Chapel Lane, Bingham, Nottinghamshire

Archaeological Excavation Report

December 2019

Client: RPS Group on behalf of Barratt and David Wilson Homes

Issue No: 1
NGR: SK 696 409

oxfordarchaeology
southsouthsouth

Client Name:	RPS Group on behalf of Barratt and David Wilson Homes
Document Title:	Chapel Lane, Bingham, Nottinghamshire
Document Type:	Excavation Report
Grid Reference:	SK 696 409
Planning Reference:	10/01962/OUT
Site Code:	BCL18
Invoice Code:	BCLPX
Receiving Body:	Nottingham City Museums and Galleries
Accession No.:	NCMG 2018-33
OA Document File Location:	X:\b\Bingham Nottinghamshire\012Post-excavation_analysis\Report
OA Graphics File Location:	\\10.0.10.86\invoice codes a thru h\B_invoice codes\BCLPX - Bingham
Issue No:	V1
Date:	17th December 2019
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Archaeological Excavation Report

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Summary

Between February and May 2018 Oxford Archaeology undertook an excavation of a 1.66ha site at Chapel Lane, *c* 1.3km north-west of Bingham, Nottinghamshire (NGR SK 696409). The excavation extended along the south-eastern side of the modern A46, which overlies the presumed line of the Fosse Way Roman road, and was located about 750m south-west of the Roman walled small town of Margidunum and *c* 400m south-east of Newton villa.

A complex of ditched enclosures was uncovered, extending for *c* 300m, that represents the southern extent of the extramural roadside settlement associated with the town. Only the rear parts of the enclosures lay within the excavation area and so any buildings that may have been located on the road frontage were not seen, but in addition to the boundary ditches, pits and wells were excavated and an assemblage of domestic waste was recovered including pottery, animal bone and smaller quantities of metal objects, tile, and two quern stones. The settlement was established during the 2nd century and occupation appears to have petered out during the second half of the 4th century. Environmental evidence indicated that the settlement was primarily engaged in agriculture, supplying goods to the market in Margidunum, with the high proportion of cattle and horse bones perhaps associated with the grazing of herds on the wetland pasture of the Bingham Basin.

The population of the settlement were represented by 54 skeletons in 52 graves (including two double burials) and a single urned cremation burial, all located against the rear boundary of the roadside plots. Disarticulated material from four grave backfills and from non-funerary features raises the total assemblage to 65 individuals. The burial rites were strikingly consistent, comprising extended, supine burials, usually without grave goods, 24 (45%) within coffins and 16 (30%) provided with hobnailed footwear, indicating a population that shared a common belief of what comprised an appropriate form of burial and that exhibited little variation in status. No prone or decapitated burials were found, and neonates and infants were also absent, from which it is inferred that such young individuals were buried closer to home within areas of domestic habitation. The results of strontium and oxygen isotope analysis of nine individuals were consistent with a population entirely of local origin. The recovery from a pit of a human femur with cut marks that may be associated with deliberate dismemberment of the corpse, radiocarbon dated to cal AD 80–225, provides a rare example of the continuation into the Roman period of funerary traditions more typically associated with the Iron Age.

A particularly unusual discovery was the remains of an adolescent (13–17 years), radiocarbon dated to cal AD 425–565, who had been buried in the top of a disused Roman well. The individual exhibited infectious lesions consistent with a diagnosis of leprosy, and represents one of the earliest instances of the

disease in Britain. It is postulated that it was because of this condition, and more significantly any visible disfigurement associated with it, that the individual was excluded from contemporary burial grounds, but he/she was nevertheless buried with due reverence and provided with a bowl of Anglo-Saxon form as a grave good. Isotopic evidence indicated that this individual was also of local origin.

Acknowledgements

Oxford Archaeology would like to thank Simon Mortimer, RPS Group, for commissioning this project on behalf of Barratt and David Wilson Homes. Thanks are also extended to James Bate, Conservation Officer, who monitored the work on behalf of Rushcliffe Borough Council, for his advice, guidance and patience. We would also like to thank John Gray for undertaking the metaldetecting survey.

The project was managed for Oxford Archaeology by Carl Champness and the post-excavation assessment was managed by Andrew Simmonds. The fieldwork was directed by Lee Sparks, who was supported by BJ Ware, Camille Guezennec, David Pinches, George Gurney, Jack Traill, John Carne, Jana Smirinova, Ines Matos Glover, Lauren McIntyre and Thomas Oliver. Survey and digitising was carried out by Benjamin Brown. Thanks are also extended to the teams of OA staff that cleaned and packaged the finds under the management of Leigh Allen, processed the environmental samples under the management of Rebecca Nicholson, and prepared the archive under the management of Nicola Scott.

1 INTRODUCTION

1.1.1 Oxford Archaeology (OA) were commissioned by CgMs Heritage (now RPS Group) on behalf of Barratt and David Wilson Homes to excavate a 1.66ha site as part of a 90ha housing development scheme. The work was undertaken between February and May 2018 on a site located at Chapel Lane, *c* 1.3km north-west of Bingham, Nottinghamshire (NGR SK 696409). The excavation extended along the south-eastern side of the modern A46, which overlies the presumed line of the Fosse Way Roman road, and was located about 750m south-west of the Roman 'small town' of Margidunum and *c* 400m south-east of Newton Roman villa (**Fig. 1**). This report presents the results of the excavation and discusses the potential significance of the roadside cemetery as part of the landscape surrounding Margidunum and Newton villa.

1.2 Geology and topography

1.2.1 The site was situated in the north-western part of the development area, on a ridge of high ground overlooking the Bingham Basin, a palaeo-lake dating to the late Pleistocene/early Holocene period (Knight *et al*. 1999). The area of the Roman enclosures is located on Edwalton Member Mudstone (BGS nd). No superficial deposits cover the area, although the site is largely surrounded by Head deposits of clay, silt, sand and gravel. The overlying soils consist of fairly fertile loamy and clayey soils (CSAI nd). The soils are slightly acidic and there is some impeded drainage.

1.2.2 The Bingham Basin palaeo-lake has been previously mapped by the BGS and Knight *et al.* (1999). It contains a thin peat resting on calcareous shelly marl and alluvium with occasional intercalated peat bands. Infra-red stimulated luminescence dating of the lower shelly marl provided dates of 14,194 ±2475 BC and 11,450 ±2360 BC, indicating a late Pleistocene/early Holocene origin for the deposits (Barnett 1996). A thin band of peat recorded on the edge of the basin was radiocarbon dated to between 6090–5790 cal BC (7090 ±80 BP; Beta-80324) and 2280–1890 cal BC (3680 ±60 BP; Beta-80322) (Knight *et al*. 1999). A program of electromagnetic survey, test pitting and targeted trenching within the Basin did not produce any archaeological remains that pre-dated the post-medieval period, suggesting that the area remained a boggy place largely unsuitable for settlement or agriculture until drainage during more recent centuries (OA 2017a).

1.3 Archaeological background

1.3.1 Previous archaeological investigation in the local area have been fairly extensive, largely due to excavations associated with the Roman walled small town at Margidunum (Oswald 1927; 1948; Todd 1969; see also Leary and Baker 2004 for an overview) and more recent fieldwork associated with the A46 Newark to Widmerpool Improvement Scheme (Cooke and Mudd 2014) (Figs 2 and 3). The latter involved the conversion of this part of the road to a dual carriageway and construction of a new alignment that diverged from the route of the Fosse Way to by-pass the Margidunum roundabout in order to avoid impinging on the archaeological remains associated with

the town. The archaeological investigations within the footprint of this new alignment uncovered much useful detail of the town's hinterland during the Iron Age and Roman period.

The prehistoric landscape around the Bingham Basin

1.3.2 Prehistoric activity is largely restricted to local finds of worked flint and cropmarks, mostly recorded on the county Historic Environment Record. A scatter of late Upper Palaeolithic flintwork was found in the south-west corner of the development site and undiagnostic prehistoric flintwork was recovered from fields to north of the A46 at the Saxondale roundabout (MNT8191; MNT8192). Late Mesolithic/early Neolithic flints were also found in different locations at the edge of a palaeochannel that drained into Bingham Basin (eg MNT1117 and MNT 11194). A Heritage Lottery Funded fieldwalking project undertaken between 2004 and 2009 also recovered Mesolithic and early Neolithic lithic material from the margins of the palaeo-lake (BHTA nd).

1.3.3 A Scheduled Neolithic henge is located nearly 900m south-east of Chapel Lane (List Entry 1016777). The monument comprised a *c* 35m-diameter ditch and bank with a causeway entrance on the south-eastern side. A possible cursus monument is located about 750m north of the site and to the east of Margidunum (MNT13539), comprising cropmarks of three parallel earthwork banks, two of which are linked by a cross-ditch. Bronze Age worked flints have been recovered nearby (MNT1810), though it is not clear whether these provide a date the monument or whether their juxtaposition is coincidental. A polished Neolithic axehead was also discovered to the north of the excavation area, in a field immediately east of Margidunum (MNT1551). Two or three possible ring ditches are known from aerial survey closer to the site, to the north-west of the A46 (MNT2009; MNT2255). These features are undated, although one appears to be cut by the Fosse Way.

1.3.4 Signs of Bronze Age activity along the A46 Improvement Scheme were very minimal. However, Iron Age land division was evidenced by a long NE–SW aligned ditch that extended the full width of the road scheme trench (*c* 75m) immediately east of Chapel Lane, and a pit alignment that also extended across the full width of the trench (here over 100m) was discovered just over 500m to the north (Cooke and Grant 2014, 76–80). An OSL sample from one of the pits provided a date of *c* 321 BC–AD 159, though the fact that the pit alignment had clearly gone out of use prior to other late Iron Age/early Roman activity in this area suggests that the feature was probably dug during the middle Iron Age. Evidence for Iron Age settlement was discovered during an evaluation *c* 350m west of the southern end of the site, though this was limited to a small number of features (BUFAU 2002). Clearer evidence of late Iron Age settlement and fairly intensive land-use was revealed about 700m north of the site during the A46 Improvement Scheme excavations (Cooke 2014a, 99–111). This was characterised by a series of irregular, conjoined enclosures with other field boundaries marking larger open areas. Some of the enclosures contained structures and no doubt represent areas

of domestic habitation. The settlement appears to have been established sometime during the 1st century BC and continued in use into the 2nd century AD.

The establishment of Margidunum and the Fosse Way

1.3.5 The date of the construction of the Fosse Way through the area is not clear cut. The traditional view, put forward long ago by Oswald (1927, 55–6), is that it was built 'as a strategic line across Britain' during the Claudian conquest around AD 47/48 (see also Webster 1958). This may be true, though definitive archaeological evidence for the date is lacking. Although not initially recognised as Margidunum, the site of the 'small town' (traditionally known as 'Castle Hill') has been known since at least the early 18th century, when Roman remains here were described by William Stukeley (Cooke 2014a, 97). It was Oswald and later Malcolm Todd who were firm in their identification of the site as the Margidunum mentioned in the Antonine Itinerary (Oswald 1927, 56; Todd 1969, 10). The settlement was surrounded by a series of defensive ditches forming a polygonal enclosure with rounded corners surrounding an area of *c* 2.23ha (Todd 1969, 54). Oswald sought to demonstrate the presence of a conquest-period fort at the site, focussing his excavations on the defensive ditches and discovering several buildings aligned on the Fosse Way within the enclosure, as well as recovering a sizable quantity of Claudio-Neronian pottery and several military-type artefacts in the process (Oswald 1948).

1.3.6 Todd undertook a further series of excavations between 1966 and 1968 in advance of road building across the site and argued that no sign of a fort had been revealed by Oswald's work (Todd 1969, 15–6). Although critical of Oswald, Todd directed his attention to the north of the enclosure, west of the Fosse Way, where he discovered V-shaped ditches of 1st-century date and suggested that these may relate to the site of a fort, rather than the Margidunum enclosure itself, though again the evidence is inconclusive. The implication of Todd's work is that the settlement defined by the enclosure, and indeed to the south of it, originated as a vicus and continued as a civilian settlement after the abandonment of the presumed fort well into the 4th century AD (ibid., 21–2). Based on the pottery assemblage recovered, Todd argued that the earliest phase of occupation at the site dated to the decade between AD 50 and 60, and therefore only shortly after the region had come under Roman military control, though he left open the possibility of a Claudian fort somewhere in the vicinity (ibid., 29). Whitwell (1982, 37–8) has pointed out the apparent discovery of Arretine ware and Claudian samian (as opposed to Claudio-Neronian) from the site, suggesting that it originated earlier than AD 50; however, there are no details about where or when this pottery was found. Perhaps surprisingly, the establishment of Margidunum and the Fosse Way appears to have had little impact, at least initially, on the late Iron Age agricultural settlement excavated in 2009 400m west of the town.

Changes from the 2nd century

1.3.7 Todd (1969, 70) suggested that military occupation could have ended any time between AD 75 and AD 150, though as mentioned above the nature of this activity is very uncertain. Nevertheless, there are signs that Margidunum was developing as an urban centre during the 2nd century. Several masonry buildings, some with notable

architectural elaboration, were built around the middle of this century (ibid., 55–65). However, some areas within the enclosure appear never to have been built over. The early extent of the settlement was clearly much greater than the relatively small area of the enclosure (which measured *c* 2.2ha), the defences of which were clearly a later addition; their construction entailed the demolition of some buildings, while early occupation has been noted extending to the south beyond the outer ditches (eg ibid., 43, fig. 17, 56, fig. 23). Furthermore, fieldwalking in advance of the A46 Improvement Scheme showed the spread of Roman material extending for about 750m both north and south of Margidunum (Leary and Baker 2004, 10–13, fig. 1). Excavation has shown that the first defences of Margidunum, consisting of a rampart measuring almost 8m across and at least one ditch, were probably constructed in the 2nd century and appear to have silted up by the early 3rd century (Todd 1969, 42–8). The defences were later strengthened by the digging of a new rampart and construction of a masonry wall. The dating evidence for this work is ambiguous; Oswald (1941, 45) suggested that the wall was built after AD 369, though Todd (1969, 49–50) questioned this owing to a lack of stratified dating evidence and argued that it could in fact have been built at any time after AD 200. Closer inspection of Leary and Baker's (2004, fig. 1) distribution of Roman pottery scatters shows a dense concentration of material from the defences to about 250m to their south, then an area of low-density for about 100m, followed by a marked increase in material for a further 300m on both sides of the road. Notably, this latter area, on the south-east side of the road, includes the location of the current excavation.

1.3.8 The middle of the 2nd century is also significant for the apparent abandonment of the late Iron Age/early Roman settlement to the west of Margidunum (Cooke 2014a, 111). By this time, the Fosse Way provided a new focus for domestic settlement. A small trench dug on the south-east side of the road revealed a series of gullies and postholes that appear to represent as many as six structures, including potentially four roundhouses. Dating evidence from these and associated features suggest domestic activity focussed on the later 1st to 2nd century.

1.3.9 About 300m north-west of Chapel Lane and almost 600m south-west of the centre of Margidunum lies the remains of a large courtyard villa. The villa has not been excavated, but its presence has long been suspected (eg Todd 1969, 12). Fieldwalking and geophysical survey have confirmed its location and the form of the building. The most comprehensive account of the site is provided by Leary and Baker (2004, 15–24). The geophysical survey identified several rooms or buildings organised around a central courtyard, with further structures to the north-east. Fieldwalking recovered quantities of painted plaster, hypocaust and roof tile, and window glass. The complex appears to be comparable in size with the villas at Woodchester, North Leigh and Chedworth (ibid., fig. 8), which are amongst the largest and most lavish known in England. The chronology of the villa is unknown, although its establishment and development may have influenced the abandonment of the late Iron Age/early Roman settlement to the north-east. The villa was almost certainly inhabited during the late Roman period, when a metalled trackway linked it to the Fosse Way, and possibly during the middle Roman period if the parallel field boundaries found to each side of

the trackway were also related to it; one contained a late 1st- or 2nd-century brooch and a small quantity of pottery (Cooke 2014a, 111).

Romano-British burial activity around Margidunum

1.3.10 Burial evidence around Margidunum includes cemeteries with small groups of inhumations, burials located within domestic areas, and seemingly more isolated burials elsewhere in the landscape. Most relevant to the current excavation is the discovery during the A46 Improvement Scheme of an enclosed roadside cemetery (Enclosure K) on the north-west side of the Fosse Way (Cook 2014, 126–31). This consisted of a series of at least three conjoined rectangular enclosures, aligned on the road and extending along it for *c* 115m, continuing northward beyond to the trench edge. The enclosures contained a total of 14 inhumations in 13 graves as well as two waterholes. All but two of the graves were aligned parallel to the rear boundary of the enclosure, including one that was cut into an early phase of the boundary ditch. The graves were rectangular or sub-rectangular, and most were very shallow because of later truncation. Nine contained evidence of wooden coffins and one individual was buried on a base of stone slabs. Females outnumbered males by eight to two and all except for a girl aged about 15–17 years old were adults. Grave goods were rare but included a copper alloy finger ring, a coin dated to 330–335, and four (possibly five) individuals were wearing hobnailed footwear. Small quantities of mid to late Roman pottery was recovered from the backfills of several graves, and the excavators dated the burials broadly to the 3rd and 4th centuries.

1.3.11 Very little evidence of late Iron Age burial is known from the area, though an interesting find of a skull fragment that exhibited cut marks possibly made post-mortem was found residually in a middle Roman layer just to the north of the current excavations (Egging Dinwiddy and McKinley 2014, 151–2). This fragment was dated by radiocarbon to the 1st century BC or the beginning of the 1st century AD and was discovered in the same context as a fragment of human femur that had been sawn and chopped before being gnawed by a dog or wolf, although the latter was not dated (ibid.).

1.3.12 Several baby and infant burials were discovered in the area of the later 1st- to 2nd-century settlement during the A46 Improvement Scheme. The remains of at least 18 neonates and one slightly older child were excavated from discrete burial contexts (Cooke 2014a, 121–3). The graves appeared to be broadly contemporary with the settlement in this area and one was radiocarbon dated to the late 1st to early 3rd century. Deposits of disarticulated human bones were recovered from the fills of two mid to late Roman waterholes to the north-west of the Fosse Way. Rather than being instances of randomly dispersed bones, several were clearly deliberately gathered together and placed within the features (ibid., 115–6). A radiocarbon date from one sample indicated that these were buried during the 3rd and early 4th centuries.

1.3.13 A late Roman inhumation cemetery was located at the southern edge of Margidunum, some graves cut into the rampart defences (ibid., 73–8). Ten inhumations were described in the report, and several more were hurriedly excavated in advance of road-building but could not be reported in detail. Dating evidence for the burials was poor

as few had grave goods, though a 4th-century date seems likely from the finds evidence and two had been interred in lead coffins. A 2nd-century cremation burial was also located by Todd (1969, 56, fig. 23) to the south-east of the early defences of the town.

Anglo-Saxon activity in the Margidunum hinterland

1.3.14 There appears to have been a marked reduction in activity after the Roman period. Oswald (1941, 19) recorded only a small amount of early Saxon pottery, a brooch and a pendant of this date and Todd (1969, 78–81; 1975, 215) added very little to this general picture of a decline in activity following the beginning of the 5th century AD, with further limited finds of early Saxon pottery. It seems likely that the enclosure was largely abandoned, although the road must have continued to be used; much of the stonework from the town was probably robbed in the medieval period. More recent fieldwalking continued to produce pottery of this date, indicating sporadic Saxon activity across the area (Leary and Baker 2004). This is largely confirmed by the excavations along the A46 Improvement Scheme, which included one sunken-featured building to the north-west of Margidunum and two pits in different areas to the south of the defended enclosure, close to the road (Cooke 2014a, 145–7).

1.4 Excavation methodology

1.4.1 The excavation encompassed a narrow, rectilinear strip of land that extended along the east side of the A46 (Figs 2 and 3). The trench was dug in two sections, divided at its southern end by a field boundary. The decision to excavate the southernmost section was made to identify the end of a large Roman field boundary found in the initial trench strip. The entire excavated area measured 388m long and varied in width from 42m to 65m, covering a total area of 1.66ha.

1.4.2 The topsoil and overburden were removed to the top of archaeological deposits by a machine using a toothless bucket operating under archaeological supervision. The exposed area was hand-cleaned to define all archaeological features present. All archaeological deposits were excavated by hand and recorded stratigraphically in accordance with OA's standard recording procedures and the WSI (OA 2017b). Significant archaeological horizons were subject to the production of a pre-excavation site plan.

1.4.3 All features and spoil heaps were scanned with a metal detector in order to enhance recovery of metal artfefacts.

1.4.4 The burials were excavated under the terms of a Home Office licence under supervision of an experienced osteoarchaeologist and in accordance with OA standard procedures (OA 2017b). All human remains were cleaned and placed in boxes following the methods of McKinley and Roberts (1993).

2 RESULTS

2.1 Phasing

2.1.1 Archaeological features were identified throughout the excavation area (Fig. 4). Phasing of the site was difficult due to the high level of truncation caused by considerable medieval ploughing. Groups of medieval furrows were consistently aligned perpendicular to the road and because this orientation was the same as that of the Roman enclosure boundaries it was often hard to distinguish between them and some of the Roman ditches. Some of the furrows contained notably lighter soils than the fills of the Roman ditches and could be identified with some certainty, while several furrows were also fairly regularly spaced. Most were also considerably shallower than the Roman ditches and could be distinguished in profile.

2.1.2 Other than three pieces of worked flint, no clearly pre-Roman artefacts were found. Although a small number of early phased features had little or no dating evidence (see below), it must be assumed that activity probably began in the later 1st or early 2nd century as suggested by small amounts of early pottery (Phase 1). Much of this evidence probably reflects material reaching the site from nearby settlement, particularly to the north-west, and use of the road.

2.1.3 The second and most prominent phase is represented by evidence of roadside settlement and the use of the site as a burial ground from the middle of the 2nd century AD (Phase 2). The burial ground was largely defined by a long NE–SW boundary ditch that extended almost the full length of the trench. This ditch was cut several times in places and there is evidence of this recutting towards the end of the 3rd century and possibly in the 4th. There was a drop in the quantity of later 4th century pottery and coinage, suggesting that the cemetery ceased to be used sometime in the second half of that century.

2.1.4 Following the Romano-British phase, an early medieval inhumation was placed in the upper fill of one of the Roman wells (Phase 3) indicating that the feature, although disused by this time, was still extant along the roadside.

2.2 Phase 1: Early Roman period (1st to mid 2nd century)

2.2.1 Evidence for activity before the 2nd century is sparse and restricted to a small number of poorly dated features.

2.2.2 In the central part of the site, a long and fairly wide ditch (1017) extended on a roughly NNW–SSE alignment and continued in both directions beyond the limits of the trench (Figs 6 and 7). The ditch narrowed from its northern end, where it measured 3.8m across, to the south, where it measured 1.0m. The feature was earlier than all the other features with which it had stratigraphic relationships, and it was clearly on a different alignment to the adjacent Fosse Way and the Phase 2 enclosures. The fact that the ditch was not orientated on the Fosse Way perhaps suggests that it pre-dated the construction of the road. Dating evidence from the ditch was restricted to a single Roman pottery sherd from an upper fill.

2.2.3 A curvilinear gully (182) and a small group of pits (28,154,156) and postholes (19, 21, 23 at the northern end of the excavation area may be similarly early (Fig. 5). Although they lacked artefactual material, they were located east of the Phase 2 enclosures where no later features were encountered. Gully 182 was only partially exposed at the eastern edge of the trench. The exposed part of the gully extended for about 6m on a curving alignment. The gully was fairly narrow at 0.15–0.17m and was no more than 0.08m deep. The pits and postholes were situated *c* 85m north-east of the gully. The postholes measured 0.25–0.35m across and were fairly closely positioned, though they did not form a coherent structure. The pits were located immediately east of the postholes and appear to have been related. They were sub-circular or irregular in plan and ranged in size from 0.8 x 0.9m to 1.25 x 1.5m.

2.3 Phase 2: Middle and late Roman period (mid 2nd to 4th century)

2.3.1 Phase 2 is characterised by construction of an alignment of conjoined enclosures alongside the Fosse Way from possibly as early as the mid 2nd century to the 4th century AD, and the insertion of burials at the rear of these plots. The survival of the ditches that defined the plots varied, and many had clearly suffered from later truncation. A total of 52 inhumation burials and one cremation burial were interred during this period, mostly situated along the edge of the long boundary ditch (1010/1022) that extended parallel to the Fosse Way and defined the rear boundary of the enclosures. The ditch was recut several times and was certainly in use until at least the early to mid 4th century. The burials were not closely dated, though some were stratigraphically later than the earliest iteration of the ditch. Although most of the inhumation burials were aligned parallel to the boundary ditch, many were positioned in clusters, particularly in the northern half of the site, and may have been deliberately interred within individual plots. Other features in this phase of activity included wells, pits and postholes, as well as a rubble surface (209).

Boundary ditch 1010/1022

2.3.2 The plots that adjoined the Fosse Way were bounded to the rear by a long ditched boundary (1010/1022) that was recorded for a distance of 390m (Figs 4–6 and 8). Toward the northern end of the excavation area, the ditch curved eastward, away from the presumed alignment of the road, although the reason for this was not apparent. At the southern end the ditch turned to form a return that extended toward the road and delimited the southern extent of the enclosures. The ditch varied in width from 0.3–2.5m, while the depth mostly ranged between 0.4m and 1.3m, though the upper parts of the ditch have clearly suffered from post-Roman ploughing in most areas of the site. The ditch was fully recut along its entire length at least once and additional, apparently more localised recuts were recorded in several interventions (Fig. 8). The recuts were typically located on the east side of the original ditch. Tracing individual phases of the ditch all along its length proved impossible due to the complexity of the sequence and in places the complete removal of earlier iterations by later ones. There was evidence that the ditch was first dug around the turn of the 2nd and 3rd centuries and recutting continued into the 4th century. In the northern half of the feature, an intervention (Fig. 8, section 151) revealed a sequence of at least six phases and a

possible pit (843), the earliest of which (795) produced 14 sherds (568g) of pottery from its lower fill (874), which included fragments from a black-burnished ware 'cooking-pot', a flanged dish in medium-sandy reduced ware and a body sherd, probably from a beaker, in Central Gaulish 'Rhenish' ware, together giving the group a date in the second half of the 2nd century. A later phase of the boundary in this intervention yielded a coin dated to 347–8 (SF 22) and was followed by two further recuttings. A short distance north of this intervention, evidence for use of the boundary during the following century was represented by phases that contained pottery dated to the mid 3rd and mid to late 3rd century (contexts 909 and 925 respectively; Fig. 8, section 174). In the southern part of the ditch, a much simpler sequence of only one or two episodes of recutting was observed (Fig. 8, section 165). In total, 25 coins were recovered from the ditch; with the exception of a probably residual 1st century sestertius they all dated from the second half of the third century or later, the latest being two minims dated to 364–78.

2.3.3 Close to the point where the ditch returned toward the Fosse Way, a localised and evidently deliberate deposit of cobbles (850) extended across the ditch (Fig. 8, section 165). Layer 850 was sub-rectangular in plan, measuring 2.35 x 3.2m, and was 0.12m thick. The cobbled surface appears to have sunk into the tops of the ditch fills over time and a layer of silt (858) had accumulated over it. There was no dating evidence from either the cobbled surface or the silt layer but the surface was presumably constructed in order to provide access across the ditch and into the enclosure.

2.3.4 Very few archaeological features were observed to the south-east of the ditch, except for the possible Phase 1 features at the north-eastern end of the trench (above) and medieval furrows that extended the full width of the trench.

The enclosure divisions

2.3.5 The area between ditch 1010/1022 and the frontage of the Fosse Way was divided into a series of enclosed plots by lateral boundary ditches, and in some locations exhibited further subdivisions within the plots thus defined. The plots were not always easily defined, and the intermittent character of some of the ditches indicated that in places they had been completely destroyed by more recent ploughing. The greatest concentration of divisions occupied the northern part of the excavated area, which was also where the greatest number of internal features and graves were located.

2.3.6 Enclosure 1005 adjoined ditch 1010/1022 near the north-eastern end of the trench. The enclosure was trapezoidal in plan and measured approximately 14m (NE–SW) by 18m (NW–SE). The north-east and south-west sides of plot 1005 were dug first, with the north-west side added later, as its terminals cut those of the other two sides. It is possible that this side of the plot was originally enclosed by ditch 335, which was a shorter, slightly sinuous ditch. The break between ditch 335 and the south-western side of the enclosure may have formed an entrance at the western corner, though this is uncertain. The ditches of enclosure 1005 varied between 0.5m and 1.0m wide and 0.1–0.3m deep; the south-eastern ends of both its sides were cut by ditch 1010/1022, but this is likely to result from the recutting of the latter boundary rather that necessarily indicating that enclosure 1005 was an earlier feature. The enclosure

contained two inhumation burials (350 and 362), both of which were aligned roughly parallel to ditch 1010/1022. Several interventions in the enclosure ditches produced pottery, with two containing mid to late 2nd-century sherds, and none was necessarily later than this date. A coin dated to 324–40 (SF 48) was recovered from the south-western ditch.

2.3.7 Apart from the two inhumations, no other internal features were found within the enclosure. Ditch 133 extended eastward from the terminus at the northern corner of the enclosure and appears to have been a later addition. Unlike the ditches of enclosure 1005, ditch 133 was slightly curvilinear and extended for almost 20m before continuing beyond the trench edge. It produced pottery ranging in date from the later 2nd to the early 4th century. It is possible that the ditch was dug to deliberately enclose the area immediately the north-east of enclosure 1005 and it may have been associated with ditch 227 to the north, which extended from the northern edge of the trench for about 4m before terminating with a slight return to the south-east. Pottery from the feature was dated to AD 200–80.

2.3.8 Ditches 183 and 1011/1012 may have defined a similarly sized enclosed area that adjoined the south-western side of enclosure 1005, though these features were less well defined. Ditches 1011 and 1012 were both cut by ditch 1010/1022 at their south-eastern ends and extended north-west for 9m and 12m respectively. The ditches were parallel to each other suggesting that one may have replaced the other. To the south-west of these, ditch 938 is likely to have been an early feature as it was cut at its south-eastern end by inhumations 707 and 713, and by ditch 1006 at its north-western end. Ditches 1011 and 1012 were positioned roughly equidistant (*c* 15m) between enclosure 1005 and ditch 946, and thus appear to have defined two more enclosures in this area. The line of ditch 946 was lost at its north-western end due to truncation, though it did not extend all the way to ditch 1010/1022 and it appears to have terminated where it was cut by sub-oval pit 948. Close to its junction with ditch 1010/1022, ditch 1012 produced a small quantity of human remains comprising two fragments of ulna from a juvenile or infant and two unidentifiable fragments, possibly from the same bone, but these could not be associated with a specific grave.

2.3.9 Ditch 1007 extended parallel to ditch 1010/1022, about 20m to its north-west, for *c* 34m. It appeared to divide a large group of features including well 192 and structure 1027 from a roadside zone with fewer features. Dating evidence from ditch 1007 was poor, amounting to no more than a few sherds of generic Roman pottery. Its alignment was continued to the south-west by ditch 1013, which contained pottery dating from the 2nd to early 3rd century and was cut by three pits (392, 394 and 396). Ditch 458 branched off ditch 1013 and was cut by ditch 1014, an L-shaped feature that extended west beyond the edge of the excavation area and may have been the rear of an enclosure that fronted onto the Fosse Way. Ditch 1014 extended for *c* 27m before its line was lost due to truncation. The ditch ranged in width between 0.78m and 1.08m and it was cut by pits 634 and 640. It contained Roman pottery dating between the mid 2nd and early 4th century. The south-western end of ditch 1014 appeared to terminate where it cut an earlier pit (223). It may have terminated in line with ditch

843, however, which extended toward ditch 1010/1021 perhaps formed the south-western boundary of an enclosure that contained well 790 and ten inhumations.

2.3.10 In the central part of the excavation area was a group of enclosures that were less complex than those to the north, with less evidence for internal subdivision and fewer internal features. Burials were found within these enclosures, and again were situated against the rear boundary defined by ditch 1010/1022, but were fewer in number. The plots were defined by lateral boundary ditches 1004, 1015, 1016 and 1023. Ditch 1004 was dug no earlier than AD 170–180 as pottery of this date was recovered from the fill of well 747, which it cut (see below). Ditch 1015 was unusual in that it continued to the south-east of ditch 1022/1010. One intervention in the ditch produced a quantity of pottery dated to after AD 170. The plot defined by these two boundaries was sub-divided by ditch 1003, which extended NE–SW for nearly 18m but terminated at each end before it reached the other boundaries. It did, however, cut a series of pits (group 1028) at the south-western end. The gap between ditch 1003 and 1015 may have provided access between the two enclosures thus divided. South of this, an area *c* 35m in extent was delimited to the south by ditch 1023 and divided by ditches 318 and 1008 into a presumed roadside zone that extended beyond the excavation area and a zone abutting boundary ditch 1010/1022. Ditch 318 represented the earlier phase of this boundary and was undated, although its north-eastern terminal apparently respected ditch 1015 and formed an entrance between the two zones that was 3.8m wide. When ditch 318 was replaced by ditch 1008, this entrance was blocked. Ditch 1008 produced sherds of late 3rd- to 4th-century pottery. The zone abutting boundary ditch 1010/1022 was subdivided by ditch 1016; the south-eastern end of this ditch could not be traced, perhaps due to truncation by graves 250 and 251, and the ditch was also cut by undated pit 839, the only feature within these enclosures that was not a grave.

2.3.11 Toward the southern end of the complex the lateral divisions that divided the plots were fewer and further between, with very few instances of sub-division and almost no internal features other than a small number of graves. Three large enclosures were defined by lateral boundaries 261/1018/1019 and 1020/1024. Ditch 1018 was fairly narrow at 0.4–0.7m wide, and shallow, measuring less than 0.2m deep, though its fill contained a small quantity of pottery. Ditch 1019 may have been replaced by 1018 to its north-east, which likewise extended south-east from the trench edge but terminated before reaching ditch 1010/1022. The ditch appears to have respected the position of inhumation 508, which suggests that it may have been a late addition. Ditch 1018 produced pottery with the latest sherds dating between 170–350. The north-western end of ditch 1018 was abutted by a possible curvilinear or D-shaped enclosure defined by ditch 612. Ditch 261 probably represented a further phase of the plot boundary, but its relationship to ditches 1018 and 1019 was unknown.

2.3.12 Ditches 1020 and 1024 were located 65m south-east of ditch 1019. Ditch 1024 measured 1.15–1.38m across and 0.21–0.41m deep, while ditch 1020 was 0.7–1.0m wide and 0.16–0.22m deep. Given their proximity to each other, it seems likely that they represent successive phases of a single boundary, although there was no evidence as to which was the earlier. Ditch 1024 produced a small quantity of pottery dated to

no earlier than the late 2nd century and ditch 1020 produced pottery dating between 230 and 370. The only evidence for further subdivision in this area was provided by ditch 1021, which extended for *c* 14–15m on a NE–SW alignment perpendicular to these boundaries and cut ditch 1020.

Structure 1027

2.3.13 A series of pits or postholes may have formed a post-built structure, given their alignment and relative proximity to each other (Figs 5 and 9). These included a row of four (66, 68, 221 and 228) orientated NE–SE and thus aligned with the Fosse Way and ditch 1010/1022. Posthole 90 and an unexcavated posthole to the south-east of the row of four seem to be related because their positions were roughly equidistant to each other and to postholes 68 and 221. Postholes 66 and 68 were positioned 2.3m from each other, as were postholes 221 and 228, while 68 and 221 were positioned 5m apart, as were posthole 90 and the unexcavated posthole. The distance between postholes 221 and 90, and between 68 and the unexcavated posthole was 7.3–7.4m. All the excavated postholes were circular in plan, measuring 0.5–0.8m in diameter and 0.2–0.3m deep, with similar steep-sided profiles (Fig. 9, sections 17, 18 and 57). Postholes 90, 221 and 228 each contained pottery, although this could generally only be ascribed broadly to the Roman period apart from a fragment from a Mancetter-Hartshill white ware mortarium and a base from a dish or bowl in Nene Valley colour-coated ware from posthole 221 which was closely datable to the late 3rd century, and this feature also produced a coin dated to 335–41 (SF 140). Posthole 90 was notable for containing the skull of a juvenile that was placed upside down in the upper part of the fill next to the eastern side of the feature (Fig. 9, section 28). Although the postholes appear to form a definite structure, it is uncertain whether this represents a building or an external structure such as a fenced enclosure or livestock pen. If contemporary, the location of late 3rd/4th century well 192 within the structure would suggest that the latter reconstruction is more likely. The postulated boundary extending between postholes 90 and 221 was respected by the terminus of L-shaped ditch 691, which may have been the surviving part of an adjacent ditched enclosure.

Surface 918

2.3.14 Surface 918 was partially exposed at the western edge of the excavation area. It was 3.4m wide N–S and extended for more than 5m E–W, continuing to the west beyond the edge of the trench. The surface overlay two earlier pits, 916 and 968. Pit 916 was slightly the larger of the two, measuring 1.7m by more than 2.0m across. It contained pottery dating to 150–180. Pit 968 was more than 1.5m across and 0.24m deep and yielded sherds dating to 230–350. Overlying both pits layer 918 consisted of a soft dark brown silt that contained masonry rubble (Fig. 10). Nearly 7kg of pottery dating to 50–250 was recovered, as well as animal bones, ironwork, slag and tile. The rubble layer appears to have been deliberately laid to create a surface.

Pits and postholes

2.3.15 Seven pits (135, 137, 139, 141, 175, 178 and 180) were located to the north-east of enclosure 1005 (Fig. 5). The pits varied in size and shape and were either sub-circular

oval in plan. The smallest (pit 178) measured 0.53 x 0.53m and the largest (pit 141) measured 2.12 x 0.76m. Each was shallow and contained a single fill. The only dating evidence was poorly dated Roman pottery from pit 175 and six sherds dated to the late 2nd to early 3rd century from pit 180, but it is thought likely that all seven features were broadly contemporary. Two shallow pits (298 and 300) were situated north-east of this group, near the northern limit of the excavation area, the former containing a small quantity of calcined bone that could not be identified to species.

2.3.16 Pit 170 was dug to the south of enclosure 1005, potentially within another enclosure (Figs 5 and 9). The pit was circular in plan, measuring 2.5m across and 0.8m deep with fairly steep sloping sides and a rounded base (Fig. 9, section 41). A thick basal fill (172) of silty clay contained the articulated partial remains of a horse, consisting of the skull, vertebral column and numerous ribs, while the pelvis and limbs appear to have been removed. The horse skeleton was accompanied in this fill by a near-complete barrel-shaped jar or large beaker dated to 120–250. The pit was sealed by a thinner, largely sterile clay fill (171).

2.3.17 Pit 107 was located about 5m north-east of surface 918 (Figs 5 and 9). The pit was ovoid in plan, measuring 3.6 x 2.8m. It had a concave profile that sloped more steeply on the south-east side, reaching a maximum depth of 0.74m. The basal fill (117) contained pottery (793g) dated to 150–210, as well as animal bone (410g), and the final backfilling episode (108) contained pottery dated to 230–50 (3377g), including samian ware and mortaria sherds, with more than 1kg of animal bones, sprouted grain, charcoal and tile. The pit is also notable for the presence of two fragments of human femur that exhibited deliberate cut marks and had been exposed to carnivore gnawing. Radiocarbon analysis of the femur provided a date of cal AD 80–225 (Table 65).

2.3.18 Pits 714 and 716 were located in the north-eastern part of the trench, both cutting the north-western side of ditch 1010/1022. Pit 716 was the earlier and larger of the two. It was oval in plan and measured *c* 3.4m long and 0.5m deep, while pit 714 was circular, measuring 1.8m in diameter, with a similar depth. Neither pit contained any dating evidence, but pit 716 cut a phase of ditch 1010/1022 that contained pottery dated to 270–350.

2.3.19 Posthole 212 was located *c* 7m south of surface 918, seemingly positioned within the northern corner of the enclosure formed by ditches 946 and 1007. The feature was flat bottomed but was very truncated, measuring only 0.08m deep. In plan, the posthole was similar in shape and dimension to the postholes that formed possible structure 1027 and was also on exactly the same alignment with four of those features, albeit located some 26m to the north-east.

2.3.20 A group of three pits (392, 394 and 396) was located just west of structure 1027. They appear to have cut at least two ditches, though they were heavily truncated by a furrow and were difficult to discern from surrounding features. Pits 634 and 640 were located just to the north of this group. Pit 634 was sub-circular, measuring 1.12 x 0.8m and pit 640 was elongated, measuring nearly 2m long, but was comparatively shallow at 0.26m deep. This pit contained pottery but it was not closely datable. Both pits, however, cut ditch 1014 and are likely to have been late Roman.

2.3.21 Pit 740 was certainly a late feature, since it cut ditch 1010/1022 and contained a coin of Constantine dated to 330–5. The pit was 0.48m deep and was cut entirely into the ditch fills.

2.3.22 Pit group 1028 consisted of at least seven intercutting features and was located close to two further pits (487 and 489). The complex nature of this group made it difficult to define the individual components, though the whole group extended over an area of *c* 4.5 x 2.5m. Pottery was recovered from several fills with spot dates ranging from 120 to possibly as late as the mid 4th century, and pit 590 contained a coin of Constantine dated to 324–30. Pit 596 contained the articulated vertebral column from a horse as well as a scapula, radius and pelvis bones, possibly from the same animal. The northern edge of the group was cut by ditch 1003. Pit 487 was located just to the south of the group and had an irregular shape, was over 1.2m long and 0.24m deep. No dating evidence was recovered from its fill, though it cut ditch 485 and is likely to have been associated with group 1028. Small pit 489 was located adjacent to 487 and may have been a small posthole.

Wells

2.3.23 Five definite wells (192, 324, 568, 790 and 884) and a possible sixth example (747) were identified. Wells 192, 324 and 790 were located within the northern half of the site, possible well 747 within the central part of the complex and wells 568 and 848 to the south, within the large enclosures divided by ditches 1020 and 1024.

2.3.24 Well 192 was situated within structure 1027 and had a construction cut that measured 2.25m across, though this narrowed to *c* 1.60–1.70m between the stone lining (Figs 4, 11 and 12). At least five courses of the stone lining remained *in situ*, constructed from roughly hewn stones. The upper part of the lining appeared to have been cut away, presumably representing an episode of stone robbing. The surviving lining was only 0.5m deep, below which the sides of the well were formed by the natural clay into which the shaft had been dug. The well exhibited evidence for two distinct phases of use, the earlier of which was 1.5m deep. A homogenous main fill of silty clay (344) contained pottery dating to 270–400 and was overlain by a second fill (194) of clay silt containing charcoal, residual 2nd/3rd-century pottery and animal bones, suggesting that it was a dump of material. After this dumping episode, the well was recut (244) and appears to have been cleaned out. This cut was filled with another homogenous clay silt (245) containing more residual 2nd-century pottery. Possible remains of a superstructure over well 192 are indicated by postholes 410, 412, 414 and 416. These cut clay packing 193, indicating that they were associated with the recut phase of the feature. They encircled the well leaving a gap, possibly for access, on the south-west side.

2.3.25 The construction cut (329) of well 324 measured over 2.3m across and had straight, vertical sides (Figs 5, 11 and 13, section 77). The stone lining was faced on the internal surface and was two courses thick. The internal diameter measured 0.8m and the well was excavated to a depth of *c* 3.2m. Most of the shaft was filled by a single deposit of dark grey silt (340) that contained sizable quantities of pottery and animal bones indicating that it was backfilled with material that included domestic refuse. The

pottery from this fill was dated to 250–400. The feature was cut on its south side by a furrow (337).

2.3.26 The cut for well 568 measured 2.3m across (Figs 6 and 13, section 124). The lining comprised several uneven courses of roughly faced limestone blocks (568). The lining was notably more poorly constructed than in well 324. The western side of the stone lining was robbed out of the well (569), presumably during a period is disuse. The feature was later recut (577) with the stone lining on the opposite side remaining *in situ*. The shaft was filled by a single, soft, grey-blue clay silt (578) containing occasional large stones and a fairly sizable quantity of pottery, animal bones and tile, suggesting waste disposal. The pottery from this fill comprised 14 sherds (288g) dated to *c* AD 270–400 based on the presence of bowls or dishes in Nene Valley colour-coated ware, including a copy of samian form Drag. 38, and a dropped flange bowl in sandy reduced ware. Pit 571 was dug into the western side of the feature but was undated.

2.3.27 Well 790 was located close to ditch 1014. The construction cut was 3m wide and had an unbonded limestone lining constructed using roughly finished blocks (Figs 5 and 13, section 150). The stone lining was excavated to a depth of 1.22m before further excavation was prevented by ingress of groundwater. The clay packing (789) behind the stone lining contained fragments from a Drag. 31R dish in Central Gaulish samian ware, a hook flanged mortarium in Mancetter-Hartshill white ware and a flanged dish or bowl in medium sandy reduced ware, indicating that it was constructed no earlier than the second half of the 2nd century. The well shaft was filled with a soft, waterlogged clay (970) that produced some poorly dated Roman pottery. The top of the well had been disturbed and early medieval inhumation burial 794 inserted into the top of the feature (see below).

2.3.28 Well 884 (Fig. 6) was very disturbed by later robbing. It had a wide construction cut measuring 3.2m across and a thick clay packing (885) around the sides. This was cut into by a large robber trench (886), presumably dug to remove the stone lining, and backfilled with limestone rubble, a mixture of pottery (dated to 230–350), animal bones and tile. This fill was only excavated to a depth of 0.58m, which was sufficient to define the top of the stone lining. The well was cut on the western side by pit 888, which was then cut by pit 891 in the centre of the well. Both pits contained later Roman pottery.

2.3.29 Feature 747 (Fig. 5) may also have been a well owing to its size, measuring 2.8m across and reaching at least 1m deep. The feature was cut through the centre by ditch 1004 and contained a single fill that produced later 2nd-century pottery.

Burials

2.3.30 A total of 54 individuals were buried in 52 inhumation graves, including two double burials. There was also a single cremation burial. Each burial was aligned along or close to ditch 1010/1022 and set back from the road frontage. Many of the burials were positioned in groups, or clusters, and some appear to have been deliberately enclosed within specific plots. The full inventory of the inhumation burials is presented in the Grave Catalogue (Appendix A).

Distribution of burials

2.3.31 Two burials (350 and 362) were located within enclosure 1005. They were aligned parallel to ditch 1010/1022 and spaced *c* 5m apart. Both inhumations contained the badly degraded remains of probable males, one aged about 26–35 years old (350) and the other an adult over 18 years (362). Their position towards what appears to have been the back of the enclosure may have been significant and it is notable that the enclosure was otherwise empty of features. Early 3rd-century pottery was recovered from the backfill of grave 350.

2.3.32 A possible group of three NE–SW burials lay fairly close together south-west of ditches 1011 and 1012. Inhumation 674 was the most north-easterly of the three, and although heavily truncated the grave contained the well-preserved remains of a middle adult (36–45 years). Graves 707 and 713 were located *c* 4m south-west of 674, grave 707 cutting 713 but not disturbing the skeleton within. Grave 713 contained a probable female, while 707 contained a probable male, and both were of a similar age at 26–35 years and 36–45 years respectively.

2.3.33 A larger group of 17 burials, including the only cremation burial, were located between ditches 1007 and 1010/1022 which together may have enclosed the group. This group can be divided into two broadly distinct clusters based on their arrangement, including eight relatively tightly arranged graves (500, 542, 589, 620, 649, 655, 699 and 998) and the cremation burial (670) to the north-east, and a more loosely arranged cluster (554, 565, 616, 703, 729, 733, 990, 994 and 1002) to the south-west. The five most northerly burials (649, 589, 655, 542 and 500) may represent a small 'family' plot. This group consisted of three adults, including two females (649 and 655) aged 26–35 years and 36–45 years and a slightly younger male (542) aged 18–25 years, as well as two children (500 and 589). Graves 620 and 998 were positioned closely adjacent to one another, suggesting that they may have been deliberately associated. Grave 998 contained an adult male aged 36–45 years and grave 620 an unsexed individual aged 26–35 years. Cremation burial 670 was located *c* 2m north-east of grave 699. This was the only cremation burial from the entire site, but its position close to this group of inhumations suggest that it was contemporary. The cut for the pit measured 0.57 x 0.68m and 0.12m deep. The surviving lower half of a reduced ware jar contained 232g of cremated remains from a probable adult male. The more southerly cluster of graves appeared to have been more haphazardly positioned, suggesting less affiliation between the burials, apart from inhumation 733 which cut directly through grave 729 so that only the bottom end of the earlier grave survived. This grave cluster mostly contained adults except for inhumations 616 and 994, which contained the burials of children aged 6–12 years and 1–5 years respectively.

2.3.34 To the south-west of this larger group, the pattern of burial was characterised by smaller clusters and paired or isolated graves. A group of four (38, 153, 267 and 297) were positioned close to ditch 1010/1022 with two more isolated inhumations (434 and 632) located to the north-west, all perhaps lying in an enclosure defined by L-shaped ditch 691. Child inhumation 297 was cut by graves 153 and 267, while the latter two and inhumation 38 clearly respect each other, albeit on different alignments.

These were all adults, though only the individual in grave 153 was sexed as a possible female.

2.3.35 Graves 526 and 584 lay about 9m south-west of this group and probably formed a pair of burials, and were possibly joined by inhumation 531 though this was uncertain. The graves lay close together, aligned parallel to the adjacent ditch 1010/1022, grave 584 containing one of the few individuals buried with the head to the south-west. Both these burials were adult males aged 36–45. Inhumation 531 was positioned to the south-east of this pair, cutting the other two. About 5m further south-east lay double burial 56, beyond which graves 220, 114, 121 and 258 were each relatively isolated.

2.3.36 A group of four burials (147, 250, 251 and 984) were located in the central part of the excavation area. The top half of grave 251 was cut by grave 250, while the other two were discrete features. Grave 251 contained an adult male aged 26–35 years old, while graves 147 and 250 were those of probable females, aged less than 18 years and 36–45 years respectively. Grave 984 was the burial of an unsexed adult about 26–35 years old.

2.3.37 The arrangement of the burials to the south-west was more linear with no graves placed side-by-side. Inhumations 508, 334, 468 and 455 may represent a group of four burials that were relatively closely spaced, although grave 455 was separated from the others by ditch 1019. Grave 455 contained an unsexed individual, probably less than 18 years old, and the other three contained adults, including two probable males and one probable female. To the south-west of this group lay inhumations 437 and 436, which intercut, although the later grave 437 was not deep enough to disturb the skeleton in grave 436. The graves contained the adult skeletons of a male and a female. Further south-west lay isolated grave 537 and double burial 355.

2.3.38 Very few graves were discovered in the southernmost part of the enclosure complex, which makes the close proximity of graves 283 and 323 more striking. These two were about 1.3m apart and contained the remains of a male (323) and a female (283), each aged 26–35 years old. The most southerly burial was grave 830, which contained a possible male aged 26–35 years.

Grave alignment and body position

2.3.39 Most of the skeletons, 46 in total, were buried on a NE–SW alignment with their heads to the north-east, the graves lying parallel to the adjacent boundary ditch 1010/1022 (Figs 14 and 15). These include the skeletons in the two double inhumations (56 and 355). Four of the 46 (267, 565, 632 and 1002) lay on a slightly more N–S alignment, though this appears to have been a discrepancy rather than a deliberate reorientation. In three graves (147, 334 and 584) the burial was orientated with the head to the south-west, the reverse of the norm. Only five graves were dug perpendicular to the boundary ditch. Of these, the individuals in graves 153, 434, 729 and 733 were positioned with the head to the north-west, and that in 258 was placed with the head to the south-east.

2.3.40 All the bodies but one were laid in an extended supine position and there is no evidence that any were lain prone. The degree of truncation had disturbed many of

the graves and it was not always possible to see all the nuances of the body positioning. At least 15 individuals lay with the upper arms to their sides and the forearms across their stomach or hips, and this appeared to be the most common positioning of the upper body. A few had their arms placed fully extended along their sides and one, in grave 733, had the forearms crossed over the chest. Inhumation 616 was the only body that was not fully extended, lying with the legs partially flexed to the left (Fig. 15). Both double inhumations had overlapped or interlocking arms.

2.3.41 In both double burials the individuals had evidently been interred at the same time, and neither grave contained any evidence for coffins (Fig. 16). Grave 56 had been quite badly truncated and both skeletons were in a poor state of preservation. The feature formed a rather rough oval in plan and the individuals (54 and 57) lay side-by-side. Skeleton 54 was a middle adult (36–45 years), possibly male, laid with arms at sides, the upper part of whose right arm was overlain by the elbow of skeleton 57, a young adult of undetermined sex. Grave 355 was more regular in shape, but both individuals had been placed at a slightly oblique angle, skeleton 352, a possible male middle adult (36–45 years), occupying the more central location with skeleton 353, a female prime adult (26–35 years), pushed against the north-west side of the grave. The crook of the left arm of skeleton 353 lay on top of the corresponding right arm of skeleton 352. Two concentrations of hobnails (SF 175 and SF 176) indicated that the individual represented by skeleton 352 was shod.

Coffins and other grave furniture

2.3.42 Out of 52 inhumations, 24 produced coffin nails indicating that they had been placed in wooden coffins, with grave 531 additionally containing an iron bracket also thought to have been a coffin fitting. In some cases, the coffin nails were found *in situ* defining the shape of the coffin around the body, but in others the nails were more dispersed or present in fewer numbers owing to truncation. In some cases, the graves had been cut much larger to allow for the coffin, as with grave 713, which measured 1.0 x 2.6m and contained several iron nails. There was no clear relationship between the provision of a coffin and the location of the burial in the cemetery and the orientation of the grave. Women were more often placed in coffins than men (eight out of 12 women compared with five out of 21 men), while there was no relationship between age and the use of coffins other than the fact that all four children aged between one and five years old were afforded containers.

2.3.43 In grave 584, burial 581 had been lain on a series of stone slabs and was the only burial in the cemetery treated in this way (Figs 5 and 17). The slabs were placed in a single course with no bonding. Some stones had been placed around the sides of the body and one had collapsed onto the feet. One stone was found lying on top of the hands which were crossed over the hips. The presence of iron nails suggests that the body had been placed in a coffin, though it is uncertain whether the stone had been placed directly over the hands or on top of the lid.

Grave goods

2.3.44 Clear evidence for grave goods was rare. A total of 17 inhumations were found with hobnails, indicating that around one third of the burials were interred wearing shoes. Except for hobnails representing footwear, only two graves contained definite grave goods. Both of these were children aged between one and five years old. Grave 500 (Figs 5 and 18) produced two shale bracelets and a necklace or bead string represented by 63 glass beads. Pottery was also recovered from the grave fill, but it is unlikely that this was a deliberate inclusion (see below). Grave 994 (Figs 5 and 18) was buried with several grave goods, including nine copper alloy bracelets, seven of which were banded together and placed on the right shoulder (SF 360), another on the left shoulder (SF 362) and one in the pelvis area (SF 361) and nine glass beads from either a necklace or bracelet. A coin dated to 350–64 was also recovered from the grave fill, and though it was not conclusive as to whether this was a grave good, it does suggest a fairly late date for the burial. Hobnails were also present in this burial suggesting that the child was wearing shoes.

2.3.45 Numerous grave fills contained finds but, in many cases, it was largely impossible to determine whether these were deliberately placed with the body, residual finds in the grave backfills, or remains that were intrusive in the graves after being ploughed out from other features such as boundary ditch 1010/1022. The shallow depth of almost all the inhumations, none being more than 0.2m deep, made interpretation of finds from graves all the more difficult. For example, a total of 24 graves contained animal bones and 39 contained Roman pottery, but these were never found in prominent positions around the body. Items that are very unlikely to have been grave goods were recovered from seven graves, included ceramic building material and iron slag. A radiate coin of AD 271–4 was found in the fill of inhumation 537, but again this may not have been placed deliberately.

Evidence for grave markers

2.3.46 There was little evidence of grave markers in general, though any such features may have been shallow and therefore susceptible to removal by truncation. However, some features are worthy of note in this regard.

2.3.47 Postholes 463 and 469 were located close to the ends of graves 153 and 267 and may indicate the presence of associated markers (Fig. 19). Both were circular features measuring *c* 0.35m in diameter and 0.1m deep and although each was fairly shallow, they were clearly truncated. A small stone slab was found in the base of posthole 469. Pit 471 may also be relevant here. Cut by inhumation 153, the pit extended along the side of the grave. Although the original plan of the feature may have been different, what remained was 0.8m long and just over 0.1m deep. It had steep sides and its fill contained several stones, one found in the base similar to posthole 469 and some more that were on edge, suggesting that they had been deliberately placed. It is possible that the upright stones were inserted as packing around a post or similar element and that was associated with the infant inhumation 297, which was also cut by 153.

2.3.48 Another possible example is represented by rectangular pit 708, a shallow rectangular feature that was dug into the upper part of the fill of grave 713. The pit contained pottery dating to the late 2nd to early 3rd century, broadly contemporary with the 2nd-century pottery recovered from the grave.

2.4 Phase 3: Anglo-Saxon period

2.4.1 The only evidence for early medieval activity comprised the insertion of burial 794 into the top of well 790. The burial had been placed at the base of a pit (791) *c* 0.50m deep, the exact form of which had been obscured by a later feature (793). The body was laid directly onto the surface of the stone lining of the well. The individual lay on the left side in a slightly flexed posture, with the head to the north-east (Figs 5 and 20). The skeleton was that of an adolescent (13–18 years old) of unknown sex who appears to have been suffering from leprosy (see Section 4). A sample from the left femur was radiocarbon dated to cal AD 425–565 (Table 65). The feature was backfilled with a deposit (792) which contained numerous stones, presumably from the removed upper part of the well lining, as well as a small quantity of animal bone and a mixture of mostly residual pottery. A substantially complete carinated bowl dated to 410–650 was recovered from the vicinity of the skeleton. A later pit (793), which appeared to have been deliberately targeted on the well and may therefore have been dug to rob material from the stonework, had disturbed the burial, removing the central part of the skeleton, including the pelvis, upper parts of the legs, and the right arm.

2.5 Phase 5: Medieval and modern periods

2.5.1 Groups of furrows were exposed throughout the excavation area, and where absent it is likely they had been truncated by more recent ploughing. The furrows were consistently aligned perpendicular to the road and because of their orientation it was difficult to distinguish them from the similarly-aligned Roman ditches. Some of the furrows contained notably lighter soils than the fills of the Roman ditches and could be identified with some certainty, in some instances the furrows were also fairly regularly spaced. When excavated they typically proved to be considerably shallower than the Roman ditches with a more gently concave profile.

2.5.2 A large irregular feature (1009) that measured *c* 40 x 25m was located in the central part of the excavation area and truncated numerous Roman features including the latest phases of ditch 1010/1022. Two interventions dug across the middle of the feature showed that it was up to 1.95m although it became shallower toward the edges and petered out. It contained a small assemblage of Roman pottery of mixed date as well as two late 3rd-century coins and a 2nd-century brooch. A Georgian coin was also recovered from the surface of the feature and probably indicates that it is modern, representing either quarrying or a large pond.

3 FINDS

3.1 Pottery *by Edward Biddulph*

Introduction

3.1.1 Some 2063 sherds of Roman-period pottery, weighing *c* 43.5kg, were recovered. The assemblage was recorded with reference to Study Group for Roman Pottery and Oxford Archaeology guidelines (PCRG *et al*. 2015; Booth nd). Forms and wares were given standard Oxford Archaeology codes, with wares cross-referenced with the National Roman Fabric Reference Collection (Tomber and Dore 1998) where possible (Table 1). The pottery was quantified by sherd count, weight in grammes, number of vessels based on rim count (MV), and estimated vessel equivalent (EVE), also based on rims (a complete rim equals 1 EVE or 100%, half the circumference of a rim equals 0.5 EVE or 50%). A single Anglo-Saxon vessel (see below) and three sherds (44g) of medieval and post-medieval pottery were also recovered.

