of an oven and not directly exposed to heat, would not necessarily show any visible signs of reheating.

Post-medieval ceramic building material

The assemblages from Hobbs Hole and Passingford Bridge are very small and similar in character, comprising roof tile, brick and drain pipe. The flat roof tile measures 11mm–14mm thick and includes pieces with circular peg holes, of which one is 17mm in diameter. Hobbs Hole also produced a piece of curved ridge tile with two nail holes and part of an illegible makers stamp, indicating a date of later 19th century. Brick is represented by small broken fragments in sandy fabrics, with only one complete thickness of 64mm, and is likely to be of 18th–19th-century date except for two of 20th century date, one probably a Fletton brick and one a perforated air brick. A single example of 20th century field drain tile was found at Hobbs Hole and from Passingford Bridge an example of water pipe. The post-medieval material is all likely to derive from agricultural activities, such as field drainage, manuring and general farm maintenance.

Minor site assemblages

Pond 1683

Three fragments (252g) of medieval roof tile, made in Fabric D, were recovered from context 1000. They measure 13–15mm

thick and one is pierced by a circular peg hole 11mm in diameter.

Upminster Bund
A few tiny indeterminate ceramic crumbs (2g) were recovered from a sieved sample from context 1064.

Tank 1706 and Strip Widening
Three small fragments (52g) of medieval or post-medieval roof tile were recovered from three contexts (7, 9, 13). They were made in Fabrics C and D and measure 13mm and 16mm thick. One is pierced by a circular peg hole 20mm in diameter.

Tank 1714 and Strip Widening
A small group comprising nine fragments (230g) of ceramic building material were recovered from five contexts (107, 115, 121, 131, 132). The majority comprise flat roof tile of medieval date made in fabrics B, C and D. They measure 13–15mm thick and one of 10mm is probably post-medieval. Two have peg holes: one a tapered diamond shape was possibly made with a nail and the other is circular. One tile has an indented border. A small fragment of post-medieval brick was made in MoL fabric 3030 or 3032.

Codham Hall Bund
Five fragments (55g) of ceramic building material include small pieces of post-medieval brick from contexts 160 and 225, made in Museum of London fabric 3042 or similar. A piece of flat tile in Fabric C from context 246 may be Roman.

Pond 1776
Six indeterminate scraps (15g) made in Fabric D were recovered from context 1012.

Pond 1812 and Strip Widening
Four fragments (27g) of ceramic building material were recovered from four contexts (222, 225, 242 and 249). Most pieces were indeterminate scraps in Fabrics B and D. The only identifiable piece is brick in London stock fabric (MoL3034).

Pond 1824 and Strip Widening
Two fragments (107g) of flat tile, made in Fabric D, were recovered from contexts 101 and 108. Both are probably Roman, though one could be medieval roof tile.

Catalogue of illustrated ceramic building material (Fig. 24)

Hobbs Hole

1. Tegula flange type A and cutaway type A3/C1 (Warry class C5). Fabric D, Phase 6, pit 6078 (6080).
2. Tegula flange type B and cutaway type A3a (Warry class D). Fabric D, Phase 6, pit 7043 (7040).
3. Signature mark type 5 or type 8. Flat tile, probably tegula. Fabric D, Phase 7, pit 7012 (7019).
4. Signature mark type 4.2 Flat tile, probably tegula. Fabric D, Phase 7, pit 7103 (7104).
5. Box Flue: a) plain face with circular vent; b: two faces one with combed keying (pattern type 14) and plain face with part of circular vent. The two pieces are probably from the same tile but do not join. Fabric D, Phase 6, pit 7043 (7040).

Passingford Bridge Bund/Passingford Bridge Flood Alleviation Area

6. Tegula flange type A. Fabric D, Phase 7, ditch 4544 (4460).
7. Tegula flange type A3 and upper cutaway. Fabric D, Phase 6, ditch 2460 (2455).
8. Tegula flange type A4 with signature mark type 1.1: single narrow finger groove forming semi-circle 70mm high. Fabric D, unphased, post-hole 1096 (1089).
9. Tegula flange type B and cutaway type A3/C1 (Warry class C). Fabric D, Phase 7, ditch 1125 (1081).
10. Tegula flange type B and cutaway type A3b (Warry class D). Fabric D, Phase 7, ditch 4544 (4528).
11. Tegula flange type D with cutaway type A3/C1 (Warry class C). The tile surface also has a short arc of finger groove forming part of a signature mark of uncertain type (not illustrated). Fabric C, Phase 7, ditch 1123 (1033).
12. Tegula flange type E and cutaway type A3b (Warry class D) with part of signature mark type 1.2. Fabric D, Phase 7, quarry pit 4472 (4475).
13. Tegula flange type F Fabric D, Phase 7, quarry pit 4482 (4483).
14. Tegula flange type F2 with cutaway type A3/C1 (Warry class C). An impression in the outer edge of the flange is possibly from a heel. Fabric D, Phase 7, water-hole 2714 (2715).
15. Signature mark type 1.3: semi-circular hoop of three finger marks 65mm high from tile edge. Brick. Th: 35mm. Fabric D, Phase 3 or 5–7, pit 1020 (1021).
16. Flat tile chipped probably from a tegula to form a trapezoidal plaque and burnt grey during use as oven furniture with part of signature mark probably of type 1.2. L: 82mm; Br: 65–85mm; Th: 19mm. Fabric D, Phase 6, ditch 2460 (2457).
17. Signature mark type 2.2, half of a horseshoe shaped mark 104mm high from tile edge; flat tile probably tegula. Fabric D, Phase 7, quarry pit 4414 (4415).
18. Signature mark type 5.2 flat tile probably tegula. Fabric B, Phase 7, ditch 1125 (1081).
19. Signature mark type 5.1 or type 8: part of tightly curved inverted loop (type 5) or more likely zigzag pattern (type 8); flat tile, probably tegula. Fabric D, Phase 7, quarry pit 4414 (4415).
20. Signature mark type 4.2 very faintly inscribed; only one very narrow shallow mark appears to form a complete circle. It was possibly made as a 2 finger semi-circle enclosed by an outer circle, so a variant on type 4. Tegula with part of A3a/b cutaway (Warry class D). Fabric D, Phase 7, quarry pit 4482 (4483).
21. Signature mark type 1 variant formed by two double arcs overlapping; tegula with part of type A3a/b cutaway (Warry class D). Fabric D, Phase 7, water-hole 3652 (3653).
22. Wall tiles (parietalis) with scored keying: a) burnt tile with two thin lines crossing; b) four wider lines probably forming diamond pattern. Fabric D, Phase 7, quarry pit 4472 (4475).
23. Box flue: plain face with cut edge of rectangular vent. Fabric D, Phase 7, quarry pit 4414 (4415).

FIRED CLAY by Cynthia Poole

Introduction

Fired clay amounted to 2840 fragments (18912g). The larger assemblages were found at Hobbs Hole and Passingford Bridge Bund/Flood Alleviation Area, together with a small assemblage from Codham Hall Bund. Clay was used as a structural material throughout the prehistoric period and into the medieval. Most fired clay found is fired deliberately or incidentally during use in the case of hearths, ovens or kilns, or accidentally in the case of building structures. Some objects may be pre-fired. The character of most fired clay suggests that it derives from oven and hearth type structures rather than buildings. Much fired clay is inherently undatable and is reliant on associated dated artefacts for phasing, though a small number of diagnostic types, mostly pedestals, can be assigned to broad periods.

None of the fired clay was found in primary situations such as ovens or hearths, but dumped in secondary features or layers. The overall very low mean fragment weight of 7g

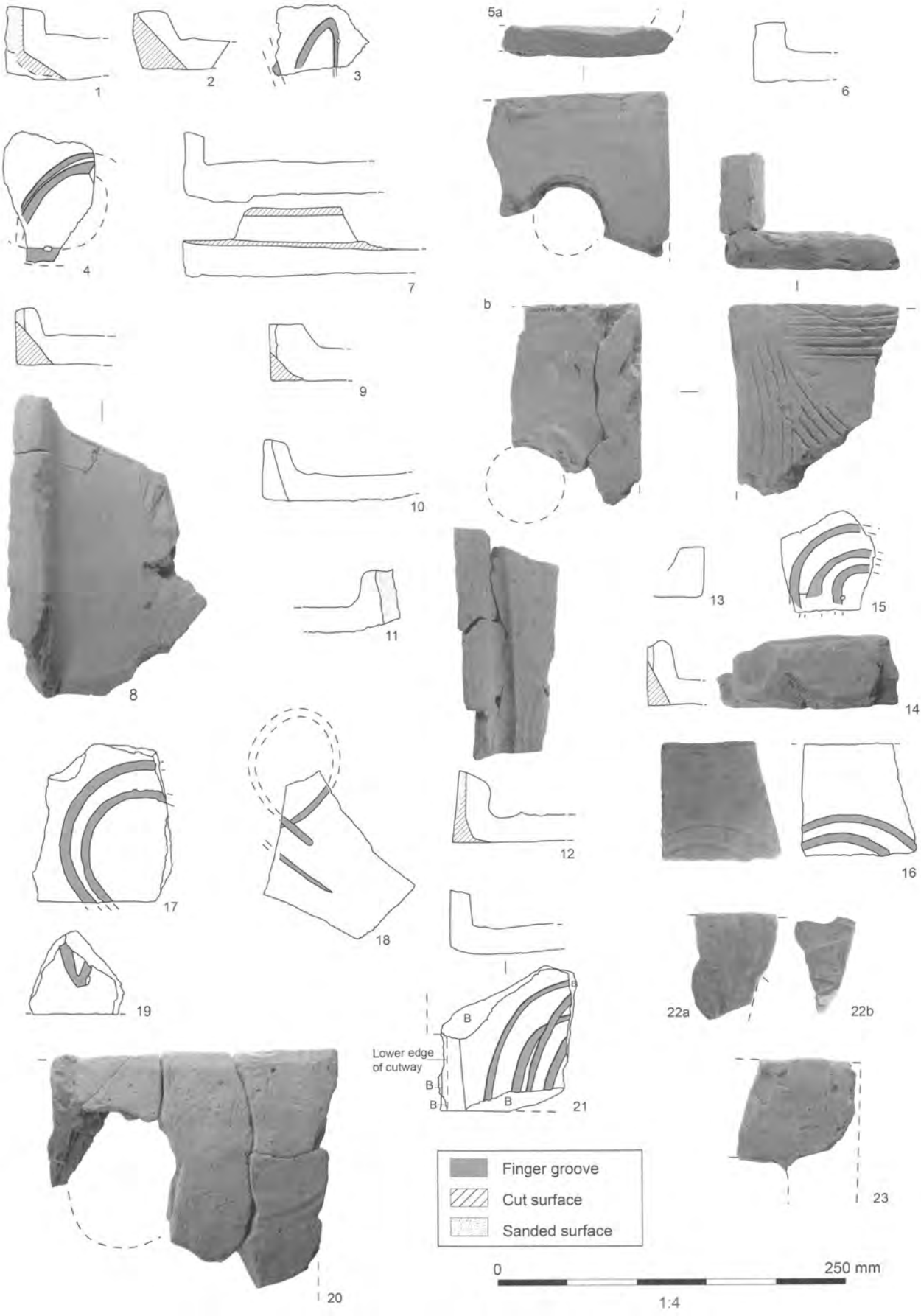

FIGURE 24: Ceramic building material, Nos 1–4

increases slightly to 12g if sieved material is excluded, but this is still fairly low, and less than this indicates little in the way of recognisable diagnostic material is likely to be present. No complete portable objects were found and all structural material occurred as small fragments. Much of the material could only be assigned to broad groupings such as oven structure or furniture and even many of the better preserved pieces could not be assigned with certainty to a single diagnostic form.

The majority of the fired clay is from late Iron Age and Roman phases, though a moderate quantity of Iron Age material was found at Passingford Bridge and a very small quantity may be of late Bronze Age or early Iron Age date. The small quantity of material in post-Roman contexts appears to be largely residual apart from a small group in Anglo-Saxon contexts from Hobbs Hole.

Fabrics

Although several fabrics were identified they divided broadly into two main groups of fine silty clay and sandy fabrics:

Silty group

Fabric A: reddish brown; yellowish/orange brown; dark grey-black core; fine smooth silty clay, sometimes with very fine sand

Fabric AV: reddish brown; dark grey-black core; fine smooth silty clay with organic temper visible as fine voids and chaff impressions up to 17mm long.

Fabric B: red/yellow/orange/brown/grey range; fine sandy silty clay with red ferruginous grits 1–2mm

Fabric F: brown; fine sandy clay; coarse flint grit, angular, 0.5–15mm

Sandy Group

Fabric Q: red/yellow/orange/brown/grey range; reddish/pinkish/orange/yellowish brown or red; grey core fine sandy silty micaceous clay mixed with medium-coarse quartz. When Fabric Q additionally contains flint grit it has been designated QF and if red ferruginous grits are present QB. Fabrics Q sometimes contained organic inclusions visible as fine voids and chaff impressions less than 5mm long within the clay. This was designated QV.

Fabric E: brown, black; sandy clay with coarse quartz sand and shell grit to 4mm. Only one fragment was found with shell inclusions and it may be Fabric Q with shell incidentally incorporated or be a genuinely different fabric.

The fired clay is likely to have utilised local clay sources. The source of the fine sandy–silty group is probably local brickearth, while the sandy group may have utilised boulder clay.

Junction 29, Hobbs Hole

A modest assemblage of fired clay amounting to 1296 fragments (8631g), which includes 790 fragments weighing 473g from sieved samples, consisting of oven or hearth structure and furniture was recovered from a range of features, though predominantly pits and ditches dating to the late Iron Age–Roman phases with the largest quantity from late Roman contexts. Quantities of forms and fabrics are summarised in Tables 24 and 25. The silty fabric group A dominates the assemblage with a significant quantity of organic tempered pieces. Preservation is poor to average with a mean fragment weight of 15g (excluding sieved material) and moderate abrasion. There are no complete objects, though portable items account for most of the largest surviving pieces over 100g in size, while most structural material is considerably smaller.

Phase 2–3: Bronze Age–Iron Age

A small quantity of 27 fragments (351g) was found in contexts phased from late Bronze Age to later Iron Age. Amorphous indeterminate fragments, a few heavily burnt, accounted for over half of these. A pit (5140) produced a piece from the side of a rounded cylindrical object (Fig. 25.2) made in Fabric QF that may be a pedestal of middle Bronze Age type. A fragment of flat plaque or disc 20mm thick and made in Fabric B was found in a ditch (1504) with a date of 1100–400 BC. Pieces that could be the corner of a triangular perforated brick or Belgic brick made in chaff tempered Fabric AV were found in an undated pit (1404) and could date from the middle-late Iron Age.

Phase 4–7: Late Iron Age and Roman

Pieces designated as oven or hearth structure generally have only a single moulded flat or slightly curving surface, occasionally with evidence of finger marks. On one piece is a shallow hollow, possibly the result of a pedestal pressed into the surface. Oven or hearth structure pieces range in thickness from 10mm to 40mm. Two different pieces have part of a perforation 30mm and 35mm in diameter piercing the surface, possibly a small vent in an oven wall or to provide access for the tuyère of a bellows. The opposite face is usually broken, sheared or worn, only occasionally with a stone impression indicating a stone foundation for an oven or hearth base or stone blocks built into the oven wall. Only a few pieces from the same pit fill (7016) have wattle impressions measuring 9mm and 17mm in diameter and another has narrow monocot stem impressions probably from a bundle of straw. Wattles may have been used to support parts of the oven superstructure.

A few small pieces had been heavily fired resulting in a cindered vesicular texture, which may indicate that they originated from furnaces or smithing hearths, though without extensive areas of vitrification on any fragment or other evidence of industrial activity, it is perhaps more likely they represent occasional intense heat in structures of non-industrial use.

A substantial number of burnt mudstone nodules ranging in size from *c.* 30–80mm had been collected as fired clay. These had been only lightly reddened and it is likely that they had been built into oven walls or used as kerbs around hearths.

Oven plates formed the largest category of oven furniture. They take the form of a thick flat slab with a fairly smooth or even moulded surfaces and evidence of a flat or bevelled edge. Sometimes one or both surfaces has evidence of chaff impressions, suggesting that this was used as a separator to stop the clay sticking while shaping the plate. They range in thickness from 15mm to 54mm, though it is clear in some that thickness vary, suggesting that the plates were convex on one side tapering to the edges. One example was pierced by a biconical perforation (Fig. 25.3). These were probably used as a suspended floor in an oven or over a hearth supported on pedestals.

Form	Fabric											Total
	A	AV	B	E	F	Q	QV	X1	X2	X3V	Mudstone	
Oven /H structure	65	2	3	1	6	26						103
Oven /H floor	25											25
Burnt mudstone											47	47
Furnace	2					3						5
Pedestal (MBA)						1						1
Triangular brick (IA-ERB)	19	56										75
Belgic brick (LIA-ERB)	5											5
Firebar	21											21
Oven plate perforated	8											8
Oven plate	125	14	1		19	1						160
Plaque/disc	1	1	1									3
Hand squeezed lump	4											4
Furniture Misc.	32		2									34
Indeterminate	786	2	2			1						791
Daub		4										4
Briquetage	1					1	1	1	4	1		9
Object	1											1
Total	**1095**	**79**	**9**	**1**	**25**	**33**	**1**	**1**	**4**	**1**	**47**	**1296**

TABLE 24: Quantification of fired clay from Hobbs Hole (M25001.08/09). Fragment count tabulated by form and fabric

Form	Fabric											Total
	A	AV	B	E	F	Q	QV	X1	X2	X3V	Mudstone	
Oven /H structure	471	17	70	13	84	337						992
Oven /H floor	182											182
Burnt mudstone											1993	1993
Furnace	7					9						16
Pedestal (MBA)						155						155
Triangular brick (IA-ERB)	556	272										828
Belgic brick (LIA-ERB)	245											245
Firebar	150											150
Oven plate perforated	246											246
Oven plate	1039	586	134		677	52						2488
Plaque/disc	54	87	15									156
Hand squeezed lump	16											16
Furniture Misc.	145		51									196
Indeterminate	538	12	10			4						564
Daub		90										90
Briquetage	1					1	4	18	6	18		48
Object	5											5
Total	**3655**	**1064**	**280**	**13**	**761**	**558**	**4**	**18**	**6**	**18**	**1993**	**8370**

TABLE 25: Quantification of fired clay from Hobbs Hole (M25001.08/09). Weight (g) tabulated by form and fabric

Two examples of thin plaques or discs were found. One had smooth moulded surfaces converging to a narrow rounded edge and measured 9mm thick. The other had flat surfaces and a straight edge with a rounded corner and was possibly oval or sub-rectangular in form (Fig. 25.4). These may have been used as supports or stabilisers for items used in an oven or to place items for cooking in the embers on a hearth.

Triangular perforated bricks take the form of a triangular block with rounded corners, with each pierced laterally. They are generally regarded as being of Iron Age date, though it is clear they continued to be used in the early Roman period and possibly later. All examples assigned to this category are incomplete and many are uncertain designations lacking the diagnostic perforation. No complete dimensions survived, though the general impression is that they are of average size (that is, *c.*70–80mm thick and *c.*150mm long). Only four perforations were found measuring 12mm, 14mm, 16mm and 18mm in diameter. These objects may have had a variety of functions as hearth floors, kerbs or pedestals. A number of examples were found discarded with block pedestals associated with pottery production at Dagenham (Poole 2010). Definite examples of use as pedestals or supports for briquetage evaporation vessels have been found associated with salt working on the Isle of Thanet (Poole 2015).

Miscellaneous items of oven furniture are represented by fragments with two or three adjacent flat even moulded surfaces, measuring up to 50mm thick. These could be parts of block pedestals or Belgic bricks or the edges of oven plates. None is sufficiently complete to make a certain identification. A single example with a flat square end may be part of a rectangular firebar.

A small quantity of briquetage vessel sherds was found in silty and sandy chaff tempered fabrics (X1, X2, X3). Most are thin walled measuring 5–7mm thick, but one is slightly thicker at 12mm. One has an angular tapered rim and two other joining sherds form the base of a vessel possibly with flared sides. They were found in a tree-throw (7093) of early-mid Roman date and a pit (7012) in Phase 7 (late Roman). They were probably brought in to the site incidentally on salt cakes from production sites on the south Essex coast along the Thames Estuary.

Phase 8: Saxon
A small group of fired clay was recovered from an Anglo-Saxon pit (5071). This comprises six fragments (249g) of wattle-supported structure. One piece, 60mm thick, in Fabric A has a smooth concave surface with finger depressions from shaping, and on the back two wattle impressions measuring 13mm and a third 20mm in diameter. Four pieces in Fabric AV measure 35mm thick and have a flat even moulded surface with slight concave grooves on the opposite face, which may be wattle impressions, possibly measuring 22mm, 32mm and 35mm in diameter. The pieces are most likely to come from the walls or dome of an oven, though the larger wattle sizes, if accurate, on the organic tempered clay could represent building daub.

Passingford Bridge Bund/Flood Alleviation Area
This site produced a modest fired clay assemblage amounting to 1337 fragments (8488g), of which 502 fragments (635g) were recovered from sieved samples. Quantities of forms and fabrics are summarised in Tables 26 and 27. The overall size of the assemblage is only slightly larger than that of Hobbs Hole. Although the mean fragment weight of 9g (excluding sieved finds) implies generally poorer preservation than Hobbs Hole, the site produced a small number of better preserved pieces of portable furniture. There is a greater emphasis on the coarse sandy fabrics (group Q) with a corresponding reduction in the silty clay fabric group and relatively little organic tempered material in both groups.

Phase 2: Late Bronze Age–Early Iron Age
Three features of this phase produced a small amount of fired clay. Pit 4085 produced only a few small amorphous fragments. A group of 20 fragments (178g) came from post-hole 4500, all apparently from broken hand-squeezed irregular lumps with moulded curving surfaces retaining grooves and depressions from squeezing with hand and fingers. The pieces represent several individual objects measuring from 22mm × 37mm × 40mm up to 40mm × 45mm × 58mm. Their function is uncertain, but they were probably single-use items of furniture in ovens or hearths. Another post-hole (2797) produced only a single piece, a small hand moulded support with an irregular concave base 60–70mm wide and curving sides with finger marks surviving to a height of 20mm. It is similar in form to small briquetage pedestals or pinch props.

Phase 3: Iron Age
A small group of fired clay (289 fragments, 712g) was recovered from Iron Age features, a mix of ditches, gullies, post-holes and pits. Nearly all pieces were either amorphous or retained a single moulded surface and are most likely to derive from oven or hearth structure. One had two possible wattle impressions 7mm and 14mm in diameter on the reverse. The only two items of oven/hearth furniture came from ditch 4251. One was a fragment of a thin plaque or disc 10mm thick and hand moulded on both sides. The other was a fragment from the side of a triangular brick pierced by a perforation 9mm diameter.

Phase 4–7: Late Iron Age and Roman
Over a third of the fired clay came from Phase 4 (Late Iron Age), followed by an abrupt decrease, with the later Roman phases producing between 4% and 9% each. Fired clay found in undated contexts accounted for more than a third of the entire assemblage, but most of this, based on the forms and general character, suggests that it belongs broadly in the late Iron Age or Roman phases.

Much of the material assigned to the category of oven/hearth structure had only a single flat or curving moulded surface, occasionally with evidence of finger marks. Most have a broken or worn back surface, though occasionally there is a hint of stone impressions. They range in thickness from 6mm to 40mm and are usually oxidised, fired to red or orange, sometimes with a buff or light brown surface and occasionally with a grey or black core. Such pieces are without any diagnostic feature, and though some could derive from oven furniture the majority are most probably pieces from the floor or wall lining of ovens and hearth floors.

A more diagnostic type has wattle impressions on the back face. These mostly survived as one or two pieces with only one or two impressions on a fragment. A total of 40 wattles were identified with half from a single context. This context (4399) from undated post-hole 4400 clearly showed the wattles to be interwoven. All impressions appear to be of horizontal rods and no vertical sails were identified from any context. Only three of the 11 contexts producing wattle impressions were dated to Phases 3 (Iron Age), 4 (late Iron Age/early Roman) and 5 (early Roman). Eight were post-hole fills, which could be taken to indicate that these pieces represent wall daub of buildings. However, the size of the wattles, which are concentrated in the 10mm–14mm size range, suggests that the fired clay derived from slighter structures, and in the absence of any evidence of burnt buildings, oven superstructure is the preferred interpretation, either as reinforcement for oven walls or supporting flat panels forming suspended floors or covers for domestic or crop processing ovens.

Industrial activity may be represented by five contexts (only one of which was dated, to Phase 4), which produced fired clay with a vitrified or vesicular cindered surface associated with other less intensely fired pieces. These could derive from either furnaces or smithing hearths, the latter probably the most likely in the absence of evidence of other metalworking or industrial processes.

A variety of portable oven or hearth furniture was identified, with pedestals being probably the dominant form. No complete objects were found and as a result many of the identifications were tentative, based on general characteristics of finish

Form	Fabric											Total
	A	AV	B	F	Q	QB	QBF	QF	QV	Mudstone	X2	
Oven/Hearth structure	153	2	2	12	217	1	1	46				434
Oven structure	4				53				9			66
Oven str.: wattle panel	19		1		34	2		33				89
Oven/H str.: floor					8							8
Industrial: Furnace /Smithing hearth	47				132	36						215
Mudstone										1		1
Oven plate: perforated								7				7
Plaque/disc		5			5							10
FB/OP							30					30
Firebar					1							1
Ped/FB		6						2				8
Pedestal	53	3	1		7							64
Triangular Brick	2	2		10	5				24			43
Hand Squeezed Lump	20					1		6				27
Furniture misc.	22	15	1		25		1	3				67
Indeterminate	70	6	6		133	28		12	3			258
Briquetage	1										8	9
Totals	**391**	**39**	**11**	**22**	**620**	**68**	**32**	**109**	**36**	**1**	**8**	**1337**

TABLE 26: Quantification of fired clay from Passingford Bridge Bund/Passingford Flood Alleviation Area (M25002.09). Fragment count tabulated by form and fabric

Form	Fabric											Total
	A	AV	B	F	Q	QB	QBF	QF	QV	Stone	X2	
Oven/Hearth structure	232	18	70	49	1162	17	24	914				2486
Oven structure	32				275				21			328
Oven str.: wattle panel	152		23		187	23		360				745
Oven/H str.: floor					86							86
Industrial: Furnace /Smithing hearth	138				93	269						500
Mudstone										3		3
Oven plate: perforated								34				34
Plaque/disc		17			56							73
FB/OP							79					79
Firebar					113							113
Ped/FB		97						45				142
Pedestal	736	22	15		821							1594
Triangular Brick	109	101		48	163				169			590
Hand Squeezed Lump	178					23		58				259
Furniture misc.	181	117	27		126		22	45				518
Indeterminate	180	12	25		364	185		112	28			906
Briquetage	1										31	32
Totals	**1939**	**384**	**160**	**97**	**3446**	**517**	**125**	**1568**	**218**	**3**	**31**	**8488**

TABLE 27: Quantification of fired clay from Passingford Bridge Bund/Passingford Flood Alleviation Area (M25002.09). Weight (g) tabulated by form and fabric

or surviving dimensions. Pedestals are either rectangular block pedestals or Belgic bricks (Fig. 25.7–8) ranging from 55–76mm by 60–90mm wide, with the greatest extant length being 95mm. One had evidence of a biconical perforation measuring 15mm diameter at its narrowest (Fig. 25.8). Triangular perforated bricks are more readily identifiable from the perforations piercing the side at an angle in conjunction with the more rounded corners. All are very fragmentary and no complete dimensions survive, though the thickness of two was estimated to be 65mm and 80mm, suggesting that these are of average size. One firebar was identified from the square end measuring 48mm thick (no.11, not illustrated) and two other pieces measuring 30 and 42mm thick may also be firebars, though they could be edges from oven plates. Oven plates were poorly represented with only one example identified by a possible perforation *c.* 17mm diameter piercing

the surface. A number of thin flat plaques or discs with roughly shaped flat surfaces and narrow rounded edge measured between 9mm and 17mm thick and 38–80mm wide. Irregular roughly oblong hand squeezed lumps *c.* 40–50mm in size were probably intended for single use as props or stabilisers.

Briquetage was only recovered from Phase 4 (late Iron Age/early Roman), all from ditch fills (2122, 4301, 4436). All were small flat body sherds, made in a fine silty chaff tempered fabric X2. Two sherds were thin walled measuring 6mm thick, while the remaining six were 10–14mm thick.

Codham Hall Bund

A small assemblage of 90 fragments (1530g) was recovered from 15 features, mostly ditches, but also pits and a tree-throw. Most of the dated features were assigned to the late Iron Age or early Roman period, which is consistent with the general character of most of the fired clay, but a few were medieval or modern. The forms and fabrics are quantified in Table 28. Fabric A was used for over two thirds of the assemblage, the remainder being made in a variety of sandy fabrics.

The major category of material was oven or hearth furniture consisting of a variety of portable items that could have been used as supports or props. Triangular perforated bricks were the commonest item. The five examples were all fragmentary and only two are certain in their identification, with evidence of a perforation across one or more corners. A third example with a perforation 18mm in diameter could be a piece of perforated oven plate. Another piece with a moulded convex surface and part of a groove 24mm in diameter through the core is interpreted as the top of a late Bronze Age type of oblong pedestal, which is characterised by a perforation close to the top end. A hand squeezed lump had an irregular moulded surface with finger marks and measured 20mm by 30mm by 50mm. It was probably a disposable single-use item, which would have been shaped from soft clay to serve a temporary need and fired during use.

The small quantity of material designated as oven or hearth structure consisted of pieces with a single moulded surface and in one case a rounded lip or flange at the edge. The general absence of substantial structural material and the preponderance of portable items may suggest that these were used in association with hearths, probably of a domestic character. The fragments of fired clay from the tree root hollow (263), which contained an area of charcoal, possibly represents lumps of subsoil with root voids from burning out the tree stump. A single small flat body sherd from a briquetage vessel 8mm thick and made in a fine sandy chaff tempered fabric is probably of late Iron Age or early Roman date and would have reached the site attached to a block of salt. The closest salt production area is in the Thames estuary at Stanford Wharf (Biddulph et al. 2012b) 12km to the south-east of the site.

Discussion and overview

At all sites the fired clay was found in secondary deposits, discarded predominantly in ditches, pits and post-holes. None was found in association with an oven or hearth structures, and from the level of fragmentation and wear, the material may have been incorporated into other deposits such as midden deposits before final deposition in features.

The sites cover a range of periods from late Bronze Age to Saxon, though the quantities from the earliest and latest phases are insufficient to fully characterise them. However, the emphasis at all the sites is on portable furniture rather than structural material, which is mirrored by the virtual absence of oven or hearth bases recognised on site with the exception of sparse evidence at Codham Hall Bund, although none of these produced any fired clay. This may be a bias of the areas of the sites focused on by the excavations or reflect a focus on particular activities undertaken at or close to the sites. Pedestals, firebars and oven plates are most commonly associated with pottery production. The use of portable furniture may have been the norm throughout the prehistoric period, though a suite of recognisable forms of block pedestals, firebars and plates becomes most apparent in the late Iron Age and continued in use into the early Roman period. These were used in conjunction with triangular perforated bricks, which had been a standard form of Iron Age domestic activity probably used as a multi-functional item in association with ovens and hearths.

An assemblage of similar furniture found at Dagenham was interpreted as evidence of small scale pottery production

Form	Nos/Wt (g)	Fabric						Total
		A	V	B	F	QF	QV	
Briquetage vessel	Nos		1					1
	Wt		2					2
Pedestal	Nos	1			13			14
	Wt	16			231			247
Triangular perforated Brick	Nos	24				1		25
	Wt	717				39		756
Hand Squeezed Lump	Nos	12						12
	Wt	78						78
Oven / Hearth structure	Nos	4						4
	Wt	103						103
Utilised/Indeterminate	Nos	22		10			2	34
	Wt	180		153			11	344
Totals	**Nos**	**63**	**1**	**10**	**13**	**1**	**2**	**90**
	Wt	**1094**	**2**	**153**	**231**	**39**	**11**	**1530**

TABLE 28: Fired clay from Codham Hall Bund (M25018.11), quantification of forms and fabrics

during the 1st century AD (Poole 2010). It is possible that furniture found at Hobbs Hole and Passingford Bridge also indicates evidence for low level pottery production somewhere in the vicinity of the sites, though the quantity of material is insufficient to suggest it was taking place within the excavated area. Perhaps more surprising is the continued use of a similar suite of objects into the late Roman phase at Hobbs Hole, suggesting the continuation of a local tradition with little evidence of change in the character of activity.

Pond 1683

All the fired clay found was from sieved samples, and as a result the 26 fragments (44g) were mostly amorphous, though some had evidence of a flat moulded surface. All were made in Fabric A and lightly fired.

Upminster Bund

A very small amount of fired clay (41 fragments, 28g) was recovered by hand excavation and sieving from four contexts. Most pieces were amorphous, but one was a fragment of a roughly moulded linear rod or hand-squeezed lump with oval cross-section measuring 25mm by 32mm and over 23mm long.

Pond 1787

One small amorphous fragment (6g) of fired clay in Fabric A was recovered from context 1007.

Pond 1791

Two small amorphous fragments (3g) of fired clay were recovered from a sieved sample from context 110.

Pond 1812

A small group (39 fragments, 147g) of fired clay was recovered from three contexts (205, 236, 242) of which two were phased to the medieval period. This mostly comprised pieces with a flat moulded surface or amorphous fragments made in fabric B. In addition, a small thin sherd of briquetage from context 205 in fabric X2 is likely to be of Roman or Iron Age date.

