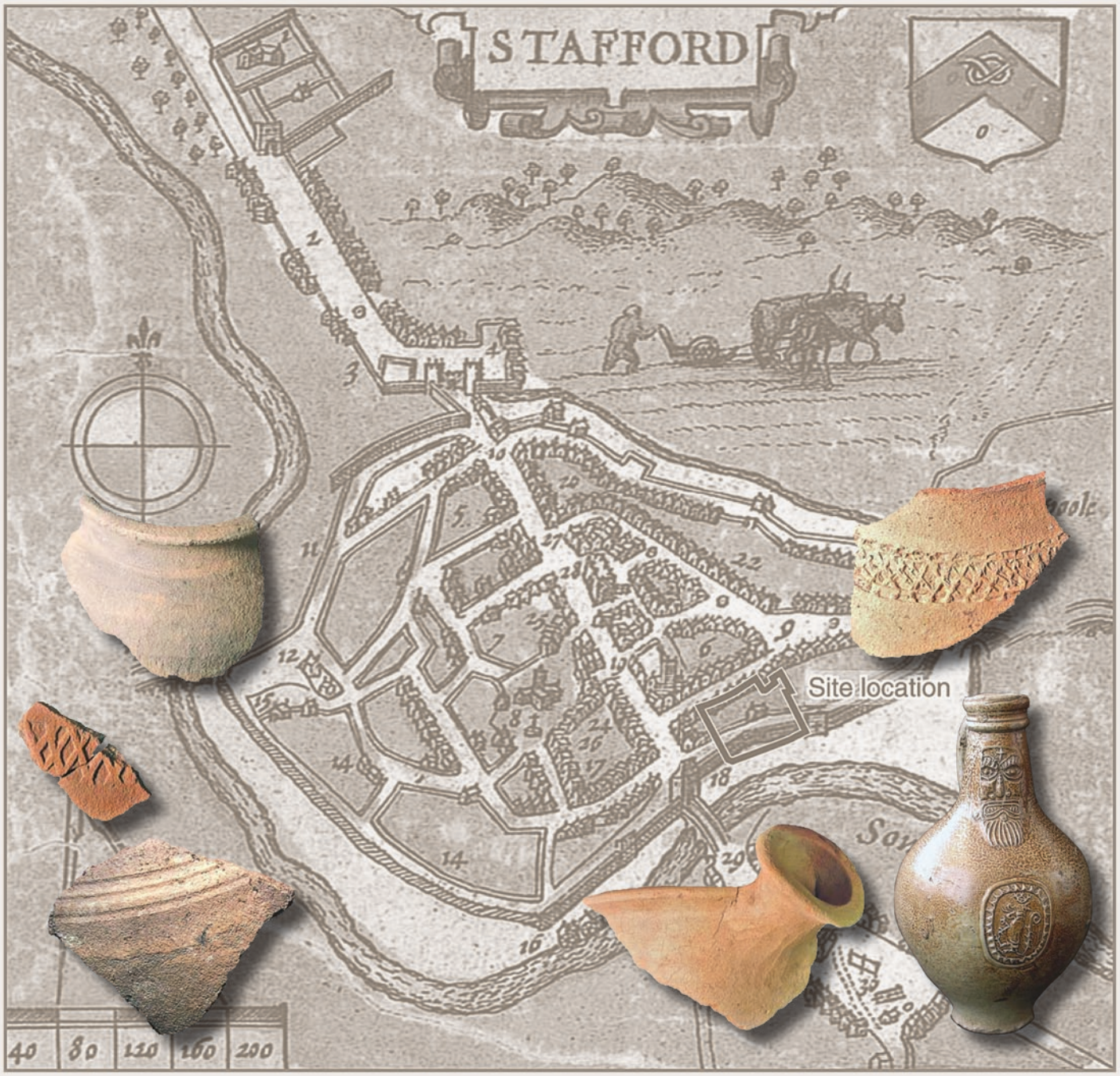
EXCAVATIONS AT TIPPING STREET, STAFFORD, 2009–10



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ANNE DODD, JONATHAN GOODWIN, SEREN GRIFFITHS, ANDREW NORTON, CYNTHIA POOLE and STEVEN TEAGUE *with contributions*

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EXCAVATIONS AT TIPPING STREET, STAFFORD, 2009–10: POSSIBLE IRON AGE ROUNDHOUSES, THREE STAFFORD-TYPE WARE KILNS, AND MEDIEVAL AND POST-MEDIEVAL URBAN REMAINS

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SUMMARY

Three area excavations and a watching brief south of Tipping Street in central Stafford recovered the remains of four curvilinear gullies that are likely to be the partial remains of Iron Age roundhouses. The next phase of use of the site dates from the mid to late Saxon period. Three pottery kilns were excavated, along with substantial assemblages of Stafford-type ware pottery, charred plant and wood remains, and fired clay debris from the floors, walls, superstructure, and furniture of the kilns. A large dump of similar material from a pit is likely to represent debris of a fourth kiln that lay outside the excavated areas. This report presents detailed analyses of the evidence for the structure of the kilns, the pottery made in them and the fuel used to fire them. A scientific dating programme carried out as part of the project has led to the development of new models for the chronology of the site, of Stafford-type ware pottery, and of Saxon activity at Stafford. The models suggest that the pottery industry lasted for around 150 years, from the middle of the 9th century until the end of the 10th century, and that it was introduced into a pre-existing settlement that probably originated in the late 8th or early 9th century. It is suggested that at this time Stafford was a place where renders may have been collected for centralised and organised processing, and that this may be associated along with the evidence from Tamworth for substantial investment in the resources of this area by the last kings of Mercia. The dating model for Stafford-type ware suggests that the introduction of the pottery industry here should be seen in the context of Mercian policy in the mid 9th century, rather than as an offshoot of industrial expansion in the Danelaw from the late 9th and 10th centuries, and this may have implications for our understanding of the origins of cognate industries in eastern England. Evidence recovered for the medieval period suggests a pattern of development broadly similar to that observed elsewhere in the town, with an upturn in activity between the late 12th and 14th centuries, and less intensive occupation in the later medieval and early post-medieval period. Evidence from the 17th and 18th centuries suggests that the frontage of Tipping Street was occupied, but that the back-plots were cultivated gardens. A complete Bartmann jug found buried in garden soils near to a boundary wall may have been a 'witch' bottle deposited to keep the inhabitants safe. Build-up of the back plots occurred from the middle of the 19th century, and brick-built foundations were uncovered that may have been part of a malting or brewing installation associated with the 19th-century Turk's Head Inn.

INTRODUCTION

Background to the excavations (Figs 1 and 2)

Between August and December 2009 Oxford Archaeology South (OAS) carried out an archaeological excavation on land at Tipping Street/South Walls Car Park, Stafford (NGR SJ 9235 2315). The work was carried out in advance of the construction of two new four- and five-storey buildings for mixed retail and commercial use, and to house the new offices of Staffordshire County Council. The excavation was commissioned by CgMs Consulting Limited on behalf of Staffordshire County Council working in conjunction with Stoford Developments. Watching Briefs were subsequently maintained during construction work at the site between December 2009 and September 2010, on behalf of Volker Fitzpatrick.

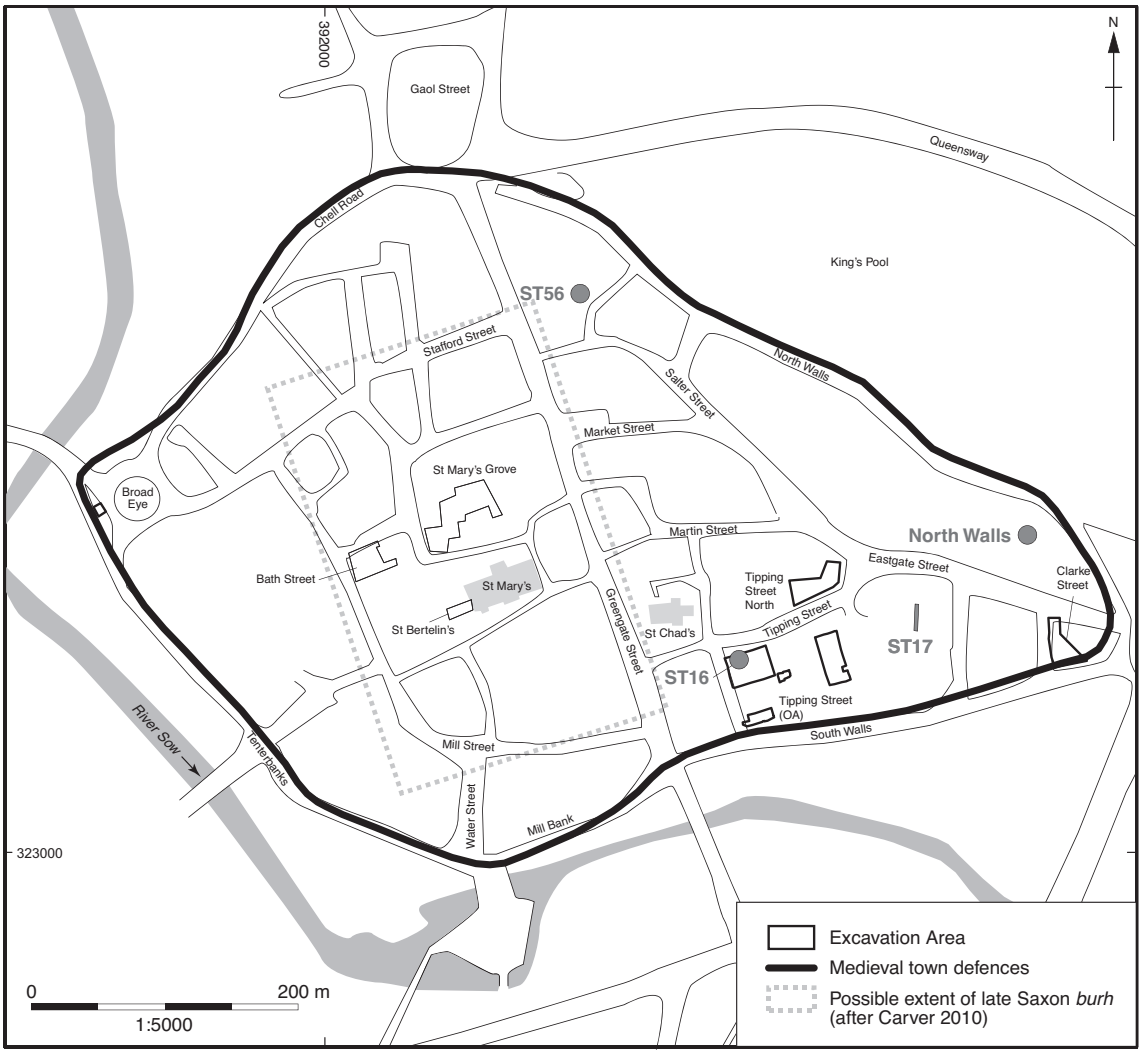


Fig. 1 Location of the site and earlier excavations mentioned in the text

The development area was bounded by Tipping Street to the north, South Walls to the south, Appleyard Court to the east, and Greengate Street Service Road to the west, and it covered an area of 0.74 ha (Fig. 1). The site had been subject to previous archaeological investigation, and two desk-based assessments were carried out to identify the potential for surviving remains (Wilkinson and Walters 1977; CgMs 2008). In 1972 an investigation by Stafford College of Further Education had revealed sand deposits up to *c*. 2.5m thick near the southern edge of the site, apparently representing an accumulation of material spanning the late Saxon to post-medieval periods. In 1977 the first Stafford-type ware kiln was discovered south of Tipping Street, approximately 75m to the east of the present site (ST17, Fig. 1), and two further kilns were found a similar distance to the north in 1982–3 (Tipping Street North ST32, Fig. 1 and below). In 1999 Oxford Archaeological Unit (now Oxford Archaeology) conducted an evaluation within the development area (OAU 1999). This work identified the presence of medieval pits in the northern area of the site, indicative of settlement activity. On the south side of the site a feature interpreted at the time as possibly a large east–west orientated ditch was identified and was thought to represent the medieval town boundary. Pottery recovered from the ditch was dated from the 12th to the 15th centuries. In May 2009 Oxford Archaeology carried out a watching brief during a geotechnical test pitting exercise, within the car park, the results of which supported those of the earlier evaluation (OA 2009).

A deposit model was developed by CgMs using the results of borehole investigations and geotechnical test pits at the site in 1973, 2008, and 2009, as well as evidence from previous archaeological interventions on the site (CgMs 2009, 4 and Appendix C; CgMs 2008). A thick deposit of garden soil/made ground overlying natural gravel and sands was present across the site, increasing in depth from the north-west corner of the site towards the south. It was considered



Fig. 2 Location of the Area excavations and watching brief showing features of all phases

to be indicative of the use of the area for agriculture and later for back-yard activity. Settlement was concentrated along the northern and southern street frontages where 19th- and 20th-century cellared buildings were evident.