Table 1: Quantification and description of Roman pottery wares

Ware	Description	NRFRC code*	Sherds	Weight (g)	MV	EVE
A11	South Spanish (Baetican) amphorae	BAT AM 1/2	38	4605	1	0.3
A13	South Gaulish amphorae	GAL AM 1	1	49		
B10	Unsourced handmade black-burnished ware		4	39		
B11	Dorset black-burnished ware	DOR BB 1	27	270	7	0.53
B30	Other/imitation black-burnished wares. Includes possible Rossington Bridge products	ROS BB 1	23	336	7	0.53
C	Indeterminate shelly ware		1	1		
C10	Unsourced shelly ware		57	839	8	0.71
C11	South Midlands/Harrold shelly wares	HAR SH	45	1054	8	1.41
C18	Dales shelly ware	DAL SH	13	204	8	0.43
E30	Late Iron Age/early Roman sandy fabric		1	1		
E80	Late Iron Age/early Roman grog-tempered ware		13	293	4	0.83
F	Indeterminate fine ware		1	6		
F20	Unsourced glazed ware		1	65		
F43	Central Gaulish Rhenish ware	CNG BS	3	6		
F44	East Gaulish Rhenish ware	MOS BA	2	3		
F51	Oxford red/brown colour-coated ware	OXF RS	1	5		
F52	Nene Valley colour-coated ware	LNV CC	181	2304	27	2.33
F60	Unsourced red/brown colour-coated ware		10	96	4	0.33
M23	Mancetter-Hartshill white ware mortaria	MAH WH	67	4472	23	1.99
M24	Nene Valley white ware mortaria	LNV WH	3	81	2	0.11
M41	Oxford red/brown colour-coated ware mortaria	OXF RS	1	12	1	0.1
M50	Unsourced oxidised mortaria		1	165		
O	Indeterminate oxidised fabric		10	15		
O10	Unsourced fine oxidised ware		84	781	14	1.43

Ware	Description	NRFRC code*	Sherds	Weight (g)	MV	EVE
O20	Unsourced sandy oxidised ware		27	329	2	0.14
O50 (a)	Hard oxidised fabric; sand tempered with occasional dark grains; blue-grey core and buff/yellow-brown margins and exterior surfaces		7	113	1	0.08
O50 (b)	?Swanpool oxidised ware		6	86		
O80	Coarse-tempered oxidised ware		10	781		
Q30	Unsourced white-slipped reduced ware		1	27	1	0.25
Q50	Unsourced white-slipped oxidised ware		3	10		
R	Indeterminate reduced ware		4	6		
R10	Fine reduced ware		51	573	3	0.42
R20	Sandy reduced ware		393	8750	47	5.01
R211	Derbyshire coarse ware	DER CO	27	426	4	0.4
R30	Medium sandy reduced ware		656	10979	113	12.68
R46	Lower Nene Valley reduced ware		2	48	1	0.04
R47	Lower Nene Valley grey slipped reduced ware		1	6		
R50	Black-surfaced fabrics		116	2304	9	2.29
R70	Calcareous reduced ware		2	6	1	0.05
R87	Lincoln/Market Rasen fine reduced ware	LMR FR	5	66		
R90	Coarse-tempered reduced ware		11	522	7	0.59
S	Indeterminate samian wares		4	5	1	0.04
S30	Central Gaulish samian ware (Lezoux)	LEZ SA 2	79	1472	19	2.02
S32	Les Martres-de-Veyre samian ware	LMV SA	6	86	1	0.18
S40	East Gaulish samian ware		3	31		
W	Indeterminate white ware		1	3		
W10	Unsourced fine white ware		4	82		
W13	Mancetter-Hartshill white ware	MAH WH	47	1028	4	1.69
W14	Nene Valley white ware	LNV WH	3	32	1	0.1
W20	Unsourced sandy white ware		1	3		
W21	Verulamium-region white ware	VER WH	5	53	1	0.1
Total			2063	43529	330	37.11

*NRFRC National Roman Fabric Reference Collection (Tomber and Dore 1998)

Assemblage composition and pottery supply

3.1.2 Less than 1% of pottery by sherd count and EVE was recovered from context groups assigned to the early Roman period (Phase 1; 1st to mid 2nd century AD). Just a single form was recognised by rim – a decorated bowl (HA; Drag. 30) in samian ware S32. Wares represented by body sherds comprised reduced ware R20, shelly wares C10 and C11 and samian ware S30. The proportion of early Roman pottery is likely to be larger than suggested by the material assigned to Phase 1. Though recovered from contexts generally dated to Phase 2, ware E80 corresponds to the so-called Trent Valley ware group, which dates to the mid/late to early 2nd century (BHTA nd, fabrics GTA5, GTA7 and GTA8).

3.1.3 Eighty-five per cent of pottery by EVE belonged to context groups assigned to the mid to late Roman period (Phase 2) and dated ceramically between *c* AD 120 and 400/10 (Table 2). Reduced wares took the largest share of the phased assemblage, and within this ware group, medium sandy reduced ware (R30) was the best represented. Sandy reduced ware (R20) made a smaller, though still significant contribution. Notably, there were some differences in the range of forms available in the two wares, beakers being present in R30 but not R20, and dishes (or bowls/dishes) being better represented in R30. This suggests that R30 was preferred for table or dining forms, with R20 being used largely for more robust functions such as cooking. The only vessels in R20 other than jars were flat-bottomed bowls with dropped-flange rims (HB), ultimately derived from black-burnished ware prototypes. These were not seen in R30 and may have been used for cooking rather than dining. Fabrics recorded under R20 were similar to those seen in Phase 1 and included hard-fired, gritty fabrics. Fabrics within ware R20 were often very hard and gritty and reminiscent of Derbyshire ware (R211), which itself was present in the form of lid-seated (CJ-type) jars. The rim of a CK-type vessel in R20 resembled that typically seen on jars in C18 and may have been a local copy.

3.1.4 Black-burnished wares arrived from Dorset (B11) and other sources, including Rossington Bridge (B30). The two wares were typological distinct. Vessels from Dorset were confined to CK jars, while plain-rimmed dishes (JB) and flanged-rim bowls (HB) were seen in B30. Oxidised wares included Swanpool products (subsumed into ware O50) from Lincoln and a fine ware (O10) of unknown source, the latter, a red-brown fabric with occasional larger quartz grains and black fragments, being the better represented by sherd count. A storage jar body sherd (9g), recorded as O80, may be pink-grogged ware from the Stowe area of Buckinghamshire; the fabric is superficially identical to the standard description (Tomber and Dore 1998, 210), but is sandier than is usual for the ware, though sandy variants are by no means unknown (Marney 1989, 174–5). Few vessels were recorded in oxidised wares; a jar or bowl (D; O20), a bag-shaped beaker (EC; O10), and bowls in O10 and O20 were seen. A sherd in O10 with rouletted decoration was also recorded. The Mancetter-Hartshill industry was responsible for mortaria (M23) and to a lesser extent other white-ware products (W13). All the mortaria arrived after *c* AD 140 and comprised hooked-flange vessels (KA) and hammerhead types (KC), the latter generally dating from the 3rd century. Other regional sources of pottery included the Nene Valley (F52, R47 and W14), the Verulamium region (W21), Lincolnshire (C18 and R87) and the South Midlands (C11). Most occurrences of colour-coated ware F52 arrived after *c* AD 250. Plain-rimmed dishes (JB) were best represented in the ware, followed by globular, funnel-necked beakers (ED) and wide-mouthed jars or globular bowls (CM/HG). Vessels copying samian prototypes Drag. 36, Drag. 38 and Drag. 45 were also recorded in the ware. Of the two Lincolnshire wares, Dales shelly ware (C18) was available in the form of cooking pots (CK) with a characteristic splayed rim (Gillam 1951). Lincoln/Market Rasen fine reduced ware (R87) was available as globular beakers with rouletted decoration (cf. Darling and Precious 2014, fig. 35, nos 256 and 271) and a pedestalled beaker, though none was represented by rim.

3.1.5 Amphorae and samian ware arrived from the continent. The former was restricted to South Spanish olive oil containers (A11; Dressel 20), while most samian arrived from Lezoux (S30). Dishes (Drag. 18/31, 18/31R, 31, 31R and 36) were the best represented by EVE, followed by the decorated bowl Drag. 37, then Drag. 33 cups. Other forms were identified from body and base sherds. A Drag. 33 was seen in East Gaulish samian ware S40. The base of the cup was completely worn. It is unclear whether this was the result of wear through use or post-depositional factors, but the latter may be more likely, as the fabric was powdery. A trace of a potter's stamp was seen on a base fragment in S30. Neither the reading nor the form could be determined.

Table 2: Summary of pottery from Phase 2. Quantification by EVE

Ware	A	B	C	D	E	F	H	I	J	K	L	Z	Total EVE	% EVE
A11	0.3												0.3	1%
B10														
B11			0.53										0.53	2%
B30							0.08	0.12	0.33				0.53	2%
C10			0.45					0.07					0.52	2%
C11			0.97						0.44				1.41	4%
C18			0.4										0.4	1%
E80			0.83										0.83	3%
F														
F20														
F43														
F52			0.2	0.11	0.67		0.31	0.15	0.36	0.1			1.9	6%
F60					0.27		0.06						0.33	1%
M23										1.66			1.66	5%
M24														
M41										0.1			0.1	<1%
M50														
O														
O10					0.7		0.47					0.06	1.23	4%
O20				0.05			0.09						0.14	<1%
O50							0.08						0.08	<1%
O80														
Q30							0.25						0.25	1%
Q50														
R														
R10			0.02										0.02	<1%
R20			3.52				0.44		0.31				4.27	13%
R211			0.36										0.36	1%
R30			6.57	0.67	1.14		0.89	0.48	1.13			0.03	10.91	34%
R46														
R47														

Ware	A	B	C	D	E	F	H	I	J	K	L	Z	Total EVE	% EVE
R50			1.84					0.26			0.06		2.16	46%
R87														
R90			0.12										0.12	<1%
S									0.04				0.04	<1%
S30						0.24	0.5		0.96				1.7	5%
S32														
S40														
W														
W10														
W13		1.55					0.14						1.69	5%
W14							0.1						0.1	<1%
W21			0.1										0.1	<1%
Total EVE	0.3	1.55	15.91	0.83	2.78	0.24	3.41	1.08	3.57	1.86	0.06	0.09	31.68	
% EVE	1%	5%	50%	3%	9%	1%	11%	3%	11%	6%	<1%	<1%		

Key: A amphora, B flagon, C jar, D jar/bowl, E beaker, F cup, H bowl, I bowl/dish, J dish, K mortarium, L lid, Z indeterminate; * ware not represented by rim

Pottery from graves

3.1.6 A total of 234 sherds of pottery, weighing 1865g, was recovered from 41 Roman-period graves. All the sherds were found as scattered fragments within the backfills. None of the pottery could be positively identified as the remains of a grave-good, and just one vessel, a jar (SF 297) from cremation grave 670, was identified as a cinerary urn. The mean sherd weight (weight divided by sherd count) of the funerary assemblage is 8g, while the 'completeness' (cf. Orton and Hughes 2013, 215) or mean EVE value (EVE divided by vessel count) is 0.09 EVE. Each of the 41 graves contained an average of 5.7 sherds, while the mean weight of the pottery per grave was 45g. These values indicate a highly fragmented assemblage with no single group of sherds approaching a complete or near-complete pot. The pottery spanned the 2nd to 4th centuries, but the emphasis was on the mid-Roman period; just *c* 30% of the pottery by sherd count were from context-groups that must date on the basis of the ceramics to *c* AD 250 or later.

3.1.7 Comparison of the assemblage from the graves with the Phase 2 assemblage (Tables 3 and 4; Figs 21 and 22) by vessel class and ware category suggests that in composition, the grave assemblage is broadly identical with the non-grave pottery. This supports the view that the pottery recovered from the graves derives from other, perhaps plough-disturbed features. However, it is notable that the grave assemblage contains a higher proportion of beakers (E) and cups (F), vessel classes that are generally over-represented in Romano-British graves, and a lower proportion of mortaria (K), which were very rarely selected as grave goods. What is more, the grave assemblage contains a lower proportion of jars (C) and a negligible quantity of indeterminate jars or bowls (D). Similarly, the grave assemblage contains the highest proportion of samian, which also tends to be over-represented in cemeteries compared with domestic groups. The

higher proportion of reduced wares in the funerary assemblage is in part owing to the fragmented remains of the urn from grave 670. Overall, these observations raise the possibility that at least some of the pottery from graves originated as grave goods, which were subsequently disturbed and scattered by ploughing. Another interpretation of the assemblage is that it represents the remains of funerary feasting or other grave-side rites, the discarded pottery having accumulated around the graves and subsequently been incorporated into the grave fills through later disturbance or reworking of the soils. The presence of stray sherds within grave backfills is an increasingly recognised phenomenon and comparison of such 'residual' assemblages with non-funerary assemblages suggests that, like the grave assemblage from Chapel Lane, 'residual' assemblages have both funerary and non-funerary characteristics (Biddulph 2015). Given the extent of later truncation from the plough and the proximity of non-funerary features, we cannot be certain of the precise origin of the pottery recovered from the graves, although it is likely that some of it saw use within the cemetery in some way.

Table 3: Pottery from funerary and non-funerary Phase 2 assemblages: comparison of vessel class (quantification by EVE)

	A	B	C	D	E	F	H	I	J	K	L	Z	Total EVE
Graves	0%	0%	45%	0%	17%	10%	3%	3%	12%	3%	0%	6%	2.62
Other features	1%	5%	50%	3%	9%	1%	11%	3%	11%	6%	0%	0%	31.68

Key: A amphora, B flagon, C jar, D jar/bowl, E beaker, F cup, H bowl, I bowl/dish, J dish, K mortarium, L lid, Z indeterminate

Table 4: Pottery from funerary and non-funerary assemblages: comparison of ware category (quantification by sherd count)

	A	B	C	E	F	M	O	Q	R	S	W	Total
Graves	0%	3%	1%	2%	11%	2%	5%	0%	68%	6%	3%	234
Other features	2%	3%	6%	1%	10%	4%	7%	0%	60%	4%	3%	1593

Key: A amphorae, B black-burnished, C calcareous, E late Iron Age/early Roman, F fine, M mortaria, Q white-slipped, R reduced, S samian, W white

Pottery condition and deposition

3.1.8 The overall mean sherd weight of the pottery is 21g, pointing to a reasonably well-preserved assemblage of large fragments. Several complete or near-complete vessels were recorded, suggesting that pottery had been deposited close to areas of use and initial discard. Turning to pottery by feature type (Table 5), ditches took the largest share (excluding graves and layers), followed by pits and well deposits. Context groups in pit and wells, however, were generally larger than those in ditches, suggesting that pottery had been scattered along the length of the ditches rather than deposited in

any concentration. The condition of the pottery in pits and wells was better than that in ditches, with both higher mean sherd weight and mean EVE values being recorded, suggesting that the pottery in pits and wells had been deposited sooner after initial breakage and discard whereas ditches received material that had undergone further disturbance, weathering or redeposition before final burial. The pottery from two other feature types is of interest. 'Masonry', which has the highest mean sherd weight, is represented by a single rubble surface (918), which contained a handle belonging to a Dressel 20 amphora. It is likely that the handle had been deliberately incorporated into the context as rubble. 'Layer' is similarly represented by a single context, layer 919, a silting deposit overlying surface 918. The layer, which contained the single largest group of pottery, appears to have been laid as a surface. The mass of pottery naturally helped to provide a hard surface, but it is interesting to note that mortarium and amphora sherds are on average better represented here than elsewhere, the layer containing 21 mortarium sherds and 16 amphora sherds, compared with a mean total per context across the site of 1.5 mortarium sherds and 2.8 amphora sherds. This suggests that to some extent thicker and heavier sherds were deliberately selected for the surface.

Table 5: Roman pottery: distribution by feature type and condition

Feature type	No. sherds	Mean no. sherds per context	Weight (g)	MSW	MV	EVE	Mean EVE
Ditch	812	8	14,497	18	112	11.6	0.10
Furrow	2	2	13	7			
Gully	3	2	84	28			
Layer 919	217	217	6860	32	56	6.79	0.12
Masonry 918	1	1	468	468			
Natural feature	29	10	845	29	16	1.1	0.07
Pit	521	15	14,136	27	79	10.1	0.13
Posthole	18	3	250	14	1	0.1	0.10
Robber backfill	5	5	5	1			
Topsoil	7	7	118	17			
Tree-throw hole	8	4	131	16	1	0.18	0.18
Well	192	17	3844	20	34	4.51	0.13

3.1.9 Analysis of the distribution and condition of pottery within boundary ditch 1010/1022, which extended along the entire length of the excavation area, offers a good indication of where activity was concentrated. Figure 23 presents the amount of pottery by sherd count from each ditch intervention. The chart shows relatively small quantities in the northern and southern parts of the ditch, but larger quantities in more centrally located sections. A similar profile is obtained in a comparison of mean sherd weight (weight divided by sherd count) by intervention (Fig. 24). The pottery collected from interventions towards the northern and southern parts of the ditch generally has a

lower mean sherd weight and is therefore more fragmented than that from central parts of the ditch. The two charts suggest that pottery deposition was concentrated in the central part of the site, which is likely to have been closer to pottery use and initial discard. By comparison, pottery deposition in the northern and southern parts of the ditch was more incidental, the ditch in these areas only occasionally receiving small quantities of highly dispersed and weathered sherds. Section 159, the southernmost intervention, appears to be anomalous, containing a relatively large quantity of well-preserved pottery. However, it can be noted that no rims were present in this group, suggesting that elements of individual vessels were well scattered, and that the mean sherd weight had been inflated by a single sherd of a thick-walled vessel.

Status

3.1.10 The excavation was located *c* 750m south-west of the Roman town of Margidunum and extended along the line of the Fosse Way. The site's peripheral position to the town raises a question about the status of the site, which may be addressed, at least in part, by the pottery. One means of assessing status is to compare the ratio of jars against dishes and bowls: lower status sites, such as basic rural settlements, tend to have higher proportions of jars compared with higher status sites, such as urban centres (Evans 2001). Table 6 gives the values for Phase 2. Pottery collected from fieldwalking within the site of Margidunum and recorded by Ruth Leary (BHTA nd b, table 2) and from excavations on the Margidunum Hinterland site of the A46 Improvement Scheme (McSloy 2014, table 4.7) provide a useful comparison. The table shows that assemblages within the town have a lower proportion of jars and conversely higher proportions of dishes and bowls compared with the sites outside it. The proportions seen at Chapel Lane and at Margidunum Hinterland, located just *c* 500m to the north, are closer to each other than they are to the town assemblages. Another measure is the proportion of samian ware that is decorated; sites such as urban centres and military sites tend to have higher proportion of decorated forms, Drag. 30, Drag. 37 and the like (Willis 2005). The value for Chapel Lane is 23.5% by vessel count (based on all sherds) and 28% by EVE. This is higher than the value obtained from the samian at Margidunum Hinterland (*c* 10%: Monteil 2014, fig. 4.8) but within the range seen at what Willis terms smaller and major civil centres, which have produced an average of 15% and 28% respectively (Willis 2005, tables 35 and 42).

3.1.11 The results generally point to an assemblage of moderate to high status. The inhabitants of the settlement at Chapel Lane enjoyed a functionally diverse range of pottery that included both table wares and kitchen or storage vessels. In addition, the settlement had good access to samian wares, probably benefitting from its proximity to the town. That said, the higher proportion of jars at Chapel Lane compared with the town suggests that the settlement was of a different status to the town, perhaps tending towards a somewhat rural character. However, as the assemblage from the Margidunum fieldwalking is relatively small and may be biased to some extent (BHTA nd b) – shiny fine wares, for example, being more obvious on the ground than dull reduced wares – one should be cautious about conclusions drawn from the results of the comparison. That the proportions of jars and bowls and dishes at both Chapel Lane and the A26 Improvement Scheme are broadly identical points to similar supply

patterns and status. Samian values admittedly appear to be more divergent, but this may be a product of the relatively small samian assemblage at Chapel Lane.

Table 6: Roman pottery – comparative proportions of jars and table wares (dishes and bowls)

Site	% Jars	% Dishes/bowls	Total EVE
Chapel Lane Phase 2	50	25	31.61
Margidunum Hinterland (middle Roman)	45	32	63.27
Margidunum Hinterland (late Roman)	53	11	32.87
Margidunum Field 9809	17	51	1.63
Margidunum Field 9912	25	31	3.59

Evidence of pottery use and production

3.1.12 Evidence of external burning or blackening was recorded on five vessels. A lid-seated jar in Derbyshire ware (R211) was blackened around the rim. Two medium-mouthed jars in ware R20 were burnt around the neck and rim, as was a jar of indeterminate type in ware R50. A body sherd in R20 also had a burnt deposit on its external surface. The evidence, though limited, indicates that at least some jars in coarse reduced sandy fabrics were used for cooking.

3.1.13 A graffito was recorded on the external surface of the base of an indeterminate vessel in ware R30. The graffito, incised after firing, was a relatively complex cross that extended to the edge of the base. A hole had been drilled after firing through a body sherd in ware R10. The sherd may be a broken spindle whorl or a failed attempt to make one. Repair holes, designed for lead rivets, were recorded on four samian vessels; in one case lead rivets survived *in situ*. The vessels were all decorated forms (Drag. 37 and a Drag. 30 or 37) in S30.

3.1.14 Two vessels offered evidence of potential pottery production. A substantially complete cooking pot (CK) in R30 and with lattice decoration was spalled in places around the body. Typologically, the vessel dates after *c* AD 170. Another cooking pot (CK), also in R30, had a warped rim, and similarly dates after *c* AD 170. The occurrence of two vessels of the same type in a similar fabric with potential production damage suggests that black-burnished ware-type cooking pots were being manufactured in the area in the mid or late Roman period.

Catalogue of illustrated pottery (Fig. 25)

1 **Barrel-shaped jar** (CB), R20, with two bands of lattice decoration between grooves. Unusual form. Context 171, pit 170, Phase 2

2 **Indeterminate form**, possibly a jar (C), with complex 'X' graffito on exterior surface of base, R30. Context 750, ditch 749, group 1004, Phase 2

3 **Base from ?jar** (C), R30, with a potter's mark, a simple 'X' scored on the exterior surface of the base before firing. Context 752, cut 751, group 1022, Phase 2

4 **Mould-decorated bowl** (HC; Drag. 37), S30, with multiple repair holes. Context 184, ditch 183, Phase 2.

5 **Dish** (JB; Drag. 31), S30. Possible graffito incised after firing on exterior surface of wall. Context 108, pit 107, Phase 2.

6 **Plain-rimmed dish** (JB), B30, with two parallel incisions – graffiti or use marks – on interior surface. Context 901, cut 900, group 1014, Phase 2.

7 **End or base of vessel** with rilled body, probably a costrel (MM), F52. Context 808, pit 807, Phase 2.

8 **Base of barrel-shaped jar** (CB), R20. Same type as no. 1, but smaller and almost certainly a separate vessel. Context 245, well 244, group 192, Phase 2.

9 **Base of pedestalled beaker** (E), F52, with possible graffito; incisions made after firing across the external surface of the base. Context 813, ditch 812, Phase 2.

10 **Mortarium fragment** (K), M23, with small herringbone stamp on the flange and parallel with the bead, which is slightly raised above the level of the flange. Context 917, pit 916, group 918, Phase 2.

11 **Mortarium fragment**, very large and crudely-made (K) with coarse stone trituration grits. The vessel was made without a defined rim and, with its simple concave profile, has the vague appearance of a saddle quern. Fine sandy red-brown fabric, M50. Context 919, group 918, Phase 2.

Anglo-Saxon pottery

3.1.15 A near-complete, though fragmented, bowl was collected from a burial that had been cut into the top of an abandoned Roman well. The vessel (31 sherds, 638g, 0.64 EVE) had been deposited as a grave good to accompany the burial of an adolescent. The handmade bowl is squat and biconical in form and has a short neck and simple everted rim. It is decorated with finely executed cordons and raised chevrons on the neck and a band of short vertical grooves (separated by raised lines) above the carination and is plain below the carination (Fig. 25, no. 12). The fabric is dark grey and sand-tempered, the frequent, rounded quartz giving the fabric a granular appearance. The surfaces have angular and elongated voids, indicating the use of organic inclusions, including shell and possibly grass or chaff. A radiocarbon date of cal AD 425–565 (Table 65) was obtained from the skeleton, and typologically the vessel is consistent with this. The shape of the vessel broadly corresponds to types catalogued by Myres (1977) and seen in early Anglo-Saxon cemeteries, but the precise style and arrangement of the decoration is not readily attested and would appear to be unusual, although the vertical grooves are reminiscent of decoration on an Anglo-Saxon urn from Saxondale on the A46 Improvement Scheme (Young and Perry 2014, 335, fig. 5.30, no. 1).

3.2 Coins *by Paul Booth*

Introduction

3.2.1 Eighty Roman coins and a single post-medieval coin were recovered during the excavation, the large majority with the aid of a metal detector. Most of the coins date to the later 3rd and 4th centuries.

3.2.2 The coins are generally in moderate to good condition in terms of surface encrustation and corrosion, though occasional pieces are quite eroded. Further to an initial rapid scan some ten coins were selected for cleaning by a conservator in order to facilitate identification.

The assemblage

3.2.3 Detailed identifications are presented in Appendix B and the assemblage is summarised in terms of the issue periods defined by Reece (eg 1991, 1) and the broader issue phases into which these can be grouped (ibid., 12) in Table 7.

3.2.4 There is a single early (probably 1st century, but very heavily worn) sestertius, but the earliest closely dated coin is a denarius of Plautilla, wife of Caracalla, incomplete but otherwise in good condition. A second denarius is worn completely flat. The later 3rd century is well represented. Period 13 coins are of Gallienus (sole reign), Postumus, Claudius II and Victorinus. The only certainly regular issue assigned to period 14 is of Allectus, and the rest are a variety of barbarous radiates. The status of the three radiates not assigned to period is uncertain because of their condition.

Table 7: Quantification of Roman coins by issue period and phase

Date	Reece period	Total coins	Phase total	% of coins assigned to phase
Before AD 41	1			
41–54	2			
54–68	3			
69–96	4			
96–117	5			
117–138	6			
138–161	7			
161–180	8			
180–192	9			
193–222	10	1		
222–238	11			
238–260	12			
Phase A	Uncertain	2	3	3.8
260–275	13	7		
275–296	14	8		
Phase B	Uncertain	3	18	23.1
296–317	15	1		

317–330	16	9		
Phase C			10	12.8
330–348	17	32		
348–364	18	9		
364–378	19	6		
378–388	20			
388–402	21			
Phase D			47	60.3
4C/unassigned		2		
Total			80	

3.2.5 Reece's Phase C is also quite well represented, by a single Soli Invicto Comiti piece in period 15 and an assortment of types dated 320–30 in period 16: Victoriae Laetae Princ Perp, Domini N Licini Aug, D N Constantini Max Aug, Beata Tranquillitas, Caesarum Nostrorum, and Providentiae Augg, these last three types each represented by two coins.

3.2.6 Forty percent of all the coins were of period 17, but present no surprises. An uncertain proportion (but perhaps as many as 10 out of the 32 coins) were considered to be irregular issues. Six of the nine period 18 coins were likewise irregular issues of Fel Temp Reparatio fallen horseman type, while the other three included a coin of Magnentius. The list ends with coins of the House of Valentinian (period 19). The total lack of coins of period 20 is unsurprising in a collection of this size, but the absence of coins of period 21 might be more significant.

3.2.7 The 4th-century mints are for the most part the usual ones, with London represented in period 15, and Lyons, Arles, Aquileia and Trier (3 examples) in period 16. The period 17 dominance of Trier (11 out of 13 assigned mintmarks) is characteristic (eg Fulford 1978, 74 and appendix 1). Thereafter the numbers are small, but one of the four assigned marks in period 19 is from Thessalonica (on a Gloria Romanorum issue of Gratian).

3.2.8 As noted above, many of the coins were recovered using a metal detector. A significant proportion, but unfortunately not all, were precisely located and can therefore be associated with individual features, though inevitably some were from locations where specific feature associations are unknown or unclear. Twenty-one coins are imprecisely located. Of the remainder, 37 were from ditches, 25 of which were certainly or probably from the main boundary ditch 1010/1022. These span the whole of the date range covered by the assemblage overall, except for the three earliest coins. Sixteen coins were associated with fills of the pit/pond feature group 1009. These included the denarius of Plautilla and five radiates, while the rest were all of Reece period 17, the absence of later coins perhaps being significant here. Three early to mid 4th-century coins came from pits (one each from features 221, 590 and 740), and two coins were from graves. Grave 537 produced a radiate of Tetricus I and grave 994 contained an irregular issue of *c* 350–64 along with a group of personal items. It is quite possible that this was a grave good, but the status of the coin from grave 537 is less certain. The recovery method for many of the metal detected coins means that they will generally

have come from the upper fills of features and are therefore more likely to be associated with the later and final stages of the use of these features.

3.2.9 The assemblage is too small to allow detailed analysis of the proportions and composition of individual period, or even wider phase, groups, but the broad characteristics outlined above present a plausible picture. Roadside settlements typically have coin loss profiles very similar in character to those from the majority of rural sites, and the present assemblage is fairly typical in those terms. The main characteristics are the scarcity of early Roman coinage (and two of the three coins assigned to Phase A were heavily worn and could easily have been lost in the later 3rd century) and a concentration of coin loss or deposition in the 4th century, with a high peak in period 17. Within this broad framework the relatively good representation of coins of Phase C (early 4th century) is slightly less common. A relative scarcity of coins of period 19 and the complete lack of later coins perhaps suggest a diminution in the level of activity in the later 4th century. Although this cannot be certain the situation is closely paralleled in the immediately adjacent A46 Improvement Scheme site DE3001 where Cooke (2014b, 225) suggested that 'coin use ... was in decline by the AD 360s.'

3.2.10 The A46 Improvement Scheme excavations formed a group of closely related sites in the hinterland of Margidunum and produced a total of 106 Roman coins, mainly from sites DE3001 (33 coins) and DE3002 (65 coins). Like site DE3001, site DE3002 lay close to the Chapel Lane excavation, and on the same, east, side of the Fosse Way, but closer to the defended settlement of Margidunum. The combined coin loss profile (ibid., 224, fig. 4.91) shows a rather different pattern from Chapel Lane, with higher numbers of radiates (particularly of period 14) than of period 17 issues, better representation of period 19 than period 18 and a respectable showing of period 21, these last coins all from site DE3002. As with the present excavation the individual site lists are too small to sustain detailed analysis, but the variations can be interpreted (with caution) as indicating local differences in patterns of activity (at least those reflected by coin loss) across the area west and south of Margidunum. Cooke (ibid., 225) shows very clearly that, as would be expected, coins from previous excavations within the early nucleus of the settlement, later defended, include a significant earlier Roman (particularly Flavian) component. In its later elements the intramural coin loss pattern matches the overall A46 Improvement Scheme one quite closely. The most notable points from the comparative picture for the present site seem to be the tailing off of activity in the later 4th century from a very marked high point in period 17, and the perhaps related unusually high level of coin loss in the immediately preceding period 16. In terms of coin loss, at least, the second quarter of the 4th century (roughly speaking) seems to have been a time of particularly intensive activity.

3.3 Objects of metal, glass and shale *by Ian R Scott*

Introduction and methodology

3.3.1 The objects of metal, glass and shale comprise 1348 objects (1812 fragments) (Table 8). The majority of the finds are iron (n = 1220, frags = 1676) and comprise mainly nails or hobnails. Other metals present are copper alloy (n = 24, frags = 26) and lead (n = 30,

frags = 30). In addition to metal finds there are 72 glass beads and two shale bracelets (frags = 8). The majority of the finds were recovered from inhumation graves (Table 9) and the single cremation burial. Finds recovered from other contexts were very limited in the number and range of types.

3.3.2 The finds have been fully recorded onto an MS Excel spreadsheet, which will form part of the archive. Each find was identified and assigned to a functional category, its context recorded, its measurements taken as appropriate and the principal material(s) recorded. Most objects were also described in free text.

Finds from graves

3.3.3 The finds from inhumations comprise nails (n = 146, frags = 263), almost certainly from coffins, hobnails (n = 1015, frags = 1348) from nailed footwear, and a much smaller number of grave goods. Fifteen graves produced no metal or other small finds.

3.3.4 Coffin nails were found in 24 graves and hobnails were recovered from 29 graves. Just two graves (500 and 994) produced grave goods. The evidence of the finds from graves is summarised in Table 9.

Table 8: Quantification of objects of metal, glass and shale by phase and feature type

		Iron		Copper alloy		Lead		Glass		Shale		Total	
Phase	**Feature type**	**Count**	**Frags**	**Count**	**Frags**	**Count**	**Frags**	**Count**	**Frags**	**Count**	**Frags**	**Count**	**Frags**
	Natural feature			1	1	2	2					3	3
Unphased	Pit	1	1									1	1
	Topsoil	1	1									1	1
	Total	2	2	1	1	2	2					5	5
1	Ditch	1	1									1	1
	Pit	2	3									2	3
	Total	3	4									3	4
	Cremation	1	1									1	1
	Ditch	8	11			1	1					9	12
	Graves	1166	1634	10	12	3	3	72	72	2	8	1253	1729
2	Layer	12	13									12	13
	Pit	2	2									2	2
	Well cut	0	1									0	1
	Well recut	2	2									2	2
	Total	1191	1664	10	12	4	4	72	72	2	8	1279	1760
Unstratified	Metal detector			3	3							3	3
	Unstratified	6	7	10	10	24	24					40	41
	Total	6	7	13	13	24	24					43	44
All	Total	1202	1677	24	26	30	30	72	72	2	8	1330	1813

Table 9: Summary of grave finds

Feature	Nails	Footwear	Personal	Structural	Misc	Query	Waste	Totals	Comments
38	8							8	8 nails (12 frags) (SF 1–10, samples 1 & 4); 4 nails each at foot and head, 1 nail near hip, 1 nail by skull. One possible T-headed nail.
56		34						34	This grave cut contained two bodies (skeletons 54 and 57) 34 hobnails (39 frags) (SF 44, samples 6, 8, 10 12) were found by one of the feet of skeleton 57. Number of hobnails is not large and the position by one foot suggests that only single item of nailed footwear was present
114	16	125						143	16 nails (30 frags) (SF 53–66, 76–80 & 177). The nails were located at the head, foot and on each side of the skeleton indicating a narrow rectangular coffin. 125 hobnails (152 frags) which were found in two concentrations (SF 50 and 51) clustered around the feet of skeleton 112, indicating that the body was buried with wearing nailed footwear.
121								0	-
147	3	1						4	3 nails (3 frags) (SF 72–4) locate at foot end.
153	(1)	1						2	1 nail frag (SF 127) by R hip
220								0	-
250	9	3						16	9 nails (13 frags) (SF 130–5). No clear pattern of nail distributions, but nails found around the skeleton 198, suggesting coffin. Grave 250 cut grave 251
251	3	6						9	3 nails (4 frags) (SF 129, 136–7). Cut by grave 250
258	2							2	2 nails (3 frags) (SF 143, 145)

Feature	Nails	Footwear	Personal	Structural	Misc	Query	Waste	Totals	Comments
267	8	21						29	8 nails (12 frags) (SF 149–54, 159), located along sides of probable rectangular coffin. Cut by grave 297 21 hobnails (21 frags) (SF 158) not by feet; possibly separately buried
283								0	-
297	3							3	3 nails (5 frags) (SF 155–7; 160). Cut grave 267
323		75						75	75 hobnails (100 frags) (SF 161 & 162; sample 70) in two clusters by the feet of the skeleton.
334	10	1						10	10 nails (16 frags) (SF 163–74, sample 71). Nails found only around upper portion of skeleton. No nails found below the pelvis. Form of coffin probably rectangular, but truncated.
350								0	-
355		45						45	Grave cut contained two bodies (skeletons 352 and 353). 45 hobnails (56 frags) (SF 175–6) found by feet of skeleton 353.
362	7	1						9	7 nails (14 frags) (SF 178–88, sample 90) Grave truncated at head and foot. Line of nails across grave just below pelvis.
434		142						142	142 hobnails (184 frags) mostly recovered in three groups (SF 200–2) with further examples recovered from soil sample 103. The hobnails found by the feet of the skeleton 432 indicating the presence of nailed footwear. Plan shows partial outlines of nailed soles.
436	4	36						40	4 nails (9 frags) (SF 194–8) 36 hobnails (51 frags) (SF 190–1); found by feet of skeleton 405
437	1	18						19	1 nail (1 frag)

Feature	Nails	Footwear	Personal	Structural	Misc	Query	Waste	Totals	Comments
									18 hobnails (23 frags) recovered in two groups (SF 192–3) one around each foot indicated presence of nailed footwear.
455								0	-
468								0	-
500	8	2	65			2		77	2 small shale bracelets (8 frags) (SF 203); 63 small dark blue glass beads (SF 277; sample 111). 8 nails (21 frags) (SF 204, 206–20; sample 110) found at foot and head and down one side of grave, indicating probable rectangular coffin. 2 hobnails only
508		49						49	49 hobnails (71 frags) (SF 221, sample 115) found concentrated by feet of skeleton 506.
526								0	-
531	14			1				15	14 nails (26 frags) (SF 224–41). Grave cut by land drain. The locations of 18 nails or nail fragments were recorded indicating the presence of a rectangular wooden coffin. Also recovered from this grave was fragment of right-angle corner bracket or binding (SF 242), probably not grave furniture.
537		117						117	117 hobnails (147 frags) (SF 222, sample 119). Hobnails clustered by feet indicating presence of nailed shoes.
542	11							11	11 nails (17 frags) (SF 244–57). Impressions of parts of wooden coffin record at the foot and head of the grave as well as nails marking the head, foot and sides of the coffin. Coffin probably rectangular.

Feature	Nails	Footwear	Personal	Structural	Misc	Query	Waste	Totals	Comments
554		71						71	71 hobnails (83 frags) (SF 243, sample 133) located around feet indicating presence of nailed footwear.
565								0	-
584	2							2	2 nails (4 frags) (SF 258–9), located either side of upper body.
589	4				1			5	4 nails (5 frags) (SF 260–1, 263–4) two nails located on each side by the shoulders/neck. Probable wood coffin with nails
616		22						22	22 hobnails (34 frags) (SF 265, samples 152 & 166) found by feet suggesting presence of nailed footwear.
620								0	-
632	8	2						10	8 nails (16 frags) (SF 278–87; samples 166–7) found at foot and head end a down one side of grave suggesting a rectangular coffin.
649	4							5	4 nails (5 frags) (SF 270–3, 276). Two nails mark the corners of a coffin at the head and two either side of the grave by the pelvis. Probable rectangular coffin.
655	9	53						62	9 nails (22 frags) (SF 274, 288–96, 298; sample 159). Nails found on sides and at the foot. No nails located at the head end of grave. Rectangular wooden coffin. 53 hobnails (85 frags) (SF 275–6, sample 160) found by feet of skeleton 652.
670		1						1	Cremation
674		3						3	-
699		68						68	68 hobnails (97 frags) (SF 301–2; sample 176) found by the feet of skeleton 696.
703								0	-

Feature	Nails	Footwear	Personal	Structural	Misc	Query	Waste	Totals	Comments
707	5	58						64	5 nails (13 frags) (SF 307–13), located either side of skeleton indicating presence of wooden coffin. 58 hobnails (98 frags) (SF 305–6, sample 192) found clustered about feet of skeleton, indicating nailed footwear.
713								0	-
729		1						1	-
733		1			1			2	-
790								0	-
830								0	-
984	6	7						14	6 nails (10 frags) (SF 330–4, 339–40, 346) representing coffin. 7 hobnails (8 frags) (SF 335–7, 341–3, 345)
990								0	
994	(1)	2	18					20	Only 1 nail stem fragment (SF 363) recovered, locate in pelvis area. 2 hobnails (samples 232, 238). Group of 7 small bangles or bracelets (SF 360) located by R shoulder; ribbon twist bracelet (SF 361) by pelvis; ribbon twist bracelet (sf 362) by left shoulder; 9 tiny annular glass beads (samples 232, 234)
1002		50				1	2	53	50 hobnails (63 frags) (SF 366; sample 243) found clustered by feet of skeleton 1000.

Evidence for wooden coffins (Tables 10 and 11)

Coffin nails

3.3.5 Some 146 nails or nail heads and 117 stem fragments were recovered from graves (frags = 263). The heads of 136 nails were sufficiently well-preserved to identify their form and size. All but one of the nail heads are circular or sub-square in plan and either flat or slightly domed, and conform broadly to Manning's Types 1a or 1b which are the most common types of Roman nail (Manning 1985, 134–7). There are no Manning Type 2 nails with triangular or diamond heads. The only nail type present other than the Type 1 was a possible T-headed nail from grave 38.

3.3.6 The nail heads all seem to be of one of three (or four) sizes. Fifty-seven nail heads are 15mm in diameter smaller (Table 10). A similar number nail heads are *c* 20mm across, and 21 have larger flat or domed heads of *c* 25mm diameter. There is single nail with head a diameter larger than 25mm.

Table 10: Nail head sizes of coffin nails

Group	Grave	Head				Total
		<15mm	*c* 20mm	25mm	>25mm	
38	35	1		4		5
114	111	3	11	2		16
147	144	2	1			3
250	197		2	5		7
251	200	3				3
258	254	1	1			2
267	263	4	2			6
297	293	3				3
334	330	3	6	1		10
362	359	1	4	1		6
436	403	4				4
437	404	1				1
500	496	3	3	1		7
531	527	5	5	3	1	14
542	538	3	7	1		11
584	579	1		1		2
589	585	1	2			3
632	628	7	1			8
649	646		4			4
655	651	5	3	1		9
707	704	5				5
984	981	1	5	1		7
Total		57	57	21	1	136

3.3.7 Only 49 nails were complete and these range in length from 25–90mm, but most fall in the range 55–75mm (Table 11). Although complete nails form less than a third of the recovered nails with heads, there is no reason to doubt that they form representative sample of the size range of the coffin nails, since many of the less complete were clearly of similar sizes.

3.3.8 Grave 114 produced the most complete nails and they are amongst the largest coffin nails. They range in length from 70–90mm. By contrast the complete nails from grave 500 comprise two small nails (L: 25mm and 37mm) and one nail 67mm long. However, these are only three nails out of the eight nails/nail heads and 21 nail fragments recovered from the grave.

Table 11: Lengths of coffin nails

Grave	Length (mm)															Total
	25	37	40	50	55	60	65	67	70	72	75	80	82	85	90	
38									1			1				2
114									2		1	1	1	2	1	8
147							1									1
250							1		1	1						3
267						1										1
334							1	1	1							3
362											1					1
436			1		1						1					3
500	1	1						1								3
531					1		1	1	2							5
542							1		3	1	2					7
584							1					1				2
589					1											1
632				1	1											2
649									3							3
655				1												1
984											1				2	3
	1	1	1	2	4	1	6	3	13	2	6	3	1	2	3	49

3.3.9 The nails from Chapel Lane are small when compared to some of the nails found in the cemetery at Poundbury, Dorset, where nails ranged in size from 22–145mm, although most fell in the range 60–100mm (Mills 1993, 115). There were also some nails with very large heads from Poundbury (ibid., 113, fig. 79). For comparison the nails from burials at Cotswold Community, Gloucestershire, ranged in length from 40–109mm, and head diameters from 10–25mm (Powell 2010a, 92). At Horcott Quarry, Gloucestershire, the range and quantity of finds from graves were comparable to Chapel Lane. In the Western Cemetery (AD 100–240) nails were recovered from four graves and ranged in length from 40–95mm (Scott 2017, 306). In the Southern Cemetery (AD 240–350) the graves produced at least 50 nails ranging in size from 39–180mm. Most graves had nails that ranged between 39mm and 105mm in length. One exception was a grave with all large nails (L: 124–180mm; Scott 2017, 309–10, tables 10.17 and 10.18). The Northern Cemetery (AD 390–570) at Horcott had nails ranging from as small 25mm up to 85mm.

Coffin forms and construction

3.3.10 Twenty-four graves produced at least one nail or nail fragment (see Table 9). In some graves nails were found positioned around the body, providing evidence for wooden coffins. For example, grave 114 produced 18 nails. Some of these were located at the ends of the grave and others distributed on either side of the body suggesting a narrow

rectangular coffin with head and foot boards and sides all securely nailed. Grave 531, although partly truncated by a field drain, clearly had a well-constructed coffin, with nails at both ends with concentrations at the corners but also nails down both sides. The grave also contained a broken structural fitting or angle bracket in addition to the nails. The fitting is rather thick in cross-section suggesting that it is not an angle bracket or corner reinforcement for a coffin such as were found in some numbers in the late Roman cemetery at Poundbury, Dorset (Mills 1993, 119–24, figs 85–9). It is more likely that was structural fitting that had broken and perhaps had been discarded.

3.3.11 Grave 542, in addition to 11 coffin nails at head, foot and sides, also revealed some remnant impressions of the wood of each end of a coffin. In this instance it appears that some nails were found lying horizontally while others were vertical. It seems likely that nails at the base of the coffin were driven horizontally through the sides into the edge of the base, rather than vertically up from the bottom. Grave 250 had nails located around the body, presumably a rectangular coffin. Grave 655 had nails at the foot and along the sides but none were found at the head end of the grave. Nonetheless the evidence suggests the presence of a nailed rectangular coffin. Grave 267 had coffin nails along each side of the body indicating the presence of a rectangular coffin. The grave was partly cut by grave 250.

3.3.12 Grave 707 had five nail locations on the right side of the skeleton and just two on the left side. Most of the nails were located around the lower half of the body, but presumably originally there was a rectangular coffin held together nails.

3.3.13 Two graves (500 and 632) had nails at both ends and nails located down just one side of the grave, but apparently no nails on the opposite side. Grave 500 was a very small grave containing the body of a child or sub-adult buried with grave goods comprising two small shale bangles and 63 small dark blue beads.

3.3.14 Grave 38 had evidence for four nails at each end (SF 1–4 and 6–9) but only two other nails (SF 5 and 10) were located, suggesting that the nailing of the side boards was limited. In grave 362 a line of close-set nails was found across the grave just below the pelvis of the deceased. The grave had been truncated at the head and foot so it is impossible to know where other coffin nails might have been placed.

3.3.15 The number of nails used to construct a coffin might vary from sufficient nails to secure the corners and hold the coffin together to much more substantially constructed coffins. The evidence from Chapel Lane hints that for many coffins the head and foot boards were more securely fastened and sides less heavily nailed. It is likely that nails were used sparingly, as Powell (2017b, 326) has suggested. None of the graves had the large numbers of nails found in coffins in some late Roman urban cemeteries.

Hobnails and evidence for nailed footwear

3.3.16 Hobnails were found in 29 graves. In 16 of these 29 graves there was definite evidence for the presence of nailed footwear (Table 12).

3.3.17 Grave 267, which was cut by grave 297, produced 21 hobnails which appeared to have been placed separately.

3.3.18 In all but one instance where hobnails were found, they were clustered around both of the feet of the deceased. The one exception is grave 56, which contained two bodies (skeletons 54 and 57). No hobnails were found with skeleton 54. The cluster of hobnails with skeleton 57 was clearly concentrated around one foot only. This fact together with the relatively small number of hobnails suggests that only a single item of nailed footwear was buried.

3.3.19 The variation in the numbers of hobnails recovered from graves may in part reflect the circumstances of recovery, but they may also reflect the differing nailing pattern of the shoes buried. Not all nailed footwear was heavily nailed. Shoes from excavations in Billingsgate, London, revealed a number of different nailing patterns some of which required comparatively few hobnails (Rhodes 1980, 105–7, fig. 59). Van Driel Murray (1999; 2001, 350–2, figs 21–3) has described and discussed nailing patterns and their potential significance and has stressed the importance of recording hobnails *in situ*, as they often provide the only evidence for footwear on archaeological sites.

3.3.20 Grave 114 contained heavily nailed footwear, as is reflected in the number of hobnails recovered and in the fact that the hobnails were found together in close-set blocks. Grave 434 also had a large number of hobnails and as in grave 114 the nails were found in close-set blocks indicating the presence of heavily nailed footwear. Grave 537 had 117 hobnails clustered around the feet and again is suggestive of heavily nailed footwear.

3.3.21 Grave 323 had fewer hobnails (n = 75) and may have a more open nailing pattern requiring fewer nails. The records of the hobnails made on site suggest shoes with limited nailing perhaps around the edges of the sole only. Evidence from grave 508, which had 58 hobnails clustered about the feet, suggests that the soles were nailed around the margins. Grave 655 had 62 hobnails, again in two groups by the feet. The nailing again appears to be light but not primarily around edges of the soles. No clear pattern is discernible. The same is the case with grave 699, which had 68 hobnails in two clusters by the feet, and grave 1002 had 50 hobnails, again in two clusters by the feet. The numbers of hobnails suggest that the shoes deposited in these graves were not heavily nailed.

3.3.22 Graves 436 and 437 had smaller numbers of hobnails, but again clustered by the feet. In Grave 436, which was cut by grave 437, 36 hobnails were recovered. The hobnails were recorded as rows possibly marking the edges of the shoes. In grave 437 only 18 hobnails were found. These may represent shoes with nailed decorative patterns on the sole, rather than heavily hobnailed footwear. Grave 355 contained two skeletons (352 and 353). Skeleton 353 had 45 hobnails found in two clumps by the feet, while skeleton 352 has no hobnails associated. The numbers of nails found with skeleton 353 again suggest light patterned nailing. The absence of hobnails with skeleton 352 does not necessarily mean that the body was buried without shoes; not all footwear was nailed.

3.3.23 Grave 554 and 707 produced 71 and 58 hobnails respectively. In the case of Grave 554, the feet of the skeleton were quite close together and the hobnails were

recovered as a single group. However, the number of hobnails suggests that it is possible that they represent two pieces of lightly nailed footwear. No discernible pattern was recorded. Grave 707 had slightly fewer hobnails but these were clearly in two clusters by the feet. The records of the hobnails suggest that the footwear again had light nailing forming patterns rather than edging of the soles.

Table 12: Hobnails from graves

Grave	Count	Fragments
56	34	39
114	125	152
267	(21)	(21)
323	75	100
355	45	56
434	142	184
436	36	51
437	18	23
508	49	71
537	117	147
554	71	83
616	22	34
655	53	85
699	68	97
707	58	106
1002	50	63

Grave goods

3.3.24 Just two graves had finds other than hobnails and coffin nails (500 and 994; Fig. 18). Grave 500 had two small shale bracelets and 63 small dark blue glass beads probably from a bead string or necklace. The bracelets were only *c* 50mm in diameter, suggesting they were for a child. The grave was small, measuring 0.35m wide and *c* 0.9m long, and clearly dug for a small child. The beads and the fragments of shale bangles were found near the centre of the grave and may have been worn on the child's wrists or simply laid on top of the body or coffin.

3.3.25 Grave 994 contained seven tiny dark blue annular beads (D: 3mm), two small copper alloy ribbon twist bracelets, and six small thin copper alloy bangles or bracelets all looped onto a seventh tiny bangle. Again the size of the bracelets suggested they were for a child.

3.3.26 The grave was larger than grave 500, but not full sized and measured just 1.2m long and 0.4m wide. The seven small bracelets (Cat. Nos 1–7, SF 360) were found on the right shoulder of the child. One of the ribbon twist bracelets (Cat. No. 8, SF 361) was found near the pelvis, and the second ribbon twist bracelet (Cat. No. 9, SF 362) was found by the left shoulder. Four of the small beads (Cat. No. 10) were found with the skull and another three beads by the ribs (Cat. No. 11). Two more beads were recovered from soils samples (Cat. Nos 12–13).

3.3.27 Bracelets and bead strings comprised of small beads are a particular feature of late Roman finds assemblages. They are primarily female accessories. Shale bracelets or armlets, both plain or with ribbing around the circumference, were produced through the Iron Age (see Lawson 1975, 242 for references). Similar bracelets were produced into the early Roman period and Lawson (1975, 248) gives examples from 2nd century contexts. There are plain examples from the fortress baths at Caerleon from early 2nd century contexts (Zienkiewicz 1986, 213) and examples of plain bracelets from later 1st- to 2nd-century and from mid 3rd- to 4th-century contexts at Castleford (Clarke 1998, 254, nos. 2 and 3, fig. 109). Plain annular shale rings are also found in late Roman assemblages. At Caister-on-Sea, Norfolk, 23 of the 29 shale bracelets from 4th-century or later contexts are plain (Darling and Gurney 1993, 84–5, fig. 51). In the Lankhills cemetery, Winchester, almost all the black bracelets (both jet and shale) were plain and most were found in children's graves (Clarke 1979, 311–12; Cool 2010, 300, table 4.27). The beads and bead strings from Lankhills include a majority of small beads in deep translucent blue. Two Lankhills burials (graves 920 and 985) in particular provide comparisons for the Chapel Lane burials. Lankhills inhumation grave 920, which was the burial of a young child, was accompanied by seven or eight copper alloy bracelets, four bone bracelets and one shale bracelet, and by a bead string of 31 beads, including five small annular beads in deep blue glass like those from Chapel Lane (Booth *et al.* 2010, 130–3, figs 3.115–3.116). Inhumation grave 985, the burial of an adolescent, possibly female, had seven copper alloy bracelets, nine bone bracelets and one shale bracelet, as well as two copper alloy finger rings and a possible copper alloy hair pin. The grave also contained a bead string which included a number of small spherical or annular beads in deep blue glass (ibd., 138–42, figs 3.127–3.129). Cool (2010, 296) commented that bead strings seem to have been thought 'especially appropriate for children and adolescents'.

Catalogue of illustrated finds

Grave 994 (Fig. 18)

1–7 **Group of seven bracelets or bangles**. SF360. Comprises:

1 Small bracelet or bangle with hook and eye fastening. Copper alloy. Narrow rectangular section band with a shallow medial groove. 33.5 x 33mm. It holds four bracelets (2–5) and held two further bracelets (6–7) now detached.

2 Small expanding bracelet with plain band. Copper alloy. 40 x 38mm.

3 Expanding bracelet with plain band. Copper alloy. 44 x 43mm.

4 Expanding bracelet with plain band. Copper alloy. 51 x 49mm.

5 Light penannular bracelet or bangle of D cross-section, quite plain but with alternate long and short slightly raised sections on the outside face. Copper alloy. 40 x 39mm.

6 Light penannular bracelet or bangle with narrow band of D-section with transverse grooves on the outer face. Copper alloy. 55.5 x 45.5mm; W: 1.5mm.

7 Probable expanding bracelet. Copper alloy. Ends twisted together. 43.5 x 50mm.

8 **Ribbon twist bracelet**, small. Penannular bracelet with each end tapered to a point. The inside face of the bracelet has been slightly flattened. Copper alloy. 48 x 42mm. SF 361.

9 **Ribbon twist bracelet**, small. Penannular bracelet with each end tapered to a point. The inside face of the bracelet has been slightly flattened. Copper alloy. 41 x 36mm. SF 362.

10 **Beads**. 4 tiny wound annular beads, very dark blue glass. D: 3mm; L: 1.5mm. Found with skeleton skull.

11 **Beads**. 3 tiny wound annular beads, very dark blue glass. D: 3mm; L: 1.5mm. Found with skeleton ribs.

12 **Bead**. 1 tiny wound annular bead, very dark blue glass. D: 3mm; L: 1.5mm. Sample 232.

13 **Bead**. 1 tiny wound annular bead, very dark blue glass. D: 3.5mm; L: 1.5mm. Sample 234.

Grave 500 (Fig. 18)

14 **Beads**. 23 small wound round beads, dark blue glass. D: 4–5mm; L: 4–5mm. SF 277.

15 **Beads**. 40 small wound round beads, dark blue glass. D: 3–4mm; L: 3–5mm. Sample 111.

16 **Shale bracelet**. Oval cross section with slight ridge on the inner face. Comprises four fragments with three definitely refitting, the fourth possibly refits. D: *c* 50mm. SF 203. Both this and 17 are small and plain and lathe-turned, as indicated by the ridges on the inside faces.

17 **Shale bracelet**. Bracelet, Rounded lozenge cross section with ridge in inner face. Comprises four fragments; two, possibly three, pieces refit. D: *c* 50mm. SF 203.

Finds from non-funerary contexts (Fig. 26)

18 **Possible bracelet fragment** (not illustrated). Plain narrow strip slightly polished. Widens to one end (W: 6mm) which tapers sharply to a blunt point. The metal is very thin at the end and shows traces of filing on its face. The other end, which is narrow (W: 4mm), is broken and shows the very end of a possible medial groove. Cf Cat. No. 19, SF 106. Copper alloy. L: 65mm. Metal detector, SF 355. Unstratified.

19 **Possible bracelet fragment** (not illustrated). Plain narrow strip (W: 5mm) with one end tapered sharply to a blunt point with transverse grooves cut across it. The other end is broken off. Could be a flattened fragment of bracelet. Copper alloy. Cf Cat. No. 18, SF 355. L: 65mm. SF 106. Unstratified

20 **'Celtic fan-tailed brooch'** (Hull's T36) with small cast head loop and hinged pin. It has a small narrow bow with slight moulded ridge and ends in a fantail. The fantail foot has Celtic style decoration. L: 39mm; W: 17.5mm. Metal detector, SF 329. Unstratified.

There is an example from a late 1st- to early 2nd-century pit at Richborough (Bayley and Butcher 2004, 100, fig. 79, no. 328), and there are two examples from Castleford,

one from a context dated to the late 2nd century (Cool 1998, 45, fig. 10, nos 55–6). According Bayley and Butcher (2004, 168) the distribution of the type is mainly in the East Midlands and northwards.

21 **Trumpet brooch**. The trumpet is plain and the sprung pin (now missing) was secured by a single moulded lug. The knop extends around the bow. Copper alloy. L: 58mm; W: 18mm. Context 978, modern feature 1009, SF 323. Late 1st to 2nd century

22 **Trumpet brooch** with the knop replaced by circular plate with enamel infill. Fragment only. The brooch above the circular plate is completely lost. The lower bow is wide and straight and could have terminated either in a knob or a pelta-shaped foot. Copper alloy. Cf Mackreth 2011, 125–6, pl 85: nos 5417, 14169. L extant: 38mm; w extant: 18mm. SF 89. Unstratified

23 **Bucket handle mount** (not illustrated). Has large oval eye at one end to hold the handle, and one, possibly two, nail holes. Incomplete. Iron. L: 110mm. Context 748, pit 747, SF 314. Phase 1, 1st to late 2nd century.

3.4 Ceramic building material and fired clay *by Cynthia Poole*

Introduction

3.4.1 The ceramic building material (CBM) and fired clay assemblage is modest in size, amounting to 142 fragments weighing 17,110g. Fired clay formed a very small proportion of the assemblage, consisting of two small indeterminate fragments (17g) and two others (19g) which cannot with certainty be differentiated as CBM or fired clay. The assemblage is quantified by form and fabric in Table 13. The assemblage consists entirely of Roman tile, most of which cannot be dated more closely than AD 43–410, though some tegulae and flue tiles have characteristics suggestive of a mid to late Roman date. This is consistent with the phasing, as the majority of the tile is assigned to Phase 2. A high proportion of the assemblage was found in ditch fills, especially the main boundary ditch (1010, 1022), together with smaller quantities in pits, wells and graves, though the largest individual group was recovered from layer 919.

3.4.2 The condition of the material is relatively unabraded, mostly low to moderate though a few pieces were heavily worn and rounded. No complete objects survived and all the tile is fragmented, resulting in a mean fragment weight of 107g. Thickness is the only complete dimension, though in the case of one flue tile sufficient survived to estimate the complete width.

Methodology

3.4.3 The assemblage has been fully recorded on an Excel spreadsheet in accordance with guidelines set out by the Archaeological Ceramic Building Materials Group (ACBMG 2007). The record includes quantification and details of fabric type, form, surface finish, forms of flanges, cutaways and vents, markings, and evidence of use/reuse (mortar, burning etc). The terminology follows Brodribb (1987); coding for markings, tegula flanges, etc follows that established by OA for the recording of CBM, and tegula cutaway types are linked to those classified by Warry (2006). Fabrics were

characterised on the basis of macroscopic features supplemented by the use of a x20 hand lens for finer constituents.

Fabrics

3.4.4 The fabrics were all sandy, consisting mainly of clear and milky quartz sand and to a lesser extent dark rock sand, ranging from fine to coarse sandy and often poorly sorted. There was considerable overlap and merging between the designated fabrics suggesting most could be subdivisions of a single fabric group using fine sandy micaceous clay as a base with variable amounts and grades of sand. In much of the tile the sand was ranged from medium to coarse in size and was poorly sorted. Density of sand was variable, ranging from sparse to extremely dense. Small red iron oxide inclusions or ferruginous clay pellets were common, and small rounded grits of cream or pale pink siltstone occurred frequently. The moulding sand used was generally medium-coarse clear or milky quartz and similar to the sand found within the fabric. The main fabrics can be summarised as follows in order of frequency:

Fabric Css. Orange, red and brownish red, occasionally with cream streaks or a grey core, fine sandy micaceous clay containing variable density and grade of quartz sand distinguished by the siltstone grits mostly 1–5mm in size but up to 12mm (60 fragments, 8188g)

Fabric C. Orange, light orange, light red, pinkish red, micaceous clay containing frequent medium-coarse quartz sand, lower density of other rock sand and rarely coarser grits in a fine sandy micaceous clay. Examples containing a high density of fine-medium sand (0.1–0.2mm) was designated as Cf (36 fragments, 4956g)

Fabric E. Red, orange with cream laminations, containing variable densities and grades of quartz sand and red ferruginous and cream clay pellets 1–5mm

Fabric D. Fine sandy micaceous clay with no or rare coarser inclusions.

Fabric B. Red and pinkish red fine sandy micaceous clay containing low to moderate density of medium-coarse quartz sand and frequent red iron oxide inclusions.

Fabric Qf. Light red or light pinkish brown with pale grey core; high density of very fine well sorted sand *c* 0.1mm plus sporadic mudstone or sandstone grit 12– 15mm.

3.4.5 The sandy micaceous fabric group (fabric B-E) was used for all tile forms and there was nothing in terms of form or finish that separated them. Amongst the different forms there is no significant variation in the fabrics used, with fabrics C and Css the most common in all forms (Table 13). There is considerable overlap and gradation in the fabric characteristics, and it seems likely that these fabrics derive from a regional production centre, comprising a number of tileries that might account for the variations within the assemblage. The nearest major production centre occurs at Mancetter, though it is possible production occurred more locally. The two examples of tegula found in fabric Qf were sufficiently distinctive from the others to suggest this fabric may have originated from a different source. A single example of imbrex was identified as pink grog-tempered ware (PNKGT) which is thought to originate from the Towcester/Milton Keynes area, though no kilns have yet been identified (Booth and Green 1989, 82).

Description of the tile

3.4.6 The assemblage consists of the major categories of Roman tile including tegula and imbrex roofing tiles, brick and flue tile, together with undiagnostic flat tile and indeterminate fragments.

Brick

3.4.7 Bricks (30 fragments, 6438g) were identified on the basis of corner or edge characteristics and thickness. Any plain flat tile over 40mm thick is classified as brick. Plain tile less than 40mm thick may overlap with other tile forms and therefore other features must also be taken into account. The brick ranged from 30 to 54mm thick, and maximum surviving width of any fragment was 165mm, which is less than all known Roman brick sizes. All had a smooth upper surface and the majority had a rough irregular base suggesting most were made on a bare ground surface, some were more regular and a small number were knife or wire trimmed across the base. Edges generally had a rough or fairly rough finish from the mould, but a proportion had been knife trimmed, usually along the lower half to remove any lip of clay squeezed under a four-sided mould.