Pond 1824

A very small quantity (5 fragments, 24g) of indeterminate pieces, all made in Fabric A, were recovered from three contexts (126, 131, 138), most as a result of sieving from two samples. A couple of fragments had a flat roughly moulded surface and probably derived from oven or hearth structure.

Catalogue of fired clay (Fig. 25)

1. Probably part of a triangular brick or perhaps the edge of an oven plate. The pieces have two adjacent surfaces, roughly at right angles. The moulded surfaces are fairly flat and even, slightly undulating with a rounded angle joining the two. Chaff impressions, mostly glumes, probably of spelt, are visible in the surface. Fabric AV; length: >70mm, thickness: >28mm, weight 143g. M25001.08. Phase 5. Pit 6086 (6089).

2. Cylindrical pedestal: Fragment from cylindrical object with smooth moulded plano-convex surface. Probably a cylindrical pedestal, possibly of MBA type though without the axial perforation or ends this is uncertain. Fabric Q. Diameter: c 110mm; height: >72mm; weight: 155g. M25001.08. Phase 2. Pit 5140 (5147).

3. Perforated oven plate: fragments from a thick flat slab with moulded smooth upper surface, perforated. The illustrated piece is pierced by half of a biconical/hour-glass shaped perforation made from both sides with a rim of thickened clay forming a halo on the underside of the plate. The perforation measures 26mm diam. narrowing to 22mm in the centre. A more heavily blackened piece (not illustrated) may have part of an impression of a small wattle or the rounded edge of a plank on the underside. Fabric: A; weight: 246g; thickness: 45–50mm. M25001.08. Phase 6. Pit 7061 (7062).

4. Flat plaque: smooth flat moulded upper surface with straight smooth edge showing rounded corner or end. The flat underside is irregular. Fabric: A; weight: 54g; length: >70mm; width: >43mm; thickness: 16mm. M25001.08. Phase 7. Pit 5161 (5162).

5. Slingshot: curved convex moulded surface with fine striations from fingers. This appears to come from a small ovoid object and is probably from the central section of a sling shot, missing the pointed ends. Fabric: A; weight: 5g; length: *c.*34mm; diameter: 25mm. M25001.08. Phase 7. Pit 7184 (7185).

6. Pedestal or fire bar: One end of a rectangular pedestal or a very substantial firebar. It has a trapezoidal cross-section and a rounded sloping end. A groove runs longitudinally down one side probably a result of smoothing and pressing the clay into shape. Surfaces are smooth and well finished, flat or slightly concave and angles rounded. Fabric: Q; weight: 523g; length: >95mm; width: 67–70mm; thickness: 55–76mm. M25002.09. Phase 4. Ditch 3109 (3111), group 3099.

7. Rectangular block pedestal: Corner fragment from rectangular block pedestal. It has smooth flat surfaces, rounded corners and angles. On one face a finger groove runs diagonally across it. Fabric: Q; weight: 298g; length: >67mm; width: >80mm; thickness: 88mm. M25002.09. Phase 4. Pit 3467 (3468).

8. Perforated pedestal: Rectangular block pedestal with flat smooth moulded surfaces and rounded angles pierced by a biconical perforation 15mm in diameter at the centre widening to 23mm at the surface. Fabric: A/E; weight: 493g; length: >83mm; width: 90mm; thickness: 58mm. M25002.09. Phase 4. Ditch 3507 (3508). Not illustrated

9. Triangular perforated brick: Corner and body of a triangular perforated brick. The triangular face has a flat undulating even moulded surface and the side edge a smooth slightly concave surface. Two perforations survive 17 and 22mm in diameter and just the edge of a third in the core of the brick. The surviving corner apex is somewhat damaged and battered. The more damaged side looks worn and re-used. Fabric: A; weight: 461g; length: >120mm; thickness: c 80mm. M25018.10. Phase 4. Ditch 260 (258), group 265.

10: Firebar: several fragments all from same object, of which two refitted, appear to come from the flat square end of a rectangular firebar, possibly tapered. It had flat even moulded surfaces with rounded angles and corners. Fabric: A; weight: 150g; width: >30mm; thickness: 40mm. M25001.08. Phase 5 or 6. Pit 5047 (5063).

11: Fire bar: square corner end of object probably a rectangular or square sectioned firebar, possibly tapered. Smooth even flat moulded side surfaces, end somewhat rougher. Surfaces heavily fired and blackened. Fabric: Q; weight: 113g; length: >50mm; width: >48mm; thickness: 45–48mm. M25002.09. Phase 5. Ditch 3407 (3476), group 3680.

THE WORKED STONE by Ruth Shaffrey

Junction 29, Hobbs Hole

A total of seven items of worked stone were recovered from Phase 7 features (Table 29). Because of the very worn nature of the lava from this site, fragments from a single context have been recorded as a single item. None of the quern fragments retains worked surfaces or diagnostic features. However, the lava fragments are catalogued as such because this is their most likely function. Two other fragments of Millstone Grit may also have been part of a quern originally, although they

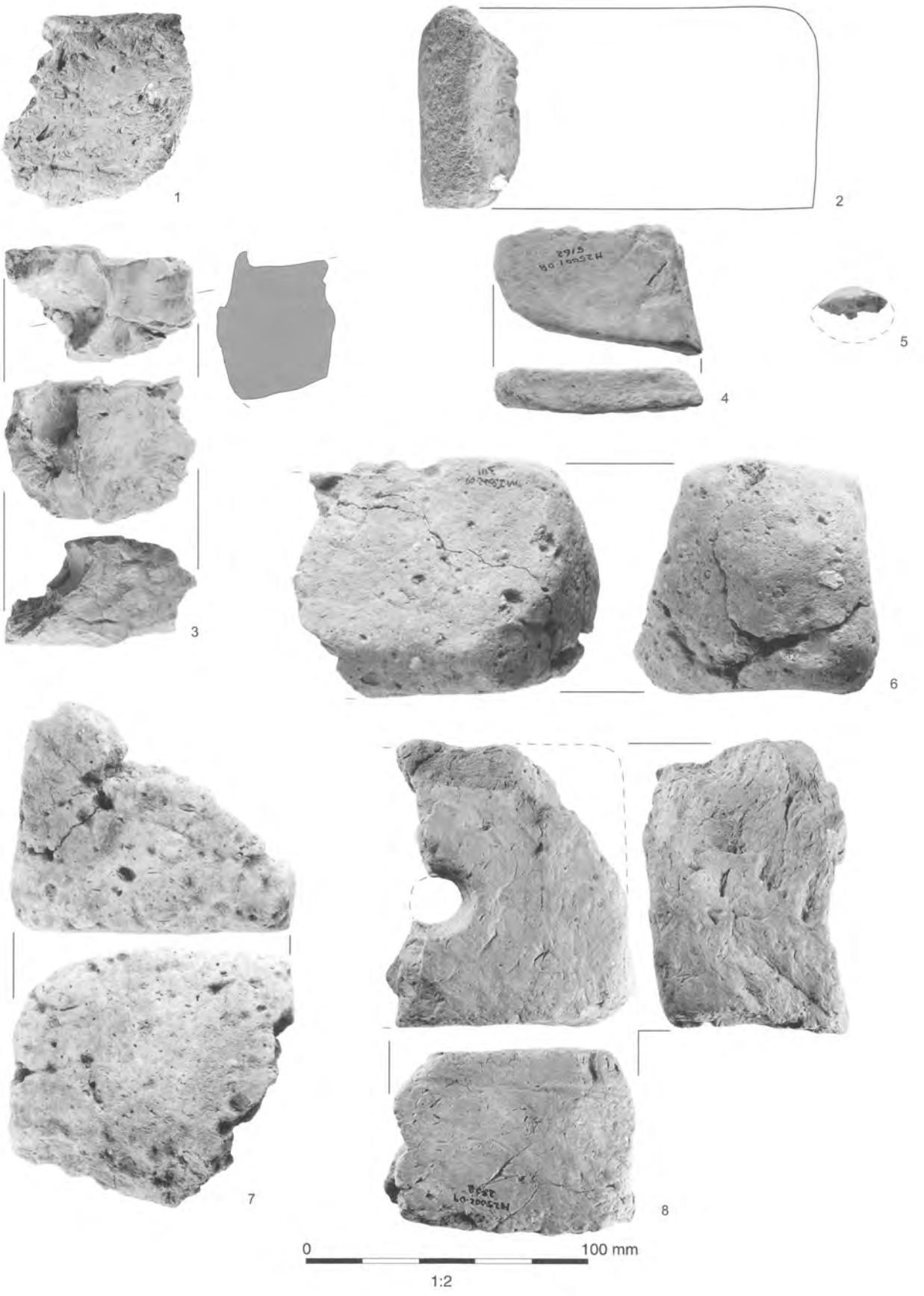

FIGURE 25: Fired clay

Context	No.	Notes	Weight (g)
5908 (pit 5911)	6	Worn lava quern fragments	188
5098 (pit 5096)	1	Worn lava quern fragment	9
5098 (pit 5096)	1	Worn lava quern fragment	39
5909 (pit 5911)	1	Worn lava quern fragment	35
5909 (pit 5911)	2	Moulded fragment of Millstone Grit, possibly a reused quern	1189 + 636
5910 (pit 5911)	1	Quern extensively reused as a processing slab	1263

TABLE 29: Worked stone from Hobbs Hole (M25001.09)

have been extensively reshaped and reused (5909). They do not adjoin but with similar grooves and shaping, they appear to have been part of the same object, whose function is unclear. It has at least one squared corner, suggesting a possible structural use, but has a number of deep wide grooves of unknown purpose that could be decorative or functional. A final quern fragment from 5910 is made of Old Red Sandstone. This has been particularly well used for rubbing and sharpening and is heavily blackened due to burning.

Without exception, the quern fragments from Hobbs Hole have been either reused or are extremely fragmentary. This indicates that a significant amount of time had elapsed between their use as querns and their eventual deposition at Hobbs Hole. It is likely that they were never used as querns where they were deposited but they were brought to Hobbs Hole as fragments for other purposes, such as sharpening stones. That interpretation would be in keeping with the lack of occupation evidence from the site generally.

Some interesting stones from unphased contexts are worth a mention because of the possibility they relate to Roman activity. These include further likely quern fragments of Millstone Grit and lava (7233, 6016) and some small pieces of worked chalk without an obvious function (7131). There are also a number of what appear to be structural stones. These comprise four large blocks (two from 7053, fill of pit 7052 and two from 813, fill of ditch 812) and seven smaller but still substantial blocks in pit 7052. A single block of tufa was also found in the fill of pit 5905 (5939). None of the blocks retains any obvious signs of working, such as tool marks, but must have been imported to the site as there are no sources of greensand nearby. They presumably served a purpose that required heavy blocks, although as no remains of structures were uncovered, their exact function is unclear.

A small quantity of burnt stone was recovered from eight contexts, totalling 2.5kg. The majority of this was heat shattered or cracked flint, probably resulting from use as pot boilers. A single cobble from 6018 was also blackened indicating direct exposure to fire. These indicate general activity in the area.

Passingford Bridge Flood Alleviation Area

Only two Roman-period contexts produced worked stone, both containing fragments of lava quern (2786 38g, 4115 816g). Another three objects are manuports. One is a slab that has been worn on one side, possibly through use as a rubbing stone or in a floor (4290), while the other two are cobbles that have been used as rubbers (2369 and 4290). The pebble from 4290 has two distinct facets, one with a polished surface (2622).

Codham Hall Bund

More than 40 fragments of worn lava weighing 500g were recovered from two contexts, both of which are unphased (289, 313). No other worked stone was found. The lava fragments probably represent rotary querns.

GLASS AND METAL OBJECTS by Ian Scott

Glass

The glass from Hobbs Hole comprises three sherds: a sherd from the kick, or push up, of a thick-walled free-blown early 18th-century wine bottle in dark olive green metal (context 3905); the neck and finish from a machine-moulded bottle in green metal of late 19th- or early 20th-century date with an applied tooled finish and a screw cork closure (context 1706); an undiagnostic sherd of vessel glass in green metal (context 1105).

Two sherds from Passingford Bridge Flood Alleviation Area comprised a weathered sherd of early thick-walled free-blown wine bottle in green metal – the sherd is not more closely datable than early 18th-century (context 3132) – and a sherd of handmade window glass with slightly irregular surfaces in light green metal. This is post-medieval, but not more closely datable (context 4460).

Eight pieces of glass from Pond 1609 consisted of a small sherd of colourless window glass, which is not closely datable (context 1007), and seven small chips of glass, which are undiagnostic and undated (context 1027). There are four sherds of glass from Pond 1812: a small body sherd probably from a cylindrical bottle, in light green metal, not closely dated but probably 19th-century or later in date (context 131); a small opaque white or off-white sherd possibly from the rim of a vessel or dish, which is not closely dated but probably later 19th-century or later (context 131); a body sherd from a cylindrical bottle in light green metal, which is again probably later 19th-century or later (context 133); and a small body sherd from an early thick-walled free-blown wine bottle. This dates no later than the late 18th-century (context 149).

Metalwork

Seventeen iron objects (22 fragments) were recovered from Passingford Bridge Flood Alleviation Area. In addition there are in excess of 175 iron crumbs recovered from soil samples. The metal finds include a small broad leaf-shaped spearhead, broken and heavily encrusted (context 2904) and a post-medieval horseshoe (context 4532). There are just three nails (6 fragments). There are also three possible bar or rod fragments, two with leaf-shaped points or terminals (context 4382 and 5038), one with a knob terminal. These are not closely datable. The most numerous finds are seven flat

irregular fragments or blocks ranging in size from 152mm × 75mm × 30mm to 125mm × 80mm × 40mm from the fills of a post-medieval pit (3130).

Of the remaining sites, a single metal object and 15 undiagnostic small fragments were collected from Pond 1609. The nail with a small solid domed head and the fragments are from context 1015. Codham Hall Bund produced two nails (8 fragments) (context 356), two small irregular undiagnostic lumps (context 356), and 20 crumbs of irregular sizes (context 359). From Pond 1812 there is a fragment of thick bar (context 193), and two small undiagnostic fragments (context 236). A single piece of metalwork from Pond 1683 is a circular iron swivel ring, flattened and pierced on one side. It is probably a cart or harness fitting, but is not closely datable (context 1000).

Catalogue of illustrated finds (Fig. 26)

1. Spearhead, small broad leaf-shaped spearhead possibly with closed and welded socket. The blade is broad and it is probable that the socket continues as a midrib. Two fragments. Heavily encrusted. Iron. L: 104mm, W.: 35mm. Context 2904, sf 2006. It is probably late Iron Age rather than Roman in date.

2. Leaf-shaped point or terminal on a rod of square section. Function uncertain. Iron. L: 69mm, W.: 15mm. Context 4382, sf 2014.

3. Small but broad leaf-shaped point or terminal, with oval section scar for rod or socket. Iron. L: 42mm, W.: 23mm. Context 5038.

SLAG AND HIGH-TEMPERATURE DEBRIS

by Lynne Keys

Introduction

A small assemblage (just over 9.6kg) from six sites was examined for this report. The general methodology used was that each slag or other material type in each context within each site was weighed, except for smithing hearth bottoms, which were individually weighed and measured. For several sites where there were many tiny bags from samples, all quantities of material which were not iron slag or high-temperature debris were not quantified.

Junction 29, Hobbs Hole

The earliest material is a very tiny quantity of undiagnostic slag in Phase 2 hollow-way 5130; undiagnostic slag cannot be assigned to either smelting or smithing because of its morphology or because it has been broken up and re-deposited. In the Iron Age (Phases 3 and 4), small quantities of undiagnostic slag and other material, such as fired clay, vitrified hearth lining and cinder (the lighter part, nearest the fire, of a hearth lining), were recovered from some features, including 6083. From the early to mid-Roman period (Phases 5 and 6), iron slag is more prevalent on the site and includes what may be two small smithing hearth bottoms (a plano-convex slag cake which builds up under the tuyère hole (the hottest part where the air from the bellows enters a smithing hearth) in pits 7029 and 7061; the small size of these slags indicates smithing was small-scale and unprolonged. Other pits in this phase contained undiagnostic slag. In Phase 7, the late Roman period, 788g of slag was recovered. Pit 7012 contained quantities of undiagnostic slag; pit 7108 contained possible furnace slag – a product of smelting – with large voids left from burnt-out charcoal. Other pits – 7020, 7063 and 7103 – contained iron-rich undiagnostic slag. The conclusion is that small-scale one-off smithing may have taken place on the site in the Roman period.

FIGURE 26: Metal objects

Passingford Bridge Flood Alleviation Area

Phase 3 gully 4095/6 contained a small quantity of broken hammerscale flake; it also contained a tiny flake of silver. Hammerscale flakes and spheres are micro-slags produced during smithing; these can be hammerscale flakes from ordinary hot working of a piece of iron (making or repairing an object) and/or tiny spheres from bloom smithing or high temperature welding used to join or fuse two pieces of iron. Hammerscale, because of its tiny size, is usually only recovered by taking soil samples from fills and deposits, but it is most concentrated in the immediate area of smithing, that is, in the vicinity of the anvil and between it and the smithing hearth. The minute amount of hammerscale and the tiny sheet fragment of silver may have come from metalworking somewhere on the site, but could be dismissed as being insufficient because of their size and the absence of associated evidence.

However, Phase 4 ditch 4436, in the immediate vicinity of gully 4095, also contained hammerscale flakes and spheres but in quantities that cannot be ignored (over 20g+ from the samples), a fragment of one smithing hearth bottom and what may be a piece of another. Some undiagnostic slags and a ceramic crucible (above) were also recovered. Ditch 4301, also nearby, contained smaller quantities (7g) of broken hammerscale flakes and spheres, other large microslags, fired clay and a piece of vitrified hearth lining. The presence of the microslags and other material in this one small area indicates iron smithing, possibly in conjunction with other fine metalworking, took place on the site during the Iron Age, probably in a building or structure in the area within the gully/ditches.

Upminster Bund

Nothing relating to iron working was recovered from this site. Quantities of ferruginous, water-rolled material and some charcoal were found in two features: pit 1046 and ditch 1065. There is the possibility that the ferruginous material may be a type of ore, in which case the pit and the material in the ditch could then represent ore roasting, which increases the amount of iron that can be recovered when the ore is smelted in a furnace. However, the identification of the material has not been confirmed. A minute amount of fired clay was recovered from pit 1168.

Pond 1609

There was virtually no evidence for iron working on this site; pit 1014 contained just 3g of iron flakes, undiagnostic slag and cinder.

Pond 1683

Some cinder was found in the top fill of medieval pit 1007.

Pond 1812

One small from ditch 225 contained a minute quantity of microslags from smithing using coal.

WATERLOGGED WOOD by Damian Goodburn

Introduction

Waterlogged wood was recovered from late Roman (Phase 7) water-hole 3652. The processing and recording was broadly in keeping with the standards set out in English Heritage guidelines (Brunning 1996). It was lifted by OA's field staff and double wrapped in polythene, some as single items, some as multiples in one bag. The assemblage was then partially cleaned and carefully repacked for storage and transport. The material was sent to the writer and unwrapped carefully, and washed where much silt still adhered. It was then examined in good light and the three best preserved and most diagnostic pieces were drawn to scale on gridded film and described on pro forma Timber Sheets, with the other less obviously worked material only being recorded on an annotated wood list. The items of oak were identified visually where they had the clear diagnostic features of our two native oaks and their hybrids. Most of the larger material was of oak. A selection of the better preserved small roundwood and non-oak larger roundwood was sampled for microscopic species identification.

General observations

None of the waterlogged wood found in the water-hole's backfill deposits (3653, 3654 and 3662) survived as large items, and none appeared to have clearly been part of some form of timber lining. Indeed, if there had been some form of timber lining originally it may well have been removed for reuse or for fuel when the feature fell into disuse. The material is effectively a rather random collection of pieces of axe-cut, small log-end off-cuts, broken sections of small square-hewn beams, small cleft pole sections and broken small roundwood under *c.*30mm in diameter. The small roundwood could be of natural origin, but might equally be fragments of some form of wattle fence originally placed around the top of the water-hole cut to prevent livestock, humans and debris falling in. One small piece of roundwood, from fill 3662, had a charred end, probably indicating that there had been a hearth nearby. Owing to the small size of the material, it is quite possible that much of it was actually originally stacked firewood and kindling. Any rural settlement in the south-east region before the exploitation of coal would have had many such stacks of fuel wood for their own use and possibly also for trade. In this writer's experience, such stacks of small cut wood are magnets to modern children who delight in playing with the wood, often tossing it into any nearby water. It is possible that this was the activity which caused the otherwise useful material to be thrown in the wet disused water-hole pit where it became waterlogged and was preserved.

While some of the material was very decayed and abraded, other material was rather well preserved, bearing clear tool marks and providing some evidence of local woodland work and conversion of small logs for constructional work. Most of the material was clearly of oak, but other species were also present. The four most diagnostic items of worked wood and timber found are briefly described and discussed below, and a summary record of the other undiagnostic material is held in the site archive.

Axe-cut oak log-end (sample 2012, context 3662, A) (Fig. 27)

This axe-cut log-end appears to have been the base of a large overgrown coppice stem. Such trees are now known as 'store coppice' in the south-east and are common around the south-east edge of London in ancient woodland today (Goodburn 1991, 193). Alternatively, the off-cut might possibly have derived from a lopped bough of a large open grown tree. It

had a marked curve and rather oval cross-section being up to 180mm in diameter and 0.38m long. It was clearly of oak and had *c.*36 moderately sized annual rings with no heartwood development visible. Both ends had been axe cut, having clear surviving axe stop marks up to 80mm wide mirroring the rather straight-edged blade of a moderately small bladed axe, well within the wide range of forms known from the Roman south-east. Traces of tool signature marks left by distinctive small nicks in the blade edge also survived. The marks could not be matched in the other worked material. The form of the log off-cut – one end with two opposed, sloping facetted faces and a torn 'hinge' – suggests that this was the felled end (Fig. 27). The other end was much more squarely axe cross-cut as if the woodsman was removing the irregular pointed butt of the felled tree or large bough. The log-end appears to have dried just a little before being dumped in the well pit, as would have been the case if it had been stacked to dry for use as firewood. Felling with axes alone is typical in Roman evidence from the south-east.

Axe-cut log-end (sample 2012, context 3662, B)
This axe-cut log-end is smaller than that described above being 0.15m long with a diameter of 85mm. One end was cut with an axe from one side to a chisel shape. The axe marks are very similar to those on the log end described above, but slightly less complete and 70mm wide. The other end was cut square across with a saw. This is not a great surprise, as a key tool introduced to Britain in the Roman period was the *'serrata'* or cross-cut saw, which has not been recorded in well dated pre-Roman woodworking. The London evidence indicates that at the source, in the woods, the same axes that were used for felling were used to cross-cut, but once on-site, in the town, cross-cutting was often done with a saw. The species of the wood is uncertain.

Fragment of a hewn oak beam (context 3662, D)
This item was a small piece of what had been a rectangular beam section timber, hewn from a relatively small oak log leaving much sapwood. It had clearly come from a small fast-grown tree, possibly large oak coppice. It is 140mm by 90mm by 40mm. The two hewn surfaces are at 90 degrees to each other and rather smooth but showing fine axe signature marks. The work of squaring up the small oak log was clearly done with care with a fine bladed keen axe. The parent timber would presumably have been used for building construction or similar purposes. It is again probable that the fragment derives from a beam-end off-cut split and stacked for use as fuel.

Fragment of a hewn oak beam (context 3662, E)
This worked timber fragment is very similar to that described above possibly even deriving from the same small oak beam but only had a very small area of surviving flat, hewn surface. It is 140mm by 80mm by 40mm.

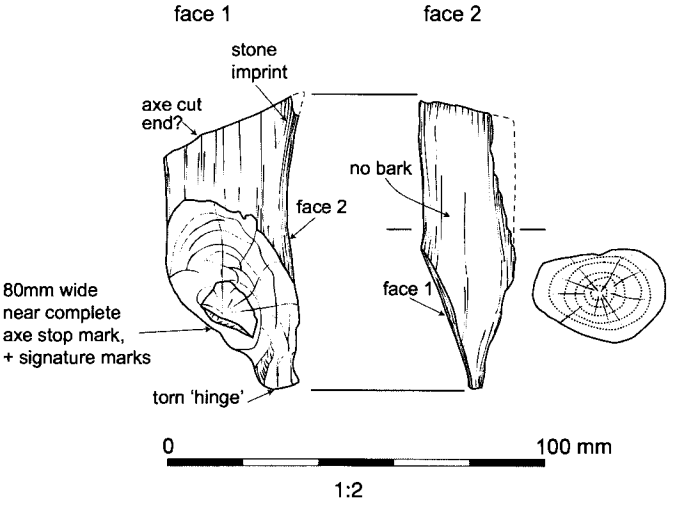

FIGURE 27: Worked wood

4 HUMAN REMAINS

Helen Webb

INTRODUCTION

Cremated human bone was recovered from Hobbs Hole, Passingford Bridge Flood Alleviation Area, Pond 1791, and Upminster Bund. A small quantity of unburnt human bone was recovered from Hobbs Hole. In accordance with recommended practice (McKinley and Roberts 1993), all cremation deposits were subjected to whole-earth recovery and cleaned by wet sieving, which sorted the bone into >10mm, 4–10mm, 4–2mm and 2–0.5mm (residues) fractions. This includes the cremation urns from Hobbs Hole and Passingford Bridge which, owing to fragmentation, could not be lifted as whole vessels and were excavated in spits. The 2mm–0.5mm residues recovered from the wet sieved cremation deposits were retained in order to assess the bone content within them. An estimate of the total weight of bone was calculated by sorting a 5g sample of each residue. The percentage bone weights within the sorted samples were then applied to the total weights of each residue. These estimated weights are included in the total weights stated in this report. Full osteological analysis of the burnt and unburnt remains was carried out with reference to standard guidelines (Brickley and McKinley 2004). The cremated bone was examined for colour, weight and maximum fragment size. Each fraction was examined for identifiable bone elements and the presence of pyre and grave goods. The minimum number of individuals present, and estimation of age and sex was attempted for all deposits (burnt and unburnt).

WEIGHT AND FRAGMENTATION OF DEPOSITS

Junction 29, Hobbs Hole

Grave 6096 (group 6104)

Urned cremation deposits 6100 and 6102 (grave 6096) had total bone weights of 194.1g and 54.6g respectively. Given that the range of weights observed in cremated adult individuals from modern crematoria is between 1000g and 2400g, with an average weight of 1650g (McKinley 2000a, 269), it is clear that 6096 did not contain anywhere near a complete adult individual. While cremated bone was thought to originate from inside the urn (SF 110), it was also present outside the pottery (in deposits 6101, 6097 and 6103), and the quantities still do not amount to the expected weights for an adult cremation. It seems likely that the bone weights observed represent the total amount, or at least very close to the total amount, originally deposited within the feature. While the pottery had suffered post-depositional crushing, it did not appear to have been truncated. In both deposits, fragmentation levels were very high. While fragments over 10mm in size were present in both, these formed very small proportions of the overall weights (4% in 6100 and 3% in 6102). Most fragments were between 10mm and 2mm in size, and the unsorted residues (2mm–0.5mm) were very rich in cremated bone. It is unclear whether the high fragmentation levels were due to on-pyre fragmentation, post-pyre or pre-burial manipulation of the remains, or post-burial fragmentation. It seems most likely that all of these, along with the excavation and post-excavation processes, played a part. Given that the pottery was noted to be highly fragmented and compacted in the ground on excavation, post-depositional fragmentation was probably significant.

Deposit 6101, recovered from inside pot 111 (also part of group 6104), had a very low total bone weight of 5.4g. This is not surprising given that the fill was interpreted as naturally accumulated clay, thus the presence of bone within it is most likely incidental (probably originally from deposit 6100 or 6102). Deposit 6097 was the upper fill of pit 6096 (part of group 6104). The total bone weight recovered from this deposit was relatively high, at 218.8g. Fill 6103, which lay below the pottery, contained less bone (20.6g). As with the urned deposits, the vast majority of bone fragments (90% in 6097, 100% in 6103) was less than 10mm in size.

Other graves and features

Unurned deposit 4304 (Grave 4303) had a very low bone weight of 12.8g. The level of fragmentation was high, with no fragments within the >10mm fraction. However, a small number could be identified to element; thus, despite the low bone weight, it could be confirmed that this deposit comprised human bone. Unurned deposit from feature 5005 had a total weight of 48.5g. Only a small proportion of the total weight (6%) comprised bone fragments over 10mm in size, but a number of fragments could be identified to element. The other three unurned cremation deposits from Hobbs Hole – 5070 (grave 5069), 6093 (Grave 6092) and 6095 (Grave 6094) – comprised the lowest bone weights (0.4g–6.4g) and had no fragments within the >10mm fraction. This, in addition to their extremely low bone weights, meant that it was not possible to confirm whether the bone was animal or human. Heavy plough truncation of these deposits, as well as deposit 4304, probably accounts for the low bone weights observed.

While all of the unurned deposits had very low bone weights, the extent to which this represents burial practice (that is, deliberate deposition of small bone quantities) is unknown. It is possible that the features observed represent only the bases of what were once much larger, deeper features, having been heavily ploughed out.

Passingford Bridge Flood Alleviation Area

Urned deposit 2007, part of grave 2009, had a total bone weight of 182.1g. Again, this is a much lower weight than expected for an adult cremation (McKinley 2000a, 269). Given the heavy plough disturbance and truncation that this feature had suffered, it seems most likely that the cremated bone recovered from the upper (2004) and lower (2008) fills of the grave originally formed part of the urned deposit. The total weights of bone recovered from fills 2004 and 2008 were 61.0g and 57.3g respectively. Even including these weights, the total is still far less than expected. Once again, it is impossible to determine whether the low overall weight relates to the level of truncation (that is, a significant proportion of the bone was lost), or if it relates to the original burial practice.

While the bone fragments from 2007 exhibited high fragmentation, with over half the total weight (54%)

comprising fragments less than 10mm, a large proportion of fragments (46%) was over 10mm in size. The largest fragment, part of a distal femur articular surface, was 34mm in length. The bone recovered from fills 2004 and 2008 exhibited higher fragmentation, with only 21% of fragments in each deposit being over 10mm in size. The higher level of fragmentation here is not surprising if, as suggested above, the bone from these fills represents disturbed bone that had originally formed part of the urned deposit.

Upminster Bund

The total bone weight recovered from deposit 1167, fill of grave 1166, was just 5.5g. To what extent the low bone weight relates to truncation of the pit is unknown. No bone fragments were retained within the >10mm sieve fraction.

Pond 1791

A total of 46g of bone was recovered from deposit 110, grave 109. Again, the level of fragmentation was high, with no bone retained within the >10mm fraction. Almost three quarters (73%) of the total bone weight was recovered from the 4–2mm and 2–0.5mm fractions.

COLOUR OF THE CREMATED BONE

Cremated bone may range in colour from brownish-black (slightly charred, *c.*300°C), through hues of blue and grey (incompletely oxidised, up to 600°C), to white, or fully oxidised bone (>600°C) (McKinley 2000b, 405). These colour changes depend on the temperature of the firing, the oxygen supply and the duration of exposure of the body to the flames (McKinley 2000c, 66). Both the length of time that the pyre will burn and the temperature attained are largely dependent on the quantity of fuel used in construction (McKinley 2000a, 269). The vast majority of cremated bone from Hobbs Hole was white in colour, indicating that the cremation process had been efficient in terms of temperature achieved and even distribution of the heat.

From grave 6096, deposits 6100, 6101, 6102, and 6103 contained only white bone. The bone recovered from deposit 6097 was also predominantly white, although a few fragments (*c.*1%) were slightly more grey in colour. Of the unurned deposits from Hobbs Hole, most (4304, 5005, 5070, 6095) comprised predominantly white bone (85%–100%), with smaller quantities of grey fragments. Deposit 6093 differed from the other deposits, in that the bone fragments were very mixed in colour, ranging from brown, black and grey, through to white.

The bone from Passingford Bridge was also predominantly white, with just a few grey fragments (*c.*1%) present in deposit 2004. All of the bone from the urn (deposit 2007) and fill 2008 was white. The unurned deposits from Upminster Bund and Pond 1791 also comprised predominantly white bone, with small proportions of grey coloured bone (25% and 10% respectively).

SKELETAL ELEMENTS REPRESENTED

Junction 29, Hobbs Hole

In unurned deposits 5070, 6093 and 6095, the small quantities of bone and high fragmentation levels meant that no fragments could be identified to skeletal element. Therefore it could not be confirmed whether they were human or non-human. Human bone was identified in all of the other deposits, however. A number of fragments, comprising 50% of the total weight (6.4g/12.8g), was identified in deposit 4304, including mandible and upper (humerus and ulna) and lower (femur and tibia) limb bones. Deposit 5005 (Hobbs Hole) comprised a more moderate weight of bone (48.5g). A total of 7.5g (15.5%) could be identified to skeletal element. These included fragments of skull, ribs, upper (humerus) and lower (femur and tibia) limb bones.

In grave 6096, just 10.4% (20.2g/194.1g) of the total bone weight in urned deposit 6100 could be identified to element owing to the high level of fragmentation. Of the identified fragments, the skull made up by far the greatest proportion (75%, 15.1g/20.2g). The rest of the identified fragments included ribs, vertebrae, humerus, femur and tibia. The unidentified bone largely comprised long bone fragments, although phalangeal shaft fragments, which could not be positively identified to hand or foot, were also observed. Just 20% (11.0g/54.6g) of urned cremation deposit 6102 could be identified to element, and all identifiable fragments were cranial vault. As with deposit 6100, the unidentified bone was largely made up of long bone fragments. The comparatively high proportion of skull fragments is a pattern often observed in cremated bone assemblages. This is because fragments of skull are so easily recognised, even within the smaller fraction sizes (McKinley 2000a, 271). The other deposits recovered from grave 6096 (6097, 6103, 6101) showed similar patterns in terms of identifiable fragments. In all three, unidentified fragments (predominantly long bones) made up the greatest bone weights, and of the identified fragments, the skull was best represented.