A mitigation strategy was produced by CgMs for archaeological excavation and a watching brief (CgMs 2009) was approved by Stephen Dean (Principal Archaeologist, Staffordshire County Council (SCC)). The investigation comprised the excavation of three areas totalling *c*. 0.15 ha and a watching brief on the land between the main excavation areas (Fig. 2). Area 1 was designed to identify back-yard activity within properties fronting Tipping Street; Area 2 was designed to investigate the earlier proposal that a section of the medieval town ditch might be located in the vicinity; and Area 3 was designed to investigate the possibility of late Saxon pottery kilns, and back-yard activity in properties fronting Tipping Street and South Walls. A watching brief was maintained on the excavation of pile caps and the rainwater reception tank (Area 4).

Geology and topography

Stafford is located in the River Sow valley, above its confluence with the River Trent. The core of the historic town occupies a peninsula of higher ground within a loop of the river (see Fig. 1). The marshy floodplain of the river almost entirely surrounds the historic town core on its west, south, and east sides, providing a significant defensive barrier in earlier times. Drainage of the marshes began in the post-medieval period, but much wetland still survives to the west and east of the town centre even today (EUS 2011, 15). The site of the present excavations lies in the south-eastern part of the town, on the sand and gravel river terraces which seal the Mercian Mudstone and rise to a height of 76m OD.

Archaeological and historical background

The archaeology of Stafford has been the subject of several recent studies. An Historic Character Assessment of the town is being undertaken by Staffordshire County Council as part of the Staffordshire Extensive Urban Survey, and we are grateful to the council's archaeology service for access to the current draft during this project (EUS 2011). A review of the evidence for the early urban form of Stafford has been published by Cuttler *et al*. (2009), and a report on earlier excavations and a synthetic discussion of evidence for the late Saxon and medieval town has been published by Carver (2010). The key comparative sites for the present excavations are shown on Figure 1.

Environmental sampling of peat at the former King's Pool east of the town centre revealed evidence for the Mesolithic landscape of the area, along with charcoal deposits that suggested the burning of woodland to create open ground, with further evidence for clearance in the Neolithic, intensifying from the mid to late Bronze Age (EUS 2011, 2.1). By the late Bronze Age the area was probably largely open, with small-scale mixed farming intensifying through the Iron Age (ibid.). The first substantial evidence for occupation of the peninsula at Stafford dates from the Iron Age. Excavations at St Mary's Grove (ST 29) revealed two or three probable four-post granaries associated with the remains of spelt and emmer wheat, and an Iron Age radiocarbon date of 510–200 cal. BC was obtained from a posthole fill (Table 11, below; Carver 2010, 29–35, fig. 3.13; Moffet, 'Plant Macrofossils' in Carver 2010, FR10.1). An archaeological watching brief at North Walls/Lammascote Road just outside the town centre to the east recovered large worked timbers radiocarbon dated to the mid to late Iron Age, which it was thought might have formed part of a bridge or embankment (EUS 2011, 2.1; Potteries Museum Field Archaeology Unit 2002). The scheduled Berry Ring hillfort lies approximately 4km to the south-west of Stafford, dominating the lowlands. It occupies the northern end of an elevated spur of land on the northern outskirts of the village of Billington, and includes the earthwork and buried remains of a univallate Iron Age hillfort. A number of finds recovered from the interior include Iron Age pottery, flints, an iron ring and fragments of medieval pottery (EUS 2011, 2.1; English Heritage List Entry Description, Monument No. 1013163). It is also likely that there was an Iron Age ditched enclosure pre-dating Roman occupation at Acton Trussell, *c*. 6km south of Stafford (EUS 2011, 2.1). Although Roman pottery and a small number of coins have been found in excavations in the historic centre of Stafford, there is currently no structural evidence for occupation of Roman date. It has been suggested that the north–south route across the peninsula (now Gaolgate and Greengate Streets) was the line of a Roman road leading to a ford across the river in the area of Green Bridge, and that there may have been a causeway across the marshland to the east (ibid.). However, no evidence for Roman occupation was found during the excavations that form the subject of the present report.

There is little evidence for occupation in the early Saxon period, and the results from environmental analyses at the King's Pool and North Walls suggest a decline in agricultural activity in the vicinity towards or after the end of the Roman period (EUS 2011, 2.3.2.1). The *Anglo-Saxon Chronicle* records that a defended site, or *burh*, was founded at Stafford by Æthelflæd, daughter of King Alfred, in 913. The *burh* at Stafford was one of a series of fortified centres created by Æthelflæd, her husband Æthelred, and her brother Edward the Elder during their (re)conquest of the Midlands following the Viking settlement of the Danelaw. A mint was subsequently established at Stafford in the reign of Athelstan (*c*. 930) and this continued into the late 12th century (EUS 2011, 2.4.3.4; Thomas 2010, 94). While the creation of the *burh* was undoubtedly a major stimulus for the development of medieval Stafford, radiocarbon dates from a number of excavations in the town had raised the possibility that the settlement's origins might lie in the early to mid 9th century as the centre of a royal or minster estate (Griffiths and Linford, below, and Table 11; EUS 2011, 2.3.4). In his recent synthetic publication of the important excavation campaign carried out in the town during the early 1980s, Martin Carver argued that while this remained entirely possible, the sudden onset of intensive activity at these sites was more likely to coincide with the foundation of the *burh* (2010, 100, 128–30). The extent of the Stafford *burh* remains unclear and no certain evidence of its defences has yet been recovered (EUS 2011, 2.4.1, 2.5.3). Carver has proposed that the fortifications enclosed a smaller area than the medieval defences (see Fig. 1; Carver 2010, 99–100; EUS 2011, 2.4.1), which would imply that the area of the present excavations lay outside the late Saxon town.

Perhaps the most controversial of the earlier excavations was that carried out on the site of St Bertelin's chapel, the results of which have provoked much subsequent debate. The medieval church or chapel of St. Bertelin, attached to St Mary's church in the town centre and demolished in 1801, was excavated in the 1950s (ST01; EUS 2011, 2.3.3; Carver 2010, 219, figs 3.2 and 3.7 and FR3). A

rectangular post-built building was discovered beneath the medieval stone-built chapel, and a wooden object originally interpreted as a cross was recovered within the enclosed area, beneath a coin of 991–997. It was suggested that this had originally been an Anglian standing cross which was probably burnt and buried within a mid to late Saxon wooden post-built church. The radiocarbon dates obtained were not, however, consistent with this interpretation (see Griffiths and Linford, below and Table 11), and it now seems likely that the cross was in fact part of a wooden coffin from a possibly 12th-century burial within the medieval chapel. Nevertheless, it remains likely that there was an early religious focus here, associated with the cult of St Bertelin, since the wooden building was constructed over an area of earlier burials and both a late Saxon coin and a hooked tag were found in association with the remains (EUS 2011, 2.3.3). Matthew Blake has argued that the religious focus at Stafford may originally have followed the eremitic tradition with adherents seeking out solitude upon what was essentially an island within the loop of the River Sow and surrounding marshland.

Excavations at St Mary's Grove 50m to the north of St Mary's church revealed two pairs of ovens, a well and a sunken-floored store associated with substantial quantities of charred remains of oats, wheat, and rye (ST29; EUS 2011, 2.3.2.1; Carver 2010, 29–35, 67–72 and FR5; Moffet, 'Plant Macrofossils' in Carver 2010, FR10.1). The extensive deposits of grain and chaff found at this site suggest that crop processing and baking were being carried out here on a very large scale. There was little associated evidence for domestic occupation in the vicinity, and it was suggested that this large-scale production may have been for the support of a high-status household (EUS 2011, 2.3.2.1) or an army (Carver 2010, 72). Radiocarbon dates obtained on burnt wood, grain, and plant remains at this site were interpreted as being of the early to mid 9th century, although this was subsequently challenged by Carver (Table 11; Carver 2010, 31). Excavations at Bath Street uncovered an area of numerous postholes associated with substantial quantities of iron fragments and slag (ST34; Carver 2010, 35–9, 72–3, fig. 3.20 and FR7). At the west edge of the site, Carver proposes the existence of a ditch and palisade on the line of the east edge of Earl Street, possibly an early defensive element of the *burh*. To the east was an area of smithing activity and further postholes, some of which can be seen as forming a rectangular structure which has been variously interpreted as a shed, a stable, or (most recently, by Carver) a timber tower associated with the possible defensive ditch and palisade to the west. A radiocarbon date was obtained on probable charcoal from the site and gave a calibrated date range of cal AD 600–880 (95.4% probability; see Table 11, below), although Carver was sceptical about its reliability (2010, 39). More recently, excavations at Broadeye, in the western angle of the medieval defensive circuit, have identified what is thought to be the site of the castle built at Stafford by William the Conqueror in 1070 in the course of his suppression of revolts in northern England (Cuttler *et al*. 2009). A very substantial late Saxon ditch over 8m in width and 2m deep was revealed here, re-cut on several occasions. Cuttler *et al*. suggest that this may have been the enclosure ditch of a pre-Conquest residence associated with the earls of Mercia or their followers, later taken over for the Conqueror's castle, and that it was well-sited to control the bridge over the River Sow giving access to the west side of the Stafford peninsula (2009, 759).

Stafford is notable for the distinctive late Saxon Stafford-type ware pottery industry, one of the key ceramic markers of the early medieval period in the West Midlands. To date, production sites have been identified only at Stafford, which may therefore have been the only centre of manufacture. Prior to the present excavations, kilns had been identified at three previous sites in the east part of the town centre. The first Stafford-type ware kiln was found south of Tipping Street in 1977 (ST17; EUS 2011, 2.3.2.2; Ford 1995, 29; Carver 2010, 77), and a kiln was excavated at Salter Street by John Darlington (ST56; Table 12, below; Ford 1995, 29; Carver 2010, 79). The most extensive site to date, however, was at Tipping Street North (ST32), where two kilns and a well were found inside a fenced working enclosure. Radiocarbon dates obtained on charcoal and burnt wood from the Tipping Street kilns were interpreted as indicating an early to mid 9th-century date (Table 11; Ford 1995, 29; EUS 2011, 2.3.2.2), but this was also questioned by Carver, who considered a later context more likely (2010, 45, 92). A forge that subsequently occupied the site at Tipping Street North (ST32) dates from the late 12th to the early 14th century, and a post-built building nearby is now suggested by Carver to be contemporary with the ironworking activity rather than the earlier phase of pottery production, which had little associated evidence for domestic occupation (ibid., 45, 778). Excavations at Clarke Street (ST15), at the edge of marshland on the east of the peninsula, found an area used for dumping Stafford-type ware wasters and butchers' refuse in the late Saxon period; the dumping continued into the 12th and 13th centuries, although by this time part of the site had been sealed with clay for building (ibid., 479). The lifespan of the Stafford-type ware industry

is not clear, although a hoard of coins dating to 972–3 was found in a probable Stafford-type ware pot at Chester (Ford 1995, 29), and production was thought to have ceased by the middle of the 11th century (Carver 2010, 92 and n. 68).

Domesday Book records Stafford as the main town of the county in 1086, with between 128 and 146 houses and a further 51 or 52 described as being waste (EUS 2011, 2.5.3). The western side of the town in the medieval period was dominated by the ecclesiastical buildings associated with the collegiate church of St Mary (which included the chapel of St Bertelin), and the Norman castle at Broadeye (ibid.). The commercial side of town, where the markets and fairs were located, lay to the east of Gaolgate/Greengate Street, the main north–south axis. A market mentioned in late 12th-century documents was probably located in the present Market Square by the later 13th century, but the earliest market place may have been elsewhere, possibly within St Mary's churchyard or at the junction of Tipping Street and Eastgate Street. A fair granted in 1261 may also have been held at this junction, which was certainly the site of a horse fair by the 17th century (EUS 2011, 2.5.5.1). Archaeologically, the markers of this period include the end of the Stafford-type ware pottery industry and the arrival of iron-rich medieval coarsewares in the late 11th and 12th century. The late Saxon grain processing and pottery manufacturing activities ceased at St Mary's Grove and Tipping Street North, and large quarry pits were dug at the former site.

Carver suggests that the town may have seen something of a decline in the early Norman period (2010, 103, 105), before a general and sudden upturn in activity around a century later, dated archaeologically by the arrival of green-glazed pitchers in the late 12th century and white-ware jugs in the early 13th century. This is accompanied by evidence for the appearance of occupied tenements in the form of buildings and rubbish pits (ibid., 108). St Chad's church was founded on the east side of Greengate Street for a small parish that included Tipping Street, the south side of Eastgate Street, and South Walls. The evidence of surviving architecture suggests the church may date from the middle of the 12th century, and it was possibly founded by the bishop of Lichfield for his tenants in the town; he held 14 properties in Stafford at the time of Domesday Book (Greenslade 1979, 245–6). By the early 15th century the church had become attached to the prebend of Prees in Lichfield cathedral (ibid.).