Table 13: Quantification (count and weight) of ceramic building material tabulated by form and fabric

Count	B	C	Cf	Css	D	E	PNKGT	Qf	U	FC: Q	Total
Brick	1	9	1	18		3					32
Flat tile	1	7	2	15	2	7		1			35
Tegula	2	10		3	1	4		1			21
Imbrex		4	4	9		4	1				22
Flue		2	1	6	1						10
Indet	2	6	1	9		2			1	1	22
Total	6	38	9	60	4	20	1	2	1	1	142
Wt (g)	**B**	**C**	**Cf**	**Css**	**D**	**E**	**PNKGT**	**Qf**	**U**	**FC: Q**	**Total**
Brick	56	2047	118	3799		523					6543
Flat tile	49	720	87	1044	34	985		76			2995
Tegula	125	1448		1586	311	490		118			4078
Imbrex		518	265	883		99	240				2005
Flue		227	215	731	30						1203
Indet	12	63	15	145		30			7	14	286
Total	242	5023	700	8188	375	2127	240	194	7	14	17,110

3.4.8 Whilst it would be tempting to suggest that the thinner examples represent small brick forms such as bessalis and pedalis, and the thicker from larger tiles such as lydions, or even sequipedalis or bipedalis, it is not uncommon for lydions to fall across the entire range of thickness represented in the brick assemblage, and the bessalis the smallest size brick may measure over 50mm thick. It is likely that the brick represents a range of forms, but it is not possible to establish which types are present. Brick had a variety

of uses as floor paving, walling, or in the construction of hypocausts for the pilae and the suspended floor. It was also frequently recycled in minor structures such as hearths, ovens and corndryers.

Flat tile

3.4.9 Plain flat tile (35 fragments, 2995g) formed a fairly small proportion of the assemblage and ranged in thickness from 17–37mm. The majority, which are under 30mm thick, are almost certainly the central plain sections of tegulae, whilst the few over 30mm thick are more likely to be brick, but thicker tegulae cannot be excluded. The overall finish of surfaces and edges is consistent with both brick and tegulae. Three quarters of the flat tile had evidence of burning to varying extents and intensities.

Tegulae

3.4.10 The tegulae (22 fragments, 4103g) were quite well made with a neat regular finish; upper surfaces were generally smooth, occasionally with fine striations present and the rough irregular bases were commonly knife- or wire-trimmed. Edges were also evenly finished with knife trimming along both end edges and the exteriors of the flanges. The tegulae were all quite thick ranging from 19–30mm with a single example of 35mm, and the greater part concentrated towards the upper half of the range. They exhibited a range of flange profiles and sizes, with a mix of rectangular and rounded profiles (Fig. 27, nos 1a–e) measuring 19–50mm wide and 36–60mm high. Very few flanges had evidence that the flanges were tapered increasing in thickness to the lower corner and few had finger grooves along the inner angle, which was generally just rounded. The small number of lower cutaways (fall into Warry's groups C and D (2006) and one that could be either group B or C, indicating production largely took place between the mid 2nd and late 4th centuries. On account of the fragmentary character of the pieces it has not been possible to be absolutely definite regarding the cutaway type. Only two complete lengths survived; one of type C4 measured 46mm long and one borderline C5 or D15 measured 50mm long. One type B6 (or C5) measured in excess of 63mm long.

Imbrex

3.4.11 The imbrices (17 fragments, 1747g) were generally well finished similar to the tegulae with smooth tops sometimes slightly corrugated from smoothing length wise, and a fairly rough underside. Some edges had been smoothed, but most were rough. They were also quite thick, ranging from 15–24mm with most over 20mm. The heights of two were *c* 90–100 and 110mm, and one width was estimated to be *c* 180mm or slightly more. A mix of angular and rounded profiles were present. One of the thickest had a large 'half round' profile with a curvature equivalent to 300mm diameter, which would indicate an unusually large example and may indicate it was a purpose-made ridge tile.

Flue tile

3.4.12 A small but significant quantity of flue tile (9 fragments, 1098g) was also recovered. These were box flue tile (tubuli) identified by the corner angle exhibiting a smooth

moulded external surface and rough sanded internal surface. Only one had evidence of keying in the form of a diagonal band of combing made by a comb with eight or more teeth measuring over 34mm wide (Fig. 28, no. 5). All other pieces had plain surfaces, which were often gently convex. The absence of keying may indicate that much of the flue tile was plain on all four faces, which, whilst uncommon, is not unknown. Tile thickness fell within the same range (19–27mm) as tegulae. One tile (357, feature 1009) with part of a rectangular vent cut into the tile had a width of 107mm, estimated to be *c* 123mm when complete (Fig. 28, no. 6). This fragment has a secondary edge slightly curved and worn very smooth; it may have been deliberately chipped down to form a specific shape such as a semi-circular disc, but if this was the case the projected edge would probably have run through the vent. It may have been reused in a floor or kerb where the broken or chipped edge was gradually worn smooth through use.

Markings

3.4.13 Markings on the tiles are limited to signatures and impressions. Fragmentary signature marks consisting of one or two curving (167, 887, 891) or straight finger grooves (239, 919) occurred on a brick and four flat tiles, probably tegulae. One (439) formed a hoop or semicircle inscribed with three fingers (Fig. 28, no. 2). An example on a brick (12) was a more unusual form of S-shaped meanders (Fig. 28, no. 3). This brick also had three hoof imprints, probably of ovicaprid, each only partially preserved. The only other marking consisted of two overlapping paw prints on another brick (449) (Fig. 28, no. 4). The best preserved had four pads and claw marks identifying it as dog and measured 48mm wide and 54mm long. This was overlain by an arc 35mm wide of four smaller circular pads, which must be a different animal. The impressions occurred too close to the broken edge for any claw marks to survive if originally present. It is therefore uncertain whether it was made by a cat or dog, but the size would be indicative of a dog.

Discussion

3.4.14 The range of ceramic building material is typical of a masonry building with at least one heated room with a hypocaust and cavity walling. It is clear that no such building existed within the excavated area and from the character of the settlement exposed is unlikely to lie within the immediate vicinity of the site. However, there are suitable sources close by in the form of the Norton villa (Leary and Baker 2004, 15–16) situated some 300–400m north-west of the site as well as town houses and other buildings within Margidunum itself *c* 600m to the north-east. There is little detailed information regarding the tile found in previous fieldwork at either possible source area to allow comparison of the present assemblage. Margidunum had extensive occupation during the mid to late Roman period with a variety of well-appointed private and public masonry buildings including a bath house and possible mansio or official residence (Todd 1969, 54). Refurbishment, rebuilding or demolition of such buildings could have provided a source of building material suitable for reuse in minor structures such as ovens and hearths and with direct access to the town along the Fosse Way this is a possible source. However, Todd (ibid., 81–2) reports that ceramic building material,

both roof tile and brick, was scarce in Margidunum and he posits that these materials were little used in the town. It is possible therefore that the villa was the source of CBM, where quantities of tegulae, box flue tile and opus signinum have been noted on the modern surface (Todd 1969, 12; Leary and Baker 2004, 15–16).

3.4.15 Burning occurred on nearly half of the tile (64 fragments, 7588g), including all forms though most common on brick, tegula and flat tile, and is indicative of reuse in hearths or ovens. The pattern of burning is variable in both location and intensity. Some were burnt grey on just one surface, either upper or lower, with burning sometimes extending to the adjacent edges, a pattern most typical of the use of tile in hearth surfaces. Some had been heavily burnt and blackened on both upper and lower surfaces, which suggests use within an oven or kiln, possibly as the suspended floor in dual chamber structures or as cheek pieces protecting the flue wall where exposed to greatest heat. Some had burning only along the edges, which is typical of tile built into the walls of the flue or lower chamber with the edge exposed in the wall face. A few pieces were just heat-discoloured which suggests they were used in a location where not directly exposed to fire. Burning on the flue tile occurred on the exterior surface indicating this relates to secondary use, not the primary use as cavity walling, which results in burning, sooting or heat discolouration on the interior surface of tubuli.

Catalogue of illustrated CBM (Figs 27 and 28)

1 **Tegula flange and cutaway profiles**: a) Flange type A, topsoil 1; b) Flange type D, ctx 26, ditch 1010/1022; c) Flange E, ctx 340, well 324; d) Flange B/D and cutaway C5, ctx 905, ditch 1010/1022; e) Flange A and cutaway type C5 or D15, ctx 165, ditch 1010/1022; f) Flange D and cutaway type D16, ctx 919, rubble surface.

2 **Signature mark on tegula fragment**: three finger grooves forming a concentric arc, probably part of three finger semi-circle. Ctx 439, ditch 1010/1022. Phase 2.

3 **Signature mark and ovicaprid hoof prints on tegula fragment**: single finger groove forming S-shaped meanders. Ctx 12, ditch 227. Phase 2.

4 **Paw prints of large dog on brick**. Ctx 449, ditch 1010/1022, SF 199. Phase 2.

5 **Combed keying on flue tile** running diagonally from tile edge. Ctx 578, well 568. Phase 2

6 **Flue tile** with cut rectangular vent and smoothed curving edge from later re-use. Ctx 357, feature 1009.

3.5 Worked stone *by Ruth Shaffrey*

3.5.1 Fragments from two upper rotary querns were found in rubble surface 918. One of these is a slightly rounded quern of poorly-sorted Millstone Grit, of which only 10% survives. The other is a fragment of flat-topped type of coarse-grained typical Millstone Grit. This latter quern is very unusual in having two lateral handle sockets positioned at one quarter of the circumference apart. Beehive rotary querns often have a second handle fitted when the side with the original handle has worn down, as a way of countering the wear, but it is rare to see two handle sockets on flat-topped querns.

3.5.2 One piece of a larger slab of clunch is heavily worn on one side: it was found in pit 596. It could be a processing slab or a whetstone but it is rather a soft stone for that and has perhaps been worn through being used in a floor. A small quantity of burnt stone (six fragments weighing 1kg) were recovered from contexts 110, 643 and 810. These are reddened or blackened, suggesting exposure to fire.

Catalogue of worked stone

Upper rotary quern fragment (Fig. 29). Millstone Grit. Coarse-grained well-sorted heavily feldspathic gritstone. Quarter of flat-topped type with heavily worn concave grinding surface, vertical sides and neatly dressed all over. Unusually it has two blind lateral handle sockets and the quern is broken along each of the handle sockets. Dia: *c* 370mm, Th: 22–69mm. Ctx 918, rubble surface. Phase 2, mid 2nd to 4th century.

Upper rotary quern fragment (not illustrated). Millstone Grit. Medium- to coarse-grained poorly-sorted greyish-red sandstone with some banding of coarser grains and frequent white feldspar. The quern is roughly worked all over but with slightly smoothed very slightly concave grinding surface. The edges are damaged but quern is slightly rounded and slightly tapered to centre. Dia: 410mm, Th: 84mm, eye dia: *c* 70mm. Weighs 2.17kg. Ctx 918, rubble surface. Phase 2, mid 2nd to 4th century.

Processing slab/flooring/whetstone (not illustrated). Fragment of large slab with one very worn smooth face. The wear goes right to all the edges and this surface is slightly concave. There are some very fine scratches on the surface but these might be modern. The worn surface of the stone could result from use as a grinding stone or hone, or perhaps in a floor; it is not possible to be certain. Measures >140 x >140 x 60mm thick. Weighs 1.52kg. Clunch. Cxt 598, 596. Phase 2, mid 2nd to 4th century.

Discussion

3.5.3 The two rotary querns are an indication that some crop processing took place. The recovery of the querns in a rubble surface means that they may have been brought onto the site to be reused but although their primary use for grinding may have occurred elsewhere, it is likely to have been nearby.

3.5.4 Sadly, both Oswald's and Todd's reports on the excavations at Margidunum fail to mention any querns. This is probably largely a reflection of the eras in which they were operating, when the retention and analysis of querns was sporadic at best, and inclusion in publications very much at the mercy of the project directors. We are fortunate, however, that more recent excavations did recover and analyse querns. In the light of the evidence for centralized grinding (in the form of millstones) and malting, on the opposite side of the Fosse Way (Roe 2014, 209; Cooke and Mudd 2014, 441) the recovery of querns from Chapel Lane is no surprise.

3.5.5 It is noteworthy that the querns are of Romano-British disc forms. Beehive querns remained in use in the north and east of England well into the Roman period on some sites, for example at Dalton Parlours, where they appear in 3rd century contexts (Buckley and Major 1990). The presence of flat Roman querns in early to mid Roman contexts here and in the A46 Improvement Scheme excavations (Roe 2014, 209) are evidence for the adoption of Roman design and technology at Margidunum. Such

adoption also occurred elsewhere in Nottinghamshire, for example at Worksop (Vince 2003, 1) but there are few published comparanda for the region. Their manufacture from Millstone Grit is also to be expected since this was a major supplier of both beehive querns and disc querns in the region.

3.5.6 The quern with two handle sockets is particularly noteworthy. Few querns from the area are published and there has been no survey of quern design in the region, so it is difficult to be sure how rare a characteristic this is. However, it is extremely unusual to find two handle sockets on flat disc-type querns in southern England. Beehive querns typically wore down in a very lopsided fashion and so often had an additional handle slot cut into the stone in a diametrically opposed position and higher up the stone (Heslop 2008, fig. 28). Since flat disc querns were operated differently and wore down evenly, there was no functional reason for an additional handle and there is no obvious explanation for the two handles.

3.6 Slag and related high-temperature material *by Lynne Keys*

Introduction and methodology

3.6.1 A very small quantity of material (555g) initially identified as slag was recovered by hand and from soil samples. For this report it was examined by eye and a magnet was used to test for iron-rich material and detect smithing micro-slags in the soil adhering to slags. The material was categorised on the basis of morphology and magnetic properties. Each slag or other material type in each context was weighed except for smithing hearth bottoms, which were individually weighed and measured for statistical purposes. Quantification data and details are given in Table 14.

Discussion of the assemblage

3.6.2 The assemblage consists mainly of tiny fragments from layers and pit and grave fills. The diagnostic slags were tiny micro-slags recovered by sampling; they represent secondary smithing: ordinary hot working of single pieces of iron (which produces hammerscale flakes) and high-temperature welding to join two pieces of iron (small smithing spheres).

3.6.3 Fill 901 of ditch 1014 contained 73g of small undiagnostic slag fragments, many smithing micro-slags (flakes and spheres) and a few iron flakes.

3.6.4 Fill 970 of well 790 also produced smithing micro-slags in the form of many broken hammerscale flakes and occasional tiny spheres, indicative of welding at high temperatures.

3.6.5 Fill 222 of posthole 221, part of structure 1027, contained a significant quantity of broken hammerscale flakes and occasional small smithing spheres as well as some very tiny fragments of abraded undiagnostic slag.

Conclusions

3.6.6 The assemblage represents occasional, possibly one-off, episodes of smithing activity during the Roman period. Whether any of the slag is re-deposited cannot be

determined but its presence in grave fills hints at material being spread about by human activity and disturbance.

Table 14: Summary of slag assemblage

Context	Sample no.	Mesh	Slag type	Weight (g)	Length (mm)	Breadth (mm)	Depth (mm)	Comment
51			undiagnostic	183	100	0	40	incomplete smithing hearth bottom?
55			cinder	5				
108	208	2-0.5mm	sample residue	0.25				heat-magnetised material; includes a few broken hammerscale flakes & some small smithing spheres.
113			iron-rich undiagnostic	7				
176			iron	4				
176			undiagnostic	64				
181			undiagnostic	149				x 1 frag
181			undiagnostic	18				x 1 frag
222	42	2-0.5mm	sample residue	6				lots of broken hammerscale flake, occasional smithing spheres; rest is heat-magnetised natural
222	42	4-2mm	sample residue	1				large hammerscale flake fragment; undiagnostic; heat-magnetised bits.
266			iron-rich cinder	3				
354	82	10-4mm	iron-rich undiagnostic	0.5				
541			vitrified hearth lining	9				
608			vitrified hearth lining	23				iron-rich
698	173	10-4mm	undiagnostic	0.5				slag dribble
732	187	10mm	undiagnostic	7				
901	206	10-4mm	undiagnostic	1				
901	206	10mm	iron-rich undiagnostic	45				one large slag run & one small
901	206	10mm	undiagnostic	20				

901	206	10mm	vitrified hearth lining	3				iron-rich
901	206	2-0.5mm	sample residue	3				lots broken hammerscale flake; tiny spheres; the rest is heat-magnetised material.
901	206	4-2mm	sample residue	0.5				one large hammerscale flake; broken iron flakes; one large sphere.
919	212	> 10mm	iron-rich undiagnostic	1				
919	212	10-4mm	iron-rich undiagnostic	0.5				
919	212		undiagnostic	0.5				
970	214	2-0.5mm	sample residue	0.25				lots tiny broken hammerscale flake; some tiny spheres; the rest is heat-magnetised material.
970	214	4-2mm	hammerscale	0				broken flake
970	214	4-2mm	smithing sphere	0				two medium sized

3.7 Flint *by Geraldine Crann*

3.7.1 Three flints were recovered, comprising a single bladelet core from fill 891 of pit 890, and blades from fill 302 of ditch 1017 and the backfill (433) of grave 434.

4 HUMAN SKELETAL REMAINS

By Lauren McIntyre with Louise Loe

4.1 Introduction and provenance

4.1.1 This report details the results of analysis of 55 articulated inhumation burials, nine contexts containing unburnt disarticulated bone and four contexts containing cremated bone. A total of 54 inhumation burials were found in a cemetery area and dated to the 2nd to 4th century (Phase 2). Of these, 51 skeletons were laid in a supine and extended position within the grave. One skeleton (614) was almost supine, but with the body slightly tilted to the left side, with the left leg flexed and the right leg extended. Burial position could not be determined for two skeletons (497 and 727) because of incompleteness and poor preservation. Most of the graves contained one skeleton. Two graves contained two skeletons each: grave cut 53 contained skeletons 54 and 57, and grave cut 351 contained skeletons 352 and 353.

4.1.2 The remaining burial (794) was buried in a flexed position on top of disused well 790, although the individual had been truncated and disturbed by later activity. This skeleton was radiocarbon dated to cal AD 425–565 (Table 65), making the burial early Anglo-Saxon in date.

4.1.3 Unburnt disarticulated bone was found in four grave fills (37, 583, 989, 993), four ditch fills (fill 122 of ditch 1022; fills 560 and 883 of ditch 1010; fill 962 of ditch 1012) and fill 108 of pit 107. Where bone was found in grave fills, fragments were checked against the appropriate articulated skeleton/s (eg where graves were intercutting) and were found to not belong to an articulated individual. All nine contexts containing disarticulated human bone were phased to Phase 2 (mid to late Roman). The bone from context 108 was radiocarbon dated to cal AD 80–225 (Table 65).

4.1.4 Cremated bone comprised one urned burial (urn SF 297: deposit 669) and small quantities of cremated bone from three other contexts (257, 299 and 983). Urn SF 297 was recovered from a shallow pit (668; up to 0.12m deep). The feature had clearly suffered extensive truncation by ploughing, which probably explains the shallow depth. The pit was cut into natural sandy clay. Contexts 257 and 983 were both grave fills (graves 258 and 984 respectively) found to contain small quantities of cremated bone, co-mingled with the unburnt articulated skeletal remains. Finally, context 299 was the fill of a shallow, earth-cut pit (298; up to 0.18m deep). This feature had suffered extensive truncation by ploughing. All cremated bone dated to the mid to late Roman period (Phase 2).

4.1.5 Osteological analysis of remains aimed to provide information on demographic patterns, physical attributes, dietary practices, the general health of the population and environmental conditions, as well as ascertain the significance and character of the burnt bone deposits. Additionally, isotopic analysis was utilised to determine whether skeleton 794 was local or non-local (ie a migrant).

4.2 Methodology and materials

Articulated inhumation burials

4.2.1 Recording of the unburnt articulated human remains was undertaken with reference to Brickley and McKinley (2004) and Mitchell and Brickley (2017). The articulated skeletons were scored for their condition (Grade 0–5+, after McKinley 2004a, 16), completeness (0–25%, 26–50%, 51–75%, 76–100%) and fragmentation ('low', <25% of the skeleton fragmented, 'medium', 25–75% of the skeleton fragmented, or 'high', >75% fragmented). These scores were then employed to assign overall preservation as either 'good', 'fair' or 'poor' (Tables 15 and 16). The age and sex of each skeleton were estimated where possible, using relevant standards (Brooks and Suchey 1990; Brothwell 1981; Buckberry and Chamberlain 2002; Lovejoy *et al*. 1985; Miles 1962; 2001; Moorrees *et al*. 1963; Scheuer and Black 2000; Fazekas and Kosa 1978; Schwartz 1995; Ferembach *et al.* 1980; Buikstra and Ubelaker 1994; Phenice 1969; Workshop of European Anthropologists 1980). A summary of the age categories used in this study are presented in Table 17. Juveniles were not sexed, as there are currently no accepted macroscopic methods available (Brickley 2004). Standard metrical analysis was carried out and stature was calculated where possible, using regression equations devised by Trotter and Gleser (1952) and revised by Trotter (1970). It was not possible to calculate cranial indices for any of the skeletons. Non-metric traits were systematically recorded for adults with reference to Berry and Berry (1967) and Finnegan (1978). Although non-metric traits were not systematically recorded in juveniles, these were recorded where noted as present. Pathology was recorded and interpreted with reference to standard texts (eg Aufderheide and Rodríguez-Martín 1998; Buikstra 2019).

Table 15: Obtaining preservation score

Surface Condition (McKinley 2004a)	Fragmentation level/value		
	Low (1)	Medium (2)	High (3)
0	1	2	3
1	2	3	4
2	3	4	5
3	4	5	6
4	5	6	7
5/5+	6	7	8

Table 16: Preservation grade

Score	Preservation grade
1	Excellent
2-3	Good
4-5	Fair
6–7	Poor
8	Destroyed

Table 17: Age categories employed

Age category	Age range
Preterm	<37 weeks gestation
Neonate	Birth–1 month
Infant	1 month–1 year
Young child	1–5 years
Older child	6–12 years
Adolescent	13–17 years
Young adult	18–25 years
Prime adult	26–35 years
Middle adult	36–45 years
Mature adult	>45 years
Juvenile unspecified	<18 years
Adult unspecified	>18 years

Unburnt disarticulated bone

4.2.2 Disarticulated bone was also analysed using the above methodology. The minimum number of individuals (MNI) was estimated based on the presence/absence of repeated skeletal elements, the comparative size of the bones (ie adult versus juvenile size), and the presence of fully mature versus unfused skeletal elements (O'Connell 2004, 18). Observations pertaining to age, sex and pathology were made as appropriate.

Cremated bone

4.2.3 Where burnt bone deposits were identified on site, they were subject to whole earth recovery then processed by flotation and wet-sieving, which sorted the material into >10mm, 10–4mm, 4–2mm and 2–0.5mm fractions. Floated residues were retained in a 250µ mesh. Once dried, the extraneous material (eg stones) from the >10mm and 10–4mm fractions was separated from the cremated bone and discarded. All cremated bone was examined in accordance with national guidelines (Brickley and McKinley 2004; McKinley 2004b; 2017).

4.2.4 A 20g sample of the 4–2mm sieve fraction was sorted. An estimation of the total bone weight was calculated for the entire fraction, based on the proportion of cremated bone present in the 20g sample. The estimated weights are included in the total weights presented below.

4.2.5 The smallest fraction sizes (2–0.5mm) were not sorted but were rapidly scanned for identifiable skeletal remains and artefacts. Estimations of the proportions of bone present within the 2–0.5mm fractions were made and recorded in the archive. These are presented below but were not included in the total bone weights.

4.2.6 The burnt bone recovered from contexts 257 and 983 was not identified on site but during the analysis of the articulated inhumations. This was recorded using the methods outlined below.

4.2.7 Analysis of the cremated bone deposits involved recording colour, weight and maximum fragment size. These observations can provide information on factors such as the efficacy of cremation (effectiveness of cremation, ie how well burnt the body was), relative quantity of fuel used, attained temperature within the pyre, length of time over which the cremation took place, degree of bone oxidation, and how well collected the burnt remains were from the pyre site (McKinley 2004b, 10–11). The deposits were examined for the presence of pyre goods but these were absent in all contexts. The weight, and presence or absence of charcoal fuel waste was also considered in order to explore deposit type, ie whether the deposit represented a formal burial or pyre debris.

4.2.8 The deposits were examined for identifiable bone elements and the minimum number of individuals (MNI) was estimated, as described above. Where possible, age, sex, evidence of normal morphological variation and pathological lesions were explored using the same methods outlined above for the examination of unburnt articulated inhumations.

Comparative sites

4.2.9 A range of contemporary or broadly contemporary assemblages was selected for comparison with the assemblage in order to explore observed patterns in demography and pathology within a wider context. They include sites from similar small defended towns in the north of England, and a number from larger, more urbanised settlements around the country (see Table 18). Additionally, average data for Roman Britain (calculated using data from 5716 skeletons from 52 sites, spanning AD 43–410). was considered for comparison, where appropriate, after Roberts and Cox (2003). It should be noted that due to the multitude of different reporting methods and data presentation, some data sets were not directly comparable with that of Chapel Lane. Thus not all sites could be used for all demography/pathology comparisons.

Table 18: Sites used as comparative data

Site	Location	Date range	Site type	No. adult skeletons	No. juvenile skeletons	Reference
A46 Improvement Scheme	Nottinghamshire	Mid 2nd–early 5th centuries	Extramural cemetery assoc. *Margidunum*	15	20	Egging-Dinwiddy and McKinley 2014
Derby Racecourse	Derbyshire	2nd–4th centuries	Extramural cemetery assoc. *Derventio* (Little Chester)	57	12	Wheeler 1985
Bletsoe	Bedfordshire	3rd century	Rural cemetery assoc. villa site	46	10	Dawson 1994
Ancaster	Lincolnshire	Late 3rd–4th centuries	Extramural cemetery assoc. *Causennae* (Ancaster)	182	64	Cox 1989
Elfed Thomas Law School, Newarke Street, Leicester	Leicestershire	4th century	Extramural cemetery assoc. *Ratae Corieltauvorum* (Leicester)	43	11	Cooper 1996
21–33 Newarke Street, Leicester	Leicestershire	4th century	Extramural cemetery assoc. *Ratae Corieltauvorum* (Leicester)	20	10	Derrick 2009
Dunstable	Bedfordshire	Early 4th–early 5th centuries	Extramural cemetery, *Durocobrivae* (Dunstable)	82	30	Matthews 1981
Lankhills, Winchester	Hampshire	3rd–early 5th centuries	Extramural cemetery, *Venta Belgarum* (Winchester)	220	64	Clough and Boyle 2010

4.3 Romano-British articulated inhumation burials

Preservation, fragmentation and completeness

4.3.1 The majority of skeletons in the assemblage were less than 50% complete (75.93%, 41/54; Table 19), with the largest proportion of skeletons less than 25% complete (38.89%, 21/54). Only 5.56% of skeletons were more than 75% complete.

Table 19: Skeletal completeness

Completeness	Number of skeletons	%
0-25%	21	38.89
26-50%	20	37.04
51-75%	10	18.52
76-100%	3	5.56

4.3.2 Fragmentation levels were generally high, with 39.26% of the assemblage being highly fragmented (32/54; Table 20). Only one skeleton (112) exhibited low levels of fragmentation.

Table 20: Level of fragmentation

Fragmentation	n	%
Low	1	1.85
Medium	21	38.89
High	32	59.26

4.3.3 In terms of surface condition (Table 21), no skeletons were assigned to the lowest (0, no erosion) grade (McKinley 2004a, 16). The majority of skeletons (22/54, 40.74%) were assigned to grade 3, meaning that the general morphology of the bones was maintained but the surfaces exhibited moderate degrees of erosion with surface penetration and masking of surface detail by erosive action (ibid.). A further 23 individuals exhibited more extensive surface erosion, consistent with grades 4 (severe erosion affecting all bone surfaces: 19/54, 35.19%) or 5 (heavy erosion across all bone surfaces with some profile modification: 4/54, 7.41%).

Table 21: Surface condition (after McKinley 2014a, 16)

Surface condition	n	%
Grade 0 (no erosion)	0	0
Grade 1	1	1.85
Grade 2	8	14.81
Grade 3	22	40.74
Grade 4	19	35.19
Grade 5	4	7.41

4.3.4 The high levels of fragmentation, combined with the levels of incompleteness and moderate surface erosion meant that the overall preservation scores for the majority of the skeletons were either poor (59.26%, 32/54) or fair (35.19%, 19/54). Three skeletons (5.56%) were in such poor condition that the bone was almost all destroyed. No skeletons exhibited good or excellent preservation (Table 22).

Table 22: Overall preservation

Overall Preservation Grade	n	%
Excellent	0	0
Good	0	0
Fair	19	35.19
Poor	32	59.26
Destroyed	3	5.56

Demography

4.3.5 The assemblage comprised 48 adult skeletons and six juveniles (Fig. 30). Of these, a substantial proportion of the adults (12/48, 25.0%) could not be assigned to a more specific age category due to poor preservation and the absence of diagnostic elements. Of the 36 adults that could be aged more precisely, almost half (17/36, 47.2% of aged adults) were prime adults aged 26–35 years. A large proportion (38.8%, 14/36) were middle adults aged 36–45 years. Only five (13.8%) were young adults aged 18–25 years. No mature adults (>45 years) were present.

4.3.6 Of the six juveniles, the majority were young children aged 1–5 years (4/6, 66.6%). Only one older child (614, aged 6–12 years) and one adolescent (432, aged 13–17 years) were present. There were no neonate or infant individuals.

4.3.7 It was possible to estimate sex for 39 skeletons (Fig. 31). The majority of these were male (21/39, 53.8%). Under a third were female (12/39, 30.8%) and six were of indeterminate sex. Sex could not be determined for nine adults. Thus, the assemblage showed substantial male bias, with a ratio of 1.75 males for every female present, although this difference was not statistically significant (chi2 test, p = <0.05, chi2 value is 2.455, p-value is 0.11719). If individuals of 'possible' sex are removed from the analysis, the sex ratio is still biased at 1.5 males for every female present, although this ratio is only based upon sex determinations for ten individuals (six males, four females).

4.3.8 Males and females had broadly similar patterns of mortality, with the proportion of deaths peaking in the Prime Adult age category (Fig. 32).

4.3.9 Compared with other assemblages (Fig. 33, Table 23) the mortality profile at Chapel Lane is most similar that at Ancaster, with slight mortality peaks in the proportion of young children present, low numbers of older children and adolescents, and a substantial peak in the number of prime adults. Interestingly, while Chapel Lane has a complete absence of neonates and young children, the A46 Improvement Scheme site has substantial numbers of neonate burials. Conversely, the Chapel Lane assemblage has a small number of older children and adolescents, while the A46 Improvement Scheme site has none.

4.3.10 Comparative sex distribution (Fig. 34, Table 24) shows that Chapel Lane has one of the highest proportions of adult males compared to the other assemblages, only being exceeded in terms of male bias by the Ancaster assemblage. Notably, the A46

Improvement Scheme assemblage exhibits female bias, which could be indicative of some sex-based cemetery zoning between here and Chapel Lane, although it should be noted that the number of sexed skeletons in the Margidunum Hinterland assemblage is rather low.

Table 23: Age distribution at Chapel Lane and comparative assemblages (number of skeletons)

Age category	Chapel Lane	A46 Improvement Scheme	Derby Racecourse	Ancaster	Dunstable	Lankhills
Neonate	0	18	1	24	0	7
Infant	0	1	0	6	15	23
Young child	4	0	5	26	0	21
Older child	1	0	5	22	5	8
Adolescent	1	1	3	6	6	9
Young adult	5	2	16	18	17	13
Prime adult	17	4	8	62	25	28
Middle adult	1	4	10	14	27	39
Mature adult	0	1	7	9	0	63
Total	29	31	55	187	95	211

Table 24: Number of sexed adults at Chapel Lane and comparative assemblages (includes skeletons with 'possible' sex estimations)

	Bingham	A46 Improvement Scheme	Derby Racecourse	Bletsoe	Ancaster	Elfed Thomas Law School	Dunstable	Lankhills
Male	21	4	30	25	67	8	36	94
Female	12	7	19	21	31	11	32	94
Total	33	11	49	46	98	19	68	188

Stature

4.3.11 Adult stature is largely governed by genetics, although variation in environmental factors experienced during the period of growth (particularly nutritional and economic status), along with susceptibility to disease and depressed immune systems, can influence final achieved height (Larsen 1997, 13–19). For these reasons, stature is often used as an indicator of physiological stresses encountered by a population (Roberts and Cox 2003, 195).

4.3.12 Stature could be calculated for three male and three female skeletons (Table 25). Numbers are too low to make any meaningful observations.

Table 25: Inter-site comparison of male and female mean stature estimates

Site	Male mean stature (range)	No. males	Female mean stature (range)	No. females
Chapel Lane	171.25cm (164.08–175.41cm)	3	148.66cm (144.58–153.39cm)	3
A46 Improvement Scheme	164cm	1	-	0
Derby Racecourse	169.7cm (161–179cm)	14	157.6cm (152–168cm)	9
Bletsoe	170.3cm (163–183cm)	15	155.8cm (146–169cm)	12
Ancaster	168.49cm (156.6–180.4cm)	87	156.92cm (144.8–169.0cm)	53
Elfed Thomas Law School, Newarke Street, Leicester	171cm (161–177cm)	7	159cm (151–170cm)	9
21–33 Newarke Street, Leicester	167cm (160–176cm)	18	165cm (161–169cm)	2
Dunstable	169.58cm (156–185cm)	38	159.86cm (152–169cm)	29
Lankhills, Winchester	169cm (157–187cm)	38	157cm (148–172cm)	31
Romano-British average (Roberts and Cox 2003, 248)	169cm	-	159cm	-

Post-cranial indices

4.3.13 Platymeric and platycnemic indices are indicators of proximal femur and tibia shaft shape respectively. In the femur, antero-posterior flattening of the shaft is assessed. The index of the femur has increased over time, ie the femur has become more rounded. This may be related to factors such as mechanical stress, squatting and mineral/vitamin deficiencies (Brothwell 1981, 90–91; Waldron 2007, 46). The platymeric index could be calculated for 12 adult skeletons: in eleven cases, the index fell into the platymeric range (index below 84.9; Brothwell 1981, 89), meaning that the femoral shaft was dorsoventrally flattened. The remaining one case was eurymeric (index 85.0–99.9), meaning that the femoral shaft was more rounded. This is consistent with findings from the nearby A46 Improvement Scheme site (Egging-Dinwiddy and McKinley 2014, 154), Newarke Street in Leicester (Derrick 2009, 35), and Lankhills, Winchester (Clough and Boyle 2010, 358).

4.3.14 In the tibia, transverse flattening of the shaft is assessed. Reasons why this may occur include pathological change, muscular action, and persistent squatting (Brothwell 1981, 91; Waldron 2007, 46). The platycnemic index could be calculated for 15 skeletons. Of these, eleven were categorised as eurycnemic (index >70.0), meaning that the tibial shaft was dorsoventrally flattened. The remaining four were mesocnemic (index 63.0 – 69.9), meaning that the tibial shaft was more rounded. This was also the case at Newarke Street and Lankhills (Derrick 2009, 35; Clough and Boyle 2010, 358).

Non-metric traits

4.3.15 Non-metric traits may be the result of genetic inheritance or non-genetic factors such as environmental or mechanical influence (Brothwell and Zakrzewski 2004, 28). They

may be present as localised deficiencies of bone (eg extra blood vessel openings or foramen), or as additional bones (eg wormian bones in the cranial sutures). Traits involving the skull, eg retention of the metopic suture into adulthood, tend to have a more genetic basis (Torgersen 1951a; 1951b; 1954; Sjøvold 1984) and have thus been used to explore familial ties within cemetery populations (Brothwell and Zakrzewski 2004, 28).

4.3.16 A summary of the cranial non-metric traits observed within the Chapel Lane assemblage is presented in Table 26. Only two skulls had the relevant parts surviving for scoring the presence/absence of lambdoid ossicles and ossicle at lambda. In all cases, these traits were present. The most frequently observed trait was the mandibular torus (left = 7/20, 35.0%; right = 9/22, 40.91%). This trait is a bony ridge or series of bony nodules located on the lingual surface of the alveolar margin of the mandible, generally in the premolar region (Hauser and DeStefano 1989; Hassett 2006, 1). Presence and variation in the form of mandibular tori are likely the result of a multi-factorial aetiology influenced by factors such as genetic inheritance, environmental influence and functional stress (Hassett 2006, Auškalnis *et al*. 2015). The next most common trait within the assemblage was the extra-sutural mastoid foramen (left = 7/7, 100%; right = 4.6, 66.7%). The mastoid foramen transmits a vein and a small branch of an artery. The position of this foramen is variable, but it is typically located within the temporo-occipital suture (Gray 1994, 30). The positioning of the foramen is thought to be influenced by genetics (Hauser and DeStefano 1989; Veldmann 2013, 76).

Table 26: Summary of cranial non-metric traits

	No. with trait (unsided)	No. observable (unsided)	No. with trait (L)	No. with trait (R)	No. observable (L)	No. observable (R)	Unsided TPR%	L TPR%	R TPR%
Metopism	1	11					**9.09**		
Ossicle at lambda	1	1					**100.00**		
Lambdoid ossicle			2	1	2	1		**100.00**	**100.00**
Mandibular torus			7	9	20	22		**35.00**	**40.91**
Parietal foramen			4	2	6	6		**66.67**	**33.33**
Accessory infraorbital foramen			1		3			**33.33**	
Absent zygomaticofacial foramen			2	1	19	12		**10.53**	**8.33**
Supraorbital foramen (bridged notch)			6	3	10	7		**60.00**	**42.86**
Accessory supraorbital/frontal foramen			2	3	7	7		**28.57**	**42.86**
Mastoid foramen extrasutural			7	4	7	6		**100.00**	**66.67**

4.3.17 The most frequently observed post-cranial non-metric trait was the double anterior calcaneal facet (left = 7/12, 58.2%; right = 5/15, 33.3%; Table 27). This trait manifests as discrete anterior and middle facets on the superior surface of the calcaneus. Variations in joint surfaces such as this are more likely to be environmentally influenced than genetically controlled (Mays 1998, 110). The most commonly observed trait was the tibial lateral squatting facet (left = 5/6, 83.3%; right = 5/8, 62.5%), a small anterior extension of the distal tibial joint surface caused by habitual extreme movement, ie hyperdorsiflexion at the ankle (Mays 1998, 118). This trait is more likely to develop in individuals who frequently/habitually adopt a squatting position from a young age (Mays 1998, 117–18). The rates observed at Chapel Lane are higher than expected, eg at Lankhills lateral squatting facets were present on 14/246 (5.7%) of left tibiae and 18/242 (7.4%) of right tibiae.

Table 27: Summary of post-cranial non-metric traits

	L affected	R affected	L total	R total	L TPR%	R TPR%
Humerus septal aperture	2		12		16.67	
Pelvis/sacrum accessory sacral facets	1		3		33.33	
Acetabular crease	5		14		35.71	
Femur Allen's fossa		1		8		12.50
Femur Poirier's facet	1	3	6	9	16.67	33.33
Femur third trochanter		1		10		10.00
Femur hypotrochanteric fossa	2	3	11	13	18.18	23.08
Femur exostosis in trochanteric fossa	1		9		11.11	
Patella vastus notch	6	4	16	16	37.50	25.00
Tibia lateral squatting facet	5	5	6	8	83.33	62.50
Talus double inferior anterior facet	3	2	15	14	20.00	14.29
Calcaneus anterior facet absent	1	2	12	16	8.33	12.50
Calcaneus double anterior facet	7	5	12	15	58.33	33.33
Calcaneus peroneal tubercle	1	2	6	10	16.67	20.00

Dental disease

4.3.18 Dental data were available for a total of 45 skeletons (39 adults and six juveniles). A total of 813 permanent teeth and 619 permanent tooth positions/sockets were present. A further 78 permanent teeth were present but were unerupted. Only unerupted teeth that were visible, eg in broken tooth crypts, were recorded. A total of 76 erupted deciduous teeth and 13 deciduous tooth positions/sockets were present.

4.3.19 Dental pathological prevalence rates were calculated separately for adult and juvenile skeletons. These are presented below.

Adult dentitions

4.3.20 Table 28 summarises the crude prevalence rates (CPR) of dental pathological conditions affecting adults (combined data for permanent and deciduous dentitions)

and Table 29 summarises the true prevalence rate (TPR) of dental pathological conditions for permanent and deciduous teeth separately.

Table 28: Adult crude prevalence (CPR%), dental pathology

	Chapel Lane	A46 Improvement Scheme	Ancaster	Lankhills	Average, Roman Britain
Dental calculus	97.44% (38/39)	-	77.47% (141/182)	28.6% (63/186)	26.8% (481/1794, range 0.8–100.0%)
Ante-mortem tooth loss	38.46% (15/39)	14.29% (2/14)	-	44.62% (83/182)	7.5% (248/3319, range not available)
Dental caries	71.79% (28/39)	57.14% (8/14)	82.97% (151/182)	37.7% (83/182)	19.1% (688/3620, range not available)
Enamel hypoplasia	30.77% (12/39)	42.86% (6/14)	10.44% (19/182)	22.7% (50/182)	13.5% (380/2808, range 2.9–58.3%)
Periodontal disease	38.46% (15/39)	14.29% (2/14)	-	32.42% (59/182)	29.3% (698/2381, range 1.6–76.6%)
Periapical cavity	28.21% (11/39)	14.29% (2/14)	-	12.3% (27/182)	11.39% (384/3372, range not available)
Ante-mortem tooth chips	38.46% (15/39)	-	-	-	-
Retention of deciduous teeth in adulthood	5.13% (2/39)	-	-	-	-
Malalignment	5.13% (2/39)	-	-	-	-
Dental overcrowding	2.56% (1/39)	-	-	-	-
Activity related wear	2.56% (1/39)	-	-	-	-
Supernumerary teeth	2.56% (1/39)	-	-	-	-
Peg tooth	2.56% (1/39)	-	-	-	-

Table 29: Adult true prevalence (TPR%), dental pathology

	Chapel Lane perm. teeth	Chapel Lane decid. teeth	*A46 Improvement Scheme* perm. teeth	Derby Racecourse	Bletsoe	Lankhills perm. teeth	Average, Roman Britain
Dental calculus	60.72% (473/779)	100% (2/2)	61.4%	-	-	48.0% (1645/3429)	43.4% (1702/3923, range 13.2–58.5%)
Ante-mortem tooth loss	9.08% (56/617)	0%	5.2%	7.25% (60/828)	19.7% (209/1062)	15.4% (562/3644)	14.1% (5042/35762, range 3.9–36.0%)
Dental caries	11.42% (89/779)	50.0% (1/2)	5.3%	10.56% (70/663)	6.7% (48/711)	5.9% (214/3631)	7.5% (2179/29247, range 3.1–64.5%)
Enamel hypoplasia	3.84% (27/703)	0%	14.0%	-	-	7.3% (295/4005)	9.1% (437/4796, range 5.6–29.0%)
Periodontal disease	16.0% (36/225)	0%	6.1%	-	-	24.0% (871/3631)	-
Periapical cavity	3.89% (24/617)	0%	2.0%	3.68% (24/653)	8.6% (75/874)	-	3.9% (970/24995, range 0.2–26.8%)
Ante-mortem tooth chips	3.21% (25/779)	0%	-	-	-	-	-
Retained deciduous teeth in adulthood	0%	100% (2/2)	-	-	-	-	-
Malalignment	0.26% (2/779)	0%	-	-	-	-	-
Dental overcrowding	0.13% (1/770)	0%	-	-	-	-	-
Activity related wear	0.39% (3/779)	0%	-	-	-	-	-
Supernumerary teeth	0.13% (1/779)	50.0% (1/2)	-	-	-	-	-
Peg teeth	0.13% (1/779)	0%	-	-	-	-	-

TPR data is based on deciduous and permanent tooth data combined unless otherwise stated. Raw data for Margidunum Hinterland not available

Dental caries

4.3.21 Dental caries refers to cavities resulting from the destruction of the enamel, dentine and cement by the acid produced by bacteria in dental plaque (Hillson 1996, 269). Diets high in sugar have a well-established association with acidogenic bacteria and

are therefore a major factor in the formation of caries (Lukacs 1989, 261). Severe caries can cause large cavities, which can lead to dental abscesses and ultimately tooth loss.

4.3.22 A total of 28/39 skeletons (71.79% CPR) had dental caries. This high result is similar to Ancaster (82.97%, 151/182). The condition was observed in 89 permanent teeth (11.42% TPR) and one deciduous (50.0% TPR) tooth. The calculated true prevalence rate of caries in permanent teeth at Chapel Lane was similar to that at Derby Racecourse, but higher than at all other comparative sites considered in this report (Table 29). It was also higher (but within the expected range) than the estimated average for Roman Britain (7.5%, 3.1–64.5%; Roberts and Cox 2003, 132).

Ante-mortem tooth loss (AMTL)

4.3.23 The loss of a tooth before death may result from several factors, including trauma or deliberate extraction, severe periodontal disease secondary to calculus formation, and pulp exposure and abscess formation secondary to caries or severe attrition (Roberts and Manchester 1995, 44–57).

4.3.24 Just over one third of dentate skeletons had lost one or more teeth before death (38.46% CPR, 15/39 skeletons). In terms of true prevalence, AMTL was observed in 56/617 tooth positions (9.08% TPR). Crude prevalence of AMTL is higher than average for Roman Britain (7.5%), although high rates were also observed at Lankhills (44.62% (83/182). True prevalence AMTL fell within the range of rates observed at comparative sites and for Roman Britain.

Dental calculus

4.3.25 Dental calculus is a mineralised plaque deposit. It derives from a combination of plaque fluid, saliva, and micro-organisms associated with plaque deposits that may accumulate on tooth surfaces (Hillson 1996, 254–5). Dental calculus has also been linked to diets high in protein and/or carbohydrates (ibid.) so may, therefore, be an indication of diet, as well as of oral hygiene practices or lack thereof.

4.3.26 Calculus was extremely common in the adult sample, affecting 97.44% (38/39) of observable dentitions. Of the permanent teeth, 60.72% had calculus deposits. Both deciduous teeth were also affected (Table 29). Crude prevalence of calculus was higher at Chapel Lane than at all other comparative sites and also higher than average rates for Roman Britain (26.8%). True prevalence at Chapel Lane and the A46 Improvement Scheme (61.4%) were very similar, which is unsurprising considering these individuals likely derive from the same parent population. This is suggestive of poor oral hygiene amongst the people living in and around Margidunum.

Dental enamel hypoplasia (DEH)

4.3.27 Dental enamel hypoplasia refers to disruption in the formation of tooth enamel, identified as defects on the tooth crowns which appear as lines, pits or grooves. The most commonly cited cause of DEH is systematic metabolic disruption during childhood (Goodman *et al*. 1988). This may develop as a result of (dietary and non-dietary) nutritional deficiency, illness, and even low birth weight (Pindborg 1982; Goodman and Rose 1991; Lewis 2000, 46). In archaeological assemblages, DEH is

generally used as a non-specific indicator of childhood physiological stress (Lewis 2000, 46).

4.3.28 Twelve skeletons exhibited DEH (30.37% CPR). Of the 703 permanent teeth which could be examined for presence of DEH, 27 exhibited defects (3.84% TPR). Lesions affecting the permanent teeth developed between the ages of 1.0 and 9.9 years, with most developing between the ages of three and five years (9/12 skeletons with DEH had lesions which likely developed within this two-year time frame). None of the deciduous teeth retained by adults exhibited DEH.

4.3.29 Compared with other assemblages, the crude prevalence for Chapel Lane was the second highest of all observed rates (Table 28), being only exceeded by that at the A46 Improvement Scheme (42.86%, 6.13). Overall, adult true prevalence was the lowest observed rate (Table 29).

Periodontal disease

4.3.30 Periodontal disease, or periodontitis, is chronic inflammation of any of the periodontal tissues (gums, periodontal ligament and alveolar bone; Hillson 1996, 260). Development of the disease may occur as a result of any combination of several factors, including but not limited to: diet, oral hygiene, genetics, and presence of other dental diseases (ibid.). Irritation and inflammation of the gums resulting from presence of dental calculus is an often cited cause (ibid.).

4.3.31 Periodontal disease affected over a third of the dentate skeletons (15/45; 38.46% CPR). A total of 36/225 (16.0%) permanent tooth sockets which could be observed for periodontal disease were affected. Although the crude prevalence at Chapel Lane was higher than all of the comparative assemblages, it falls well within the range for Roman Britain (1.6–76.6%: Roberts and Cox 2003, 140). True prevalence of periodontal disease at Chapel Lane was more than twice the rate from the A46 Improvement Scheme (6.1%).

Periapical cavity

4.3.32 Periapical cavities are holes at the apex of tooth sockets that arise as a result of inflammation of the dental pulp due to trauma, caries or attrition. They include abscesses, granulomas and cysts, though it is difficult to distinguish between these without soft tissue (Dias and Tayles 1997). Identification of a periapical cavity in archaeological material is often impossible unless radiography, showing translucent, destructive areas at the tooth's apex, is undertaken (Roberts and Manchester 1995, 50). It should be noted, therefore, that the recorded prevalence of periapical cavities is probably an underestimate of the true prevalence.

4.3.33 Eleven skeletons had periapical cavities (28.21% CPR). Only permanent dentitions were affected (24/617 sockets/tooth positions, 3.89% TPR). Crude prevalence of periapical cavity was much higher at Chapel Lane than at either the A46 Improvement Scheme (14.29%) or Lankhills (12.3%). True prevalence was very similar to rates observed at all other comparative sites and very close to the average for Roman Britain (3.9%: Table 29).

Ante-mortem tooth chips

4.3.34 Fifteen skeletons exhibited ante-mortem chipping of the tooth enamel (38.46% CPR). A total of 25 permanent teeth (3.21% TPR%) were chipped. None of the deciduous teeth retained by adults exhibited ante-mortem chips.

Other dental anomalies

4.3.35 Low frequencies of other dental pathological conditions were observed in the dental assemblage. These comprised retained deciduous teeth in adulthood; malalignment; dental overcrowding; activity-related wear; supernumerary teeth and peg teeth.

Juvenile dentitions

4.3.36 Summaries of crude and true prevalence for dental pathological conditions in juveniles are presented in Tables 30 and 31. Limited comparative data were available, from the A46 Improvement Scheme and Lankhills.

Table 30: Juvenile crude prevalence (CPR%), dental pathology

	Chapel Lane	A46 Improvement Scheme	Lankhills
Dental calculus	50.0% (3/6)	-	6.52% (3/46)
Dental caries	33.33% (2/6)	-	10.87% (5/46)
Enamel hypoplasia	50.0% (3/6)	5.56% (1/18)	34.78% (16/46)
Ante-mortem tooth chips	16.67% (1/6)	-	-

Table 31: Juvenile true prevalence (TPR%), dental pathology

	Chapel Lane perm. teeth	Chapel Lane decid. teeth	Lankhills perm. teeth	Lankhills decid. teeth
Dental calculus	50.00% (17/34)	20.27% (15/74)	-	0.70% (5/710)
Dental caries	0%	14.86% (11/74)	0%	1.69% (12/710)
Enamel hypoplasia	0%	6.85% (5/73)	-	-
Ante-mortem tooth chips	2.94% (1/34)	0%	-	-

Dental calculus

4.3.37 Three out of the six dentate juveniles had dental calculus (50.0% CPR), affecting 17/34 permanent teeth (50.0% TPR) and 15/74% deciduous teeth (20.27% TPR). Both crude and true prevalence were much higher than at Lankhills (6.52% CPR; 0.70% TPR deciduous teeth).

Dental caries

4.3.38 Precisely one third of dentate juveniles had dental caries (33.33% CPR, 2/6 skeletons). All of the affected teeth were deciduous (14.86% TPR, 11/74 teeth). Again, both crude and true prevalence of caries in deciduous teeth was higher than observed prevalence at Lankhills (10.87% CPR; 1.69% TPR deciduous teeth).

Dental enamel hypoplasia (DEH)

4.3.39 Half the dentate juveniles had enamel hypoplasia (50.0% CPR, 3/6 skeletons). This was much higher than at both the A46 Improvement Scheme and Lankhills (5.56% and 34.78% respectively).

4.3.40 No permanent teeth were affected by DEH at Chapel Lane. Five of the 73 deciduous teeth had hypoplastic lesions (6.85% TPR). DEH lesions developed between the ages of 40 weeks (around the time of birth) and nine months. No true prevalence data were available from comparative assemblages.

Ante-mortem tooth chipping

4.3.41 One juvenile (432; 16.67% CPR) had ante-mortem tooth chips (2.94% TPR, 1/34 permanent teeth). No comparative data were available.

Skeletal pathology

4.3.42 Pathological lesions are discussed here according to their primary aetiology, broadly classified as traumatic, infectious, circulatory, metabolic, congenital/developmental conditions, neoplastic, joint disease, and miscellaneous pathological conditions.

Traumatic injury

4.3.43 Evidence of both ante-mortem and peri-mortem trauma, and myositis ossificans traumatica were present in the assemblage.

Ante-mortem fracture

4.3.44 Broadly, the term ‘fracture’ refers to any traumatic event resulting in partial or complete bone discontinuity (Redfern and Roberts 2019, 211). Fractures may result from underlying pathology, repeated stress or acute injury (Roberts and Manchester 1995).

4.3.45 Six adults (352, 405, 406, 705, 731 and 1000) had ante-mortem fractures, all of which were healed and well remodelled (12.5% CPR, 6/48 adults). Male skeletons were much more likely to have ante-mortem fractures than females (Table 32). Crude prevalence for Chapel Lane and data from comparative assemblages is summarised in Table 33. The higher incidence of ante-mortem fracture in male skeletons is a pattern borne out by data from all other sites where fracture prevalence according to sex was available.

4.3.46 Fractures involved bones from the hand and leg and were most prevalent among right distal hand phalanges (see Table 34).

4.3.47 Prime adult male 406 had multiple fractures, affecting the right first metacarpal, left tibia and right fibula. It is unclear whether these were sustained during one traumatic event or during separate incidents. Interestingly, the type of fracture observed in the right tibia of skeleton 406 (fracture of the medial malleolus) was also observed in the right tibiae of a further two skeletons: middle adult possible male skeletons 352 and 705. Fracture in this location is typically caused by simultaneous inversion of the foot and adduction of the talus as a result of either a direct blow, an awkward fall, or jumping onto a twisted foot or ankle (Galloway 2013, 285–6).

Table 32: Crude prevalence of ante-mortem trauma according to sex

	Affected	Total	CPR%
M	4	21	19.05
F	1	12	8.33
??	1	6	16.67

Table 33: Crude prevalence of ante-mortem trauma: Bingham and comparative sites

Site	Total CPR%	Male CPR%	Female CPR%
Chapel Lane	12.5 (6/48)	19.05 (4/21)	8.33 (1/12)
A46 Improvement Scheme	6.7 (1/15)	25.0 (1/4)	0 (0/7)
Derby Racecourse	3.5 (2/57)	6.7 (2/30)	0 (0/19)
Ancaster	13.2 (24/182)	25.4 (17/67)	16.1 (5/31)
Elfed Thomas Law School	11.6 (5/43)	-	-
21–33 Newarke Street	3.0 (6/20)	-	-
Dunstable	8.5 (7/82)	13.9 (5/36)	3.1 (1/32)
Lankhills, Winchester	13.7 (39/284)	25.5 (24/94)	13.8 (13/94)

Table 34: True prevalence of ante-mortem fracture by skeletal element

(Adult) skeletal element	Affected	Total	TPR%
R first metacarpal	2	36	5.56
R proximal hand phalanx	1	27	3.70
R distal hand phalanx	1	12	8.33
L tibia	1	43	2.33
R tibia	2	42	4.76
R fibula	1	35	2.86

Peri-mortem sharp force trauma

4.3.48 Fractures occurring at or immediately prior to/post the time of death are referred to as peri-mortem. Peri-mortem trauma in this study was identified by the presence of sharp cut lesions and the absence of periosteal reaction or any other skeletal evidence of healing (Sauer 1998).

4.3.49 Sharp force trauma was observed in one proximal (right?) hand phalanx. The bone was originally bagged during excavation as disarticulated within grave fill 467 (grave 468, containing prime adult probable male skeleton 466). The right hand of skeleton 466 is incomplete and has suffered post-mortem damage, though the shape, size and colour of the isolated phalanx is consistent with the other articulated hand bones from this skeleton. If this phalanx does belong to skeleton 466, the size compared to the existing phalanges suggests it may belong to the third or fourth digit. However, skeleton 466 had suffered some *in situ* truncation and disturbance as a result of ploughing and the presence of a land drain, so while it is possible that the affected phalanx is a disturbed bone from this individual, the possibility of it being an intrusive bone from a second individual cannot be discounted.

4.3.50 The bone was examined macroscopically and also using a hand lens. Approximately ten peri-mortem cuts were present on the dorsal surface of the phalanx, with a further six on the palmar surface (Fig. 35). Further cuts may be visible under a high-powered microscope (not used in this study). No evidence of healing was present, indicating that these cuts were made shortly before or shortly after death. The ten dorsal cuts were located on the central dorsal shaft of the bone, on the medial and lateral sides. All ten were on an approximate medial to lateral orientation, although the longest medial cut was slightly more oblique in orientation. The cuts were all v-shaped in cross-section and very fine (<1mm wide and deep) and ranged from 2.7–7.8mm in length. Two of the cuts to the central dorsal surface exhibited some flaking of the cortical bone surface on the proximal side of the kerf.

4.3.51 The cuts to the palmar side of the bone were all concentrated on the medial side of the proximo-central shaft, in one very localised area, and overlapped with each other on the medial margin of the phalanx in two closely adjacent places. Three cuts were oriented medio-distal to proximo-lateral; the other three were oriented proximo-medial to disto-lateral. The palmar cuts ranged in length from 5.4mm–7.3mm, were v-shaped in cross section, and were the same width as the dorsal cuts. Cut depth was deepest on the medial side of the bone at approximately 0.6mm. The cuts were deepest where they overlapped, suggesting repeated cutting in one small area.

4.3.52 These observed patterns of trauma are consistent with several cuts made to the base of the finger with a fine, sharp blade such as a small knife, around the time of death or shortly after.

Myositis ossificans traumatica (MOT)

4.3.53 In this condition the soft tissue structures of the periosteum, the muscle and its fascial sheaths and/or the tendinous attachment of muscle to bone, ossify into a bony mass as a result of trauma and subsequent haematoma formation (Aufderheide and Rodríguez-Martín 1998, 26).

4.3.54 One skeleton, middle adult probable male 997, exhibited this condition (CPR 2.08%, 1/48 adults; 4.76%, 1/21 adult males). A large, dense, well-circumscribed, sub-oval bony nodule measuring 12.3mm long, 9.2mm wide and 4.5mm thick was present on the inferior left clavicle, at the acromial end of the bone at the attachment site for the trapezoid ligament. No evidence of fracture or other trauma (eg dislocation, subluxion) was present. Direct trauma to the trapezoid muscle (soft tissue trauma) could have resulted in the development of this MOT lesion. Similar low levels of this condition were noted in adult males from Lankhills (3.2% CPR, 3/94).

Infectious disease

4.3.55 Lesions observed in this category include maxillary sinusitis, ectocranial porosity, periostitis, osteitis and osteomyelitis.

Maxillary sinusitis

4.3.56 Maxillary sinusitis refers to inflammation of the mucous membranes of the paranasal sinuses (Aufderheide and Rodríguez-Martín 1998, 257). Symptoms can include nasal congestion, nasal and pharyngeal discharges, facial and dental pain, earache and fever (Evans 1994). The condition is classified as a non-specific inflammatory condition, because it can be caused by a variety of factors that irritate the mucosa, including environmental pollution (indoor and outdoor), exposure to dust or smoke, weather, climate, or exposure to mould or fungus, to name but a few (Honicky *et al*. 1985; McCurdy *et al*. 1996; Howe 1997, 31). Congenital predisposition and systemic susceptibility are other factors in the aetiology of maxillary sinusitis (Lewis *et al*. 1995a, 498–9). In dry bone, maxillary sinusitis presents as pitting or new bone deposits on the surfaces of the maxillary antra (Boocock *et al*. 1995, 486). In the present assemblage, maxillary sinusitis was recorded only where sinuses were observable macroscopically (ie in skulls that had broken post-mortem, rather than intact skulls using radiographic or endoscopic analysis), and therefore presented prevalence should be considered as minimum rates within the population.

4.3.57 Three adult skeletons (prime adult possible female 151, middle adult probable female 331 and prime adult of indeterminate sex 982; CPR: 6.25%; 3/48) had bony changes that were consistent with the presence of maxillary sinusitis. This is higher than the average crude prevalence for Roman Britain (1.8%, 36/2013 skeletons) but is within the given prevalence range for this period (0.7–8.1%: Roberts and Cox 2003, 113). No juvenile skeletons from Chapel Lane were observed with this condition. Furthermore, there was no evidence to suggest that sinusitis may have occurred in relation to dental disease, as can be the case (Abrahams and Glassberg 1996).

4.3.58 True prevalence of maxillary sinusitis at Chapel Lane was 17.65% in the left maxilla (3/17) and 12.5% in the right maxilla (2/16). This is lower than observed true prevalence at Lankhills, where TPR was calculated at 22.5% (18/80) and 30.0% (24/80) for the left and right sides respectively. However, examination of sinuses at Lankhills did involve endoscopy, where an endoscope was used to check unbroken skulls for signs of the disease. This technique was not utilised in the Chapel Lane material, which may explain (in part) the lower prevalence.