Passingford Bridge Flood Alleviation Area

Within grave 2009, 30% of the total bone weight (53.7g/182.1g) from urned deposit 2007 could be identified to element. Interestingly, apart from a few small rib fragments, all identified bone came from the upper and lower limbs, including humerus, radius and ulna shaft fragments, a metacarpal head, femur and fibula shaft fragments, and a part of a distal femur articular surface. No skull fragments were present within the urned deposit. The cremated bone recovered from the upper (2004) and lower (2008) grave fills comprised similar proportions of identified bone (35% and 30% respectively) to the urned deposit. Interestingly, both of these deposits contained skull fragments, and in both, skull fragments made up the majority of the total weight of identified bone (76% in deposit 2004 and 79% in deposit 2008). As stated above, it seems likely that the bone within the fills surrounding the urn had originally formed part of urned deposit, having been disturbed by ploughing. Based on the fact that these fills contained significant proportions of skull fragments, while the urned deposit, of which only the base remained intact, contained none, it is possible that that there had been some order to the way in which the bone was interred within the urn, with the skull having been placed at the top. In the majority of urned cremation burials in south-eastern Britain, bone fragments from different body regions are evenly mixed throughout the receptacle. Ordering of skeletal elements is far rarer (Boston and Witkin 2006, 44). At Pepper Hill, Kent, five Roman-period urned burials exhibited depositional patterning of elements (Boston and Witkin 2006, 45). In all

cases, the bone had been placed in the urn in a systematic fashion, approximating normal anatomical position, with lower limbs at the base of the urn, upper limbs and axial bones in the middle, and skull at the top (Boston and Witkin 2006, 32), as suggested for the Passingford Bridge burial.

Upminster Bund and Pond 1791

In total, 7.6g (16.5%, 7.6g/46.0g) of the Pond 1791 deposit (110) was identifiable to element. Most of the identified bone (86%) was made up of skull fragments. The rest of the identified bone comprised fragments of rib, ulna, tibia and a foot phalanx. Despite the small bone weight (5.5g) of the Upminster bone deposit, half of the bone weight could be identified to element. Skull and upper limb bone fragments were identified.

Palaeodemography

None of the cremation deposits from any of the sites contained repeated skeletal elements, and therefore the minimum number of individuals represented in each deposit was one. Of the deposits that were confirmed as human bone, all appeared to contain adult remains, although no specific skeletal indicators were present that could aid in estimation of specific age or sex. No pathological lesions or non-metric traits were observed.

Unburnt human bone

Two fragments of unburnt human bone were recovered from a fill of middle or late Roman pit 7054 from Hobbs Hole. The fragments comprised partially preserved left and right tibiae from a very young juvenile, probably a neonate or an infant. Judging by their size and condition they were probably from the same individual. The bones were in good condition, exhibiting only slight, patchy surface erosion (Grade 1, McKinley 2004, 16). No pathological lesions were present.

5 ENVIRONMENTAL EVIDENCE

ANIMAL BONE by Lena Strid

Introduction and methodology

The bone report encompasses all hand-collected bones from securely-dated features, as well as a selection of bones from sieved samples. The analysis includes a total of 1584 bones from six sites, the majority of which derive from late Roman period. A full record of the assemblage can be found in the site archive.

The bones were identified using comparative skeletal reference collections, in addition to osteological identification manuals. All animal remains were counted and weighed, and where possible identified to species, element, side and zone (Serjeantson 1996; Strid 2012). An attempt was made to identify sheep and goat to species where possible, using Boessneck et al. (1964) and Prummel and Frisch (1986), although this was not successful and the ovi-caprine remains were classified as 'sheep/goat'. Ribs and vertebrae, with the exception of atlas and axis, were classified by size: 'large mammal' representing cattle, horse and deer; 'medium mammal' representing sheep/goat, pig and large dog; 'small mammal' representing small dog, cat and hare; and 'microfauna' representing animals such as frog, rat and mice.

The condition of the bone was graded on a 6-point system (0–5), grade 0 equating to very well preserved bone, and grade 5 indicating that the bone had suffered such structural and attritional damage as to make it unrecognisable. For ageing, Habermehl's (1975) data on epiphyseal fusion were used. Three fusion stages were recorded: 'unfused', 'in fusion', and 'fused'. 'In fusion' indicates that the epiphyseal line is still visible. Tooth wear was recorded using Grant's tooth wear stages (Grant 1982), and correlated with tooth eruption (Habermehl 1975). In order to estimate an age for the animals, the methods of Halstead (1985), Payne (1973) and O'Connor (1988) were used for cattle, sheep/goat and pig respectively. Sex estimation was carried out on morphological traits on cattle and sheep/goat pelves, using data from Boessneck et al. (1964), Prummel and Frisch (1986) and Vretemark (1997). Further, the presence/absence of deer antlers and medullary bone in bird bones were used to sex cervid and avian remains. Measurements were taken according to von den Driesch (1976) using digital callipers with an accuracy of 0.01mm. Large bones were measured using an osteometric board, with an accuracy of 1mm.

Sieved samples from Passingford Bridge Flood Alleviation, Upminster Bund and Pond 1609 were recorded during the assessment stage. The sieved samples from securely phased contexts from Hobbs Hole were scanned and bones from bird and fish extracted, as well as mammal bones identifiable to species. The extracted bones comprised 21 fragments (4.3% of the total fragment count from the sieved samples). The remaining bones mostly consisted of small unidentifiable fragments.

Junction 29, Hobbs Hole

The preservation was varied, but the bones were generally well or fairly well preserved. The presence of gnaw marks from carnivores (3.9% of the total assemblage) suggests that butchery and kitchen waste had been disposed of rapidly and securely. Burning would not have been a common method of waste disposal, as evidenced by the scarcity of burnt bones (0.7%).

The faunal assemblage contained bones from the late Bronze Age/early Iron Age up to the Anglo-Saxon period. The species present include cattle (*Bos taurus*), sheep/goat (*Ovis aries/Capra hircus*), pig (*Sus domesticus*), horse (*Equus caballus*), dog (*Canis familiaris*), red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), domestic fowl (*Gallus gallus domesticus*) and ?gull (*Laridae*) (Table 30).

Only the late Roman assemblage was sufficiently large to give reliable information on the utilisation of animals. As is common, domestic mammals dominate; game is only found in the middle/late Roman and late Roman assemblages. The bones, a red deer axis and a roe deer skull from the middle/late Roman period and a red deer metacarpal from the late Roman period, represent remains of hunting. This was mainly a social activity rather than something necessary for subsistence. Most cattle were sub-adult or adult when slaughtered. There were too few ageable bones from sheep/goat and pig to provide even a tentative ageing profile. One humerus from a juvenile calf and one femur from a neonatal piglet were recovered from the early/middle Roman assemblage. They may represent deliberate slaughter, possibly as delicacies for feasting, but may also be natural mortalities.

Butchery marks were recorded on one cattle scapula from the early/middle Roman period and one cattle tarsal bone from the middle/late Roman period. The former presents an indication of the use of Roman military/urban butchery methods, as the spina had been chopped off the scapula. This was part of the procedure for removing meat quickly from the shoulder with the use of a cleaver (Maltby 2007, 71). Whether the same butchery procedure was in use on rural sites, or whether such scapula fragments represent purchased cured shoulder cuts from urban markets is unknown. Cut marks suggesting disarticulation or skinning were recor ded on the middle/late Roman tarsal bone.

The late Roman (Phase 7) assemblage is strongly dominated by cattle bones (Table 31). While the total number of fragments for the main domesticates (cattle, sheep/goat and pig) is fewer than 300, the required number for a secure comparison (cf. Hambleton 1999, 39–40), a predominance of cattle bones is common for many contemporary sites in south-eastern England. Nevertheless, the frequency of cattle bones from Hobbs Hole is substantial even among the comparative sites. Other animals present in the assemblage include sheep/goat, pig, horse, dog, red deer, domestic fowl and ?gull. Sheep/goat, pig and domestic fowl would have contributed to the diet, but also in the case of sheep/goat, yielded wool and dairy products, and in the case of domestic fowl, eggs and feathers/down. Domestic fowl were also used for cock fighting. Horse and dog were used as working animals: horses as riding and/or pack animals and dogs as guarding dogs, herding dogs or ratters. The presence of a red deer metacarpal suggests that the inhabitants took part in the occasional hunt. A coracoid bone, tentatively identified as a small gull, probably represents

Species	Phase								
	2	3	4	5	5/6	6	6/7	7	8
Cattle	3		2	3	23	9	33	174	
Sheep/goat		1			15	4	3	24	4
Pig					1		1	11	
Horse						2		13	2
Red deer							1	1	
Roe deer							1		
Dog								4	
Domestic fowl								1	
Gull?								1	
Indet. bird								2	
Small mammal							1		
Medium mammal				1	2	4		16	
Large mammal				1	9	6	14	130	9
Indeterminate	10	1	2	17	20	27	88	296	36
Total fragment count (NISP)	**13**	**2**	**4**	**22**	**70**	**52**	**142**	**673**	**51**
Total weight (g)	**12**	**4**	**47**	**93**	**1598**	**556**	**2839**	**9763**	**214**

TABLE 30: Animal bone: number of identified fragments by species and phase, Hobbs Hole (M25001.08/09)

	Cattle	Sheep/ goat	Pig	Horse	Red deer	Dog	Domestic fowl	Gull?	Indet. bird	Medium mammal	Large mammal	Indet.
Horncore	2											
Skull						1						
Mandible	50		1			1						
Loose teeth	62	14	9	6		2					3	1
Vertebra											10	
Rib										2	23	
Coracoid								1				
Scapula	2			1							3	
Humerus	4	1	1									
Radius	4	2									1	
Ulna	1											
Carpal	2											
Metacarpal	11	2			1							
Carpo-metacarpus									1			
Pelvis	9											
Femur	3						1					
Tibia	2	2										
Calcaneus	1											
Astragalus	4											
Tarsal	1											
Metatarsal	7	2										
Phalanx 1	6											
Phalanx 2	1	1							1			
Phalanx 3	1											
Indet. metapodial	3			2								
Longbone				4						14	88	
Indet.											2	295
Total count	**176**	**24**	**11**	**13**	**1**	**4**	**1**	**1**	**2**	**16**	**130**	**296**
Total weight (g)	**6440**	**134**	**69**	**172**	**64**	**101**	**2**	**<1**	**<1**	**44**	**1509**	**1228**

TABLE 31: Animal bone, Hobbs Hole (M25001.8/09), Phase 7. Anatomical distribution of all species, including fragment count and weight

Species	Tooth wear stages				MWS	Estimated age
	dp4	M1	M2	M3		
Cattle	j	f	b		19–20	18–30 months
				c	32–35	30–36 months
		j	k	g	41	Adult
		k	k	g	42	Adult
		m	j	j	46–47	Old Adult
				j	45–47	Old Adult
				j	45–47	Old Adult
				l	49–52	Senile
Sheep/goat				d	32–34	2–3 years
				e	33–38	3–4 years
				g	36–46	4–8 years
				g	36–46	4–8 years
				g	36–46	4–8 years

TABLE 32: Hobbs Hole (M25001.08/09). Dental analysis of cattle and sheep/goat, using Grant (1982), Halstead (1985) and Payne (1973)

	Cattle		Sheep/goat		Horse	
	N	% unfused	N	% unfused	N	% unfused
Early fusion	10	100%	2	100%	1	100%
Mid fusion	15	100%	1	100%		
Late fusion	3	67.7%				

TABLE 33: Epiphyseal fusion of cattle, sheep/goat and horse from Hobbs Hole (M25001.08/09)

Phase	Species	Element	Female	Male	Castrate
5/6	Sheep/goat	Pelvis	1		
6	Cattle	Pelvis	1		
6/7	Roe deer	Skull		1	
7	Cattle	Pelvis		1	1
7	Domestic fowl	Femur	1		

TABLE 34: Sexed bones from Hobbs Hole (M25001.08/09)

Species	Bone	Phase	Bd
Cattle	Metacarpal	3	69.0
		6/7	66.5
		7	59.6
		7	65.7
		7	66.7
	Metatarsal	5/6	56.4
		7	51.4
		7	58.2
	Tibia	7	56.8
Sheep/goat	Tibia	7	25.2

TABLE 35: Measurements of cattle and sheep/goat from Hobbs Hole (M25001.08/09)

accidental or natural death, although it is possible that seabirds were occasionally eaten in Roman Britain.

The skeletal element representation shows that the cattle remains are dominated by fragmented mandibles and loose teeth. Excluding these, the frequencies of bones from the meat-rich parts and the meat-poor lower legs are similar. There are too few remains from other species to study element representation, but bones from meat-rich and meat-poor body parts are found from both sheep/goat, pig and horse.

The cattle assemblage contains ageable teeth from sub-adult up to senile animals, with a focus on older cattle. This is consistent with the epiphyseal fusion which suggests that most cattle were slaughtered as sub-adults or adults. The only ageable sheep/goat teeth came from adults (Tables 31–33). Juvenile remains were absent. A small number of bones from cattle, sheep/goat, roe deer and domestic fowl could be measured and/or sexed. The sample size is too small to yield any useful information regarding animal size, sex ratio and breed on the site. Data that were useful for comparison on a regional scale have been compiled in Tables 34–35.

Butchery marks were recorded on two cattle bones. There were also several cases of fragmented bones, but it was not possible to discern whether these happened during butchery or post-depositionally. A chopmark at the proximal end of a metatarsal suggests disarticulation of the lower leg. Transverse cutmarks on the neck of a cattle scapula probably derives from filleting.

Pathological conditions were recorded on two cattle and one sheep/goat cheek tooth from the late Roman assemblage. Both cattle teeth were worn unevenly, suggesting that the corresponding tooth in the upper jaw had been lost, or was missing from birth. The roots of the sheep/goat tooth were deformed with extra growths, possibly connected to long-term infection (Baker and Brothwell 1980, 150–1).

Passingford Bridge Bund/Flood Alleviation Area

The assemblage from Passingford Bridge Bund comprised twelve bones from a post-medieval ditch (1052) and consequently the analysis will mostly discuss the bones from Passingford Bridge Flood Alleviation Area. The bones were generally well or fairly well preserved. Gnaw marks from carnivores were found on a single bone in the late Roman assemblage from Passingford Bridge Flood Alleviation Area. Burnt bones were more common, indeed the Neolithic/middle Bronze Age and middle Iron Age assemblage consist only of burnt bones. This is less likely to reflect waste disposal practices, but instead poor bone preservation in the earlier phases, as burnt bone is more resistant to taphonomic destruction than unburnt bone. The late Iron Age/early Roman assemblage also contains a large amount of burnt bones (72.5%). Most of these bones came from sieved samples from two ditches (3193, 4436), which suggests that the increased recovery from samples would have disproportionately increased the number of burnt fragments from this period. Indeed, the vast majority of the burnt bones from Passingford Bridge comes from samples.

Identified species include cattle (*Bos taurus*), sheep/goat (*Ovis aries/Capra hircus*) and horse (*Equus caballus*) (Table 36). A single gnawed bone from the late Roman phase implies the presence of dog. The number of identifiable bones is very small in all phases and consequently no conclusions on animal husbandry strategies can be made. However, the scarcity of game is typical for post-Mesolithic sites (Grant 1989, 144; Yalden 1999).

Upminster Bund

Only three bones from Upminster Bund came from phased features. These remains include one large mammal bone from late Bronze Age/early Iron Age pit (1150) and two unidentifiable bones from late Bronze Age/early Iron Age ditch (1086). With the exception of a cattle tooth from pit (1026), the remaining bones from unphased features are unidentifiable to species.

Pond 1609

The assemblage from Pond 1609 comprises six bones from a total of three undated pits (1006, 1014, 1020). With the exception of two fragmented rabbit long bones, the bone fragments were unidentifiable to species and very small, weighing less than 1g each. As rabbits burrow, their bones may be later intrusions.

Pond 1812

The faunal remains include a cattle tooth from the fill of medieval tree throw (238) and two fragmented bones from large mammals from a post-medieval land-drain (184).

Pond 1824

The late Bronze Age/early Iron Age remains from Pond 1824 were in a poor condition, comprising of tooth fragments from cattle and sheep/goat as well as unidentifiable fragments from large mammals.

	Phase					
Species	**2**	**3**	**4**	**5**	**6**	**7**
Cattle			3	5	1	8
Sheep/goat		1				
Horse			1			
Medium mammal		13	14			1
Large mammal			7			5
Indeterminate	6	223	170	2		54
Total fragment count (NISP)	6	237	195	7	1	68
Total weight (g)	<1	27	112	26	<1	718

TABLE 36: Number of identified fragments by species and phase for Passingford Flood Alleviation Area (M25002.09)

Discussion

The animal bone assemblages from the sites along the scheme are rather small, and it is therefore unwise to make any elaborate analyses of animal husbandry at the settlements. Nevertheless, no assemblage speaks against a mixed subsistence economy in the Iron Age and Roman periods. At late Roman Hobbs Hole, the largest assemblage, cattle bones are numerous, comprising over 80% of the combined livestock remains. The cattle remains contain a large number of fragmented mandibles and loose teeth, suggesting that the predominance of cattle may not be as remarkable as the number of fragments first seem to imply. Teeth can easily fall out post-mortem and as they are very easy to identify to species, a fragmented mandible with loose teeth may be recorded as several fragments.

Cattle is the dominant animal in most late Roman assemblages from sites in the region. This pattern can also be found in Iron Age assemblages (Hambleton 1999, 46), suggesting that the local environment may have favoured cattle to sheep. Other factors may also have influenced animal husbandry practices, such as demand for particular produce, whether for market sales or taxation/tribute. A demand for either grain or beef would have prioritized cattle rearing to sheep or pig rearing, cattle being used as draught animals for the plough. Pig rearing was common in towns, where pork comprised a relatively large part of the diet, but seems to have been of minor importance on rural sites.

The limited ageing data from Hobbs Hole suggest that cattle were mainly slaughtered as sub-adults or adults, the former probably being surplus animals who would yield prime beef, and the latter animals past their prime as breeding, milking or draught cattle. There were too few ageable bones from sheep/goat or pig to give a picture of slaughter ages for these taxa. In the comparative rural and urban assemblages almost all cattle were slaughtered as adults, sometimes at an advanced age, supporting the hypothesis of increased agricultural production and consequently increased use of draught cattle. Sheep/goat seem to have been killed off as sub-adults and as adults. While wool was an important product, sheep were generally not kept for many years before slaughter, indicating that wool production was not a focus for sheep husbandry in this region. An exception was the villa at Chignall St James, where most sheep were 4–6 years old when killed. Pigs were, as is common, mostly slaughtered as sub-adults for their meat (Johnstone and Albarella 2002; Luff 1993).

Horse, dog and domestic fowl were kept in small numbers. Horses and dogs were normally not eaten. Horses were kept for their use as riding and pack animals, and dogs as working dogs and companions. Chickens were probably kept for eggs and feathers/down, with meat being a by-product, and some were used in cock fighting. Game was scarce throughout the assemblages, only present in the middle/late Roman and in the late Roman periods. This is consistent with evidence from contemporary sites, suggesting that hunting was a rare activity, possibly associated with specific occasions. It has been suggested that villa owners may have controlled hunting in the local area, as Roman villas usually contain a relatively large number of bones from wild fauna (King 1991, 18). However, game is entirely absent at the Chignall St James villa and only comprises 0.1% of the total speciable fragment count for the entire Roman period at Gorhambury villa (Locker 1990; Luff 1998).

The presence of a cattle scapula from with the spina chopped off by a cleaver suggests the use of Roman military and urban butchery methods in the early/middle Roman period. Small-scale use of cleavers for butchery is known from several rural sites, although it is not known whether this represents adoption of Roman butchery practices, the presence of retired professional butchers, or purchases of cured meat from urban centres.

CHARRED PLANT REMAINS by Sheila Boardman, with a contribution by Kath Hunter

Introduction

Some 102 bulk soil samples from Passingford Bridge Flood Alleviation Area and 43 samples Hobbs Hole were assessed for charred plant remains (Bonsall et al. 2012). Of these, 22 samples were selected for fuller investigation, either full analysis of the charred plant samples, or more detailed scans of the sample fractions. Two samples from Passingford Bridge came from Iron Age post-holes, and one came from an Iron Age pit. Four samples came from different ditch fills which span the late Iron Age to late Roman periods. Two samples came from a late Roman water-hole, and two were from unphased post-hole fills. The Hobbs Hole samples all came from Roman deposits. The earliest was from an early/mid-Roman quarry pit. There was a single sample from a middle/late Roman pit fill, and the remaining nine samples came from late Roman quarry pits, ditch fills and another pit. The results are discussed by site below. In addition, eight samples from Upminster Bund were also analysed. The charred plant investigation was undertaken in order to identify the following:

- The range of plant foods used at the sites
- Crop husbandry practices and changes over time, from the Iron Age to Roman periods, and during the Roman period
- Areas used for crop processing and food preparation during the Roman period (and possibly in the Iron Age)
- Evidence for the environment(s) in and around cultivated fields, from weed ecology, and with reference to other botanical remains from the sites
- Local and regional crop husbandry practices, on the basis of charred plant remains from Passingford Bridge, Hobbs Hole, and other sites in the region

Methods

Bulk soil samples were processed in the manner outlined in the charcoal report (below). Residue and flot fractions were sorted by eye or using a low power (×10–×20) binocular microscope for cereal grains and chaff, smaller seeds and other quantifiable remains. All identifications were carried out at magnifications of ×10–×40, using standard morphological criteria for the cereals (e.g. Jacomet 2006) and wild plants (e.g. Berrgren 1969; 1981), and by comparison with modern reference material. Classification and plant nomenclature follows Stace (2010).

The scanned samples from Passingford Bridge were investigated slightly differently due to time constraints. Flots were dry-sieved at 2mm and 1mm. The greater than 2mm flots were examined fully (as above). The 1–2mm and less than 1mm flots were further subdivided, using a riffle sample splitter, and measured fractions of each (generally 1/2–1/8)

were examined in detail. The fractions examined varied, both between samples and among the different sized flots (i.e. >2mm, 1–2mm, <1mm). For ease of comparison, therefore, the results from individual fractions have been multiplied to represent whole samples. All unsorted fractions were scanned for additional species, but it is possible that some rarer species were missed.

Results

The plant identifications are listed in Tables 37–39. The counts represent individual grains, seeds, fruits, etc., plus glume bases, rachis internodes and culm nodes of the cereals and grasses. Spikelet forks consist of two glume bases. Fragment counts are suffixed by F. Oat awns were very fragmentary so they have been roughly quantified using asterisks (see key for Tables 37 and 38). Scanned samples are clearly marked in Table 37 (above sample volumes).

The plant material from the Passingford Bridge and Hobbs Hole samples produced a range of cereals: spelt wheat (*Triticum spelta*), emmer wheat (*T. dicoccum*), bread wheat (*T. aestivum*), hulled barley (*Hordeum* sp.), including the six row species (*H. vulgare*), and oats (*Avena* sp.). A single, poorly preserved, lemma base from Passingford Bridge (sample 2051) was not identifiable to species, so it is unclear whether cultivated oats (e.g. *A. sativa*), wild oats (*A. fatua*, etc.) or both types are present.

Other cultivated plants are represented by a single fragment of probable pea (cf. *Pisum sativum*), and a few larger legume (Vicieae) fragments, which may include other crop species, such as celtic bean (*Vicia faba* var. *minor*). Wild, edible plants are represented by hazelnut (*Corylus avellana*) fragments from a single sample (2127) from Passingford Bridge. This sample also produced uncharred (waterlogged) hazelnut shell fragments, and a fruit stone fragment of probable wild cherry (*Prunus* cf. *avium*). The latter was also represented by wood charcoal at Passingford Bridge and Hobbs Hole (below).

Passingford Bridge Flood Alleviation Area

(Table 37)

Iron Age (Phase 3)

Two post-holes (2152 and 2161) produced predominantly cereal grains. These were largely wheat (*Triticum* sp.), but hulled barley and a few oat/probable oat grains were also present. Two free threshing type wheat grains were present in each sample. Sample 2013 produced the largest number of barley grains from all the Section 4 sites. Definite oat grains are represented by a few grains. The post-hole fills produced very few wild plants, mostly from larger-seeded taxa such as the brome grasses (*Bromus* spp., cf. *Anisantha sterilis*).

The other Iron Age sample, from pit 3519, had a more even mixture of cereal grains and chaff, and many wild plant species were present. The latter again included larger seeded taxa, such as brome grasses, plus a range of twining plants, including the Fabaceae (e.g. *Vicia/Lathyrus*) and cleavers (*Galium aparine*). Smaller seeded plants are represented by rushes (*Juncus* spp.), and low growing plants are represented by docks (*Rumex* spp.) The cereals included spelt wheat, some probable emmer wheat, free threshing wheat (all probably bread wheat – *T. aestivum*), plus hulled barley and oats.

Late Iron Age–early Roman (Phase 4 and 5)

Sample 2045 from an intervention through Phase 5 ditch 3677 had a mixture of cereal grains (wheat and barley), wheat chaff (mostly/all spelt) and wild species. Most numerous among the last named were the knotweed (Polygonaceae) and goosefoot families (Amaranthaceae). The other sample (2127), from an intervention through Phase 4 enclosure ditch 4251 produced largely mixed cereal grains (including spelt, possible emmer, free threshing wheat and oats). There was very little barley in any later Roman samples from Passingford Bridge. The mixed nature of this assemblage is emphasised by a small deposit of charred hazelnut shell fragments, which were accompanied by uncharred fruit remains of hazelnut and wild cherry.

Late Roman (Phase 7) water-hole 3652

Of the two samples studied here, only one (2051) was fully analysed for charred plant remains. Sample 2051 was much richer than sample 2098, but the range and proportions of material (species, and ratios of grains: chaff: weeds) were similar in the two samples. Both were dominated by spelt glumes, and there were a few grains (and/or chaff fragments) of emmer wheat, oats, free threshing wheat and barley. Many wheat grains, particularly from sample 2098, showed signs of germination. There were a number of detached, sprouted embryos (coleoptiles). Some of these were 6mm-plus in length. The presence of sprouted grains/embryos could indicate malting of cereals (Hillman 1982), or that some grain had germinated as it was being dried to prevent further damage (and accidentally became charred), or it was deliberately destroyed. The presence of quantities of malted spelt has been noted at Springhead and Northfleet in Kent (Stevens 2011; Smith 2011), and at sites across the country (van der Veen 1989). It seems to be more common at sites located close to villas or roadside towns. Unfortunately, the numbers of clearly sprouted wheat grains and embryos in the Passingford Bridge samples were not large, so naturally sprouted (spoiled) grain is also a possibility. The wild plants in these samples included various legumes (*Vicia/Lathyrus*, Fabaceae, etc.), knotgrasses (*Polygonum aviculare*), docks (*Rumex* spp.) and grasses (Poaceae).

Unphased deposits

Both samples here produced almost pure deposits of cereal grains. These seem to be largely or all from spelt wheat but there were few chaff fragments present to confirm this.

Passingford Bridge Bund (Table 37)

Sample 1002 from an intervention through Phase 7 ditch 1123 produced more than twice as much cereal chaff as grains. Only one cereal was clearly identified – spelt wheat. There were a few weeds, including docks and grasses (Poaceae). Sample 1000 from ditch 1028 which was broadly phased to the Roman period, was one of the richest samples from the site. Wheat chaff outnumbered wheat grains by more than twelve to one. The dominant cereal was spelt, but moderate numbers of emmer chaff, together with isolated grains of barley and oats, were recovered. There were relatively few seeds of wild plants. These were similar to before, with many docks and/or grasses.

Sample		2011	2013	2041	2045	2127	1002	1000	2051	2098	2040	2043
Context		2153	2163	3520	3605	4302	1033	1036	3653	3654	3197	3301
Feature		2152	2161	3519	3600	4301	1027	1028	3652	3652	3196	3300
Feature type		Post-hole	Post-hole	Pit	Ditch	Ditch	Ditch	Ditch	Water-hole	Water-hole	Post-hole	Post-hole
Phase(s)		3	3	3	5	4	7	Roman	7	7	Unphased	Unphased
Period		MIA	MIA	IA	ER	LIA	LR	Roman	LR	LR		
Analysis		Full	Full	Scan	Scan	Scan	Scan	Full	Full	Scan	Scan	Scan
Litres		10	7	20	35	40	20	20	30	30	20	10
Cereal grain												
Triticum spp.	free threshing type wheat grain	2	2			5		2	8	1	4	
Triticum spp.	wheat grain	44	142	18	13	85	25	74	78	10	90	150
Hordeum vulgare	barley, hulled twisted grain								1			
Hordeum sp.	hulled barley	7	30	11	12			2	2	1	1	2
Hordeum sp.	barley	2	17								1	5
cf. Hordeum sp.	cf. barley							1				
Avena sp.	oat grain		1	6		45		4	58	4	6	5
cf. Avena sp.	cf. oat	2	1					1	5	1		
Avena/Bromus	oat/brome grass		1	1	4	9		2	12	8		
Cereal indet.	indet. cereal grain	43	55	26	12	35	20	61	52	8	44	25
Cereal indet.	detached embryos/coleoptiles						1	3	17	8		
Cereal indet./large grass	cereal/large grass								2	4		
Cereal chaff & straw												
Triticum aestivum	bread wheat type rachis								4			
Triticum cf. *aestivum*	cf. bread wheat type rachis								7			
Triticum cf. *dicoccum*	emmer wheat glume base	1				1		2				
Triticum spelta	spelt wheat glume base					1	20	97	215	40	4	
Triticum spelta	spelt wheat spikelet fork							5	9	1		
Triticum cf. *spelta*	cf. spelt glume base			1	4		5		134	16		
Triticum cf. *spelta*	cf. spelt spikelet fork				2				4			
Triticum dicoccum/spelta	emmer or spelt, glume base	1	1	10	28	3	75	783	1335	68		
Triticum dicoccum/spelta	emmer/spelt, spikelet fork			3				10	1	8		
Triticum sp.	free threshing cereal rachis			1					10	16		
Triticum sp.	glume wheat rachis							20	153			
Triticum sp.	basal rachis internode								2			
Hordeum sp.	barley rachis								1			
Hordeum sp.	lemma base								1F			
Avena sp.	lemma base								1			
Avena type awns	awns	**					*	**				
Cerealia indet	indet rachis (basal internode)								1	1		
Cerealia indet	cereal culm base			1	1							
Large grass/small cereal	culm node				2				2			
Other edible plants												
Vicieae (*Vicia/Lathyrus/Pisum*)	pea/bean			1	2				1			
Corylus avellana	hazelnut shell fragments					30F						

Sample		2011	2013	2041	2045	2127	1002	1000	2051	2098	2040	2043
Context		2153	2163	3520	3605	4302	1033	1036	3653	3654	3197	3301
Feature		2152	2161	3519	3600	4301	1027	1028	3652	3652	3196	3300
Feature type		Post-hole	Post-hole	Pit	Ditch	Ditch	Ditch	Ditch	Water-hole	Water-hole	Post-hole	Post-hole
Phase(s)		3	3	3	5	4	7	Roman	7	7	Unphased	Unphased
Period		MIA	MIA	IA	ER	LIA	LR	Roman	LR	LR		
Analysis		Full	Full	Scan	Scan	Scan	Scan	Full	Full	Scan	Scan	Scan
Litres		10	7	20	35	40	20	20	30	30	20	10
Wild plants												
Vicia/Lathyrus	vetch/tare (> 2mm)			6								
Vicia/Lathyrus	vetch/tare (< 2mm)			26	2						4	
Melilotus/Medicago/Trifolium	small seeded legume					1				4		
Fabaceae undiff.	small seeded legume			2	2	1			4			
Agrimonia cf. *eupatoria*	agrimony									1		
Brassica sp.	cabbage, mustard, etc										2	
Persicaria maculosa	redshank			2		6						
Polygonum aviculare type	knotgrass			3	6				8			
Polygonum cf. *aviculare* type	cf. knotgrass			4								
Fallopia convolvulus	black bindweed				1							
Rumex acetosella	sheep's sorrel			2	2		?	1				
Rumex acetosa	common sorrel			4	3			3				
Rumex spp.	docks			8	2	1	5	4				
Chenopodium album type	fat hen		1	3	11	1				8	4	1
Chenopodium sp.	goosefoot				2							
Chenopodium/Atriplex	goosefoot/orache				2					1	2	
Montia fontana cf. ssp. *chondrosperma*	blinks					1						
Galium aparine	cleavers			1								
Plantago lanceolata	ribwort plantain			1	2							
Juncus sp.	rush			43								
Carex sp.	sedge, three sided nutlet			1		1	?					
Bromus spp.	brome grasses		3	7		2		2	18	4	4	1
cf. *Anisantha sterilis*	barren brome		1									
Poaceae undiff.	grass family large seeds			4		1	6	4		4		
Poaceae undiff.	grass family medium seeds			3			5	2	4			1
Poaceae undiff.	grass family small seeds			10	2		?	1				
Poaceae undiff.	grass family, culm node						?		8	4		
Indeterminate	seed/fruit/nut	1	1	2	2	5	6	3	4	5	4	2

TABLE 37: Charred plant remains from Passingford Bridge Bund and Passingford Flood Alleviation Area (M25002.09). Key: F – fragment(s), * 1–5 items/frags.; ** 6–10; *** 11–20; **** 21–50; **** 51–100+

Junction 29, Hobbs Hole (Table 38)

Mid–late Roman (Phase 6–7) pits

The six samples from the quarry pits located in the northern area all appear to be very similar and are shown in Table 38. All were heavily chaff dominated and, as at Passingford Bridge, the main species was spelt wheat (*Triticum spelta*). Twenty-one oat grains were present in one sample (107) but this contributed a tiny proportion to the overall remains (which included a thousand plus wheat chaff fragments). Elsewhere, cereal species other than wheat were represented by a mere 1–5 grains, and occasional chaff fragments. These included free threshing wheat, all probably bread wheat (*Triticum aestivum*), barley (*Hordeum* sp.) and oats (*Avena* sp.). Although the numbers of seeds were low, there was a slightly wider range of wild plant remains in these samples, as compared to those from Passingford Bridge. Additional species included lesser stitchwort (*Stellaria* (cf.) *graminea*), mint (*Mentha* sp.), stinking chamomile (*Anthemis cotula*), scentless mayweed (*Tripleurospermum inordorum*) and rye grass or fescue (*Lolium/Festuca*). The other quarry pit sample (118, pit 7012) was also spelt chaff dominated, and it produced greater numbers of remains of oats and brome grasses. There were many detached and sprouted embryos present, and a larger number of seeds of wild species than in most of the other Section 4 samples.