In the later medieval and early post-medieval period there is evidence from a number of sites that this phase of activity had come to an end, with areas formerly occupied being turned over to cultivation (EUS 2011, 2.5.3, 2.5.3.1, 2.5.5). This change of character is not necessarily a symptom of widespread decline, however, as there is evidence from written sources that gardens were highly prized by their occupants and pigs were being raised and fruit trees cultivated within the town (EUS 2011, 2.6.3, 2.6.5.2). Speed's map of 1610 suggests that many street frontages remained built up with extensive areas of garden behind (Fig. 3), but only two properties are shown along the north side of South Walls. Stafford remained a judicial and administrative centre during the post-medieval period and prospered as a market town serving its agricultural hinterland (EUS 2011, 2.6.5, 2.7.5), but in common with many other places it did not see significant expansion beyond its medieval limits until the 19th century. Much of this took place at the northern edge of the town and was associated with the growth of the boot and shoe making industry in this area (EUS 2011, 2.7.3.2). By contrast, St Chad's parish, within which the present site was located, had only 35 houses in 1834 and a population of only 500 in 1851, and was described as destitute (Greenslade 1979, 189).

A detailed review of historic maps and documentary sources for the present development area was carried out by Wilkinson and Walters (1977). At the west end of Area 1, nos 23 and 22 Tipping Street were two private houses bought in 1882 for the vicarage of St Chad's, although the vicar did not move in until the beginning of the 20th century; no. 19 is identifiable on Wood's map of 1835 (keyed as no. 42) as the Turk's Head Inn, mentioned as such in late 19th-century trade directories but apparently having closed by 1911 (Wilkinson and Walters 1977, 13); no. 16 was originally a large private residence, but was in use as a boarding house in the early 20th century, with a leather warehouse at no. 17 next door. Both no. 16 and no. 17 were leased to the Siemens' Institute in 1908 for use as a Club House, which in 1909 included a concert room, bar, billiard room, supper room, and large hall, with the lawn and garden at the back in use as the members' bowling green. Between 1930 and 1947, and again between 1962 and 1971, the building, then known as the Assembly Rooms, was a spiritualist meeting house, but it had fallen out of use by 1977 (ibid., 13–14).

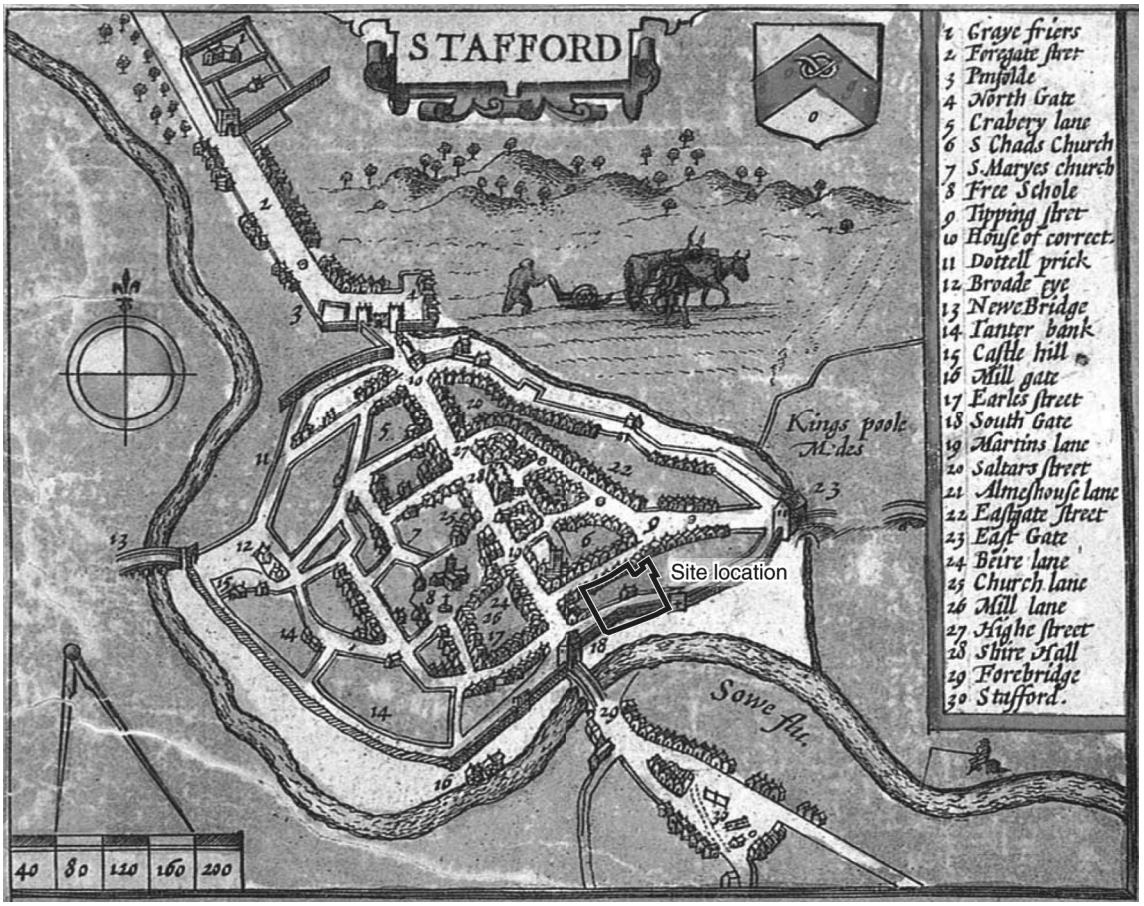


Fig. 3 Speed's map of Stafford (1610)

Excavation methodology

The initial stage of archaeological works comprised the removal of the existing car park and associated levelling material using a mechanical excavator. In all trenches the underlying deposits were then excavated under close archaeological supervision to the level of the first significant archaeological horizon. The upper archaeological horizon was represented by largely structural remains associated with the later occupation of Tipping Street and South Walls. These remains were cleaned, photographed and recorded in accordance with the *OAU Fieldwork Manual* (ed. D. Wilkinson 1992). Once recorded and after consultation with James Gidman (CgMs) and Stephen Dean (SCC) the structural remains were removed under archaeological supervision using a mechanical excavator to the next significant archaeological horizon. All significant archaeological remains were then hand-excavated to the top of the pre-settlement geology. The initial watching brief works comprised the removal of the car park and its associated levelling material, followed by the reduction of the existing ground level to formation level or to the first significant archaeological horizon, whichever was encountered first. All archaeological features encountered were planned and where excavated their sections drawn at a scale of 1:20. All features were photographed using black-and-white film and digital media. Recording followed procedures laid down in the *OAU Fieldwork Manual* (ed. D. Wilkinson 1992). The second phase consisted of the machine excavation of the pile cap and Rain Water Harvest Tank locations. Here, where the archaeological deposits encountered comprised only pits and recent building foundations, they were removed by machine in *c*. 50mm spits until the natural geology was reached. The resulting sections were then photographed and drawn at a scale of 1:20. Where more significant remains were identified, such as kilns or associated features, the surrounding area was reduced to a safe working level and excavation continued by hand.

Post-excavation

The exceptional quality of the stratigraphic, ceramic, fired clay, and environmental evidence for the late Saxon period, and the potential for a new programme of scientific dating, was identified at the post-excavation assessment stage (OA 2011). The evidence for this period was therefore prioritised for further study, as the results were considered likely to be of regional and national significance, providing new and more robust models for the Stafford-type ware industry and the development of the burh at Stafford. Results from the medieval and post-medieval periods were assessed as being of less significance, and it was proposed to report these at a more summary level. The allocation of the curvilinear gullies to a prehistoric, possibly Iron Age, phase of occupation was confirmed following detailed analysis of the stratigraphic sequence during post-excavation works, but the features had produced very little in the way of finds or environmental material to support more detailed analysis.

STRATIGRAPHIC DESCRIPTION

Dating and phasing (Fig. 2)

The allocation of contexts to dated phases was initially undertaken by a combination of stratigraphic analysis and the integration of information obtained from the pottery, and to a lesser extent the ceramic building material. Stafford-type ware dates sequences from the 9th century to the early 11th century. Iron-rich sandy ware is current from the later 11th to 13th centuries, with glazed pitchers indicating a 12th- to 13th-century date. Midlands White ware is datable to the 13th to mid 14th century, and Midlands Orange and Purple wares appear in the later medieval period (late 14th to 16th century). Post-medieval wares made up only 13% of the pottery assemblage, with locally-produced coarsewares dominant in the earlier part of the period. The 18th century sees the appearance of refined tea and table wares, many of them North Staffordshire products. Creamwares are common in late 18th- and early 19th-century groups, with decorated tea, table and toiletwares becoming common in the 19th century. Radiocarbon dates were obtained on seven samples from early contexts, particularly those associated with the kilns, giving date ranges spanning the 9th and 10th centuries (Griffiths *et al*., below).

Natural topography of the site (Fig. 4)

Natural sands and gravel occurred at their highest surviving point at the north-west corner of Area 1 at *c*. 75.6m OD. Mapping of levels of natural obtained across the site revealed that its surface sloped away from this point towards the east where it levelled off within Area 3 at around 74.0m OD. Towards the south of Area 1 it sloped away more markedly and near the northern edge of Area 2 this slope became more pronounced before apparently levelling off around 73.2m OD and forming a possible SW–NE aligned terrace.

PHASE 1 **(Pre-historic)** (Figs 4–7)

A number of features (2143, 3412, 3414, and 4085) were stratigraphically clearly earlier than the earliest recognisable Anglo-Saxon activity. Their form suggests that they could be roundhouse drip gullies or wall trenches of Iron Age or earlier date, though none provided any dating evidence. A buried soil found in Area 2 (SG 2156) also predates the earliest Anglo-Saxon activity in this area, and might also be of prehistoric origin.

Buried Soil (SG 2156)

Towards the south of the site, within Area 2 and accumulating against the edge of the postulated terrace, was a build-up of sandy soils pre-dating the earliest late Saxon activity. These were excavated within two east–west orientated trenches positioned within the northern half of the area and recorded within pile cap trenches located immediately to the north. A small sondage excavated near the southern end of the area revealed sterile natural sand gravels that occupied this or an adjacent terrace. The earliest of these soils (2114) contained a single undiagnostic struck flint (SF 102), but the only other finds recovered from these soils were two Stafford-type ware sherds from layer 2103, which are likely to be intrusive since roots had heavily disturbed this deposit. Within pile pit TP5 was a 0.40m thick deposit of soft dark orange silty sand that overlay natural, which in turn was cut by Gully 4085 of possible Iron Age or earlier date.

Curvilinear gullies (Figs 4–7)

Gully 3412 was the most complete in plan and was found within the central area of Area 3 (Fig. 5). Stratigraphically, it was the earliest feature found within this area, and pre-dated linear Ditch 3411 (see Phase 2 below) which itself predated the construction of the earliest late Saxon kiln (SG 3408). The gully formed an approximate semicircle, though given its rather ephemeral nature further remains to the east could have been removed by later features or by truncation. Its external diameter is estimated to be in the region of 10m. The gully survived to a maximum width of 1.0m and depth of 0.18–0.30m and had a rounded base. It contained a single fill of firm, mixed greyish-pink sand, probably weathered natural, but no finds. It is possible that there was a gap on its SE side as there was evidence that the gully had started to turn inwards at this point, possibly forming the western side of an entrance porch. A second gully (3414), located to its south, ran NE–SW and apparently terminated at a point immediately adjacent to the possible entrance. It may have been curvilinear and was 0.48m in width and survived to a depth of 0.16m. It was filled with mid grey-brown silt sand containing pebbles and gravel, with no finds.

Gully 2143 (Figs 6 and 7) was revealed in a machine-excavated sondage within the central part of Area 2. Although only a 2.6m length was exposed, enough was revealed to suggest that the gully was curvilinear and if circular could have measured approximately 10m in diameter. Unfortunately in the area investigated, its relationship with buried soil SG 2156 had been removed by Phase 2 hollow-way 2154, though given its depth of 0.60m it is unlikely to have suffered significant truncation. The gully measured 0.90m in width and was well-defined with steep and straight sides to a narrow slightly rounded base and had a clear terminus at its S/SE end. It contained two fills, the earlier (2150) composed of loose dark orange brown sand with gravel, probably weathered natural, that contained occasional flecks of charcoal. The upper fill comprised loose mid-brown silty sand with charcoal flecks and contained a small fragment of fired clay of indeterminate form, representing the only find, despite the full excavation of its entire exposed length.