Ectocranial porosity

4.3.59 Adult male skeletons 563 and 997 exhibited ectocranial lesions which included increased density and porosity, indicative of healed inflammation. These changes, referred to as 'orange peel lesions' because of their similarity in texture to orange peel (Stirland 2000, 90; 2005, 97), are commonly observed in archaeological populations. They may have resulted from a minor scalp irritation, for example as may be caused by headlice or subaponeurotic haematomas caused by mild trauma such as hair pulling (Shang and Trinkaus 2008, 434). True prevalence rates for each affected skeletal element are presented in Table 35. No comparative data was available.

Table 35: True prevalence of ectocranial porosity

(Adult) skeletal element	No. observed	No. present	TPR%
L parietal	2	37	5.41
R parietal	2	32	6.25
Occipital	1	36	2.78

Periostitis, osteitis and osteomyelitis

4.3.60 Periosteal new bone (or periostitis) is formed as a result of inflammation of the overlying soft tissue (Weston 2012, 492–3) as a response to trauma, metabolic (eg scurvy), neoplastic or infectious disease (Resnick and Niyawama 1995; Roberts 2000, 148). In dry bone, periostitis may be identified as fine pitting, longitudinal striations or plaque-like bone formations on the original cortical surface (Roberts 2019, 288–9). Prevalence and severity of periosteal new bone formation in archaeological populations is generally utilised to infer adaptation or maladaptation to environmental conditions, in particular poor sanitation, malnutrition and general health stressors (Roberts and Manchester 1995, 129–30). Infection may also affect the cortical bone (osteitis) or medullary cavity (osteomyelitis) (ibid., 126). All three of these changes may be observed as a result of tuberculosis, leprosy and syphilis (among others) or, where the pattern of change is non-diagnostic and the pathogen is unknown, non-specific infection.

4.3.61 All three forms of non-specific infection lesion were observed in the Chapel Lane assemblage. Crude prevalence rates are summarised in Table 36. Periostitis was observed in ten adult skeletons (20.83% CPR) and one juvenile (adolescent skeleton 432; 16.67%, 1/6). Of the affected adults, eight were male (skeletons 201, 348, 352, 406, 696, 701, 705 and 1000; 39.1%, 8/21), and two were of indeterminate sex (skeletons 672 and 982; 33.33%, 2/6). Osteitis was observed in two possible male skeletons (701 and 1000; 9.52%, 2/21). Osteomyelitis was only observed in one skeleton, possible male 1000 (4.76%, 1/21). This skeleton was the only individual to exhibit periostitis, osteitis and osteomyelitis. No females had evidence of non-specific infection. Generally, crude prevalence of all three types of non-specific infection were higher at Chapel Lane than elsewhere.

4.3.62 True prevalence of non-specific infectious lesions according to skeletal element are summarised in Table 37. The right tibia was most commonly affected by both periostitis (9.52%, 4/42) and osteomyelitis (2.38%, 1/42). The right tibia was also the

only long bone to be affected by osteitis, although the left and right ilium of the pelvis were equally affected. The tibia is frequently affected by non-specific infectious lesions, those related to inflammation of the periosteum in particular. This may be because the soft tissue layers on the anterior tibia (the 'shin') are very thin, with the surface of the bone being closer to the skin and therefore more susceptible to irritation of the skin (Cox and Mays 2000, 147; Roberts 2019, 289).

Table 36: Crude prevalence of non-specific infectious lesions

		Chapel Lane	A46 Improvement Scheme	Ancaster	Lankhills	Average, Roman Britain
Periostitis	Adult	20.83% (10/48)	6.7% (1/15)	6.0% (11/182)	9.1% (20/220)	-
	Juvenile	16.67% (1/6)	25.0% (5/20)	-	6.3% (4/64)	-
Osteitis	Adults	4.17% (2/48)	-	0.5% (1/182)	-	-
Osteomyelitis	Adults	2.08% (1/48)	-	0%	0.9% (2/220)	0.8% (11/1291, range 0.3-50.0%)

Table 37: True prevalence of non-specific infectious lesions according to lesion type and skeletal element

	Adult skeletal element	No. observed	No. present	TPR%
Periostitis	L maxilla	1	22	4.55
	R maxilla	1	25	4.00
	R mandible	1	29	3.45
	R ribs	5	81	6.17
	L ilium	2	36	5.56
	R ilium	2	38	5.26
	L tibia	2	43	4.65
	R tibia	4	42	9.52
	L fibula	1	38	2.63
	R fibula	3	35	8.57
	L MT1	1	19	5.26
	Juvenile Skeletal Element			
	L rib	1	19	5.26
	Adult Skeletal Element			

Osteitis	L ilium	1	36	2.78
	R ilium	1	38	2.63
	R tibia	1	42	2.38
	Adult Skeletal Element			
Osteomyelitis	R tibia	1	42	2.38

4.3.63 Middle adult possible male skeleton 705 exhibited diffuse periosteal new bone formation. The changes involved multiple skeletal elements, including the left and right ulnae and radii, left patella, and left and right tibiae and fibulae. This pattern of distribution may be indicative of systemic infection. It is not possible to say from these changes alone what the infection was, but it may have been secondary to ante-mortem fracture of the medial malleolus of the right tibia. This fracture was well healed, with evidence of well healed periosteal new bone around the superior part of the fracture line.

Circulatory conditions: osteochondritis dissecans (OD)

4.3.64 Osteochondritis dissecans presents as small pits or porous lesions located on convex joint surfaces (Rogers and Waldron 1995, 29–30). The condition is known to result from traumatic disruption of the articular cartilage (ibid., 28–30). One adult skeleton of unknown sex (453) was noted to have an OD lesion on the inferior aspect of the lateral epicondyle of the left femur. The low CPR of 2.08% is in keeping with the very low expected prevalence of OD in Roman Britain (0.4% CPR; Roberts and Cox 2003, 152).

Metabolic disease

4.3.65 Metabolic disease was present in the Chapel Lane assemblage in the form of cribra orbitalia and one possible case of rickets.

Cribra orbitalia (CO)

4.3.66 Cribra orbitalia manifests as small porous lesions in the orbital roof (Grauer 2019, 515). The exact aetiology of CO is unknown, though it has been linked to a number of conditions including iron deficiency anaemia and infection (ibid., 515; Steckel *et al*. 2006). Additional research has postulated Vitamin B deficiency as a possible cause (Walker *et al.* 2009). However, when only observed macroscopically (as was done for the present analysis) CO is best used only as a general indicator of stress (Steckel *et al*. 2006).

4.3.67 Four adults and one juvenile exhibited CO, comprising one young child (586), one young adult possible male (535), one prime adult male (201), one prime adult female (353) and one middle adult probable male (997). Crude prevalence for juvenile and adult individuals was 16.67% (1/6 juvenile skeletons) and 8.33% (4/48 skeletons) respectively. The adult prevalence is close to rates observed at the A46 Improvement Scheme (13.3%, 2/15 adults), Lankhills (12.1% of adults) and the average value given for Roman Britain by Roberts and Cox (9.64%, 460/4773; 2003, 141). Males at Chapel

Lane were almost twice as likely to exhibit CO lesions as females (male CPR of 14.29% versus female CPR of 8.33%).

4.3.68 The true prevalence of CO for Chapel Lane adults was 11.76% (2/17) and 14.29 (2/14) for left and right orbits respectively. These rates are comparable with those reported for Lankhills (left: 17.3%, 21/121; right: 15.1%, 18/119). The juvenile with CO from Chapel Lane had the only orbit (a left orbit) in the entire juvenile assemblage which could be observed for the condition.

Possible rickets

4.3.69 Rickets occurs in juvenile individuals when inadequate levels of vitamin D are obtained, usually due to lack of exposure to sunlight and/or poor diet (Stuart-Macadam 1989, 206–7; Brickley 2000, 187). Insufficient quantities of vitamin D during childhood makes normal bone mineralisation impossible during growth and development of the skeleton; poor mineralisation can cause symptoms such as bowing of the long bones (as a result of weight being placed on the limbs during normal locomotion), flaring at the metaphyses, distortion of the bones of the pelvis and bossing of the frontal bone (Brickley 2000, 187–8; Brickley and Mays 2019, 540).

4.3.70 One skeleton, prime adult male 406, had possible residual tibial lateral bowing resulting from childhood rickets (2.08% CPR, 1/48 adult skeletons). The observed changes were slight, and radiography would be required to confirm this diagnosis. Evidence of residual rickets was present in the Lankhills assemblage (2/220 adults, 0.9% CPR) and active rickets was present in one infant from the A46 Improvement Scheme (5.0% CPR, 1/20 juveniles). The low prevalence is in keeping with a general low prevalence amongst Roman populations (0.8% average, range 0.3–8.3%: Roberts and Cox 2003, 143).

Congenital/developmental conditions

4.3.71 Three different types of minor congenital/developmental conditions were present in the assemblage, affecting three adult skeletons. Observed conditions were sacralisation and additional thoracic vertebrae. Sacralisation is where the last lumbar vertebra (usually LV5, or where a supernumerary vertebra is present, LV6) is partially or completely incorporated into the sacrum (Aufderheide and Rodriguez-Martin 1998, 65). Additional thoracic vertebrae were recorded as present where a thirteenth thoracic vertebra was present in the spine.

4.3.72 Only one skeleton had sacralisation, prime adult possible female 281. No males were affected. Compared with other sites, the CPR of sacralisation for Chapel Lane (1.85%, 1/54) is lower than Dunstable (2.41%; 2/83) and the Roman average of 2.5%, cited by Roberts and Cox (2003, 117), but higher than Lankhills (1.36%; n/N), the A46 Improvement Scheme (0%; 0/15) and Derby Racecourse (0%; 0/57). The true prevalence of sacralisation was 3.57% (1/28).

4.3.73 The two prime adult male skeletons (348 and 406) had supernumerary vertebrae (3.7% CPR, 2/54). True prevalence was calculated at 1.07% (2/187 thoracic vertebrae). No comparative data was available for the presence of additional vertebrae.

Neoplastic disease

4.3.74 Evidence for two types of benign neoplasm were observed in the Chapel Lane assemblage: button osteoma and vertebral haemangioma.

Button osteomas

4.3.75 Button osteomas are benign primary bone tumours composed of mature lamellar bone and are more frequent in males than females (Aufderheide and Rodríguez-Martin 1998, 375). They are most usually found on the skull, eg frontal and parietals, and whilst they are predominantly found on the outer table they can be located on the inner table (Aufderheide and Rodríguez-Martin 1998, 375; Eshed *et al*. 2002). Osteomas can also be found post-cranially, but less frequently (Aufderheide and Rodríguez-Martin 1998, 375). As these tumours are benign, they do not impact significantly upon health (Roberts and Cox 2003, 280).

4.3.76 Two prime adult skeletons had osteomas (female skeleton 647 and male skeleton 1000: 4.17% CPR, 2/48 adult skeletons). In both cases, lesions were located on the parietal bone. True prevalence in the right parietal was calculated at 3.13%: the second osteoma was located on a fragment of parietal that could not be sided, and thus could not be included in true prevalence rates. Prevalence of button osteomas at Chapel Lane is slightly elevated for the period. Only 1.8% (5/284) of adult skeletons at Lankhills had osteomas. Roberts and Cox (2003, 114) reported that an average of 1.05% (32/3033) of British Roman skeletons were affected in their study.

Vertebral haemangioma

4.3.77 Two vertebral bodies (TV 2–3) from prime adult male skeleton 406 exhibit destruction of much of the trabeculae inside the vertebral body, with the exception of several 'columns' of vertical trabeculae which are thickened (Fig. 36). These are consistent with a diagnosis of vertebral haemengioma, where destruction of trabeculae combined with the thickened vertical trabecular bands is often observed radiographically, known as 'corduroy sign' or 'corduroy cloth' (Hwang 2002; Knipe and Mapes 2019). Most vertebral hemangiomas are located in either the thoracic or lumbar spine (Hwang 2002). They are the most common type of benign spinal neoplasm and are mostly asymptomatic, except where the vertebral body collapses or there is encroachment into the neural canal (ibid.). No examples of vertebral haemangioma were found in the comparative assemblages.

Joint Disease

4.3.78 Lesions indicative of joint disease were observed as follows: osteoarthritis, Schmorl's nodes and diffuse idiopathic skeletal hyperostosis (DISH).

Osteoarthritis

4.3.79 Osteoarthritis (OA) is frequently observed in archaeological human skeletal assemblages (Aufderheide and Rodríguez-Martín 1998, 95). It is a chronic, progressive and non-inflammatory disease that can affect any synovial joint of the skeleton, and is usually associated with progressive age (Rogers and Waldron 1995, 32; Aufderheide and Rodríguez-Martín 1998, 93; Waldron 2019, 720). OA was diagnosed by the

presence of joints with eburnation or at least two other joint changes, including joint surface pitting, presence of osteophytes and bony contour change (Rogers and Waldron 1995, 44).

4.3.80 A total of five adults (skeletons 352, 406, 535, 581 and 731: CPR 10.42%; 5/48) exhibited joints changes indicative of spinal OA. This is higher than the 7.1% average for Roman Britain (405/3111 skeletons; Roberts and Cox 2003, 145). No juveniles or adult females from Chapel Lane were affected. Almost a fifth (19.05%; 4/21) of adult males had the condition. One affected skeleton was unsexed (skeleton 731). A similar pattern was observed at the A46 Improvement Scheme, where the crude prevalence was 25% (1/4) among males and 0% (0/7) among females. Unlike Chapel Lane and the A46 Improvement Scheme, at Lankhills the condition had similar prevalence among females (7.45%; 7/94) and males (8.51%; 8/94).

4.3.81 In terms of ages, one young adult skeleton (535), one prime adult (406), two middle adults (352 and 581) and one adult of unspecified age (731) were affected. Prevalence was not calculated per age bracket because of the low sample size in each age category.

4.3.82 Both the cervical and thoracic vertebrae were affected. OA was most common in the cervical spine (10.97% TPR, 7/68 cervical vertebrae). This is slightly unusual, as spinal OA is typically more prevalent in the lumbar region (Spencer Larsen 2015, 195). The distribution of OA throughout the spine differed between Chapel Lane and Lankhills (the only other site with comparable data), with OA at Lankhills being more common in the thoracic spine (Clough and Boyle 2010, 379). It was also noted that female skeletons from Lankhills were more likely than males to exhibit spinal osteoarthritis in the cervical vertebrae: this may be indicative of differential activity patterns between the sexes (ibid, 379).

4.3.83 A total of 14 adults (29.17% CPR, 14/48 adult skeletons) had extra-spinal OA, which is much higher than the average CPR (8.4%) reported for Roman sites by Roberts and Cox (2003, 145). Of those affected, nine were male (skeletons 201, 352, 406, 524, 535, 563, 705, 986 and 997: 42.86% CPR; 9/21) two were female (skeletons 198 and 353: 16.67% CPR; 2/12) and three were of indeterminate sex (skeletons 552, 672 and 731: 50.0% CPR; 3/6). Again, no juveniles were affected by this condition. A higher prevalence of the disease among males was also observed at the A46 Improvement Scheme and Lankhills, where 25% (1/4) and 62.5% (15/24) of males respectively, and 0% (0/7) and 33.3% (8/24) of females respectively had the condition.

4.3.84 In keeping with the age progressive nature of the disease, one young adult skeleton (535), four prime adults (skeletons 201, 353, 406 and 563), seven middle adults (skeletons 198, 352, 524, 672, 705, 986 and 997) and two adults of unspecified age (skeletons 552 and 731) were affected.

4.3.85 The left and right acromio-clavicular joints were the most frequently affected extra-spinal locations (Table 38). Osteoarthritis tends to occur in this location as a result of progressive age related wear and tear (Petersson 1983; Roberts and Manchester 1995, 114; Burgener 2006, 132), although in the present assemblage, the high prevalence is

likely influenced by the small sample size. The left wrist and hand were the next most frequently affected locations.

Table 38: True prevalence of extra-spinal osteoarthritis by joint

Joint	Affected	Total	TPR%
L Acromio-clavicular	1	6	16.67
R Acromioclavicular	1	6	16.67
L Sternoclavicular	1	9	11.11
R Sternoclavicular	1	11	9.09
L Wrist	3	25	12.00
L Hand	3	25	12.00
R Hand	3	31	9.68
L Hip	2	32	6.25
R Hip	3	38	7.89
L Ankle	2	34	5.88
R Ankle	2	34	5.88
R Foot	1	27	3.70

4.3.86 There was one case of osteoarthritis secondary to trauma. Skeleton 731 (an adult of unspecified age and indeterminate sex) had a well healed comminuted fracture involving the distal phalanx of the right first digit of the hand (thumb). Osteoarthritis was present on the proximal end of this distal phalanx and on the distal right first metacarpal. Comminuted fractures in this location are typically the result of trapping the end of the finger between two solid surfaces (Galloway 2013, 241).

Schmorl's nodes

4.3.87 Schmorl's nodes are visible as indentations on the superior and/or inferior surfaces of vertebral bodies, with the lesions representing sites of herniation in the intervertebral disc material through the vertebral body end plates (Rogers 2000, 169–70). These are likely to form as a result of the combination of activity related stresses placed on the vertebrae and intervertebral disc, and developmental factors associated with vertebral formation and growth in early life (Dar *et al.* 2010, 675).

4.3.88 Seven adults had Schmorl's nodes (skeletons 151, 331, 348, 360, 535, 629 and 997; 14.58% CPR, 7/48 adults). No juvenile skeletons were affected. The condition was more prevalent in females (25%; 3/12) than males (19%;4/21). It was also more prevalent in the young adult (40%; 2/5) and middle adult (14%; 2/14) age categories, than the prime adult (11.76%; 2/17) and unspecified adult age categories (8.3%; 1/12). Compared with elsewhere, a higher prevalence among females (14.9%; 1/7) than males (0%; 0/4) was also observed at the A46 Improvement Scheme, but at Lankhills more males (62.2%; 23/37) than females (32.4%; 12/37) were affected. The overall CPR at Chapel Lane is higher than the national average cited by Roberts and Cox (2003, 147) of 8.9% (range: 0.2–36.9%).

4.3.89 Schmorl's nodes were most common in the lumbar spine (14/90 lumbar vertebrae, 15.56% TPR). This is consistent with the observation that the condition is more

common in the lower thoracic and lumbar vertebrae than elsewhere in the spine (McNaught 2006, 53). A smaller proportion were observed in the thoracic spine (21/187 thoracic vertebrae, 11.23% TPR). Schmorl's nodes were absent in the cervical and sacral vertebrae.

Diffuse idiopathic skeletal hyperostosis (DISH)

4.3.90 In this disease, the anterior longitudinal spinal ligament ossifies and the vertebral bodies fuse together causing a deformation of the spine that has the appearance of dripped candle wax (Rogers and Waldron 1995). New bone formation on the rest of the skeleton, at the sites of tendon and ligament insertions (enthesophytes) and around the margins of joints (osteophytes), and calcified soft tissues, such as blood vessels and cartilage, are also seen in this condition. DISH tends to affect older males and it has been suggested that there is an association between the condition and mature-onset (Type II) diabetes and obesity (Rogers and Waldron 2001, 359).

4.3.91 A possible case of DISH was observed in middle adult possible male skeleton 524. In this case, 'candle wax' ligament ossification and severe lipping were observed down the right hand side of the lower thoracic spine, in keeping with ossification of the anterior longitudinal spinal ligament. The lipping between the 10th and 11th thoracic vertebrae appears to have been fused during life, but then broken post-mortem. The 8th– 9th and 11th–12th thoracic vertebrae similarly appear to have been fused or at least close to fusing, the extent of post-mortem damage (abrasion and fragmentation) precluding conclusive observation. In the remaining thoracic and cervical spine, lumbar spine and first sacral vertebra, severe marginal osteophytosis was also observed on left and right sides of the vertebral bodies. Together, these changes were classified as a probable case of (early) DISH, giving a crude prevalence of 1.58% (1/54). This prevalence is in keeping with the period average (1.3%, 23/1819; Roberts and Cox 2003, 139) and comparative sites considered in this report (for example, Lankhills 3.5%, 3/85).

Miscellaneous pathology

4.3.92 Five skeletons exhibited lesions classified here as miscellaneous because they do not fit within any of the aforementioned categories. The lesions included hyperostosis frontalis interna and plastic deformation.

Hyperostosis frontalis interna (HFI)

4.3.93 Four skeletons (198, 405, 647 and 696: 8.33% CPR, 4/48 adults) exhibited dense, nodular new bone deposits and/or slight thickening of the endocranial surface of the frontal bone, consistent with a diagnosis of hyperostosis frontalis interna. This condition is normally associated with older females and may be linked to change in pituitary hormones, although males can also be affected (Aufderheide and Rodríguez-Martin 1998, 418; Brickley and Mays 2019, 561).

4.3.94 Of the four affected skeletons, three were females or possible females (198, 405 and 647; 25.0%, 4/12), and one was a possible male (696; 4.76%, 1/21). One case of HFI was found in a female skeleton at the A46 Improvement Scheme, and five cases (four female and one male) were present at Lankhills.

Plastic deformation

4.3.95 All of the left and right metatarsals of middle adult possible male 352 exhibited abnormal medial curvature. This was more pronounced at the distal ends of the metatarsals, and most exaggerated in the fourth and fifth metatarsal. The precise cause of this is unknown, possible causes including localised trauma (with lack of involvement of rest of foot, though note that there is no remodelling/callus), developmental abnormality, and cultural modification (although this is typical for this period and culture). Cultural modification of the foot bones is most often seen in later periods, for example in medieval Britain where individuals develop changes in the feet such as hallux valgus (bunions) in relation to habitual wearing of tight/pointed shoes (Mays 2005). Deformity also occurs in cultures where foot binding is practised (Cummings *et al*. 1997).

Undiagnosed pathology/bony abnormality

4.3.96 Undiagnosed pathology/bony abnormality was observed in thirteen skeletons and is summarised in Table 39. Full details are recorded in the archive.

Table 39: Summary of undiagnosed pathological changes in articulated inhumation burials

SK	Age category	Sex	Affected bone	Summary	Possible diagnosis
198	Middle adult	??Female	R Femur	Increased new bone R femur in region of greater trochanter	Pathological? Or robust muscle attachment sites?
201	Prime adult	Male	R Femur	Elongation of the femoral head and some (likely associated) change to the acetabulum. (OA present in this joint)	Congenital deformity/abnormality? Mild hip dysplasia? Or just OA
281	Prime adult	??Female	Cranial vault	Unusual lamination of the cranial vault in three unsided fragments of parietal.	Sickle-cell anaemia? Soft tissue calcification?
352	Middle adult	??Male	CV	Oval shaped lesion	Space occupying lesion? Joint cyst? Tumour?
			L Carpal	Oval shaped lesion located on the lateral side of the lunate	
			R Radius	Large, rounded lesion inside the metaphysis of the distal R radius.	
			R Ulna	Large, rounded lesion	
			L Patella	Bony projection observed on the lateral side of the anterior L patella	Fibrocartilagenous connection point? OA/pseudoarthrosis? Ossified haematoma?

353	Prime adult	Female	TV body	Enlarged basivertebral foramen in 11 observed thoracic vertebrae	Epidural Venous Plexus Engorgement?
			LV body	Enlarged basivertebral foramen in the first to fourth lumbar vertebrae.	
405	Middle adult	Female	R Metatarsal	Erosive lesions observed on the medial joint surface of right fourth metatarsal and medial joint surface of right fifth metatarsal.	Early stages of an erosive arthropathy?
			L Metatarsal	Erosive lesion observed on the medial joint surface of fifth metatarsal.	
406	Prime adult	Male	CV	Unusual lytic lesion observed in the right superior articular facet of second cervical vertebra.	Unusual presentation of osteochondritis dissecans?
535	Young adult	?Male	L & R Tarsals	Possible displacement of L&R naviculae, and subsequent changes to the talonavicular joint surface.	Developmental anomaly? Normal variation with OA? Well healed trauma?
539	Young adult	??Male	Cranial vault	Noticeably thickened cranial vault	Normal variation in skull thickness? HFI?
647	Prime adult (26-35 yrs)	??Female	Cranial vault	Asymmetrical ear ossicles.	Developmental?
696	Adult unspecified (>18 yrs)	??Male	L & R Innominate	Large rounded lesions on the posterior ilium	Space occupying lesions? Joint cysts? .
988	Adult unspecified (>18 yrs)	Not recordable	L Metatarsal	Dense bony plaques present on the dorsal and plantar aspect of the left fourth metatarsal shaft.	Remodelled periostitis? Ulceration?
			R Metatarsal	Dense bony plaque present on the medial aspect of the right third metatarsal midshaft.	
			L Foot phalanx	Dense bony plaques present on the superior aspect of one left proximal foot phalanx.	
1000	Prime adult	??Male	Unsided metatarsal	Thickened bone plaques present on the plantar and lateral sides of 1x unsided metatarsal shaft.	Remodelled periostitis? Ulceration?

4.4 Unburnt disarticulated bone

4.4.1 Unburnt disarticulated bone was recovered from nine contexts (37, 108, 122, 560, 583, 883, 962, 989 and 993). These are summarised in Table 40. A minimum number of nine individuals was present, based on the number of discrete deposits and non-repeated skeletal elements. These comprised three juveniles and six adults. Of the juveniles, one was possibly a neonate, one an infant, and the third either an infant or young child. Age could not be determined for any of the adults, but one of the individuals (from fill 560 of ditch 559) was possibly female. Fragments from this individual also exhibited the only pathological lesions observed in the disarticulated remains: marginal osteophytes. Full details are recorded in the archive.

4.4.2 A left femur (from fill 108 of pit 107) exhibited evidence of probable anthropogenic and faunal modification (Fig. 37). At least five fine, short, v-shaped striations were located on the antero-lateral side of the midshaft, oriented in either a medial-lateral or infero-medial to proximo-lateral direction. There were also multiple fine striations on the posterior aspect of the distal shaft. The same bone also exhibited multiple broad, shallow pits around both ends of the bone, consistent with canid tooth marks (Loe and Cox 2005, 16). In addition, multiple broad, u-shaped striations were present on the medial and lateral aspects of the proximal and distal shaft, mostly oriented perpendicularly to the long axis of the bone. These may represent tooth scores or claw marks made during manipulation of the bone by an animal (O'Sullivan 2001, 34). However, the possibility that these are tracks made by root activity cannot be ruled out. Overall, the striations are consistent with deliberate cutting with either a stone or metal tool and the tooth pits and tooth scores are consistent with carnivore gnawing (Loe and Cox 2005, 15).

Table 40: Summary of disarticulated unburnt bone

Fill	Feature	Context	Surface preservation (McKinley 2004a, 16)	Skeletal elements	Age?	Sex?	Pathology?	Dentition?	MNI	Comments
37	38	In grave fill associated with SK 36, but SK 36 has a full dentition.	2	2x unid skull fragments (Temporal? Sphenoid??).	Adult	U	-	1x right maxillary canine, 1x left maxillary second premolar (medium carious lesion, distal side) and left maxillary first molar. 1x L mandibular first and second molar.	1	-
108	107	Fill of pit 107	1	2x fragments of L femur (same element)	Adult	U	N	N	1	Anthropogenic modification observed on both fragments, comprising approx. At least 6x sharp force cut marks. Also 8x rounded tooth pits and numerous u-shaped shallow striations – faunal, e.g. canid gnawing
122	1022	Fill of ditch 1022	1	1x juvenile distal R humerus. Incomplete.	Juvenile, neonate?	U	N	N	1	-

560	559	Fill of ditch 559	2	2x frags of L pelvis/acetabulum (same element)	Adult	F??	Marginal osteophytes	-	1	-
583	584	In grave fill associated with SK 581, recovered from sample 140	2	Right cuboid and medial cuneiform, 1x distal phalanx for left great toe and 1x further distal foot phalanx (unsided). Poss belongs to SK 527 but unconfirmed.	Adult	U	-	-	1	-
883	1010	Fill of ditch 1010	5	1x R distal humerus shaft	Adult	U	N	N	1	-
962	1012	Fill of ditch 1012	1	2x fragments unfused ulna, proximal shaft and distal shaft. Also 2x unid fragments - part of same bone, broken segment?? Incomplete.	Juvenile - infant? Young child?	U	N	N	1	-
989	990	In grave fill associated with SK 988. Bagged up on site with 2x hand phalanges from SK 988.	2	1x juvenile long bone shaft. Cross section suggests maybe ulna, but unclear. No metaphyseal ends. Not femur/tibia/fibula/radius. Outside chance humerus, but thicker end is too round in cross section?	Juvenile. Infant?	U	-	-	1	-
993	994	In grave fill associated with SK 992	n/a	-	Adult	U	-	1x left maxillary second molar (small distal carious lesion). 1x left maxillary first incisor, 1x right mandibular second incisor	1	-

								(slight calculus). 1x maxillary third molar (unsided, slight calculus.)		

4.5 Cremated bone

4.5.1 A summary of the osteological findings is presented in Table 41. Cremated bone from contexts 257 and 299 could not be identified in terms of species (ie whether the bone is animal or human) and therefore these contexts will not be discussed in this report.

Table 41: Cremated bone, osteological summary

Feature	Deposit	Total weight	Colour	MNI	Age	Sex	Non-metrics/ pathology/ other comments
984	983	2.1g	White 100%	1	Adult >18 yrs	U	Pale green staining on both sides of the fragment (very light surface staining). Has been in contact with a Cu object?
258	257	0.1g	White 100%	-	-	-	Unidentified species: animal or human?
298	299	-	White 100%	-	-	-	Unidentified species: animal or human?
670	669	232.3g*	White 60%, grey 25%, blue 5%, black 10%	1	Adult >18 yrs	M??	1x supra-orbital accessory foramen (unsided)

Key: U = Unknown, M?? = possible male. * denotes inclusion of estimated bone weights

Bone weights

4.5.2 A summary of bone weights is presented in Tables 42 and 43.

4.5.3 Cremated bone from urn 297 in cremation burial 670 (deposit 669) weighed a total of 232.2g, comprising 222.2g of cremated bone from inside urn 297 (sample 180) and 10.1g from soil immediately around the urn (sample 168). This falls below the weight range cited by McKinley (2013, 154) for archaeologically recovered cremation burials (600–900g). This is unsurprising, as the feature was very shallow (only 0.12m deep) as a result of plough-truncation. It is unclear how much bone has been lost from the original deposit weight as a result of this later truncation.

4.5.4 Cremated bone from deposit 983 weighed 2.1g. This is an extremely low weight.

Table 42: Deposit 983 – summary of bone weights

	Skeletal element (g)								
	Skull	Axial	Upper limb	Lower limb	Unid. long bone	Unid. hand/foot	Unid. joint surface	Unid. other	Total
Total	0g (0%)	0g (0%)	0g (0%)	0g (0%)	2.1g (100%)	0g (0%)	0g (0%)	0g (0%)	2.1g (100%)

Table 43: Cremation burial 668 (deposit 669) – summary of bone weights

	Skeletal element (g)								
Sample	**Skull**	**Axial**	**Upper limb**	**Lower limb**	**Unid. long bone**	**Unid. hand/foot**	**Unid. joint surface**	**Unid. other**	**Total**
168	0.2	0	0	0	0.4	0	0	9.4*	10.1g* (4.3%)
180	44.9	1.0	2.8	7.1	24.0	1.3	4.7	136.4*	222.2g* (95.7%)
Total	45.1g (19.4%)	1.0g (0.4%)	2.8g (1.2%)	7.1g (3.1%)	24.4g (10.5%)	1.3g (0.6%)	4.7g (2.0%)	145.8g* (62.8%)	232.3g* (100%)

Note: where indicated with *, includes estimated weights from the 4-2mm fractions

Fragmentation

4.5.5 A summary of fragmentation is presented in Table 44. The largest bone fragment measured 25.5mm (a fragment of cranial vault from sample 180, context 669). The largest proportion of bone fragments from context 669 came from the 10–4mm sieve fraction (49.4%), although almost a third of bone also came from the 4–2mm fraction (31.9%; Table 45). A moderate proportion of cremated bone was also present in the 2–0.5mm residue from sample 180 (Table 46), although the total weight of this could not be estimated.

4.5.6 Only one cremated bone fragment was present in context 983 (a fragment of unidentified long bone), from the >10mm sieve fraction.

Table 44: Summary of fragmentation

Context	Total weight	>10mm	10-4mm	4-2mm	Max. frag. size
983	2.1g	2.1g	0g	0g	15.6mm; unid. long bone (femur?)
669	232.3g	43.5g	114.7g	74.1g	25.5mm; cranial vault

Note: Where indicated with *, includes estimated weights from the 4-2mm fractions

Table 45: Cremation burial 670, summary of 4–2mm fraction

Context	Sample	Material	Total 4-2mm fraction weight	Weight from sorted 20g sample	Proportional bone content of 20g sample	Estimated bone weight for total 4–2mm fraction
669	168	Cremated bone	470.7g	0.4g	2%	9.4g
	180	Cremated bone	82.9	15.6g	78%	64.7g

Table 46: Cremation burial 670, 2–0.5mm fraction proportional bone content

Context	Sample	Total 2–0.5mm fraction weight	% cremated bone (based on visual assessment)
983	-	0g	-
669	168	1247.0g	<5%

	180	75.4g	40%

Skeletal representation

4.5.7 A summary of skeletal representation is presented in Tables 42 and 43. Of the identified fragments from context 669, bone from the skull was most frequently observed (45.1g/19.4% of the total bone weight). A high proportion of skull fragments is a pattern often noted during cremation analysis, as the skull vault is more easily identified than other bones, even within the smaller fractions. Bone fragments from the axial skeleton and upper and lower limbs were also identified in smaller proportions.

4.5.8 The majority of bone from deposit 669 was unidentified, eg from unidentified long bones (24.4g; 10.5%). Very small proportions of bone were from the hands and feet (1.3g; 0.6%), or joint surfaces (4.7g; 2.0%). However, most of the unidentified bone could not be assigned to a skeletal region (145.8g; 62.8%). Most of the unidentified bone was from the 10–4mm and 4–2mm fractions. This is unsurprising, given that the majority of bone from this deposit was from these two fractions, and highly fragmented.

4.5.9 The cremated bone from context 983 comprised one fragment of unidentified long bone. The thickness and curvature of the fragment suggests that this may be femoral shaft, although the overall size of the fragment combined with the potential for warping of the bone during the burning process means that it was not possible to confirm this beyond reasonable doubt.

Efficiency of cremation

4.5.10 Approximately 60% of the bone from 669 was white in colour (Table 41). White bone fragments are indicative of a generally efficient cremation process, with bones being burnt at a temperature in excess of 600°C (McKinley 2006, 84), and in a location on the pyre where maximum and consistent heat and oxygen supply were available (McKinley 2013, 158). The fragment of cremated bone from context 983 was also white in colour.

4.5.11 Smaller proportions of bone from 669 were coloured grey/blue and black (Table 41). Black colouration of the bone occurs at temperatures up to 300˚C (McKinley 2004b, 11). Grey/blue colouration occurs between 300–600°C, indicating that the bone is incompletely oxidised (Ibid.). Cremation of the bone may be inhibited where the overlaying soft tissues are thicker; until these are removed, the bone is insulated from oxygen and the heat of the fire (McKinley 1989, 65; 2013, 158). This can lead to variation in the degree of bone oxidation across the skeleton (ibid.). No pattern of burning and charring was observed across the identified skeletal elements. However, the observed variation in bone fragment colouration suggests that while some parts of the corpse were in an optimum position on the pyre, others were placed in a position where oxygen flow and heat were inconsistent or limited, perhaps due to environmental factors (eg poor weather, insufficient fuel quality of quantity) or because the corpse was placed in a position on the pyre that impeded heat and oxygen to these anatomical areas.

Demography

4.5.12 A minimum number of two individuals were present in the assemblage, based upon the number of discrete deposits and the non-repetition of observable, identifiable, skeletal elements in each deposit (Buikstra and Ubelaker 1994).

4.5.13 Osteological indicators of age were very limited. The size and morphology of the identified bone fragments from both contexts were in keeping with those of adults, aged over 18 years (Scheuer and Black 2000).

4.5.14 Sex estimation methods must be employed with caution to burnt human bone. In unburnt adult skeletons, typical accuracy for sex assessment from morphological traits is 90–95% when using the pelvis, and 80% when using the skull (Krogman and Işcan 1986). Therefore, sexual dimorphism in the cranium is more variable than in the pelvis, and sex determination more accurate when utilising multiple traits, preferably from the pelvic bones. When applying these observations to burnt material, there is the added complication of potential for bone shrinkage and warping as a result of dehydration, which may influence the size and morphology of sexually dimorphic traits.

4.5.15 One sexually dimorphic cranial trait (the orbital margin) was observable, in the 10–4mm fraction of context 669 (sample 180). The rounded shape of the orbital margin fragment was in keeping with that of a male individual. As this was the only trait available, and considering the above points, the estimation is very tentative.

Non-metric traits and pathology

4.5.16 One example of a non-metric trait was observed, in context 669 (sample 180). One fragment of unsided frontal bone exhibited an accessory supra-orbital foramen. This trait likely has a genetic aetiology (Hauser and DeStefano 1989; Veldman 2013, 75).

4.5.17 No evidence of pathological lesions was present in either context.

Bone fragment staining

4.5.18 Pale green surface staining was observed on both sides of the unidentified long bone fragment from context 983. Green staining on bone fragments is typically indicative of contact with copper or copper alloy objects (Dupras and Schultz 2013, 327). No copper or copper alloy objects were found within this context. However, the fact that staining was observed on both sides of the cremated fragment and has not suffered discoloration indicates that the bone fragment came into contact with copper after burning. Either contact ceased prior to burial or the copper object was completely destroyed as a result of normal decomposition processes in the grave after deposition.

4.5.19 No staining was observed on cremated bone fragments from context 669.

4.6 Skeleton 794

4.6.1 Skeleton 794 was 50% complete. Bones from the skull, left and right arms and hands, ribs, spine, left and right legs and feet were all represented, although many of these were fragmented and incomplete. The pelvis and lumbar spine were absent. Bone

surface condition was scored as grade 2 (more extensive surface erosion with deeper surface penetration; McKinley 2004a, 16) and fragmentation was medium. Overall preservation was therefore deemed to be fair.

4.6.2 The skeleton was judged to be of adolescent age (13–17 years), based on epiphyseal fusion, dental development and dental eruption (Moorees *et al*. 1963; Workshop of European Anthropologists 1980; Scheuer and Black 2000). Stature was not calculated because none of the long bones were sufficiently complete or fully fused.

4.6.3 Several non-metric traits were observed, comprising bilateral lambdoid ossicles, bilateral maxillary torus, accessory supraorbital foramen on the left side of the frontal bone, and bilateral double anterior facet in the calcaneus.

4.6.4 A total of 29 permanent teeth and 32 tooth positions/sockets were present. Dental calculus was observed on 23 teeth. Periodontal disease affected one socket.

4.6.5 Several examples of skeletal pathology were observed. Cribra orbitalia was present in both orbits (grade 3, large and small isolated foramina: Stuart-Macadam 1991). In addition, the sixth and seventh cervical vertebrae were fused, on the left lateral and posterior sides of the body. The neural arches, apophyseal joints and spinous processes were still separate, and disc space between the bodies was retained. An absence of evidence for traumatic injury meant that this fusion is likely to result from a minor congenital/developmental abnormality.

4.6.6 The most notable observation pertaining to this skeleton was the presence of substantial evidence for infectious disease. Active new woven bone (periostitis) was observed on the superior side of the maxillary palate, just posterior to the inferior margin of the nasal aperture, as well as on both femoral and tibial shafts, and one unsided fragment of fibula shaft. Thickened trabeculae and cortical bone with increased porosity was also observed in the (post-mortem) broken cross-sections of all five affected long bones, indicating the presence of deeper bone infection: the absence of cloacae suggests a diagnosis of osteitis (non-specific infection of the bone cortex).

4.6.7 Further lesions were observed in the facial region (Fig. 38). Despite some taphonomic abrasion, the margins of the nasal aperture were rounded and eroded/reabsorbed both inferiorly and around the sides of the aperture. Increased abnormal vascularity was apparent on the inferior and superior sides of the palate in the left and right sides of the maxilla. It should be noted that the observed oral porosity was compared to skeletons from the same site, not affected by oral disease, in order to rule out the possibility these were caused by normal variation. In addition, the aforementioned periosteal new woven bone was present in the right superior surface of the palate (just posterior to the margin of the inferior nasal aperture). Lytic lesions were also present in this area. These changes are consistent rhinomaxillary syndrome bone changes associated with a diagnosis of leprosy (Moller-Christensen 1953; 1961; Anderson and Manchester 1992; Lewis *et al*. 1995b; Lee and Manchester 2008).

4.6.8 Several other pathognomic changes, besides rhinomaxiallary syndrome, are also associated with leprosy, of which reabsorption of the alveolar process and intranasal structures and ante-mortem loss of the anterior teeth are some (Moller-Christensen

1953; 1961; Lewis *et al*. 1995b; Anderson and Manchester 1992; Lee and Manchester 2008; Roberts and Buikstra 2019, 365). However, it was not possible to observe these because the relevant skeletal elements were absent or incomplete. Leprous changes may also occur in the bones of the extremities (metacarpals, metatarsals and hand/foot phalanges; Roberts and Buikstra 2019, 367); where these bones were present, they were unaffected. Additionally, chronic secondary infection (eg in the form of periostitis) is a common observation in the long bones of leprous individuals, most commonly affecting the tibiae and fibulae bilaterally and symmetrically (Aufderheide and Rodriguez-Martin 1998, 154; Lee and Manchester 2008; Roberts and Buikstra 2019, 367). Furthermore, studies of leprous skeletal remains often find a high prevalence of cribra orbitalia, although it is unclear whether such lesions are true cribra orbitalia (ie metabolic in origin) or the result of chronic eye infection, which is a well-known complication of leprosy (Moller-Christiansen 1953, 134–5; 1961, 29; Roberts and Buikstra 2019, 367).

4.6.9 Considering the above evidence, the infectious lesions exhibited by skeleton 794 are consistent with a diagnosis of leprosy despite absence of some skeletal regions where further pathognomic changes typically occur. Alternative diagnoses (eg an unidentified systemic infection) still cannot be wholly ruled out, but the leprosy diagnosis should be regarded with a degree of confidence.

4.7 Strontium and oxygen isotope analysis of tooth enamel *by Jane Evans, Doris Wagner and Hilary Sloane*

Analytical method – Sr isotopes

4.7.1 Ten skeletons were sampled for stable isotope analysis. Either a second molar or premolar was sampled from each individual, and the ratio of strontium and oxygen isotopes determined in order to investigate likely childhood geographic origin, with the origin of skeleton 794 a particular objective.

4.7.2 The enamel surface of the tooth was abraded from the surface to a depth of >100 microns using a tungsten carbide dental bur and the removed material discarded. An enamel sample was cut from the tooth using a flexible diamond-edged rotary dental saw. All surfaces were mechanically cleaned with a diamond bur to remove adhering dentine. The resulting sample was transferred to a clean (class 100, laminar flow) working area for further preparation. In a clean laboratory, the sample was first cleaned ultrasonically in high purity water to remove dust, rinsed twice, and then soaked for an hour at 60°C, rinsed twice, then dried and weighed into pre-cleaned Teflon beakers. The sample was mixed with 84Sr tracer solution and dissolved in Teflon-distilled 8M HNO3 and converted to chloride form using 6M HCl. Strontium was collected using Eichrom AG50 X8 resin columns. Strontium was loaded onto a single Re Filament following the method of Birck (1986) and the isotope composition and strontium concentrations were determined by Thermal Ionisation Mass spectroscopy (TIMS) using a Thermo Triton multi-collector mass spectrometer. The international standard for 87Sr/86Sr, NBS987, gave a value of 0.710276 ± 0.000014 (n=27, 2σ) during the analysis of these samples and data are corrected to the accepted value for this standard of 0.710250. Recent laboratory blanks give ~85pg.

4.7.3 The data from this site are compared with those from other data sets from UK Roman sites (Chenery *et al*. 2010; 2011; 2012; Eckhardt *et al.* 2009; Evans *et al*. 2006; Leach *et al.* 2010; Montgomery *et al.* 2011; Muldner *et al*. 2011) in Figures 39 and 40.

4.7.4 The following observations can be made. The oxygen isotope composition is compared with oxygen isotope data from other UK Roman-period datasets. The published data that was produced as phosphate oxygen measurements has been converted to carbonate oxygen values for ease of comparison with the Chapel Lane data. This was done using the conversion equation from Chenery *et al.* (2012).

Table 47: Isotope analysis results

Skeleton	Batch	Code	Sr ppm	87sr/86Srcorr	δ13C (‰) VPDB	δ18O (‰)VSMOW
201	P866	1	125	0.70983	-14.21	26.50
352	P866	2	206	0.70936	-14.16	26.49
353	P866	3	67	0.71016	-14.31	26.59
405	P866	4	130	0.71048	-13.33	26.34
406	P866	5	66	0.71071	-13.05	26.71
535	P866	6	73	0.71028	-13.89	26.59
581	P866	7	86	0.71068	-13.99	26.17
586	P866	8	152	0.71034	-13.72	26.45
794	P866	10	74	0.71050	-15.01	26.63
992	P866	9	281	0.70971	-13.30	26.08

4.7.5 The Chapel Lane oxygen isotope data generate a very tight grouping of data with a small interquartile range and no outliers, in contrast to the other datasets. Dataset size might play a role in this as the Chapel Lane dataset is small (n = 10) but equally it could support a local origin and possibly support an argument for an isotopically stable water source such as a well into well-equilibrated aquifer.

4.7.6 An initial analysis of the strontium and oxygen isotope data supports a group of locally derived individuals, but it should be noted that the isotope data do not provide a unique solution.

4.7.7 The Sr isotope range from the Chapel Lane individual is consistent with an origin within 30km radius of Chapel Lane (Evans *et al*. 2018). However, the values they yield are not unusual and can be found elsewhere in the UK and the continent. When compared with other Roman datasets the Chapel Lane data show no outlier compositions.

4.8 Discussion of the Romano-British assemblage

4.8.1 The assemblage comprised a total of 54 articulated inhumations, fragments of disarticulated bone from four grave fills, four ditch fills and one pit, one urned cremation burial and a fragment of cremated human bone from one grave fill. The MNI for the full assemblage was 65 (63 unburnt, two cremated), based upon the number of inhumation burials plus the number of discrete deposits containing bone. Of these 65, 56 were adults and nine were juveniles; 13 were female, 22 were male, 6 were of

indeterminate sex and 22 were unsexed. Post-cranial indices and adult male stature were within the expected range for the period but adult female stature was low.

4.8.2 In general, the articulated assemblage is relatively typical of a Romano-British urban cemetery. For the most part, rates of dental and skeletal pathology were consistent with those reported for other Romano-British populations, although crude dental pathological prevalence was mostly at the high end of the expected range for Roman Britain (Roberts and Cox 2003). The most commonly observed skeletal pathology was extra-spinal osteoarthritis. It should be noted that data collection in general (and hence interpretation) was somewhat hindered by high levels of fragmentation and incompleteness.

4.8.3 Isotopic analysis of nine skeletons showed that all of these individuals could have been local in terms of childhood geographic origin.

Articulated skeletons

Demography

4.8.4 An interesting demographic pattern was noted at Chapel Lane, comprising a total absence of neonate and infant individuals. Conversely, the cemetery at the A46 Improvement Scheme exhibited a large proportion of neonates (as well as one infant) but an absence of older children (Egging-Dinwiddy and McKinley 2014, 153).

4.8.5 Neonatal and infant skeletal remains are most commonly recovered from Romano-British sites such as villas and rural settlement contexts; in general, they appear to be excluded from formal cemeteries and instead buried in closer association with areas of domestic habitation (Cooke and Mudd 2014, 444). The presence of neonate and infant burials at the A46 Improvement Scheme (and relative absence at Chapel Lane – remains this young were only represented by a small quantity of disarticulated material) fit with this pattern, with interments of the very young taking place in buildings or located on the edge of domestic space, away from the designated cemetery areas (Cooke 2014a, 122; Cooke and Mudd 2014, 444).

Health and environment

4.8.6 The most common skeletal pathology was extra-spinal osteoarthritis (OA). OA is commonly observed in archaeological populations, although its anatomical distribution and prevalence in Romano-British populations is highly variable (Roberts and Cox 2003, 145–50; McIntyre 2013, 294). Almost a third of all adult skeletons at Chapel Lane had OA in one or more joints. When this was analysed by age and sex, adults from the older age categories (prime and middle adult) were increasingly affected by the condition, and males were much more likely to exhibit OA than females. The acromio-clavicular joint was most commonly affected (16.67% TPR for both the left and right joints). Clinically, OA in this location is more common in elderly patients and is thought to be largely age progressive (Roberts and Manchester 2005, 114; Burgener 2006, 132). Prevalence of OA in the acromio-clavicular joint is low in Romano-British assemblages (an average of 1.51% TPR for Roman Britain; Roberts and Cox 2003, 147–8). However, the high TPR at Chapel Lane could be influenced by the low number of acromio-clavicular joints present overall: two out of a total of twelve

joints were affected (left and right combined). The higher prevalence has therefore probably been influenced by poorer preservation, high levels of fragmentation, and general absence of the parts of skeletal elements that comprise this joint, ie the acromion of the scapula and lateral end of the clavicle.

4.8.7 Dental health was found to be poorer than average for the period, but still within the range of normal variation. The most common dental pathologies were calculus (permanent dentition 60.27% TPR) and periodontal disease (16.0% TPR). Prevalence of dental caries was also higher than average for the period. The observed patterns are suggestive of poor oral health coupled with consumption of more cariogenic foods than the other comparative populations at the A46 Improvement Scheme, Bletsoe and Lankhills.

4.8.8 Evidence of non-specific infection and inflammation was completely absent in adult female individuals, with only males and skeletons of indeterminate sex exhibiting such lesions, eg periosteal new bone formation. Prevalence and severity of periosteal new bone formation in archaeological populations can be indicative of adaptation/maladaptation to environmental conditions, in particular poor sanitation, malnutrition and general health stressors. As such, its presence/absence within a population is often used as an indicator of the general health of a population (Roberts and Manchester 1995, 130). With this in mind, the evidence from Chapel Lane suggests that females may have been less susceptible to the aforementioned stressors. However, erosion and abrasion of the cortical surfaces of the bones may also have eradicated evidence of periosteal new bone formation in this group (especially subtler lesions). In this respect, observed prevalence of periostitis among the Chapel Lane individuals should be viewed as a minimum rate.

4.8.9 Males from Chapel Lane were also much more likely than females to have one or more healed fractures. This pattern is also borne out in the observed comparative data, and generally in data across Roman Britain (Cox 1989; Roberts and Cox 2003, 151; Clough and Boyle 2010, 402). The types of fracture observed in the Chapel Lane population were caused by a variety or direct or indirect mechanisms, with no overt evidence for interpersonal violence. Accidental injury can occur in a wide range of scenarios, such as trips or falls (Roberts 2000, 338). Very broadly, clinical studies have shown that males are at increased risk of accidental fracture trauma resulting from occupational or leisure activities compared to females, reflecting a greater tendency for males to engage in behaviour with associated higher risk (Eckel and Grossman 2008; Saw *et al*. 2010; Mitchell *et al*. 2012). The supination-adduction fractures to the medial malleolus of the tibiae observed in three skeletons (352, 406 and 705) are relatively uncommon clinically (Smithius 2012), especially given the apparent lack of evidence for involvement of the associated distal fibulae (although of course, fracture to these bones may be so well healed or overprinted by taphonomic signatures that evidence of injury cannot be detected). The fibula is more likely to suffer avulsion fracture before oblique fracture of the medial malleolus during this type of supination-adduction movement (Smithius 2012). Clinically, commonly cited causes of these types of fractures include falls and sporting injury (eg during walking, running or jumping), with

frequent involvement of a slippery floor surface and/or being under the influence of alcohol (Jensen *et al*. 1998).

Diet

4.8.10 In general, patterns of dental health are shown to worsen in the Romano-British period compared to the preceding Iron Age, which may relate to a lack of oral hygiene in conjunction with an increase in the consumption of foods that contain sucrose (eg honey, wine, and a fermented grape juice known as sapa; Roberts and Cox 2003, 130; Sealey 2009, 28). Starchy foods may also have a cariogenic effect when consumed in large quantities in combination with sugar (Rugg-Gunn *et al*. 1987; Moynihan 2012, 107); the combination of sugar and starch together is considered to be more cariogenic than sugar alone (Bibby 1975). Thus, the higher prevalence of dental caries observed in the Chapel Lane population may be indicative of increased consumption of sugary foods, possibly in conjunction with foods containing starch, compared to the other observed populations. Caries prevalence at Chapel Lane should be observed as a minimum rate considering that it is impossible to deduce how many carious teeth were lost ante mortem.

4.8.11 Compared to other data, crude prevalence of dental enamel hypoplasia at Chapel Lane was relatively high, with a third of dentate skeletons exhibiting hypoplastic lesions; this higher rate is consistent with findings from the A46 Improvement Scheme, where crude rates were even more elevated (Egging-Dinwiddy and McKinley 2014, 155). However, per-tooth prevalence at both sites was much lower, suggesting that while a higher proportion of the population exhibited lesions, fewer teeth per person were affected. Furthermore, the ages at which lesions were likely to develop could broadly be divided into two groups: in the deciduous teeth (below the age of nine months) and in the permanent teeth (between the ages of three and five years). These individuals are thus likely to have suffered periods of low level physiological stress (eg illness, nutritional deficiency) and/or metabolic disruption during these times.

4.8.12 The clustering of individuals with lesion development around the age of three to five years is interesting as this may relate to weaning. Reduced breast milk consumption and introduction of new solid foods can potentially expose young children to new pathogens (Fuller *et al*. 2006, 49). Additionally, weaning foods of lesser nutritional quality than the previously consumed breast milk can put a child at risk of nutritional stress (ibid, 49).

4.8.13 Males from Chapel Lane were almost twice as likely to exhibit cribrous lesions in the orbits than their female counterparts. While presence of cribra orbitalia (CO) has been linked to the development of iron-deficiency anaemia, or vitamin B12 deficiency, it has also been argued that where CO has only been diagnosed macroscopically it is best used as a general indicator of stress (Steckel *et al.* 2006, 13; Walker *et al*. 2009). This may indicate that the adult males in the population were subject to more general stress than the females, a finding which appears to contrast with the aforementioned diminished adult female stature in the Chapel Lane population. However, as CO and diminished stature are only utilised here as very general evidence for physiological

stress, the possibility remains that this pattern is indicative of males and females being subject to different types of health stressors.

Mobility

4.8.14 Isotope analyses for the purposes of identifying geographic origins can only identify individuals who clearly did not originate at the site as children; the data cannot be used to confirm that these individuals were definitely local, since environmental conditions which replicate those of the burial location may well be seen in other regions. That said, the isotopic results generated in this study are all consistent with local environmental conditions.

Post-mortem intervention

4.8.15 The series of peri-mortem cuts to a hand phalanx associated with prime adult probable male skeleton 466 are intriguing. The size, shape, direction and number of cuts is consistent with several cuts being made to the base of the finger by a fine, sharp blade such as a small knife, taking place around the time of death or shortly after. Sharp force trauma to the hands may occur as defensive wounds, when a person uses their hands to fend off a blade-wielding attacker. These typically occur in two locations: firstly, cuts may be located on the back (dorsal) surface of the hand, forearm and upper arm, where the victim has raised the hands and arms to protect their upper body from oncoming blows (Vanezis 2003, 315); secondly, cuts to the palms of the hands and ventral surfaces of the fingers (of the attacker or victim) may occur as a result of grasping a knife by the blade during a frantic attack, or where the blade has slipped through the fingers, eg if the hands are lubricated with blood or sweat (ibid.; Schmidt 2013, 108). Where an attempt to grasp the blade occurs, these cuts tend to be located on the first and second digits, ie between the thumb and forefinger, or across several fingers (Schmidt 2013, 105). The absence of cuts to the other digits or bones of either arm of skeleton 466 does not rule out the defensive interpretation as a possibility: defensive cuts of this sort may still occur in the form of superficial lacerations to the soft tissue and hence not affect the underlying bone. Furthermore, we cannot completely discount the possibility that this particular phalanx is intrusive, and hence the rest of the associated skeleton unobservable.

4.8.16 A second hypothesis centres on possible deliberate careful post-mortem cutting of the digit for the purposes of removing an associated item such as a finger ring. Such an item may hold either financial and/or sentimental value and as such could be considered a desirable item to take from the deceased. The observed cuts could represent deliberate localised incisions around the base of the finger, made in an attempt to dislodge jewellery that has become stuck, for example because of swollen or enlarged soft tissue. However, removal of soft tissue may be easier using a skinning action (ie scraping the soft tissue away from the bone surface) rather than cutting directly into the digit. Defleshing cuts typically scrape across the cortical surface of bone as the blade meets the cortex at an oblique angle, stripping away the adhering flesh (Loe and Cox 2005, 19; Bello *et al*. 2016, 730). In contrast, the observed cuts were made with the blade oriented perpendicular to the cortical surface. Additionally, an attempt to remove an object such as jewellery from a finger would be easier using

circumferential incisions around the base of the digit in order to unsleeve the skin and tendons from the bones (Chamberlain pers. comm.). Having said this, an opportunistic attempt by an individual who is inexperienced in this type of undertaking may resort to any convenient techniques which immediately spring to mind. An additional possibility is that this phalanx is intrusive within the grave fill. Anthropogenically modified disarticulated bone was recovered from several features and may represent earlier remains deliberately modified during mortuary rites (see Disarticulated Section, below).

Unburnt disarticulated bone

4.8.17 Although not as common as in the preceding Iron Age, fragmentary disarticulated human skeletal material is occasionally noted from Roman period non-funerary contexts, although considerably less attention has been given as to its interpretation (Pearce 2013, 146). Inhumation burials at Chapel Lane were frequently found to have been subject to later disturbance by ploughing. This raises the distinct possibility that fragmentary disarticulated bone found within non-funerary features could simply be intrusive material redeposited from graves via ploughing.

4.8.18 Macroscopic observations of the cut marks exhibited by bone fragments from context 108 suggests that these were made using a metal or stone tools (Loe and Cox 2005, 15). Furthermore, evidence from the same bone fragment is suggestive of carnivore gnawing (O'Sullivan 2001, 42; ibid, 15). Similar modified bone fragments were also recovered at the A46 Improvement Scheme (Egging-Dinwiddy and McKinley 2014, 152). One frontal bone had several small, fine, vertical and horizontal cuts (similar to 'filleting' marks) located on the centre of the bone: these were interpreted as possible evidence of peri- or post-mortem scalping (ibid, 152). Radiocarbon dating indicated that this frontal bone was late Iron Age in date. Fragments of tibial shaft and proximal femur exhibited chop and saw marks consistent with bone working, and the ends of these fragments exhibited evidence of canid gnawing (ibid, 152–3). All three fragments from the Chapel Lane assemblage were found in Roman contexts.

4.8.19 Similar examples of anthropogenically modified bone exist from elsewhere in the UK (Carr and Knüsel 1997). Three disarticulated bones (two femora and a tibia) recovered from early Roman features at Longford in Gloucestershire exhibited both cut marks and evidence of canid gnawing, again consistent with an interpretation of deliberate disarticulation and a period of time where animal had access to the remains (McIntyre forthcoming). A similarly modified disarticulated right femur of Iron Age date was recovered from Gussage All Saints in Dorset (Redfern 2008, 286). In both the Longford and Gussage femora, the proximal ends of the bone were gnawed in the region of the femoral neck, and parallel cut marks were present on the lateral aspect of the proximal femoral diaphysis (ibid; McIntyre forthcoming). At Gussage, this was interpreted as evidence for cutting of the muscle attachments around the thigh, during deliberate disarticulation of the (partially decomposed?) joints of the corpse (ibid., 294), and the same interpretation may be applied to the Longford example (McIntyre forthcoming). It is unclear whether the remains from these sites were gnawed by animals before or after the cuts were made, but it is clear that animals had access to the remains after

death but prior to burial (ibid, 295). Given the analogous nature of the evidence, a similar interpretation could certainly be postulated for the modified bone from Chapel Lane. Although these findings are more consistent with Iron Age practices, later, Roman period examples of this character may reflect the continuation of older customs (McKinley 2011b, 65–9).

Cremated bone

4.8.20 The burnt bone assemblage comprises one urned burial (670) and one fragment of residual cremated long bone from an inhumation grave (984). Bone from burial 670 (an adult possible male) is the only primary cremation burial.

4.8.21 General observations made during the excavation and analysis of these deposits was the lack of charcoal, and hence the lack of evidence for redeposited pyre debris. This could suggest that the cremated bone fragments may have been hand-picked from the pyre for deposition within the burial, deliberately excluding any form of pyre debris or fuel ash. This also contrasts with findings pertaining to two unurned cremation burials found nearby at the A46 Improvement Scheme, where both graves contained notable quantities of redeposited fuel ash and fired earth as well as the cremated bone (Cooke 2014a, 125; McKinley 2014, 158–60). In this case it was hypothesized that cremated remains were raked out of the pyre en masse and then winnowed, rather than being handpicked (McKinley 2014, 159).