Sample 132 came from a fill of middle or late Roman pit 7054, while sample 124 was from late Roman pit 6015. Sample 132 was the richer of the two and was spelt chaff dominated. It had moderate amounts of oats, brome and indeterminate cereal remains, with but very few weeds seeds. Sample 124 produced modest amounts of material, with spelt chaff and a few weeds, but very little cereal grain.

Late Roman (Phase 7) ditches

Two samples came from late Roman ditch fills. Sample 110 produced a little grain and chaff, with occasional weed seeds. Sample 147 was richer and with more spelt chaff overall, plus a few cereal grains and weed seeds. The latter included stinking chamomile (*Anthemis cotula*) and brome grasses.

UPMINSTER BUND by Kath Hunter

An assessment of the charred plant remains from Upminster Bund was carried out by Denise Druce (2012). The remains from eight samples were processed by flotation, with the flot collected on a 250µm sieve and the residue on a 500µm sieve. The flot and residue were scanned and the results described and assessed (Druce 2012). The assessment indicated that one of the samples, 106 from context 1169, pit 1168, produced an assemblage of charred cereals with weed seeds and a fruit stone. A single wheat grain was submitted for radiocarbon dating, and a date of cal. AD 690–881 (1230±27, 95.4%; SUERC-43696) was returned. The present author re-examined the remaining flot, confirmed the identifications, and quantified the preserved plant remains (Table 39). The nomenclature for these remains follows Stace (2010). The combination of free-threshing wheat (*Triticum* sp.) with rye (*Secale cereale*), the large cereal weed corn cockle (*Agrostemma githago*) and the lack of cereal chaff is a characteristically post-Roman assemblage. Though rye and corn cockle first appear in archaeological assemblages during the Iron Age and Roman period, their occurrence in charred assemblages increases significantly in Britain from the Saxon period onwards (Carruthers and Hunter forthcoming). The charred assemblage may represent the disposal or accumulation of cereal processing waste. The single sloe stone (*Prunus spinosa*) may represent a fruit that was gathered with wood for fuel or as a potential food resource.

Discussion

Crop husbandry – the economic plants

A fairly consistent range of cereal species was present in samples from Passingford Bridge and Hobbs Hole. By the early Roman period, if not earlier, these seem to be dominated by spelt wheat. The introduction of spelt wheat is generally associated with the cultivation of heavier soils (Jones 1981). In this region, it has been interpreted as evidence for the (increasing) cultivation of the heavy Essex boulder clays (e.g. Carruthers 2007; Carruthers 2008). Spelt may have been grown initially as a maslin crop, with emmer wheat, which overtime and with increasing cultivation of areas to which it was more suited, gradually came to dominate (van der Veen and O'Connor 1998). Elsewhere, the uptake of spelt seems to have been more deliberate and abrupt. If the transition to spelt as the dominant crop was largely completed by the late Iron Age–early Roman period, at Passingford Bridge and Hobbs Hole it possibly took place much earlier. There were few chaff remains in the Iron Age samples from Passingford Bridge, so it is uncertain which (wheat/other) crops were being grown at this time.

Weeds associated with the cultivation of heavier ground, for example stinking chamomile (*Anthemis cotula*) (Greig 1991), do not appear prior to the late Roman period at Hobbs Hole, but the aerodynamic seeds of these and other species may have been largely removed from the spelt crops during threshing and winnowing. Plants associated with damp conditions, for example mint (*Mentha* sp.) and blinks (*Montia fontana*), were present in very low numbers from the late Iron Age/early Roman period at Hobbs Hole and Passingford Bridge.

Taxa	Common name	Element	Count (frags)
Triticum sp.	wheat (free threshing type)	grain	35
cf. *Triticum* sp.	possible wheat type	grain	6
Secale cereale	rye	grain	8
cf. *Secale cereale*	possible rye	grain	2
	cereal NFI	grain fragments	5
Prunus spinosa	blackthorn	stone	1
Agrostemma githago	corn cockle	seed	4

TABLE 39: Plant taxa from Sample106, Context 1169, Upminster Bund (M25008.09)

Sample		109	108	107	114	144	143	124	110	132	147	118
Context		5085	8099	5098	5162	6073	6072	6016	5133	7055	7233	7014
Feature		5083	5096	5096	5161	6071	6071	6015	5132	7054	7231	7012
Feature type		Quarry pit	Quarry pit	Quarry pit	Quarry pit	Quarry pit	Quarry pit	Pit	Ditch	Pit	Ditch	Quarry pit
Phase(s)		6	7	7	7	7	7	7	7	6/7	7	7
Period(s)		MR	LR	LR	LR	LR	LR	LR	LR	M/LR	LR	LR
Area		E	E	E	E	E	E	E	E	W	W	W
Litres		40	40	40	40	40	40	40	40	40	40	40
Cereal grain												
Triticum spp.	free threshing type wheat grain			5				1			1	1
Triticum spp.	wheat grain	1	9	21	3	2	1	6	1	5	5	9
cf. *Triticum* sp.	cf. wheat grain						1	1		1		
Hordeum vulgare	barley, hulled twisted grain	1		1								
Hordeum vulgare	barley, hulled straight grain			2								
Hordeum sp.	hulled barley		2	2						1		1
Hordeum sp.	barley								1	2		
cf. *Hordeum* sp.	cf. barley											1
Avena sp.	oat grain		1	21	4	1	1	1	3	9	1	44
cf. *Avena* sp.	cf. oat						2			3	1	4
Avena/Bromus	oat/brome grass			4	1		1	1F			1	27
Cereal indet.	indet. cereal grain	5	7	9	2	2	4	6	3	5	10	9
Cereal indet.	detached embryos & coleoptiles		2	12	1	4	1	1	2	5	2	10
Cereal indet./large grass	cereal/large grass		2						1		1	4
Cereal chaff & straw												
Triticum spelta	spelt wheat glume base	70	47	470	6	41	25	18	3	60	31	137
Triticum spelta	spelt wheat spikelet fork							2		1		1
Triticum cf. *spelta*	cf. spelt glume base	26	31	150	4	22	10	9	2	41	15	20
Triticum cf. *spelta*	cf. spelt spikelet fork					2				1		
Triticum dicoccum/spelta	emmer or spelt, glume base	100	120	415	14	67	25	21	5	200	60	165
Triticum dicoccum/spelta	emmer/spelt, spikelet fork			2					2			1
Triticum cf. *aestivum*	cf. bread wheat type rachis			1					1	1	1	
Triticum spp.	glume wheat rachis	16+	20	120	8	20	5		1	20+		100+
Avena sp.	awns (present)		**	****	*	**	*	***		***		**
Cerealia indet	cereal culm node			1	2	1						
Cerealia indet	cereal awns									****		
Pulses, edible plants												
cf. *Pisum sativum*	cf. pea							1				
Vicieae	Vicia/Lathyrus/Pisum	1		1								
Wild plants												
Ranunculus acris/repens/ bulbosus	meadow/creeping/bulbous buttercup											4
Vicia/Lathyrus	vetch/tare (>2mm)							1				
Vicia/Lathyrus	vetch/tare (<2mm)	1		1		1		2	1	2	3	

Sample		109	108	107	114	144	143	124	110	132	147	118
Context		5085	8099	5098	5162	6073	6072	6016	5133	7055	7233	7014
Feature		5083	5096	5096	5161	6071	6071	6015	5132	7054	7231	7012
Feature type		Quarry pit	Quarry pit	Quarry pit	Quarry pit	Quarry pit	Quarry pit	Pit	Ditch	Pit	Ditch	Quarry pit
Phase(s)		6	7	7	7	7	7	7	7	6/7	7	7
Period(s)		MR	LR	LR	LR	LR	LR	LR	LR	M/LR	LR	LR
Area		E	E	E	E	E	E	E	E	W	W	W
Litres		40	40	40	40	40	40	40	40	40	40	40
Melilotus/Medicago/Trifolium	small seeded legume	2		6	3		2	2	1	1		1
Fabaceae undiff.	small seeded legume		1	3	2		2	1		1	1	3
Aphanes arvensis	parsley piert									1		
Polygonum aviculare type	knotgrass			1	2							
Polygonum cf. *aviculare* type	cf. knotgrass											
Rumex acetosa	common sorrel			1								
Rumex cf. *crispus*	curled/broad-leaved dock			1								
Rumex spp.	docks		2	7	2	1		1		2	1	
Polygonaceae undiff.	knotweed family			1	1							
Stellaria cf. *graminea*	lesser stitchwort	2			2							
Silena cf. *alba*	cf. white campion								1			
Caryophyllaceae undiff.	pink family										1	
Chenopodium album type	fat hen			3	1	1	1		1			8
Chenopodium sp.	goosefoot			6	1							
Chenopodium/Atriplex	goosefoot/orache											
Plantago lanceolata	ribwort plantain			3	2						1	
Mentha sp.	mint	2										
Lamiaceae undiff.	dead nettle family											1
Anthemis cotula	stinking chamomile			9	2					2	2	1
cf. *Anthemis cotula*	cf. stinking chamomile		1		1							
Tripleurospemum inodorum	scentless mayweed			3			1					
Asteraceae undiff.	daisy family											1
Lolium sp.	rye grass											4
Lolium/Festuca	rye grass/fescue				1			1				
Poa/Agrostis/Phleum spp.	meadow grasses/bents/cat's tails						2	1	1			
Bromus spp.	brome grasses	1		2	2	1	1				3	38
Poaceae undiff.	grass family large seeds			3								
Poaceae undiff.	grass family medium seeds			9	2					1		13
Poaceae undiff.	grass family small seeds	2	2	3	3	1	1			3	3	8
Poaceae undiff.	grass family, culm node								3			1
Indeterminate	seed/fruit/nut	2	3	4	4	3	1	2	1	1	1	8

TABLE 38: Charred plant remains from Junction 29, Hobbs Hole (M25001.08/09). Key: F – fragment(s), * 1–5 items/frags.; ** 6–10; *** 11–20; **** 21–50; **** 51–100+

Increasing numbers of free threshing-type grains and bread wheat chaff during the Roman period at Stansted (Carruthers 2008) and sites on the A120 in Essex (Carruthers 2007) have also been linked to the cultivation of damper ground, for example at low-lying Rayne Roundabout on the A120 (Carruthers 2007). A few free threshing-type wheat grains were found in the Iron Age samples from Passingford Bridge, and bread wheat chaff and/or free threshing-type wheat grains were present in several late Roman deposits from Passingford Bridge and Hobbs Hole. The low numbers of free-threshing wheat grains at Passingford Bridge, and those of barley, must partly reflect preservation biases. Diagnostic free-threshing cereal chaff was most likely removed (with straw) during threshing and winnowing, before these crops reached settlement sites (Hillman 1981; 1984). Fire is not routinely used in processing free-threshing cereals. Traditionally, emmer and spelt spikelets were parched to make their glumes brittle, and so aid dehusking (Hillman 1981; 1984). In addition, the lighter chaff of barley and bread wheat are less likely to survive charring than the glumes of emmer and spelt, or cereal grains (Boardman and Jones 1990). For similar reasons, and due to identification issues, legume crops are also likely to be under-represented in charred assemblages.

At the A120 sites and Stansted, the numbers of barley grains noticeably decreased between the late Iron Age/early Roman period and the late Roman period. According to Carruthers, this may reflect the switch from barley to oats as the main fodder crop around this time (Carruthers 2007; Carruthers 2008). There seems to be a general decrease in barley grains and an increase in oat grains at Passingford Bridge and Hobbs Hole, but this should be regarded as tentative, particularly at Hobbs Hole with so few barley or other remains overall. Oats are better able to withstand poor, damp and acidic soils than barley (Carruthers 2008). Several late Roman samples from Stansted also produced remains of possible hay, including grass stems, seeds of sedge (*Carex* sp.), sheep's sorrel (*Rumex acetosella*) and other damp meadow species (Carruthers 2008). The presence of similar species may indicate that collected grassy material contributed to the plant assemblages from Passingford Bridge and Hobbs Hole. However, the low numbers of such remains could also indicate that crops were being grown in areas that were previously given over to grass.

Notable absences from the Roman deposits from Passingford Bridge and Hobbs Hole were imported crops (e.g. lentil), imported exotic fruits and nuts (e.g. grape, fig, walnut, etc.), and herbs and spices (e.g. coriander, dill, etc.) (Willcox 1977). This may reflect the types of deposits sampled and analysed, that is, those that were visibly rich in cereal remains. Roman exotic plants are also more common in waterlogged deposits on urban sites and villas, including drains and cesspits. Waterlogged features at Passingford Bridge were largely water-holes, which we would not expect to produce exotic plant remains. Exotic plants were largely absent from other sites in the region (see below), which must in part reflect the rural nature of the local economy. A single waterlogged plum (*Prunus domestica*) stone was recovered from the Olympic Park site (Wyles et al. 2012). Native hedgerow species were also poorly represented at Passingford Bridge and Hobbs Hole. Finds from neighbouring sites have included charred/waterlogged hazelnut (*Corylus avellana*), bramble (*Rubus* sect. 2 *Glandulosus/R fruticosus*), elderberry (*Sambucus nigra*), rose (*Rosa* sp.), hawthorn (*Crataegus monogyna*), wild cherry (*Prunus avium*) and possible wild strawberry (cf. *Fragaria vesca*) (Carruthers 2007; Carruthers 2008; Wyles et al. 2012). In contrast, the villa at Great Holts Farm, Boreham, produced remains of chestnut (*Castanea sativa*), walnut (*Juglans regia*), stone pine (*Pinus pinea*), olive (*Olea europaea*) and grape (*Vitis vinifera*), as well as hazelnut, apple (*Malus* sp.), hawthorn, possible bird cherry, sloe (*Prunus spinosa*) and plum (*Prunus domestica*) (Murphy 2003).

A wild plant of possible note was agrimony (*Agrimonia* cf. *eupatoria*), a seed head of which was recovered from a residue fraction of one Passingford Bridge sample (2098). This plant has a range of medicinal uses, including as an antidote to snake bites or to treat dysentery (Grigson 1975), and is sweet smelling when crushed (Clapham et al. 1987). It is also a plant of hedgebanks, roadsides and field edges, and the hooked, burr-like seed heads easily attach themselves to passing animals and humans, so may not have been deliberately collected.

Crop husbandry – wild plants

Some of the most common taxa in the Passingford Bridge and Hobbs Hole assemblages were docks (*Rumex* spp.), vetch/tare (*Vicia/Lathyrus*), other small legumes (including melilot/clover/medick – *Melilotis/Medicago/Trifolium*, and other Fabaceae), and brome/chess (*Bromus* spp.). The small-seeded legumes generally indicate soils with low nitrogen content, but many of these species are known to decline rapidly when nitrogen is increased, for example through manuring (Carruthers 2008). At Hobbs Hole, small legume seeds were sporadically present throughout the samples. At Passingford Bridge, one Iron Age sample (2013) produced significantly more seeds of vetch/tare and other small legumes, but there were fewer such remains generally in the Roman samples, possibly pointing to more effective methods of increasing nitrogen, or changes in weeding practices.

The numbers of seeds of brome grass and other invasive taxa, such as rye grass (*Lolium* sp.), in the Section 4 samples remained similar or increased slightly over time. This suggests that the inhabitants of Passingford Bridge and Hobbs Hole did not become more efficient at weeding their cereal crops. Their heights, and those of other tall weeds such as knotgrass (*Polygonum aviculare*), mean hand weeding would have been required. The latter also would have been necessary to remove twining plants, such as small legumes and cleavers (*Galium aparine*). In contrast, docks are not easily removed by hand-weeding. They are perennial weeds with long tap-roots which will regrow if small sections are left behind. Large numbers of dock seeds may point to autumn sowing of spelt crops, as autumn ploughing would have given perennial docks a head start on spring germinating annual weeds (Carruthers 2008).

On site crop processing activities

A majority of the samples from Hobbs Hole were chaff rich, or chaff and weed rich, so they must represent crop processing waste. The moderate quantities of material and sample constituents (that is, largely glume wheat chaff with/without a few large seeded weeds) are consistent with piecemeal dehusking of spelt crops, carried out as required. These types

of deposit are most common on prehistoric sites but are seen less often on middle and late Roman sites, where grain rich or grain and chaff rich samples seem to be the norm (Stevens 2003). While they were not rich in plant remains, the Iron Age samples from Passingford Bridge had more grain than chaff, and one sample (2041) was grain and weed rich. Grain-rich samples may represent cleaned grain that was accidentally burnt during food preparation or when it was heated to halt germination. Charred grain also may have been deliberately burnt to destroy pests, etc. (Hillman 1981; 1982; 1984; Carruthers 2008; Stevens 2003). Of the phased samples from Passingford Bridge, only one (2127) was more grain rich, but the overall quantity of material was low. Sample 2041 had more cereal grain and weed seeds than chaff, so might represent accidents with partially cleaned grain, or the charring of ears or whole spikelets from which some chaff has been lost due to differential preservation (Boardman and Jones 1990). The remaining samples were chaff- and grain-rich (2045, 1002), or chaff-rich (1000, 2051, 2098). Grain- and chaff-rich samples may represent accidental charring of whole ears or spikelets during parching and so on, and chaff rich samples are probable crop processing (dehusking) debris. Two chaff-rich samples (2051 and 1000) produced larger quantities of plant material, but few inferences about the site and organisation of crop processing can be made from a single ditch fill and a water-hole, other than that these were used as refuse locations for crops processed nearby.

Other sites

There is limited evidence for Bronze Age or early Iron Age agriculture in the region, as compared to the later Iron Age and Roman periods. At Bronze Age Greenfields, on the A120 in Essex (Timby et al. 2007), emmer and spelt were found in roughly equal proportions and barley was present throughout. Low numbers of remains and the few leguminous weeds or remains of plants associated with damp conditions suggests fairly low intensity cultivation focused of the better-drained, more fertile soils in the area (Carruthers 2007). A similar range of crops was recovered from three Iron Age sites on the A120, but local differences are beginning to emerge. Barley was less frequent or absent at Iron Age sites, and spelt (particularly), and bread wheat grains became more common, particularly at the low-lying site of Rayne Roundabout and at Strood Hall. By the late Iron Age/early Roman period, concentrated deposits of crop processing waste were common in samples from the A120 sites, and about 90% of identifiable chaff fragments now came from spelt. The remainder were from emmer wheat, and only traces of bread wheat and barley were found. Low numbers of damp ground plants from samples dated to this period, even at Rayne, may point to better drainage, including the use of ditches (Carruthers 2007).

At the Olympic Park sites in the Lea Valley, several late Bronze Age pits produced quantities of cereal remains dominated by glume wheat chaff, identified as emmer and spelt in roughly equal proportions, plus hulled wheat and barley grains (Wyles et al. 2012). One pit produced quantities of hazelnut (*Corylus avellana*) shells and a range of larger seeded weeds. The latter included species associated with damp ground, such as common spike-rush (*Eleocharis* cf. *palustris*), sedge (*Carex* sp.) and blinks (*Montia fontana* subsp. *chondrosperma*). The late Bronze Age assemblage was interpreted as waste from dehusking of emmer and spelt following storage (Wyles et al. 2012), and similar remains were identified at Innova Park, Enfield (Ritchie et al. 2008). The middle Iron Age samples from the Olympic Park sites produced a similar range of cereal species, and glume wheat chaff greatly outnumbered cereal grains. This was interpreted as further evidence of piecemeal dehusking of glume wheats which had been stored as whole spikelets (Wyles et al. 2012). A few waterlogged wheat/emmer glume bases, were recovered from middle Iron Age ditch fills, together with seeds/fruits of linseed/flax (*Linum usitatissimum*), blackthorn/sloe (*Prunus spinosa*), bramble (*Rubus* sp.), elder (*Sambucus nigra*) and hazelnut shell fragments, all indicators of shrub vegetation as well as sources of supplementary foods. Roman period deposits from these sites produced small quantities of emmer and spelt wheat (in unknown proportions) but, as at the A120 sites, little or no barley. Other edible plants were plum (*Prunus domestica*) and wild cherry (*Prunus avium*) (Wyles et al. 2012).

At Stansted, tiny amounts of cultivated remains from Neolithic deposits included some free-threshing wheat grain and rachis (Carruthers 2008). Middle Bronze Age pits produced a mixture of emmer and spelt chaff, with poorly preserved cereal grains, including hulled wheat and barley, and a few weed seeds. Another important cultivated plant from this period was flax. Until the middle Iron Age, the standard local pattern was for small, scattered, unenclosed settlements. From the late Iron Age, more intensive, enclosed settlements with large fields, linked by droveways, became the norm. Samples from late Iron Age and early Roman deposits at Stansted produced large numbers of grain-rich or grain and chaff-rich samples, rather than the chaff and weed-rich (that is, cereal processing waste) samples seen in earlier periods (Carruthers 2008) and this seems to be a general pattern across southern Britain from the late Iron Age onwards (Stevens 2003). In contrast, at Passingford Bridge and in particular at Hobbs Hole, the Roman deposits of plant material continued to be very chaff-rich, or chaff and weed-rich.

At Stansted, a number of arable weeds appeared for the first time during the late Iron Age–early Roman period, including brome/chess (*Bromus* spp.), perennial rye grass (*Lolium perenne*) and several species associated with damp ground, while weeds characteristic of acidic or nutrient poor soils (e.g. *Vicia/Lathyrus*) increased significantly. It is possible that some variations in species at different sites, or in different periods, reflect variations in soils and elevation as much as changes in husbandry practices, increasing agricultural intensification or declining soil fertility. In the early Roman period, bread wheat also became more widespread which, given the biases against its preservation may reflect its growing economic importance. In addition to larger numbers of oat grains, one late Roman sample from Stansted also produced an unusual concentration of rye (*Secale cereale*), another very important fodder crop of the historical period (Carruthers 2008).

The few remains of cultivated legumes from sites across the region was surprising, even in view of known preservation biases. Smaller, wild legume seeds were recovered from Passingford Bridge and Hobbs Hole, and pea (*Pisum sativum*) and celtic bean (*Vicia faba* var. *minor*) have been recovered from charred assemblages elsewhere in southern Britain from at least the Bronze Age. A large

number of samples were assessed from Passingford Bridge and Hobbs Hole, so the low numbers may point to limited legume cultivation. A slightly different picture can be seen at the small villa site at Great Holts Farm, where several samples produced large quantities of larger seed legumes. Many were not identifiable to species but they included field pea (*Pisum sativum* var. *arvense*) and celtic/field bean (*Vicia faba* var. *minor*) (Murphy 2003).

Conclusions

Bearing in mind the caveats relating to different site locations and local conditions, and problems around differential preservation and comparison of different types of crop material (and crop processing remains), a number of broad conclusions can be drawn from the study of charred plant material from Passingford Bridge and Hobbs Hole. The main crop cultivated from at least the late Iron Age (and possibly much earlier) appears to be spelt wheat. Some of the spelt crops appear to be autumn sown. Bread wheat, present in the area from Neolithic times, apparently increased in importance through the Roman period. This may be partly related to the cultivation of low-lying areas. Barley, also present from early prehistoric times, noticeably declines after the late Iron Age/early Roman period, while the numbers of oat grains increased. This may reflect a switch in the main fodder crops from barley to oats, which may in turn reflect the poorer land available for fodder crops, plus possibly an increased demand for these.

There was a lack of evidence for legume crops, possibly a feature of this region. Animal products may have provided alternative sources of protein, while manuring could have become increasingly important for maintaining soil fertility. Remains of exotic Roman plants were not found at these sites and seem to be rare locally, possibly owing to the types of deposits sampled. Perhaps more unusual was an almost complete absence of evidence for local wild foods, including hedgerow fruits and nuts. This absence, together with the overwhelming emphasis on small scale spelt processing (unusual in the late Roman period) may point to another possibility, that the main foci of domestic activity lay elsewhere during the mid-late Roman periods, away from the features sampled and analysed here.

THE WOOD CHARCOAL by Sheila Boardman

Introduction and methods

A total of 146 bulk soil samples from excavations at Passingford Bridge Flood Alleviation Area, Pond 1791 and Hobbs Hole were assessed for wood charcoal. Of these, 23 samples were selected for full wood charcoal analysis. An additional five samples were scanned to ascertain the range of taxa present, but the charcoal was not quantified. A single sample came from a middle to late Bronze Age cremation (Pond 1791). The remainder came from late Iron Age and Roman-period deposits from Passingford Bridge Flood Alleviation Area and Hobbs Hole. Bulk soil samples from a number of other sites were also assessed for wood charcoal, including Ponds 1609, 1615, 1683, 1812 and 1824, Upminster Bund and Codham Hall Bund. The deposits ranged in date from Late Neolithic to the medieval period, and where possible, the results have been incorporated below.

The main aims of the wood charcoal study were to investigate: the fuels used in different periods and any changes discernible through time or due to particular activities at the sites; the woods used in the cremations and whether particular taxa were selected for ritual purposes in the late Bronze Age, Late Iron Age and Roman periods (cf. Gale 1997; Thomson 1999; Challinor 2008); the function and/or use of different archaeological features, other than as refuse locations; and the role of wood charcoal, combined with other types of evidence and charcoal data from other sites, in the reconstruction of local and regional woodland and environmental conditions.

The samples were processed at Oxford Archaeology using a modified Siraf-type water separation machine. The flots were collected in a 250μm mesh and heavy residues in a 500μm mesh. Both fractions were dried slowly and later dry sieved at 4mm and 2mm. The greater than 4mm wood charcoal fragments (flots and residues), and a selection of material from the 2mm–4mm flots, were extracted for identification, initially using a low power binocular microscope at magnifications of ×10 to ×40. Charcoal fragments were fractured by hand and sorted into groups based on features observed in transverse sections. Fragments were then broken longitudinally along their radial and tangential planes and examined at magnifications of up to ×350 using a Biolam Metam P1 metallurgical microscope. Identifications of wood charcoal were made with reference to Schweingruber (1990), Hather (2000) and Gale and Cutler (2000). Many samples were rich in material, so only some of the greater than 4mm and 2mm–4mm wood charcoal was examined. For six poorer samples from Hobbs Hole, it was necessary to analyse all charcoal fragments greater than 2mm in size, and there were still fewer than 100 fragments per sample. Plant nomenclature follows Stace (2010).

Results

Most of the material in the analysed samples was reasonably well preserved. Several samples produced a few fragments of vitrified charcoal (mostly (cf.) oak). Opinions differ as to whether this is caused by heating at temperatures greater than 800°C (Prior and Alvin 1983), or other processes. At least eighteen taxa groups were identified at the three sites, a wide range of trees and shrubs in relatively few samples. The different levels of identification reflect the anatomy of individual taxa and their biogeographical range.

Pond 1791

The wood charcoal from middle to late Bronze Age cremation grave 109 was largely oak (*Quercus*) heartwood and there were a few alder/hazel (*Alnus/Corylus*) and indeterminate fragments (Table 40).

Passingford Bridge Flood Alleviation Area

At least 11 taxa were identified in contexts dating to the late Iron Age and Roman periods (Table 41). Oak (*Quercus*) fragments were most numerous, and they included a mixture of sapwood (including probable branch wood), narrow roundwood and heartwood. A sample (2052) from pit 3467 was dominated by oak heartwood. A sample (2038) from pit 5040 had a mixture of sapwood and narrow roundwood, with fragments of ash (*Fraxinus*), including heartwood, some hazel (*Corylus*) (including roundwood), and alder/hazel (*Alnus/Corylus*) charcoal. The charcoal from water-hole 3652 (sample 2051) was dominated by ash (*Fraxinus*),

Sample No.		**1**
Context No.		**110**
Feature type		**Cremation 109**
Phase		**Phase 2**
Sample vol. (litres)		**20**
Fagaceae		
Quercus	oak	125h(s)
cf. *Quercus*	cf. oak	3
Betulaceae		
Alnus/Corylus	alder/hazel	2
Indet. charcoal fragments		3
Total charcoal fragments		**133**

TABLE 40: Charcoal from Pond 1791 (M25023.11).
Key: h – heartwood; s – sapwood

including heartwood and roundwood, with significant finds of oak (*Quercus*) and hazel (*Corylus*) charcoal. The other five samples came from a Phase 3 post-hole, two late Iron Age (Phase 4) ditch fills, and two mid-Roman (Phase 6) ditch fills. Together these produced the widest range of material from this site, with oak (*Quercus*), hawthorn/*Sorbus* type (Pomoideae), hazel (*Corylus*), blackthorn/cherries (*Prunus* spp.), willow/poplar (*Salix/Populus*), ash (*Fraxinus*) and field maple (*Acer*) charcoal, plus occasional finds of elm (*Ulmus*) and buckthorn (*Rhamnus*). It is hard to see any clear differences between different deposits or periods. There was possibly slightly more hawthorn/*Sorbus* type charcoal in the earlier (Phase 4) samples, and one sample, 2127 (ditch 4251), produced similar amounts of hawthorn/*Sorbus*-type charcoal to that of oak.

Junction 29, Hobbs Hole

The earliest material came from late Iron Age (Phase 4) deposits, with a single sample (130) from grave 6092 (Table 42). This was one of several charcoal-poor scanned samples, from the Northern Area and from evaluation Trench 43. It contained a combination of oak (*Quercus*), blackthorn (*Prunus spinosa*) and elder (*Sambucus*) charcoal. The four other quarry/cremation samples also scanned for charcoal, produced largely oak. The main charcoal results from Roman-period features can be found in Table 43. At least 17 taxa are present in the Hobbs Hole samples. Most widespread were oak (*Quercus*), hawthorn/*Sorbus* type (Pomoideae), blackthorn/cherries (*Prunus* spp.), hazel (*Corylus*), willow/poplar (*Salix/Populus*), purging buckthorn (*Rhamnus*) and ash (*Fraxinus*). The oak was again predominantly sapwood, although heartwood, roundwood and bark were all identified. Birch (*Betula*) charcoal was found in moderate quantities in one mid-Roman (Phase 6) sample (123) from ditch 6058, and a sample (129) from Roman-period pit 5980. Yew (*Taxus*), broom/gorse (*Cytisus/Ulex*), spindle tree (*Euonymous*), holly (*Ilex*) and ivy (*Hedera*) were each recovered from one or two deposits, mostly as single fragments.