A further (possibly curvilinear) gully (4085) was recorded during the watching brief and was found within a pile pit that was located some 12m to the NW of Gully 2413 (Fig. 4). It cut an early buried soil (4098), possibly the equivalent to the soils found in Area 2, and was itself sealed by a later soil (4062) containing a Stafford-type ware jar sherd. As revealed in plan (cutting natural) it measured

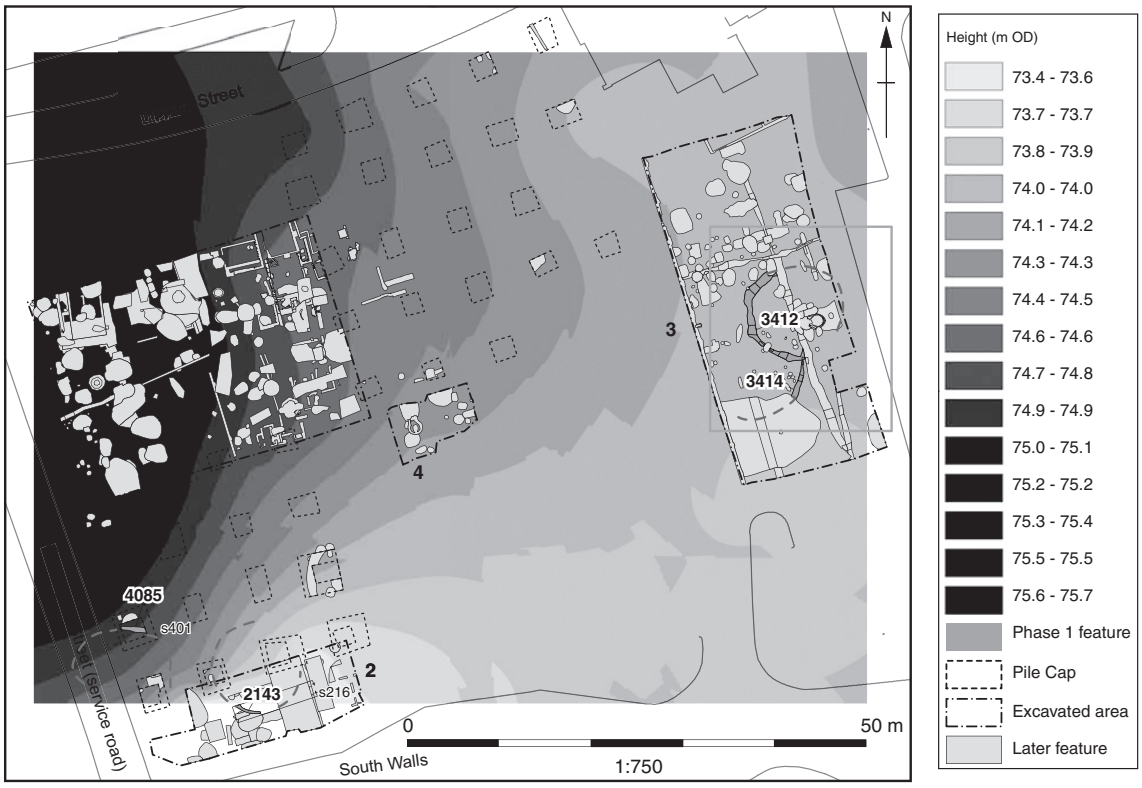


Fig. 4 The natural topography of the site and features of Phase 1, prehistoric

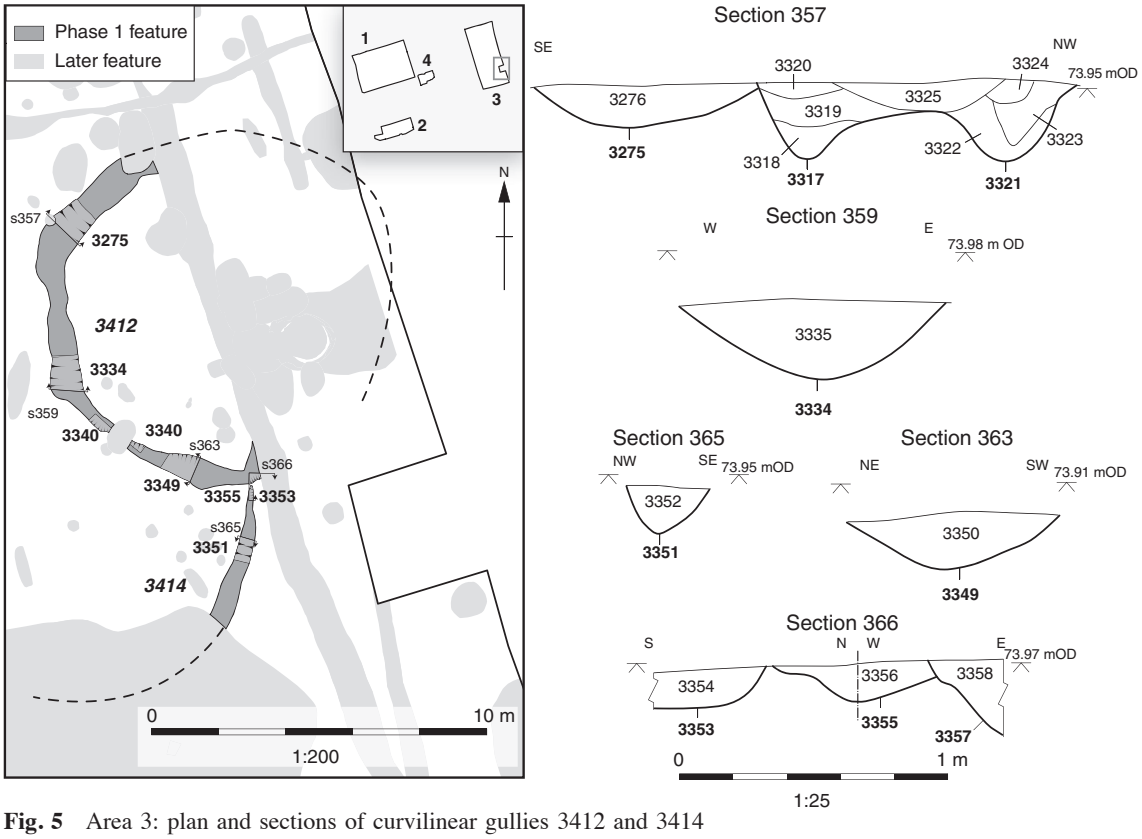


Fig. 5 Area 3: plan and sections of curvilinear gullies 3412 and 3414

up to 0.59m in width and 0.09m in depth (as revealed at the base of the pile pit) with steep straight sides to a concave base. It contained a single fill of soft brown silty sand that probably represented a gradual accumulation; no finds were recovered.

PHASE 2 **(late Saxon–9th to early 11th century)** (Fig. 8)

Three *in situ* kiln bases and a large quantity of demolished kiln debris were recovered during the excavation and watching brief, all associated with the Stafford-type ware pottery industry. Two kilns (3401 and 3408) were found in Area 3, with 3408 directly overlain by 3401. A single kiln (4287) was situated in Area 4 and was recorded under watching brief conditions. In addition, the presence of a large dump of demolished kiln debris in pit 2052 (Area 2) suggests that a fourth kiln was situated either in the unexcavated area to the north or truncated by a large medieval ditch to the east (Phase 4, below). The description of the kilns given here is taken from a full report by Cynthia Poole, which is available as part of the research archive and contains a detailed record of all surviving elements of the fired clay kiln structure and furniture. No evidence for kilns was found in Area 1, where a single pit and a single wattle-lined well were excavated. Other features of this phase comprise a probable hollow-way running from west to east across the southern part of the site in Area 2, two gullies, and a number of pits in Area 3, some of which may pre-date the building of the first kiln, and a timber-lined well in Area 4.

AREA 3 (Figs 9–14)

Ditch 3411 (Fig. 9) was stratigraphically earlier than the Area 3 kilns, and also cut curvilinear gully 3412; it was straight and shallow, aligned NW–SE, and recorded over a length of 32m but was likely to have continued beyond the northern and southern limits of Area 1. A number of sections excavated across it revealed its width to be up to 1.0m and its depth varied between 0.24 and 0.28m. It had a U-shaped profile and contained a single fill of re-deposited natural sand suggesting that it was allowed to silt up. The only finds were a small sherd from a Stafford-type jar, an iron-rich sherd, and a tiny sherd of glass. Given the early stratigraphic position of the ditch, it is likely that these finds are intrusive, possibly from Phase 3 timber Structure 635 that overlay this section of the ditch.

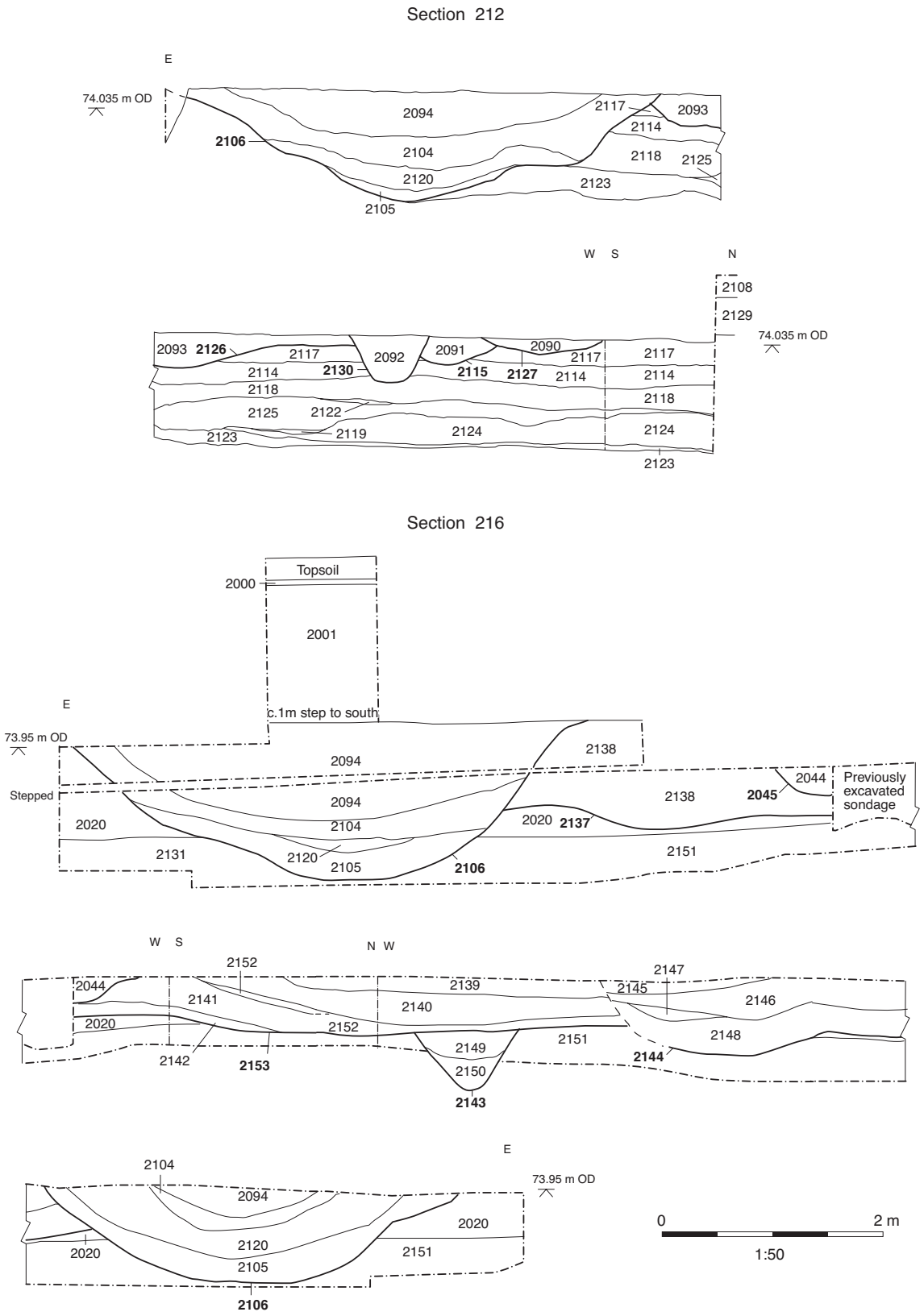


Fig. 6 Area 2: Sections 212 and 216 (for location of section see Fig. 18)

Ditch 3413 was located immediately to the east of Ditch 3411 and ran on a slightly different alignment, cutting across ditch 3411 at its southernmost extent. Posthole 3396, if contemporary, occupied a position close to the line of the ditch within the gap between its two separate segments. It is notable that ditch 3413 lay immediately to the east of kilns 3401/3408. Excavated sections through its northern segment revealed it to be steep-sided and flat-bottomed, measuring up to 0.54m in width and 0.45m in depth with termini at each end. The profile and fills of the southern segment were similar though the ditch was shallower at 0.140–0.24m. It contained several fills of mid greyish brown silty sand, and a thin darker soil had developed over the northern section before it was cut by medieval boundary ditch 3217 (see Phase 4 below). The only finds recovered were several sherds of Stafford-type ware, all from the southern segment.

Other features

At the southern end of Area 3 were three pits or hollows (3166, 3188, and 3110). Pit or hollow 3166 was partially exposed and measured at least 4.0m across and 0.32m in depth with shallow sloping sides. It contained a single charcoal and clay-rich fill with a significant quantity of fragments from at least two Stafford-type ware jugs, some decorated with lozenge rouletting. Sub-rectangular hollow 3110/3214 (Fig. 9, Section 317) had a similar profile but was considerably larger, measuring 8.2m in width and 9.6m in length and was slightly deeper at 0.65m. It appears to have terminated immediately to the west of Ditches 3411 and 3413 suggesting some contemporaneity with them. It contained two fills, both devoid of finds, the lower comprising mottled re-deposited sand, the upper dark grey sandy silt. It is possible that this feature is a continuation of the probable hollow-way (2154) identified in Area 2 (see below). The third pit, possibly a large circular posthole (3188), measured 1.2m in diameter and 0.50m in depth and contained a single fill of dark grey sandy silt that contained a Stafford-type ware bowl sherd.