4.8.22 Although the majority of bone from burial 670 was white in colour (indicating a high level of oxidation), colour variation between a substantial proportion of fragments (*c* 40%) reflected incomplete oxidation. Elements from all skeletal regions had white fragments, but the skull, patella and other unidentified fragments (including from long bone shafts) were also coloured grey, blue and black, although whole fragments were rarely affected. This indicates that some parts of the head and legs of the corpse (and potentially other areas) were subject to variation in heat and oxygen supply (McKinley 2013, 158). This could result from insufficient fuel, shortened/inadequate burning time or other factors that could lead to curtailment of the cremation process, such as damp fuel or wet weather (McKinley 2013, 158; 2014, 159). A similar pattern was also apparent in both cremation burials from the A46 Improvement Scheme: here, the cremated female was noted to have blue/grey coloration of fragments from the cranium and larger long bones and one largely unburnt cervical vertebra (McKinley 2014, 159).

4.8.23 Experimental work pertaining to pyre technology has suggested that although the main pyre structure tends to burn down in approximately two hours (leaving much in the way of charred remains still retaining soft tissue), the bed of ashes may remain hot for around a further six to seven hours, during which time the remainder of the soft and hard tissues become oxidised (McKinley 2013, 160). As well as factors that may hinder cremation during burning of the pyre, interruption of the later part of the process may result in a mixture of burnt, charred, and possibly even unburnt remains. Thus, either part of the cremation process could have been hampered by a variety of factors and produced the observed fragment colouration. Moreover, the consistency observed between cremation burials from Chapel Lane and the A46 Improvement

Scheme may indicate that either full oxidation of cremated remains was not considered necessary or that materials and/or environmental conditions available at Margidunum were not conducive to a complete, wholly efficient cremation process. That said, it should also be noted that interpretation of fragment colouring from the Chapel Lane deposit in particular is hindered by the low recovered bone weight, with the majority of ashes being absent and hence unavailable for observation.

4.8.24 To summarise, the cremation burial from Chapel Lane is of a form typical for the Roman period in Britain, with the cremated individual placed in an urn and then buried in a pit (Philpott 1991, 8). The 2nd to late 4th century date for this burial means there is potential for this cremation to have been undertaken somewhat late, at a time when inhumation had superseded cremation as the dominant funerary practice (ibid., 50–2; McKinley 2014, 160), though clearly the given date range is broad, and the archaeological evidence attests to the persistence of cremation as a minority rite in the later Roman period (Pearce *et al*. 2013, 452). Examples of cremation burials from this period are certainly more common in the north of England, often at military sites, and particularly in the vicinity of Hadrian's Wall (Thompson *et al*. 2016, 831–2). Examples include 322 cremated bone deposits dating chiefly to the 3rd century from the cemetery associated with the auxiliary fort at Brougham in Cumbria (Cool 2004) and cremation burials dating from the 2nd to early 4th century at the Petty Knowes cemetery associated with the fort at High Rochester in Northumberland (Charlton and Mitcheson 1984). Further examples of cremation burials dating to as late as the 4th century were found at Derby Racecourse (Wheeler 1985; Pearce 2013, 37). Clearly, although the later Roman period saw a general decline in cremation burials, regional variation in preferred funerary practice meant that the rite still persisted until the end of the Roman period.

5 ENVIRONMENTAL EVIDENCE AND RADIOCARBON DATING

5.1 Animal bone *by Martyn Allen*

Introduction

5.1.1 A total of 3022 refitted animal bone fragments were recorded. All the bones were recovered from Phase 2 features and thus dated to the late 2nd to 4th century. The assemblage was dominated by cattle remains and included a notably high proportion of horse bones. The remains were relatively well preserved, and specimens were recovered from a range of contexts including the major boundary ditch 1010/1022, subsidiary ditches, pits/postholes and wells. A small amount of material was recovered from grave deposits, though all of this was deemed to be residual in the backfills and was thus not recorded (there was no evidence for the use of animals as grave goods).

5.1.2 The assemblage provides a useful zooarchaeological dataset from a roadside site in the East Midlands, an area which has relatively few animal bone assemblages. This collection has been examined in order to better understand livestock exploitation practices at the site and has been examined against comparative data from contemporary sites to place it within its regional context.

Methodology

5.1.3 The assemblage was recorded at Oxford Archaeology South using the in-house skeletal reference collection. Each fragment was analysed and identified to taxon where possible. Identifiable long-bone shafts, ribs and vertebrae were recorded as large-, medium- or small-sized mammals. Specimens were recorded according to element zone, allowing for minimum numbers of animals (MNI) and minimum numbers of elements (MNE) to be calculated (Serjeantson 1996). Articulated remains were recorded where present (here termed associated bone groups, or ABGs).

5.1.4 Ageing data were collected from the analysis of tooth-wear patterns following Grant (1982) and estimated ages were drawn from comparisons with modern livestock following the work of Jones and Sadler (2012) for cattle, Jones (2006) for sheep and O'Connor (1988) for pigs. Epiphyseal fusion of post-cranial elements was also recorded, and age estimates were calculated using the timings presented by Sisson and Grossman (Getty 1975). Horse ages were estimated from measurements of the premolar and molar crown heights (Levine 1982).

5.1.5 Measurements were taken using the standards of von den Driesch (1976) and withers' heights were calculated from Kiesewalter's factors (von den Driesch and Boessneck 1974). Types of butchery marks were recorded according to Maltby's (2010) codes. Evidence of burning was recorded based on colour (eg black, grey or white, ie calcined). Gnaw marks were recorded where present. Signs of pathology were recorded in detail.

Taphonomy

5.1.6 The assemblage was generally well preserved, though modern breakages were fairly common. Most specimens had intact cortical surfaces, suggesting that animal waste

had been buried fairly rapidly and had suffered little from weathering. This is supported by the minimal occurrence of bones with gnaw marks. Gnawed bones, all of which had been damaged by dogs, accounted for between 1.1% and 1.8% of specimens recovered from each feature type (Table 48).

Table 48: Summary of gnawed, burnt and butchered bones

Features	Gnawed		Burnt		Butchered	
	No.	%	No.	%	No.	%
Ditch 1010/1022	10	1.3	0	0.0	39	4.9
Other ditches	11	1.2	7	0.9	21	2.5
Pits/postholes	9	1.1	2	0.2	44	5.2
Wells	9	1.8	0	0.0	34	6.7
Other	1	1.5	0	0.0	4	5.9
Total	39	1.3	5	0.2	139	4.6

5.1.7 Burnt remains were very rare, being found only in fill 748 of pit 747 and fill 313 of ditch 1013. In the former, a cattle mandible had been burnt on the diastema just below the tooth row which may have been caused to deliberately break the bone to release marrow within the jaw (see Butchery, below). In ditch 1013 several long-bone shaft fragments were calcined and had been heated to a very high temperature. The reason for this burning is unclear and the practice seems to have been very uncommon.

5.1.8 Butchery marks were more common than gnawed and burnt bones in all feature types. A total of 139 bone fragments exhibited butchery marks, representing 4.6% of the total assemblage. A more detailed discussion of these marks will be presented below, but it is worth noting here that a slightly higher proportion of remains found in wells included butchery marks (6.7%) compared with material from ditches (excluding ditch 1010/1022), in which incidences of butchery were fairly low (2.5%). This variation may reflect differences in depositional practices across the site. Overall, however, the pattern of butchery did not hinder the recording and analysis of the assemblage.

Taxa representation

5.1.9 Cattle bones dominate the assemblage, representing over 58% of the total remains identified to species (Table 49). A total of 644 cattle fragments were recovered, added to which were 11 fragments that made up four ABGs (see Associated bone groups, below). Horse bones were the next most common species, contributing 18.7% of the identified assemblage, which compared with 16.6% from sheep/goat remains. However, 52 horse bones made up three ABGs, which, if discounted from the totals, would mean that horse bones were not quite as common as sheep/goat. Dog bones constituted nearly 4% of the identified assemblage, though just over half of these derived from two ABGs, including a partial dog skeleton recovered from ditch 1014. Pigs bones were very poorly represented, by only 26 fragments. Red deer was the only wild mammal present, represented by two fragments of antler (one worked) and a tooth. Bird bones were even less common, consisting of a single crow bone and a wing bone from an unspecified species. A large proportion of the assemblage consisted of long-bone shaft fragments, broken skull, vertebrae and ribs that were identified as

large, medium or small mammal. The majority of these derived from larger mammals, and almost certainly are mostly bones from cattle and horses. Just under one third of the assemblage consisted of small, unidentifiable fragments.

Table 49: Number of fragments identified to taxon and frequency of remains recorded as ABGs

Taxa	No. frags	No. ABGs	Total	%NISP
Cattle	644 (11)	4	655	58.1
Sheep/goat	187		187	16.6
Pig	26		26	2.3
Horse	159 (52)	3	211	18.7
Dog	16 (28)	2	44	3.9
Red deer	3		3	0.3
Crow	1		1	0.1
Bird	1		1	0.1
Large mammal	707 (41)	1	748	—
Medium mammal	157		157	—
Small mammal	2		2	—
Unidentified	987		987	—
Total	2890	10	3022	—

Contextual and spatial distribution

5.1.10 Ditch 1010/1022 and its associated recuts contained 776 animal bone fragments, the highest number recovered from a single feature at the site (Table 50). If this feature is excluded, the total number of fragments from all the other ditches came to 827, which was fairly evenly matched by the 846 from pits and postholes. The 505 specimens recovered from the five wells also represents a sizable group. The proportions of different taxa do not change markedly between different feature type, as is often found in zooarchaeological assemblages (Fig. 41). Cattle remains are slightly better represented in ditch 1010/1022 and in the wells, while sheep/goat bones were more frequently encountered in pits/postholes, though the differences are not substantial. There is good evidence, however, that sheep/goat remains were much more affected by taphonomic factors than cattle and horse, most likely owing to differences in fragmentation and recovery (see below). Horse remains tended to be better represented in ditch 1010/1022, and dog remains were predominantly from ditches and rare in pits/postholes and wells.

5.1.11 In terms of spatial distribution, there were notable differences in the quantity of bones excavated from different areas of the site. Since the distribution of archaeological features was generally uneven across the excavated area, this was tested by calculating the number of bones recovered from different parts of ditch 1010/1022. A total of 19 interventions were dug into this feature at roughly equal distances. The number of fragments from each intervention is presented in Figure 42. There is a trend towards higher numbers of animal bone fragments in the northern half of the site, particularly

in areas where there are larger numbers of inhumation burials and ditched enclosures. The distribution of animal bones along the length of the ditch is a good indicator of the level of activity within different areas of the roadside enclosure.

Table 50: Number of fragments per taxon in each feature type

Taxa	Ditch 1010/1022	Other ditches	Pits/ postholes	Wells	Other	Total
Cattle	216	163	138	122	16	655
Sheep/goat	48	40	54	37	8	187
Pig	4	9	3	8	2	26
Horse	75	46	67	18	5	211
Dog	13	27	2	2	0	44
Red deer	1	0	0	2	0	3
Crow	0	0	1	0	0	1
Bird	0	0	0	1	0	1
Large mammal	217	243	172	96	20	748
Medium mammal	47	35	39	31	5	157
Small mammal	1	0	1	0	0	2
Unidentified	154	264	369	188	12	987
Total	776	827	846	505	68	3022

Inter-site comparison of taxa representation

5.1.12 The high proportion of cattle and horse bones in the assemblage is notably very different to the assemblages excavated from nearby areas at the A46 Improvement Scheme (**Fig. 43**). The Margidunum hinterland assemblage was drawn together from several excavated areas during the A46 Improvement Scheme excavations, including trenches on the opposite side of the Fosse Way, to the north-east of the current excavation, and further north around Newton villa. The hinterland data presented here includes the Roman phases of those excavations, though the report does not divide the assemblage between each trench (Higbee 2014). Nonetheless, the overall pattern suggested a much stronger emphasis towards the exploitation of sheep/goat, a small but notably higher proportion of pig bones and comparatively few horse bones. Some of these differences may be due to contextual variation, as sheep and pig bones were better represented in pits and postholes, while cattle bones were more common in ditch fills and layers and horse bones were mainly recovered from ditches. Given the large area excavated, however, it seems likely that the spatial distribution of animal remains would have been strongly determined by different activities occurring in different areas, as shown above in the uneven distribution of animal remains along ditch 1010/1022 in the current excavation.

5.1.13 It is useful to compare these assemblages with other regional and/or site-type groups. Assemblages from contemporary roadside settlements at Sleaford Power Station, Lincolnshire, and Bainesse, North Yorkshire (included here because of its proximity to

the Roman town at Catterick), show some similarity with the Chapel Lane assemblage, with fairly high cattle proportions, slightly higher sheep/goat percentages and fewer horse. These are similar to the combined faunal assemblages excavated from Leicester, though differ from the exceptionally high cattle percentage in assemblages at Lincoln (datasets aggregated in Maltby 2010). The differences between these towns is largely a product of the location of excavations at each: assemblages from Leicester have tended to come from areas within the town, while those at Lincoln are generally from excavations that have focussed on areas to the south of the town which have exposed large dumps of processed cattle remains (Dobney *et al*. 1996). No comparably large dumps of cattle bones were identified at Chapel Lane, though the assemblage here could partly reflect an area that was primarily concerned with processing cattle and horse carcasses. The prevalence of horse bones at Chapel Lane notably stands out compared with all the other sites examined here. Horse bones commonly account for between 5% and 10% at Roman rural sites in southern and eastern England and are often poorly represented in urban assemblages. The figure of almost 20% for horse bones at Chapel Lane is unusual and cannot be solely attributed to differential recovery or the presence of ABGs.

Body-part patterns

Cattle

5.1.14 Body part analysis has been carried out by counting the number of repeating zones of a certain element to calculate the MNE and MNI when taking body side into account. For cattle remains, mandibles were the most frequently occurring element with at least 30 jaw bones representing a minimum of 20 animals (Table 51). The dominance of mandibles is not matched by horncores, which are the least frequently occurring element. The discrepancy between mandibles and horncores may be due to poorer survival of horncores and difficulties in zoning fragmented horncore specimens. It is possible that some horncores were removed from skulls after slaughter for working in another part of the site. Aside from the skull, all the post-cranial elements were fairly evenly represented and there was a clear lack of preference for any particular body part (Fig. 44). Distal humeri and scapula bones tended to be well represented, as did proximal metacarpals and distal tibiae, though this variation is likely to derive from differential preservation of bones.

Table 51: Cattle body-part patterns in terms of minimum numbers of individuals (MNI) and minimum numbers of elements (MNE)

Element	MNI	MNE	%MNE
Horncore	5	8	26.7
Mandible	20	30	100.0
Scapula	10	20	66.7
Humerus	14	22	73.3
Radius	8	14	46.7
Ulna	6	12	40.0
Metacarpal	9	17	56.7

Element	MNI	MNE	%MNE
Pelvis	7	10	33.3
Femur	8	12	40.0
Tibia	8	17	56.7
Calcaneus	7	14	46.7
Astragalus	9	13	43.3
Metatarsal	7	12	40.0

Sheep/goats

5.1.15 Compared to cattle remains, sheep/goat bones suffered far more from differential preservation and recovery (Table 52). Distal tibiae were the most commonly occurring element, representing 21 bones from at least 12 animals. Other sheep/goat bones that were fairly common included mandibles, proximal radii and proximal metapodials (Fig. 45). Humerus, femur and scapula specimens were present but in much lower numbers. This is very common pattern in sheep/goat assemblages where the carcasses of these animals have been more greatly affected by fragmentation and thus recovery of less robust and smaller elements.

Table 52: Sheep/goat body-part patterns in terms of minimum numbers of individuals (MNI) and minimum numbers of elements (MNE)

Element	MNI	MNE	%MNE
Horncore	1	3	14.3
Mandible	8	16	76.2
Scapula	3	3	14.3
Humerus	4	5	23.8
Radius	7	12	57.1
Ulna	0	0	0.0
Metacarpal	6	10	47.6
Pelvis	2	2	9.5
Femur	3	6	28.6
Tibia	12	21	100.0
Calcaneus	1	1	4.8
Astragalus	0	0	0.0
Metatarsal	7	16	76.2

Horses

5.1.16 Body-part patterns for horses were similar to that for cattle, suggesting similar patterns of survival and recovery. When minimum numbers were considered, horses were fewer in number than sheep/goats. Mandibles were the best represented element with at least seven bones from a minimum of four animals (Table 53). The relative frequency of post-cranial elements was fairly even, with all the main bones except the

ulna present in the assemblage (Fig. 46). Humerus, pelvis, astragalus and metatarsal bones were each represented by five individual elements.

Table 53: Horse body-part patterns in terms of minimum numbers of individuals (MNI) and minimum numbers of elements (MNE)

Element	MNI	MNE	%MNE
Mandible	4	7	100.0
Scapula	2	3	42.9
Humerus	3	5	71.4
Radius	2	3	42.9
Ulna	0	0	0.0
Metacarpal	2	3	42.9
Pelvis	4	5	71.4
Femur	3	4	57.1
Tibia	1	2	28.6
Calcaneus	3	4	57.1
Astragalus	3	5	71.4
Metatarsal	3	5	71.4

Pigs

5.1.17 Given the small number of pig bones recovered during the excavation, it was difficult to reconstruct body-part patterns for this animal. When zones were considered, the only elements present were mandibles, scapulae, humeri, femora and one tibia (Table 54). Other pig elements included maxilla bones, loose teeth and phalanges, all in small numbers.

Table 54: Pig body-part patterns in terms of minimum numbers of individuals (MNI) and minimum numbers of elements (MNE)

Element	MNI	MNE
Mandible	3	4
Scapula	1	2
Humerus	2	2
Femur	2	2
Tibia	1	1

Dental ageing

Cattle

5.1.18 A total of 21 cattle mandibles provided enough information from tooth wear patterns for the attribution of age stages based on the work of Jones and Sadler (2012). These ranged from animals estimated to have been 5–18 months old and those aged between 8–16 years when they died (Table 55). Two peaks in these data are evident: one centring around cattle culled at stages D and E, aged between 16 months and three years, and a later peak at stage J, representing cattle aged 8–16 years. Such a pattern suggests that some cattle were slaughtered at prime beef age while others were maintained to older ages. This pattern is very similar to that found in the

Romano-British assemblage from the A46 Improvement Scheme excavations, which also showed a husbandry strategy that was 'geared towards the production of beef' with some maintenance of older cattle (Higbee 2014, 249). No evidence of very young cattle below six months old was identified from dental specimens (a pattern supported by the epiphyseal fusion data). This may be partly influenced by fragmentation and recovery, which is noted above to have been an issue, but may also suggest that the cattle were not husbanded at the site, but reared locally and brought in for slaughter and consumption.

5.1.19 The cattle dental ageing data can be compared with those from the roadside settlement at Bainesse and the urban assemblage from Lincoln. Here, the data have been converted to age groups based on O'Connor's (1988) categories (Fig. 47). The Chapel Lane slaughter pattern differs to both these sites in having a greater proportion of cattle in the immature and sub-adult age groups. Immature cattle have the first molar in wear but the second molar not yet in wear, while sub-adult cattle have the second molar in wear but have unworn third molars. According to Jones and Sadler's (2012, 15) work on dental ageing in modern breeds, these equate to cattle aged 5–18 months and 16–28 months respectively. The pattern at Chapel Lane could represent annual culling of one- and two-year-old livestock. Adult and elderly cattle are present, perhaps for secondary products, use on the plough and for herd maintenance. Although beef production was important, the slaughter pattern does not indicate that specialised/intensive husbandry practices were undertaken. At Bainesse and Lincoln, the pattern is more focussed on adult and elderly cattle. Stallibrass (2002, 407) noted the predominance of older cattle at Bainesse and suggested that this reflects the possibility that the roadside settlement acted as a rural producer site, the implication being that young bulls were sold off to the urban market in Catterick. Such targeted selection of cattle is shown in the assemblage from Lincoln, though here the focus was also on adult cattle over four years old, rather than sub-adults. In fact, Dobney *et al*. (1996, 30) note that most of these cattle were probably nearer to eight years old. This pattern is consistent with multiple use of cattle for breeding, secondary products and ploughing, after which they were sold to the urban market.

Table 55: Cattle dental ageing data (stages and estimated ages based on Jones and Sadler 2012)

Stage	Estimated age	No.	% culled
A	Neonatal	0	100.0
B	0–6 months	0	100.0
C	5–18 months	2	90.5
D	16–28 months	5	66.7
E	26–36 months	4	47.6
F	34–36 months	2	38.1
G	40m–6.5 years	3	23.8
H	5–10 years	0	23.8
J	8–16 years	5	0.0
K	14 years+	0	0.0

Sheep/goats

5.1.20 The sheep/goat dental ageing data indicate that a wide range of ages were represented in the assemblage. A total of 17 mandibles represented animals in each age group from 1–3 months old to 4.5–9 years old (Table 56). No neonates and no elderly sheep/goats (ie 6–11 years or older) were present. A peak in slaughter occurred at stage E, mostly representing animals in their third year (following Jones 2006). This broadly follows the pattern of sheep/goat slaughter found in the Margidunum hinterland assemblage from all the Roman phases, though here there was a higher incidence of culling of animals below two years old and slightly higher proportion of elderly livestock (ie age stage H–I/J).

5.1.21 The Chapel Lane sheep/goat ageing data can be usefully compared with data from Bainesse and Lincoln (Fig. 48). At Bainesse, there is a clear emphasis on young sheep/goats slaughtered in their second year (stage D). Stallibrass (2002, 408) picked up on this pattern and commented that it represents a preference for the consumption of young lamb and suggested that wool production was of comparatively little importance. The data from Lincoln was similar to Chapel Lane in showing a less intensive slaughter strategy but indicated a slightly higher overall proportion of older sheep/goats. If most of these animals were raised locally around the town, it likely indicates that wool production was of greater importance for the urban market. Dobney *et al.* (1996, 39) remark that wool may have been at a premium in the late Roman period.

Table 56: Sheep/goat dental ageing data (stages and estimated ages based on Jones 2006)

Stage	Estimated age	No.	% culled
A	Neonatal	0	100.0
B	1–3 months	2	88.2
C	3–12 months	1	82.4
D	10–24 months	3	64.7
E	20–36 months	5	35.3
F	2.5–4.5 years	3	17.6
G	4.5–9 years	3	0.0
H	6–11 years	0	0.0
J	8–13+ years	0	0.0

Horses

5.1.22 Horse dental ageing data was calculated from the measurement of tooth crown heights rather than wear patterns on occlusal surfaces. Horse tooth crowns wear down at a fairly constant rate and approximate ages can be estimated (Levine 1982). Most molars were found loose from the mandibles, allowing for measurements to be taken, and often several teeth in individual contexts were clearly from the same animal. In these cases, the mean age was taken from assessment of all the teeth present. A total of eight horses were aged from tooth crown heights (Table 57). These animals ranged

from 5–6 years old to 12–13 years old. There was no clear dominance of any particular age.

5.1.23 Horse ageing data are rarely presented in zooarchaeological reports owing to the lack of suitable material. Data from Thornhill Farm, Gloucestershire, presented ageing evidence from a large sample of horse remains (Levine 2004). Although the age range extended between horses less than a year old up to those over 20 years, a clear peak between 6–7 years and 10–11 years was observed. Levine (ibid., 126–8) states that 6–7 years onwards is a normal age-at-death for working horses and argued against that site being a specialist horse-breeding centre owing to the low frequency of horses aged between 0–2 years.

*Table 57: Estimate horse ages calculated from tooth crown heights (*estimated from single tooth)*

Context	Specimen	Estimated age
80	605	5–6 years
810	207	7–8 years
813	223	7–8 years
750	161	9–10 years
811	242	9–10 years
172	453	10–11 years
207	1293*	11–12 years
340	1023*	12–13 years

Pigs

5.1.24 Only three pig mandibles provided ageing data. One was juvenile and two were sub-adults based on O'Connor's (1988) age stages.

Epiphyseal fusion

Cattle

5.1.25 Cattle epiphyseal fusion data indicate that a fairly large proportion of the population (80%) survived through their third year and almost 60% survived through their fourth year (Table 58). This pattern broadly supports the dental ageing data, which suggests that some cattle were culled at prime-beef age while a sizable proportion of the population survived to older ages. Although not as accurate as dental wear data, the epiphyseal fusion evidence was based on a sample of 122 bones. The complete lack of unfused early-fusing elements is significant, given that these represented just over half the total sample. This suggests that it was rare for cattle to be killed before the end of their second year, and perhaps suggests that aged mandibles at stage D (16–28 months, see above) were probably from animals that were towards the end of that age range.

Table 58: Cattle epiphyseal fusion data

Fusion stage	Element	No. fused	No. unfused	%fused
Early fusing (7–24 months)	Scapula	10	0	
	Pelvis	17	0	
	Proximal radius	9	0	
	2nd phalanx	4	0	
	Distal humerus	10	0	
	1st phalanx	13	0	
	Total	63	0	100.0
Middle fusing (24–36 months)	Distal tibia	8	0	
	Distal metapodial	12	5	
	Calcaneus	4	1	
	Total	24	6	80.0
Late fusing (36–48 months)	Proximal femur	1	2	
	Proximal humerus	1	1	
	Distal radius	10	0	
	Distal femur	2	4	
	Proximal tibia	3	5	
	Total	17	12	58.6

Horses

5.1.26 A total of 35 horse bones were available to examine states of epiphyseal fusion (Table 59). It was notable that only one horse specimen, a proximal femur, was found in an unfused state. This bone fuses at 36–48 months in horses and the specimen was otherwise fairly well developed. A three-year-old horse is certainly capable of being ridden. The epiphyseal fusion data supports the crown height data, which show a lack of evidence for juvenile horses. Although the zooarchaeological assemblage contains an unusually high proportion of horse bones, there is no evidence that horses were being bred and reared there. Perhaps such activities were undertaken closer to Newton villa.

Table 59: Horse epiphyseal fusion data

Fusion stage	Element	No. fused	No. unfused	%fused
Early fusing (12–18 months)	Scapula	4	0	
	Proximal radius	2	0	
	2nd phalanx	0	0	
	Distal humerus	5	0	
	1st phalanx	3	0	
	Distal metapodial	7	0	
	Total	21	0	100
Middle fusing (18–24 months)	Pelvis	4	0	
	Distal tibia	2	0	
	Total	6	0	100
Late fusing (36–48 months)	Proximal femur	2	1	
	Calcaneus	0	0	
	Proximal humerus	0	0	
	Distal radius	3	0	
	Distal femur	1	0	
	Proximal tibia	1	0	
	Total	7	1	87.5

Livestock size

5.1.27 Very few complete bones were recovered from the site and most of these came from horses (see below). The number of sheep/goat bones that were available for measurement was too few to provide useful statistical analysis and measurable pig bones were completely absent. The data presented here therefore focusses on cattle and horse bones. The full dataset is kept with the archive.

Cattle

5.1.28 Astragali provided the largest sample of measurable cattle elements. Measurements of astragali length and breadths are a good indicator of livestock height and stockiness. Analysis of the range and mean of the astragalus lateral lengths from different sites shows that the cattle at Chapel Lane were comparatively short (Fig. 49). Although widely overlapping, these size ranges suggest a geographical pattern of smaller cattle in northern England and larger livestock in the south. All the sites show a similar minimum astragalus length, though sites in southern England tend to have higher upper ranges, which increases the average of these datasets. It seems unlikely that all the southern England sites would tend to include more bulls in the assemblage and we might expect a more mixed pattern if sex was an overriding factor. Instead, the pattern may be reflecting the presence of larger cattle types in southern England and it is becoming increasingly accepted that, from around the 2nd century, more intensive cattle husbandry practices were developing in the south, possibly supplemented by imported breeding stock from the continent (Allen 2017, 99–104). If this interpretation

is accepted, these larger cattle do not appear to have been present as far north as Chapel Lane, which may have continued to husband local stock.

Horses

5.1.29 Contrasting with the cattle biometric data, the horses at Chapel Lane appear to have been comparatively tall. Withers' height calculations were made from five bones: a radius, a metacarpal and three metatarsals. These were calculated using Kiesewalter's factors on the lateral lengths of the long bones, which gave an overall height range of 1375–1497mm. This was compared with withers' heights from several other Romano-British rural and urban settlements (Fig. 50). The Chapel Lane horses showed the highest average withers' height and a higher upper limit than five of the other nine sites. The lower end of the range from Chapel Lane was also above the upper limit of horse heights from Faverdale, a contemporary rural settlement in County Durham.

Butchery and bone-working

Cattle

5.1.30 A total of 107 cattle and large mammal-sized bones exhibited butchery marks (Table 60). It is possible that some of the latter, mostly ribs and vertebrae, derived from horses, though it is likely that the majority were cattle bones. Of these, 55 exhibited knife cuts and 51 had chops or blade marks, the latter possibly made using a heavier implement such as a cleaver. Two horncores were chopped through at the base and one had been sawn through at the tip. Butchery marks on extremities such as foot, toe and ankle bones were mostly knife cuts consistent with skinning.

5.1.31 Cut marks on upper limb bones were most commonly found on the femur and the scapula and were associated with disarticulating the shoulder and rump joints. Two scapulae were chopped in or near to the glenoid to dissect the shoulder, while seven had axial blade marks on the blade where the spine had been removed. Some upper limb bones had been axially chopped. One humerus had been chopped through the trochlear at the distal end, a blow which split the shaft. Several upper limb bones had chop marks on the shaft. Seven pelves had been chopped. Mostly these were superficial blows focussed around the acetabulum, or occasionally on the ilium or ischium.

Table 60: Number of cattle bones exhibiting butchery marks

Body part	Cut mark	Chop/blade mark	Saw mark
Skull/horncore	1	2	1
Mandible	12	3	0
Trunk	13	12	0
Upper forelimb	10	22	0
Upper rearlimb	6	9	0
Lower limb/extremities	13	3	0
Total	55	51	1

Trunk = vertebra, rib, pelvis; upper forelimb = scapula, humerus, radius, ulna; upper rearlimb = femur, tibia; lower limb/extremities = astragalus, calcaneus, metapodials, phalanges

5.1.32 A total of 12 mandibles exhibited cut marks and a further three had chop marks. Most of the cut marks found on the lateral diastema below the molar tooth row and may have been made during skinning. Some had cuts on the medial side, however, which may have been made when dissecting the tongue. Five mandibles had cuts on the ramus and were probably made when removing the jaw from the skull. One of these had cuts around the articulation. One mandible showed signs of burning just below the molar row where the bone appears to have been deliberately fractured. This type of butchery has also been found in Roman urban assemblages at Lincoln and Chichester (Dobney *et al*. 1996, 25–6). The rationale for this type of butchery is uncertain but may have been undertaken to liquefy the bone marrow which could then be poured out after breaking the bone.

Sheep/goats

5.1.33 A total of 22 sheep/goat and medium mammal-sized bones were recorded with butchery marks (Table 61). Of these, 17 exhibited knife cuts. Five metapodials exhibited skinning marks and one mandible had cut marks on the diastema, also probably made during skinning. Four radii and a four tibii had cut marks on the shaft of the bones made during defleshing. Chop marks were noted on the shafts of two tibii and one femur, presumably made when dissecting the carcass.

Table 61: Number of sheep/goat bones exhibiting butchery marks

Body part	Cut mark	Chop/Blade mark
Skull/horncore	0	0
Mandible	1	0
Trunk	2	1
Upper forelimb	5	0
Upper rearlimb	4	3
Lower limb/extremities	5	1
Total	17	5

Horses

5.1.34 Four horse bones exhibited cut marks. These were generally quite faint but indicate both skinning and dissection of the skeleton. It appears that horse carcasses were treated differently to cattle. A metacarpal and a metatarsal bone both had cut marks. The metacarpal had axial cuts along the shaft and horizontal cuts near the distal end, while the metatarsal had cut marks near the proximal articulation. A mandible had cranio-caudal knife cuts on the lateral ramus near the condyle and some lower down on the ramus. These suggest that the jaw had been removed, perhaps to access the tongue. One horse femur had cuts on the caput femoris demonstrating that the hip had been dissected.

Pigs

5.1.35 Two pig scapulae were butchered. One had knife cuts on lateral and anterior aspects of blade and the other had knife cuts around rim of glenoid cavity.

Red deer

5.1.36 One red deer antler consisted of a worked and finely polished tine. It was sawn through at both ends with cut marks on the surface (possibly added later?). The tine had been hollowed out at the tip end. The item appears to have been a roughout for a handle.

Pathologies

5.1.37 Eight animal bone specimens were recorded as having signs of pathology. Four of these were cattle bones. Two first phalanges exhibited some lipping of the bone (one fairly excessive) around the lateral side of the proximal articulation. Lipping normally occurs when excessive pressure is placed on the joint over a consistent period. One metacarpal showed signs of periostitis on the shaft and may have resulted from an infection. One ulna exhibited an unusual bony growth just below the articulation, probably caused by an infection.

5.1.38 One dog pelvis had considerable extra bony growth on lateral side of the ilium. A horse proximal metatarsal was notably extended on the medial side, a modification that appears to have formed when the bone was still growing, possibly owing to excessive pressure on the joint before the bone had fully developed. One sheep/goat had suffered from a dental infection that had manifested itself on a mandible which displayed some bone loss and porosity around the first molar. This was seen on both sides but was focussed on the buccal side.

Associated bone groups

5.1.39 Ten associated bones groups (ABGs) were identified in the assemblage: four of cattle, three of horses, two of dogs and one from a large mammal, either cattle or horse (Table 62). Cattle skulls were deposited in ditches 1003, 1004 and ditch 1010/1022. These were usually fragmented but appear to have been originally placed with the mandibles. An articulating cattle ankle joint was represented in ditch 1010/1022 by a right-sided astragalus, calcaneus and tarsal bones.

5.1.40 Dog bones were represented by partially complete skeleton found in ditch 1014. No remains of the skull were found but no butchery marks were observed on any part of the skeleton. As well as this, an articulating rear limb was represented by femur and tibia bones found in ditch 1010/1022.

5.1.41 The three horse ABGs consisted of a partial skeleton, a vertebral column and an ankle joint. The partial skeleton was deposited in pit 170. It comprised the skull, mandibles, atlas, axis, numerous cervical and thoracic vertebrae and several large rib fragments. No pelvis or other limb bones were found, though butchery marks were absent on the skeleton. The skull was heavily fragmented but consisted of a large piece of maxilla with *in situ* cheek teeth. Both lower second premolars exhibited enamel/dentine exposure on the anterior edges. This was more prevalent on the left side, where up to 8mm was exposed and was also matched by some exposure on the upper tooth. This type of modification is consistent with bit-wear indicating that the animal had been ridden using reins (Bendrey 2007). An articulating vertebral column from a horse was

found in pit 596. This consisted of an atlas, an axis and two cervical vertebrae. Horse scapula, radius and pelvis bones were also present in the context and may have come from the same animal, though no butchery marks were identified. A horse ankle joint was recovered from ditch 1010/1022 from the remains of tibia, a calcaneus, an astragalus and a tarsal bone. No butchery marks were noted on these bones.

5.1.42 Three large mammal-sized lumbar vertebrae and a sacrum were recovered in articulation from ditch 1018. It is uncertain whether these were from cattle or horse, though remains of both species were found in this feature. It is worth pointing out, however, that the associated horse bones included a pelvis and several cervical vertebrae, while some large ribs were also present.

Table 62: Summary of associated bone groups

Taxon	Context	Feature	Description of ABG
Cattle	425	ditch 1004	Remains of a very fragmented cattle skull – the maxillae are fairly well preserved
Cattle	602	ditch 1003	Remains of a very fragmented cattle skull – the mandibles are largely complete
Cattle	864	ditch 1010/1022	Fragmented skull (consisting of maxilla, nasal and occipital) and mandible
Cattle	909	ditch 1010/1022	Ankle joint (articulating calcaneus and astragalus)
Dog	165	ditch 1010/1022	Articulating rear limb (femur and tibia)
Dog	901	ditch 1014	Partially complete dog skeleton (no sign of skull)
Horse	172	pit 170	Partial skeleton consisting of head, neck and trunk (some evidence for bit wear on teeth)
Horse	597	pit 596	Articulating vertebral column, including atlas and axis, and several other vertebrae are present (horse scapula, radius and pelvis also present in context)
Horse	883	ditch 1010/1022	Complete ankle joint consisting of tibia, calcaneus, astragalus and tarsal
Large mammal	857	ditch 1018	Several lumbar vertebrae and the sacrum in articulation

Discussion

5.1.43 The animal bone assemblage provides a good insight into livestock exploitation at the site. The very high proportion of cattle bones is striking and does not appear to simply reflect recovery and preservation bias (although these factors will have had a bearing). The assemblage is generally in a very good condition and it clearly differs from the sheep/goat-dominated assemblage from the Margidunum hinterland excavations, though this includes earlier material than was present at Chapel Lane. Higbee (2014, 253) notes that the pattern of late Iron Age animal husbandry did not change a great deal in the early Roman period, but states that 'the effects of Romanising influences on the local pastoral economy' were felt later on as cattle became more common in the late Roman phase. The implication of this statement is that cattle became more important as a commodity within the Romano-British economy. As demand for arable produce increased, more cattle were required for tillage and older animals were sent to the urban market or to the military for meat, bone, horn and leather. This theory

has been more recently supported by the examination of zooarchaeological datasets from a large number of urban and rural sites across Britain (Maltby 2010; Allen 2017). It seems likely that the late 2nd- to 4th-century assemblage at Chapel Lane reflects this late Roman pattern of livestock exploitation.

5.1.44 Some evidence for the use of heavy cleavers was found in the assemblage, a trait which is usually associated with Romano-British towns (Maltby 2007), but there is no strong evidence for the intensive butchery practices often found in many urban centres, such as the axial splitting of long bones or trimming around the scapulae. Intensive butchery at towns reflected rapid processing of large numbers of cattle and other livestock, but this is unlikely to have been the case at Chapel Lane which was probably home to a fairly small roadside community. Equally, evidence for small-scale horn- and antler-working is evident but no more than was required for local needs.

5.1.45 The high proportion of horse bones is notable. Even when articulated remains are accounted for, the percentage is high for a rural site. It is unusual for horse remains to represent more than 10% of the overall assemblage at rural sites in this period (Allen 2017, 124–5). Horse bones accounted for around 10% of the assemblages at the roadside settlements at Bainesse and Sleaford Power Station (see above), which is also higher than at roadside settlements in southern England (ibid., fig. 3.48). This may relate to the economic importance of horses at these types of settlements in the Midlands and further north during this period. The proximity of Chapel Lane to Margidunum and Newton villa may also be relevant here. No neonatal or infant horse bones were found at the site, which suggests that horse breeding was occurring elsewhere. Such remains were recovered from the hinterland excavations, though the report does not state exactly where they were found (Higbee 2014, 252). It is possible that horse rearing was locally controlled or managed from the villa. Horse remains from Chapel Lane indicates that they were mostly working animals. Analysis of withers' heights indicate that they were comparatively tall, and bitting wear on the anterior teeth suggests that they were ridden. Ageing data demonstrates that horses lived to a mature if not elderly age, consistent with that seen in modern working animals. Some horses may have been eaten, as butchery marks were found on long bones to indicate that the carcasses had been dissected, while some had clearly been skinned. Horse meat probably made an infrequent appearance in the local diet, however, as horse carcasses do not appear to have been treated in the same way as cattle, which were more intensively butchered (see above). The horse skeleton buried in pit 170 is notable for having its legs removed before the trunk was placed in the feature.

5.1.46 The position of the site on a high ridge along the Fosse Way afforded views overlooking the Bingham Basin to the south-east, an area of low-lying waterlogged land that formed from a prehistoric lake (Knight *et al.* 1999). Analysis of land snails from a palaeochannel that flowed into the Basin from the north of the site strongly suggests the presence of an open landscape with long, damp grass. Such lush pasture would have been perfect for cattle and horses to graze on, the environment allowing for potentially large-scale management of livestock. The proximity of the Bingham Basin was possibly a major factor in the establishment of Margidunum and Newton villa in this area after the construction of the road. In excavations closer to the villa, there was

clear evidence of field systems and probable paddocks (Cooke and Mudd 2014). Of course, the relationship between Chapel Lane and the villa is unclear. It is possible that Chapel Lane represents a largely self-sufficient agricultural community living along the roadside, making a living from cattle farming. Alternatively, the community may have been subservient to the villa estate and helped to manage livestock on the villa's behalf. It is notable that no remains of neonatal livestock and very few bones from infant animals were found at the site. This may be partly due to recovery bias, but it still unusual for none to be present. In contrast, neonatal livestock bones were found in all phases in the Margidunum hinterland assemblage (Higbee 2014, 53). The lack of evidence for livestock breeding at Chapel Lane perhaps suggests that the settlement was receiving livestock from the estate. If the villa was a producer of cattle and horses, it may be that some were sent north-east to Lincoln and south-west to Leicester for sale in the urban market.

5.2 Fish remains *by Rebecca Nicholson*

5.2.1 A single bone and two fish scales were recovered from the residues of processed soil samples. These were routinely sorted to 2mm, and in two instances scanned to 0.5mm. Identifications are based on comparison with the author's comparative osteological collection and a published atlas of fish scales (Steinmetz and Müller 1991).

5.2.2 The solitary fish bone comprised a fragment of a burbot (cf. *Lota lota*) precaudal vertebra from a fish >20cm long, recovered from layer 919 (sample 212). Two tiny fish scales, only one of which was complete, are both likely to be cyprinid (Cyprinidae), the intact specimen possibly barbel (*Barbus barbus*). Both were found in fill 970 of Phase 2 well 790 (sample 214). Burbot, a freshwater member of the cod family (Gadidae) is now almost certainly extinct in the UK, but used to inhabit rivers in the east of England including the River Trent, being relatively common there even in the 19th century (Worthington *et al*. 2011).

5.2.3 It is likely that these scant remains come from small fish caught in nearby rivers or streams. They are of limited significance beyond the fact that they suggest occasional procurement and consumption of freshwater fish. Roman rural sites in England rarely produce fish bones, but where they are recovered as here they typically comprise small numbers of freshwater fish remains, usually dominated by the catadromous eel, but also sometimes together with small numbers of flatfish or herring bones (Locker 2007).

5.3 Charred plant remains *by Sharon Cook*

Introduction

5.3.1 Following processing and rapid assessment of twenty-two bulk soil samples and seven 1L incremental samples, six flots, all from the mid to late Roman phase (2nd–4th century AD), were selected for analysis based on the quantity and quality of the plant remains.

5.3.2 The samples were processed using standard water flotation methods with the flot collected on a 0.25mm mesh and the residues on a 0.5mm mesh. The dried flots were sorted using a low power (x10) binocular microscope to extract cereal grains and chaff,

smaller seeds and other quantifiable remains. Dried residues were routinely sorted to 2mm and a proportion of the <2mm fraction scanned and sorted if appropriate. Identifications were carried out using standard morphological criteria for the cereals (Jacomet 2006; Cappers *et al*. 2006) for identification of wild plant remains, as well as comparison with modern reference material held at Oxford Archaeology. Classification and nomenclature of plant material follows Stace (2010).

5.3.3 Quantification of remains is as follows: cereal grains and the seeds of wild plants were only quantified for items of which more than half was observed, which means that all cereal and seed counts may be used to reach a minimum number of individuals (MNI); for chaff, awns and nutshell fragments the count is for all observed fragments, which means these figures are not suitable for use in calculating MIN.

The assemblage

5.3.4 Details of the processed samples and identified material is given in Table 63. Generally, the archaeobotanical remains from across the site are in poor condition, with flots typically small in size and containing small-sized charcoal (<2mm), some of which is heavily mineral encrusted. Cereal grains are largely fragmented and missing the testa, with a generally clinkered appearance, although occasional grains in much better condition indicate that grain condition is likely to reflect the burning process rather than post-depositional degradation.

5.3.5 The vast majority of identifiable grains are wheat (*Triticum* sp.) although a small number of grains in poor condition are possibly barley (*Hordeum* sp.). The majority of grains categorised as indeterminate are of a shape and size consistent with wheat or barley as opposed to oat (*Avena* sp.) or rye (*Secale cereale*) but due to fragmentation further identification is impossible.

5.3.6 Most of the flots include some cereal chaff but this is mostly small fragments of wheat glume base which retain insufficient characteristics to be firmly identified to species. Fragments of oat awns are also present.

5.3.7 The seeds of uncultivated plants can provide valuable information about soil type, geology and cultivation practices. In these samples, the wild plant seeds are in very mixed condition, with a number missing their distinguishing characteristics, and so many have been identified only to family or genus, which limits their interpretative value. The seeds are typically from plants of cultivated fields, disturbed ground, grassland or damp ground.

5.3.8 All of the samples analysed date from Phase 2. Sample 66, from the single fill of ditch 1013 produced a very small amount of grain (probably wheat) in poor condition and a small quantity of wild seeds which are a mixture of arable weeds and plants that are generally found at field edges and/or on rough ground. Sample 66 also includes a single fragment of hazelnut shell (*Corylus avellana*).

5.3.9 Sample 202 from the single fill of ditch 910 stands out from the other samples on this site due to the large amount of chaff present. While the majority of this material is extremely fragmented meaning that an accurate estimate of glume base numbers is not possible, the high proportion of chaff:cereal grains may indicate that this section

of the ditch has been used to discard material derived from processing. The few identifiable glume bases are all spelt wheat (*Triticum spelta*), but the grain is mostly unidentifiable (wheat/barley). All of the identifiable grains are wheat. While a single grain, in poor condition, could be either oat or brome the presence of oat awn fragments in the flot perhaps makes wild or cultivated oat more likely. Weed seeds are present in moderate amounts and are dominated by stinking chamomile (*Anthemis cotula*), small Fabaceae such as vetches/medicks (*Vicia*/*Lathyrus*/*Medicago* sp(p).) and grass seeds (Poaceae).

5.3.10 Sample 208 came from the upper fill of pit 107 located towards the northern edge of the site. In contrast to the contents of sample 202, this sample includes a small chaff component accompanying a larger quantity of cereal grain. The sample is notable for the large proportion of sprouted grains and the large number of detached coleoptiles. In this case the sprouting is likely to have affected the structural integrity of the grain, which may explain the fragmented nature of many of them.

5.3.11 In addition to the sprouted grain, sample 208 also contains the largest proportion of wild plant seeds among the recorded samples, a mixture of common arable weeds such as stinking mayweed, vetches and grass seeds combined with a number of plants typical of damp ground such as spike rushes (*Eleocharis* sp.), rushes (*Juncus* sp.) and sedges (*Carex* sp.).

5.3.12 The remaining three samples (201, 207 and 212) date from the late 3rd and 4th centuries and generally contain less abundant charred plant remains than those discussed above. Sample 201, which is from the single fill of ditch 1021 at the southern end of the site, contained only a small number of cereal grains, a moderate quantity of cereal chaff and a small number of wild plant seeds.

5.3.13 Sample 207, from the single fill of ditch 1010, which traverses the site, contains a similar suite of plant remains similar to sample 201.

5.3.14 Sample 212, from a layer overlying surface 918 which is close to pit 107 (sample 208), contains a similar range of material, albeit in much smaller quantities, with the exception of grass seeds (Poaceae) which are very common.

Discussion

5.3.15 While these excavations have not produced samples that are particularly rich in charred grain and other charred plant remains, the general distribution of remains is similar to that reported from site DE3001 of the A46 Improvement Scheme excavations (Stevens 2014). At that site, the charred material dating to the early Roman period was generally richer in the northern area, largely concentrated around a corndryer, and less common further to the south, which is the area closest to the current excavation. Later Roman crop-related activity appeared to be concentrated further north and was associated with a collection of stone buildings.

5.3.16 It is therefore likely that the relative lack of charred plant remains at Chapel Lane is a reflection of its position south of the main areas of crop-related activity and the absence of corndryers and granaries in this part of the settlement. In many cases the sampled deposits are likely to be remnants of activities taking place further to the

north, with the majority of material being small and fragmented – possibly windblown or carried across the area by other means.

5.3.17 Only two of the samples contained significant quantities of charred material and these are very different in terms of their content: sample 202 is chaff-dominated and sample 208 is grain-dominated. While sample 202 appears likely to reflect the burning of crop processing waste, possibly as fuel, sample 208 is less easy to interpret.

5.3.18 Archaeobotanical assemblages on British rural sites are typically charred and are often dominated by the by-products of grain de-husking and cleaning, which are deliberately burnt as either fuel or waste (van der Veen 2016). This generally results in assemblages of chaff and weed seeds, with only little grain, a pattern that can be seen clearly in the majority of the samples from Chapel Lane.

5.3.19 The presence of sprouting grain within a charred assemblage can be an indicator of grain spoiled during storage or a result of deliberate malting. In the case of sample 208 the presence of a fairly wide range and significant quantity of charred seeds of uncultivated plants probably means that the former interpretation is more likely. Generally, the presence of quantities of germinated grain during the Roman period has been interpreted as a reflection of the large-scale production of cereals and malting of grain for beer production (van der Veen 2016). Germinated grains and coleoptiles were also recovered from a corndryer at A46 Improvement Scheme excavation area DE3001 (Stevens 2014) and in that case it was suggested that the remains were indicative of malting.

5.3.20 The charred material from layer 919 (sample 212), which is located fairly close to pit 107 (sample 208), also contains a large proportion of charred seeds from uncultivated plants in comparison to the majority of samples from this site, many of which are typically found growing as weeds in arable fields. This may also be part of a dump of cereal processing waste, as the seed types are similar to those in sample 208.

5.3.21 During the 2nd and 3rd centuries it is believed that an expansion of arable farming took place into areas that were previously under-exploited, as evidenced by an increase in weeds associated with low soil fertility such as stinking chamomile (*Anthemis cotula*), which is associated with heavier clayey soils, and medicks (*Medicago* sp.) and vetches (*Vicia*/*Lathyrus* spp.), which are commonly found on sites with low nitrogen values (Lodwick with Brindle 2017). Together with this an increase in plants with a preference for damp conditions such as sedges (*Carex* sp.) and rushes (*Juncus* sp., *Eleocharis* sp.) is also noted (Allen and Lodwick 2017). These seeds are all common within this assemblage, which would indicate the cultivation of heavy, seasonally damp soils, although the largest component is grass seeds which are present in all of these samples.

5.3.22 While grass seeds were common within the assemblages from the A46 Improvement Scheme and in some cases have been associated with the burning of heath-grassland vegetation (Stevens 2014), this interpretation was largely based on the presence of charred stems and roots. The lack of such material in samples from the Chapel Lane indicates that in this case the grass seeds probably come from accidentally harvested plants.

5.3.23 It is possible that the presence of grass seeds in relatively large amounts (compared to the other seeds) is indicative of land being periodically left fallow for grazing in order to increase fertility of the soil; this has been suggested as a strategy (Allen and Lodwick 2017; Savio 2011) and is mentioned by both Cato and Columella in their works on agriculture. It is not clear, however, if this method of increasing yields extended as far as the British Isles in the Roman period. At Chapel Lane, given the small number of samples studied the evidence is equivocal; it is equally possible that grasses growing on the periphery of the crop fields were accidently incorporated into the harvested material.

5.3.24 Considered together with the faunal evidence for livestock farming from the presence of cattle, horse and sheep/goat on the site (see Allen, this volume), the archaeobotanical remains are consistent with arable cultivation predominantly focussed on glume wheat (likely to be mainly spelt) as part of a mixed farming regime.

Table 63: Summary of charred plant remains

Sample no.		**66**	**201**	**202**	**207**	**208**	**212**
Context no.		**313**	**369**	**911**	**909**	**108**	**919**
Feature		**1013**	**1021**	**910**	**1010**	**107**	**1026**
Feature type		**Ditch**	**Ditch**	**Ditch**	**Ditch**	**Pit**	**Layer**
Phase		**2**	**2**	**2**	**2**	**2**	**2**
Volume (l)		**10**	**18**	**40**	**40**	**40**	**40**
Flot volume (ml)		**65**	**10**	**18**	**10**	**90**	**100**
Flot analysed		**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Charcoal	>2mm	***	**	***	**	****	***
Cereal grain							
Triticum sp.	Wheat		5#	15#	2#	110#	14#
cf. *Triticum* sp.	cf. wheat	3#	3#	9#			16#
Triticum sp.	Wheat collapsed grain					3#	
Triticum sp.	Wheat sprouted					84#	1#
cf. *Hordeum* sp.	cf. barley					2#	2#
Avena/Bromus	Oat/brome		1#	1#	1#	8#	5#
Cerealia	Indet. cereal	1#	15#	45#	3#	234#	29#
Chaff							
Triticum dicoccum/spelta	Emmer/spelt glume base fragments		108#	837#	78#	157#	169#
Triticum spelta	Spelt glume base		4#	21#	8#	15#	25#
cf. *Triticum dioccum*	cf. emmer glume base				4#		
Triticum dicoccum/spelta	Emmer/spelt glume base			18#	6#	9#	11#
Triticum/Hordeum	Rachis fragments			1#	1#		
Triticum sp.	Wheat detached embryos		2#	2#	1#		2#
Triticum sp.	Wheat coleoptiles		6#	6#		52#	2#
Cerealia	Indet. detached embryos			3#			
Avena sp.	Oat awns			***	***		**
Fruit, nutshell etc							
Corylus avellana	Hazelnut shell	1#					
Wild Species							
Fabaceae	Pea family (small)			1#		1#	
Vicia/Lathyrus sp. *>2 mm*	Vetch/vetchling/tare etc	2#		2#		3#	3#
Vicia/Lathyrus sp. *<2 mm*	Vetch/vetchling/tare etc		3#	8#	3#	19#	8#

Medicago type	Medick type (small)	5			2#	1	8#
Potentilla cf. *anserina*	Silverweed						
Brassicaceae	Cabbage family				3#		
Persicaria sp.	Knotweed (2 sided)						1#
Rumex spp.	Docks	2#	1	1#		3#	6#
Caryophyllaceae	Pink family				1#		
Stellaria media	Common chickweed						3#
Chenopodium album	Goosefoot					1#	2
Montia fontana	Blinks					3#	5#
Galium aparine	Cleavers					2#	1
Veronica hederifolia	Ivy-leaved speedwell			2	1		
Plantago lancelota	Ribwort plantain	1				1#	
Asteraceae	Daisy family		2#	1#	1#	6#	1#
Centaurea sp.	Knapweed						1#
Anthemis cotula	Stinking chamomile	1	1	13	2	4#	
Leucanthemum vulgare	Oxeye daisies			3#			
Tripleurospermum sp.	Mayweed			1#		4#	5#
Leucanthemum/ Tripleurospermum sp.	Oxeye daisies/mayweed						1#
Juncus spp.	Rushes		3			2#	5#
cf Juncus sp.	cf rushes	1				4#	
Eleocharis sp.	Spike rushes					4#	1#
cf *Eleocharis* sp.	cf spike rushes					1#	
Carex/Rumex	Sedges/docks (3 sided)					1#	7#
Carex spp.	Sedges	1				6#	5#
Poaceae	Grass seeds (various)	12#	3#	7#	2	14#	32#
Danthona decumbens	Heath grass					1	1#
Other							
Indeterminate	Seed/fruit		4#	3#	3#	25#	13#
Raphanus raphinitrum	Capsule fragments				1#		

Key: # Majority damaged or partially fragmented; * = 0–4, ** = 5–24, *** = 25–99, **** = 100+

5.4 Charcoal *by Julia Meen*

5.4.1 The twenty bulk sediment samples processed for charred plant remains were scanned for the presence of charcoal, and on the basis of this initial assessment five samples were identified as being suitable for further work to identify the range of wood taxa present.

5.4.2 Charcoal fragments of potentially identifiable size were randomly selected from each sample. While normally it is preferable to identify around 100 pieces in order to fully

characterise the diversity of wood taxa in an assemblage, there was not always sufficient charcoal available and in these cases 50 items were identified. Each fragment was fractured and examined on the transverse, radial and tangential sections as necessary at up to x400 magnification using a Brunel SP-400BD metallurgical microscope. Species identifications were made on the basis of diagnostic anatomical characteristics, using criteria in Hather (2016) and Schweingruber (1990). Nomenclature follows Stace (2010).

5.4.3 Wood species identifications for each sample are shown in Table 64, and Figure 51 illustrates the relative proportions of taxa in each assemblage.

Table 64: Charcoal identifications

Sample no.		**66**	**208**	**212**	**42**	**65**
Context no.		**312**	**108**	**919**	**222**	**299**
Feature		**1013**	**107**		**221**	**298**
Feature type		**Ditch**	**Pit**	**Layer**	**Posthole**	**Pit**
Phase		**2**	**2**	**2**	**2**	**2**
Charcoal >4mm		**5**	**48**	**26**	**4**	**134**
Charcoal 4–2mm		**54**	**200**	**118**	**64**	**500**
Prunus sp	blackthorn/cherry		10		5 (r)	2
Maloideae	hawthorn/apple/ whitebeam/rowan type		1	1		
cf. Maloideae	cf. hawthorn/apple/ whitebeam/rowan type	1	1	1	1	
Prunus/Maloideae	blackthorn/cherry/hawthorn type			2		
Quercus sp.	oak	41	59 (r, h)	30 (r)	28	96 (h)
cf. *Quercus* sp.	cf. oak	8	2	4	6	1
Betulaceae	birch family		2			
Betula sp.	birch		1			
Corylus avellana L.	hazel		4 (r)			
cf. *Corylus avallana* L.	cf. hazel		3			
cf. *Salix/Populus*	cf. willow/poplar		1			
Acer campestre L.	field maple				1	
cf. *Acer campestre* L.	cf. field maple		2		1	
Fraxinus excelsior L.	ash		1	5	3	
cf. *Fraxinus excelsior* L.	cf. ash		3	1		
Ring porous			1			
Diffuse porous			8	1		
Indeterminate			1	5	5	1
Total		50	100	50	50	100

5.4.4 The identifications show that oak is the dominant taxon in all five analysed assemblages, with small quantities of other taxa including ash (*Fraxinus excelsior*),

hazel (*Corylus avellana*), field maple (*Acer campestre*), hawthorn/apple/whitebeam type (the Maloideae group) and blackthorn/cherry (*Prunus* sp.). There is no clear spatial patterning or evidence of deliberate selection of certain taxa, and it is likely that the species represented reflect what was growing in local woodlands or hedgerows.

5.4.5 Contemporary charcoal assemblages from an area of roadside settlement close to Margidunum have previously been examined at the A46 Improvement Scheme. This showed that a similar range of wood taxa were present, with oak predominant in most assemblages, complemented by small quantities of taxa including alder (*Alnus glutinosa*), field maple, willow/poplar (*Salix*/*Populus*), hazel and hawthorn type (Barnett 2014). Such mixed assemblages were interpreted as deriving from the collection of wood from hedgerow or scrub for domestic fires. However, the A46 sites also revealed structures that included corndryers and a hearth, and charcoal from these showed a contrast with the domestic deposits in that they solely contained oak, apparently indicating deliberate selection of oak fuelwood for specific purposes.

5.5 Radiocarbon dating *by Andrew Simmonds*

5.5.1 Samples of human bone from skeleton 794 and the disarticulated femur with anthropogenic modifications from pit 107 were submitted to the Scottish Universities Environmental Research Centre (SUERC) AMS Facility, Glasgow, for radiocarbon dating (Table 65). The calibrated age ranges were determined using the University of Oxford Radiocarbon Accelerator Unit calibration program OxCal 4.3.2 and the IntCal13 curve. They are cited in the text of this report at the 95% confidence level (2 sigma) and have been rounded out to the nearest five years following Mook (1986, 799).

Table 65: Radiocarbon dates

Lab. ID	Context	Feature	Material	$\delta^{13}C$ (0/00)	Radiocarbon age (BP)	Calibrated date (95.4% confidence)
SUERC-84129	Skeleton 794	Well 790	L. femur shaft	-20.4	1552 ± 25	Cal AD 425–565
SUERC-89919	Fill 108	Pit 107	Femur	-20.0	1865 ± 23	Cal AD 80–225

6 DISCUSSION

6.1 Early Roman period

6.1.1 A small number of features that preceded the construction of the Phase 2 enclosures were assigned to an early Roman phase. Dating evidence for this phase was unfortunately poor. Only a handful of sherds from the excavation were dated to before the mid 2nd century and these were all residual in later contexts.

6.1.2 The large north-south aligned ditch 1017 was one of the few linear features that were not aligned either parallel or perpendicular to the adjacent Fosse Way. This ditch was essentially undated (containing a single sherd of generic Roman pottery), but it was clearly earlier than all the other features with which it has stratigraphic relationships. The fact that its alignment disregarded that of the road strongly suggests that it was dug before the road was built, though this is not capable of proof. The date of construction of the Fosse Way is unclear, but it was probably in place by the time Margidunum was established to the north, which on current evidence occurred sometime in the AD 50s. Apparent early Roman features were discovered on the western side of the road during the A46 Improvement Scheme (Cooke 2014a, 106–11). Two small, curvilinear enclosures (J and H) were encountered at the edge of the trench, due west of ditch 1017 (ibid., fig. 4.11). Dating evidence suggests that these were established during the late Iron Age and recut in the early Roman period. Both enclosures where then cut by two straight, roughly east-west ditches that may have defined a trackway, and these were probably associated with a boundary ditch that extended southwards perpendicular to the trackway ditches (ibid., fig. 4.17). The excavators placed these ditches in the middle Roman period as they cut the late Iron Age/early Roman enclosures (J and H), but they were not securely dated. Curiously, the trackway ditches align very well with ditch 1017, which was parallel to the perpendicular ditch just less than 200m to the east. The dimensions of the trackway ditches were not presented in the A46 Improvement Scheme report for comparison. It is possible that the alignment of these ditches is coincidental, but if they were related it seems likely that they were dug before the Fosse Way was constructed given that the road extends across their projected alignment.