Discussion

Pond 1791

Cremated bone from sample 110 (grave 109) was radiocarbon dated to the middle to late Bronze Age. The wood charcoal, gathered up as pyre material with the cremated bone, was largely mature oak timber. A few alder/hazel and indeterminate fragments may represent incidental inclusions or possible

Sample No.		**130**	**133**	**135**	**102**	**131**
Context No.		**6093**	**6097**	**6103**	**4304**	**6095**
Feature type		**Grave 6092**	**Grave 6096**	**Grave 6096**	**Grave 4303**	**Grave 6094**
Period/Phase		**4**	**6**	**6**	**Roman**	**4**
Period		**LIA**	**MR**	**MR**	**Roman**	**LIA**
Sample vol. (litres)		**1**	**1**	**3**	**2**	**1**
Rosaceae						
Prunus spinosa	blackthorn	x				
Fagaceae						
Quercus	oak	Xs	X	Xs(h)	Xh	X
Caprifoliaceae						
Sambucus nigra	elder	x				cf. x
Indet. charcoal fragments						x
Total charcoal fragments		**<50**	**<10**	**<20**	**<30**	**<20**

TABLE 42: Charcoal from cremation graves, Hobbs Hole (M25001.08/09). Key: X – dominant; x – present; h – heartwood; s – sapwood; r – roundwood

Sample		2038	2052	2127	2130	2068	2051	2022	2023
Context		**3468**	**5038**	**4302**	**4382**	**4116**	**3653**	**2455**	**2446**
Feature type		**Pit 3467**	**Pit 5040**	**Ditch 4251**	**Ditch 4436**	**Posthole 4117**	**Waterhole 3652**	**Ditch 2460**	**Ditch 2432**
Period		**LIA**	**MIA**	**LIA**	**LIA**	**MIA**	**LR**	**MR**	**MR**
Phase		**4**	**3**	**4**	**4**	**3**	**7**	**6**	**6**
Sample vol. (litres)		**40**	**30**	**40**	**30**	**40**	**30**	**40**	**40**
Rosaceae									
Prunus domestica/spinosa type	plum/blackthorn			10	5r		1	14r	
Prunus avium/padus type	wild/bird cherry			1	1			4	
Prunus sp.	cherry/blackthorn, etc.	1		3	7r		2	10r	2
cf. *Prunus* sp.	cf. cherry/blackthorn			2	1		1	1	
Pomoideae* (see key below)	syn. Maloideae	3		22	12		6	6	12
cf. Pomoideae	cf. Maloideae			1	3		1		
Rhamnaceae									
Rhamnus cathartica	purging buckthorn	1		1					
Ulmaceae									
Ulmus	elm				1				1
Fagaceae									
Quercus	oak	72s(r)	107h	20s(rhb)	46s(hr)	30s(h)	46srh	61sh	77s(hr)
cf. *Quercus*	cf. oak				4b		1b	1	1b
Betulaceae									
Betula	birch			3	1		4	1	1
cf. *Betula*	cf. birch				1				1
Corylus avellana	hazel	24r		4	20(r)	15r	22r	3r	5r
Alnus/Corylus	alder/hazel	4						1	
cf. *Alnus/Corylus*	cf. alder/hazel								1
Salicaceae									
Salix/Populus	willow/poplar			13	9		5		2
cf. *Salix/Populus*	cf. willow/poplar				6				1
Sapindaceae (Aceraceae)									
Acer campestre	field maple			2	4		7r	3	2
cf. *Acer campestre*	cf. field maple								1
Oleaceae									
Fraxinus excelsior	ash	6hs		2		55hr	6h	14hs	5
cf. *Fraxinus excelsior*	cf. ash	1							
Indet. charcoal fragments		2	3	5	6r	3	2	5	10
Total charcoal fragments		**114**	**110**	**89**	**127**	**103**	**104**	**124**	**122**

TABLE 41: Charcoal from Passingford Bridge Bund/Passingford Flood Alleviation Area (M25002.09). Key: h – heartwood; s – sapwood; r – roundwood; b – bark; *Pomoideae (syn. Maloideae) including: *Pyrus* (pear), *Malus* (apple), *Crataegus* (hawthorn) and *Sorbus* (rowan, service, whitebeam)

Sample No		**126**	**109**	**123**	**118**	**107**	**114**	**143**	**110**	**124**	**145**	**101**	**129**	**105**	**112**
Context No		**5051**	**5085**	**6059**	**7014**	**5098**	**5162**	**6072**	**5133**	**6016**	**7192**	**1414**	**5981**	**5005**	**5149**
Feature type		**Ditch 5054**	**Pit 5083**	**Ditch 6058**	**Quarry 7012**	**Quarry 5096**	**Quarry 5161**	**Quarry 6071**	**Ditch 5132**	**Pit 6015**	**Quarry 7120**	**Pit 1409**	**Pit 5980**	**Tree-throw hole**	**Ditch 5148**
Period/Phase		**5**	**6**	**6**	**7**	**7**	**7**	**7**	**7**	**7**	**Roman**	**Roman**	**Roman**	**Unphased**	**Unphased**
Period		**ER**	**MR**	**MR**	**LR**	**LR**	**LR**	**LR**	**LR**	**LR**	**Roman**	**Roman**	**Roman**	**Unphased**	**Unphased**
Sample vol. (litres)		**28**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**37**	**40**	**26**	**40**
Taxaceae															
Taxus baccata	yew														1
Fabaceae															
Cytisus/Ulex	broom/gorse												1		
Rosaceae															
Prunus domestica/spinosa type	blackthorn	15r								3				28	1
Prunus avium/padus type	wild/bird cherry	3+								1			1	1	1
Prunus sp.	cherry/blackthorn, etc.	7r		2	4			3	2	1			1	15	1
cf. *Prunus* sp.	cf. cherry/blackthorn	2			2			1	1				2		
Pomoideae* (see key below)	syn. Maloideae	15r	1		40r	10	11	4	2	7	4	6	5		3
cf. Pomoideae	cf. Maloideae	2							4	1		2	2		1
Rhamnaceae															
Rhamnus cathartica	buckthorn					3		6r							
cf. *Rhamnus cathartica*	cf. buckthorn	1													
Ulmaceae															
Ulmus	elm			1											
Fagaceae															
Quercus	oak	27sr	26sh	42hs	43shr	60sh(b)	70srb	58shr	56sh	82shr	109h (sr)	34shr	49sbh	62hs	90sh
cf. *Quercus*	cf. oak	8b	2(b)	3			1	3b	1	1			2		1
Betulaceae															
Betula	birch			13									14		
cf. *Betula*	cf. birch			2											
Alnus glutinosa	alder								1						
Corylus avellana	hazel	6r		4		1r	2	4					5		
Alnus/Corylus	alder/hazel		2	3		1	4	1	1			1	1		
Celastraceae															
Euonymous europaeus	spindle tree	1r												1r	
Salicaceae															
Salix/Populus	willow/poplar		1			6									2
cf. *Salix/Populus*	cf. willow/poplar				2	3			2	1					2
Sapindaceae (Aceraceae)															
Acer campestre	field maple	4						5	4r	2	1	2	2		5
cf. *Acer campestre*	cf. field maple				2			1					1		
Oleaceae															
Fraxinus excelsior	ash							2		2			1		2
cf. *Fraxinus excelsior*	cf. ash			1					4						
Aquifoliaceae															
Ilex aquifolium	holly			1											
Araliaceae															
Hedera helix	ivy										1				
Indet. charcoal fragments		15	16(br)	8	17	97	15	14rb	13(b)	5(b)	4r	6(b)	10(b)	4	3
Total charcoal fragments		**106**	**48**	**80**	**110**	**181**	**103**	**102**	**91**	**106**	**119**	**51**	**97**	**111**	**113**

TABLE 43: Charcoal from Hobbs Hole (M25001.08/09). Key: h – heartwood; s – sapwood; r – roundwood; b – bark; *Pomoideae (syn. Maloideae) including: *Pyrus* (pear), *Malus* (apple), *Crataegus* (hawthorn) and *Sorbus* (rowan, service, whitebeam)

tinder materials. A great deal of wood is required to cremate a human body, but estimates of this have varied considerably, from 300kg (Challinor 2007) to 500kg (McKinley 1994) and 1000 kg/1 tonne (Gale 2008). This would obviously depend on the types of wood used and their form(s). Sufficient temperatures would have to be maintained for a minimum of three hours, and possibly much more. Oak is ideally suited for this purpose.

The selection of a single species for use in cremation is widely seen across southern Britain in the Bronze Age (Gale 1997; Challinor 2008; Thomson 1999; Smith 2002). Oak was the most common wood selected. Also frequently found as the sole fuel wood in Bronze Age cremations is hawthorn/*Sorbus* type (Pomoideae) wood, which includes crab apple (*Malus*), pear (*Pyrus*), hawthorn (*Crataegus*) and rowan whitebeam/service (*Sorbus*) species. Some of these woods may have been selected in part for their aromatic (de-odourising) qualities when burned (Edlin 1949). Elsewhere, ash (*Fraxinus*), field maple (*Acer*) and other trees seem to have been used. The maturity of the trees also may have had significance.

Passingford Bridge Flood Alleviation Area

The features sampled included ditch fills, a post-hole and a water-hole. The ditch fill samples were the most mixed. Three of four samples had nine or ten charcoal taxa, including oak (*Quercus*), hazel (*Corylus*), hawthorn/*Sorbus* type (Pomoideae), willow/poplar (*Salix/Populus*), plum/blackthorn (*Prunus spinosa*), maple (*Acer*), ash (*Fraxinus*), wild cherry (*Prunus* cf. *avium*), birch (*Betula*) and buckthorn (*Rhamnus*). This very mixed picture is consistent with the deposition of a variety fuel debris in the ditches, probably from a number of sources/activities. The same may be true of the water-hole fill 3653, which had an almost identical range of charcoal taxa to the ditches. In contrast, the Phase 3 post-hole (4117) produced just three taxa: ash (heartwood and roundwood), oak (sapwood and a little heartwood) and hazel (including roundwood). The oak was noted in the charcoal assessment and it was suggested this could represent a post burnt *in situ* (Druce and Bonsall 2012). The mixture of trees and presence of narrow roundwood and mature wood does not support this hypothesis, although it is possible that this charcoal represents former construction materials, rather than fuel waste.

Junction 29, Hobbs Hole

Table 42 shows that the main taxon in each cremation sample was oak, consistent with the earlier cremation from Pond 1791. It is possible that the wood charcoal remains are remnants of original pyres, although it seems unlikely that blackthorn (*Prunus spinosa*) would have been deliberately selected for this purpose, as its spiny nature would make it extremely difficult to collect in sufficient quantities. Among the other 14 samples from Hobbs Hole (Table 43), five came from large quarry pits in the northern area. They were dominated by oak charcoal or had a mixture of oak and hawthorn/*Sorbus*-type charcoal. Minor components included hazel (*Corylus*), alder/hazel (*Alnus/Corylus*), blackthorn/cherry (*Prunus* spp.), willow/poplar (*Salix/Populus*), buckthorn (*Rhamnus*) and field maple (*Acer*). The sample from pit 1409 was very similar in content. As at Passingford Bridge, the most mixed samples came from Roman-period or unphased ditch fills. They included low numbers of finds of some of the more unusual taxa from these sites: yew (*Taxus*), probable wild cherry (*Prunus* cf. *avium*), birch (*Betula*), spindle tree (*Euonymous*) and holly (*Ilex*), reinforcing the idea that ditches were refuse locations for fuel waste from a (wide) range of sources and activities. Sample 129, was similarly mixed and the samples from the remaining pit fill (124) and tree hole (105) probably also contain debris from domestic fuel.

The trees and shrubs represented

Tables 40–43 demonstrate that most numerous across all three sites were fragments of oak (*Quercus*) charcoal. Other large trees are represented by ash (*Fraxinus*), elm (*Ulmus*) and possibly field maple (*Acer*). Ash grows in open woodland and will colonise cleared areas. Like oak, it was highly valued as a building material and fuel wood in the past (Edlin 1949). Holly (*Ilex aquifolium*), a tree with many superstitious associations (Grigson 1975; Rackham 1980), is found in a variety of conditions, and it is very shade tolerant, sometimes also growing as an understorey in oak and beech (*Fagus*) woodlands. Ivy (*Hedera helix*) is another very shade tolerant species, and a climber, so may have been collected incidentally with other fuel woods (Gale and Cutler 2000; Stace 2010; Edlin 1949). Hazel (*Corylus avellana*) is a common understorey tree in oak and ash woodlands, and also a shrubby plant of more open areas. It was one of the most coppiced trees in the past, providing rods and poles for a wide range of construction and other purposes. It was also an important fuel (Edlin 1949). Hazel charcoal is common on British sites of all periods. At Hobbs Hole and Passingford Bridge, hazel roundwood was present in several late Iron Age to late Roman samples, but this was very variable (diameters <6–20+mm, growth rings 4–10+), so may reflect collection of naturally occurring roundwood rather than providing clear evidence for coppicing or other forms of woodland management. At Stansted, consistently sized hazel roundwood stems (with diameters of *c.* 15mm) were found associated with iron working debris, an activity that would have necessitated the use of charcoal fuels, and they are interpreted as probable evidence of coppiced wood (Gale 2008). Birch (*Betula*) is a short-lived tree of light, non-calcareous soils, and will also coppice if felled young, but does not produce high quality wood (Edlin 1944; Gale and Cutler 2000). It is found in oak woodlands, on heathlands and is another hardy coloniser of cleared areas. The wood burns with a good heat but quickly, although it can produce high quality charcoal (Gale and Cutler 2000).

Two different *Prunus* groups are represented in the Hobbs Hole and Passingford Bridge assemblages: *Prunus domestica/spinosa* (plum/blackthorn) and *P. avium/padus* (wild/bird cherry). The wood of the two taxa in each group are very similar. The plum/blackthorn charcoal here was probably all or mostly blackthorn (*P. spinosa*), but a waterlogged plum stone was recovered from a Roman deposit at the Lea Valley/Olympic Park excavations (Wyles et al. 2012), so some caution is necessary. The cherry charcoal is most likely to be *P. avium* (also recovered at the Olympic Park) rather than *P. padus*. The latter has slightly wider rays to those seen here, and it has a more westerly distribution in Britain today (Hather 2000). Wild cherry (*Prunus avium*) is often found growing with beech on rich soils or clay overlying chalk, and it produces small edible

fruits (Gale and Cutler 2000). In contrast, blackthorn (*Prunus spinosa*) is a spiny species found in marginal woodland, hedgerows and thorn scrub. It is quick to colonise clearings and can form very dense thickets (Gale and Cutler 2000). Many of the other taxa present in the Section 4 samples are associated with woodland margins, hedgerows and/or scrub, including hazel (see above), hawthorn/*Sorbus*-type (Pomoideae), purging buckthorn (*Rhamnus cathartica*), field maple (*Acer campestre*), spindle (*Euonymous europaeus*) and elder (*Sambucus nigra*). Elder is associated with nitrogen rich areas (e.g. around settlements), or phosphate enrichment (e.g. through grazing animals/dung) (Gale and Cutler 2000; Grigson 1975; Stace 2010).

Willow (*Salix*) and alder (*Alnus glutinosa*) are found on damp or marshy ground, and by rivers and streams. Poplar (*Populus*) thrives in open conditions on rich alluvial soils, on flood plains and in meadows. Alder is another poor fuel wood which makes good quality charcoal (Stace 2010; Gale and Cutler 2000). Very few definite alder fragments were found in the Section 4 samples, which was surprising, especially at Passingford Bridge, located close to the River Roding. However, alder can be difficult to distinguish from hazel where key diagnostic features are obscured, hence the more common alder/hazel category used here.

While legume wood was only present as a single fragment from Hobbs Hole, both broom (*Cytisus scoparius*) and gorse (*Ulex*) had a wide variety of uses historically, and gorse was a favoured fuel in bread ovens and kilns (Gale and Cutler 2000). As with birch, these shrubs favour lighter (here sandy), non-calcareous soils. In contrast, field maple, spindle and yew (*Taxus baccata*) are often found on calcareous soils, although yew has a wider distribution and was a component of the natural riverine woodland overlying peats in the lower Thames Valley up to 2000 BC (Branch et al. 2012).

Soils and current land use

Landscape Characterisation Areas in the immediate vicinity of Passingford Bridge and Hobbs Hole include Epping Forest and Ridges, the Roding Valley and Brentwood Hills (Biddulph et al. 2012a; Chris Blandford Associates 2003). A mosaic of different soil types and local conditions would have dictated ancient vegetation patterns. The main part of Epping Forest lies on a ridge of London Clay overlain in places by Claygate Beds, and in higher areas by Bagshot Sand and Pebbble Gravel. The soils range from neutral to acidic loams, to impervious clays to well drained gravels. Epping Forest was traditionally managed wood pasture. At least four distinct vegetation types can be seen today: pedunculate oak (*Quercus robur*) – beech woodland (with ash, holly, hazel and rowan (*Sorbus aucuparia*)), oak – hornbeam (*Carpinus betulus*) woodland (with silver birch (*Betula pendula*), holly, occasional hazel), lowland birch – pedunculate oak woodland/scrub (invasive in formerly grazed areas), and open grasslands and relic heaths. There are also many bogs, pools and ponds. Large parts of the Roding Valley are still traditionally managed with a mixture of flood meadows, marsh/fen, rough grassland, hay meadows, woodland scrub, hedgerows, and freshwater habitats. The Brentwood Hills are a series of ridges and undulating, rounded hills, which include many small and large woods, and patchworks of pasture and arable fields (plus some dense urban settlement along main road/rail routes) (Chris Blandford Associates 2003). Thus, these areas alone would have supported most of the trees and shrubs seen in the archaeological assemblages and account for the wide range of habitats these represent.

Pollen and macrofossil evidence

Pollen investigations at Stansted Airport (Huckerby et al. 2008), 20 miles north of Passingford Bridge, and at Stebbingford, Felsted, east of Stansted (Wiltshire and Murphy 1996), point to *Tilia/Quercus* and *Corylus* woodland on drier ground during the early Bronze Age (the earliest deposits). Lime was probably the main component, with hazel and occasional scrubby oak trees. Alder fen carr probably grew on the wetter ground. The other trees from the Bronze Age onwards were, in varying quantities, ash, field maple, birch, blackthorn/cherries, hawthorn, beech, elm, willow, elder and pine. Work by Scaife (1988) at Mar Dyke, along the Grays Bypass, Essex, suggests *Tilia/Quercus* and *Corylus* woodland was the major woodland type from much earlier (Mesolithic) times, with lime retaining importance into the Iron Age. Birch pollen probably indicates that scrub recolonized cleared areas, and pine probably represents long pollen distance transport (in increasingly open conditions). Pollen from herbaceous plants, including cereal-type pollen and ribwort plantain (*Plantago lanceolata*), rose steadily from the early Bronze Age until *c.* AD 400, when there was a decline in cultivation (Scaife 1988). By the Roman period at Stansted, the archaeological pollen spectra point to extremely open conditions, with cultivated fields, possibly surrounded by hedgerows, and extensive areas of meadows and grazed grasslands (Huckerby et al. 2008).

Several contexts from a single water-hole feature (3652) from Passingford Bridge Flood Alleviation Area were assessed for pollen, including context 3653, which was also investigated for wood charcoal (Table 41). Ribwort plantain (*Plantago lanceolata*), cereal-type and herbaceous taxa pollen, suggest an open landscape with grassland or pastures and ruderal species. The water-hole provided limited evidence for the regional vegetation, but mixed deciduous woodland is suggested by a few grains of oak, elm and alder pollen (Rutherford 2012). Further evidence for trees and shrubs growing on the site come from the waterlogged seeds of brambles (*Rubus* spp.) and elder (*Sambucus nigra*), recovered from the same feature (Huckerby and Bonsall 2012).

Charcoal evidence

The assessments of wood charcoal from prehistoric deposits at Passingford Bridge, Hobbs Hole and the other Section 4 sites indicate a broadly similar range of species to those seen in the Iron Age – Roman assemblages, including oak, ash, elm, hawthorn/*Sorbus*-type, blackthorn/cherries and alder or hazel (Bonsall et al. 2012). Again, other taxa possibly growing on-site are indicated by waterlogged seeds of birch, elder and brambles (Bonsall et al. 2012). No clear trends in the fuel use can be seen from the range of tree and shrub taxa present across all sites, but the evidence does emphasize the species-rich nature of the local woodlands in these periods. At Stansted and other sites in the region, a broadly similar (if sometimes slightly narrower) range of wood charcoal can be seen (Gale 2008; Challinor 2007; Challinor 2012). At Stansted, there was considerable use of narrow roundwood from earliest times, including in cremation pyres, which is unusual and suggests early pressure on woody resources (Gale 2008). By

the late Iron Age/early Roman period, a drop in alder/hazel pollen at Stansted (Huckerby et al. 2008), with the recovery of consistently-sized hazel roundwood stems (Gale 2008), both seem to point to possible woodland management through coppicing.

Notable absences from the Hobbs Hole and Passingford Bridge charcoal assemblages (and from other sites in the region) were lime and pine. Charcoal and wood of lime are extremely rare archaeologically, presumably due largely to preservation biases (Gale 2008). Lime was widely collected for bast fibres and leafy fodder in the past, which would have produced waste which might have ended up on fires (Gale 2008). Meanwhile, resinous woods have a tendency to spit when burnt (Gale and Cutler 2000), so the absence of pine charcoal may reflect human selection rather than a total absence of the trees locally. A small quantity of pine charcoal was recovered from the Lea Valley/Olympic Park excavations (Challinor 2012).

Conclusion

The wood charcoal evidence from Passingford Bridge and Hobbs Hole, and from other Section 4 sites on the M25, indicate that wide range of fuels were used in the late Iron Age and Roman periods. This suggests species-rich woodland in the area, and in particular around Hobbs Hole. The range of tree and shrub taxa seems to be similar to that available in earlier prehistoric times, but very limited charcoal data are available for the prehistoric periods with which to compare this material. Other lines of evidence, including pollen and waterlogged macrofossils, point to much more open conditions around sites by the late Iron Age/early Roman periods. The wood charcoal evidence suggests this is a partial picture. Moreover, the wood charcoal assemblages from the Section 4 sites do not indicate the pressures on woodland resources seen at other sites in the region, such as at Stansted. This may be due in part to the selection of samples for detailed study, from very charcoal-rich and varied deposits. Alternatively, it could indicate that sizeable pockets of mature, species-rich woodland were being conserved. Such resources and their protection must have become increasingly important in order to meet the fuel demands of growing urban populations, including that of Roman London. Other than as refuse locations, the wood charcoal evidence did not contribute to the interpretation of individual domestic features.

The Bronze Age and Iron Age/Roman cremations were all dominated by oak charcoal, which possibly indicates deliberate selection of cremation pyre and fuel woods, plus an easy availability of this highly important wood resource throughout the periods under study, reinforcing the picture of good availability of fuel resources produced by the domestic fuel debris above.

WATERLOGGED PLANT REMAINS

by Elizabeth Huckerby and Sandra Bonsall

Introduction and methodology

Following an initial assessment of the waterlogged plant remains from Passingford Bridge Flood Alleviation Area (Huckerby and Bonsall 2012), eleven samples were selected for further analysis. Nine samples were from the lower fills of the late Roman water-hole 3652, and six of these were part of a series of incremental samples taken through the fills. A single sample was analysed from water-hole 2714, and another from the late Roman pit 4453.

One litre of sediment from each of the samples selected for the analysis of the waterlogged plant remains was hand floated and the flots collected on a 250 micron mesh and retained wet. The flots were examined in their entirety, except for sample 2082 from fill 3662, and all seeds, fruits and parts of fruits were extracted and counted. The components of the matrix were noted and scored on a scale of 1–5, where '1' indicates up to five items, and '5' more than 100 items. Identification was aided by Katz et al. (1965), Stace (2010), Cappers et al. (2006), and by comparison with modern reference material held at OA North. Plant nomenclature follows Stace (2010). The results are shown in Tables 44–45. Each individual plant species has been described as a member of a single plant community, although many taxa can be found growing in more than one type. These categories are similar to those defined by Huntley and Hillam (2000, 356–7) and are as follows:

1. Plants of cultivated and waste ground including arable weeds, weeds of cultivated ground and ruderal plants. Ruderal plants are found growing on waste or fallow ground; they are usually biennial or perennial, and inhibit the growth of annual plants.
2. Grassland plants found in open grassland or meadows.
3. Woodland/scrub plants, comprising trees, shrubs, and the ground flora common in woodland clearings and in hedgerows.
4. Aquatic and wet ground plants. These are found growing on wet marshy ground, water meadows, in and on the banks of rivers, ditches and ponds.
5. Plants belonging to broad ecological groupings that are not specific to any one plant community.

Results

There were quite large assemblages of waterlogged plant remains recorded in many of the samples and these included several plants described by Stace (2010) as archaeophytes, that is, plants that are associated with man's activity as weeds of cultivated ground (Stace 2010, 1077). In general, they have existed in the British Isles since at least the medieval period (Stace 2010). Examples recorded at Passingford Bridge include stinking chamomile (*Anthemis cotula*), common mallow (*Malva sylvestris*) and swine-cress (*Lepidium coronopus*). There is little evidence in the samples of economic plants or native ones that can be used as food sources, but this may be because of the relatively small volume of material processed for the recovery of waterlogged plant remains (1 litre).

Water-hole 3652 series samples (Table 44)

The two lowest samples (2083 and 2084) were from fill 3664, two (2081 and 2082) were from fill 3662, one (2080) was from 3652, and the sixth (2078) from 3653 (Table 44). The most frequent plant remains in fill 3664 were bur chevril (*Anthriscus caucalis*), common mallow (*Malva sylvestris*), fat-hen (*Chenopodium album*), common chickweed (*Stellaria media*), common nettle (*Urtica dioica*) and grasses with seeds less than 2mm (Poaceae), with some stinking chamomile and common poppy (*Papaver rhoeas*). Above this, in fill 3662, the assemblages are similar but the numbers of remains from common mallow and bur chevril

Sample no		**2078**	**2080**	**2081**	**2081**	**2083**	**2084**
Context no		**3653**	**3662**	**3662**	**3662**	**3664**	**3664**
Phase		**7**	**7**	**7**	**7**	**7**	**7**
Feature type		**Water-hole 3652**	**Water-hole 3652**	**Water-hole 3652**	**Water-hole 3652**	**Water-hole 3652**	**Water-hole 3652**
Processed sample volume (L)		**1**	**1**	**1**	**1**	**1**	**1**
Plants of cultivated and waste ground including arable weeds							
Aethusa cynapium L	Fool's parsley	1	2	13	16	2	4
Agrostemma githago L	Corncockle (a)						1
Anagalis arvensis L	Pimpernels	1					
Anthemis cotula L	Stinking chamomile (a)	5+half	28	>100	>100	33+frags	17
Anthriscus caucalis M Bieb	Bur chevril	3	4.5	3	48	39	49
Arctium L sp.	Burdocks			1		1	2
Capsella bursa-pastoris (L) Medik	Shepherd's purse (a)					12	16
Chenopodium album L	Fat hen	16	4+frag	37	>100	68	56
Conium maculatum L	Hemlock (a)	1	5		4	1	1
Hyoscyamus niger L	Henbane (a)		4				
Lepidium corronopus (L) Al-Shehbaz	Swine-cress fruit (a)	7	1+frags				
Lepidium corronopus (L) Al-Shehbaz	Swine-cress seed (a)	1	?1				
Malva sylvestris L seeds	Common mallow seeds (a)		7	2	8	4	14
Malva sylvestris L fruit fragments	Common mallow nut fragments (a)				8	12	79
Papaver rhoeas L	Common poppy (a)	1					8
Persicaria lapathifolia (L) Delarbe	Pale persicaria			11			
Persicaria maculosa Gray	Redshank	1	1				
Persicaria lapathifolia (L) *Delarbe/maculosa* Gray	Pale persicaria/redshank			1			
Prunella vulgaris L	Selfheal	9	11	18	8	3	4
Reseda luteola L	Weld			9			
Sonchus asper (L) Hill	Prickly sow-thistle			2		27	2
Spergula arvensis L	Corn spurrey						
Stellaria media (L) Vill	Common chickweed	6	4	40	>100	67	>100
Taraxacum FH Wigg	Dandelions						1
Thlapsi arvense L	Pennycress (a)					1	
Urtica dioica L	Common nettle	>100	>100	>100	>100	>100	>100
Urtica urens L	Small nettle (a)	13	12	5	8	6	20
Grassland plants							
Daucus carota L	Wild carrot			2			
Leontodon cf. *saxatilis* Lam	Lesser hawkbit			2			
Pastinaca sativa L	Wild parsnip		1				
Poaceae with seeds 2–4mm	Grasses with medium seeds		12	>100	4	8	30
Poaceae with seeds >4mm	Grasses with large seeds					4	
Rumex acetosa L	Common sorrel	19	27	73	>100	57	24
Rumex acetosella L	Sheep's sorrel	1		1	8	2	
Stellaria graminea L	Lesser stitchwort	8	4	14	20		3

Sample no		2078	2080	2081	2081	2083	2084
Context no		3653	3662	3662	3662	3664	3664
Phase		7	7	7	7	7	7
Feature type		Water-hole	Water-hole	Water-hole	Water-hole	Water-hole	Water-hole
		3652	3652	3652	3652	3652	3652
Processed sample volume (L)		1	1	1	1	1	1
Woodland/scrub							
Silene dioica (L) Clairv	Red campion				4		
Aquatic and wet ground plants							
Carex cf. *disticha* Huds	Brown sedge				16	4	
Carex trigonous	Sedges with 3 sided nutlets	2	2+frags	4	16	7.5	9
Carex lenticular	Sedges with biconvex nutlets	1	2	1	12	4.5	
Carex utricle undifferentiated	Sedge utricle						5
Comarum palustre L	Marsh cinquefoil	1	2				
Juncus effusus L type	Common rush	37	18	1	4	12	
Lycopus europaeus L	Gipsywort		1				
Montia L sp.	Blinks		2				1
Ranunculus subgenus Batrachium (DC) A Gray	Crowfoots		1				
Ranunculus flammula L	Lesser spearwort		1				
Schoenoplectus (Rchb) Palla sp.						1	
Economic and native plants that can be used as a food source							
Prunus L sp.	Cherries includes blackthorn			Fragment			
Rubus sect 2 Glandulosus Wimm & Grab	Bramble	1+3 frags	1+frags	1	12		
Sambucus nigra L	Elder			1	4		
Cerealia undif charred	Charred cereal grain		5				1
Triticum spelta glumes	Spelt wheat glumes WPR	1					
Avena/Poaceae	Oat/grass with large seed CPR	1					
Rachis fragment WPR			1				
Glume base			5 wpr			1 cpr	1 cpr
Culm nodes WPR				18			
Plants of broad ecological groupings							
Anthriscus sylvestris (L) Hoffm	Cow parsley					8	
Barbarea vulgaris W T Aiton	Winter-cress						1
Chenopodium L (*Blitum* L) sp.	Goosefoots						
Cirsium Mill sp.	Thistles	4	21	38	>100	54	4
Comarum palustre L/*Ficus carica* L	Marsh cinquefoil/fig					4	
Epilobium L sp.	Willowherb		4	20	48	5	1
Fabaceae with seeds <4mm	Wild member of the pea family					2	
Galeopsis tetrahit L	Common hemp-nettle			1			
Hypericum L sp.	St John's-worts	5			4		26
Lamium L sp.	Deadnettles	8	3	12	5	4	
Lapsana communis L	Nipplewort			1		4	
Mentha L sp.	Mints			1			5
Poaceae with small seeds	Grasses with small seeds	60	>100	>100	>100	>100	65

Sample no		**2078**	**2080**	**2081**	**2081**	**2083**	**2084**
Context no		**3653**	**3662**	**3662**	**3662**	**3664**	**3664**
Phase		**7**	**7**	**7**	**7**	**7**	**7**
Feature type		**Water-hole**	**Water-hole**	**Water-hole**	**Water-hole**	**Water-hole**	**Water-hole**
		3652	**3652**	**3652**	**3652**	**3652**	**3652**
Processed sample volume (L)		**1**	**1**	**1**	**1**	**1**	**1**
Polygonum aviculare L	Knotgrass	38+frags	29	44	12	9+frags	6
Polygonum undifferentiated	Knotweeds	10+frags			frag		
Potentilla erecta (L) Raesch type	Tormentill-type	5	6	1			
Potentilla L sp.	Cinquefoils						1
Ranunculus repens type	Creeping buttercup-type	38	39	10	12	2	2
Ranunculus sardous Crantz	Hairy buttercup		5	2	12	3	
Rumex obtusifolius L	Broad-leaved dock	5	46	>100	>100	64	21
Silene L sp.	Campions					2	
Solanum dulcamara L	Bittersweet		4	1			4
Veronica L sp.	Speedwells	6					
Unknown fruits/seeds		5	3	7			
Matrix components	**Scale of 1–5**						
Amorphous plant remains		5	5	5	3	5	5
Monocotyledenous remains			2				2
Wood fragments		3	5	2	5	3	3
Roundwood and twiggy pieces						2	1
Buds			1		1	1 cpr	
Bud scales			2				
Leaf fragments				3	2		2
Charcoal fragments		3	3	3	3	4	4
Bryophyte fragments	Moss fragments		2			1	1
Thorns				1			
Fly puparia				2	2	1	1
Insect fragments		3		3	5	5	
Kretzschmaria deusta	Brittle cinder fungus					1	
Earthworm egg cases		2	2	1	1	2	2
Daphnia ephippia		2				5	5

TABLE 44: Waterlogged plant remains (WPR) from Passingford Flood Alleviation Area (M25002.09), Phase 7 water-hole 3652. (a) archaeophytes

decrease and there is a sharp increase in numbers of stinking chamomile seeds (although in sample 2080 there is a decline in their numbers), broad-leaved dock (*Rumex obtusifolius*) and common sorrel (*Rumex acetsoa*). Thistle fruits are also abundant in sample 2082 from this context and are present in the other two. Grasses with seeds less than 2mm and common nettle are abundant. However, both produce very large numbers of small seeds and perhaps do not reflect the actual number of plants present.

There is a decline in the total number of waterlogged plant remains in fill 3653, but swine-cress (*Lepidium coronopus*) fruits and seeds were identified and common nettles and grasses with seeds less than 2mm continue to be well represented. Aquatic and plants of wet ground are not well represented, although the number of rush (*Juncus*) seeds increase in the two upper samples analysed (sample 2078 from context 3653 and sample 2080 from context 3652), and these occur together with occasional seeds of marsh cinquefoil (*Comarum palustre*), gipsywort (*Lycopus europaeus*), blinks (*Montia* sp.), crowfoots (*Ranunculus* subgenus Batrachium) and lesser spearwort (*Ranunculus flammula*).

One litre sub-samples taken from three bulk samples (2061, 2064 and 2098) from contexts 3663, 3662 and 3654 from water-hole 3652 were also analysed to look for additional taxa to those represented in the incremental series samples. Context 3663 is an earlier fill which pre-dates 3664, and 3654 seals 3653. The assemblage of waterlogged plant remains from context 3663 is dominated by the remains of common mallow and other plants of cultivated and waste ground, including stinking chamomile, common nettle, common chickweed and shepherd's purse (*Capsella bursa-pastoris*). Grasses with seeds between 2mm–4mm and common sorrel suggest the presence of some grassland; again few remains of plants associated with wet ground were recorded. A single charred undifferentiated cereal grain, several wheat (*Triticum* sp.) glumes and two small charred seeds from the pea family (Fabaceae), which includes vetches (*Vicia*) and trefoils (*Lotus* spp.) were also recorded in these samples.

The plant remains recorded in sample 2061 from context 3662 were similar to those identified in the three series samples from this context, although two taxa from cultivated or waste ground were identified in this sample but not in the others: scarlet pimpernel (*Anagalis arvensis*) and parsley-piert (*Aphanes arvensis*). Fairy flax (*Linum catharticum*), common sorrel and sheep's sorrel (*Rumex acetosella*) suggest the presence of grassland. Fewer broad-leaved dock fruits were recorded in sample 2061 than in three series samples from this context.

The uppermost sample (2098) analysed had fewer plant remains recorded in it, but there were large numbers of seeds from common rush-type (*Juncus effusus*-type) present, suggesting the presence of wetter ground. However, it should be noted that all *Juncus* spp., like common nettle, produce very large numbers of small seeds.