THE KILNS

Dimensions of the kilns, stokeholes, and pedestals are given in Table 1.

Kiln 3408 (Figs 9–12)

Kiln 3408 was set within foundation pit 3402, which was continuous with the stokehole (3202) to the west. Both were cut into the natural sand, though the stokehole partly cut through the fill of Ditch 3411. Cut 3402 was keyhole shaped with a main circular firing chamber narrowing to a short parallel sided flue. It had a flat base and vertical, slightly concave sides with a rounded basal angle. The stokehole formed a continuous cut with the foundation pit for the kiln and the south wall of the flue projected slightly into the stokehole. The stokehole took the form of an oval bowl-shaped feature with shallow dished base and sloping sides.

The first element of construction was probably to set a large triangular/pyramidal stone inverted into the centre of the base to form the foundation of the central pedestal (Fig. 10). The pedestal was probably of a single build, constructed of sandstone blocks 140–250mm set in clay and placed over and around the foundation block to form a central sub-circular pedestal (3404), and surfaced with a render of clay continuous with that of the floor. The cut 3402 was then lined with clay to form the *in situ* kiln walls and lower floor structure (3403), which was continuous with the facing of the pedestal (Fig. 10). The clay walls lining the pit were heavily fired black on the inner face with a gradual diminution in intensity so that the unexposed side against the pit edge was only lightly fired or heat-affected. Along the sides of the flue the wall was reinforced with stone slab cheek pieces.

The fired clay surface was sampled from the walls, floor, and pedestal. The fired clay from the pedestal 3404, all from the foot at the junction with the floor, was very roughly finished compared to the kiln walls and floor. Nearly all pieces have deep finger grooves and depressions, which sweep down pressing the clay to lute it to the floor surface. One of the pieces from the base of the pedestal has an impression that is probably from the clothing of the workman, though it is possible sacking was used to protect the clay from drying too quickly. The cloth impression (Fig. 11, A) has c. 13 threads over a width of 18mm; it covers an area c. 50x30mm but is distorted in places by the curve of the surface and a large thumb mark. The fired clay from the wall and floor had a roughly moulded surface, ranging from fairly smooth to irregular and uneven with projecting lumps and depressions. Much of it was covered in hand and finger marks, grooves, finger tip depressions, and smears from wiping (Fig. 11, B). Several palm prints c. 70mm across were present and these were noted mainly in the angle between the floor and the wall (Fig. 11, C). The pattern of work suggests



Fig. 7 Area 2: view looking NW of possible roundhouse drip gully 2143

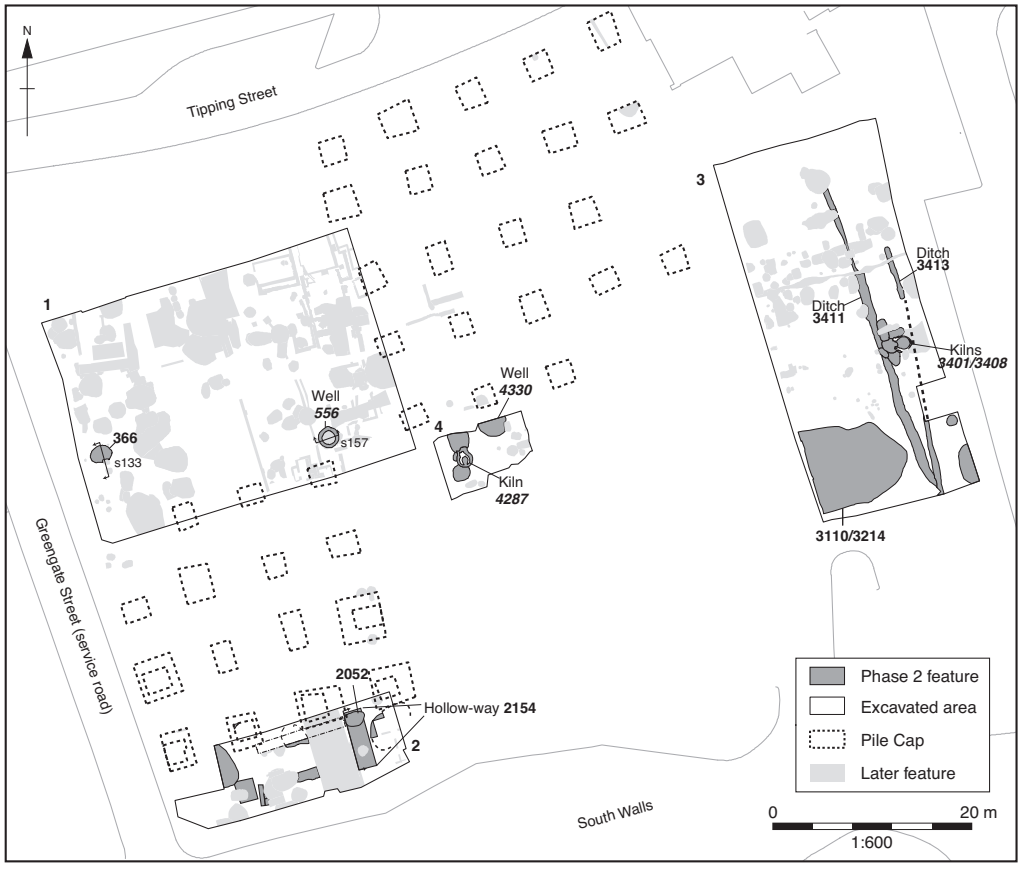


Fig. 8 Features of Phase 2, 9th to early 11th century

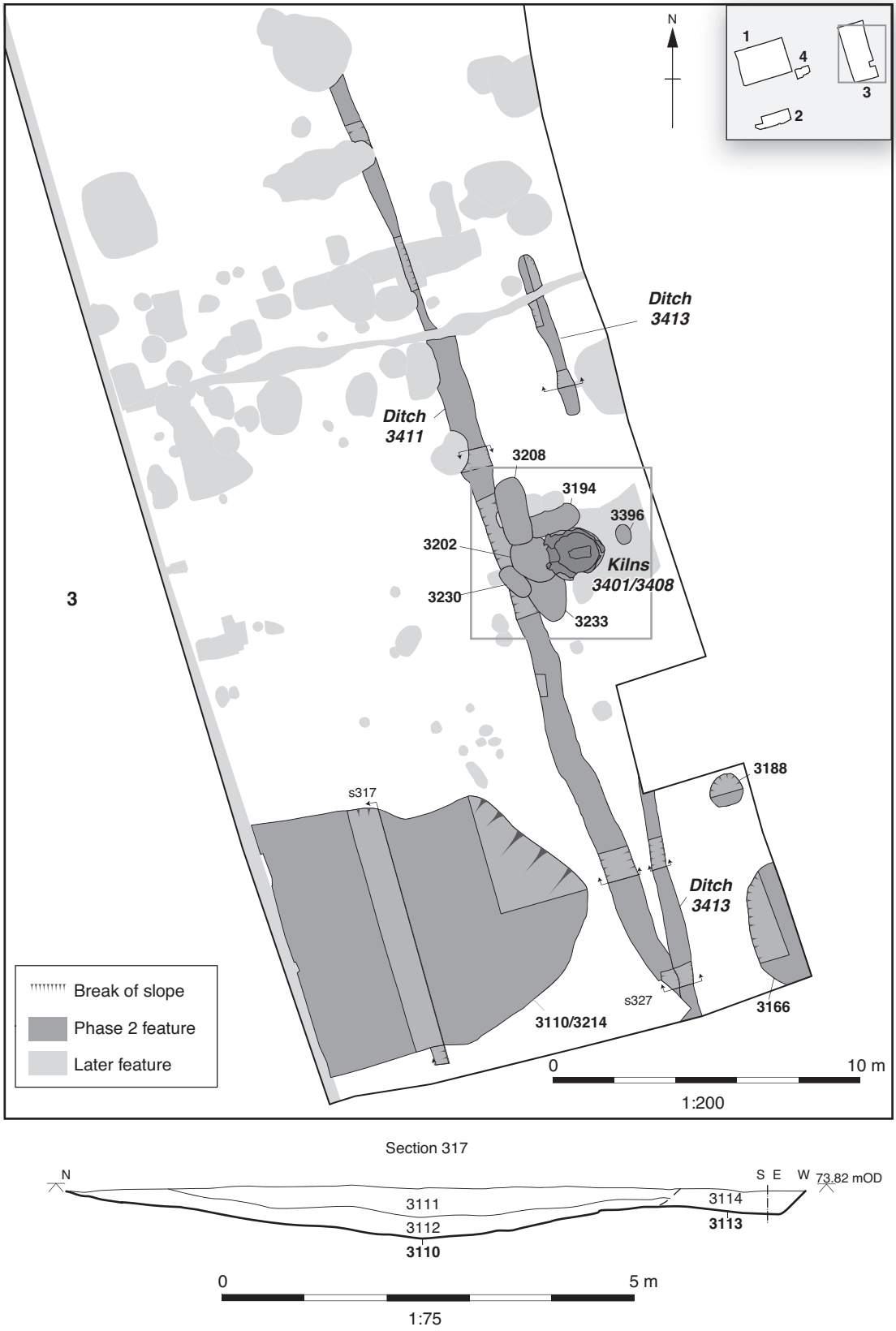


Fig. 9 Area 3: features of Phase 2, 9th to early 11th century

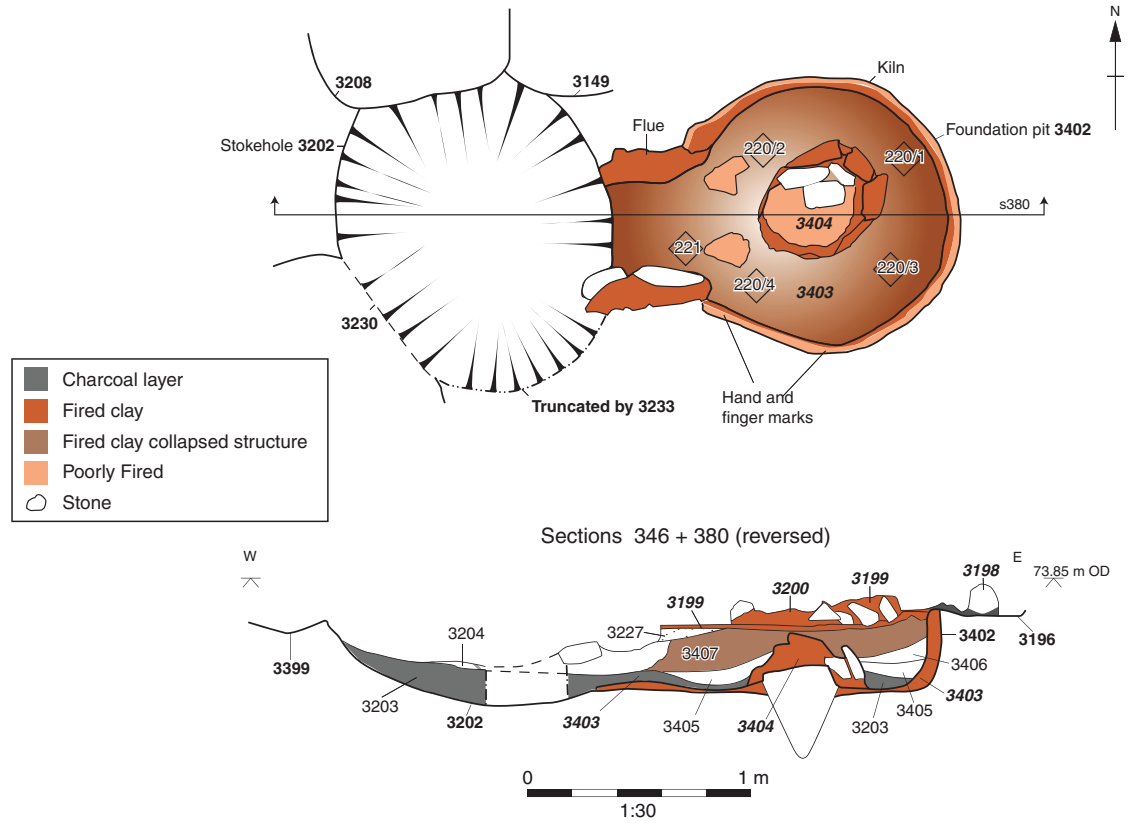






Fig. 10 Plan of Kiln 3408 with composite section showing the deposits of Kiln 3408 and overlying Kiln 3401; (*bottom left*) Kiln 3408 showing the stone block base for the central pedestal 3404 after removal of later deposits; (*bottom right*) Kiln 3408 fully excavated