6.2 Middle and late Roman occupation and the cemetery

6.2.1 During analysis it was decided that activity of the middle and late Roman periods should be amalgamated into a single phase, since the roadside enclosures were evidently in continuous use from the 2nd century until the end of Roman activity sometime in second half of the 4th century, and the dating evidence was not able to effectively divide this occupation into practical sub-phases. The longevity of some of the features, particularly the principal boundary ditch 1010/1022, defied such sub-division, while in other instances artefactual dating evidence comprised pottery groups with wide possible date ranges, often extending from the 2nd century to the 4th. Establishing the dates of the burials was particularly difficult, given the general absence of grave goods, and in most instances the only dating evidence came from residual pottery and therefore provided only a *terminus post quem*, often with an

unhelpfully broad date range. The radiate of Tetricus dated 271–4 from grave 537 and the irregular issue dated *c* 350–64 from grave 994 demonstrate the late date of at least some of the burials, as do a dropped flange dish in sandy reduced ware and a body sherd in East Gaulish 'Rhenish' ware from grave 38, a hammerhead mortarium in Mancetter-Hartshill white ware from grave 542 and a globular beaker in fine reduced ware and body sherds in Nene Valley colour-coated ware from grave 699, which indicate a date no earlier than the middle of the 3rd century for these burials, but it is not certain how early burial here began.

6.2.2 The construction of the roadside enclosures around the middle of the 2nd century marked a significant change in the landscape. The enclosure was defined by the long boundary ditch 1010/1022 that extended the full length of the excavation. Its southern end turned back towards the Fosse Way at an acute angle that mirrors the corresponding boundary on the west side of the road (Cooke 2014a, 127); this appears to define the south-western limit of the roadside occupation, and corresponds closely with the end of the extent of fieldwalking finds identified by Leary and Baker (2004, fig. 29). The northern limit of the enclosures lay beyond the excavation area. Roadside complexes of this period often have buildings aligning the road with plots of land behind (eg Lawrence and Smith 2009; Cowie *et al*. 2013); the enclosures at Chapel Lane may represent the rear part of such an arrangement, although roadside enclosures also occur with no internal features, when they apparently represent paddocks or fields designed to provide easy access to the road to facilitate movement of livestock (eg Gill Mill Quarry, Oxfordshire: Booth and Simmonds 2018). A gap of about 20m between the excavation area and the presumed alignment of the Roman road beneath the modern carriageway meant that any roadside buildings at Chapel Lane would not have been exposed.

6.2.3 Although no clear evidence for buildings was found, two possible structures were identified. Feature 918 consisted of a deliberately laid surface made of unshaped limestone blocks. It was very similar in size and construction to two stone platforms identified to the north during the A46 Improvement Scheme (Cooke 2014a, 137–9, figs 4.46 and 4.49). These features were interpreted as stone footings or foundations for small buildings close to the roadside and it was suggested that they may have acted as support for some sort of funerary monument. Further to the south, a possible structure was defined by six postholes (structure 1027; Fig. 7). Four of the postholes were arranged in a straight line 12m long, with the two internal postholes (68 and 221) lying 6m from each other and 3m from the two outer postholes (66 and 228). Two more postholes (90 and an unexcavated feature) were aligned perpendicular to the first four, aligned on the two internal postholes (66 and 228) about 8m to the south-east, forming a rectilinear shape in plan. If this structure was a building, there was no evidence of internal supports and the distance between each posthole seems to have been too far to have supported a large or heavy superstructure, and it is possible that the structure represents a fenced enclosure or pen rather than a building as such. Well 192 was positioned within the structure, though this feature may not have been contemporary and appears to have had its own superstructure defined by a group of postholes surrounding it. The structure may have been associated with metalworking,

since hammerscale flakes and occasional small smithing spheres as well as some very tiny fragments of abraded undiagnostic slag were recovered from a soil sample from posthole 221. The overall quantity of smithing material was very small, but it is possible that much had been lost to truncation by medieval and modern ploughing. Evidence for metalworking was also recorded to the north at A46 Improvement Scheme excavation area DE3002, where a rectangular building (Structure 17) was associated with working of iron, copper and possibly lead (Cooke 2014a, 119).

6.2.4 Despite the lack of structural evidence, the presence of domestic activity is implied by the quantities of pottery and animal bones recovered from ditches and pits within the enclosure. The distribution of animal bones and pottery along boundary ditch 1010/1022 suggests that occupation was focussed in the central/northern half of the enclosure (see above), notably where the greatest concentration of burials and enclosure subdivisions were located. It is possible that occupation varied along the road south from Margidunum; a fairly intensive level of domestic occupation was recorded along the roadside about 150m north of the current excavations in trench DE3002 during the A46 Improvement Scheme. The nature of this activity changed over time, but it appears to have lasted throughout the Roman period (Cooke 2014a, 110–1, 116–4, 136–40). It included clear evidence of buildings. The early Roman buildings were mainly circular timber structures represented by ring gullies (similar to gully 182), and these gave way to rectilinear post-built structures, some with clay floors, in the middle and late Roman phases.

6.2.5 The laying out of the roadside enclosure in the mid 2nd century occurred alongside wider changes in the landscape during this period. The apparent military occupation of Margidunum is thought to have ended sometime between 75 and 150 (Todd 1969, 70). The construction of masonry buildings within the town and of defensive earthworks around it hint at the presence of a developing 'small town', perhaps supported by trade along the route of the Fosse Way between Leicester (*Ratae Corieltauvorum*) and Lincoln (*Lindum*). The distribution of pottery and other finds from previous fieldwalking also shows that settlement extended southwards along the roadside (Leary and Baker 2004, 10–13). The 2nd century also saw a shift in local rural communities in the area to the west becoming focussed on the Fosse Way (Cooke 2014a, 111). It seems likely that the settlement at Chapel Lane represents a fairly small, but perhaps relatively self-sufficient agricultural community that benefitted from its proximity to the road and to Margidunum. The relationship between the roadside settlement at Chapel Lane and the nearby Newton villa is less certain. The villa has not been excavated, so its exact period of occupation is not known. Geophysical survey, however, suggests that it was of a considerable size (Leary and Baker 2004, 15–24). It might be assumed that the villa formed the centre of a potentially large estate with much influence in the hinterland around Margidunum.

6.2.6 The economy of the roadside settlement is difficult to assess. Two rotary querns suggest small-scale flour production for domestic consumption, though charred plant remains were generally sparse. A relatively large quantity of cereal grain was recovered from the upper fill of pit 107, much of which had sprouted, and there were numerous detached coleoptiles. Although sprouted grain may represent a spoiled batch, such

remains are commonly interpreted as debris from malting as part of the brewing process. This deposit could therefore represent a dump of material after mashing. In addition to the sprouted grain, the deposit also contained weed seeds with frequent inclusions of damp-ground species. The presence of these plant taxa indicate that arable farming extended onto the lower-lying wetter areas of land nearby, perhaps towards the Bingham Basin to the south-east of the site. Sprouted grain and grasses may also have been used as fodder for livestock. As well as the putative domestic activity, the complex of conjoined enclosures is typical of arrangements elsewhere that have been interpreted as evidence for the management of livestock (Booth and Simmonds 2018, 787–8; Jones *et al*. 2008, 84–7), and the high proportion of cattle and horse bones indicates that husbandry of these animals formed an important component of the economy. The proximity of the settlement to the Bingham Basin would have provided ample grazing land for cattle and horses. It was notable that the animal bone assemblage from excavations on higher ground to the north around Newton villa has higher proportions of sheep bones (Higbee 2014), perhaps indicating that pastoral strategies may have varied across the local landscape according to variations in the topography. This perhaps suggests that an integrated system of livestock husbandry was in place across the Margidunum hinterland. The character of the remains at Chapel Lane was more akin to rural settlements than to urban centres, and it is likely that the roadside enclosures were primarily engaged in agricultural production, supplying goods to the market in Margidunum. It is significant, therefore, that there was no evidence for either breeding of livestock, in the form of neonatal deaths, or processing of crops, in the form of corndrying ovens or dumps of burnt waste from such activities; this suggests that these activities took place elsewhere and that the roadside enclosures were more involved in gathering of produce for trans-shipment to Margidunum or beyond. The location of the town roughly halfway between Leicester (*Ratae Corieltauvorum*) and Lincoln (*Lindum*), and approximately a day's travel from each, means that it was probably an important stopping point and a conduit for people, goods and information travelling between the two towns, and potentially that it was part of the longer transport network between the agricultural south and the garrisons of the North.

The burials

6.2.7 The graves that were distributed intermittently along the west side of ditch 1010/1022, at the rear of the roadside plots, are assumed to represent the population who resided within or otherwise utilised the enclosures. The isotopic evidence supported this, indicating that the ten sampled individuals were all of local origin. The chronological relationship between the apparent domestic activity and the burials placed predominantly to the rear of the enclosures is difficult to assess. Nonetheless, two possible interpretations can be offered here. Almost half the pottery assemblage dated to the middle Roman period (*c* AD 120–250), while only 14% dated to the late Roman period (*c* AD 250–400) and most of the remainder spanned these date ranges. It is therefore possible that occupation was most intensive in the later 2nd and early 3rd century, with a reduction thereafter, and that use of the enclosures as a burial ground occurred after the domestic occupation had ceased. Alternatively, the site may have

had a domestic element right through to the 4th century with the burials being placed in 'backyard' plots throughout the period, and this interpretation would be more consistent with the evidence from the coin assemblage, which suggests a peak in activity, or at least coin loss, during the second quarter of the 4th century, petering out over the course of the third quarter. Extended supine inhumations are often assumed to represent late Roman burial practices, though this form of burial was not uncommon from the 2nd century (Smith *et al*. 2018). Dating evidence from the inhumation burials was rare; small quantities of pottery were recovered from 40 of the 52 inhumations but none of this material was deliberately placed as grave goods and it is likely to have been incorporated incidentally with the backfill from the contemporary ground surface, along with small quantities of slag and tile. The date of the pottery from graves ranged between the 2nd and the 4th centuries with a concentration in the middle Roman period consistent with the wider pattern of pottery use at the site, as one would expect for residual material derived from the general reservoir of refuse on the site. There was also no clear distinction between the pottery forms and fabrics found in burial contexts compared with other features, apart from a slightly higher proportion of beakers and cups. It is possible that some of the latter sherds derive from vessels that were used in grave-side rituals and commemorations, which often involved feasting (Biddulph 2015). Hobnails were found in 18 graves and are sometimes taken as a marker of late Roman inhumations, though a recent survey has shown that hobnails are not unusual in middle Roman contexts (Smith *et al*. 2018, 268, fig. 6.48).

6.2.8 The 52 graves and one cremation burial were all located in relation to the main boundary ditch (1010/1022) that defined the rear of the roadside plots, most lying parallel to it and a few at right angles. A single grave (990) was dug entirely into the fill of an early phase of the ditch, and was presumably contemporary with the adjacent later iteration, and grave 554 also slightly cut into the earlier ditch. This association with a boundary is a typical location for burials on rural settlements and at smaller nucleated centres (Esmonde Cleary 2000; Pearce 1999). The burials comprise a remarkably consistent group as regards burial rites, comprising extended, supine burials with the arms usually placed either by the sides or with the hands resting, sometimes crossed, on the pelvis, and only a few burials with the arms folded across the chest. The burials comprise single, discrete graves with the exception of two instances (56 and 355) where particularly large graves contained two burials that were evidently inserted in a single episode, the skeletons lying close together with arms overlapping. The individuals in grave 355 were a possible male aged 36–45 years and a female aged 26–35 years and those in grave were a possible male aged 36–45 years and an individual of undeterminable sex aged 18–25 years, and it is tempting to see these as the burials of married couples.

6.2.9 A total of 24 graves (45%) were interred within timber coffins, which were represented by coffin nails indicating that they were nailed at the corners and occasionally also at the middle or a third of the way along. This is a rather higher proportion than the figure of 20% burials provided with coffins recorded by the Roman Rural Settlement Project, but the latter aggregates burials from a wide range of site types with vastly different

representation of coffins, and the authors cautioned that coffin use may have been in part due to the choices of individual communities rather than having any greater significance regarding, for examples, the status of the buried individual (Smith *et al*. 2018, 254). In addition to the evidence for coffins, the stone slabs that lined the base of grave 579 presumably represented some form of cist, although there was no indication that the sides of the burial had been similarly lined, apart from a stone that had collapsed onto the feet and a single stone that may have been deliberately placed on the hands. Fifteen individuals (29% of the total) were buried shod in hobnailed footwear, but this information is difficult to interpret due to the probability that others were provided with footwear constructed without hobnails, and in any case the status of such material as grave goods is ambiguous since these items may have been no more than part of the clothes in which the individuals were buried. A rather different instance was represented by grave 267, where the footwear was not worn but had been placed away from the body, and most likely outside the coffin, and a similar instance was recorded in the A46 Improvement Scheme excavation on the opposite side of the Fosse Way (Cooke 2014a, 128). The deliberate burying of footwear with the deceased has been interpreted as related to the journey to the afterlife, and became increasingly popular in the 3rd and 4th centuries (Philpott 1991, 171–3; van Driel-Murray 1999, 131). Other than this, the only evidence for grave goods were deposits of jewellery buried with children aged 1–5 in graves 500 and 994. The child in grave 500 was provided with two shale bracelets and a necklace or bead string comprising 63 glass beads, but bone preservation was very poor and consequently it is not known whether the items were worn, placed loose on the body, or perhaps located on the coffin. The arrangement is more certain in the case of burial 994, where six copper alloy bracelets were looped onto a seventh and placed on the right shoulder and two further bracelets were placed on the left shoulder and near the pelvis. A necklace of glass beads may again have been present, although the beads appeared to be distributed quite widely from the skull to the pelvis. Such item of jewellery, often placed rather than worn, were a common inclusion in burials during the late Roman period, and although the sex of the individuals at Chapel Lane could not be determined, they are particularly associated with the graves of young girls (Cool 2010, 307; Philpott 1991, 142–9). The burial rites at Chapel Lane bear close similarity to the group of 13 graves excavated in a corresponding location along the rear boundary of the similar enclosures on the opposite side of the Fosse Way in A46 Improvement Scheme excavation area DE3001 (Cooke 2014a, 126–31). In addition to the similar choice of location, the burials in DE3001 were all supine interments, nine of them coffined and four with hobnailed footwear, and grave goods were absent with the possible exceptions of a broken finger ring and a single coin. Like the Chapel Lane burials, they were not well dated apart from the inclusion of residual pottery, which included both middle and late Roman sherds and the coin, which was dated to 330–5. The similarities between the two groups of burials strongly suggest that they are the graves of a single community, and that the community shared a very clear idea of what represented an appropriate burial rite. In this they contrast with the small number of burials that Todd excavated close to the defences of Margidunum, which included two

with lead coffins and one individual who had been decapitated (Todd 1969, 76–8), suggesting the individuals buried here exhibited a wider range of status.

6.2.10 The single cremation burial appears as something of an anomaly in a cemetery that otherwise comprises only inhumation burials, although the fragment of cremated long bone recovered from a soil sample from the fill of grave 984 may indicate that other cremations were originally present. It is unfortunate that the urn, a greyware jar, could only be assigned broadly to the Roman period. Cremation was the predominant rite until the 2nd century, after which it was supplanted by inhumation, but persisted as a minority rite (Philpott 1991, 50–2; Pearce *et al*. 2013, 452). The close proximity of burial 670 to a cluster of eight inhumation burials (500, 542, 589, 620, 649, 655, 699, 998) with a further three graves (554, 565, 616) immediately to the south suggests that despite the difference in rite, it formed a contemporary part of the cemetery and was not an earlier feature.

The cemetery population

6.2.11 The cemetery produced a total of 54 articulated inhumations from 52 graves plus the single urned cremation burial, fragments of disarticulated bone from four grave fills, four ditch fills and one pit, and a fragment of cremated human bone from one grave fill, thus representing the remains of at least 65 individuals. Of these, 56 were adults and nine were juveniles; 13 were female, 22 were male, 6 were of indeterminate sex and 22 were unsexed. The predominance of males over females is typical for a Roman urban or semi-urban cemetery, although given the large proportion of skeletons at Chapel Lane that could not be sexed the discrepancy may not be significant. Neonate and infant individuals were completely absent, and a similar pattern was found in the A46 Improvement Scheme excavation on the opposite side of the Fosse Way, where the burials comprised adult inhumations with the exception of one girl aged 15–17 years old (Cooke 2014a, 128). In contrast to this pattern, numerous infant burials were found placed in and around buildings in A46 Improvement Scheme excavation area DE3002, *c* 150m north of the Chapel Lane (Cooke 2014a, 137–9). Most of these dated to the middle and late Roman phases, and adult inhumations were largely absent apart from one late Roman individual. It is probable that babies and the very young were consistently buried close to the home, while those of a certain age and older were buried away from the main domestic area. The practice of burying infants in and around buildings during the Roman period is fairly common and there are many examples of infants found sealed within successive floor layers and others overlain by domestic debris (Millett and Gowland 2015, 184–5). The absence of infants at Chapel Lane may therefore be explained by their having been buried closer to the focus of domestic occupation, which presumably lies unexcavated on the road frontage.

6.2.12 In general, the health of the population is relatively typical of other Roman-period assemblages. For the most part, rates of dental and skeletal pathology were consistent with those reported for other Romano-British populations. Of note was the high prevalence of modifications to the leg and ankle bones that are typically associated with individuals who habitually adopt a squatting posture; this may have been related to the undertaking of everyday domestic, craft or occupational activities. The types of

fractures observed were caused by a variety or direct or indirect mechanisms, with no overt evidence for interpersonal violence. Of note are three skeletons (352, 406 and 705) that exhibited similar supination-adduction fractures to the medial malleolus of the tibiae that are relatively uncommon clinically (Smithius 2012). Clinically, commonly cited causes of these types of fractures include falls and sporting injury (eg during walking, running or jumping), and the instances at Chapel Lane are similarly likely to be accidental, although the occurrence of the same injury in three individuals suggests that the cause was some common activity, and may have been occupational.

Post-mortem modification of human remains

6.2.13 The observation of deliberate cut marks on the disarticulated human femur recovered from pit 107 indicates that human remains were being deliberately modified, albeit in ways and for reasons that are uncertain. The marks are similar in character and location to examples from Longford in Gloucestershire (McIntyre forthcoming) and Gussage All Saints in Dorset (Redfern 2008, 286), and may be evidence for cutting of the muscle attachments around the thigh during deliberate disarticulation of the (partially decomposed?) joints of the corpse. Such manipulation of human remains is commonly thought of as an aspect of Iron Age funerary practice, and indeed a frontal bone at the A46 Improvement Scheme with cut marks interpreted as possible evidence of peri- or post-mortem scalping was dated by radiocarbon to between 100 cal BC and cal AD 30 (Egging-Dinwiddy and McKinley 2014, 152), but a growing body of evidence indicates that such traditions continued into the Roman period (Pearce 2008; 2013, 25 and 145). The Chapel Lane specimen was radiocarbon dated to cal AD 80–225 (94.5% probability) and the bones at Longford, which comprised two femora and a tibia, were recovered from early Roman features. Striking evidence for treatment and modification of the dead during the Roman period has been recorded at Clay Farm, Cambridgeshire, and Gill Mill Quarry, Oxfordshire, both involving skull fragments from Roman deposits that exhibited cut marks interpreted as evidence for defleshing. In the case at Gill Mill, a frontal bone with cut marks and a drilled perforation was dated by radiocarbon to cal AD 85–235 and was recovered from a ditch fill dated certainly later than 300 and possibly after 350 (Loe 2013, 175; Webb *et al*. 2018, 522–6).

6.2.14 The series of peri-mortem cuts to a hand phalanx recovered from the backfill of grave 468 are more difficult to interpret. It is unfortunate that the grave had been disturbed by a modern land drain, which had cut diagonally across the skeleton and completely removed the left hand, as a result of which it is not certain whether the bone was a displaced digit from this burial or an intrusive element. The size, shape, direction and number of cuts is consistent with several cuts being made to the base of the finger by a small knife, either to remove the finger or perhaps to recover an associated item such as a finger ring.

6.3 Anglo-Saxon burial

6.3.1 Evidence of Anglo-Saxon activity in the area had markedly reduced from the late Roman period. Both Oswald (1941) and Todd (1969, 77–80) argued that Margidunum was largely abandoned following the end of Roman occupation, although small quantities of early Anglo-Saxon pottery from both their excavations suggest an

ephemeral presence remained. Further Anglo-Saxon finds, although still few in number, were recovered during fieldwalking surveys along the Fosse Way (Leary and Baker 2004, 34). It has also been suggested that some of Todd's late Roman inhumations found cutting the earthworks around Margidunum could be early Anglo-Saxon (ibid., 21), though there is no conclusive evidence of their date. Signs of early Anglo-Saxon habitation in the wider landscape is equally scarce but nonetheless present. Since Newton villa has not (yet) been excavated, any possibility of continued post-Roman use of the building complex is unknown. Excavation between the villa and the Fosse Way, however, has discovered a few Anglo-Saxon features. The most significant of these was a sunken-featured building located about 250m north-west of Margidunum (Cooke 2014a, 145–7). The feature contained some late Roman/early Anglo-Saxon glass, an Anglo-Saxon cruciform brooch and a wide selection of 5th/6th-century pottery representing at least 48 vessels. Two pits were discovered further south close to the western side of the Fosse Way, one to the north of the current excavations and the other to the south. The nearest Saxon settlement of any significance has more recently been found about 2.3km to the south-west at Saxondale, where an enclosure and several pits were accompanied by a 5th/6th-century cremation cemetery featuring at least 19 burials (Holt 2014, 310–3).

6.3.2 The only evidence for activity of this period at Chapel Lane comprised the burial of an individual suffering from leprosy (794), radiocarbon dated to cal AD 425–565. This was a young person, no older than 18 years of age, of unknown sex, who had been buried in a pit dug into the top of Roman well 790, lying directly on the surface of the well's stone lining. Pottery from the construction packing of the well indicated that it was dug sometime after the middle of the 2nd century, but the sherds from its backfill were not sufficiently diagnostic to establish when it went out of use, although all the material was definitely Roman and, since activity associated with the roadside enclosures apparently ceased before the end of the 4th century, there was presumably some period of disuse before the burial was inserted. A handmade bowl of 5th/6th century date was found in close proximity to the skeleton and is likely to have been deliberately placed as a grave good; it may be significant that the form of the urn was consistent with vessels commonly used as containers for contemporary cremations. Both the radiocarbon date and the dating of the urn indicate that the burial dates from the earliest part of the Anglo-Saxon settlement of the region, which appears to have comprised a piecemeal process, with only limited evidence for Anglo-Saxon material from settlements or cemeteries in Nottinghamshire before the 6th century (Bishop, nd). Isotopic results for this individual are consistent with the local environment, thus it is likely that skeleton 794 spent their childhood in the local area and was not a first-generation migrant, if indeed he/she was of Anglo-Saxon rather than British descent (although non-local origin in a location with a similar environment cannot wholly be ruled out).

6.3.3 The skeleton was particularly notable for the presence of specific infectious lesions consistent with a diagnosis of leprosy, which is a most uncommon find for this period. Although the first written records of leprosy in Britain date to the 10th century (Magilton 2008, 9), the earliest reported archaeological cases date to the Roman

period (Roberts 2002, 213; Rohnbognor 2017, 281). Though the frequency of leprosy in Britain does appear to slowly increase from the Roman period onwards, it is not until the 12th century that infection rates begin to peak (Inskip *et al.* 2015). The number of cases dating to the post-Roman/early Saxon period is small, and they tend to be located in the southern half of England. Examples include a 5th/6th century burial of a leprous male aged around 21–35 years old at Great Chesterford, Essex (Inskip *et al*. 2015), a possible 6th century instance from Beckford in Gloucestershire (Magilton 2008, 9), 7th century cases from Burwell and Edix Hill in Cambridgeshire (ibid.) and Eccles in Kent (Manchester 1981), and a 7th to 8th century skeleton from Tean in the Isles of Scilly (Thomas 1985). Given this evidence, the likely leprosy diagnosis in early 5th to mid 6th century skeleton 794 from Chapel Lane is rare for this period, and unheard of as far north as Nottinghamshire at this time.

6.3.4 It is probable that this condition, and perhaps more significantly any visible disfigurement associated with it, was the reason behind the decision to bury skeleton 794 in a seemingly isolated location, rather than in the community cemetery, wherever that may lie. The juxtaposition of the burial and well is unlikely to be coincidental, but the circumstances that lead to this arrangement can only be guessed at, although presumably the backfilled well remained visible on the ground surface. The burial was at the bottom of a substantial pit, although it was not entirely certain whether it lay at the base of the pit or was already in place and had been disturbed by the pit, which might explain why much of the middle of the skeleton was missing. Neither is it certain what had happened to the upper part of the well lining, which was absent to a depth of *c* 0.5m. Indeed, one possible scenario is that the burial was opportunistically interred within a pit that was initially dug in order to obtain stone from the lining, just as the upper part of the stonework had evidently been robbed from wells 192, 568 and 884.

6.3.5 It is in fact difficult to characterise a typical burial of is date, since, at least by the 6th century when more evidence becomes apparent, both inhumation and cremation cemeteries were in use, as well as mixed rite cemeteries and a few individual burials. In the vicinity of Chapel Lane, an apparently isolated burial with helmet, sword and shield was found at Parsons Hill in *c* 1893 (Meaney 1964, 200), and a probable cremation cemetery has been identified at Starnhill Farm, where fieldwalking produced sherds of Anglo-Saxon pottery and noted that the ground was ‘dotted with patches of ash and cremated bone’ (Alvey 1980, 82–4). Another isolated weapons burial was found at Aslockton during gravel quarrying in 1893 (Meaney 1964, 202) and a little further afield further cremation cemeteries are known at Newark-on-Trent, Netherfield and Kingston-on-Soar (Kinsley 1989; Meaney 1964, 201; Barley 1957), as well as inhumation cemeteries as Cotgrave and Broughton Lodge (Bishop 1984; Kinsley 1993). The inhumation cemeteries include a range of forms of burial; at Broughton Lodge supine, flexed and crouched burials were recorded, as well as one individual buried prone (Kinsley 1993, 69–70), while at Cotgrave excavation uncovered both flexed burials, occasionally with grave goods, and unaccompanied extended burials, interpreted as representing the graves of two communities (perhaps British and Anglo-Saxon respectively) practising differing funerary traditions within a shared burial

ground (Bishop 1984; nd). Given this background of rather varied contemporary burial rites, burial 794, which was evidently placed with some care on the surface of the well lining in a flexed posture and provided with an urn presumably as a grave good, must be considered to have been interred with the respect that was accorded any other burial of the time.

6.3.6 The selection of a disused Roman feature within an abandoned settlement as an appropriate location for this burial is striking and was presumably a consequence of the contemporary community's attitude toward the deserted site – be it positive or negative. The relative paucity of identifiably early Anglo-Saxon material may imply that Nottinghamshire continued to be populated by communities derived from the Roman population into the 6th century (Bishop nd), and it is therefore possible that skeleton 794 was buried by a community that viewed the abandoned settlement as the home of their forebears. A study on the reuse of Roman sites for the burial in the early Anglo-Saxon period has suggested that such instances reflect places of perceived importance in the contemporary landscape rather than simply the opportunistic use of abandoned space (Williams 1997, 24–5). An example of the significance attached to Roman remains occurred at Newark, where reused Roman vessels appear to have been regarded as desirable containers in which to bury Anglo-Saxon cremations (Kinsley 1989).

6.3.7 Alternatively, if the presence of the urn within the burial indicates that the community regarded themselves as Anglo-Saxon rather than British, they may have felt no connection to the former settlement and considered it to be the work of a distinctly different community, in which case the apparent exclusion of the individual from normative Anglo-Saxon burial locations may suggest some form of exclusion from wider society (cf. Sofield 2015, 376–7). It is notable in this context that the burial does not correspond with any of the categories of 'deviant burial' that Reynolds (2009, 62–95) has defined for the early Anglo-Saxon period, defined by a prone position or evidence for decapitation, stoning or amputation, and which he associated with superstitions related to fear of the dead and a desire to 'lay potentially troublesome individuals in the grave without fear of their returning to inhabit the world of the living' (ibid., 235–6). However, Reynolds stressed that even these types of abnormal burials were usually placed within the community burial ground (ibid., 231), which makes the location of skeleton 794 all the more unusual.

6.3.8 The placement of this individual within an abandoned Roman settlement and burial ground appears to have been significant, as was the deposition in the abandoned well, which was deemed more appropriate than digging a grave for the body. It is possible that the fact that this individual had contracted leprosy made them a social outcast. The exact reasoning behind the burial in this particular location, however, must remain open to debate.

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APPENDIX A GRAVE CATALOGUE

Roman cemetery

Grave 38

Grave pit (35): Sub-rectangular, NE–SW, 1.88 x 0.65m, 0.25 deep
Skeleton (36): Supine, extended, both arms slightly flexed with hands crossed on pelvis; 15% complete, poor preservation; 26–35 years, sex unrecordable; calculus, enamel hypoplasia and ante-mortem tooth chips
Coffin (143): Four nails at each end and two in middle (SF 1–10 and samples 1 and 4). 1.80 x 0.60m
Grave fill finds (37): Three sherds (50g) of pottery – dropped-flange dish (R20) and vessel of indeterminate form (R30), body sherd (F44); two unidentified human skull fragments; two fragments (13g) of animal bone
Date: 250–410 (pottery in backfill)

Grave 56

Grave pit (53): Oval, NE–SW, 2.04 x 1.22m, 0.10m deep. Double burial
Skeleton (54): Supine, extended, arms extended by sides; 55% complete, poor preservation; 36–45 years, ??male; mesocnemic; L vastus notch, L&R lateral tibial squatting facets, L&R talus double inferior anterior facet, L&R calcaneus double anterior facet; ante-mortem tooth loss, caries, calculus and periodontal disease
Skeleton (57): Supine, extended, right arm tightly flexed with hand on right shoulder, left hand slightly flexed with hand on pelvis with elbow overlying right arm of 54; 35% complete, poor preservation; 18–25 years, sex indeterminable; R mandibular torus, L talus double inferior anterior facet, L calcaneus double anterior facet; caries, calculus, periodontal disease; vertebral body marginal osteophytes
Coffin: None
Grave goods: Footwear indicated by 34 hobnails associated with left foot of skeleton 57 (SF 44 and samples 6, 8, 10 and 12)
Grave fill finds (55): Four sherds (38g) of pottery – storage jar (R90); body sherd (R30); one fragment (218g) of flat tile; slag
Date: 100–410 (pottery in backfill)

Grave 114

Grave pit (111): Sub-rectangular, NE–SW, 1.96 x 0.60m, 0.19m deep
Skeleton (112): Supine, extended, arm position did not survive; 20% complete, poor preservation; >18 years, sex not recordable; L calcaneus double anterior facet
Coffin (115): 18 nails, at corners and along both sides. 1.70 x 0.50m
Grave goods: Footwear indicated by 27 hobnails associated with right foot (SF 52), 41 associated with left foot (SF 51), and 97 from the general area of the feet (SF 67, 68 and 70, samples 13 and 15)
Grave fill finds (113): Seven sherds (52g) of pottery – dish (Drag. 36; S30); body sherds (M23, R20, W13); One piece (7g) of undiagnostic iron-rich slag; four fragments (53g) of animal bone
Date: 140–200 (pottery in backfill)

Grave 121
Grave pit (118): Sub-rectangular, NE–SW, 2.00 x 0.60m, 0.25m deep
Skeleton (119): Supine, extended, both arms slightly flexed with hands on pelvis; 40% complete, poor preservation; 18–25 years, ??female; stature 153.39cm; Platymeric; L accessory sacral facets, L&R acetabular crease, L&R lateral tibial squatting facets; caries, calculus, enamel hypoplasia and periodontal disease
Coffin: None
Grave fill finds (120): None
Date: -

Grave 147
Grave pit (144): Sub-rectangular, SW–NE, 2.00 x 0.55m, 0.15m deep
Skeleton (145): Supine, right arm bent at *c* 90° across abdomen, left arm did not survive; 15% complete, poor preservation; >18 years, ??female; L&R hypotrochanteric fossa
Coffin (177): Three coffin nails (SF 72–4) at foot end, other end truncated
Grave fill finds (146): None
Date: -

Grave 153
Grave pit (150): Sub-rectangular, NW–SE, 1.83 x 0.44m, 0.15m deep, cuts grave 297
Skeleton (151): Supine, extended, both arms slightly flexed with hands on pelvis; 60%, poor preservation; 26–35 years, ??female; stature 148.02cm; L acetabular crease, L&R lateral tibial squatting facets; caries, calculus, enamel hypoplasia; maxillary sinusitis, Schmorl's nodes, vertebral body marginal osteophytes
Coffin: None
Grave fill finds (152): Five sherds (29g) of pottery – body sherds (E30, E80, M23, O10, R30); a single nail fragment (SF 127); 29 fragments (38g) of animal bone
Date: 100–140 (pottery in backfill)

Grave 220
Grave pit (217): Sub-rectangular, NE–SW, >1.48 x 0.42m, 0.08m deep, foot end truncated by modern land drain
Skeleton (218): Supine, extended, right arm slightly flexed with hand on pelvis, left arm extended by side; 5% complete, bone destroyed; >18 years, sex unrecordable; calculus
Coffin: None
Grave fill finds (219): None
Date: -

Grave 250
Grave pit (197): Sub-rectangular, NE–SW, 2.00 x 0.80m, 0.11m deep. Cut grave 251.
Skeleton (198): Supine, extended, both arms slightly flexed with hands on pelvis; 60% complete, fair preservation, 36–45 years, ??female, platymeric, eurycnemic, L lambdoid ossicle, L&R supraorbital foramen, R acetabular crease, L&R vastus notch, L&R calcaneus double anterior facet; ante-mortem tooth loss, caries, calculus, periodontal disease, ante-

mortem tooth chips; vertebral body marginal osteophytes, vertebral pitting/dense bone, extra-spinal osteoarthritis, hyperostosis frontalis interna, undiagnosed pathology
Coffin (253): Three nails at head end, five at foot and one in the middle (SF 130–5)
Grave fill finds (199): None
Date:

Grave 251
Grave pit (200): Sub-rectangular, NE–SW, 1.90 x 0.60m, 0.10m deep. NE end cut by grave 250, removing upper part of skeleton
Skeleton (201): Supine, extended, right arm slightly flexed with hand on pelvis, left arm extended by side; 55% complete, poor preservation; 26–35 years, male; Platymeric, eurycnemic; L parietal foramen, L mastoid foramen extrasutural, L&R hypotrochanteric fossa, L vastus notch; Caries, calculus, enamel hypoplasia, periapical cavity; Periostitis, cribra orbitalia, extra-spinal osteoarthritis, undiagnosed pathology
Coffin (203): Three nails (SF 129, 136–7) from either side in middle part of grave, ends truncated
Grave fill finds (202): Two sherds (8g) of pottery – jar (R20), body sherd (B11)
Date: 120–410 (pottery in backfill)

Grave 258
Grave pit (254): Oval, SE–NW, 1.72 x 0.66m, 0.12m deep
Skeleton (255): Supine, extended, right arm flexed across chest, left arm did not survive; 10% complete, bone destroyed; >18 years, sex unrecordable
Coffin (256): Two nails on either side in middle part of grave (SF 142–5), ends truncated
Grave fill finds (257): Four sherds (13g) of pottery – body sherds (O10, R30)
Date: 43–410 (pottery in backfill)

Grave 267
Grave pit (263): Sub-rectangular, NE–SW, 1.82 x 0.64m, 0.24m deep. Cuts grave 297
Skeleton (264): Supine, extended, arms poorly preserved but possibly extended by sides; 15% complete, poor preservation; 36–25 years, sex unrecordable; Ante-mortem tooth loss, calculus, enamel hypoplasia, ante-mortem tooth chips, activity related wear
Coffin (265): Eight nails (SF 149–154, 159) and localised staining at foot end
Grave goods: Unworn footwear indicated by 21 hobnails (SF158) located at edge of grave, away from feet and possibly outside coffin
Grave fill finds (266): Five sherds (41g) of pottery – plain-rimmed dish (R20), groove-rimmed dish (R46), jar (R70), body sherds (F52, R30); one iron-rich cinder (3g)
Date: 170–300 (pottery in backfill)

Grave 283
Grave pit (280): Oval, NE–SW, 1.85 x 0.50m, 0.20m deep
Skeleton (281): Supine, extended, right arm bent *c* 90° across abdomen, left arm tightly flexed over chest; 70% complete, poor preservation; 26–35 years, ??female; L mastoid foramen extrasutural, R Poirier's facet; Caries, calculus, enamel hypoplasia, periodontal disease, malalignment; Sacralisation, undiagnosed pathology

Coffin: None
Grave fill finds (282): One sherds (11g) of pottery – lid-seated jar (R211)
Date: 150–350 (pottery in backfill)

Grave 297
Grave pit (293): Sub-rectangular, NE–SW, >0.90 x 0.46m, 0.18m deep, truncated at NE end by grave 267 and at SW end by grave 153
Skeleton (294): Supine, extended, arms extended by sides; 20% complete, poor preservation; 1–5 years; Calculus, enamel hypoplasia
Coffin (295): Three nails (SF 155–7)
Grave fill finds (296): Two sherds (50g) of pottery – body sherd (R211); 33 fragments (11g) of animal bone
Date: 150–350 (pottery in backfill)

Grave 323
Grave pit (320): Sub-rectangular, NE–SW, 2.00 x 0.60m, 0.45m deep
Skeleton (321): Supine, extended, arms extended by sides; 45% complete, poor preservation; 26–35 years, ?male; Platymeric; Ossicle at lambda, L lambdoid ossicle, L supraorbital foramen, R mastoid foramen extrasutural; Ante-mortem tooth loss, calculus, periodontal disease, ante-mortem tooth chips
Coffin: None
Grave goods: Footwear indicated by 15 hobnails associated with the right foot (SF 161), 24 with left foot (SF 162) and a further 36 from the general area of the feet (sample 70)
Grave fill finds (322): Six sherds (55g) of pottery – cup (Drag. 33; S30), beaker (R30), jar (R20)
Date: 120–200 (pottery in backfill)

Grave 334
Grave pit (330): Sub-rectangular, SW–NE, 1.80 x 0.50, 0.16m deep
Skeleton (331): Supine, extended, both arms slightly flexed with hands on pelvis; 70% complete, fair preservation; 36–45 years, ?female; Calculus, enamel hypoplasia, periodontal disease, ante-mortem tooth chips; Maxillary sinusitis, Schmorl's nodes, vertebral body marginal osteophytes
Coffin (332): Ten nails (SF 163–74 and sample 71) at head end and sides, foot end truncated
Grave fill finds (333): One sherd (3g) of pottery – body sherds (R70); one fragment (10g) of animal bone
Date: 43–410 (pottery in backfill)

Grave 350
Grave pit (347): Sub-rectangular, NE–SW, 1.72 x 0.56m, 0.20m deep
Skeleton (348): Supine, extended, both arms slightly flexed with wrists crossed on pelvis; 20% complete, bone destroyed; 26–35 years, ??male; Caries, calculus, ante-mortem tooth chips; Additional thoracic vertebra, periostitis, Schmorl's nodes
Coffin: None
Grave fill finds (349): Six sherds (32g) of pottery – body sherds F44, F52, R20; 16 fragments (24g) of animal bone

Date: 200–250 (pottery in backfill)

Grave 355
Grave pit (351): Sub-rectangular, NE–SW, 2.00 x 1.00m, 0.25m deep. Double burial
Skeleton (352): Supine, extended, right arm slightly flexed with hand on pelvis, left arm extended by side; 55% complete, poor preservation; 36–45 ??male; mesocnemic; L mandibular torus, L mastoid foramen extrasutural, L vastus notch, L calcaneus double anterior facet; Ante-mortem tooth loss, caries, calculus, periodontal disease, periapical cavity; Periostitis, vertebral body marginal osteophytes, vertebral pitting/dense bone, spinal osteoarthritis, extra-spinal osteoarthritis, ante-mortem fracture, slight plastic deformation of the metatarsals? Undiagnosed pathology
Skeleton (353): Supine, extended, both arms slightly flexed with hands on pelvis, crook of left elbow overlies right elbow of 352; 65% complete, fair preservation; 26–35, female; stature 144.58cm; Platymeric, mesocnemic; L mandibular torus, R supraorbital foramen, L&R acetabular crease, L&R peroneal tubercle; Ante-mortem tooth loss, caries, calculus, enamel hypoplasia, periodontal disease, periapical cavity; Cribra orbitalia, extra-spinal osteoarthritis, undiagnosed pathology
Coffin: None
Grave goods: Footwear with skeleton 353 represented by 12 hobnails associated with right foot (SF 175), 13 with left foot (SF 176) and 20 from the general area of the feet (sample 86)
Grave fill finds (354): Two sherds (23g) of pottery – body sherds (R20, includes sherd from indented beaker); three fragments (116g) of animal bone
Date: 170–250 (pottery in backfill)

Grave 362
Grave pit (359): Sub-rectangular, NE–SW, >0.90 x 0.44m, 0.10m deep, both ends truncated by ploughing
Skeleton (360): Supine, extended, left arm truncated but possibly flexed across chest, right arm bent at *c* 90° across abdomen; 15% complete, poor preservation; >18 years, ??male; Schmorl's nodes
Coffin (374): Seven nails (SF 78–88 and sample 90) mostly in a line across the grave just below the pelvis, both ends of grave truncated
Grave fill finds (361): None
Date: -

Grave 434
Grave pit (431): Sub-rectangular, NW–SE, 1.68 x 0.43, 0.27m deep
Skeleton (432): Supine, extended, both arms bent at *c* 90° across abdomen; 70% complete, fair preservation; 13–17 years; Calculus, ante-mortem tooth chips; Periostitis
Coffin: None
Grave goods: Footwear indicated by 52 hobnails associated with right foot (SF 200), 48 with left foot (SF 202) and 42 from the general area of the feet (SF 201 and sample 103)
Grave fill finds (433): Twelve sherds (45g) of pottery – body sherds (A11, R30, S30); flint blade; six fragments (10g) of animal bone
Date: 120–200 (pottery in backfill)

Grave 436
Grave pit (403): Sub-rectangular, NE–SW, 2.10 x 0.78m, 0.23m deep. Cut by grave 437
Skeleton (405): Supine, extended, both arms slightly flexed with hands crossed on pelvis; 85% complete, fair preservation; 36–45 years, female; Platymeric, eurycnemic; L absent zygomaticofacial foramen, L supraorbital foramen, L mastoid foramen extrasutural, L&R Poirier's facet, R vastus notch; Ante-mortem tooth loss, caries, calculus, periapical cavity, ante-mortem tooth chips; Vertebral body marginal osteophytes, ante-mortem fracture, hyperostosis frontalis interna, undiagnosed pathology
Coffin (491): Four nails at the head end and middle (SF 194–8). The single nail in grave 437 may be from this coffin
Grave goods: Footwear indicated by 13 hobnails associated with right foot (SF 190) and 23 with left foot (SF 191)
Grave fill finds (407): Two sherds (50g) of pottery – body sherds (R20, R30); 21 fragments (31g) of animal bone
Date: 120–410 (pottery in backfill)

Grave 437
Grave pit (404): Sub-rectangular, NE–SW, 2.10 x 0.50m, 0.20m deep. Cuts grave 436
Skeleton (406): Supine, extended, both arms slightly flexed with hands on pelvis; 65% complete, fair preservation; 26–35 years, male; Eurymeric, eurycnemic; R Allen's fossa; Ante-mortem tooth loss, caries, calculus, periodontal disease, periapical cavity, ante-mortem tooth chips; Additional thoracic vertebra, periostitis, residual rickets? Vertebral body marginal osteophytes, vertebral pitting/dense bone, spinal osteoarthritis, extra-spinal osteoarthritis, ante-mortem fracture, possible vertebral haemangioma, undiagnosed pathology
Coffin: None
Grave goods: Footwear indicated by five hobnails associated with right foot (SF 192), seven with left foot (SF 193) and 6 from the general area of the feet (SF 267 and sample 99)
Grave fill finds (408): Two sherds (18g) of pottery – body sherds C10, R30; single coffin nail; nine fragments (35g) of animal bone
Date: 43–410 (pottery in backfill)

Grave 455
Grave pit (452): Oval, NE–SW, 1.84 x 0.54m, 0.03m deep
Skeleton (453): Supine, extended, right arm did not survive, left arm possibly across abdomen; 20% complete, poor preservation; >18 years, sex unrecordable; L acetabular crease; Osteochondritis dissecans
Coffin: None
Grave fill finds (454): Two sherds (14g) of pottery – body sherds (F52, R30); one fragment (9g) of animal bone
Date: 170–400 (pottery in backfill)

Grave 468
Grave pit (465): Sub-rectangular, NE–SW, 1.80 x 0.60m, 0.26m deep

Skeleton (466): Supine, extended, arms extended by sides; 80% complete, fair preservation; 26–35 years, ?male; stature 164.08cm; mesocnemic; L&R mandibular torus, L&R accessory supraorbital foramen, R mastoid foramen extrasutural, L septal aperture; Caries, calculus; Peri-mortem trauma
Coffin: None
Grave fill finds (467): One fragment (351g) of flat tile; human bone – hand phalanx with cut marks at distal end
Date: -

Grave 500
Grave pit (496): Sub-rectangular, NE–SW, 1.05 x 0.35m, 0.10m deep
Skeleton (497): Supine, extended, arms did not survive; 5% complete, fair preservation; 1–5 years
Coffin (498): Eight nails found at foot and head and along north-western side of grave (SF 204, 206–220 and sample 110)
Grave goods:
23 small wound round beads, dark blue glass located in the central part of the grave (SF 277).
40 small glass beads, as above, were recovered from a soil sample from the grave fill (sample 111).
2 shale bracelets located in the central part of the grave, with the beads (SF 203).
Grave fill finds (499): One sherd (1g) of pottery – body sherd (R20); two hobnails
Date: 43–410 (pottery in backfill).

Grave 508
Grave pit (505): Sub-rectangular, NE–SW, 2.20 x 0.65m,
Skeleton (506): Supine, extended, arms extended by sides; 50% complete, fair preservation; 36–45 years, ??male; Platymeric, eurycnemic; R mandibular torus, R absent zygomaticofacial foramen, R acetabular crease; Ante-mortem tooth loss, caries, calculus, enamel hypoplasia, periapical cavity; Vertebral marginal osteophytes
Coffin: None
Grave goods: Footwear indicated by 49 hobnails clustered around the feet (SF 221 and sample 115)
Grave fill finds (507): One sherd (1g) of pottery – body sherd, indeterminate reduced ware
Date: 43–410 (pottery in backfill)

Grave 526
Grave pit (523): Sub-rectangular with rounded ends, NE–SW, >1.70 x 0.54m, 0.10m deep. Cut by grave 531
Skeleton (524): Supine, extended, right arm slightly flexed with hand on pelvis, left arm tightly flexed with hand on chest; 50% complete, poor preservation; 36–45 years, ??male; Ante-mortem tooth loss, caries, calculus, enamel hypoplasia, periapical cavity, ante-mortem tooth chips; Vertebral body marginal osteophytes, extra-spinal osteoarthritis, probable? early DISH?
Coffin: None

Grave fill finds (525): One sherd (2g) of pottery – body sherd (R30)
Date: 43–410 (pottery in backfill)

Grave 531
Grave pit (527): Irregular-rectangular, NE–SW, 2.00 x 0.80m, 0.12m deep. Cut graves 526 and 584. A land drain cut across the grave and had removed the torso and arms of skeleton 528
Skeleton (528): Supine, extended, arms did not survive; 15%, poor preservation; 26–35 years, sex unrecordable; Ante-mortem tooth loss, calculus
Coffin (529): 14 nails (SF 224–41) were recovered from either end of the grave and along both sides. A fragment of right-angle corner bracket or binding (SF 242) was probably not grave furniture.
Grave fill finds (530): Eight sherds (130g) of pottery – storage jar (R90); body sherds (F52, O10, R30, W13); possible tessera (4g);
Date: 170–400 (pottery in backfill)

Grave 537
Grave pit (534): Sub-rectangular, NE–SW, 2.09 x 0.56m, 0.20m deep. A land drain cut across the grave and had removed part of the right arm, pelvis and upper part of the legs
Skeleton (535): Supine, extended, right arm truncated by land drain, left arm slightly flexed with hand on pelvis; 80% complete, fair preservation; 18–25years, ?male; stature 174.25cm; eurycnemic; R mandibular torus, R supraorbital foramen, L&R accessory supraorbital foramen, L&R mastoid foramen extrasutural, L acetabular crease, L calcaneus anterior facet absent, R calcaneus double anterior facet; Caries, calculus, overcrowding, malalignment; Cribra orbitalia, Schmorl's nodes, spinal osteoarthritis, extra-spinal osteoarthritis, undiagnosed pathology
Coffin: None
Grave goods: Footwear represented by 117 hobnails clustered around the feet (SF 222 and sample 119)
Grave fill finds (536): Three sherds (28g) of pottery – body sherds (O10, R20, R30); radiate of Tetricus dated 271–4 (SF 223); three fragments (6g) of animal bone
Date: After 271 (coin in backfill)

Grave 542
Grave pit (538): Sub-rectangular, NE–SW, 2.10 x 0.76m, 0.40m deep
Skeleton (539): Supine, extended, right arm disturbed by land drain, left arm extended by side; 40% complete, poor preservation; 18–25years, ??male; L parietal foramen, R mastoid foramen extrasutural; Calculus, ante-mortem tooth chips, retention of deciduous teeth in adulthood; undiagnosed pathology
Coffin (540): 11 nails at corners and along both sides (SF 244–57), and coffin stain. 1.70 x 0.50m
Grave fill finds (541): Twelve sherds (120g) of pottery – lid-seated jar (R50), jar (R30), hammer-headed mortarium (M23), body sherds (B11, C10, F52, F60, R20, indeterminate oxidised ware); One fragment (70g) of flat tile; two fragments (3g) of animal bone
Date: 230–350 (pottery in backfill)

Grave 554
Grave pit (551): Sub-rectangular, NE–SW, 1.80 x 0.65m, 0.12m deep. Cut ditch 1010
Skeleton (552): Supine, extended, both arms bent at *c* 90° across abdomen; 35% complete, fair preservation; >18 years, sex indeterminate; eurycnemic; calculus; Vertebral body marginal osteophytes, extra-spinal osteoarthritis
Coffin: None
Grave goods: Footwear represented by 71 hobnails clustered around the feet (SF 243 and sample 133)
Grave fill finds (553): None
Date: -

Grave 565
Grave pit (562): Sub-rectangular, NE–SW, 1.90 x 0.80m, <0.10m deep, SW end truncated by land drain, removing feet
Skeleton (563): Supine, extended, right arm slightly flexed with hand on pelvis, left arm tightly flexed with hand on left shoulder; 35% complete, poor preservation; 26–35 years, ??male; eurycnemic; calculus; Ectocranial porosity, extra-spinal osteoarthritis
Coffin: None
Grave fill finds (564): One sherd (1g) of pottery – indeterminate oxidised ware
Date: 43–410 (pottery in backfill)

Grave 584
Grave pit (579): Sub-rectangular, SW–NE, 1.82 x 0.54m, 0.24m deep. Base of the grave lined with stones and further stones had been placed around the sides of the body, one of which had collapsed onto the feet. A single stone on the hands may also have been deliberately placed. Cut by grave 531
Skeleton (581): Supine, extended, both arms slightly flexed with hands on pelvis; 50% complete, poor preservation; 36–45 years, ??male; L&R mandibular torus, R vastus notch; Caries, calculus, periapical cavity; Vertebral body marginal osteophytes, spinal osteoarthritis
Grave goods: None
Grave fill finds (583): Three sherds (12g) of pottery – body sherds (R20, S30, indeterminate oxidised ware); one fragment (60g) of tegula; two nails that may derive from coffin 529 in grave 531; human bone – right cuboid and medial cuneiform, 1x distal phalanx for left great toe and 1x further distal foot phalanx (unsided); one fragment (1g) of animal bone
Date: 160–200 (pottery in backfill)

Grave 589
Grave pit (585): Sub-rectangular, NE–SW, 1.36 x 0.56m, 0.14m deep
Skeleton (586): Supine, extended, upper arms by sides, lower parts of arms truncated; 30% complete, poor preservation; 1–5 years; R lambdoid ossicle, L mastoid foramen extrasutural; Caries, calculus, enamel hypoplasia; Cribra orbitalia
Coffin (587): Two nails located on either side by the shoulders/neck (SF 260–1, 263–4)

Grave fill finds (588): Nine sherds (39g) of pottery – bowl or dish with flanged rim (R30), body sherds (B11, F52, M23, O10, indeterminate samian ware); small iron bar or block (SF 262); seven fragments (15g) of animal bone
Date: 170–240 (pottery in backfill)

Grave 616
Grave pit (613): Sub-rectangular, NW–SE, 1.50 x 0.60m, 0.08m deep
Skeleton (614): Flexed on left side, right arm tightly flexed across chest, left arm extended by side; 25% complete, fair preservation; 6–12 years
Coffin: None
Grave goods: Footwear represented by 22 hobnails clustered around feet (SF 265 and samples 152 and 166)
Grave fill finds (615): None
Date: -

Grave 620
Grave pit (617): Sub-rectangular, NE–SW, 1.90 x 0.50m, 0.11m deep. Truncated by land drain, removing upper part of torso
Skeleton (618): Supine, extended, right arm slightly flexed with hand on pelvis, left arm truncated; 25% complete, poor preservation; 26–35 years, sex indeterminate; Platymeric; R accessory supraorbital foramen; Caries, calculus, supernumerary teeth, ante-mortem tooth chips, retention of deciduous teeth in adulthood
Coffin: None
Grave fill finds (619): Seven sherds (13g) of pottery – body sherds (F43, F52, R20, indeterminate samian ware); four fragments (12g) of animal bone
Date: 170–240 (pottery in backfill)

Grave 632
Grave pit (628): Sub-rectangular, NE–SW, 1.92 x 0.59m, 0.24m deep
Skeleton (629): Supine, extended, right arm slightly flexed with hand on pelvis, left arm extended by side; 30% complete, poor preservation; 18–25 years, ?female; L accessory infraorbital foramen; Caries, calculus, ante-mortem tooth chips; Schmorl's nodes
Coffin (630): 8 nails at head and foot end and along west side of grave (SF 278–87 and samples 166-167)
Grave fill finds (631): Nine sherds (81g) of pottery – vessel of indeterminate form (S30), body sherds (O10, R20, R30); two fragments (41g) of flat tile; 23 fragments (12g) of animal bone
Date: 120–200 (pottery in backfill)

Grave 649
Grave pit (646): Sub-rectangular, NE–SW, 2.20 x 0.76m, 0.24m deep
Skeleton (647): Supine, extended, right arm slightly flexed with hand on pelvis, left arm extended by side; 25% complete, poor preservation; 26–35 years, ??female; Metopic suture, L supraorbital foramen; Caries, calculus, ante-mortem tooth chips; Button osteoma, hyperostosis frontalis interna, undiagnosed pathology

Coffin (650): Two nails at the corners at the head end and two on either side of the pelvis (SF 270–3, 276)
Grave fill finds (648): One sherd (1g) of pottery – body sherd, indeterminate oxidised ware
Date: 43–410 (pottery in backfill)

Grave 655
Grave pit (651): Sub-rectangular, NE–SW, 2.18 x 0.60m, 0.10m deep
Skeleton (652): Supine, extended, both arms slightly flexed with hands on pelvis; 45% complete, poor preservation; 36–45 years, ??female; Eurycnemic; L&R mandibular torus, L&R absent zygomaticofacial foramen, L supraorbital foramen; Ante-mortem tooth loss, caries, calculus, enamel hypoplasia, periodontal disease, periapical cavity, ante-mortem tooth chips; Vertebral body marginal osteophytes
Coffin (653): 9 nails, at the corners and halfway along the north-west side (SF 274, 288–96, 298, and sample 159).
Grave goods: Footwear represented by 29 hobnails associated with right foot (SF 275), 16 with left foot (SF 276) and 8 from the general area of the feet (sample 160)
Grave fill finds (654): None
Date: -

Grave 670
Grave pit (668): Circular, 0.68 x 0.57m, 0.12m deep
Cremation deposit (669): 232.2g, largest fragment 25.5mm (cranial vault), identified bone: hands, feet, colour white; >18 years, ??male; 1x supra-orbital accessory foramen (unsided)
Urn (SF 297): Substantial portion of a jar base (20 sherds, 361g) in medium sandy reduced ware R30
Grave fill finds (669): None
Date: 43–410 (cremation urn)

Grave 674
Grave pit (671): Sub-rectangular, NE–SW, 1.90 x 0.52m, 0.10m deep. Feet truncated by land drain
Skeleton (672): Supine, extended, both arms bent at *c* 90° across abdomen; 45% complete, fair preservation; 36–45 years, sex indeterminate; Platymeric; L lateral tibial squatting facet, L talus double inferior anterior facet; Caries, calculus; Periostitis, vertebral body marginal osteophytes, extra-spinal osteoarthritis
Coffin: None
Grave fill finds (673): One sherd (3g) of pottery – body sherd (E80)
Date: 43–150 (pottery in backfill)

Grave 699
Grave pit (695): Sub-rectangular, NE–SW, 1.93 x 0.60m, 0.22m deep
Skeleton (696): Supine, extended, both arms slightly flexed with hands crossed on pelvis; 40% complete, poor preservation; >18 years, ??male; Ante-mortem tooth loss, caries, calculus, periodontal disease, periapical cavity; Periostitis, hyperostosis frontalis interna, undiagnosed pathology

Coffin: None
Grave goods: Footwear represented by 29 a cluster of 68 hobnails clustered around the feet (SF 301–2 and sample 176)
Grave fill finds (698): 40 sherds (191g) of pottery – jars (R30), globular beaker (R10), vessel of indeterminate form (R30), body sherds (F52, S30, prehistoric fabric); ten fragments (3g) of animal bone
Date: 250–400 (pottery in backfill)

Grave 703
Grave pit (700): Sub-rectangular, NE–SW, >1.00 x 0.80m, 0.10m deep. Lower half of skeleton truncated by medieval furrow
Skeleton (701): Supine, extended, right arm slightly flexed with hand on pelvis, left arm extended by side; 25% complete, poor preservation; >18 years, ??male; L exostosis in trochanteric fossa; Periostitis, osteitis
Coffin: None
Grave fill finds (702): One sherd (7g) of pottery – body sherd (W13)
Date: 140–350 (pottery in backfill)

Grave 707
Grave pit (704): Sub-rectangular, NE–SW, 2.60 x 1.00m, 0.40m deep. Cut grave 713
Skeleton (705): Supine, extended, right arm slightly flexed with hand on pelvis, left arm bent at *c* 90° across abdomen with hand on left forearm, left over right; 45% complete, fair preservation; 36–45 years, ??male; stature 175.41cm; eurycnemic; L mastoid foramen extrasutural, L calcaneus double anterior facet; Caries, calculus, enamel hypoplasia, periodontal disease; Periostitis, extra-spinal osteoarthritis, ante-mortem trauma
Coffin (770): 5 nails located at foot end and on either side of grave (SF 307–13)
Grave goods: Footwear represented by 23 hobnails associated with right foot (SF 306), 17 with left foot (SF 305) and 18 from the general area of the feet (SF 311–2 and sample 160)
Grave fill finds (706): 13 sherds (80g) of pottery – cup (Drag. 33; S30), jars (R30), body sherds (R20, W10, W13); two fragments (6g) of animal bone
Date: 140–200 (pottery in backfill)

Grave 713
Grave pit (710): Sub-rectangular, NE–SW, 1.48 x 0.49m, almost completely truncated. North-west side truncated by grave 707
Skeleton (711): Supine, extended, right arm angled across torso, left arm did not survive, possibly displaced; 10% complete, poor preservation; 26-35 years, ??female; R Poirier's facet
Coffin: None
Grave fill finds (712): One sherd (5g) of pottery – body sherd (R50); one fragment (36g) of indeterminate ceramic building material
Date: 43–410 (pottery in backfill)

Grave 729
Grave pit (726): Sub-rectangular, NW–SE, >0.20 x 0.50m, 0.14m deep. Almost completely truncated by grave 733, only SE end surviving
Skeleton (727): ?Supine, extended; 10% complete, fair preservation; >18 years, sex unrecordable; R calcaneus anterior facet absent
Coffin: None
Grave fill finds (728): One sherd (5g) of pottery – body sherd (E80); six fragments (112g) of animal bone
Date: 43–150 (pottery in backfill)

Grave 733
Grave pit (730): Sub-rectangular, NW–SE, 1.79 x 0.54m, 0.25m deep. Cut grave 729
Skeleton (731): Supine, extended, both arms tightly flexed across chest; 40% complete, poor preservation; >18 years, sex indeterminate; Platymeric; L&R mandibular torus, R hypotrochanteric fossa; Ante-mortem tooth loss, caries, calculus; Vertebral body marginal osteophytes, spinal osteoarthritis, extra-spinal osteoarthritis, ante-mortem fracture
Coffin: None
Grave fill finds (732): 16 sherds (108g) of pottery – jars (R30), body sherds (B11, F52, O10, R20); a single hobnail; a small fragment of copper alloy; one fragment (7g) of undiagnostic slag; 44 fragments (31g) of animal bone
Date: 170–250 (pottery in backfill)

Grave 830
Grave pit (827): Sub-rectangular, NE–SW, 1.46 x 0.54m, 0.08m deep. A land drain cuts through the grave, removing or displacing much of the upper part of the skeleton
Skeleton (828): Supine, extended, both arms slightly flexed with hands on pelvis; 15% complete, poor preservation; 26–35 years, ??male; caries, calculus
Coffin: None
Grave fill finds (829): One sherd (3g) of pottery – body sherd (R211)
Date: 150–350 (pottery in backfill)