Many of the other plant remains recorded in all the samples from water-hole 3652 are found today growing in non-specific ecological habitats, for example deadnettles (*Lamium* sp.), and grasses with seeds less than 2mm: knotgrass (*Polygonum aviculare*), creeping buttercup-type (*Ranunculus repens*-type) and broad-leaved dock. Charcoal fragments were present in the matrices of all the samples from water-hole 3652 together with abundant amorphous plant remains and wood fragments including roundwood.

Water-hole 2714 (Table 45)

The waterlogged plant remains from a single sample from this late Roman (Phase 7) feature were analysed and were dissimilar to those from water-hole 3652. The most striking difference is the large the number of seeds from aquatic plants and those that grow on wet ground, with abundant seeds of common starwort (*Callitriche* cf. *stagnalis*), crowfoots and rushes identified. A few duckweed (*Lemna* sp.) and blinks (*Montia*) seeds and fruits of broad-leaved pondweed (*Potamogeton* cf. *natans*) were also recorded and suggest the presence of aquatic vegetation. The components of the matrix from this feature include abundant amorphous plant and insect remains, but fewer wood fragments than in water-hole 3652.

Roman pit 4453

The waterlogged plant remains from a single sample (2132) were examined, but very few were noted. However, a few charred plant remains were identified, including grasses with seeds greater than 4mm, fragments of undifferentiated cereal grains, and two wheat glumes (*Triticum* sp.). Charcoal fragments were abundant.

Discussion

The assemblage of waterlogged plant remains from the late Roman water-holes 3652 and 2714 suggests an open landscape of grassland, waste and possibly cultivated ground in and around the settlement. This is consistent with a pattern in the late Roman period of extensive exploitation of the landscape at other sites in the area surrounding London, for example in the Thames Valley (Booth et al. 2007), Stansted Airport (Carruthers 2008) and Heathrow Airport (Carruthers 2010).

Water-hole 3652 was probably bordered by common nettles, which are often found growing where animals defecate (Stace 2010, 285) and by broad-leaved dock, identified in contexts 3662 and 3664. Today, both nettles and docks are to be found growing along ditches and the banks of small streams, as well as on waste and cultivated ground. E. Allison (below) also identified insects suggestive of stands of nettles (*Urtica*) growing close to water-hole 3652, while the pollen assessment by Rutherford (2012) indicated a landscape with grassland/pastures and disturbed ground with ruderal plant communities. The occurrence of obligate coprophilous fungal spores noted in context 3662, taxa comprising *Sordaria* spp., *Podospora* species and *Sporomiella* spp., suggests the presence of grazing animals, and these are also tentatively identified from the presence of Scarabaeid beetles (below).

There was little evidence of any shrubs growing locally for example brambles, elder or other hedgerow plants in the samples from either of the water-holes or the pit. Further evidence for an open landscape comes from the very abundant small grass seeds recorded in many of the samples. These may not necessarily be present in grassland or meadows, as many of the small grasses grow on waste ground. Although there is considerable evidence of their exploitation at this time, only occasional remains of economic plants or native ones used as food sources (for example brambles and elder) were recorded.

Sample no.		2098	2061	2064	2025	2132
Context no.		3654	3662	3663	2819	4453
Phase		7	7	7	7	Roman
Feature type		Water-hole 3652	Water-hole 3652	Water-hole 3652	Water-hole/ pit 2714	Pit 4453
Processed sample volume (L.)		1	1	1	1	1
Plants of cultivated and waste ground including arable weeds						
Aethusa cynapium L	Fool's parsley		8	3		
Anagalis arvensis L	Pimpernels		25			
Anthemis cotula L	Stinking chamomile (a)	Frag	57	42		1
Anthriscus caucalis M Bieb	Bur chevril	1		63		
Aphanes arvensis L	Parsley-piert		10			
Capsella bursa-pastoris (L) Medik	Shepherd's purse (a)			13		
Chenopodium album L	Fat hen	3	32	45	33	
Conium maculatum L	Hemlock (a)	1	2	1		
Fallopia convolvulus (L) A Love	Black bindweed (a)			1		
Malva sylvestris L seeds	Common mallow seeds (a)		6	16		
Malva sylvestris L fruit fragments	Common mallow fruit fragments (a)			>100		
Persicaria lapathifolia (L) Delarbe	Pale persicaria		3		7+frags	1 cpr
Persicaria maculosa Gray	Redshank			1	2	
Prunella vulgaris L	Selfheal	1	14		1	
Reseda luteola L	Weld (a)		6			
Sonchus asper (L) Hill	Prickly sow-thistle			26	1	
Stellaria media (L) Vill	Common chickweed		18	>100	6	
Thlapsi arvense L	Pennycress (a)			1	1	
Urtica dioica L	Common nettle	80	>100	>100	36	1
Urtica urens L	Small nettle (a)	10	10	15		
Grassland plants						
Daucus carota L	Wild carrot	3				
Leontodon cf. *saxatilis* Lam	Lesser hawkbit		2	1		
Linum catharticum L	Fairy flax		8			
Poaceae with seeds 2–4mm	Grasses with medium seeds	5		25	41	
Poaceae with seeds >4mm	Grasses with large seeds					1 cpr
Rumex acetosa L	Common sorrel	11	>100	35	19	2
Rumex acetosella L	Sheep's sorrel		10	2		
Stellaria graminea L	Lesser stitchwort	2		9	20	
Woodland/scrub						
Betula sp.	Birch scale			1		
Aquatic and wet ground plants						
Callitriche cf. *stagnalis* Scop	Common water-starwort				>100	
Carex trigonous	Sedges with 3 sided nutlets	5	10	4	18	

Sample no.		2098	2061	2064	2025	2132
Context no.		3654	3662	3663	2819	4453
Phase		7	7	7	7	Roman
Feature type		Water-hole 3652	Water-hole 3652	Water-hole 3652	Water-hole/ pit 2714	Pit 4453
Processed sample volume (L.)		1	1	1	1	1
Carex lenticular	Sedges with biconvex nutlets	1	8	7	3	
Cyperacea undifferentiated	Sedge family				1	
Eleocharis palustris (L) Roem & Schult	Common spike-rush				1	
Filipendula ulmaria (L) Maxim	Meadowsweet			6	1	
Juncus effusus L type	Common rush	>100	6		>100	
Lemna L sp.	Duckweeds				4	
Montia L sp.	Blinks				6	
Potamogeton cf. *natans* L	Broad-leaved pondweed				2	
Ranunculus subgenus Batrachium (DC) A Gray	Crowfoots	1	4		>100	
Ranunculus flammula L	Lesser spearwort		4			
Economic and native plants that can be used as a food source						
Rubus sect 2 Glandulosus Wimm & Grab	Bramble	4	2+frags	1+frags	2 frags	3 frags
Sambucus nigra L	Elder					
Triticum sp.	Wheat glumes				1	
Cerealia undif charred	Charred cereal grain			1		4 frags cpr
Triticum spelta glumes	Spelt wheat glumes WPR					
Triticum sp. glumes	Wheat glumes	6				2 cpr
Plants of broad ecological groupings						
Atriplex/Chenopodium	Goosefoots/oraches			6		
Brassica sp. L	Cabbages but includes black mustard			2		
Cirsium Mill sp.	Thistles	3	8+frags	6		
Comarum palustre L/*Ficus carica* L	Marsh cinquefoil/fig					
Epilobium L sp.	Willowherb		4	2		
Fabaceae with seeds <4mm	Wild member of the pea family			2 cpr		2 cpr
Lamium L sp.	Deadnettles	4+frags		27		
Mentha L sp.	Mints		2	1	2	
Poaceae with small seeds	Grasses with small seeds		62	>100	57	
Polygonum aviculare L	Knotgrass	2	38	41		
Polygonum undifferentiated	Knotweeds					
Potentilla erecta (L) Raesch type	Tormentill-type	1				
Potentilla L sp.	Cinquefoils		2			
Ranunculus repens L type	Creeping buttercup-type	11	56	9	14	
Ranunculus sardous Crantz	Hairy buttercup		2	1		
Rumex obtusifolius L	Broad-leaved dock		62	30	10	
Rumex sp. perianth	Docks unknown			15		

Sample no.		**2098**	**2061**	**2064**	**2025**	**2132**
Context no.		**3654**	**3662**	**3663**	**2819**	**4453**
Phase		**7**	**7**	**7**	**7**	**Roman**
Feature type		**Water-hole 3652**	**Water-hole 3652**	**Water-hole 3652**	**Water-hole/ pit 2714**	**Pit 4453**
Processed sample volume (L.)		**1**	**1**	**1**	**1**	**1**
Rumex sp. perianth	Dock sp. perianth		Frags	24		
Solanum dulcamara L	Bittersweet	1				
Unknown fruits/seeds					4	
Matrix components	**Scale of 1–5**					
Amorphous plant remains		2	5	5	5	
Wood fragments		4	2	5		1
Roundwood and twiggy pieces				2	1	
Buds				1		
Leaf fragments				2		
Charcoal fragments		5	4	3		5
Bryophyte fragments	Moss fragments			1		
Rosaceae thorn	Rose/hawthorn-type thorn		1	1 *Rubus*-type		
Insect fragments					5	
Earthworm egg cases		1	1	1	1	
Daphnia ephippia		4	1	1		
Trichoptera eggs					1	

TABLE 45: Waterlogged plant remains (WPR) from Passingford Flood Alleviation Area (M25002.09), water-holes 3652 and 2714 and pit 4453

A few charred cereal grains, some waterlogged remains of wheat glumes, a few bramble and elder pips and a possible fig (*Ficus carica*) seed were the only such plants recorded. Unlike many Roman sites no grape (*Vitis vinifera*) or other exotic taxa were identified, but this may be a reflection of the type of feature sampled. However, many of the plant taxa, which have been included in the group of plants from waste or cultivated ground, are described by Stace (2010) as archaeophytes (10 of the 26 included in the group).

There is no direct evidence of wet conditions in or around water-hole 3652, other than the presence of well preserved waterlogged plant remains and the abundance of water beetles recorded in the samples, although E. Allison (below) suggests that they may not be a well established community. The water-hole may have been kept clear of vegetation to provide a source of good water while the feature was in use. In contrast, there are large numbers of plants such as water-starwort (*Callitriche*), rushes (*Juncus*) in water-hole 2714, perhaps indicating that this water-hole was not being maintained or had fallen in to disuse by the time the sediments accumulated in it. As well as the greater abundance of waterlogged plant remains of aquatic and wet ground plants, there was also a wider range of water beetles recorded from feature 2714 (E. Allison, below).

The plant remains seem to indicate that there were areas of both cultivated and waste ground, with possible track or roadways suggested by the presence of swine-cress and common mallow around the settlement. Common mallow is an interesting plant; as well as being a plant that is associated with track or roadways, it has in the past been used for medicinal and nutritional purposes. At Heathrow Airport, mallow notably increased during the late Roman period (Carruthers 2010, 43). Dickson and Dickson (2000) suggest that it may have been grown for a special purpose and they quote Pliny who was said to extol the medicinal virtues of the plant. The many uses of common mallow are described by Culpepper (Grieve 1971) and Allen and Hatfield (2004). The very high number of common mallow nut fragments from this site may suggest that mallow was being utilised at the site.

In conclusion, the waterlogged plant remains support the evidence from the analysis of the insect remains of a cleared and exploited landscape during the late Roman period. Stands of nettles and broad-leaved docks probably grew beside water-hole 3652, which was kept clear of vegetation. The evidence from both the plant and insect remains suggests that the soil around water-hole 3652 was probably nitrogen rich, possibly as a result of the application of manure or from grazing cattle. Despite the strong evidence for cultivated and waste ground and the number of archaeophytes there are few remains of economic plants or native ones that are used as food sources.

INSECTS by Enid Allison

Introduction

Four samples from the lower fills of Phase 7 water-hole 3652 and one sample from another water-hole or pit (2714) were examined for insect remains. Sample selection was based on observations of good survival of organic remains in these features during assessment of plant macrofossils (Huckerby and Bonsall 2012).

Five sediment samples with volumes of 3 litres were wet-sieved with flotation. Residues and flots were collected on 0.25mm mesh and both fractions were submitted for insect analysis. Paraffin flotation was carried out to extract insect remains following the methods of Kenward et al. (1980) with remains recovered on 0.3mm mesh. The paraffin flots were stored in industrial methylated spirits (IMS).

Insect remains were abundant in all the samples, and assemblages from two of the paraffin flots were analysed in detail. For this, beetles (Coleoptera) and bugs (Hemiptera) were removed from the flots onto moist filter paper and identified using a low-power stereoscopic zoom microscope (×10–×45). Identification was by comparison with modern insect material and reference to standard published works. Numbers of individuals and taxa of beetles and bugs were recorded, and taxa were divided into broad ecological groups for interpretation following Kenward et al. (1986) and Kenward (1997). Insect remains in the remaining three flots were recorded by scanning. This was mainly carried out in IMS, with occasional specimens picked out onto damp filter paper for closer identification. Adult beetles and bugs in the scanned assemblages were quantified on a four point scale. The state of preservation of insect remains in all samples was recorded using the system of Kenward and Large (1998) where fragmentation (F) and erosion (E) are scored on a scale from 0.5 (superb) to 5.5 (extremely decayed or fragmented). Nomenclature follows Duff (2012a) for Coleoptera, Aukema and Rieger (1995–2006 for Hemiptera: Heteroptera, and Le Quesne and Payne (1981) for Hemiptera: Homoptera. The abundance of other invertebrates in the flots was recorded subjectively on a three point scale as present, common or abundant.

Notes on identification

Compound taxa: These have been used for some groups of beetles with closely similar morphology and ecology. Separation of species is particularly problematic for disassociated archaeological material. The groups used in this report are *Latridius minutus* group (*Latridius* spp.), *Anotylus sculpturatus* group (*A. mutator*, *A. sculpturatus*), *Platystethus cornutus* group (*P. alutaceus*, *P. cornutus*, *P. degener*), and *Cercyon tristis* group (*C. convexiusculus*, *C. granarius*, *C. sternalis*, *C. tristis*)

Pterostichus nigrita/rhaeticus: The species are only separable on genitalia. Both are found in damp grassland but *P. nigrita* mainly in lowland riparian sites, and *P. rhaeticus* mainly in exposed uplands on nutrient-poor sites, but there is an overlap in habitats (Luff 2007, 114–15; Duff 2012b, 192–3).

Chaetocnema concinna/C. picipes: It has recently been established that British authors have confused the two species under the name '*Chaetocnema concinna*' (Booth and Owen 1997). The species are reliably separable on only on male genitalia and an antennal feature which are not usually present in macrofossil assemblages. Both species are chiefly associated with Polygonaceae.

Geotrupidae: The genus of scarabaeid dung beetles formerly known as *Geotrupes* (Kloet and Hincks 1964–77) is currently split into three separate genera (Duff 2012b). It was not possible to closely identify the very fragmentary remains noted in some of the Passingford Bridge assemblages.

Results

Insect remains were abundant in all of the samples, and the assemblages from deposits filling both features are described below. Samples from the fills of water-hole 3652 are described in stratigraphic order beginning with the earliest deposit. Sample details and the preservational state of insect sclerites are shown in Table 46, the ecological groups used in analysis in Table 47, host plants of strongly plant-associated taxa in Table 48, and lists of insect and other invertebrates recorded from each sample in Table 49. The main statistics used in interpretation of the two samples analysed in detail are presented in Tables 50 and 51. Percentages used to describe the abundance of particular ecological groups in this report have been calculated from the numbers of individuals within that group.

Context 3665, sample 2084, late Roman water-hole 3652

Preservation of insect remains was generally good, although some sclerites showed signs of significant erosion and a tendency towards paleness. The assemblage was recorded in detail since it represented the earliest fill of the feature. Aquatics accounted for 40% of the beetles and bugs recovered, and water flea ephippia (Cladocera: resting eggs) and ostracod carapaces were common, together indicating that the feature contained standing water and could have functioned as a water-hole. The presence of ephippia and ostracods does not necessarily imply that water was permanently present; ephippia are produced at certain times of the year, particularly in the autumn or at times of environmental stress such as seasonal reductions in water level (Scourfield and Harding 1966, 3), and some ostracods inhabit temporary water bodies. However, the general condition of the waterlogged remains in the lower fills of this feature suggests that it remained wet throughout even if there were seasonal fluctuations in water level.

Over a third of the water beetles were *Helophorus* species, which are attracted to many types of water bodies, often in considerable numbers. Almost as well represented (by 18 individuals) was *Tanysphyrus lemnae*, a tiny aquatic weevil that feeds on duckweeds (*Lemna*). *Ochthebius minimus* and *O. dilatatus* were suggestive of muddy water and marginal mud. Other water beetles included *Hydrobius fuscipes* typically found in detritus pools (Friday 1988, 149), *Anacaena*, *Limnebius* and *Hydraena testacea*.

Waterside and damp ground taxa made up 15% of terrestrial taxa. *Platysthetbus cornutus* group and *P. nitens* were both represented by several individuals indicating exposed organic-rich mud immediately surrounding the water-hole. There was good evidence for stands of nettles (*Urtica*) growing close to it from *Nedyus quadrimaculatus* and the nettle ground bug (*Heterogaster urticae*). Some of the other plant feeding insects recorded, such as *Mecinus pascuorum* found on plantains (*Plantago*) and five species of apionid weevils, were suggestive of grassland and herbaceous vegetation. Ground beetles (Carabidae) which often provide good information on local ground conditions were poorly preserved in this sample and most fragments were not identified closely enough to be informative.

A quarter of the terrestrial insects were decomposers. They included a few species (particularly *Latridius minutus* group and *Enicmus*) that provided slight hints that discarded litter from within buildings may have entered the deposit in very limited amounts. Unless there was archaeological evidence for the dumping of waste into the feature, the most likely source of such material is from manuring of adjacent land. Remains of woodworm beetle (*Anobium punctatum*) might also have arrived with such material since it commonly infests wooden buildings, but it could equally have formed part of the 'background' fauna of the site infesting wooden structures associated with the enclosures and nearby settlement. It also occurs in naturally occurring dead wood. Single individuals of three species of *Aphodius* were recorded. These scarabaeid beetles are primarily associated with herbivore dung, but some species less commonly exploit other types of foul decomposing plant matter (Jessop 1986, 20–5).

Numbers of beetles regarded as synanthropic were small (6% of the terrestrial fauna) and all but one of those recorded are classed as *facultative synanthropes* (Kenward 1997). Such taxa are commonly found in naturally occurring decomposing matter and although they are favoured by intensive human activity which can provide longer-lived habitats, and where large populations of certain species may opportunistically develop, they are not necessarily tied to human activity.

Context 3663, sample 2064, late Roman water-hole 3652

Insect remains were rather better preserved than in the lowermost sample from this feature. Recording was by scanning. Water flea ephippia and aquatic beetles were

Feature	Context	Sample	Sample volume (litres)	Paraffin flot volume (ml)	MNI beetles and bugs	Fragmentation (F) of insect sclerites	Erosion (E) of insect sclerites
[3652]	3665	<2084>	3	20	149	F: 2–3.5 (mode 2.5)	E: 2–4 (mode 3)
[3652]	3663	<2064>	3	20	~175*	F: 2–3 (mode 2)	E: 2–3.5 (mode 2)
[3652]	3664	<2066>	3	20	388	F: 2–3 (mode 2)	E: 2–3.5 (mode 2.5)
[3652]	3662	<2061>	3	25	~250*	F: 2–3 (mode 2.5)	E: 2–3.5 (mode 2.5)
[2714]	2819	<2025>	3	15	~170*	F: 2–4.5 (mode 3)	E: 2–4 (mode 3)

TABLE 46: Details of samples examined for insect remains from Passingford Flood Alleviation Area (M25002.09). Scores for fragmentation and erosion of beetle and bug sclerites follow Kenward and Large (1998) where values range from 0.5 (superb condition) to 5.5 (extremely decayed or fragmented). *numbers estimated during scanning

Code	Ecological group
d	damp ground or waterside taxa
g	grain-associated taxa
l	wood-associated taxa
m	moorland taxa
oa	certain outdoor taxa (unable to live and breed either within buildings or in accumulations of organic material)
ob	probable outdoor taxa
p	strongly plant-associated taxa
rd	dry decomposers
rf	foul decomposers
rt	generalized decomposers
RT	total decomposers (rd+rf+rt)
ss	strong synanthropes (very rare in natural habitats)
st	typical synanthropes (typically present in man-made habitats but capable of living in natural situations)
sf	facultative synanthropes (found in man-made and natural habitats)
S	total synanthropes (ss+st+sf)
w	aquatic taxa
u	uncoded taxa

TABLE 47: Ecological groups used in analysis of insect remains, following Kenward et al. (1986) and Kenward (1997)

Species	Food and habitat preferences
Podops inuncta	Damp meadows feeding on grasses and sedges. Hibernates in tufts of grass in dry places
Heterogaster urticae	Warm, sunny fields and non-acid wastelands, on nettles (*Urtica*)
Conomelus anceps	Common on rushes (*Juncus*)
Trioza urticae	On nettles (Urtica)
Kissister minimus	At grass roots, especially in sandy places and at the roots of sheep's sorrel (*Rumex acetosella*)
Dascillus cervinus	The larvae feed at the roots of short vegetation
Brachypterus spp.	On nettles (*Urtica*)
Bruchinae spp.	Associated with leguminous plants
Lema or Oulema sp.	Feeds on the leaves of grasses and cereals
Longitarsus spp.	Members of the genus are found on various herbaceous plants, especially Boraginaceae, Scrophulariaceae and Labiatae
Neocrepidodera sp.	Adults are polyphagous and hosts include grasses and cereals, with their larvae feeding in the stems
Crepidodera sp.	On willows (*Salix*) and poplars (*Populus*), including aspen (*P. tremula*)
Chaetocnema concinna	Usually on members of the knotweed family (Polygonaceae) including Polygonum and docks (*Rumex*)
Chaetocnema picipes	On Polygonaceae and oraches (*Atriplex*)
Malvapion malvae	On mallows (Malvaceae), especially common mallow (*Malva sylvestris*)
Apionidae spp.	Most species are found on herbaceous vegetation, often in grassland
Notaris sp.	On semi-aquatic grasses
Mecinus pascuorum	On plantains (*Plantago*)
Ceutorhynchus contractus	In waste and open places on crucifers
Ceutorhynchus erysimi	In Britain found exclusively on shepherd's purse (*Capsella burs-pastoris*), in waste places and on disturbed ground
Nedyus quadrimaculatus	On nettles (*Urtica*)
Sitona spp.	On Papilionaceae
Scolytus rugulosus	Bark beetle usually found on trees and shrubs of the Rosaceae family
Hylesinus varius	Bark beetle found on ash (*Fraxinus*)
Tanysphyrus lemnae	On duckweeds (*Lemna*)

TABLE 48: Habitat and food preferences of plant-associated beetles and bugs. Very eurytopic taxa have been excluded. Main sources: Cox 2007, Harde and Hammond 1984, Morris (1990–2008), Southwood and Leston (1959)

		Feature [3652]			Feature [2714]
Context	**3665**	**3663**	**3664**	**3662**	**2819**
Sample	**<2084>**	**<2064>**	**<2066>**	**<2061>**	**<2025>**
Sample volume	**3 litres**	**3 litres**	**3 litres**	**3 litres**	**3 litres**
ANNELIDA					
Oligochaeta sp. (earthworm egg capsules)	+	+	–	+	+
CRUSTACEA					
Daphnia sp. (ephippia)	++	++	+++	++	+
Cladocera sp. (ephippia)	++	++	+	+	+
Ostracoda spp.	+	–	++	++	+
INSECTA					
Dermaptera (earwigs):					
Dermaptera sp. [u]	+	+	–	+	+
Mallophaga (biting lice):					
Bovicola ovis (Schrank)	–	–	–	+	–
Hemiptera (true bugs):					
Cydnidae sp. [oa-p]	1	–	–	–	–
Podops inuncta (Fabricius)[oa-p]	–	*	–	–	–
Heterogaster urticae (Fabricius) [oa-p]	1	*	1	*	–
Peritrechus geniculatus (Hahn) [oa-p]	–	–	1	–	–
Scolopostethus sp. [oa-p]	1	–	1	–	–
Lygaeidae spp. [oa-p]	–	*	–	*	–
Tingidae sp. [u]	–	*	–	–	–
Miridae sp. [u]	1	–	1	–	–
Saldidae sp. [oa-d]	–	–	1	–	*
Corixidae sp. [oa-w]	–	–	1	*	*
Corixidae sp. (nymphs) [oa-w]	–	–	–	+	–
Heteroptera spp.	1	*	1	*	*
Conomelus anceps Germar [oa-p]	–	–	–	–	*
Delphacidae spp. [oa-p]	–	*	2	*	*
Auchenorhyncha spp. [oa-p]	2	**	10	**	**
Trioza urticae (Linnaeus) (nymphs) [oa-p]	–	+	++	+	–
Aphidoidea sp.	+	++	–	+	+
Hemiptera sp. (nymphs)	–	+	–	++	–
Trichoptera (caddis flies):					
Trichoptera sp. (wing fragments)	–	–	–	+	–
Diptera (flies):					
Bibionidae sp.	–	–	–	+	–
Diptera spp. (adults)	+	–	–	–	–
Diptera spp. (puparia)	++	++	++	+	+
Hymenoptera (bees, wasps and ants)					
Formicidae spp.	–	–	–	+	–
Apoidea (?Apis mellifera)	–	–	–	+	–
Apoidea sp. indet.	–	–	–	+	–
Hymenoptera Parasitica spp.	+	–	–	+	–
Coleoptera (beetles):					
Haliplus sp. [oa-w]	–	–	1	–	*
Agabus bipustulatus (Linnaeus) [oa-w]	–	–	2	–	*
Agabus or *Ilybius* spp. [oa-w]	–	–	–	–	*
Colymbetes fuscus (Linnaeus) [oa-w]	1	*	1	*	*
Hygrotus sp. [oa-w]	–	–	–	–	*
Hydroporinae spp. [oa-w]	2	–	5	*	*
Dytiscidae spp. [oa-w]	–	*	–	*	*
Nebria cf. *brevicollis* (Fabricius) [oa]	1	–	–	–	–
Clivina sp. [oa]	–	–	–	–	*
Dyschirius globosus (Herbst) [oa]	–	–	–	–	*
Trechus obtusus or *quadristriatus* [oa]	1	*	1	–	–
Bembidion properans (Stephens) [oa]	–	–	1	–	–
Bembidion illigeri Netolitzky [oa]	–	*	–	–	–
Bembidion fumigatum (Duftschmid) [oa-d]	–	–	1	–	–

		Feature [3652]			Feature [2714]
Context	**3665**	**3663**	**3664**	**3662**	**2819**
Sample	**<2084>**	**<2064>**	**<2066>**	**<2061>**	**<2025>**
Sample volume	**3 litres**	**3 litres**	**3 litres**	**3 litres**	**3 litres**
Bembidion guttula or *mannerheimii* [oa]	–	–	3	–	–
Bembidion lunulatum (Geoffroy) [oa-d]	–	–	3	–	–
Bembidion (Philochthus) sp. [oa]	*1*	*	–	–	–
Bembidion sp. and sp. indet. [oa]	*1*	*	–	*	*
Poecilus sp. [oa]	*1*	–	–	–	*
Pterostichus nigrita or *rhaeticus* [oa-d]	–	–	–	–	*
Pterostichus (Pseudomaseus) sp. [oa-d]	–	–	–	*	–
Pterostichus vernalis (Panzer) [oa-d]	–	–	1	–	*
Pterostichus diligens (Sturm) [oa-d]	–	–	–	–	*
Calathus fuscipes (Goeze) [oa]	–	–	–	–	*
Calathus sp. [oa]	–	–	–	–	*
Anchomenus dorsalis (Pontoppidan) [oa]	–	–	–	*	–
Amara sp. [oa]	–	*	1	–	–
Harpalus rufipes (De Geer) [oa]	–	–	1	–	–
Acupalpus sp. [oa-d]	–	–	1	–	–
Harpalini sp. [oa]	1	*	1	–	–
Paradromius linearis (Olivier) [oa]	–	–	–	–	*
Lebiini sp. [oa]	–	*	–	–	–
Carabidae spp. and spp. indet. [ob]	2	*	4	*	*
Helophorus (terrestrial) sp. [oa]	–	–	1	–	–
Helophorus grandis Illiger [oa-w]	–	–	4	–	*
Helophorus aequalis or *grandis* [oa-w]	2	*	–	**	**
Helophorus spp. [oa-w]	21	***	78	****	***
Anacaena sp. [oa-w]	2	*	3	*	*
Cymbiodyta marginellus (Fabricius) [oa-w]	–	–	–	*	–
Helochares lividus (Forster) [oa-w]	–	–	6	*	–
Hydrobius fuscipes (Linnaeus) [oa-w]	2	**	5	*	**
Hydrophilinae sp(p). and sp. indet. [oa-w]	1	*	–	*	*
Coelostoma orbiculare (Fabricius) [oa-w]	–	–	1	–	*
Cercyon haemorrhoidalis (Fabricius) [rf-sf]	–	*	3	*	–
Cercyon nigriceps or *pygmaeus* [rf-st]	–	–	–	–	–
Cercyon tristis group [oa-d]	1	*	–	*	*
Cercyon analis (Paykull) [rt-sf]	–	–	–	*	–
Cercyon spp. and sp. indet. [u]	–	–	1	*	–
Megasternum concinnum (Marsham) [rt]	3	*	5	*	*
Cryptopleurum minutum (Fabricius) [rf-st]	–	*	2	–	–
Sphaeridium sp. [rf]	–	*	–	–	*
?Sphaeridium sp. [rf]	–	–	–	*	–
Acritus nigricornis (Hoffman) [rt-st]	–	–	3	*	–
Kissister minimus (Laporte) [rt]	–	*	2	–	*
Histeridae sp. [u]	–	–	1	*	–
Hydraena testacea Curtis [oa-w]	1	*	2	–	*
Hydraena spp. [oa-w]	–	–	1	–	*
Limnebius spp. [oa-w]	3	*	1	*	*
Ochthebius bicolon Germar [oa-w]	–	–	2	–	*
Ochthebius dilatatus Stephens [oa-w]	2	*	2	**	*
Ochthebius minimus (Fabricius) [oa-w]	5	–	10	**	***
Ochthebius cf. *minimus* (Fabricius) [oa-w]	–	**	–	–	–
Ochthebius pusillus or *viridis* [oa-w]	–	–	1	–	–
Ochthebius sp. and sp. indet. [oa-w]	–	–	–	*	–
Ptenidium sp. [rt]	1	–	3	–	–
Acrotrichis sp. [rt]	1	–	3	*	*
Cholevinae sp. [u]	–	–	–	*	–
Silphidae sp. [u]	1	–	1	–	–
Anthobium sp. [oa]	–	*	–	–	–
Lesteva longoelytrata (Goeze) [oa-d]	1	*	10	*	–

		Feature [3652]			Feature [2714]
Context	**3665**	**3663**	**3664**	**3662**	**2819**
Sample	**<2084>**	**<2064>**	**<2066>**	**<2061>**	**<2025>**
Sample volume	**3 litres**	**3 litres**	**3 litres**	**3 litres**	**3 litres**
Lesteva sp. and sp. indet. [oa-d]	1	–	–	–	*
Omalium sp. [rt]	–	–	1	–	–
Micropeplus fulvus Erichson [rt]	–	–	1	*	–
Tachinus spp. [u]	1	–	2	–	*
Tachyporus sp. [u]	1	*	2	*	*
Cordalia obscura (Gravenhorst) [rt-sf]	–	*	2	*	–
Falagria sp. [rt-sf]	2	–	–	–	–
Drusilla canaliculata (Fabricius) [u]	–	*	2	*	–
Aleochariinae spp. [u]	4	**	17	**	**
Anotylus nitidulus (Gravenhorst) [rt-d]	1	–	3	*	*
Anotylus rugosus (Fabricius) [rt]	–	–	1	*	*
Anotylus sculpturatus group [rt]	–	–	1	–	*
Oxytelus sculptus Gravenhorst [rt-st]	–	*	2	*	–
Platystethus cornutus group [oa-d]	5	**	17	**	**
Platystethus nitens (Sahlberg) [oa-d]	4	*	3	*	–
Platystethus nitens or *nodifrons* [oa-d]	–	–	–	–	*
Platystethus arenarius (Fourcroy) [rf]	–	*	4	**	–
Aploderus caelatus (Gravenhorst) [rt]	–	–	–	*	–
Carpelimus spp. [u]	2	*	7	*	*
Scydmaeninae spp. [u]	1	*	–	–	–
Stenus spp. [u]	–	*	5	*	*
Ochthephilum sp. [oa-d]	–	–	–	–	*
Lathrobium spp. [u]	–	–	1	*	*
Lobrathium multipunctum (Gravenhorst) [u]	–	–	1	–	–
Medon or *Sunius* sp. [rt]	1	–	–	–	–
Paederus sp. [oa-d]	–	–	1	–	–
Rugilus sp. [rt]	1	*	–	–	*
Paederinae sp. [u]	1	–	1	–	–
Erichsonius sp. [oa]	1	–	1	–	–
Ocypus olens (Müller) [u]	1	–	–	–	–
Gyrohypnus angustatus Stephens [rt-st]	–	–	1	–	–
Gyrohypnus fracticornis (Müller) [rt-st]	–	–	–	*	–
Gyrohypnus sp. indet. [rt]	1	*	3	–	–
Leptacinus sp. [rt-st]	–	*	1	*	–
Xantholinus linearis or *longiventris* [rt-sf]	–	*	4	–	–
Xantholinini sp. [u]	1	–	–	*	–
Staphylininae spp. [u]	4	**	5	**	**
Geotrupinae sp. [oa-rf]	–	–	1	*	*
Aphodius granarius (Linnaeus) [ob-rf]	–	–	1	*	–
Aphodius sphacelatus (Panzer) [ob-rf]	1	–	–	–	–
Aphodius prodromus or *sphacelatus* [ob-rf]	–	–	–	**	–
Aphodius contaminatus (Herbst) [oa-rf]	–	–	–	–	*
Aphodius spp. and spp. indet. [ob-rf]	2	*	5	*	*
Oxyomus sylvestris (Scopoli) [rt]	1	–	2	*	–
Onthophagus spp. [oa-rf]	–	*	1	–	–
Cyphon sp. [oa-d]	–	–	–	–	*
Scirtidae sp. [u]	–	–	–	*	–
Dascillus cervinus (Linnaeus) [oa-p]	–	–	–	–	*
?Elmis aenea (Müller) [oa-w]	–	–	–	–	*
Oulimnius sp. [oa-w]	–	–	1	–	*
Dryops sp. [oa-d]	–	–	1	*	*
Heterocerus sp. [oa-d]	–	–	2	–	*
Elateridae spp. [ob]	4	*	–	*	*
Elateridae sp. (larval apex) [ob]	–	+	+	–	–
Cantharidae sp. [ob]	–	–	–	–	*
Ptinus fur (Linnaeus) [rd-sf]	–	*	–	*	–