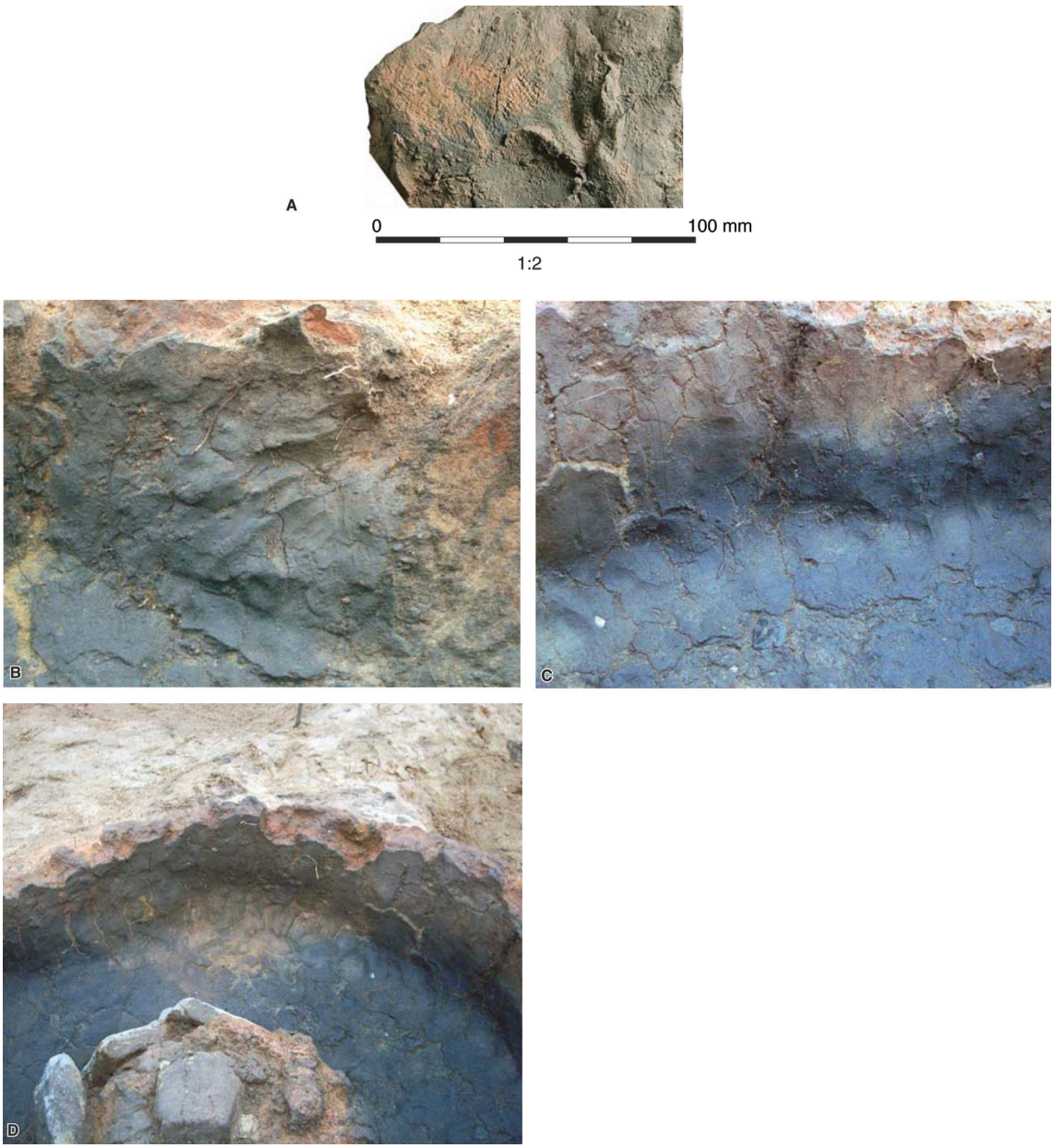


Fig. 11 Kiln 3408: A. Fragment of fired clay from the pedestal with surviving cloth impression; B. *in situ* kiln wall surface 3404 showing finger marks; C. *in situ* junction between the wall and floor showing surviving palm marks; D. *in situ* kiln lining of wall and floor

that construction started with the floor and the pedestal, expanding outwards and then up the walls. The fired clay across the floor was thinner than the walls and at the joint there were overlapping layers, where clay from the walls had been smoothed out over the floor to effect a continuous surface. Two layers of clay were also noted in some sections of the walls, where a later batch of clay had been smoothed over an earlier section. One piece with a smoothed edge was probably an internal surface representing a hiatus in construction.

The back face of the wall was sand coated, often quite even and regular. The exposed face in the interior of the kiln was fired grey to a depth of 15–20mm grading to a buff yellowish brown behind to a depth of 35–45mm, beyond which it was effectively unfired, reddened turning to the natural yellow clay at the rear face against the pit cut. It was most heavily fired to dark grey across the floor and lower walls and base of the pedestal, only becoming less intensely fired to a brown colour on the back wall behind the pedestal; the less intense firing noted along the flue during excavation is a result of the erosion of the clay render from the stones lining the flue. Two holes in the floor



Fig. 12 Kiln 3408: a. side and end views of a fragment of firebar; b. kiln wall end of a firebar showing expansion into a 'trumpet' shape; (*left*) side view showing expanded profile; (*centre*) internal view with wattle impressions; (*below*) end view originally luted to the kiln wall; c. fired clay fragment from the junction of the pedestal and the kiln bar, showing how the clay has been pressed flat onto the surface of the pedestal; *(above)* upper surface; (*below*) side profile showing one of the wattles of the kiln bar; d–g. fragments of kiln furniture props used to stabilise the pots when loaded in the kiln, showing surviving impressions of pot rims, bodies and bases

between the pedestal and kiln mouth represent wear from raking and attest to the use of the kiln over a period of time.

The floor of the kiln was covered by layer 3203, a dark brown-black sandy deposit of cinders comprising mostly charcoal representing the firing and use of the kiln. Flotation samples produced a rich sample of charcoal and carbonised seeds including cereals, chaff, and sparse weed seeds. Within

the kiln it was thickest (up to 60mm) at the back behind the pedestal, the least accessible area, and was continuous with the thicker layer of cinders (140mm thick) within the stokehole which must have accumulated over several firings, possibly throughout the life of the kiln.

Overlying the cinders was layer 3405, a deposit of loose yellow sand that had accumulated within the kiln to a depth of 80mm. No fired clay or other finds were recovered from this, nor the overlying deposit 3406, a brown sandy silt with scattered charcoal flecks which had accumulated at the back of the kiln between the pedestal and the rear wall. The sand was probably re-deposited natural and 3406 eroded soil from around the kiln structure. Their formation is somewhat problematic as they appear to contain no kiln debris and suggest that there was a period of disuse between the final firing and its demolition, when clean sand and then soil could accumulate. It is surprising that clean sand could accumulate whilst the superstructure was still apparently standing, and it is difficult to judge how this occurred without contamination from other debris, unless clean sand was used to seal the top of the kiln during firing and fell in as the kiln was opened and the load removed. Sand would also provide good insulation during firing.

Over this was a thick deposit of fired clay kiln debris (3407) lying within a matrix of loose orange-brown sand. The fired clay, amounting to 48.5kg of debris, was composed of kiln wall structure, pedestal surface, and broken fire bars, and it appears to represent demolished kiln debris from the suspended floor and walls. The walling includes both material from the subsurface structure and the superstructure. Fragments interpreted as the subsurface structure were very similar to those already described for 3403 and suggest that the lower chamber was originally deeper than the surviving feature and could have been up to 0.4m deep. No *in situ* evidence of the upper chamber was attributed to this kiln during excavation, though subsequent analysis by the author now suggests that the base of the upper chamber and the stub of the walls in fact survived incorporated within the base of kiln 3401 (below).

The fire bars provide evidence for the form which the floor took. Over 36kg of fire-bar fragments were recovered representing up to 14 individual bars. No complete examples were found but the better preserved (Fig. 12, a) indicate that they were cylindrical, expanding to a trumpet-shaped end where they adjoined the kiln wall and probably flattened into a flatter sheet where they were luted onto the pedestal. The central stem was circular or oval ranging in diameter from 80–125mm increasing to 120–180mm at the trumpet end (Fig. 12, b). The maximum surviving length was 270mm, but they must have been at least 400mm to span the distance between the kiln wall and the pedestal. They were formed by wrapping a slab of clay around a bundle of two, or more rarely three, wattles. The trumpet end usually had deep finger marks where the clay was pressed onto and luted to the kiln wall. The opposite end appears to be represented by some pieces where the clay was wrapped over the wattles but curved out to the side, forming a thinner curving sheet smoothed over another structural element, which included moulded clay surface, stone blocks, and possibly ceramic sherds (Fig. 12, c). These are interpreted as the junction of pedestal and kiln bars luted together, with the ends of the fire bars effectively forming the finished surface of the pedestal. The bars may have been secured in place by a number of methods. There are some pieces of walling with a wattle impression pressed into the wall face. Some of the trumpet ends have a projecting knob of clay suggesting some sort of hole was made in the wall face into which the end of the bar was pressed. Others may have been pressed firmly against the wall and luted to it by pressing and smoothing the clay out to form the trumpet end in the process. The inner end presumably rested on the pedestal and was flattened to form an even floor surface. Impressions of 111 wattles were measured and ranged from 10 to 36mm diameter, having a bimodal distribution with two peaks at 14–15mm diameter and 25mm diameter. Most were roundwood rods, but about 11% were split wattles, which all fell into the larger size group (Fig. K13, a chart of wattle sizes, is available in archive).

The number of bars (14) estimated from the surviving fragments is consistent with what would fit comfortably within a kiln of this size. Based on the circumference of the pedestal (c. 1.65m) and the narrower widths of the bars (0.08–0.12m), somewhere between 13 and 20 would fit radiating like spokes from the pedestal. Based on the size of the trumpet ends (0.18m) and the circumference of the kiln the maximum number would be 22, but to ensure some gaps in between to allow hot air to rise into the chamber, the number is likely to have been fewer than this, closer to the 14 estimated from the fragments.

A significant number of fragments had impressions of pot rim or body, suggesting the kiln was first loaded while the clay of the bars was still sufficiently soft to press the pot into the surface to secure it.

There are a number of pieces of fired clay that may be attributed to the kiln superstructure. These have the typically hand-moulded face covered with finger marks, often heavily corrugated with finger grooves, but the back surface was more irregular than the lower wall, sometimes with a wedge-shaped profile, projecting ridges, or impressions of stone blocks, suggesting these are clay render over a core of stone bedded in clay. This supports the evidence from kiln 3401, which appears to have utilised the walls of the upper chamber in its construction (below). Some of the more heavily fired blackened pieces are likely to derive from the stokehole arch which would support the wall of the upper chamber where it crossed the flue. One piece appears to form part of a ledge or recess which suggests (not unexpectedly) that the upper chamber extended beyond the limits of the lower chamber.

Five small pieces of furniture were identified and included a rounded plaque c. 120mm in diameter with a wedge shaped profile 630mm thick, fragments of thin plaques c. 9mm thick and a wedge or prop 50x>80mm and 4–19mm thick with the impressions of two pots – a rim on one side and a neck on the other side (Fig. 12, d–g).

At the west end of the kiln at the junction with the stokehole, the demolition debris 3407 was abutted by layer 3204, a mixed deposit of clay and sand, mottled red, brown and grey, and containing frequent blocks of sandstone 100–200mm. This layer appears to consist of kiln superstructure comprising stone blocks and poorly fired clay superstructure laid across the stokehole area to create a level foundation for the next kiln. No fired clay was recovered from this deposit, though a small quantity of wedge, fire-bar and kiln wall fragments were found in the overlying layer, a thin deposit of sand (3227) of limited extent which ran from the flue into the stokehole. This was sealed by kiln 3401.

Kiln 3401 (Fig. 10 and Fig. 13)

Kiln 3401 was constructed over the demolished and infilled kiln 3408 (Fig. 13). There is no suggestion of any time lag from the stratigraphic evidence between the demolition of 3408 and the construction of 3401. Kiln 3401 appears to have been founded on the upper chamber of Kiln 3408, with a construction cut (3196) apparent for a new upper chamber. Kiln 3401 was therefore not a refurbishment of the earlier structure, although it does appear to have incorporated some elements of the old kiln in the new construction. Being at a higher level than 3408 it was more heavily truncated and poorly preserved by comparison, with only the base of the lower chamber surviving (Fig. 13, bottom right). Like Kiln 3408, it was keyhole shaped, and its dimensions are given in Table 1.

The remnant of the walls (3198) was the primary structure, built of sandstone blocks measuring 140–320mm bedded in clay and rendered with clay. The flue was lined with sandstone slab cheek pieces of which one (250 × 80mm) on the south side of the flue survived *in situ*, but on the north only the impression remained. The only surviving fragment of wall surface was a large block with a flat moulded face and burnt grey. Some rather amorphous unfired lumps of heat-reddened clay, some with a rough flat surface, may be from the exterior of the kiln wall, forming the outer render layer over the stone core.