Grave 984
Grave pit (981): Sub-rectangular, NE–SW, 2.10 x 0.80m, 0.16m deep
Skeleton (982): Supine, extended, right arm slightly flexed with hand on pelvis, left arm extended by side; 50% complete, fair preservation; 26–35 years, sex indeterminate; R mandibular torus, L supraorbital foramen, R acetabular crease, L&R vastus notch, R lateral squatting facet, R talus double inferior anterior facet, R calcaneus double anterior facet; Caries, calculus, enamel hypoplasia, periodontal disease, ante-mortem tooth chips; Maxillary sinusitis, periostitis, vertebral body marginal osteophytes
Coffin (985): 6 nails located at the head end and middle of the grave (SF 330–4, 339–40, 346)
Grave fill finds (983): 13 sherds (43g) of pottery – Bag-shaped beaker (F52); body sherds R20, R30; seven hobnails, distributed throughout grave; one fragment of calcined human long bone; six fragments (19g) of animal bone
Date: 170–210 (pottery in backfill)

Grave 986
Grave pit: NE–SW, almost completely truncated by ploughing, no grave pit discernable
Skeleton (986): Supine, extended, only the upper parts of the legs and the right side of the pelvis surviving; 15% complete, fair preservation; 36–45, ??male; Extra-spinal osteoarthritis
Date: -

Grave 990
Grave pit (987): Sub-rectangular, NE–SW, almost completely truncated by ploughing. Cut entirely into the fills of ditch 1010
Skeleton (988): Supine, extended, only the legs surviving; 15% complete, poor preservation; >18 years, sex unrecordable; L&R lateral tibial squatting facets, L&R calcaneus double anterior facet, R peroneal tubercle; Undiagnosed pathology
Coffin: None
Grave fill finds (989): Human bone – 1x juvenile long bone shaft
Date: -

Grave 994
Grave pit (991): Sub-rectangular, NE–SW, 2.10 x 0.60m, 0.08m deep
Skeleton (992): Supine, extended, arms extended by sides; 50% complete, fair preservation; 1–5 years; Caries, calculus, enamel hypoplasia
Coffin: None
Grave goods:
Group of 7 bracelets or bangles located on right shoulder (SF360). Six of the bracelets or bangles had been looped onto the seventh, which had a hook and eye fastening.
Small ribbon twist bracelet located on left shoulder (SF 362).
Small ribbon twist bracelet located near pelvis (SF 361).
Four glass beads located near the skull.
Three glass beads located near the ribs.
Two glass beads, as above, recovered from soil samples taken from the chest (sample 232) and abdomen/pelvis (sample 234).
Grave fill finds (993): Two sherds (13g) of pottery – body sherds (R30); irregular issue coin dated *c* 350–64; single nail; two hobnails; four adult human teeth
Date: After *c* 350 (coin from backfill)

Grave 998
Grave pit (995): Sub-rectangular, NE–SW, 2.10 x 0.60m, 0.15m deep. A land drain cuts obliquely across the middle of the grave, truncating the middle of the skeleton
Skeleton (996): Supine, extended, right arm did not survive, left arm bent at 90° across abdomen; 45% complete, fair preservation; 36–45 years, ?male; Platymeric, eurycnemic; L&R mandibular torus, L&R parietal foramen, L absent zygomaticofacial foramen, L septal aperture, R third trochanter, L vastus notch, R calcaneus anterior facet absent; Ante-mortem tooth loss, caries, calculus, periodontal disease, periapical cavity, ante-mortem tooth chips; Ectocranial porosity, cribra orbitalia, Schmorl's nodes, vertebral body marginal osteophytes, extra-spinalosteoarthritis, myositis ossificans traumatica

Coffin: None
Grave fill finds (997): Three sherds (85g) of pottery – medium-mouthed jar (R90); body sherds (R20); one fragment (1g) of animal bone
Date: 43–410 (pottery in backfill)

Grave 1002
Grave pit (999): Sub-rectangular with rounded ends, NE–SW, 1.83 x 0.61m, 0.18m deep
Skeleton (1000): Supine, extended, arms folded across abdomen, right over left; 35% complete, poor preservation; 26–35 years, ??male; L&R parietal foramen; Calculus, ante-mortem tooth chips; Periostitis, osteitis, osteomyelitis, vertebral body marginal osteophytes, ante-mortem fracture, button osteoma, undiagnosed pathology
Grave goods: Footwear represented by 50 hobnails clustered around feet (SF 366 and sample 243)
Grave fill finds (1001): Unidentified lead object (SF 364) and a fragment of melted lead waste
Date: -

Anglo-Saxon burial 794

Grave 794
Grave pit (791): Shape unknown die to disturbance by later pit 793. Vertical sides, flat base, 0.52m deep. Cut into the top of Roman well 790, with skeleton laid on the surface of the stone lining of the well
Skeleton (794): Flexed on left side, head to north-east, left arm flexed in front of body, central part of skeleton including upper parts of legs, pelvis and right arm truncate by pit 793; 50% complete, fair preservation; 13–17 years; L&R lambdoid ossicle, L&R maxillary torus, L accessory supraorbital foramen, L&R calcaneus double anterior facet; calculus, periodontal disease; Congenital vertebral fusion, periostitis, osteitis, leprosy, cribra orbitalia
Grave goods: Near-complete squat, biconical bowl (Z11)
Grave fill finds (792): Residual Roman pottery – rim of beaker (R30), body sherd (F52)
Date: Cal AD 425–565 (radiocarbon)

APPENDIX B SUMMARY OF COIN ASSEMBLAGE

SF	Cxt	Cut	Group	Type	Est Date	Reece Period	Denomination	Obverse	Reverse	Mint	Ref.	Condition	Comment
21	795	795	1022	ditch	1C?		sestertius 32–33mm	beardless? head r	figure			VW/EW	no legends
93	1009	1009 n972	1009	pit/pond	202–5	10	denarius	PLAVTILLAE [AVGVS]TAE	PR[OPAGO I]MPERI	Rome	RIC 362	SW/SW	about a third missing
11	750	749	1004	ditch	1–3C		denarius					EW/EW	worn completely flat
318	1010	1010 nr455	1010	ditch	260–8	13	radiate 14mm	radiate head r ?Gallienus	goat l (eg Iovi Cons Aug)			SW/SW	legends mostly off flan, trimmed, rather than irregular?
25	763	762	1010	ditch	260–9	13	radiate 20mm	IMP C POSTVMVS PF AVG	ORIENS AVG Sol l	Cologne	RIC Vii, 316	W/W	
126	548/556	547/555	611	ditch	268–70	13	radiate 20mm	IMP C CLAVDIVS AVG	PROVIDENT AVG		RIC Vi, 91	W/SW	
357	?				268–70	13	radiate 18mm	IMP[ ]S AVG radiate head r (Claudius II)	MARS V]LTOR? Mars advancing r			SW/SW	part encrusted and eroded
321	978	972	1009	pit/pond	268–70	13	radiate 17–18mm	..VICT]ORINVS P[FAVG	figure advancing l			W/VW	
324	1010	1010 nr455	1010	ditch	268–70	13	radiate 18mm	]VICTORINVS[	figure l with cornucopia, poss Provident Aug?			W/W	
189	371	370	1021	ditch	268–70	13	radiate 18–19mm	I]MP C VI[CTORINVS? radiate bearded head r	SALVS [AVG			W/W	obv encrusted
223	536	534	537	grave	271–4	14	radiate 19mm	IMP C TETRICVS…	]OIVI[?victory l with wreath			W/W	rev legend? – poss irregular
35	966	965	1010	ditch	275–85	14	radiate 17–18mm	]C TET[RICVS radiate head r	figure l			W/W	irregular
40	?	nr624			275–85?	14	radiate 14–17mm	]CVSCVES for Tetricus caes	figure and altar l, cf Felicitas 6?			W/W	irregular, incomplete
81	772	771	1010	ditch	275–85	14	radiate 10–12mm	radiate head r	altar?			W/W	irregular
87	1009	1009 nr872	1009	pit/pond	275–85	14	radiate 9–11mm	radiate head r	?			W/W	v irregular
347	?				275–85	14	radiate 15mm	radiate head r	figure l			W/W	legends almost entirely off flan, irregular

SF	Cxt	Cut	Group	Type	Est Date	Reece Period	Denomination	Obverse	Reverse	Mint	Ref.	Condition	Comment
108	356	356	1009	pit/pond	275–85	14	radiate 9mm	radiate crown frag	?			W/VW	irregular
107	356	356	1009	pit/pond	293–6	14	radiate 18–20mm	I]MP [C] ALLECTVS[	VIRTVS AVG ?galley	//Q L?		W/W	L of mm not certain and anything after it is lost
42	?	nr78			260–96		radiate 18–19mm	radiate head r	figure advancing l			VW/VW	no legends
49	?				260–96		radiate 18–19mm	radiate head r	?Mars l			VW/VW	obv encrusted
322	978	972	1009	pit/pond	260–96		?radiate 18mm+	radiate head r	figures?			EW/VW	very incomplete and eroded
12	745?	744	1022	ditch	317	15	AE2 20–21mm	IMP CONSTANTINVS AVG	SOLI INVICTO COMITI	S/P//PLN	RIC VII London, 106	SW/SW	
43	752	751	1022	ditch	320	16	AE3 17–18mm	CONSTAN TINVS AVG	VICTORIAE LAETAE PRINC PERP	PsymbolL	RIC VII Lyons, 79	SW/SW	
14	751	751	1022	ditch	321	16	AE3 18mm	IMP LIC INIVS AVG	DOMINI N LICINI AVG wreath VOT XX	.AQP.	RIC VII Aquileia, 86	SW/SW	
353	?				321	16	AE3 19mm	CONSTAN TINVS AVG	DN] CONSTANTINI MAX AVG around wreath with VOT//XX	ParcA	RIC VII Arles, 233	SW/SW	slightly eroded, rev partly encrusted
317	1010	1010 nr355	1010	ditch	321	16	AE3 16–17mm	CONSTANTINVS IVN NOB C	BEATA TRAN[QVILLITAS		as eg RIC VII Trier, 312	SW/SW	mm and parts of legends lost
99	167	166	1010	ditch	320–4	16	AE3 17mm	helmeted head r	Beata Tranquillitas, altar			W/W	part encrusted and flaking, v poor
266	?				320–1	16	AE3 20mm	CONSTANTINVS IVN NOB C	CAESARVM NOSTRORVM wreath around VOT V or X	?		SW/W	rev encrusted
13	754	754	1022	ditch	323–4	16	AE3 18mm	IVL CRIS PVS NOBC	CAESARVM NOSTRORVM wreath around VOT X	PTR	RIC VII Trier, 431	SW/SW	
39	591	590		pit	324–30	16	AE3 17mm	head r	PROVIDEN] TIAE AVGG			W/SW	about half survives
351	?				326	16	AE3 18–19mm	Constantinus Aug	PROVIDENTIAE AVGG	PTRsymbol	RIC VII Trier, 475	?/SW	obv encrusted, ID entirely on rev mm

SF	Cxt	Cut	Group	Type	Est Date	Reece Period	Denomination	Obverse	Reverse	Mint	Ref.	Condition	Comment
47	?	nr538			330–5	17	AE3 15mm	VRBS] ROMA	wolf and twins			W/W	
117	356	356	1009	pit/pond	330–5	17	AE4 12mm	Urbs Roma	wolf and twins			W/W	irregular
17	763	762	1010	ditch	330–5	17	AE3 17mm	CONSTAN TINOPOLIS	Victory on prow			W/W	poss irregular
32	758	758	1010	ditch	330–1	17	AE3 17mm	CONSTAN TINOPOLIS	victory on prow	TRP	RIC VII Trier, 523	SW/W	
33	758	758	1010	ditch	330–5	17	AE3 16mm	Constantinopolis	Victory on prow	TR[		W/W	
84	1009	1009 nr777/9	1009	pit/pond	330–5	17	AE3 17mm	CONSTAN TINOPOLIS	Victory on prow	?		SW/SW	mm fragmentary
95	1009	1009 nr972	1009	pit/pond	330–5	17	AE3 14mm+	CONSTAN]TIN[OPOLIS	?			W/	incomplete, rev completely lost
358	?				330–5	17	AE3 13mm+	head l	?			VW/VW	eroded, prob Urbs Roma or Constantinopolis
27	?	nr796			330–1	17	AE3 17mm	CONSTANTINVS IVN NOB C	GLOR IA EXERC ITVS	*//SCONST	RIC VII Arles, 346	SW/SW	
112	1009	1009 nr356	1009	pit/pond	333–4	17	AE3 16–17mm	CONSTANTI NVS MAX AVG	GLORIA] EXER CITVS	*SLG	RIC VII Lyons, 262	SW/SW	
18	740	740		pit	330–5	17	AE3 17mm	head r	Gloria Exercitus 2 standards	TRP.		SW/SW	incomplete, good condition, but legends mostly off flan
119	356	356	1009	pit/pond	330–5	17	AE3 14mm	head r	Gloria Exercitus 2 standards			VW/VW	eroded
319	1010	1010 nr355 g	1010	ditch	330–5	17	AE3 14mm	FL IVL CONSTANTIVS NOB C	GLOR [IA EXERCITVS 2 standards	?		W/W	mm incomplete, prob irregular?
98	167	166	1010	ditch	335–7	17	AE3 16mm	FL IVL CONSTANS NOB CAES	GLOR IA EXERC ITVS 1 standard	.TRP.	RIC VII Trier, 593	SW/SW	
118	1009	1009 nr356	1009	pit/pond	335–7	17	AE3 13–14mm	]IVN N[C	GLORIA] EXERC ITVS 1 standard			SW/SW	edge damage, parts of legends and mm missing
28	?				335–41	17	AE3 15mm	]CONSTANTIVS[	GLORI A EXER CITVS 1 standard	Arles??		SW/SW	irregular?
120	1009	1009 nr356	1009	pit/pond	335–41	17	AE3 13mm	head r	Gloria Exercitus 1 standard			W/W	incomplete, irregular
124	?				335–7	17	AE3 16–17mm	CONSTANTI NVS IVN NC	GLORIA EXERC] ITVS	.TRS.	RIC VII Trier, 591	SW/SW	

SF	Cxt	Cut	Group	Type	Est Date	Reece Period	Denomination	Obverse	Reverse	Mint	Ref.	Condition	Comment
125	?				335–41	17	AE3 14mm	head r	Gloria Exercitus 1 standard			VW/VW	all edges and legends lost (trimmed?) – irregular?
140	222	221		pit	335–41	17	AE3 13–14mm	head r	Gloria Exercitus 1 standard			SW/SW	legends mostly off flan, irregular?
85	1009	1009 nr777/9	1009	pit/pond	337–40	17	AE3 15mm	]NVS PF AVG	Quadriga	TR[?		SW/SW	some edge damage
110	356	356	1009	pit/pond	337–40	17	AE3 15mm	FL MAX [THEO DORAE] AVG	PIET[AS ROMANA	.TRP.	RIC VIII Trier, 65	W/W	
354	?				337–40	17	AE3 14mm	FL MAX THEO DORAE AVG	PIETAS ROMANA	.TRS.	as RIC VIII Trier, 65	SW/SW	
300	688	687	1010	ditch	337–40	17	AE3 16mm	FL MAX THEO DORAE AVG	PIETAS ROMANA			SW/SW	mm unclear
114	1009	1009 nr356	1009	pit/pond	337–40?	17	AE4 12mm	empress r	empress holding two children			SW/SW	edges eroded, no legends survive, probably Pietas Roman (337-341) but irregular?
48	196	195	1007	ditch	324–40	17?	AE3 14–15mm	head r	empress holding two children			W/W	edges eroded, no legends survive, more probably Pietas Romana (337-341)
22	876	?			347–8	17	AE3 15mm	CONSTAN S PF AVG	VICTORIAE DD AVGG Q NN	M/TRP	RIC VIII Trier, 182	SW/SW	
29	?				347–8	17	AE4 12–13mm	head r	Victoriae dd augg q nn			W/W	irregular? Encrusted
30	?	nr924			347–8	17	AE3 15mm	CONSTAN [S PF AV]G	VICTORIAE DD AVGG Q NN	eta/TRP	RIC VIII Trier, 199	SW/SW	
31	758	758	1010	ditch	347–8	17	AE3 13–14mm	head r	VICTORIAE] DD AVGG Q NN			SW/SW	eroded
348	?				347–8	17	AE3 16–17mm	CONSTAN S PF AVG	VICTORIAE] DD AVGG Q NN	branch//TRS	RIC VIII Trier, 205/206	SW/SW	
20	758	758	1010	ditch	347–50	17	AE3 13mm	DN CONSTAN] S PF AVG	VICTORIAE DD AVGG Q NN			SW/SW	irregular?
299	688	687	1010	ditch	348–50	18	AE3 16mm	DN CONSTA] NS PF AVG	FEL TEMP [REPARATIO phoenix on pyre			SW/SW	eroded, mm invisible

SF	Cxt	Cut	Group	Type	Est Date	Reece Period	Denomination	Obverse	Reverse	Mint	Ref.	Condition	Comment
46	513	513	1010	ditch	348–60?	18	AE3 17mm	DN CONSTAN [TIVS PF] AVG	Fel temp reparatio fallen horseman			VW/VW	extensive edge damage
97	167	166	1010	ditch	350–3	18	AE3 19mm	DN MAGNE NTIVS PF AVG	VICTORIAE DD NN AVG ET CAE, victories etc	S/V//RPLG	RIC VIII Lyons, 123	SW/SW	edges eroded
38	765	764	1015	ditch	350–64	18	AE4 10mm	head r	Fel temp reparatio fallen horseman			W/W	irregular
41	?	nr775			350–64	18	AE3 15mm	DN CON] Constantius	Fel temp reparatio fallen horseman	?Trier		W/W	incomplete, irregular
121	375	375	1010	ditch	350–64	18	AE4 12mm	head r	Fel temp reparatio fallen horseman			W/W	thick flan, irregular
320	1010	1010 nr355	1010	ditch	350–64	18	AE3 14mm	head r	?Fel temp reparatio fallen horseman			VW/VW	eroded and unclear, irregular
	993 SS232	991	994	grave	350–64?	18	AE4 7mm	head r	Fel temp reparatio fallen horseman			SW/SW	irregular
328	752	751	1022	ditch	350–64??	18	AE3 frag 12mm+	head r	poss Fel temp reparatio fallen horseman??			W/W	incomplete, irregular
69	838	837	1016	ditch	364–7	19	AE3 18mm	DN VALEN S PF AVG	GLORIA ROMANORVM	/chirho//SMAQP	LRBC2, 985	SW/SW	
23	17?	17	1010	ditch	364–78	19	AE3 17–18mm	DN V[?	Securitas reipublicae??			W/W	eroded
36	966	965	1010	ditch	364–78	19	AE3 17mm	head r	SECVRITAS REIPVBLICAE	//PCON		SW/SW	eroded, soft, no obv legends survive
325	?	nr687			364–75	19	AE3 18mm	DN VALEN]TINI [ANVS PF AVG	SECVRITAS] REIPVBLICAE	OF/II//S?...		W/W	incomplete, prob Arles
24	226/844	225	1014?	ditch	367–75	19	AE3 18mm	DN GRATIAN[ ]AVG	GLORIA ROMANORVM	M/A? // ?Thessalonika	cf LRBC2, 1777, 1782	SW/SW	mint ID depends on letter on left field, not certain
26	?	nr195			367–75?	19?	AE3 16mm	head r	Gloria Novi Saeculi?			W/W	eroded, soft
37	?	nr900			4C		AE3 15mm+	?	?				incomplete and heavily eroded
123	375	375	1010	ditch	4C?		AE3 16mm	?	?				completely eroded

APPENDIX C SITE SUMMARY DETAILS

Site name:	Chapel Lane, Bingham, Nottinghamshire
Site code:	BCL18
Grid Reference	SK 696 409
Type:	Excavation
Date and duration:	February–May 2018
Area of Site	1.66ha
Location of archive:	The archive is currently held at OA, Janus House, Osney Mead, Oxford, OX2 0ES, and will be deposited with Nottingham Museum in due course, under the following accession number: NCMG 2018-33
Summary of Results:	A complex of ditched enclosures was uncovered, extending for *c* 300m, that represents the southern extent of the extramural roadside settlement associated with the town. Only the rear parts of the enclosures lay within the excavation area and so any buildings that may have been located on the road frontage were not seen, but in addition to the boundary ditches, pits and wells were excavated and an assemblage of domestic waste was recovered including pottery, animal bone and smaller quantities of metal objects, tile, and two quern stones. The settlement was established during the 2nd century and occupation appears to have petered out during the second half of the 4th century. Environmental evidence indicated that the settlement was primarily engaged in agriculture, supplying goods to the market in Margidunum, with the high proportion of cattle and horse bones perhaps associated with the grazing of herds on the wetland pasture of the Bingham Basin. The population of the settlement were represented by 54 skeletons in 52 graves (including two double burials) and a single urned cremation burial, all located against the rear boundary of the roadside plots. Disarticulated material from four grave backfills and from non-funerary features raises the total assemblage to 65 individuals. The burial rites were strikingly consistent, comprising extended, supine burials, usually without grave goods, 24 (45%) within coffins and 16 (30%) provided with hobnailed footwear, indicating a population that shared a common belief of what comprised an appropriate form of burial and that exhibited little variation in status. No prone or decapitated burials were found, and neonates and infants were also absent, from which it is inferred that such young individuals were buried closer to home within areas of domestic habitation. The results of strontium and oxygen isotope analysis of nine

individuals were consistent with a population entirely of local origin. The recovery from a pit of a human femur with cut marks that may be associated with deliberate dismemberment of the corpse, radiocarbon dated to cal AD 80–225, provides a rare example of the continuation into the Roman period of funerary traditions more typically associated with the Iron Age.

A particularly unusual discovery was the remains of an adolescent (13–17 years), radiocarbon dated to cal AD 425–565, who had been buried in the top of a disused Roman well. The individual exhibited infectious lesions consistent with a diagnosis of leprosy, and represents one of the earliest instances of the disease in Britain. It is postulated that it was because of this condition, and more significantly any visible disfigurement associated with it, that the individual was excluded from contemporary burial grounds, but he/she was nevertheless buried with due reverence and provided with a bowl of Anglo-Saxon form as a grave good. Isotopic evidence indicated that this individual was also of local origin.

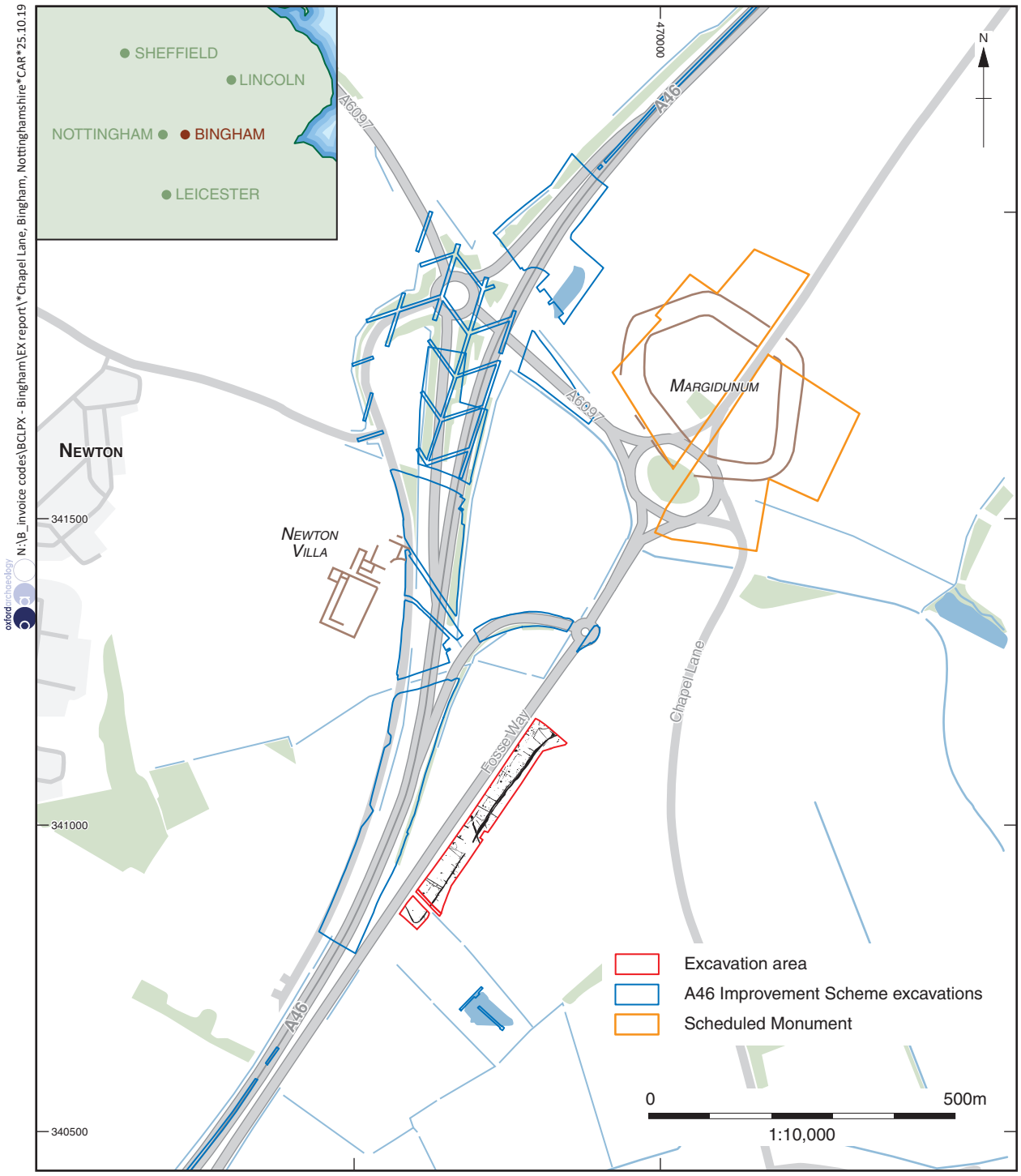

Figure 1: Site location

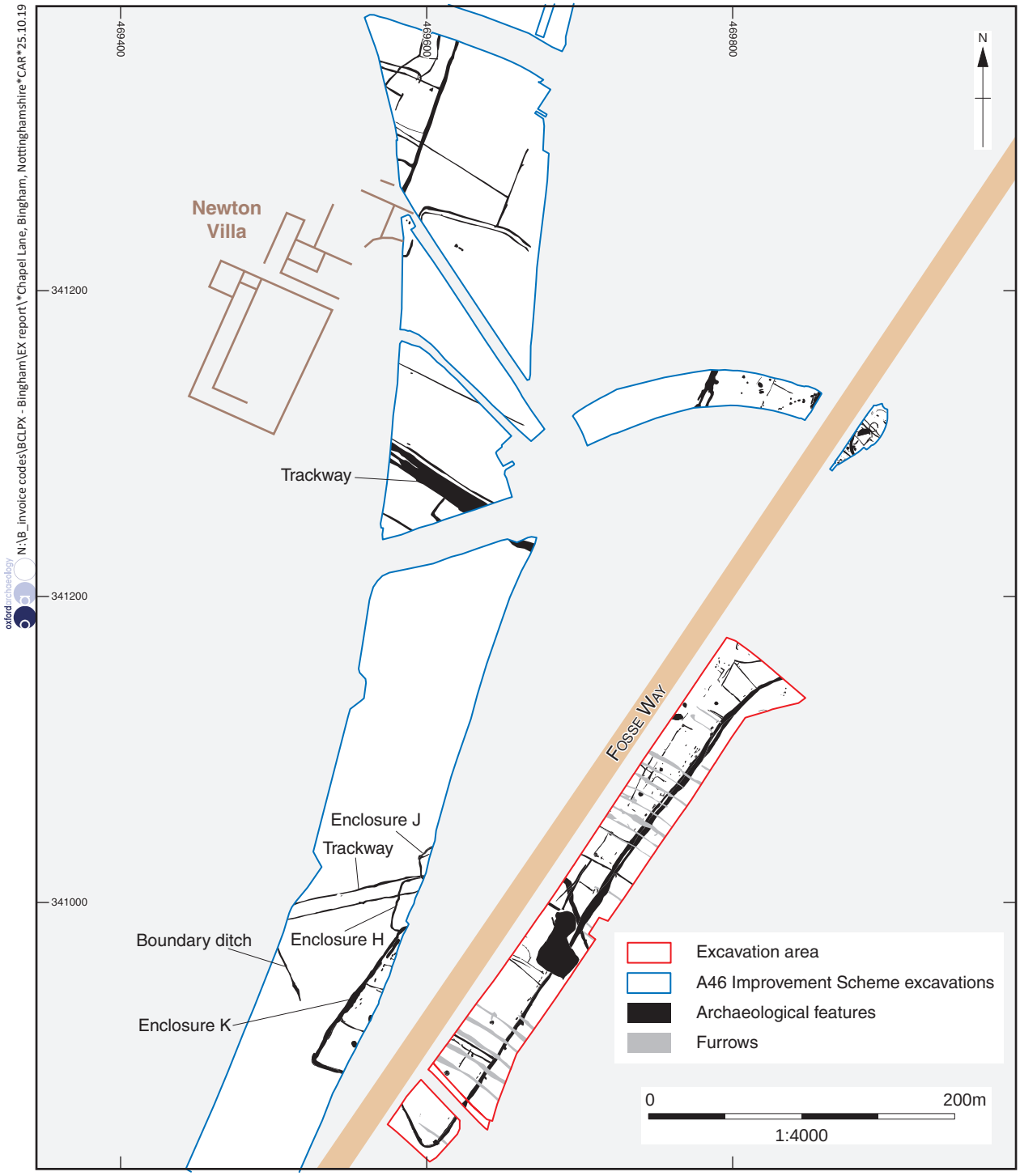

Figure 2: Plan of the site in relation to the A46 Newark to Widmerpool Improvement Scheme excavations

Figure 3: Aerial view of the excavation, facing north. The road to the left is the A46 Newark to Widmerpool Improvement Scheme and the road adjacent to the site follows the presumed line of the Fosse Way

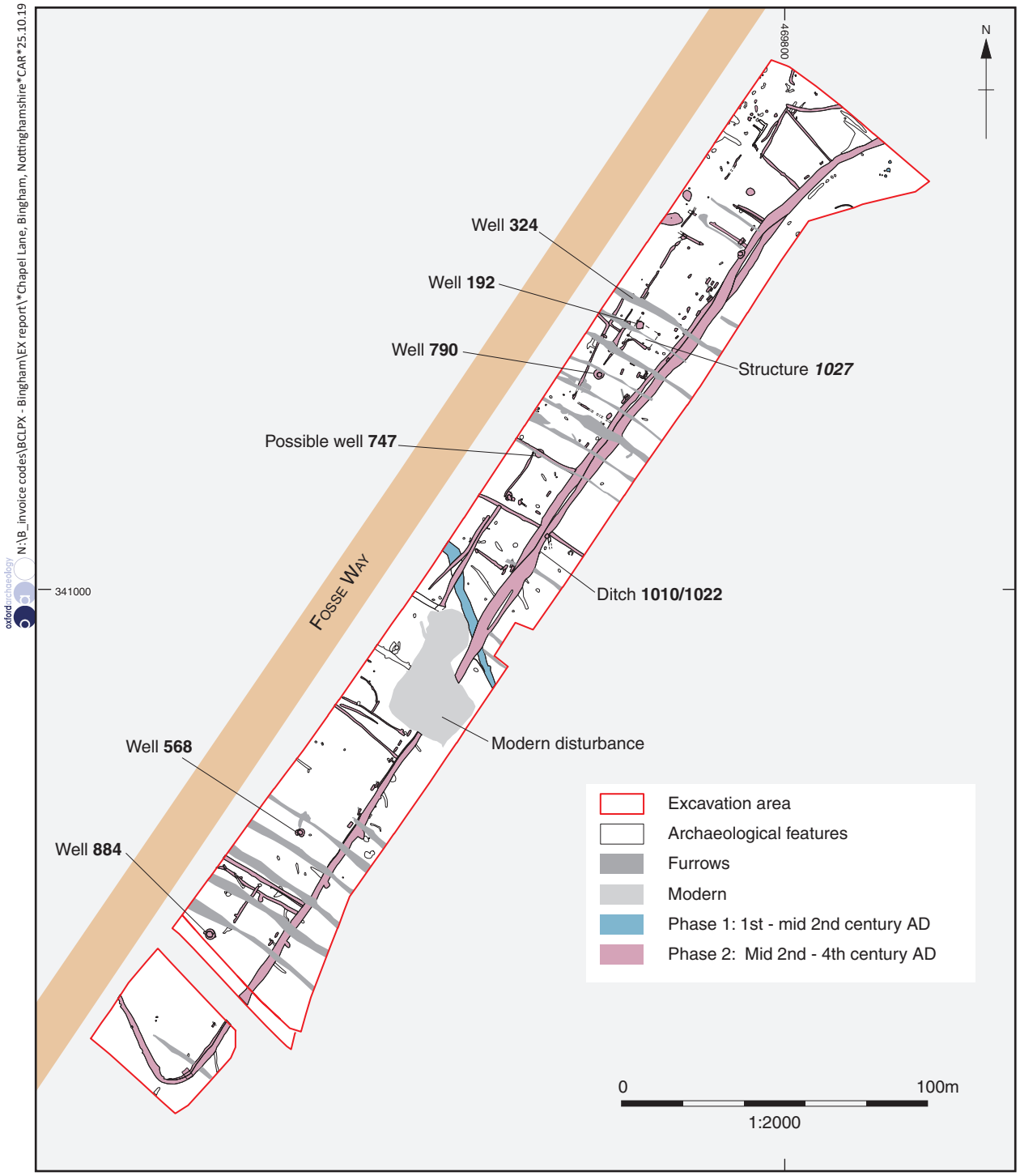

Figure 4: Phase plan of all excavation features

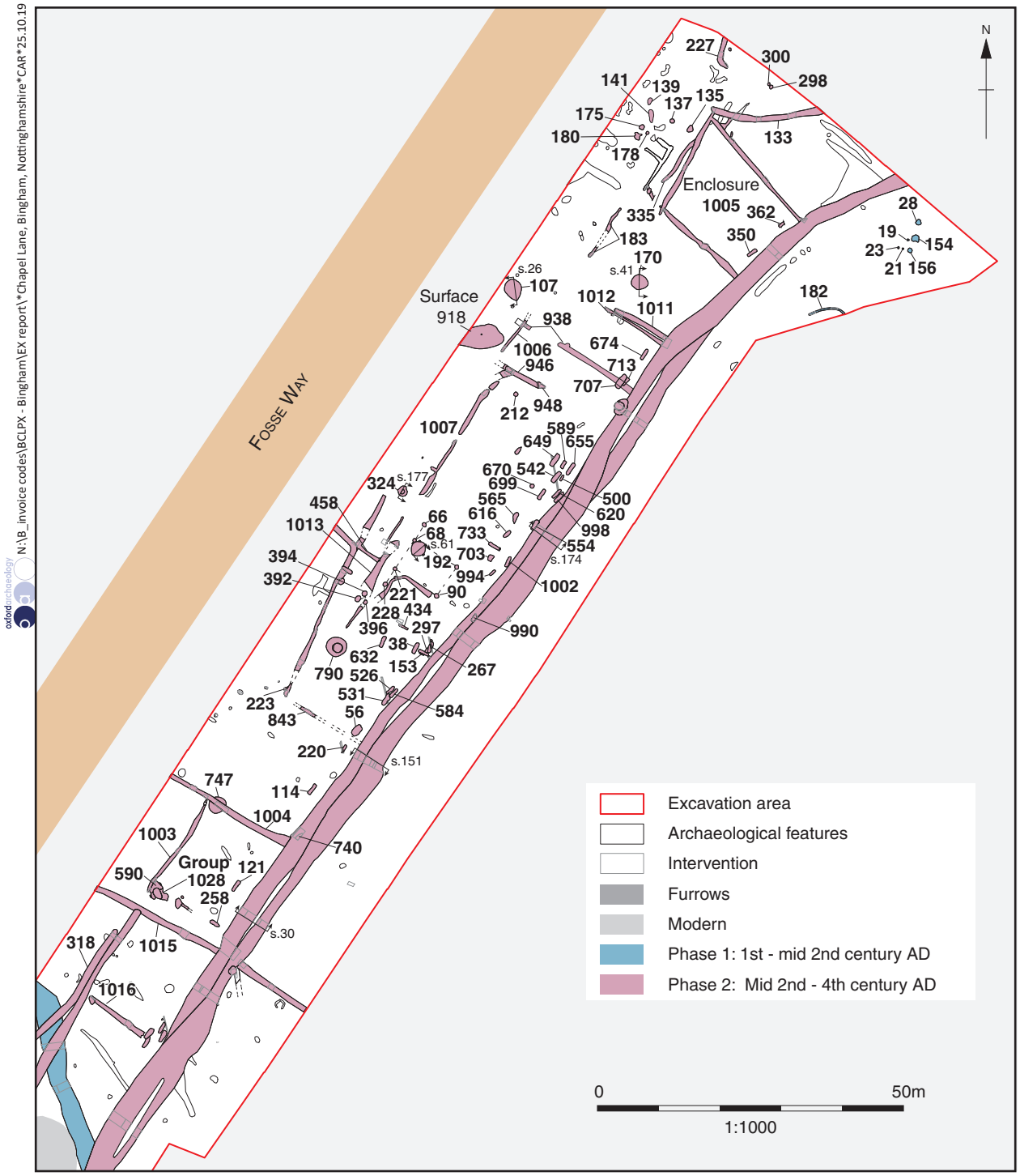

Figure 5: Features in the north half of the excavation area

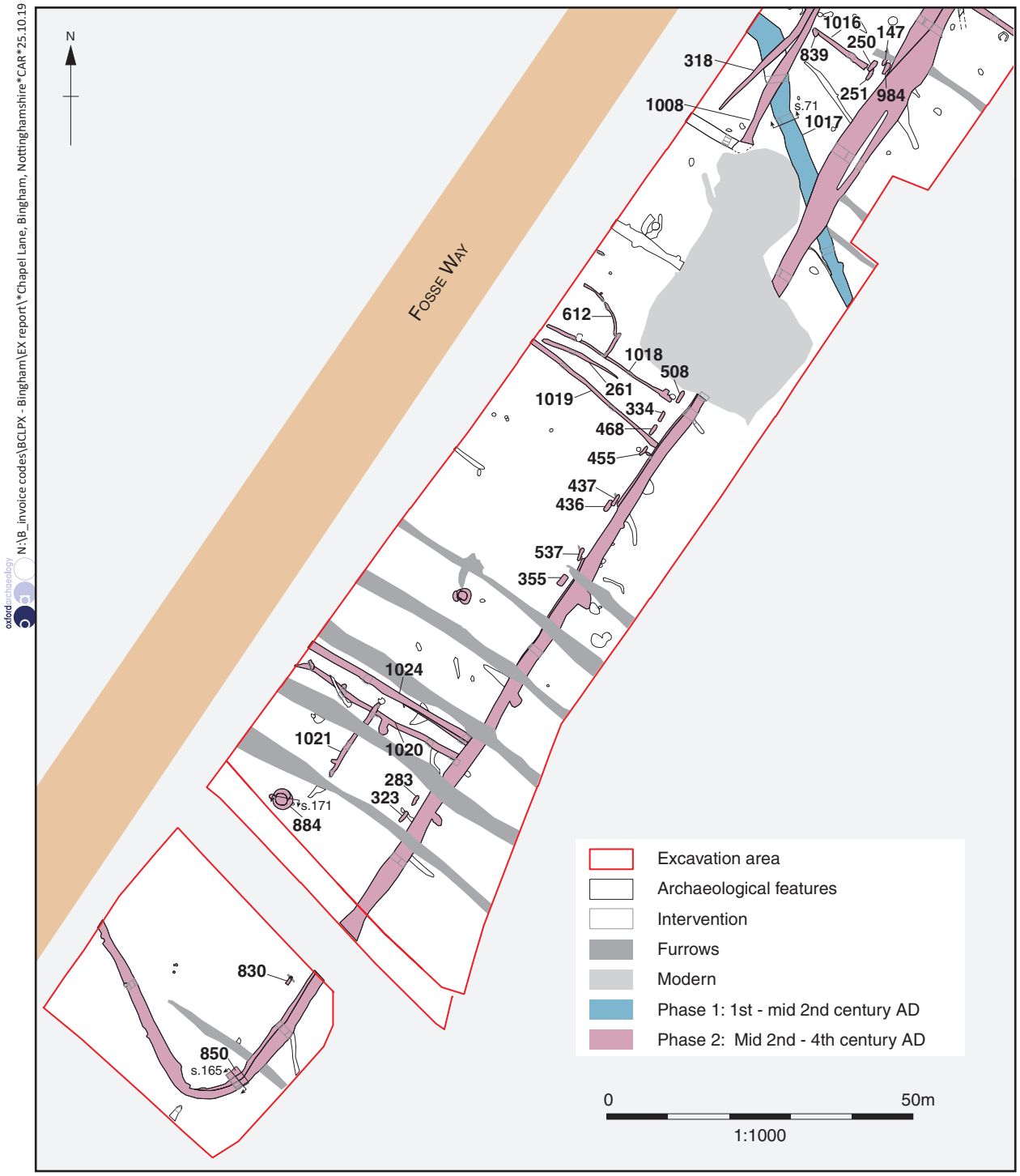

Figure 6: Features in the south half of the excavation area

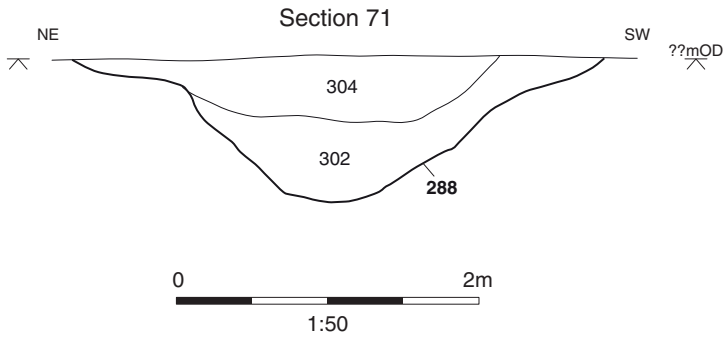

Figure 7: Section across early Roman ditch 1017

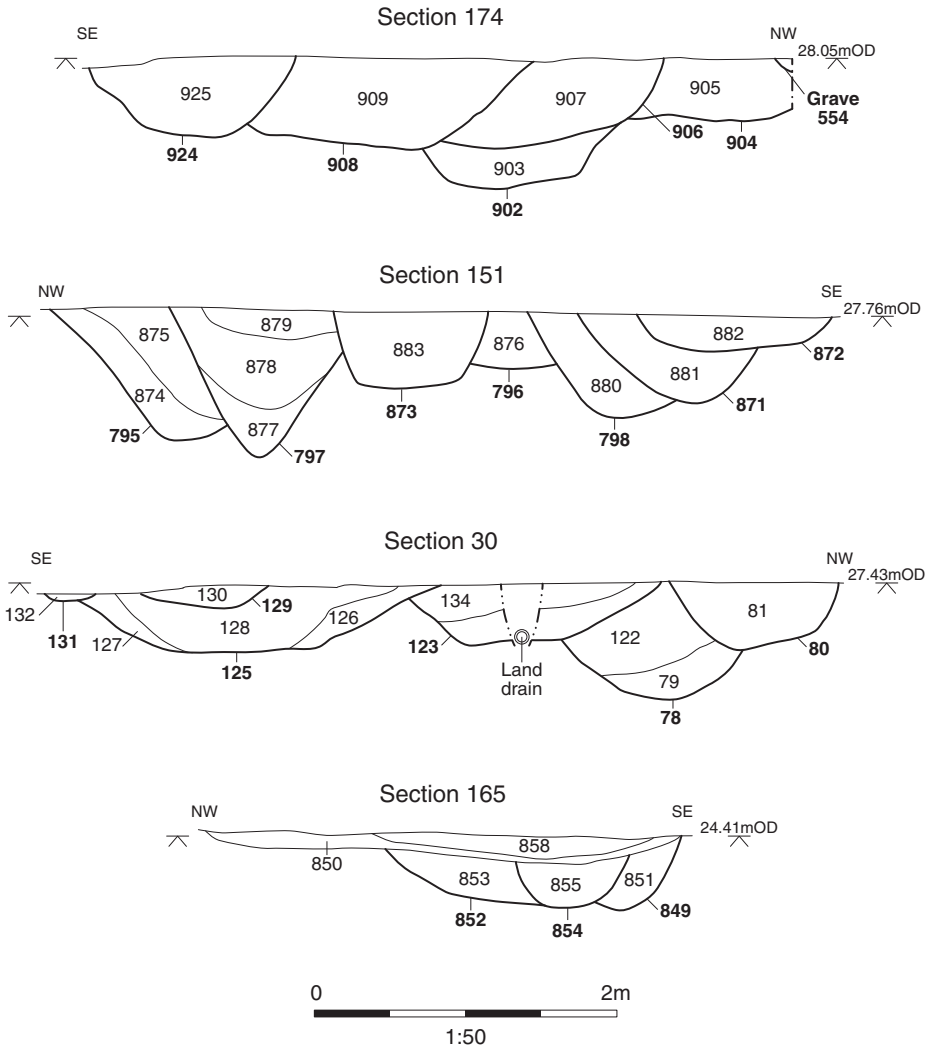

Figure 8: Sections through ditch 1010/1022

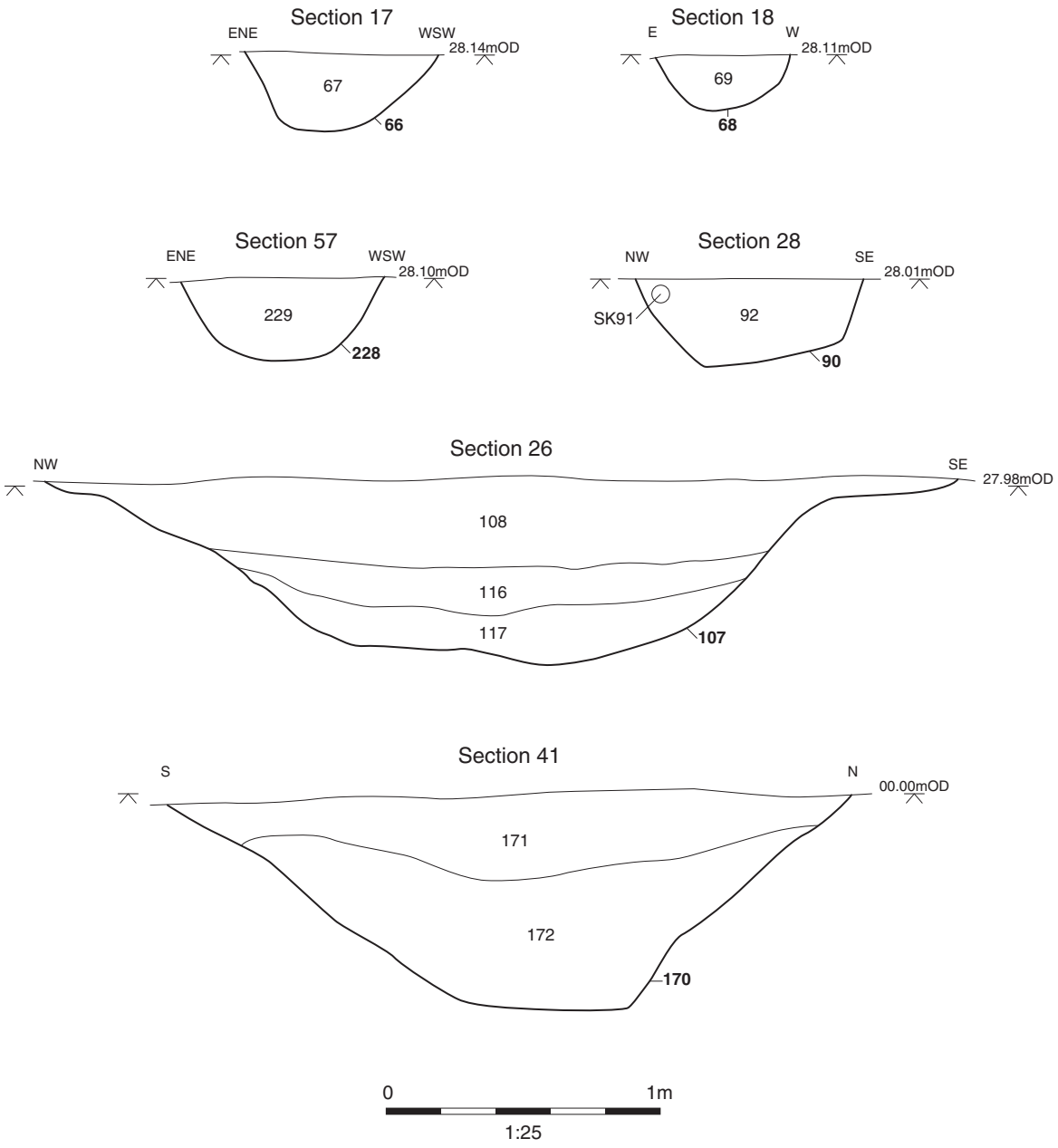

Figure 9: Sections of structure 1027 and pits 107 and 170

Figure 10: Surface 918

Figure 11: Wells 192 and 324

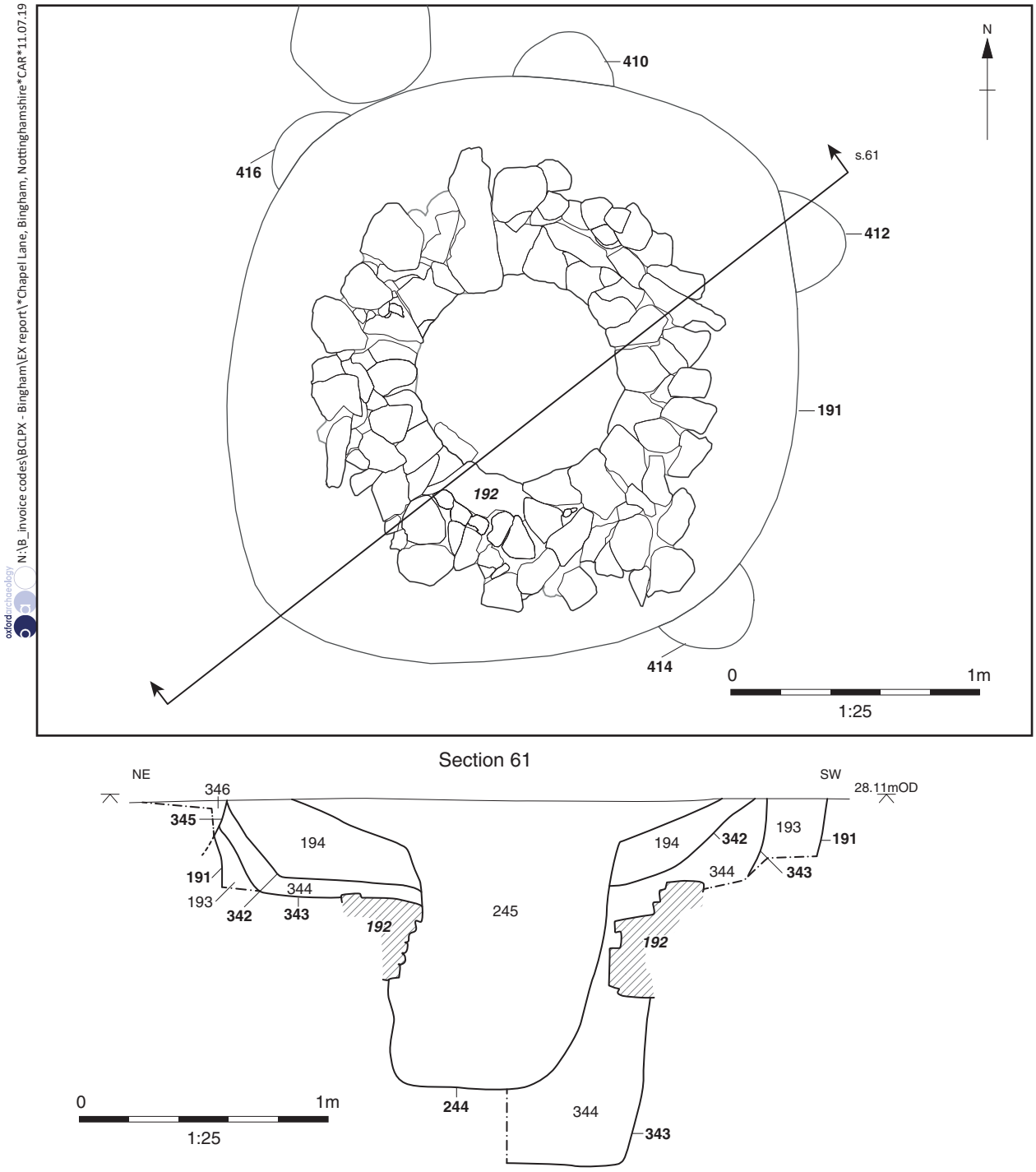

Figure 12: Plan and section of well 192

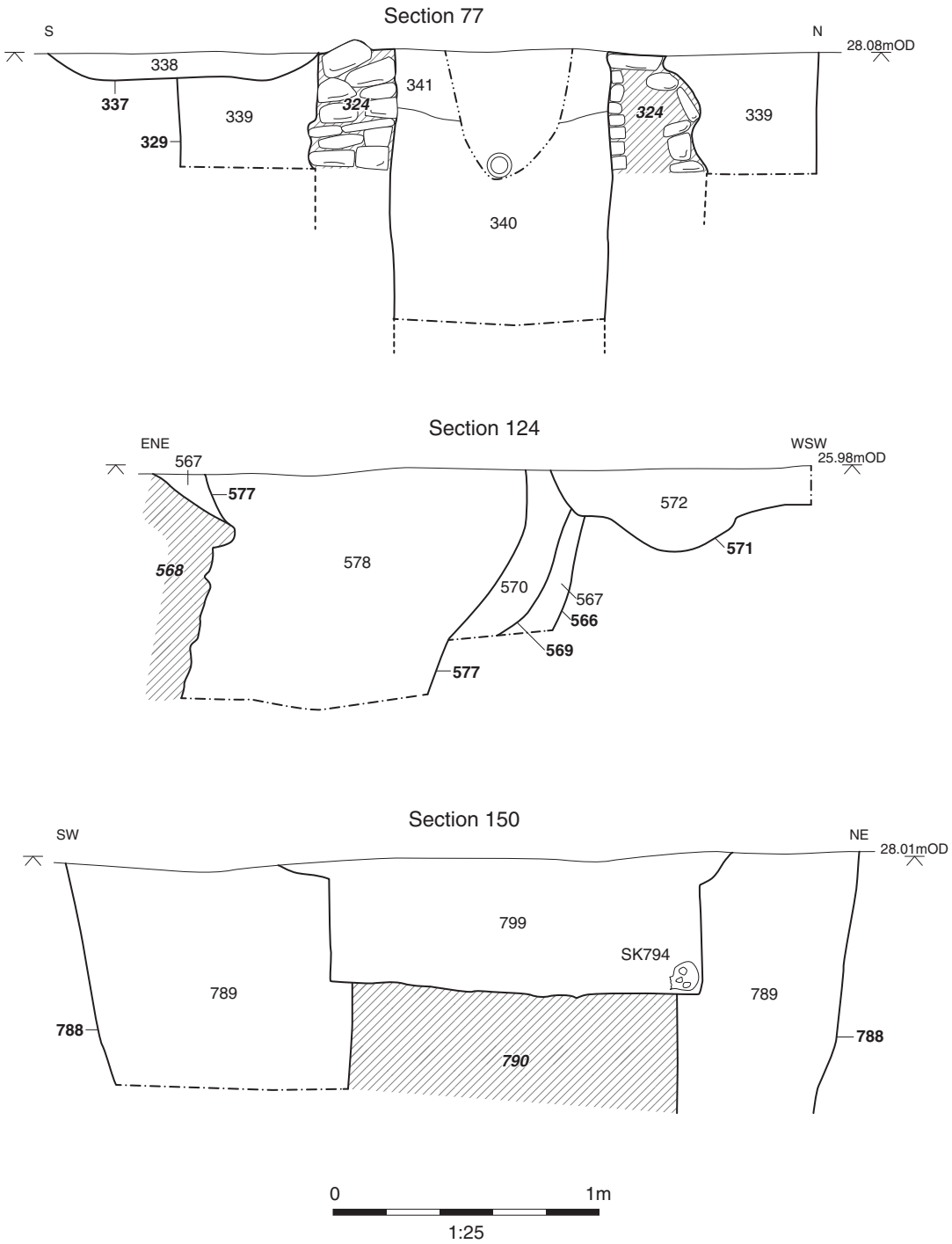

Figure 13: Sections of wells 324, 568 and 790

Figure 14: A selection of typical graves: 121, 153, 323 and 434

468

508

616

699

Figure 15: A selection of typical graves: 468, 508, 616 and 699

Figure 16: Double burials 56 and 355

Figure 17: Grave 584, the only grave with a stone lining

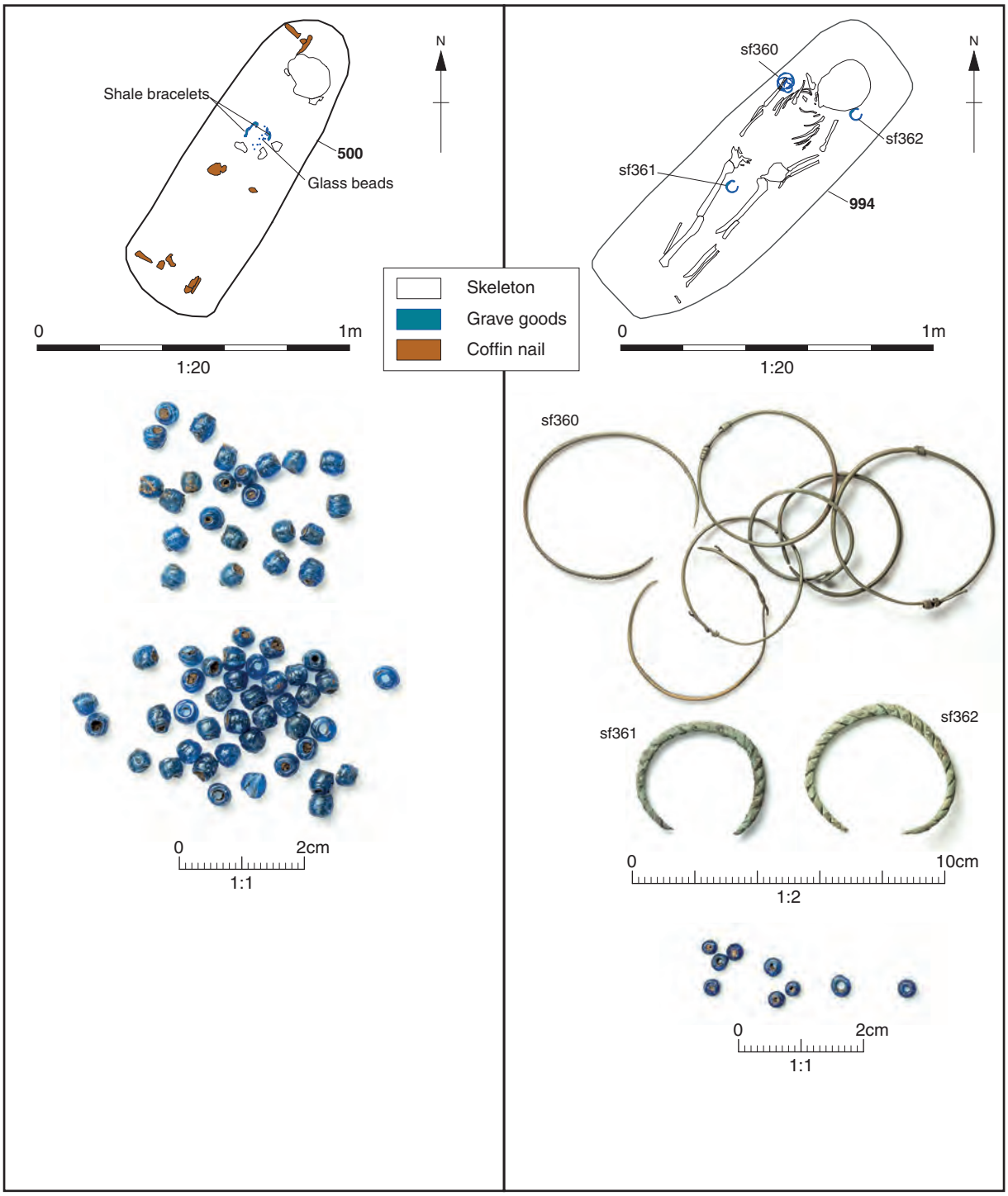

Figure 18: Graves 500 and 994, with grave goods

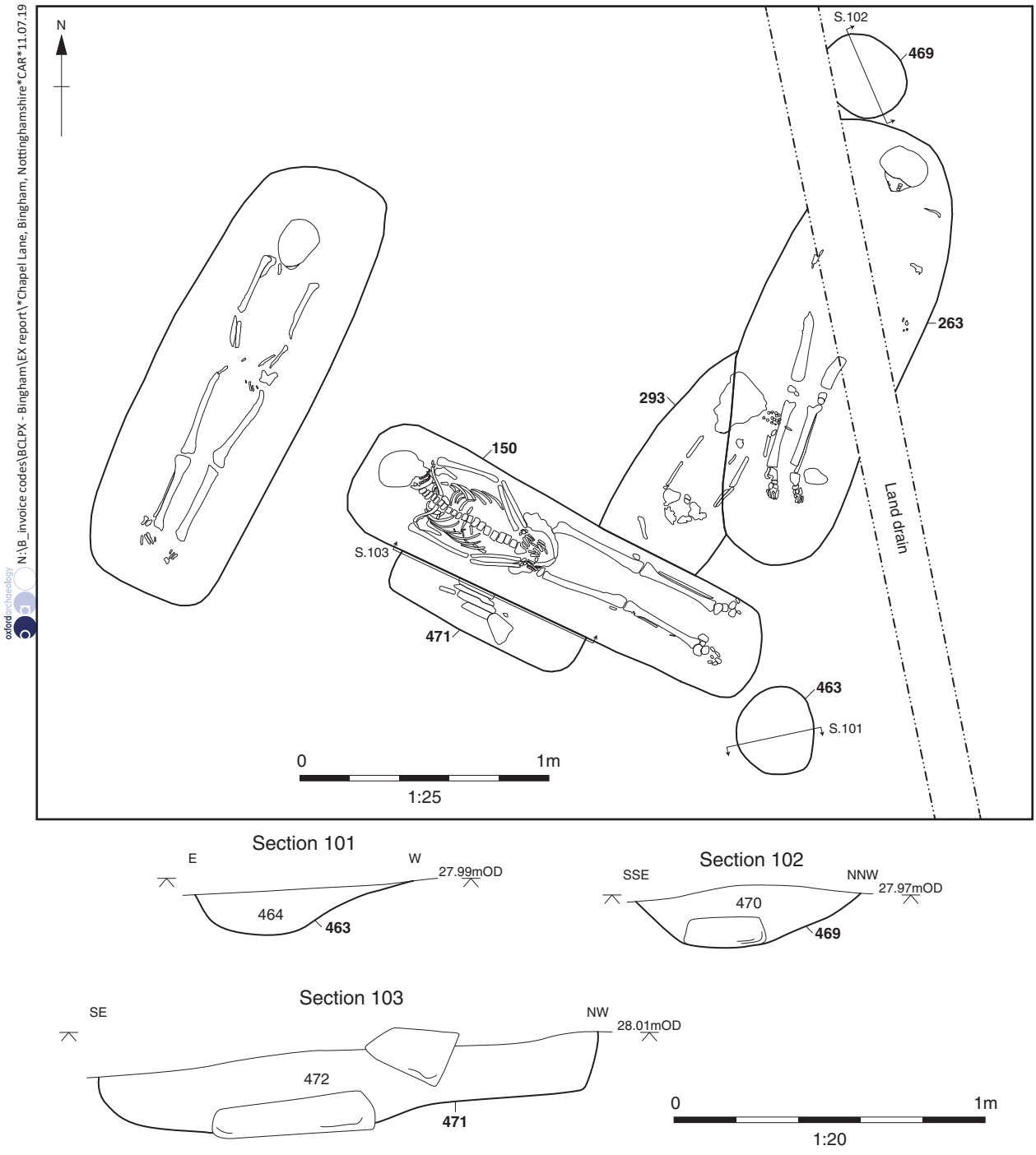

Figure 19: Possible grave markers associated with graves 150, 263 and 293

Figure 20: Early medieval inhumation 794 on top of Roman well 790

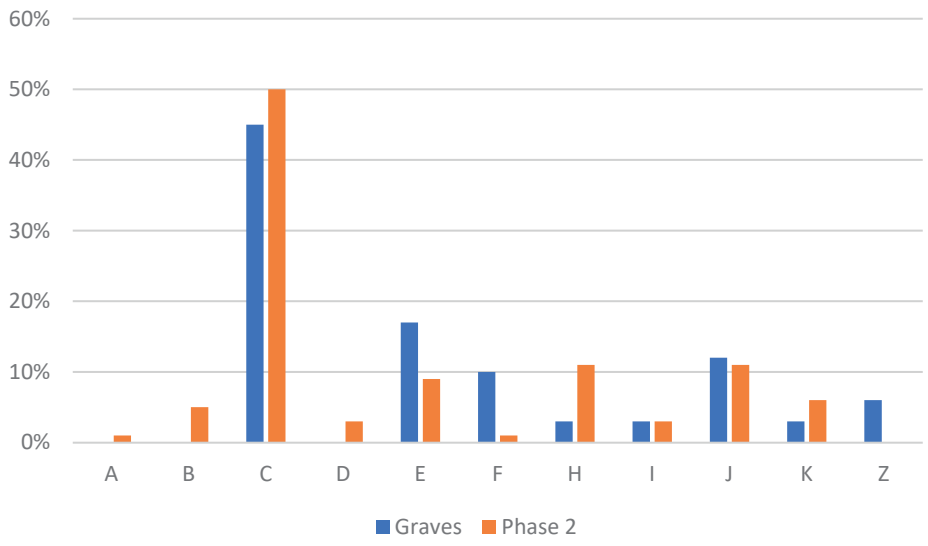

Figure 21: Pottery from funerary and non-funerary assemblages: comparison of vessel class. Quantification by estimated vessel equivalent (EVE)