		Feature [3652]			Feature [2714]
Context	**3665**	**3663**	**3664**	**3662**	**2819**
Sample	**<2084>**	**<2064>**	**<2066>**	**<2061>**	**<2025>**
Sample volume	**3 litres**	**3 litres**	**3 litres**	**3 litres**	**3 litres**
Ptinus ?fur (Linnaeus) [rd-sf]	–	–	1	–	–
Anobium punctatum (De Geer) [l-sf]	1	*	2	*	–
Brachypterus sp. [oa-p]	–	*	4	–	–
Monotoma sp. [rt-sf]	–	*	–	*	–
Cryptophagus spp. [rd-sf]	–	*	1	*	–
Atomaria spp. [rd]	1	*	2	–	–
Ephistemus globulus (Paykull) [rd-sf]	–	–	1	–	–
Coccinellidae sp. [oa-p]	1	–	–	–	–
Corylophidae sp(p). [rt]	2	–	1	*	*
Latridius minutus group [rd-st]	1	–	4	*	–
Enicmus sp. [rd-sf]	1	*	1	–	–
Corticaria sp. [rt-sf]	–	–	1	–	–
Corticariinae spp. [rt]	2	*	4	*	–
Omonadus sp. [rt]	–	–	1	–	–
Bruchinae sp. [u]	–	–	1	–	–
Lema or *Oulema* sp. [oa-p]	–	–	1	–	–
Chrysomelinae sp. [oa-p]	–	–	–	–	–
Longitarsus sp. [oa-p]	1	*	–	*	–
Neocrepidodera sp. [oa-p]	–	–	–	*	–
Crepidodera sp. (Fabricius) [oa-p]	–	–	–	*	–
Chaetocnema concinna or *picipes* [oa-p]	–	*	1	*	–
Alticini sp. [oa-p]	1	*	–	–	*
Chrysomelidae sp. [oa-p]	–	*	–	–	*
Malvapion malvae (Fabricius) [oa-p]	–	*	3	–	–
Apionidae sp. [oa-p]	5	*	6	*	*
Notaris sp. [oa-p-d]	–	–	–	–	*
Tanysphyrus lemnae (Paykull) [oa-p-w]	18	***	43	**	**
Mecinus pascuorum (Gyllenhal) [oa-p]	1	–	–	–	–
Mecinini sp. [oa-p]	–	*	–	–	–
Ceutorhynchus ?contractus (Marsham) [oa-p]	–	–	1	–	–
Ceutorhynchus erysimi (Fabricius) [oa-p]	–	–	1	–	–
Nedyus quadrimaculatus (Linnaeus) [oa-p]	1	–	–	*	–
Ceutorhynchinae sp. [oa-p]	3	*	2	*	*
Phyllobius sp. [oa-p]	1	–	–	–	–
Phyllobius or *Polydrusus* sp. [oa-p]	–	–	2	–	*
Sitona sp. [oa-p]	–	–	1	–	–
Scolytus rugulosus (Müller) [l]	–	–	1	–	–
Hylesinus varius (Fabricius) [l]	–	*	1	–	–
Scolytinae sp. [l]	–	–	–	*	–
Curculionidae sp. and spp. indet. [oa-p]	3	–	–	–	*
Coleoptera spp. and sp. indet. [u]	–	–	–	*	–
Insecta spp. indet. larval fragments	+	++	+++	+++	+
ARACHNIDA					
Acarina spp. (mites)	++	++	+++	+++	++
Aranae sp. (spiders)	+	–	–	+	–
TOTAL INDIVIDUALS BEETLES AND BUGS	**149**	**~175**	**388**	**~250**	**~170**

TABLE 49: Insect and other invertebrates recorded from the samples. Ecological codes are shown in square brackets. The codes are explained in Table 47. For samples recorded by scanning abundance of adult beetles (Coleoptera) and bugs (Hemiptera) was recorded as: * (1–3 individuals), ** (4–9 individuals), *** (10–25 individuals), **** (25–100 individuals). Abundance of invertebrates other than beetles and bugs was estimated on a three-point scale as + present,++ common, and +++ abundant

abundant, and the latter were dominated by *Helophorus* species and *Tanysphyrus lemnae* found on duckweeds.

The range of aquatic and damp ground/waterside beetles was similar to the previous sample and the *Ochthebius dilatatus* and *Platystethus cornutus* group in particular were suggestive of muddy water and exposed organic-rich marginal mud. Terrestrial conditions appear generally to have been rather open – the ground beetle *Bembidion illigeri*, for example, is found in open, sunny sites near water (Luff 2007, 93) – and ground at least immediately around the feature may have been rather sparsely vegetated. Plant-associated insects were well-represented and some were indicative of particular groups of plants of disturbed or waste ground and grassland: *Heterogaster urticae*, *Brachypterus* and nymphs of *Trioza urticae* all pointed to the continuing existence of stands of nettles close to the water-hole, *Chaetocnema concinna/picipes* is associated with the knotweed family (*Polygonaceae*), *Malvapion malvae* is found on mallows, especially common mallow (*Malva sylvestris*), and *Kissister minimus* is found at the roots of grasses and other plants on dry sandy or stony soils, often at the roots of sheep's sorrel (*Rumex acetosella*) (Allen 1960). Seeds of all these host plants were identified from the fills of the water-hole during the assessment (Huckerby and Bonsall 2012). A turtle bug (*Podops inuncta*) was also suggestive of grassland. It feeds on grasses and sedges in wet meadows, but hibernates in tufts of grass in dry places (Southwood and Leston 1959, 35). There was also a suggestion of occasional trees from *Leperisinus varius*, a bark beetle found on ash (*Fraxinus*).

By comparison with the earliest sample there were slightly stronger suggestions for the introduction of litter from within buildings into the deposit, chiefly from remains of white-marked spider beetle (*Ptinus fur*), *Cryptophagus*, *Atomaria*, and *Enicmus*, all of which typically occur together in an ancient building fauna. Scarabaeid dung beetles were represented by an *Aphodius* and two species of *Onthophagus*. Some other decomposer beetles – *Cercyon haemorrhoidalis*, *Cryptopleurum minutum*, *Sphaeridium*, and *Platystethus arenarius* – are all associated with foul organic material which would include both dung and other foul settlement waste. The number of beetles with synanthropic associations was subjectively a little higher than in the previous sample, and they included several typical synanthropes, perhaps suggesting increased agricultural activity.

Context 3664, sample 2066, late Roman water-hole 3652

This sample produced the largest assemblage of beetles and bugs (388 individuals of 148 taxa), which was recorded and analysed in detail. Preservation of sclerites was generally good. Water flea ephippia were abundant and ostracod carapaces common, and there was a sizeable component of water beetles (44% of the whole assemblage), again dominated by *Helophorus* species and *Tanysphyrus lemnae*. *Helochares lividus*, represented by six individuals, is an efficient coloniser of sparsely vegetated ponds, dying out if aquatic plant and animal communities develop (Denton 2007, 108, 129). *Ochthebius* species were common and the majority were *O. minimus*, but *O. dilatatus*, *O. bicolon* and either *O. pusillus* or *O. viridis* were also represented. Other aquatic taxa included *Hydrobius fuscipes*, *Hydraena testacea*, *Coelostoma orbiculare*, and a single riffle beetle (Elmidae: *Oulimnius*). Most of the species were typical of still water as might be expected, and some of muddy water, but *Oulimnius* would not be able to live in such conditions. It requires clean, clear well-oxygenated running water and may have come from a nearby stream. *Ochthebius bicolon* is also usually found in mud by running rather than stagnant water (Friday 1988, 151).

Damp ground and waterside taxa were well-represented (19% of terrestrial forms) with some taxa, particularly *Platystethus cornutus* group, *Dryops* and *Heterocerus*, indicative of exposed organic-rich wet mud close to the water-hole. *Bembidion lunulatum* (represented by three individuals) is found on damp, bare or sparsely vegetated ground near water (Luff 2007, 102). Plant-associated species suggested that the surroundings of the feature included disturbed/cultivated or waste ground, and damp and drier grassland. Nettles were indicated by the nettle ground bug (*Heterogaster urticae*), *Trioza urticae* nymphs and *Brachypterus*, and the knotweed family and mallows by *Chaetocnema concinna/picipes* and *Malvapion malvae* respectively, while *Ceutorhynchus ?contractus* is found on crucifers (Brassicaceae) and *C. erysimi* on shepherd's purse (*Capsella bursa-pastoris*). *Kissister minimus* which is found at plant roots in sparse grassland and often specifically at the roots of sheep's sorrel (*Rumex acetosella*) was again recorded. *Lema/Oulema* species feed on the leaves of grasses or cereals, and *Sitona* on leguminous plants (Fabaceae) such as clovers and trefoils. Although the general implication of the assemblage was for open ground, the presence of *Hylesinus varius* and *Scolytus rugulosus*, bark beetles usually associated with ash (*Fraxinus*) or woody Rosaceae, was suggestive of the presence of isolated trees and/or a hedgerow.

Decomposers were somewhat better represented than in the earliest fill examined, making up a third of terrestrial beetles and bugs compared to a quarter in the earlier deposit. The proportion of synanthropic taxa was also larger (13% of the terrestrial group compared to 6% in the earlier sample), and they included a number of typical synanthropes such as *Acritus nigricornis*, *Cryptopleurum minutum*, *Oxtelus sculptus*, *Gyrohypnus angustatus*, *Leptacinus* and *Latridius minutus* group perhaps suggesting increased human activity. There was again a characteristic group of beetles suggesting that material from within building had been incorporated into the fill (*Ptinus ?fur*, *Cryptophagus*, *Atomaria* spp., *Ephistemus globulus*, *Latridius minutus* group, and possibly woodworm beetle). The small numbers of scarabaeid dung beetles included *Aphodius granarius*, *Onthophagus* and *Geotrupidae* sp.. Some other beetles associated with foul organic material (*Cercyon haemorrhoidalis*, *Cryptopleurum minutum*, *Platystethus arenarius*) could have exploited either dung or foul habitation waste.

Context 3662, sample 2061, late Roman water-hole 3652

A substantial insect assemblage (an estimated 250 individuals) was recorded by scanning. Proportions of aquatics and the composition of both aquatic and terrestrial components, and therefore the ecological implications, were very similar to the previous sample. The same group of beetles characteristic of litter from within buildings was also represented. Two additional records were worthy of note: a poorly preserved leg

segment of a bee, probably a honey bee (*Apis mellifera*), and a complete male abdomen and genitalia of a biting louse found exclusively on sheep (*Bovicola ovis*). This louse often occurs in archaeological insect assemblages in contexts where it appears to be derived from the cleaning or processing of fleeces or wool rather than the penning or close proximity of sheep. They are most commonly recorded from house floors or from redeposited floor litter (for example in Anglo-Scandinavian tenements at Coppergate in York (Kenward and Hall 1995, 775–7).

Context 2819, sample 2025, late Roman pit or water-hole 2714

Insect remains from this deposit were recorded by scanning. There was a large aquatic component and *Helophorus* species, *Ochthebius minimus* and *Tanysphyrus lemnae* were the most abundant taxa. There appeared to be a rather wider range of diving beetles (*Dytiscidae*) than in the fills of water-hole 3652. Other aquatics included single individuals of two species of riffle beetles (*?Elmis aenea* and *Oulimnius*) which may have come from nearby running water since they could not live in the stagnant and perhaps rather muddy water suggested by the rest of the water beetles.

Platysthetus cornutus group, *Dryops*, and *Heterocerus* were all indicative of exposed wet organic-rich mud around the margins of the feature, and there was a hint of emergent or wetland vegetation from *Notaris*, a weevil that feeds on semi-aquatic grasses, and *Conomelus anceps* found on rushes (*Juncus*). None of the insects associated with nettles that were seen throughout the sequence of samples from water-hole 3652 was noted in this sample. The chief indications were for grassland. Ground beetles included several species of damp grassland (*Pterostichus vernalis*, *P. nigrita/rhaeticus*, *P. diligens*) and others from drier grassland or possibly cultivated ground (*Calathus fuscipes*, *Paradromius linearis*). Small numbers of several species primarily associated with herbivore dung were recorded, including *Aphodius contaminatus* and *Sphaeridium*. Unlike the assemblages from water-hole 3652, there were no indications from the insect assemblage for litter from within buildings having entered the feature, and no taxa that are regarded as synanthropic to any degree were noted during scanning.

Discussion and conclusions

The abundance of water beetles and other aquatic invertebrates in all of the assemblages indicated that both features contained standing water more or less permanently, although there may have been seasonal fluctuations in water level. Both could therefore have functioned as water-holes. The aquatic beetles recovered from water-hole 3652 did not suggest a well-established community, rather an opportunistic invasion of a silty water body. A slightly wider range of taxa appeared to be present in water-hole/pit 2714. Weevils found on duckweed (*Lemna*) were some of the more abundant beetles in all of the assemblages from both features.

A recent modern study of insect material in accumulations of sediment in small ponds indicated that most terrestrial insects arrived from within a 100m–200m radius of the sampling sites (Smith et al. 2010). The terrestrial insect assemblages from the two features studied here are therefore likely to provide information on local habitats, with much of the information pertaining to the immediate surroundings of the features.

Context	3665	3664
Sample	<2084>	<2066>
Total individuals	149	388
Total taxa	92	148
Number of aquatic individuals	60	170
% aquatic individuals	40%	44%
Number of aquatic taxa	15	27
% aquatic taxa	16%	18%
Number of terrestrial taxa	89	218
% terrestrial individuals	60%	56%
Number of terrestrial taxa	77	121
% terrestrial taxa	84%	82%

TABLE 50: Proportions of aquatic and terrestrial beetles and bugs from Passingford (M25002.09). Percentages have been rounded to the nearest whole number

Groups of insects from both features provided good evidence for exposed, organic-rich mud immediately around them, and for stands of nettles (*Urtica*) growing close to water-hole 3652.

Generally, terrestrial insects from both features indicated an open, sunny site. There were consistent records of bark beetles from all but the lowermost fill of 3652, suggesting either isolated trees or perhaps a hedgerow in its vicinity. The two species identified closely usually occur on ash (*Fraxinus*) and shrubby Rosaceae.

Phytophages associated with herbaceous plants recovered from 3652 reflected the presence of disturbed/cultivated or waste ground and also damp and drier grassland. Specific host plants identified from the first category were the knotweed family (Polygonaceae), mallows (Malvaceae, probably common mallow (*Malva sylvestris*)), crucifers (Brassicaceae), shepherd's purse (*Capsella bursa-pastoris*), grasses and sedges (*Carex*), plantains (*Plantago*), and perhaps sheep's sorrel (*Rumex acetosella*). Evidence for damp grassland was particularly strong in the sample from water-hole/pit 2714, where there were fewer insect indicators of other plants.

An extract of a distinctive suite of insects typical of litter from ancient buildings was represented in all samples from water-hole 3652, albeit in very small numbers in the earliest fill. Unless there was archaeological evidence for the dumping of waste into the feature, the most likely source of such material is from manuring of adjacent land, introduced either accidentally during spreading or in run-off. Manuring using a variety of materials and domestic waste as well as dung appears to have been practised from the Late Neolithic onwards in western Europe (Bakels 1997) and it may have been carried out seasonally on both cultivated fields and on meadowland sbject to its availability.

For the samples analysed in detail from water-hole 3652 the proportion of synanthropic beetles increased between the earliest fill and the later one. A similar increase was also indicated in the two scanned samples, suggesting a greater human influence after the earliest fill had accumulated. Neither synanthropic taxa nor fauna from within buildings were noted during scanning the assemblage from water-hole/pit 2714.

Scarabaeid dung beetles were represented in low numbers in all of the samples from both features. Two species of *Onthophagus* and the fragmentary remains of geotrupids were

recorded in addition to several species of *Aphodius*. All are primarily associated with dung but some *Aphodius* are (less commonly) associated with decomposing plant material, and some may have been attracted to foul habitation waste other than animal dung. The modern study carried out by Smith et al. (2010) suggested that the proportion of dung beetles in insect assemblages from small bodies of water has the potential to reflect intensity of land use by grazing animals. Based on preliminary findings it was suggested that dung beetles make up more than 10% of the terrestrial fauna when large or dense populations of grazing animals are present nearby, and less than 5% when there are natural populations of grazing animals or 'naturalistic' grazing by domestic animals. At Passingford Bridge scarabaeid dung beetles accounted for 3% of the terrestrial fauna in the earliest fill of water-hole 3652 and 4% in a later deposit. The latter figure rises to 8% if non-scarabaeids associated with foul organic matter including dung are considered. Similar proportions of scarabaeids and other foul matter beetles appeared to be represented in the three scanned samples. The situation at Passingford Bridge is complicated by the likelihood that agricultural fields were manured with foul habitation waste of various kinds, which is likely to have included some of the non-scarabaeid foul decomposers. Scarabaeid dung beetles are not usually characteristic of stable manure (Kenward and Hall 1997) and so their abundance on their own is likely to be a better indicator of the levels of herbivore activity. The results from the samples analysed in detail suggest that there was only a low-level presence of grazing livestock in the near vicinity of the water-holes. This might suggest that land around the features was used mainly for cultivation or as meadowland. This would also tie in with the probable evidence for manuring in the vicinity of water-hole 3652. The insect evidence suggested that land around water-hole/pit 2714 may have been primarily damp grassland. Livestock such as cattle may have been mainly kept closer to habitation, and pastureland may have existed at some distance from the settlement on land less suitable for cultivation or use as meadowland.

Context	**3665**	**3664**
Sample	**<2084>**	**<2066>**
Number of terrestrial individuals	89	218
Number of terrestrial taxa	77	121
Number of RT individuals	22	72
% RT individuals	25%	33%
Number of RT taxa	18	37
% RT taxa	23%	31%
Number of rd individuals	3	10
% rd individuals	3%	5%
Number of rd taxa	3	7
% rd taxa	4%	6%
Number of rf individuals	3	17
% rf individuals	3%	8%
Number of rf taxa	3	7
% rf taxa	4%	6%
Number of rt individuals	16	45
% rt individuals	18%	21%
Number of rt taxa	12	23
% rt taxa	16%	19%
% rd/RT individuals	14%	14%
% rf/RT individuals	14%	24%
% rt/RT individuals	73%	63%
Number of g individuals	0	0
% g individuals	0%	0%
Number of g taxa	0	0
% g taxa	0%	0%
Number of l individuals	1	4
% l individuals	1%	2%
Number of l taxa	1	3
% l taxa	1%	3%
Number of d individuals	13	41
% d individuals	15%	19%
Number of d taxa	6	11
% d taxa	8%	9%
Number of p individuals	23	38
% p individuals	26%	17%
Number of p taxa	23	28
% p taxa	30%	23%
Number of m individuals	0	0
% m individuals	0%	0%
Number of m taxa	0	0
% m taxa	0%	0%
Number of oa individuals	42	91
% oa individuals	47%	42%
Number of oa taxa	35	49
% oa taxa	46%	41%
Number of oa+ob individuals	51	101
% oa+ob individuals	57%	46%
Number of oa+ob taxa	43	55
% oa+ob taxa	56%	46%
Number of S individuals	5	29
% S individuals	6%	13%
Number of S taxa	4	15
% S taxa	5%	12%
Number of ss individuals	0	0
% ss individuals	0%	0%
Number of ss taxa	0	0
% ss taxa	0%	0%
Number of st individuals	1	13
% st individuals	1%	6%
Number of st taxa	1	6
% st taxa	1%	5%
Number of sf individuals	4	16
% sf individuals	5%	7%
Number of sf taxa	3	9
% sf taxa	4%	7%

TABLE 51: Proportions of terrestrial beetles and bugs from Passingford (M25002.09) representing different ecological groups. Percentages have been rounded to the nearest whole number. Ecological groups are based on Kenward et al. (1986) and Kenward (1997). See Table 47 for codes used

6 IN THE WIDER SCHEME: DISCUSSION

FROM MESOLITHIC TO BRONZE AGE

Evidence for earlier prehistoric activity (Phase 1) was sparsely distributed across the M25 Section 4 Widening Scheme. The evidence, comprising residual occurrences of flint tools and other pieces, suggests that Mesolithic and Neolithic hunter-gatherers left little impact on the landscape as a result of the infrequency or transitory nature of their visits. That said, the tools identified indicated that visitors engaged in a range of activities. Scrapers from Pond 1683 and Upminster Bund may have been used for the preparation of hides, or possibly the processing of woods or fibres, while a piercer and awl, also from Pond 1683, were used for activities such as perforating hides. A microlith dating to the early Mesolithic period was collected from Pond 1824. A flint arrowhead from Passingford Bridge Flood Alleviation Area attests to the hunting of animals by the River Roding, while blades also found there were used for cutting and processing the meat. Blades were additionally found at Pond 1835 and Pond 1824, and a core from Tank 1714 suggests that knapping took place in the vicinity of that site.

The tools from Pond 1824 were recovered from a group of pits along with roughly-worked later prehistoric material, including two cores and several flakes. The later pieces were chronologically consistent with flint-tempered pottery also collected from the features. In addition, the pits contained charcoal, and burnt grain from one of them (130) was radiocarbon dated to the middle Bronze Age (Phase 2) (Table 52). The pits provide trace evidence for permanent occupation of the area. The evidence seems minor, certainly compared with, for example, the roundhouses and fencelines recorded at the Mid Term Car Park (MTCP) site at Stansted (Framework Archaeology 2008, 44–9) or boundary ditches at Great Wakering (Reidy 1997), but the material from the pits nevertheless indicates that settlers were using pottery, possibly for storage and consumption, and making flint tools. The burnt grain, dumped into the pits along with domestic hearth waste, suggests that crops were grown nearby. A pit (4) containing charcoal and the substantial remains of a ceramic pottery vessel at Pond 1615 offers a glimpse of an area of late Bronze Age occupation at Pond 1615, while a fired-clay pedestal of middle Bronze Age date from pit 5140 at Hobbs Hole hints at a nearby oven or hearth.

Funerary activity is potentially represented by the middle Bronze Age annular ring-ditch (2100) at Passingford Bridge Flood Alleviation Area. Its interpretation is uncertain, but given its form and location on the floodplain of the River Roding, the feature is likely to have once surrounded a barrow. No central grave that cut into the natural brickearth and was covered by the putative mound was seen, but it is possible that a burial had been removed by the plough. Alternatively, cremated remains had been scattered through the mound or within the ditch. As with 2100, a barrow at the Mid Term Car Park (MTCP) at Stansted had an internal diameter of 8m, it was located on the floodplain (in this case the Princey Brook), and was dated to the middle Bronze Age. There was no central grave, but cremated bone was placed in the ditch fills, with a smaller amount deposited within the mound (Framework Archaeology 2008, 58–61). Ring-ditch 2100 contained no cremated bone, but its shallow profile and the modern roots found within it suggest that the ditch had been truncated by the plough, which may have removed any bone. It could be argued that the flintwork collected from the ditch, dominated by flakes, but including a significant Mesolithic or earlier Neolithic blade and blade-like component (M. Donnelly, above), represents a curated assemblage deposited to establish or reinforce territorial claims and connections with the past, but the pieces could equally be viewed as fortuitous survivals, as appeared to be the case with Stansted's barrow (Cramp 2008, 24.27). The liminal location of both barrows is also paralleled by two middle Bronze Age ring-ditches uncovered at Slough House Farm, near Heybridge and close to the River Blackwater. The ditch of structure B at that site, which had an internal diameter of 8m, was partially filled with clay, suggesting that the ditch was periodically flooded (Wallis 1998, 14). In all cases, water may have played a role in mortuary rituals and commemoration of the dead, while the construction of permanent monuments gave communities a degree of control over the dynamic environment of the floodplain. Such locations contrast with the elevated positions favoured for some barrows in the region, for example an early Bronze Age barrow recorded at Marks Warren, Dagenham (Lyons 2011, 14), which gave prominence to the monument, the deceased and the community. That is not to say that the barrow from Passingford Bridge was not a visible marker in the landscape, as it would have been seen by travellers moving up and down the river. To what extent the choice of location reflects changing or divergent beliefs among chronologically and geographically separate communities is uncertain.

More certain funerary activity was uncovered at Upminster Bund. A single grave (1166) contained fragments of bone from an adult and charcoal presumably taken from the pyre. Another apparently isolated cremation grave (109) in which an adult was buried was uncovered at Pond 1791. The bone from both was radiocarbon dated to the middle to late Bronze Age (Table 52). No human remains were recovered from a middle Bronze Age flint-tempered urn in a pit (219) from Pond 1812, and it is possible that the feature represents a severely plough-damaged grave. However, it joins other later Bronze Age pits across the scheme route – including pit 4 (Pond 1615) and 2698 (Passingford Bridge Flood Alleviation Area) – that contained substantial portions of single vessels but no bone, which may instead be interpreted as placed or structured deposits. The phenomenon is known elsewhere in the region. At Great Holts Farm, Boreham, for example, six pits, each containing a single vessel dated to the late Bronze Age, were uncovered (Germany 2003, 14). At Orsett, two pits dated to the late Bronze Age or early Iron Age were found to be 'crammed with flint-tempered pottery' (Wilkinson 1988, 15), while four late Bronze Age pits recorded at Mucking contained material, including pottery, fired clay and flint, that appeared to have been deliberately selected (Bond 1988, 14; Barrett and Bond 1988, 34). While the cultural context of the ritual activity is uncertain, features such as these nevertheless imply nearby domestic activity.

Site	Feature/layer	Sample	Context	Material	Lab code	δ13C (‰)	C14 Age BP	Calibrated date (2σ, OxCal v.4.1.7)
M25001.09	Cremation burial 6092	130	6092	Human cremated bone	SUERC-43685 (GU29031)	-21.6	2010±29	91–70 BC (3.9%) 60 BC-AD 65 (91.5%)
M25002.09	Fill of ring-ditch 2138	2005	2139	Charcoal: Pomoideae	SUERC-43686 (GU29032)	-25	3097±29	1434–1299 BC (95.4%)
M25002.09	Fill of post-hole 2161	2013	2163	Charred grain: *Triticum* sp. (*spelta/ dicoccum*)	SUERC-43687 (GU29033)	-25.4	2276±27	400–352 BC (55.8%) 296–228 BC (37.6%) 221–211 BC (2%)
M25002.09	Fill of post-hole 2152	2011	2153	Charred grain: *Triticum* sp.	SUERC-43688 (GU29034)	-24.2	2303±29	406–356 BC (79.3%) 286–233 BC (16.1%)
M25003.09	?Cremation burial 1014	1001	1015	Charcoal: small roundwood indet <3 yrs old	SUERC-43692 (GU29035)	-26.8	FAIL	FAIL
M25004.09	Fill of pit 4	1	5	Charcoal: cf. *Prunus spinosa*	SUERC-43722 (GU29059)	-25.4	2890±29	1195–1141 BC (9.4%) 1134–979 BC (86%)
M25007.09	Fill of pit 1005	1000	1006	Charcoal: *Quercus* sp. (sapwood)	SUERC-43694 (GU29037)	-24.6	948±27	AD 1025–1155 (95.4%)
M25008.09	Fill of cremation burial 1166	100	1167	Human cremated bone	SUERC-43695 (GU29038)	-19.9	2949±29	1266–1051 BC (95.4%)
M25008.09	Fill of pit 1168	106	1169	Charred grain: *Triticum* sp.	SUERC-43696 (GU29039)	-21.2	1230±27	AD 690–750 (30.7%) AD 762–881 (64.7%)
M25018.10	Fill of pit 222	102	224	Charcoal: *Fraxinus* sapwood	SUERC-43697 (GU29040)	-24.7	1596±29	AD 409–540 (95.4%)
M25023.11	Fill of cremation burial 109	1	110	Human cremated bone	SUERC-43698 (GU29041)	-21.7	2942±29	1262–1050 BC (95.4%)
M25025.11	Fill of pit 130	1	131	Charred grain: *Triticum* sp.	SUERC-43702 (GU29042)	-23.9	3133±29	1495–1472 BC (4.5%) 1465–1371 BC (82.2%) 1346–1316 BC (8.7%)

TABLE 52: Radiocarbon dates obtained by the Scottish Universities Environmental Research Centre (SUERC) on samples from M25 Section 4

Potentially the grave from Upminster Bund was contemporary with two pit alignments recorded at the same site, although it may have been an earlier feature; pottery from the pits, including a carinated bowl and a jar with an upright rim, was dated to the late Bronze Age or early Iron Age. The two alignments of irregularly-shaped pits and short ditch-like features are likely to have served as boundaries, and it is possible that the alignments met to form the corner of a field. Pit alignments are rare in the region – an alignment of some 100 pits of probable prehistoric date has been identified through aerial photography at Chrishall, north-west Essex (ECC HER 16267), and an alignment of four pits at the early–middle Iron Age site at Rainham may mark the course of a boundary or droveway (Grassam 2009, 84) – but are better known outside the region. Two examples of late Bronze Age–early Iron Age date were investigated at Biddenham Loop, Bedfordshire. The longest of the two extended across Biddenham Loop for some 900m, cutting off or isolating the southern tip of the loop of the River Great Ouse. The pits were rectangular or circular in plan, measured up to 1.85m wide and 1.05m deep and were dug at intervals of between 1.5m and 2m (Luke and Edmondson 2008, 124–5). The alignments at Upminster share nothing but date and general boundary function with that at Biddenham Loop, and its classification within the same category of monument is open to question. The alignments may instead be better viewed as the remains of an ancient tree- or hedgeline reduced over time to irregular, tree-throw-like pits and further denuded by the plough. Support for this is offered by the features' excavators, who frequently observed plough-scars and other signs of agricultural damage running across the features. There is also the superficial resemblance the alignments have with the remains at Pond 1812 of a post-medieval wooded area comprising a linear arrangement of irregular pits and hollows.

Low-level later Bronze Age or early Iron Age settlement activity was also noted at Junction 29, Hobbs Hole. A hollow (5112/5131) recorded in the north-eastern tip of the eastern area contained pottery dating to this period, while a pit (5140) whose relationship with the hollow is uncertain, but which was cut by a pit also cutting the hollow, contained a possible middle Bronze Age fired-clay pedestal. Contemporaneous hollows are known, for example, at Witham (Reynolds 2011, 60) and West Thurrock (Andrews 2009, 6), and in both cases were filled by significant amounts of domestic waste, including animal bone, charcoal, fired clay and pottery, which pointed to their use as middens. Much less was collected from 5112/5131, but the assemblage included animal bone, as well as pottery, and is tentatively identified as a truncated midden.

Returning to Passingford Bridge, discrete spreads of burnt flint and charcoal uncovered on the floodplain may represent the vestiges of a burnt mound. Their location adjacent to a water source and their composition are consistent with such features uncovered in south-eastern Britain, for example at Pheonix Wharf, London (Bowsher 1991, 18), and Barkham Square Wokingham (Torrance and Ford 2003), and typically dated to the Bronze Age. The stones may have been heated in the pits next to the spreads, with the spreads representing discarded waste. Interpretation is uncertain, but suggestions that the mounds record places of cooking, industrial activity or saunas have been offered (Barfield 1991; Jeffery 1991).

THE IRON AGE

The most significant evidence was concentrated in Passingford Bridge Flood Alleviation Area. An unenclosed settlement was established by the middle Iron Age on the gravel terrace. Four roundhouses (4016, 4095 and 4377), an enclosure (4310), and the remains of another roundhouse or enclosure (4256), as well as a number of pits and smaller structures, were assigned to this period. Dating the somewhat scrappy collection of pottery retrieved from settlement features is necessarily onerous, but the material suggests that deposition in the stratigraphically earliest features occurred during the early/middle Iron Age transition. Pottery in a fine glauconitic fabric dated to the middle Iron Age was recovered from roundhouse 4095, which was cut by structure 4016, whose pottery was more of an early Iron Age character, while a group from pit 4361, which may have been associated with enclosure 4310, appeared to belong to the 5th or 4th century BC.