The floor surface (3199) overlapped the wall face and was composed of a thin layer (20–30mm thick) of dark red clay laid directly on the demolition layer 3407 of the earlier kiln. The central pedestal (3200) was constructed as a single entity with the floor. It was rectangular and survived to a height of 0.12m, and was situated 0.4m from the kiln mouth and 0.2m from the back wall. It was constructed of fired clay and sandstone blocks c.100–140mm laid at an angle and overlapping, possibly in a herringbone formation, though only one course survived. They were bedded in clay fired reddish brown, except at the surface where it was blackened. The moulded clay surface, which survived only on the east and west ends, was well finished and smooth, curving out at the base to form a continuous surface with the floor. The west end closest to the kiln flue and mouth was reinforced with the stem of a kiln bar c.120mm diameter and *c*. 100mm long, probably reused rather than *in situ*.

The kiln floor was overlain by a 0.12m thick layer of charcoal and ash (3201) in a sandy soil matrix, representing the final firing of the kiln. It contained a moderate quantity of Stafford-type ware pottery, as well as structural fired clay. Some fired clay fragments, which were probably the interior wall lining, had a single smooth, even moulded surface, though sometimes with rough irregular areas with finger depressions and grooves. Other pieces had impressions of pot sherds including a rim, and on a large piece were several impressions of large body sherds: these pieces of clay appear to have been pressed over a layer of sherds and may represent part of the covering sealing the load of pots during firing. A single tiny glass bead was recovered from this layer (Scott, Metalwork and Glass report, below).

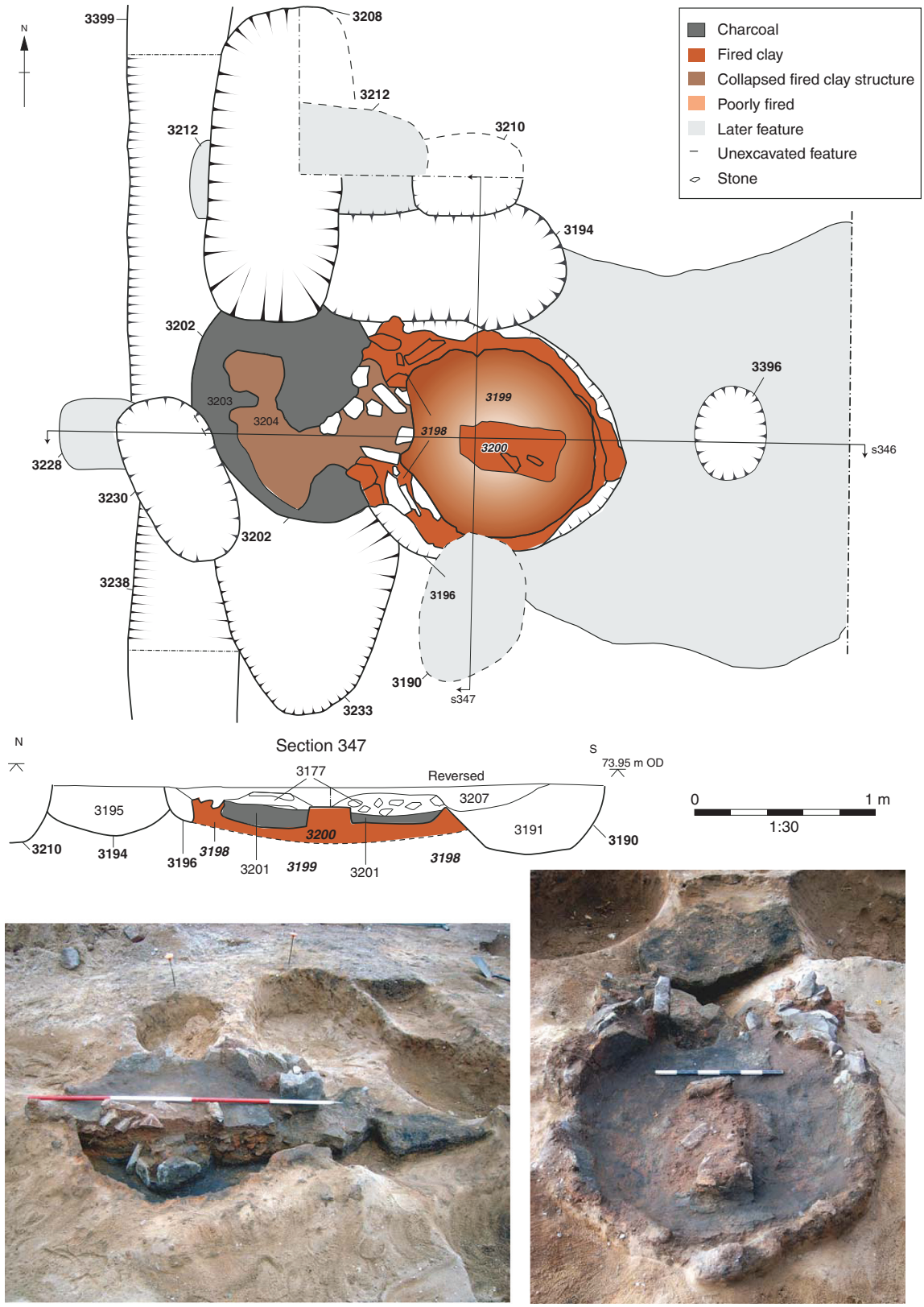


Fig. 13 Plan of Kiln 3401 and surrounding features, with N/S section; (*bottom left*): view looking S of Kiln 3401 overlying Kiln 3408, both half sectioned; (*bottom right*) view looking W of Kiln 3401 fully excavated

Equivalent layers of ash and charcoal had been raked into the stoking pit 3202. The lowest of these overlying the demolition and trample layers of kiln 3408 was layer 3205, 0.3m thick and composed of dark brown silty sand containing frequent charcoal, occasional gravel, frequent pottery (including definite misfires and wasters), and moderate amounts of fired clay fragments. The fired clay included typical wall lining and pieces that are interpreted as part of the pedestal. There were also six small fragments of fire bar of which two retained wattle impressions.

Filling the upper half of the stoking pit was a similar layer (3206) which contained less charcoal, but similar quantities of pottery and fired clay. In addition to the structural elements the fired clay included elements of kiln furniture in the form of wedges and possible plaques that stabilised the pots when loaded into the kiln. The wedges (Fig. 14) are lunate in form with usually one rough flat sand-coated surface (the impression of the work surface on which the slab of clay was initially moulded) and, diverging from an acute edge, a smooth concave surface formed by the surface of a pot; the thicker edge is usually covered with deep finger-tip depressions resulting from the soft wet clay being pressed into position. (Full details of wedges and plaques are summarised in Tables K2 and K3 in archive.) The character of the layers in the stoking pit suggests they are mixed, incorporating rake-out cinders, discarded pot wasters, disused furniture, and broken kiln structure accumulated during the use of the kiln and probably subject to constant trampling, mixing, and reworking of the deposits while the kiln was in use. The upper horizon of 3206 is probably continuous with layer 3207 within the kiln (see below) and accumulated after the demolition of the superstructure (3177).

Within the interior of the kiln was a compact dump of fired and heated clay kiln structure (3177), which also contained a substantial quantity of Stafford-type ware pottery. The layer produced nearly 18kg of fired clay from the kiln superstructure, most of it typical wall structure characterised by flat undulating or more rarely curving moulded surface, many pieces retaining finger marks. Some pieces had a distinct wedge-shaped profile with a smooth back face which had sheared away at an internal constructional interface. These may indicate joints between batches of clay where one had been smoothed over an earlier constructed section — this effect may arise where the first batch dried out and the second lot of clay did not fully adhere, perhaps indicating construction of the kiln over several days. Several pieces have impressions within their core of quite large potsherds, which may have been used as a general reinforcement or as a lining of the pit where cut into soft sand. A few fragments of poorly fired clay probably derive from the lightly heated exterior skin. One piece has a deep U-shaped groove piercing the wall surface at an angle, which may represent some sort of vent or inspection hole through the kiln wall; the groove measures 35mm deep, 18mm wide, and over 50mm long.

Table 1 Comparison of the size, characteristics and structure of the kilns

Kiln features	**Kiln 3408**	**Kiln 3401**	**Kiln 4287**	**Kiln in pit 2052**
Total length (kiln & stokehole)	2.7m	3.2m	3.65m	~
External length (kiln & flue)	1.7m	2.0m	2.1m	~
External diameter	1.24m	1.5m	1.55m	~
External width of flue	0.7m	1.25m	1.0m	~
Internal length (kiln & flue)	1.6m	1.7m	1.95m	~
Width of kiln	1.12m	1.35m	1.1m	~
Depth of kiln	0.24m	0.14m	0.18m	~
Width of flue	0.35m	0.45m	0.4m	~
Shape of kiln	Keyhole	Keyhole	Keyhole	~
Stokehole shape	Circular	Circular	Subrectangular	~
Stokehole size	1.24 × 1.46m	1.24 × 1.46m	2.1 × 1.5m	~
Stokehole depth	0.38m	0.2m	0.45m	~
Alignment	E–W	E–W	NNW–SSE	~
Pedestal shape	circular	rectangular	tongue	Uncertain: curved
Pedestal structure	Clay and stone	Clay and stone	Clay	Clay and stone
Pedestal size	0.6 × 0.45m	0.77 × 0.35m	0.8 × 0.6m	>0.3m
Wall structure	Clay	Clay and stone	Clay and cobbles	Clay
Wall thickness	0.05–0.12m	0.15m	0.26–0.35m	0.05–0.08m
Flue structure	Clay and stone	Clay and stone	Clay and stone	Clay and stone
Flue wall thickness	0.15–0.18m	0.4m	0.25–0.45m	~
Kiln floor	Trumpet firebars	Firebar	~	Plate on timbers with firebars
Kiln furniture	Wedges	Wedges, plaques	Plaques	~

A few small fragments of fire bar with two wattle impressions on the interior (14–15mm and 18–19mm) were also found in this layer and are the only indication that the suspended floor was constructed of wattle-reinforced fire bars of the same type as found in kiln 3408. Other possible kiln furniture includes three large pieces of fired clay and one smaller piece with a distinctive smooth concave surface resulting from the impression of the body of a pot, and deep finger-tip depressions along the edges. These could be very large wedges or props, but it is possible they represent a temporary dome over the load formed by a layer of large pot sherds covered with a sealing layer of clay.

The final layer filling the kiln was a loose grey sand (3207) containing a low density of gravel and a low density of fired clay, all derived from the kiln walls, and frequent pottery.

Kiln furniture found in direct association with the kilns was sparse, but it occurred more commonly in the surrounding features suggesting that these were contemporary with the use of the kilns, as the furniture appears to be single-use and was presumably discarded after each firing. The most common were wedges of clay, which took the form of hand-moulded lunate-shaped lumps pressed between pots whilst soft, with deep finger marks along their thicker edge and the impression of pot rims or bodies on the other two surfaces. Small thin discs or plaques were less common. (Both types of furniture are summarised in Tables K2 and K3 (archive), covering all the kilns.)

Kilns 3401 and 3408 were surrounded by a number of broadly contemporary or slightly later features assigned to Phase 2. One small circular pit or posthole (3396) was situated to the back of the kilns and may pre-date them as it contains no associated kiln debris. The series of linear oval or sub-rectangular features (3194, 3208, 3230, 3233) had no evidence of *in situ* burning, though they contained varying quantities of fired clay kiln debris, discarded pottery of the same types as associated with the kilns, and some charcoal and burnt sand deposits. (All the features are summarised in archive, Table K4, comparing size, fill and finds.) In plan they respect the position of the kilns, clustering around the stokehole end with only very slight intercutting. This, together with the fact that they contained much higher proportions of kiln furniture than structural material, suggests that they were cut and infilled while the kilns were in operation. They may have been dug to obtain sand, with the holes backfilled fairly rapidly with kiln waste as the natural sand would otherwise soon have eroded in from the edges. An alternative hypothesis is that they were used for storing clay during loading and firing for easy production of kiln furniture, repairs to the kiln structure, or material to cover the dome following loading. However, no clean clay was found within any features, though it could be argued clay was brought in baskets or other containers, placed in the pits whilst required, and then removed subsequently. Features 3190, 3212, and 3210, although also clustering around the kilns and containing some fired clay and Stafford-ware pottery, are thought to form part of a later structure 636 (see Phase 3, below). However, the three near complete wedges found in 3210 show no evidence of wear, which might suggest that they found their way into the feature not long after being discarded, perhaps being used as post packing. This could indicate that there was little gap between the final use and demolition of Kiln 3401 and the construction of building 636.