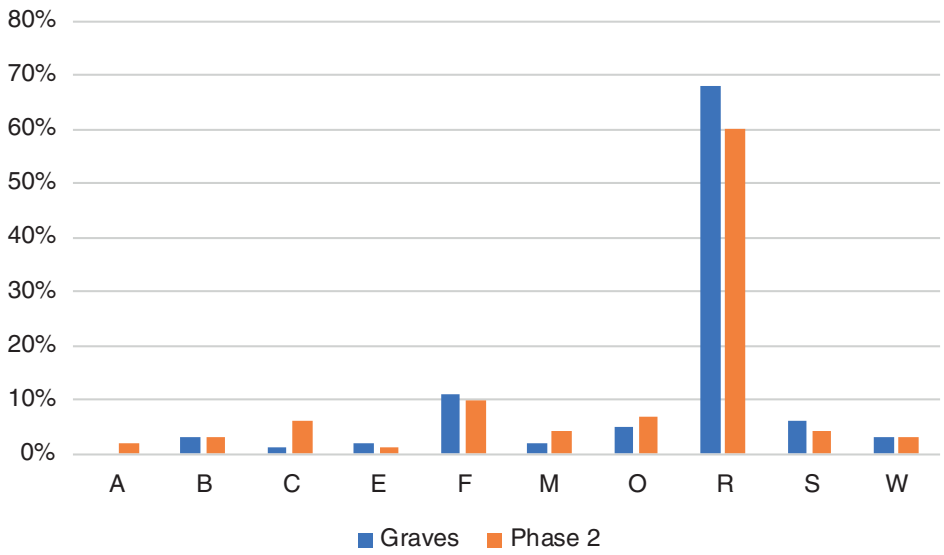

Figure 22: Pottery from funerary and non-funerary assemblages: comparison of ware category. Quantification by estimated vessel equivalent

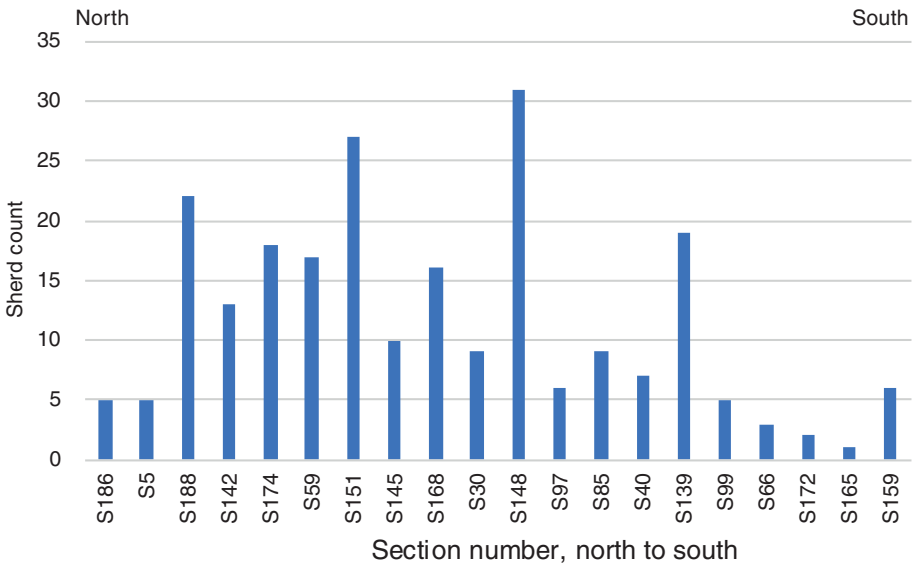

Figure 23: Amount of pottery per ditch intervention. Quantification by sherd count

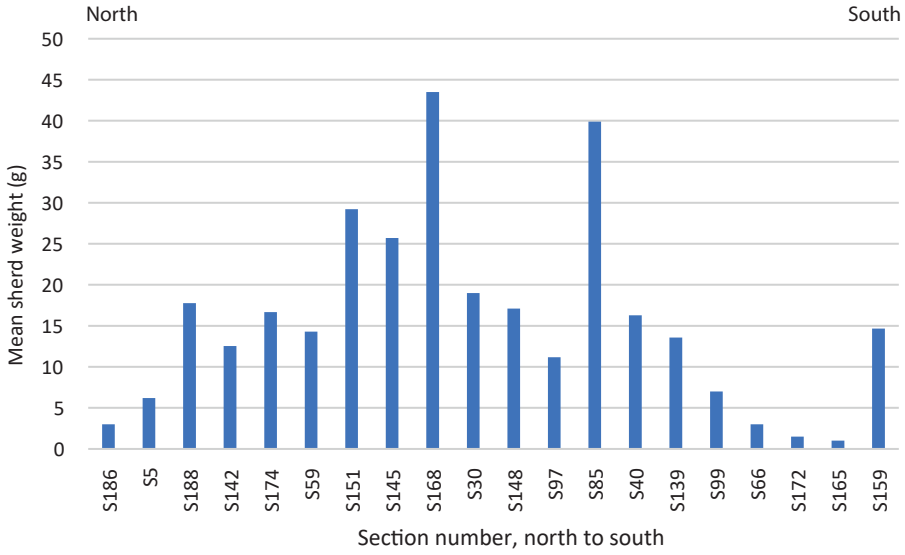

Figure 24: Mean sherd weight (g) of pottery per ditch intervention

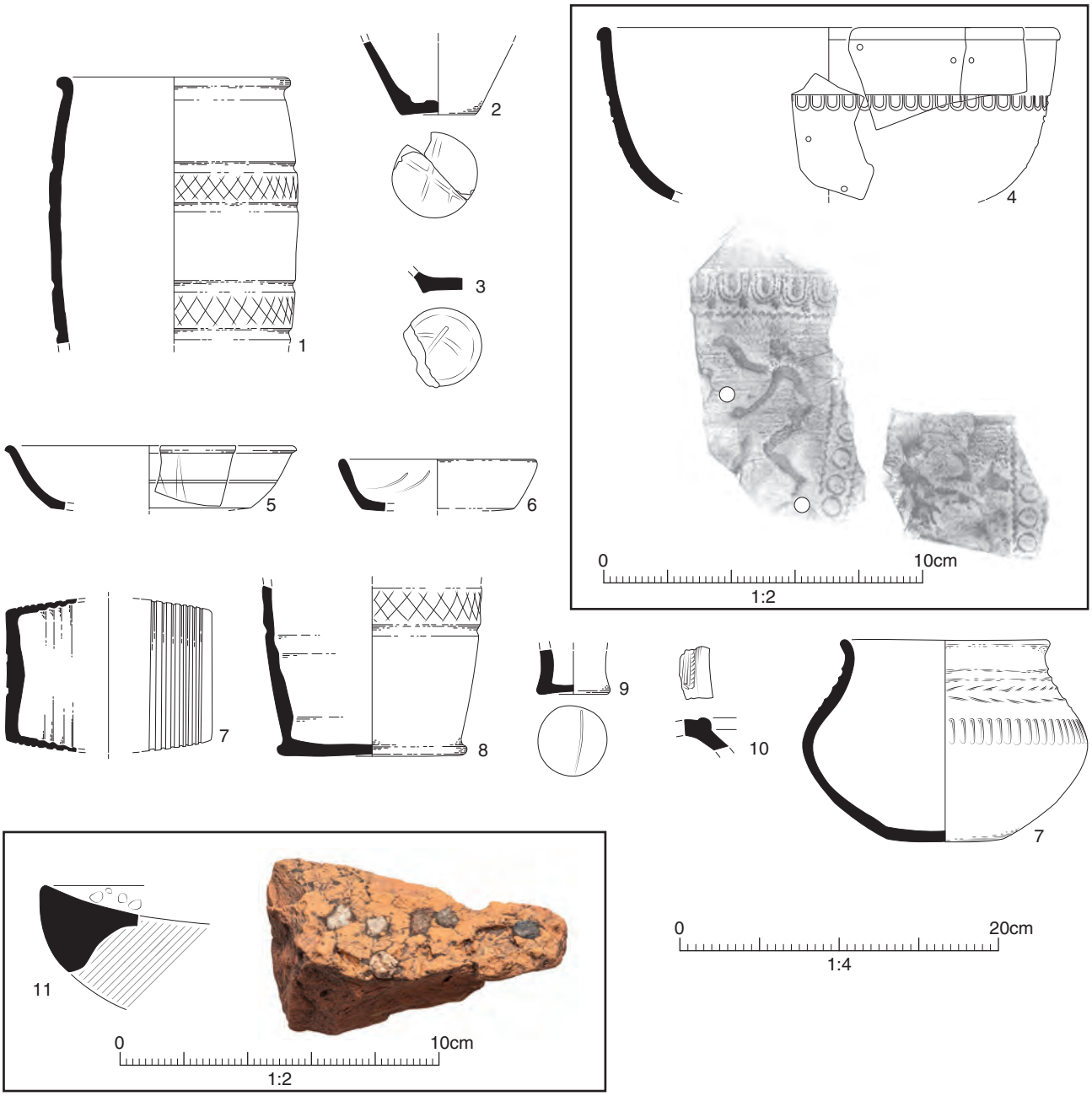

Figure 25: Roman and Anglo-Saxon pottery

Figure 26: Metal finds from non-funerary contexts

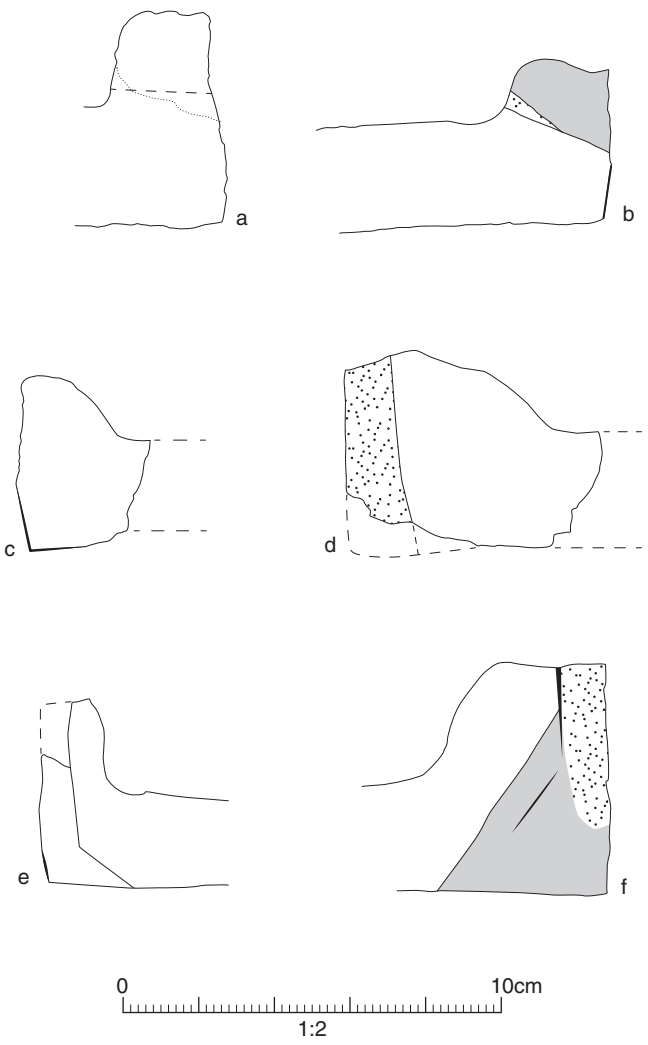

Figure 27: Roman ceramic building materials: tegula flange and cutaway profiles, no.1

Figure 28: Roman ceramic building materials: signature marks, hoof and paw prints and flue tiles, nos 2-6

Figure 29: Upper rotary quern from surface 918

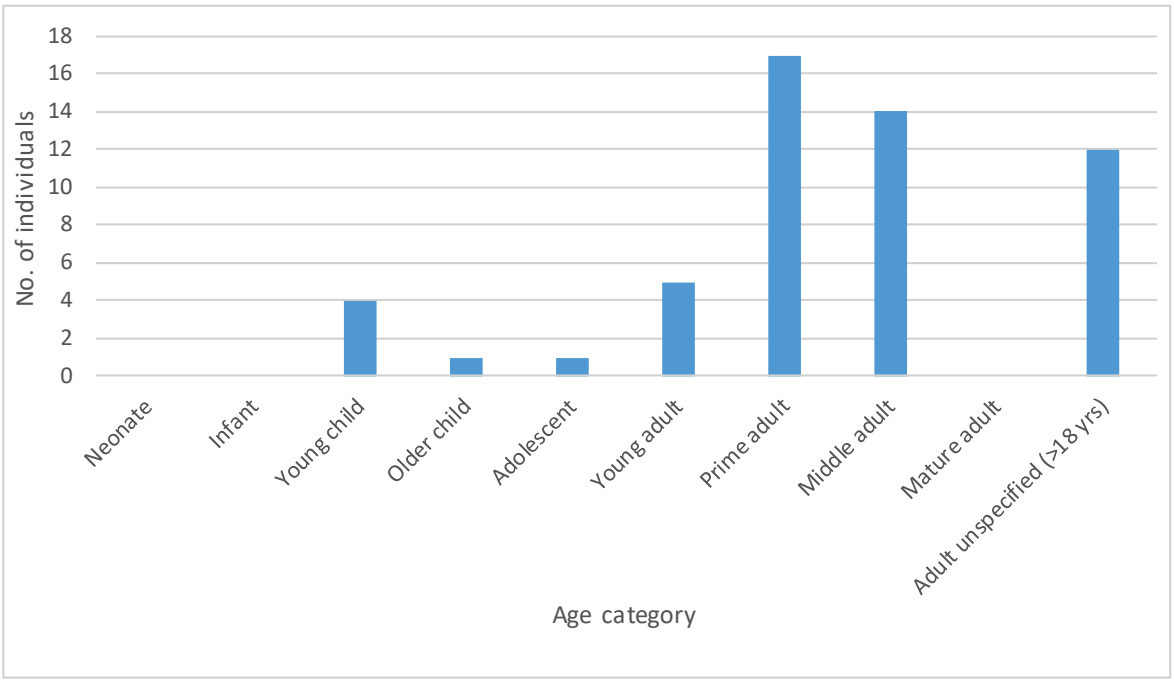

Figure 30: Age categories for the skeletal assemblage

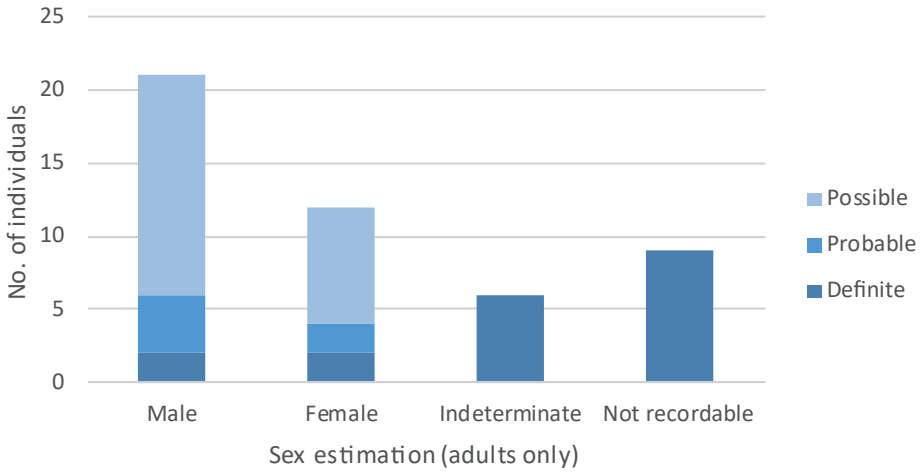

Figure 31: Adult sex distribution

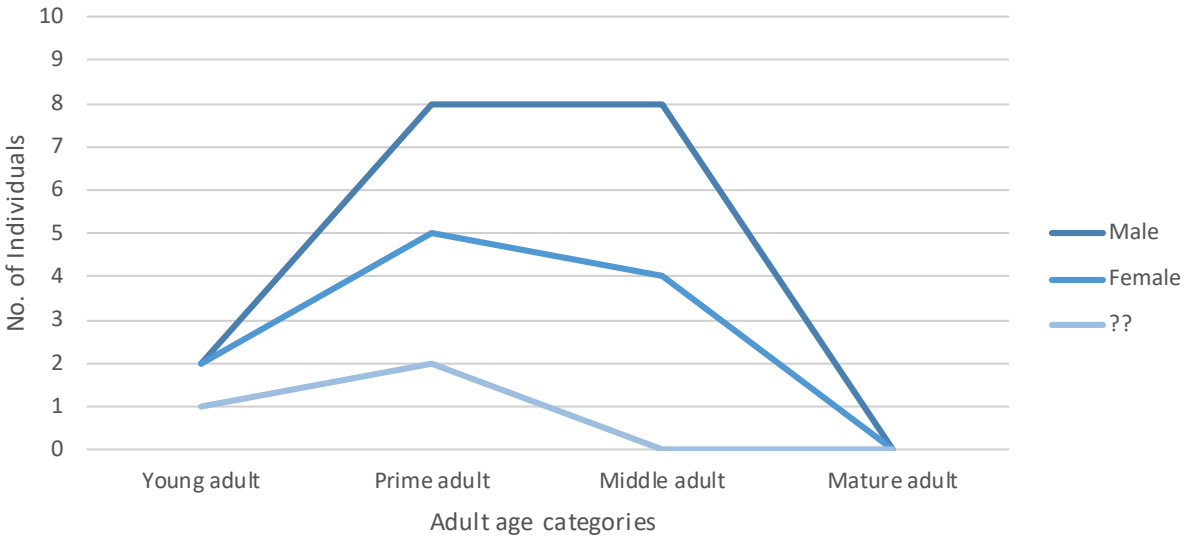

Figure 32: Adult age distribution

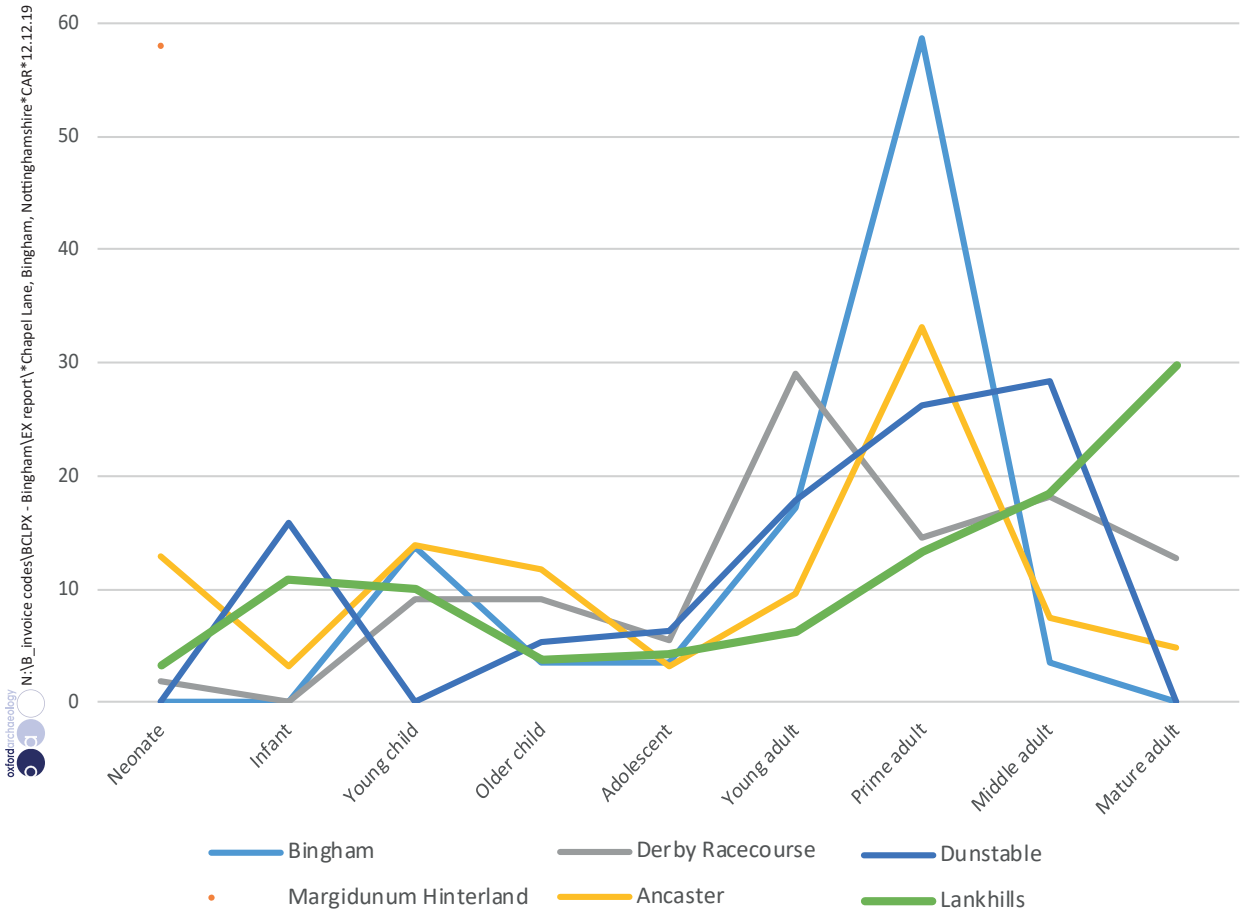

Figure 33: Comparative age distributions

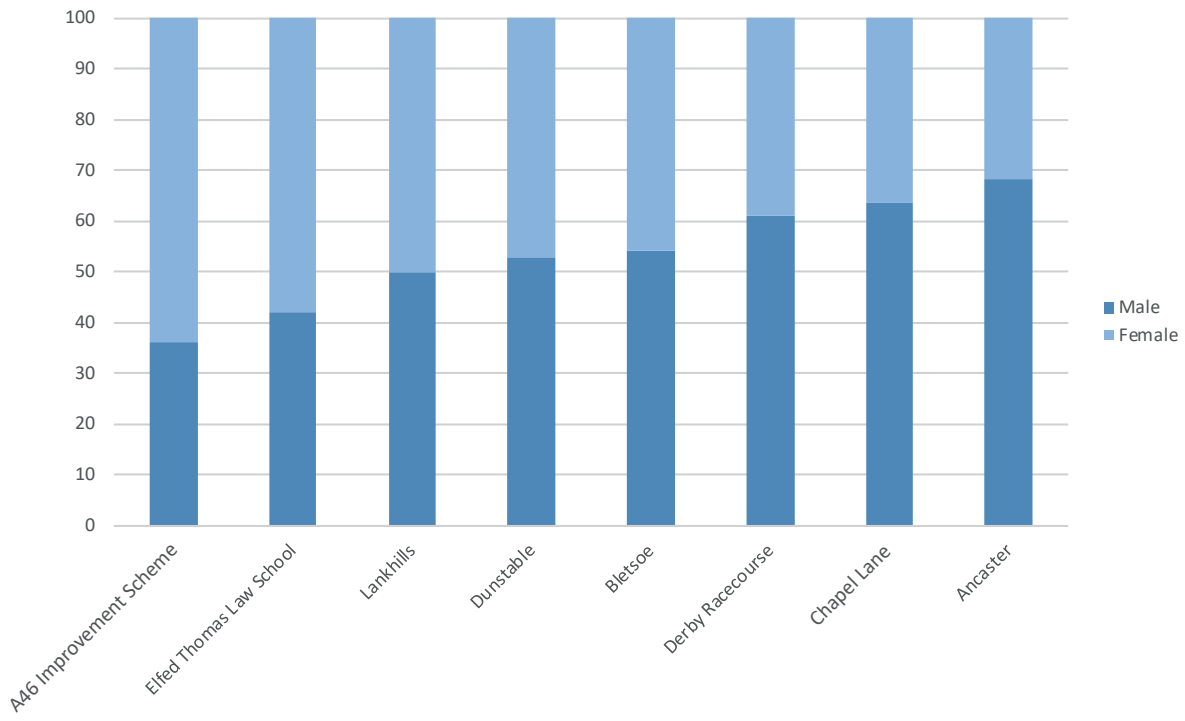

Figure 34: Comparative sex distributions

Figure 35: Skeleton 466, peri-mortem cuts, proximal hand phalanx.

Figure 36: Skeleton 406, vertebral haemangioma, second and third thoracic vertebrae.

Figure 37: Human femoral shaft from pit 107 displaying anthropogenic modification. Inserts a) and c) canid gnawing, inserts b) and d) transverse peri-mortem cuts

Figure 38: Skeleton 794: Rounded, eroded margins of the nasal aperture, plus periostitis and lytic lesions affecting the superior and inferior maxillary palate.
All consistent with rhinomaxillary syndrome and a diagnosis of leprosy.

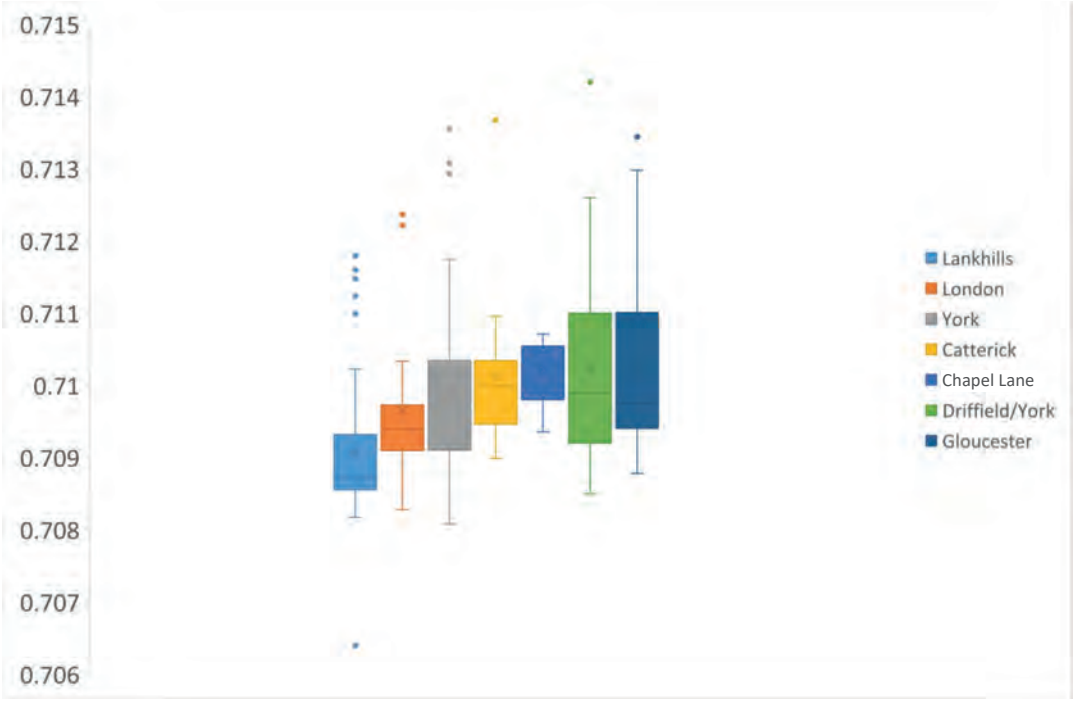

Figure 39: The $^{87}Sr/^{86}Sr$ isotope composition of the Chapel Lane samples and comparative Roman UK populations represented by box and whisker plots

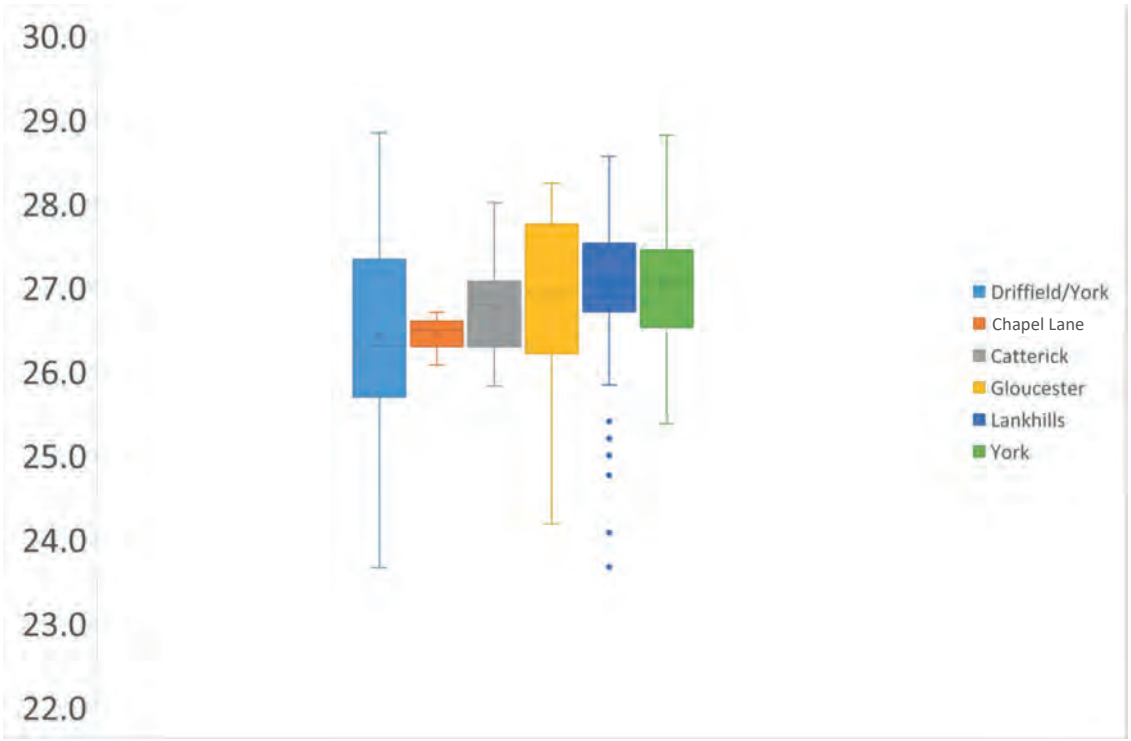

Figure 40: The δ^{18}OCARBVSMOW isotope composition of the Chapel Lane samples and comparative Roman UK populations represented by box and whisker plots

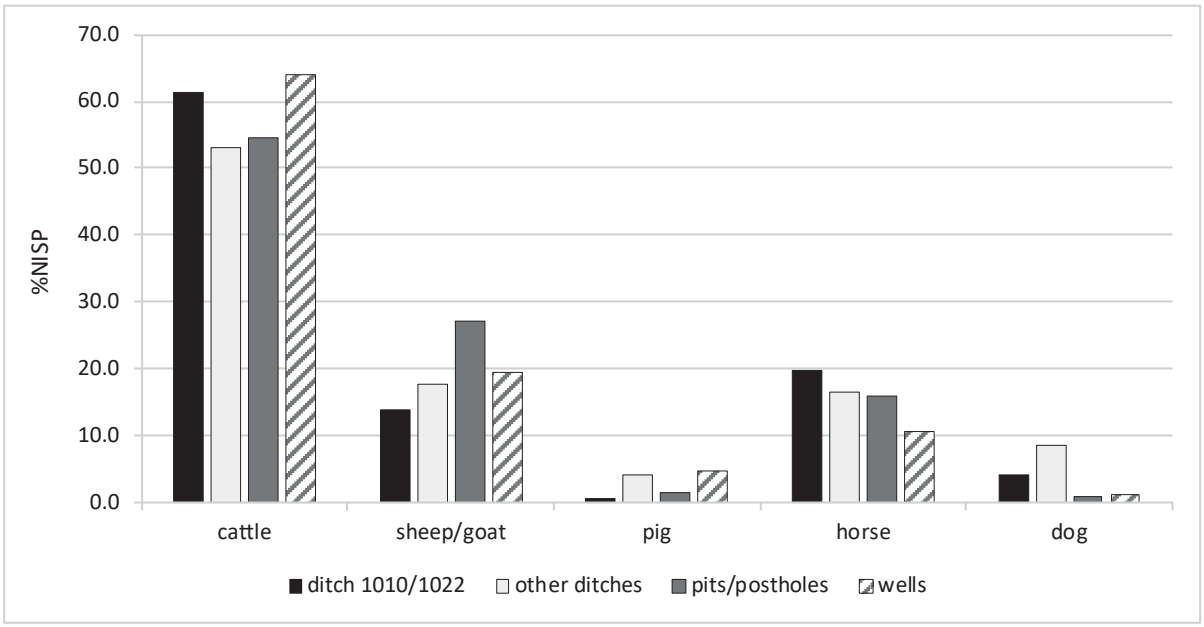

Figure 41: Relative frequency of the main mammal taxa recovered from different feature types

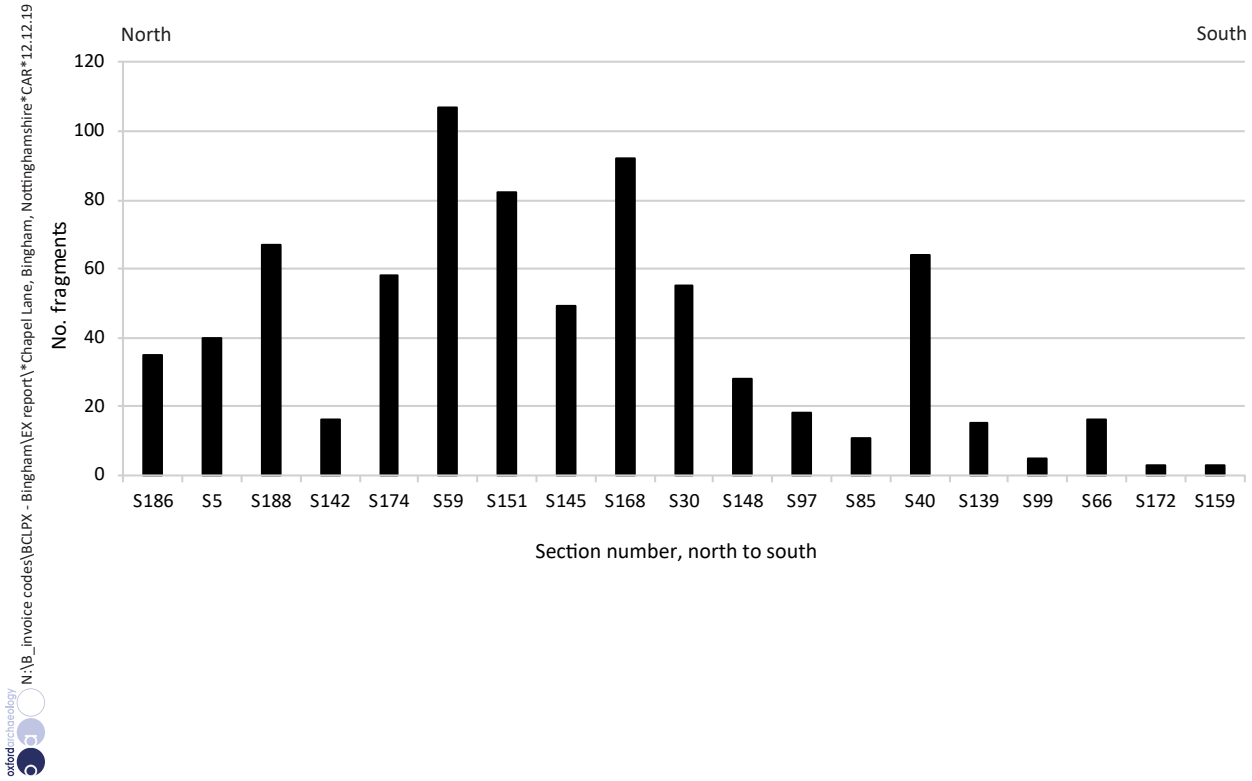

Figure 42: Number of animal bone fragments recovered from interventions in ditch 1010/1022 from north (left) to south (right)

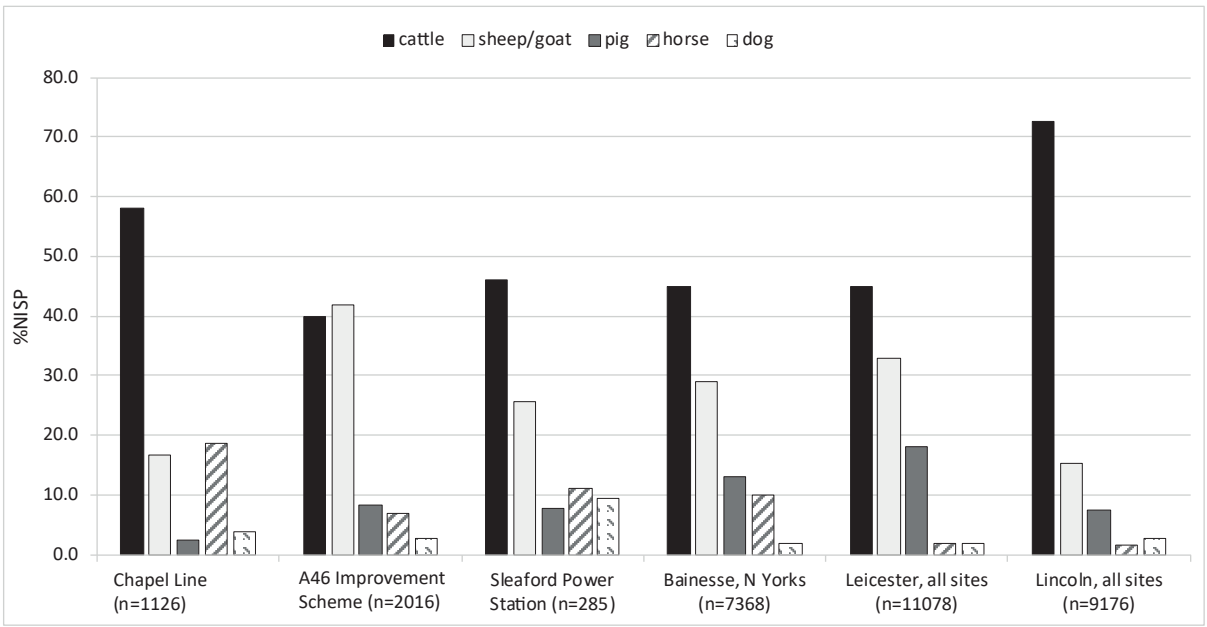

Figure 43: Comparison of relative frequencies of main taxa at Chapel Lane with data from the A46 Improvement Scheme (Higbee 2014), roadside settlements at Sleaford Power Station (Allen 2013), Bainesse (Stallibrass 2002), and combined urban assemblages from Leicester and Lincoln (data from Maltby 2010)

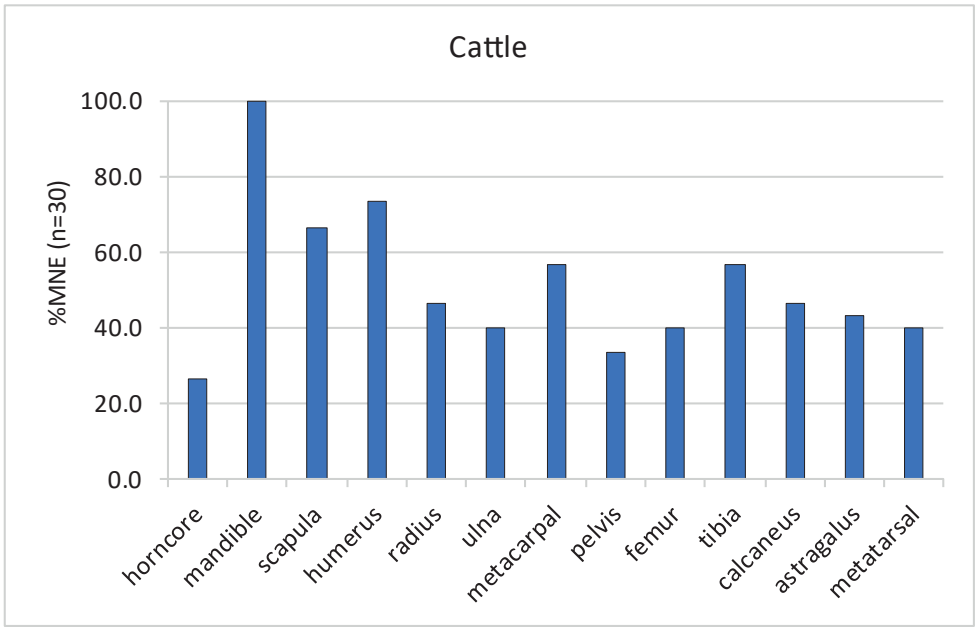

Figure 44: Relative percentages of cattle elements

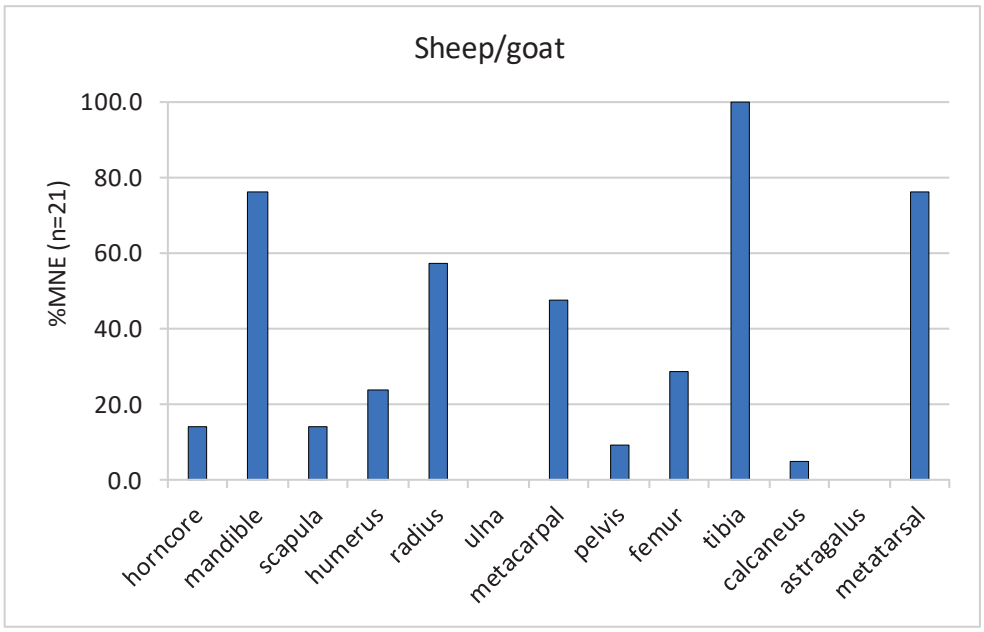

Figure 45: Relative percentages of sheep/goat elements

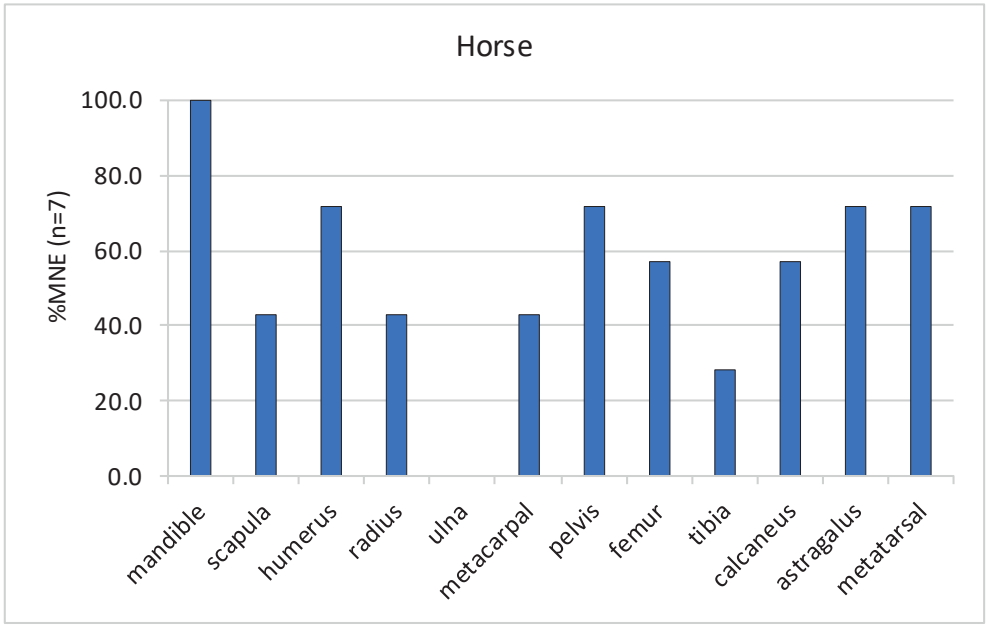

Figure 46: Relative percentages of horse elements

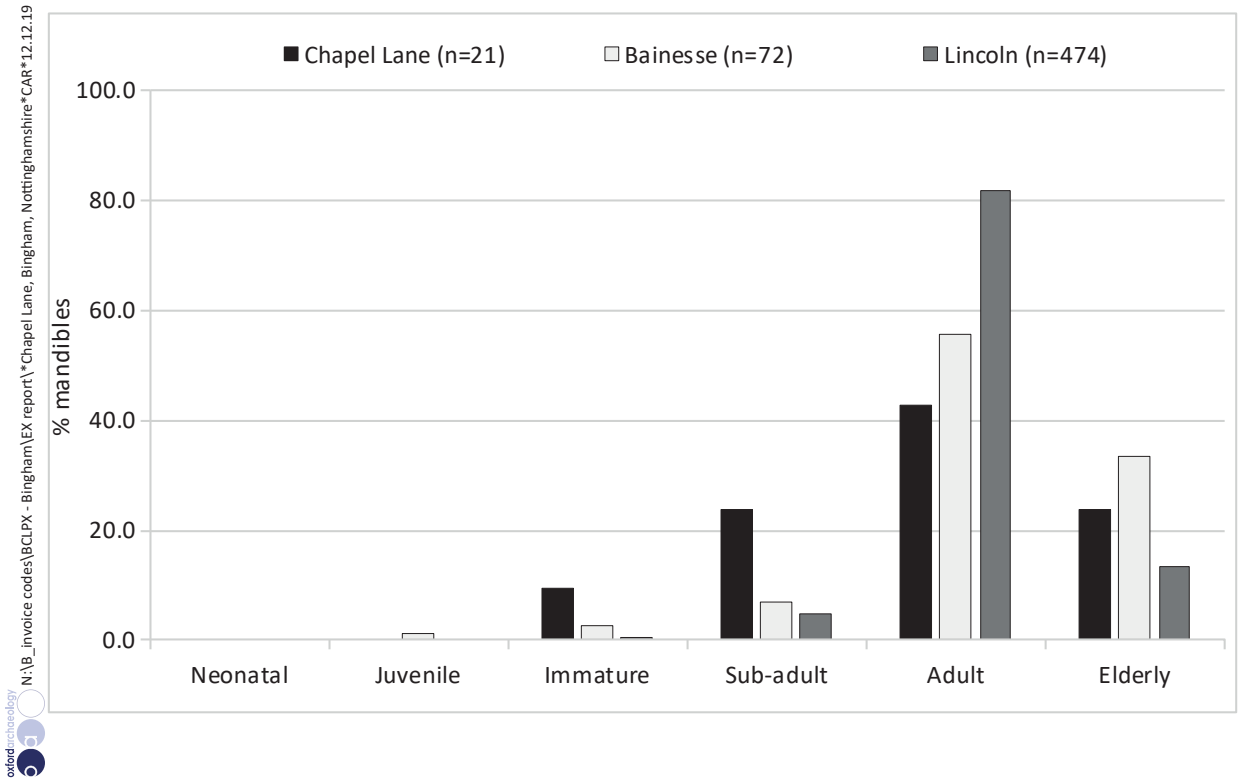

Figure 47: Comparison of cattle dental ageing data from Chapel Lane with the roadside settlement at Bainesse (Stallibrass 2002) and urban sites at Leicester (Browning 2009) and Lincoln (Dobney et al. 1996). Age groups based on O'Connor (1988)

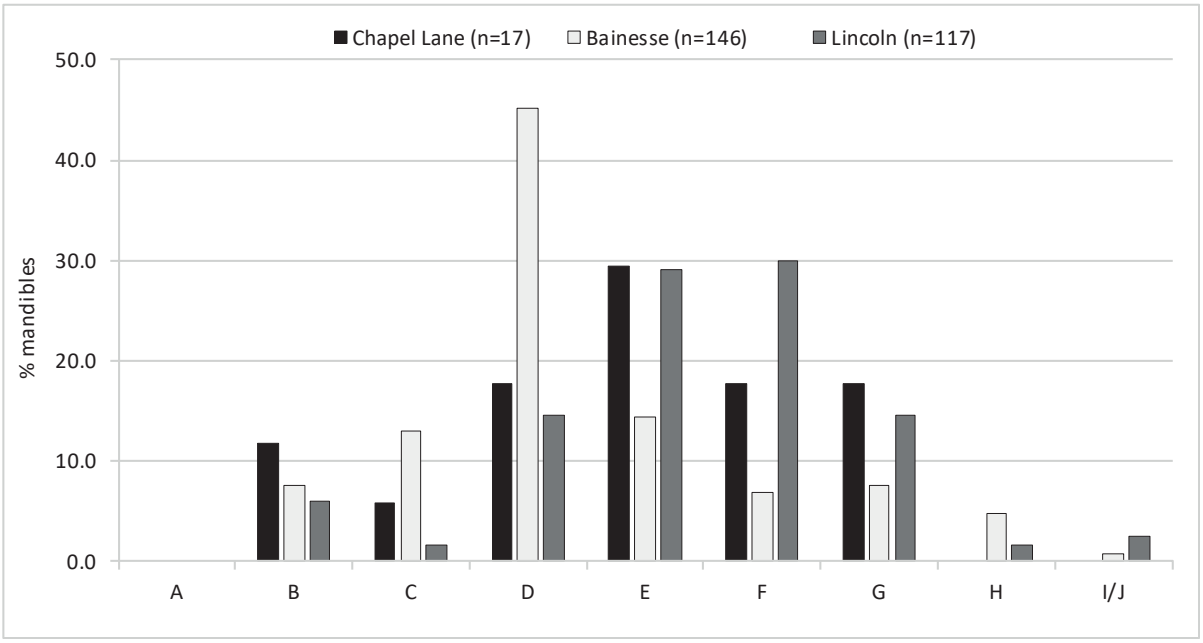

Figure 48: Comparison of sheep/goat dental ageing data from Bingham with the roadside settlement at Bainesse (Stallibrass 2002) and Lincoln (data from Maltby 2010, after Dobney *et al.* 1996). Age groups based on Payne (1973) and Jones (2006)

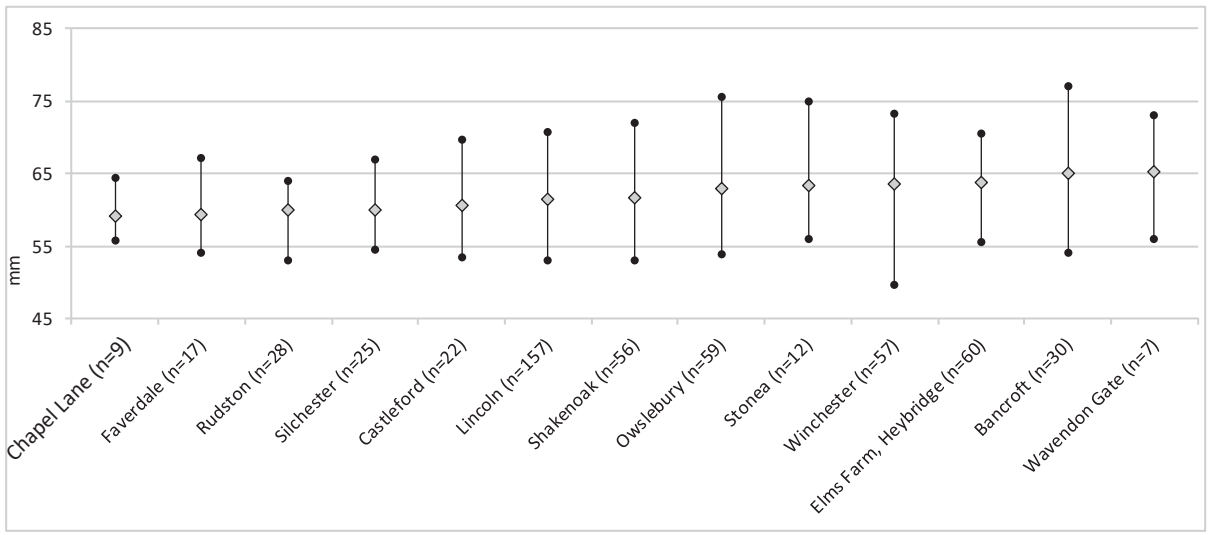

Figure 49: Range and mean of cattle astragalus lateral lengths from mid to late Roman assemblages in Britain

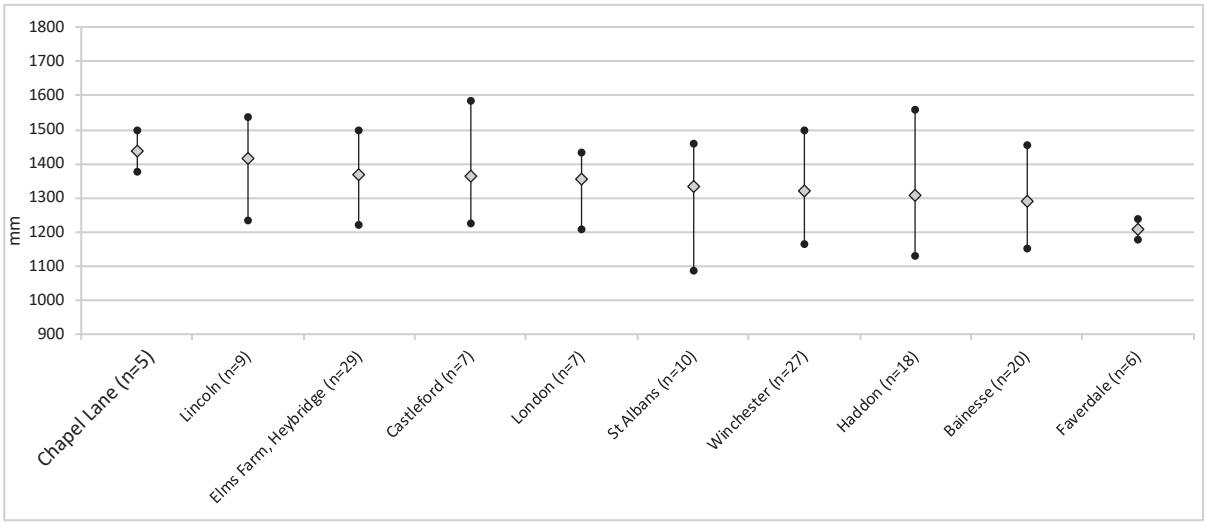

Figure 50: Range and mean of withers' heights from mid to late Roman assemblages in Britain

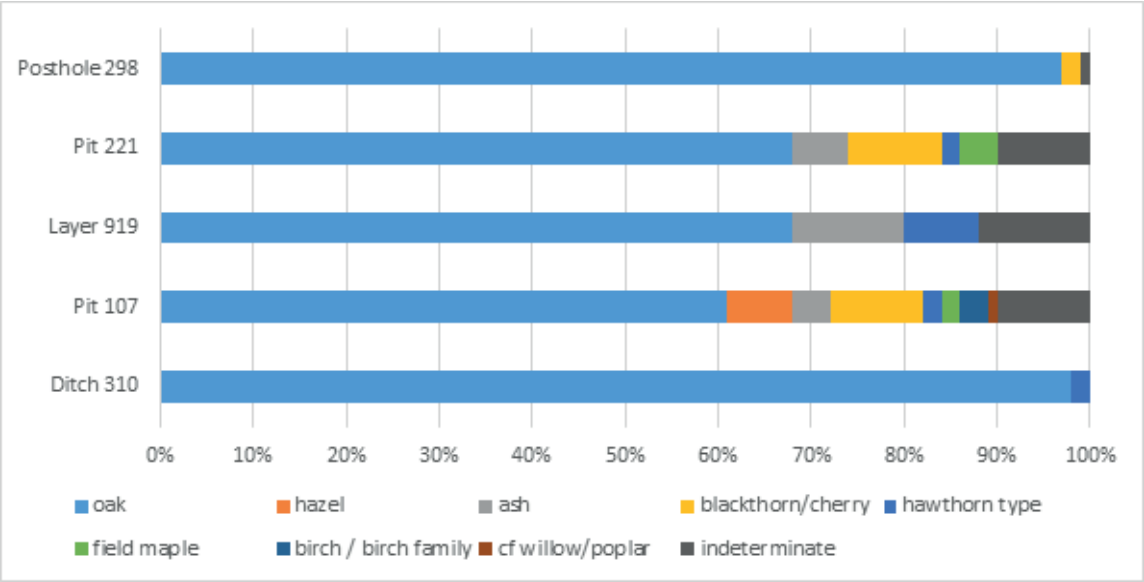

Figure 51: Relative proportions of wood taxa identified from the five samples

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