The roundhouses were characterised by narrow ditches or gullies that either formed near-complete circuits or shorter arcs. The south-east-facing entrance recorded for 4016 and possibly 4095 generally matches the orientation of the entrances of roundhouses in contemporaneous settlements in the region, for example Buildings Farm, Great Dunmow (Lavender 1997, 51), East of Parsonage Lane between Braintree and Stansted (Powell 2007, fig. 2.37), and the Long Term Car Park site, Stansted (Framework Archaeology 2008, 84–5). The entrances of the roundhouses in the more extensive middle Iron Age (period II) settlement at Little Waltham faced east (Drury 1978, 14–25), while the roundhouse entrances at the middle Iron Age enclosed settlement at the Airport Catering Site (ACS), Stansted, faced north-east (Havis and Brooks 2004a, fig. 73), but overall orientations conform to the prevailing easterly direction common throughout late prehistoric Britain (Lambrick and Robinson 2009, 142). Door posts or a porch structure were identified in roundhouse 4016 – post-holes were recorded in both the north and south entrances – and post-holes in 4095 may relate to internal structural posts or division of space. There remains much debate about the function of roundhouse ditches, which is complicated by incomplete circuits, the paucity of internal features, and later truncation. Interpretations have tended to settle on drip gully or wall trench, and attention has been given to ditch profiles as a means of providing clarity. Roundhouse ditches interpreted as wall trenches at Little Waltham tended to be steeper-sided and have flatter bases (for example period II hut C8, into which the bases of post-holes had also been dug (Drury 1978, 14–15) compared with the ditches of, say, period III huts C1 and C2, which were viewed as open ditches, having wide V-shaped profiles that were filled with silt and occasional dumped deposits (Drury 1978, 32). At Chignall St James, a late Iron Age roundhouse gully (820/821) interpreted as wall trench had been severely truncated by the plough, but it generally had a flat base, and the interpretation was supported by the gradient into which the gully had been dug, which suggested that any water draining into the feature would have pooled into the gully terminals marking the entrance (Clarke 1998, 18, 132). The profiles of the middle Iron Age roundhouse gullies at Slough House Farm, Heybridge, varied, but were mostly U-shaped (Wallis 1998, 21), pointing to their function as wall trenches, while the gullies of the roundhouses at ACS,

Stansted were generally steep-sided and had flat or slightly concave bases (Havis and Brooks 2004a, figs 61–72).

Returning to Passingford Bridge Flood Alleviation Area, the profiles of roundhouse ditches 4016, 4095 and 4377, all relatively steep-sided and flat-based, suggest that the ditches served as wall trenches, although the incomplete circuits of 4095 and 4377 may have marked the position of an open structure, such as a fence, that sheltered roundhouses, which otherwise have left no trace. Indeed, it is worth considering the possibility that some or all the ditches held small timbers and wattle work that lined a mass wall built on the ground surface. Mass walls are better known in western and northern Britain, for example at Farmoor and Mingies Ditch in the Upper Thames Valley (Lambrick and Robinson 2009, 135), but evidence from Essex has now been presented. Woodwork recorded in the inner ditch – which had a U-shaped profile – of a double-ditched late Roman roundhouse at Stanford Wharf Nature reserve (Biddulph et al. 2012b, 132) was suggested to have lined a mass wall built on the ground surface in the gap between the ditches (Goodburn 2012).

A mass of post-holes was recorded across the gravel terrace at Passingford Bridge. Relatively few could be dated or resolved into coherent structures, but at least four four-post and one seven-post structures were assigned to the middle Iron Age. The seven-post structure comprised post-holes 2418, 2758, 2760, 2762, 2765, 2791 and 2793, occupied a rectangular space *c.* 5m by 3m, and had a slight projection on its short north side. It can be allied with six-post structures recorded at Slough House Farm (Wallis 1998, 28) and other sites in Essex. Structures such as these are typically interpreted as a storage building (Lambrick and Robinson 2009, 151). The pairs of post-holes located on the edge of the gravel terrace recall two-post structures, dated to the middle Iron Age, recorded at Little Waltham. As with the pairs at Passingford Bridge, these tended to be located on the edge of settlement and ranged in length from *c.* 2m to 4m (Drury 1978, 26, 124). A shared function is likely, probably drying racks or some other purpose requiring suspension of materials. The four-post structures, dated largely by middle Iron Age pottery recovered from the post-holes, were built on the gravel terrace. The structure defined by post-holes 2938, 2944, 2971 and 2969 formed a square 2m wide, post-hole group 2729/2733, 2737, 2744 and 2741 was a rectangle 3m by 3.5m, the surviving post-holes of a third structure (2934, 2965 and 3022) formed a 2.5m square, as did post-hole group 2840, 2891, 2893 and 2895. Such structures are found in later prehistoric settlements across southern Britain, and in Essex examples are known at Marks Warren (Lyons 2011, 20), Slough House Farm (Wallis 1998, 28), the Car Park I site, Stansted (Havis and Brooks 2004a, 25), Little Waltham (Drury 1978, table 3), and sites along the A120 (Powell 2007, 72), among many other sites. Four-post structures are commonly interpreted as raised granaries (cf. Bersu 1940, 97–8). The association of charred plant remains with a number of structures found in the Upper Thames Valley supports that view (Lambrick and Robinson 2009, 271), and in Essex charred grains of emmer/spelt wheat were collected from a middle Iron Age four-post structure at East of Little Dunmow Road on the A120 (Biddulph et al. 2007, 130).

Intriguingly, charred wheat and barley grains were recovered from two post-holes from the parallel alignments of post-holes (group 2101) in the floodplain in the southern part of the excavation area at Passingford Bridge. Radiocarbon determinations from the same two post-holes (2152 and 2161) indicate that some or all of the posts were erected during the 4th or 3rd century BC, and that potentially this activity was contemporary with occupation of the middle Iron Age settlement (Table 52). If interpreted as an array of eight four-post structures (not necessarily built and in use contemporaneously), the interpretation of the structures as raised granaries – a view supported by the charred plants remains – seems at odds with their location in a relatively low-lying area prone to flooding, and contrasts with the location of the other structures on higher, drier, ground. Other interpretations are possible, but are harder to reconcile with the plant evidence. The array extended through middle Bronze Age barrow 2100, which, judging by the fact that the post-holes cut into the space within the ring-ditch were at a higher level than those outside the monument, was still visible as a low mound when the array was set out during the middle Iron Age. As argued above, the location of the barrow may have been determined by the perceived religious and ritual significance of the dynamic environment of the floodplain and the River Roding. While the floodplain may have been available for the grazing of livestock, the possibility that the inhabitants of the middle Iron Age settlement similarly saw the floodplain as landscape that retained religious or funerary significance is a strong one, and with this in mind, it is not unreasonable to suggest that the array of four-post structures, plus the structure slightly off the alignment to the west, may have had a ritual or mortuary function. Inevitably, we can tentatively view the putative structures as raised excarnation platforms; the row of post-holes to the north of the structures marked the position of a fence that further separated the mortuary activity from domestic space. Excarnation, through which the body is dismembered and defleshed naturally through exposure to the elements and scavengers, such as birds, is poorly attested in later prehistoric Britain, but is inferred by the discovery of disarticated skeletal elements in pits and other settlement features (Cunliffe 1991, 418–25; Lambrick and Robinson 2009, 325–7). Indeed, excarnation may have been the predominant mortuary rite in this period (cf. Framework Archaeology 2008, 121; Carr and Knüsel 1997).

Nevertheless, the identification of excarnation platforms is not without difficulties, not least the absence of disarticulated remains at Passingford Bridge Flood Alleviation Area, as well as the presence of charred plant remains recovered from the post-holes. Much of the bone, however, may have been deposited in the River Roding. A late Iron Age pyre site at Beam Washlands, Dagenham, located on the floodplain of the Wantz Stream (Biddulph et al. 2010, 112) reminds us of the importance of rivers in Iron Age funerary practice, and the intriguing discovery of two skulls on a gravel and brushwood platform – admittedly of later Bronze Age date – on the bank of the Fenn Creek on the Crouch estuary in south-east Essex more directly links the treatment of human remains with watery places, as well as offers potential evidence for excarnation (Wilkinson and Murphy 1995, 132–5). Still, the number of structures at Passingford Bridge – nine including the structure off the main alignment – seems excessive for the size of the settlement, which during the middle Iron Age accommodated perhaps two or three households, but it is possible that site attracted communities from neighbouring settlements.

Alternatively, the alignment of post-holes marks out a monumental avenue. Participants may have used the avenue as a processional route that took them to the Bronze Age barrow, which provided the focus for ritual activity possibly relating to ancestor worship. The NE–SW orientation of the alignment may also have had cosmological significance, as it matches the direction of light cast by the rising sun during the summer solstice around 21st June. The westernmost four-post structure, which is off the alignment of the avenue, may have served as a viewing platform or an elevated structure used for other ritual activity. As with excarnation, the avenue interpretation is open to question. That the number of post-holes can be arranged into an exact number of four-post structures is a coincidence not easily ignored, and there still remains the origin of the charred plants in two of the post-holes to be explained. Overall, a prosaic array of four-post storage structures is the favoured interpretation, but the alternatives should not be dismissed.

The late Iron Age (Phase 4) saw the continuation of the settlement and the reorganisation of the field system at Passingford Bridge Flood Alleviation Area. Two roundhouses (3360 and 4020) are attributed to this phase. Structure 4020 was the larger of the two, and while the entrances of both included post-holes marking the doorway or porch structure, the entrance of 4020 was more substantial, judging by its larger post-holes, and, with the addition of a slot behind the post-holes, more elaborate. These differences may reflect social distinctions among the settlement's inhabitants or the use of 4020 as a communal building, but this is uncertain. As with middle Iron Age roundhouse 4016, the entrances of the Phase 4 roundhouses faced south-east, and the steep sides of the circular ditches suggest that they held walls or timbers to support a mass wall. An irregular, though broadly oval, enclosure, comprising several ditch segments (including 4251), replaced the enclosure ditches used in the middle Iron Age. A four-post structure (4315), 3m square in plan, was erected within the enclosure. The post-holes were over 1m in diameter and much larger than the post-holes belonging to the middle Iron Age four-posters, putting the structure into the category of 'mega-posters' recorded on sites in the Upper Thames Valley (Lambrick and Robinson 2009, 272–4). As has been suggested for those structures, 4315 may simply have been built in a more robust fashion to store heavier loads of grain or other commodities. Substantial posts would also have been required for structures such as watchtowers, or otherwise served as roof supports for roundhouses. These possibilities were considered in the interpretation of four large post-holes, each 1m wide and forming a 4.5m-wide square, at Stanford Wharf Nature Reserve. The structure was surrounded by what appeared to be the remains of a bank, and, given the location of the site on the Thames Estuary, a watchtower seemed plausible. But the bank could also be viewed as the remains of a mass wall, and together with hearths and other features within and around the four-post structure, this permitted the structure to be seen as the internal posts of a large roundhouse (Biddulph et al. 2012B, 167–9).

Ditch 4431 was cut by enclosure 4251 and was the earlier feature, but grog-tempered pottery recovered from fills of 4251 also placed it in the late Iron Age. Interpretation of the feature is uncertain, but its form and size (10m by 15m, with a square 'room' 9m by 9m internally) recall rectangular structure 667 at ACS, Stansted. This measured 10m by 7.5m and was located in the centre of the enclosed late Iron Age/early Roman settlement. As with ditch 4431, the gully had a steep-sided profile (though unlike 4431 was flat-bottomed), and was viewed as a wall trench; post-holes were seen inside the structure, but may have been related to later activity (Havis and Brooks 2004a, 104–8). Its location and form, associated finds (a number of brooches were recovered from adjacent pits), and parallels led excavators to interpret structure 667 as a shrine (Havis and Brooks 2004b, 553). The mid-1st century enclosed settlement at Orsett 'Cock', which was characterised by a principal roundhouse comprising a square post-hole structure with sides 6m long, was also considered to have a religious function (Carter 1998, 132), and it is not implausible that ditch 4431 defined a structure with a similar role. There are no internal features, however, or associated deposits which lend themselves to such an interpretation, and the feature, along with another rectangular structure further south (4141), could instead be viewed more prosaically as a fenced pen or shelter for livestock, or perhaps a workshop or storage building.

The land west of the settlement, which had been open during the middle Iron Age, was re-organised in the late Iron Age, as a series of ditches and large enclosures that divided the land and marked out fields. Several phases of field systems were recorded. In the earliest phase, rectangular fields were laid out immediately west of the settlement and extended onto the floodplain, as well as the gravel terrace. Post-holes within the enclosures record the position of fencelines, pens and small structures. At the western end of the excavation area, short ditches and a circular enclosure with a funnel-like entrance may have controlled and corralled livestock, although one or more four-post storage structures were also recorded. Both elements were connected by a long ditch (2337) that extended NE–SW approximately along the junction of the floodplain and the gravel terrace. Whether this served to more formally delineate the settlement boundary or was dug primarily to protect the settlement from flooding is unclear, but the setting out of the ditch and associated fields and boundaries nevertheless fits a wider pattern of increased land division seen across the region, for example at Stansted (Framework Archaeology 2008, 113) and East of Dunmow Road on the A120 (Powell 2007, 60). An enclosure uncovered at Codham Hall Bund and dated to the late Iron Age may belong to the same phenomenon.

The inhabitants of the later Iron Age settlement at Passingford Bridge were farmers. Faunal remains from Phase 3 and 4 groups offer limited insight for animal husbandry, but most bones identified to species were cattle, followed by sheep/goat. Evidence for the agricultural regime was more promising. The middle Iron Age farmers grew free-threshing types of wheat and barley, which were stored in four-post raised granaries, and during the late Iron Age these were supplemented by spelt. Perhaps the more important activity undertaken by the late Iron Age settlers was metalworking. Hammerscale and even a small fragment of silver from roundhouse ditch 4095 indicates that metalworking was carried out during the middle Iron Age, but the work undertaken during the late Iron Age was at an increased scale. Significant quantities of hammerscale, which is diagnostic of nearby iron smithing, was recovered from pit or small ditch 4436 within the settlement area. In addition, the pit contained fragments of a smithing hearth bottom and vitrified hearth lining, and the remains of a ceramic crucible

with deposits characteristic of bronze-working were recovered from the same feature. Abundant charcoal from the feature was identified largely as oak. The deposit represents a dump or dumps of metalworking waste which derived from an area of iron and bronze-working within the settlement. The large 'mega-poster' (4315) and ditches (4251, 4269, 4520 and 4428) immediately to the east of the pit offer a potential site for industrial activity, comprising as it possibly does a robust structure and ditches that may have held windbreaks or thrown up equally useful banks.

The metalworkers were possibly joined by potters. Firebars and block and perforated pedestals collected from features across the Flood Alleviation Area are identified as portable kiln furniture typically used by late Iron Age and early Roman potters. The kilns would have had very shallow bases and would not have survived persistent ploughing, although Cynthia Poole (above) suggests that given the small quantity of kiln furniture from Passingford Bridge, the kilns and pottery workshops were outside the area of excavation. Kiln furniture, including a triangular perforated brick and oven plate fragments, were recovered from late Iron Age deposits at Codham Hall Bund, and similar material was also collected from early Roman features at Hobbs Hole. All these sites potentially join others in the wider region, among them Mucking (Evans and Lucy 2008), Dagenham (Biddulph et al. 2010, 155–6), Gun Hill (Drury and Rodwell 1973, 62), as areas of late Iron Age and early Roman pottery production

Funerary activity during the late Iron Age was restricted to three cremation graves at Hobbs Hole, and an isolated cremation grave at Passingford Bridge Flood Alleviation Area. Those at Hobbs Hole (5069, 6092 and 6094) had been severely truncated, and it is uncertain how much evidence has been lost, but they appeared to be simple, unfurnished, graves containing unurned deposits of charcoal and human remains. At Passingford Bridge, grave 2009 had in contrast been furnished with an urn (a butt-beaker) to contain the charcoal and human remains, with the addition of a second butt-beaker, which served as an accessory vessel. The location of the grave next to the Bronze Age barrow suggests that the landscape retained religious or ritual significance well into the late Iron Age. Little can be said about the very small quantities of fragmented cremated bone from the Hobbs Hole graves – indeed, the bone cannot be confirmed as human – but the remains from 2009 are likely to be adult. In addition, the apparent over-representation of skull fragments in deposits scattered by the plough through the grave fill, and the presence of leg and arm bone fragments (and the absence of skull fragments) within the lower, surviving, part of the urn, suggests that cremated remains were deposited into the vessel in a systematic way, with the upper body and skull fragments being placed in the upper part of the beaker. The pattern of deposition has been noted elsewhere, for example in a number of Roman-period burials from Pepper Hill, Southfleet, Kent. At that site, the evidence was simply thought to reflect the strong possibility that after cremation, the body continued to lay in approximate anatomic order on the remains of the pyre, and that mourners collecting the bone began with the feet and worked towards the head, filling the urn as they did so (Boston and Witkin 2006, 44). While this may well be the case, the absence of examples at that site where the skull was at the bottom of the urn and the lower bones at the top suggests a level of consistency that is potentially the product of a practice significant enough to be imitated and transmitted from one generation to the next. After all, it takes no great leap of imagination to imbue the urn with the characteristics of the body, the identification of the foot, body, shoulder and head being self-evident. Though by no means a common practice, the careful collection and deposition of the cremated remains may have been important to some mourners, then, possibly because for them the deposition and the urn represented the reconstituted body. No pyre sites were uncovered, but the charcoal from the Hobbs Hole graves indicated that oak was the principal fuel and structural material. Blackthorn wood was an additional component on the pyre associated with grave 6092 – the wood not only provided good fuel, but also pleasant aromas (Gale 1997, 82) – and elder was recorded in grave 6094.

THE ROMAN PERIOD

Passingford Bridge Flood Alleviation Area saw little activity in the early Roman period, as the settlement was abandoned by the mid-1st century AD. While the pottery that dated Phase 4 settlement features may have been manufactured in the few decades following the Roman conquest, the absence within the settlement of any certain post-conquest pottery found in association with late Iron Age material suggests that there was very little deposition during the third quarter of the 1st century AD. However, the fields continued to be worked during the early Roman period, as pottery dated to the second half of the 1st century or first half of the 2nd was recovered from boundary ditch 3671, which had been cut – and recut – across the eastern part of the excavation area. Clearly the land supported a population which lived nearby, but by this time, the settlement had shifted away from its Iron Age location. Elsewhere along the widening scheme, pits and enclosure ditches recorded at Hobbs Hole were assigned to the second half of the 1st century AD, and early Roman activity at other sites is at best represented by small quantities of pottery. To what extent these observations can be linked with wider settlement patterns in the region is unclear, but evidence for settlement shift and hiatus have been recorded across the region. At Chignall St James, the location of the settlement focus shifted after the late Iron Age (Clarke 1998, 133). Across the Stansted landscape, two late Iron Age settlements (the M11 site and the western LTCP site) were abandoned before the introduction of post-conquest ceramics – that is, before the final quarter of the 1st century AD – while another (the eastern LTCP site) contracted in size, although not all settlements shared this fate, as the MTCP site expanded in the decades following the conquest (Framework Archaeology 2008, 143). Settlements along the A120 also experienced changes in the settlement pattern during the mid- to late-1st century. Late Iron Age settlements at East of Little Dunmow Road, Highwood Farm and Valentine Cottage were abandoned by *c.*AD 60/70, while the early Roman farmstead at Strood Hall was in a different location to a putative late Iron Age settlement (Biddulph 2007, 109).

Passingford Bridge Flood Alleviation Area continued to be used for farming throughout the Roman period. New boundary ditches, sub-divided into smaller fields and enclosures, were laid out in the later 2nd and 3rd century, and these also served to delineate the junction of the floodplain and the gravel

terrace. A water-hole was dug, and a trackway extending NW–SE at the western limit of the excavation area, implying movement between the higher ground and the floodplain and the river as inhabitants exploited riverine resources and grazing for their livestock, hints at settlement higher up on the terrace, possibly further to the north-west. At Hobbs Hole, more enclosure ditches were laid out, and quarry pits were dug to extract clay. The area used for burial during the late Iron Age continued to be identified as an appropriate location for burial in the later 2nd century. Grave 6096 contained the cremated remains of an adult, which were deposited in a jar and accompanied by a ceramic flask imported from North Kent. No pyre-related features were recorded, but charcoal from the grave indicated that, as with Iron Age cremation, oak had been used as the principal fuel. Another cremation burial further east (4303) was not closely dated within the Roman period, but the treatment and rites evident were consistent with the basic character of the late Iron Age and Roman burials from Hobbs Hole and Passingford Bridge.

Activity during the late 3rd and 4th century AD was again largely limited to Passingford Bridge and Hobbs Hole. At the latter, a curving boundary comprising a series of short ditch segments and elongated pits (6000) was seen in the northern area. Recalling the late Bronze Age or early Iron Age pit alignment at Upminster Bund, the boundary at Hobbs Hole may be the remains of a tree-line or hedge. A small enclosure, or possibly a structure, open at one end, was recorded in the southern area. Some of these features received dumps of wheat chaff, a crop processing waste that dominated the assemblage of charred plant remains. Much of the animal bone from the late Roman features comprised cattle fragments; an emphasis on older individuals suggests that the animals were more usually kept for breeding, milk and as draught animals, rather than for beef, although butchery marks typical of military or urban assemblages were noted on a cattle scapula from Hobbs Hole, suggesting that meat was processed nearby, perhaps for an urban market, or had arrived at the settlement already processed. A water-hole (3652) and a number of quarry pits were recorded in Passingford Bridge Flood Alleviation Area, and excavation at the Passingford Bridge Bund site to the north-west uncovered an enclosure and the western end of an east–west-orientated trackway, suggesting that the focus of settlement activity lay to the east. Water-hole 3652 contained a small collection of wood, identified as oak, comprising axe-cut, small log-end off-cuts, broken sections of small square-hewn beams, small cleft pole sections and broken small roundwood. Much of this may well have derived from a pile of random pieces reserved for firewood, although the roundwood was possibly the remains of a wattle fence placed around the top of the water-hole. The axe- and saw-cut pieces suggest that carpenters familiar with a standard range of Roman woodworking techniques were among the inhabitants of the settlement located outside the area of excavation (D. Goodburn, above). There are hints, too, that the oak was managed by coppicing. Some of the pieces were off-cuts from beams that would have been incorporated into buildings, presumably erected in the putative settlement. Roofing and heating tiles recovered largely from late Roman deposits may have been used on such domestic buildings, although the composition of the assemblage and general lack of wear point more strongly to the possibility that the tile had been acquired from a nearby villa or larger settlement as demolition or construction waste for reuse in hearths, ovens and other small structures (C. Poole, above).

The insect and charred and waterlogged plant remains recovered from water-hole 3652 and another late Roman water-hole, 2714, reveal much about the late Roman landscape at Passingford Bridge. As might be expected, aquatic species dominated the insect assemblage, confirming that for much of their life, the features held water. Relatively low levels of insects associated with domestic litter and dung suggest that the features were some distance from the domestic focus. The insects also pointed to a low-level presence of grazing animals around the features, although this assessment is complicated by the pollen evidence from 3652, which included a fungal spore assemblage strongly linked with grazing animals (Rutherford 2012). A large proportion of the insects is likely to have been brought into the area within manuring spreads containing a range of domestic waste, including small fragments of pottery. Overall, the picture obtained from the plant remains and insects is of a landscape of open meadows or waste ground, but with cultivated land nearby. Wheat (mainly spelt), and to a lesser extent oats and barley, were under cultivation in the late Roman fields; wheat chaff and straw recovered from the water-hole suggest that the crops had been processed nearby. Sprouted or germinated wheat grains from water-hole 3652 hint at the production of malted spelt, which was the basis for ale and could be stored for up to a year (Corran 1975, 12–16). Evidence for malting and brewing is being increasingly recognised in Roman-period rural sites, and some of the best evidence – including super-abundant sprouted grain, malting ovens, and brewing tanks – has been recorded at the Roman villa at Northfleet, near Gravesend in Kent on the Thames Estuary (Smith 2011, 109–12). Plants that may have been put to medicinal use and identified in the water-hole samples included common mallow, which is associated with trackways, and agrimony, which has been used to treat snake bites and dysentery (Grigson 1975; Clapham et al. 1987).

There is no clear evidence of the character and size of the settlements associated with the peripheral landscapes of Passingford Bridge and Hobbs Hole, although the artefactual and environmental remains provide tentative clues. Fragments of olive oil amphorae from southern Spain were recovered from Hobbs Hole, and wine amphorae from southern Gaul were recorded at Passingford Bridge, as well as Hobbs Hole. Decorated samian was also collected from Hobbs Hole. The proportion of decorated sherds compared favourably to that from the villa at Great Holts Farm, Boreham, but at Passingford Bridge, the little samian recorded was all from plain vessels. Turning to coarsewares, the ratio of jars to open forms (dishes and jars) offers another useful means of ranking sites (Evans 2001, 26–31). At Passingford Bridge, the ratio was similar to that of Great Holts Farm and the temple site at Ivy Chimneys, while the ratio from Hobbs Hole better matched that of the farmstead at Strood Hall. The assemblage of ceramic building material from both Hobbs Hole and Passingford Bridge included roof tile, a flue tile and tesserae, and derived from, or was intended for, one or more buildings with a tiled roof, tessellated floor and heated room. The identification of red deer within the animal bone assemblage at Hobbs Hole hints at hunting possibly for social purposes, and the signature of the faunal remains from the site, with its emphasis on mature

cattle that are likely to have been required for breeding and traction, matches the patterns recorded at, for example, the villa estates of Great Holts Farm (Germany 2003, 222–3) and Chignall St James (Clarke 1998, 134–5), and the MTCP site at Stansted (Bates 2008). Butchery marks typical of military or urban assemblages were noted on a cattle scapula from Hobbs Hole, suggesting that meat was processed nearby, perhaps for an urban market, although it is possible that the bone arrived at the settlement already processed.

We cannot be certain what type of settlements the artefactual and environmental evidence from Passingford Bridge and Hobbs Hole represents, but the evidence consistently points to rural settlements of middle to high status, and there is a strong possibility that the sites in the later Roman period belonged to villa estates. Overall, the later Roman evidence can be placed within a pattern of intensification of production, a phenomenon recorded at many late Roman sites across the region, for example Great Holts Farm (Germany 2003, 222), Stansted (Framework Archaeology 2008, 170–2), and Strood Hall (Biddulph 2007, 114), where there was intensification of arable and pastoral farming, and at Stanford Wharf Nature Reserve in the Thames Estuary, where the level of salt production dramatically increased after a mid-Roman hiatus (Biddulph and Stansbie 2012b, 174).

The transect cut by the M25 Widening Scheme, which broadly takes a slice from south-west Essex to the west-central part of the county, provides some insight into regional variation, which may help identify social groupings and cultural affiliations (cf. Medlycott 2011, 47). Pottery is a potential means by which we can address the question, and it is useful to focus on the distributions of distinctive types of known source, for example the lid-seated, shell-tempered ware jar (Going 1987, type G5.1), which was manufactured at Mucking (Rodwell 1973, 22–4) and Gun Hill, West Tilbury (Drury and Rodwell 1973, 82) during the late Iron Age and early Roman periods, and the bifid-rimmed necked jar (Going 1987, type G28), which was produced at Dagenham (Biddulph et al. 2010) and Mucking (Rodwell 1973, 26) from the 2nd century onwards. As might be expected, the frequency of those forms appears to have decreased along the route with increased distance from their south Essex source. The G5.1 jar accounted for 1% by estimated vessel equivalents (EVE) of the late Iron Age and Roman pottery assemblage at Hobbs Hole, one of the route's southernmost sites, but less than 1% at the Passingford Bridge sites, while the G28 jar took a 7% share by EVE at Hobbs Hole, and a 2% share at Passingford Bridge. While the values may be the product of several factors – and further analysis is required to assess the statistical significance of the apparent differences – the values are nevertheless in the expected order when compared with those from Stanford Wharf Nature Reserve on the Thames Estuary – G5.1, 2%; G28, 6% (Biddulph and Stansbie 2012a) – and at Strood Hall on the A120 in central Essex (less than 1% for both G5.1 and G28 jars) (Biddulph 2007). Potentially, then, Hobbs Hole can be placed in a supply pattern drawn from the Thames-side region, while Passingford Bridge had a signature allied more strongly with central Essex. We should not ignore the possibility that salt produced along the south Essex coast was transported in jars such as the G5 (and perhaps even the G28) (Rodwell 1979, 161), but in any case, the pottery gives us a sense of how the influence of zones of production and supply – and perhaps with them cultural and social ties – varied with distance.

The fields at Passingford Bridge and the features within them were abandoned during the second half of the 4th century AD. Pottery suggests that features continued to receive material after *c.*AD 350. Oxford red colour-coated ware, in which some of the latest forms produced by the Oxford industry were recorded, and late shell-tempered ware were recovered from both Passingford Bridge and Hobbs Hole. In addition, Portchester D ware was present at Hobbs Hole. How far this activity extended is unclear. Anglo-Saxon pottery recovered from Hobbs Hole potentially points to 5th-century occupation, but none was found in association with the latest Roman-period pottery. While the Roman material would have been residual at the time of deposition in such cases, the incorporation of ideally large and coherent groups of latest Roman pottery in 5th-century deposits raises the possibility that Roman pottery continued to be used and deposited after AD 400. That such groups are absent from Passingford Bridge appears to rule out this possibility.

POST-ROMAN

Evidence for Anglo-Saxon activity was recorded at three sites. At Codham Hall Bund, a pit (222) containing abundant charcoal was radiocarbon dated to the 5th or early 6th century AD (Table 52). The edges of the pit had been scorched, suggesting that wood (mainly oak) had been burned *in situ*. The pit was within a cluster of pits that were also charcoal rich, and the sides and bases of some pits had been affected by heat. These pits were dated either to the Roman or medieval periods based on the pottery recovered, or were otherwise undated, but it is possible that all are associated with pit 222 by function and date. The function of pit 222 is uncertain, but given the paucity of settlement evidence at Codham Hall Bund – no early Saxon pottery was recovered, for example – it seems unlikely that the feature was a domestic hearth, and instead it may relate to agricultural or industrial activity. One possibility is that the pits represent the truncated bases of charcoal-burning pits or clamps. Similar clusters of charcoal-rich and heat-scorched pits in areas devoid of settlement evidence are known in other parts of eastern England; for example, pits dated to the middle Saxon period were recorded at Peterborough and interpreted as charcoal-burning pits, as were early Saxon examples from Wittering, Cambridgeshire (Webley 2007, 94; 112). The charcoal-rich pits recorded at Pond 1609 may also represent evidence of charcoal-burning, but none could be dated.

A pit (5071), much larger than 222, but broadly contemporaneous, was recorded at Hobbs Hole. On excavation it was identified as a quarry pit, although its dimensions – 6m long by 4m wide by 0.7m deep – are within the ranges given for sunken-featured buildings (SFBs) recorded at Mucking, while its circular shape in plan and profile are also matched by a number of Mucking's structures (Hamerow 1993, 10–11, figs 57–81). Pottery recovered from the lower part of the feature, as well as the upper parts of Roman-period ditches, was mainly sand-tempered, and included sherds of shallow bowls and globular jars in relatively fresh condition. A pit (1168) recorded at Upminster Bund was a later; charred grain from the feature was radiocarbon dated to the middle–late Saxon period (late 7th to late 9th century; Table 52). The pit was chronologically isolated, but its date is supported by the charred plant remains

recovered from the fill, which included rye and corn cockle, species that typically occur in archaeological assemblages from the Anglo-Saxon period onwards.

Though meagre, the early to middle Saxon evidence adds much-needed points to the otherwise sparse distribution map of Saxon settlement in the region. The apparent concentration of the evidence to three adjacent sites is noteworthy and perhaps reveals a genuine absence elsewhere along the scheme route. Given the shared dating, it is possible that the pit or pits from Codham Hall belonged to the same settlement represented by the putative SFB at Hobbs Hole, and more settlement evidence may be expected in the unexcavated gap between the sites. The later dating and location of the Upminster pit may reflect a pattern of settlement shift over time, a phenomenon recognised at Mucking (Hamerow 1993, 86–9). Late Saxon or early medieval (10th–12th century) activity is represented by field and enclosure ditches and a trackway recorded at Pond 1812 some 3.5km south of Upminster Bund. The features indicate nearby settlement, probably of a farming or craft-based community, and this is supported by small amounts of smelting waste collected from one of the ditches. At Codham Hall Bund, pit and field or enclosure ditches indicate that settlers returned to the site in the early medieval period (11th–12th century). Together the evidence demonstrates a remarkable continuity in the location of settlement and associated fields from the early Saxon to early medieval periods.

Evidence for later medieval activity along the widening scheme was limited to ridge-and-furrow at Upminster Bund. Little else could be assigned to the period with certainty, although it is possible that some of the post-medieval field ditches recorded on ten of the scheme's sites relate to older boundaries. Few of the post-medieval ditches contained dating evidence, although many appeared on first-edition Ordnance Survey maps, demonstrating that they were visible at least in the 19th-century. Post-medieval pottery, restricted to Passingford Bridge Flood Alleviation Area, was of 18th or 19th century date.

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Archaeological fieldwork by Oxford Archaeology at some 29 sites along the route of a widening scheme between junctions 27 and 30 of the M25 motorway in Essex uncovered evidence of past occupation and activities dating from the Mesolithic to post-medieval periods.

Late Iron Age cremation burials, Roman-period enclosures and field boundaries, and a tentatively identified Anglo-Saxon sunken-featured building were discovered at Hobbs Hole at Junction 29 of the M25. At Passingford Bridge, Stapleford Tawney, a middle Bronze Age ring-ditch, possibly a barrow, was recorded in the floodplain of the River Roding. Evidence was found of a middle Iron Age to Roman farming settlement of roundhouses, enclosures and raised granaries, established on the higher ground of the gravel terrace. An alignment of irregular pits dated by pottery to the early-middle Iron Age was uncovered near Upminster, and early Saxon charcoal-filled pits – evidence, possibly, of charcoal-burning – were recorded at Codham Hall near Great Warley.

The limited opportunity for archaeological excavation during the original construction of the motorway meant that little had been known of the archaeology beneath. The results presented in this volume have significantly altered that view, revealing a picture of an evolving cultural landscape between Aveley and Epping from prehistoric to modern times.

The middle Bronze Age ring-ditch at Passingford Bridge, its outline marked out by Oxford Archaeology's field team.