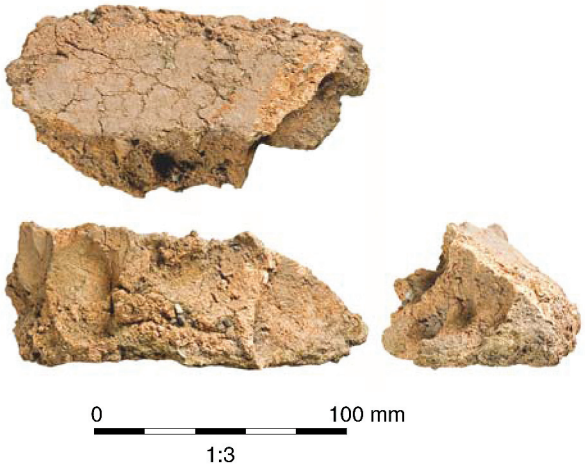


Fig. 14 Fired clay wedge from Kiln 3401 showing (*above*) the smooth surface formed by contact with a pot; (*below left*) side view showing finger marks; (*below right*) profile showing wedge shape

AREA 4 (Fig. 15)

Kiln 4287

Kiln 4287 was discovered during the course of a watching brief. It was set within cut 4355 and the stoking chamber within 4336 (Fig. 15). These appeared to cut through three earlier shallow hollows 4347, 4351, and 4349. Of these, 4347 contained 42 sherds of Stafford-type ware pottery similar in character to that from the kiln, suggesting the hollow may have been open for part of the kiln's use. It may have been dug at the same time as the kiln cut, possibly intended for the stokehole, but a change of alignment or position was decided before construction commenced. Alternatively the scoops may have been dug to obtain sand for use in the potting process.

The kiln structure was key-hole shaped with the flue to the north (Fig. 15; the dimensions of the kiln and its components are given in Table 1). The stoking pit may have started as a rectangular feature 0.8m by 0.7m in size immediately outside the kiln mouth. The periphery of the stokehole is more irregular, and possibly extended beyond the initial rectangular area as a result of trample and use rather than any deliberate shaping of the feature.

The foundation pit (4355) for the kiln had a flat undulating base curving up at the edge to straight near vertical sides. The base layer (4360) was 0.19m thick and was interpreted on site as a make-up or foundation layer for the kiln. It comprised a soft greyish orange silty sand with sparse charcoal. It is clear from the photos (Fig. 15) that this was partly *in situ* natural sand and pebbles below the SE half of the kiln, possibly slightly heat-discoloured with a mixed trampled upper horizon of sand outlined with a thin dark grey lens with areas of charcoal outlining the top of the deposit. There is no comparable layer below kiln 3401, which raises the question of whether there may have been an earlier kiln that was completely removed, though some explanation for such thorough removal is required. However, if an early kiln had used 4347 as its stokehole and a decision had then been made to reverse the arrangement of kiln and stokehole so that the flue faced north rather than south, but that the same depth of subsurface structure was required, then complete removal of any earlier kiln would have perhaps been easier than attempting to incorporate part of its structure. Such a hypothesis would account for the layer of dark brownish grey sandy silt containing a high density of charcoal (4359) which had accumulated to a depth of 0.1m in a hollow below the kiln floor and also the greater quantity of pottery in 4347 compared to other features cut by kiln 4827. Although hollow 4359 could be regarded as indicating wear of the kiln floor followed by resurfacing, there was no other evidence for anything except a single build (see Fig. 15). Though some evidence is suggestive of an earlier kiln, it must remain conjecture, though it is tempting to link the dump of demolished kiln debris in pit 2052 to such an event (see below).

The primary kiln structure (4357) formed the walls, floor, and pedestal of the kiln, apparently constructed as a single build using a light greenish grey clay, which contained few stones, possibly only naturally-occurring small pebbles. The surfaces had been intensely fired and blackened and the clay structure fired to a uniform dark orange red (to a depth of 120–150mm), resulting in a sharp boundary to the unfired clay which had discoloured pink in places where the heat had penetrated. The outer wall was reinforced with rounded river pebbles and rectangular blocks of sandstone set into the clay. The west wall of the flue was constructed with blocks from two querns (Shaffrey, below), whilst rounded river cobbles were built into the east wall. The tongue pedestal extended from the back wall of the kiln and was constructed of solid clay without stone reinforcement. It measured 0.8m long by 0.3m at the back, increasing to *c*. 0.6m in the centre; the pedestal and walls survived to a height of 0.3m.; and the walls were *c*. 0.2m thick. Only the lower half of the lower chamber survived, with both walls and the upper section of the pedestal truncated.

The kiln floor (4356) was a thin layer (20mm thick) of hard black well-fired clay, which extended up the sides of the pedestal. A single thin fragment was sampled and retained. It was made using clay with a high density of sand, some grit and pebbles (see research archive for details) and had a flat undulating surface covered with deep finger grooves from pressing and moulding the clay. The back is rough and irregular, though basically flat, with the imprint of the rough underlying surface and charcoal adhering from 4359.

The general character of the clay wall surface is obtained from the fired clay recovered from the fill of the kiln. This was made in a sandy clay containing scattered rounded pebbles and fired reddish orange, though often buff, light brown, or grey at the surface. Typical are some well-preserved blocks collected by hand excavation from 4305; these have a single flat undulating moulded surface crudely finished with deep finger grooves and depressions up to 14 mm deep, though some areas

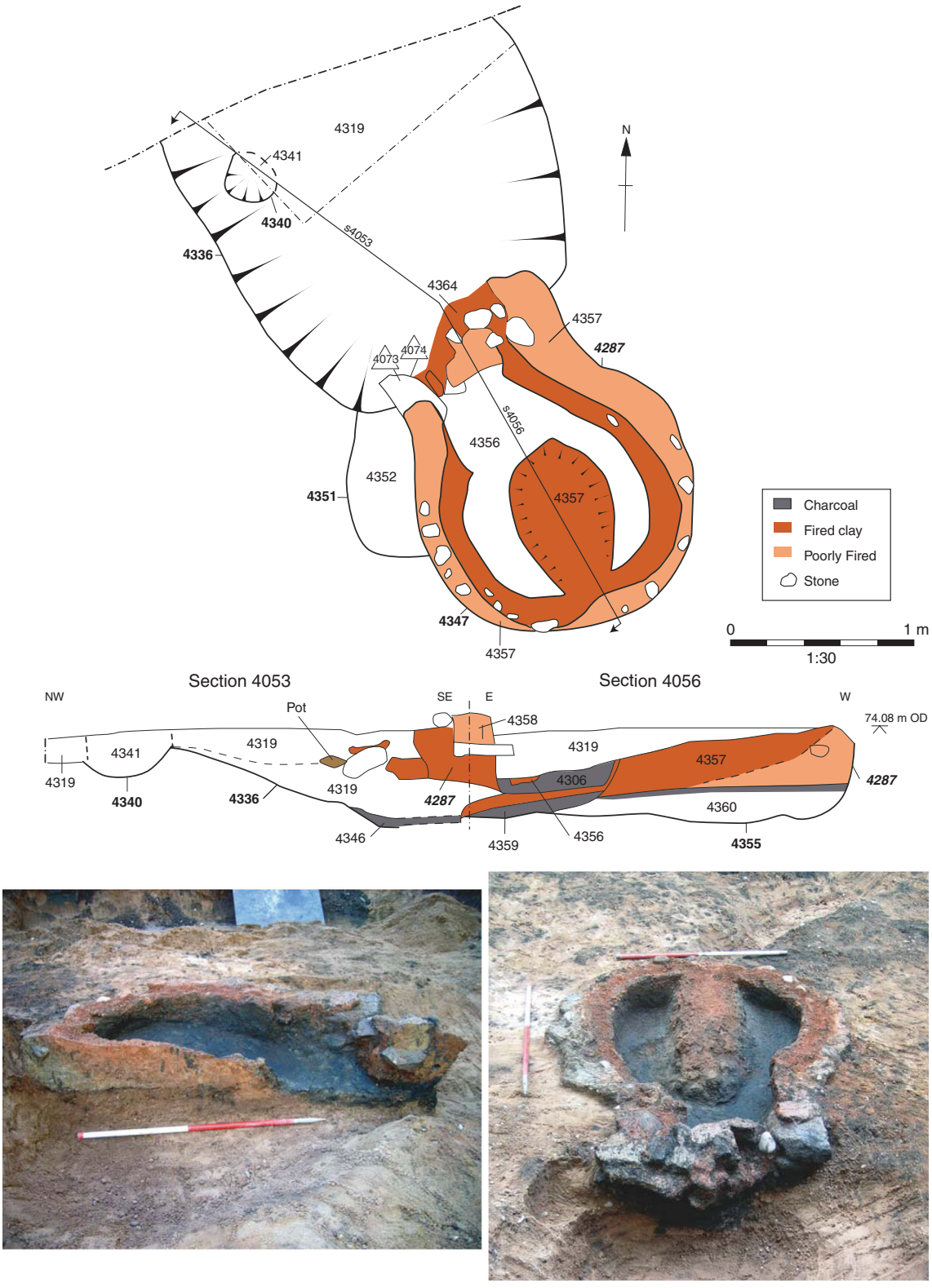


Fig. 15 Kiln 4287, plan and section; (*bottom left*) view looking W showing the kiln half-sectioned along its longitudinal axis; (*bottom right*) view looking S showing the kiln and stokehole fully excavated

can be regular and smooth. Most pieces have a rough irregular back face bearing the impression of the surface or structure covered by the clay. Some exhibit the interface where batches of clay overlapped or joined. A significant number of pieces had organic impressions, generally on the back of the fragments. These were monocot stem and leaf impressions (probably straw or grass), measuring

14mm diameter and mostly 15–20mm long but occasionally up to 90mm long. They may indicate that the clay partly formed a lining to a turf superstructure, but it is possible that blocks of clay were prepared on a bed of straw (to prevent it adhering to the ground surface) prior to incorporation in the kiln structure. Several pieces 50–70mm thick had a flat moulded surface burnt buff, yellowish brown, or dark purplish red and cracked and crazed from contraction and intense firing of the wet clay. These pieces have a broken underside with voids of small pebbles or larger concave hollows possibly signifying that the clay was laid over or against a stone cobble foundation, suggesting the outer skin of stones set in clay continued in the upper sections of the kiln wall.

Two blocks of clay and stone structure (4364 and 4358) (see Fig. 15) are likely to be part of the stokehole arch or kiln wall above the flue. The lower section (4364) was constructed of stone blocks set in unfired grey and red fired clay 0.33m thick and the upper part (4358) of light greyish yellow and pink clay 0.13m thick. This upper section was very similar in character to the outer poorly-fired wall seen *in situ* and is likely originally to have formed the outer skin of the wall.

Evidence for the suspended floor can only be inferred as no evidence survived of the actual structure. On the west side of the kiln the wall begins to arch over as it approaches the mouth of the kiln, suggesting that the wall was built into a continuous arch over the flue. The use of stone blocks in the structure suggests that stone slabs may have been used to bridge the gap across the flue and possibly to join to the end of the pedestal. There is no evidence for the use of fire bars as found in kiln 3408.

Following construction, ash and charcoal accumulated within the kiln and stokehole as a result of firing the kiln, though the presence of pottery and fired clay superstructure suggests that there is an element of deliberate dumping of kiln debris and demolished structure mixed with it. The primary layer 4346 accumulated to a depth of 0.12m in the stokehole and flue and consisted of soft ashy dark-grey to black sand mixed with a high density of charcoal and only a few small fragments of fired clay. It occupied a sharply defined rectangular area 0.7m × 0.8m, suggesting this was the original shape of the stoking chamber that was subsequently worn to a much larger hollow (see above). A similar layer of charcoal in soft dark grey-black ashy sand had accumulated within the kiln to a depth of 80 mm, though only the very lowest black lens directly on the kiln floor represents *in situ* cinders from the final firing. Overlying this, the layer was more mixed, representing collapsed kiln structure and re-deposited cinders, with pottery. Moderate quantities of carbonised cereals (wheat, oat, and rye), low densities of chaff and weed seeds, fuel ash slag, and burnt bone were present in samples taken from this layer.

These were overlain by a thicker deposit filling the stokehole (4319) and kiln (4303 and 4305, 4337, 4342). This deposit was a mix of re-deposited cinders and charcoal from firing the kiln, demolished or collapsed fired clay kiln structure, and large sandstone blocks and pebbles in a matrix of loose greyish brown clayey sand c. 0.2m thick. Within the kiln this deposit contained less pottery, though a much higher proportion of fired clay. Over 23kg (9290 fragments) of fired clay was recovered from the infill of the kiln and stokehole, of which approximately 80% came from the upper horizon and less than a quarter of this within the stokehole.

The fill of the stokehole 4319 was the only deposit to produce any oven furniture, all three fragments being small plaques that were probably used as setters to stabilise the pots when loaded into the kiln. It is likely that a much higher proportion of the fill in the stokehole represents rake-out cinders during the use of the kiln, with a smaller proportion of demolition debris and dumped pottery. It was composed of a firm black silty sand 0.48m thick containing a high density of charcoal, including coarser fragments than within the kiln but a similar range and quantity of cereal grains (wheat, rye, oats), chaff, and weed seeds.

Well 4330 (Fig. 16)

A possible well was also revealed within Area 4 during the watching brief. It was located 2.0m to the NE of kiln 4287 and may have been contemporary with the latter's use. Though not fully revealed, it was probably circular measuring approximately 2.8m across at the top with somewhat irregular (possibly collapsed) upper sides that narrowed to a near vertical shaft measuring *c*. 1.6m in diameter towards the bottom, at a depth of *c*. 2.3m. Its sides had been lined with roughly cut cleft oak that was probably wedged together, remnants of which had survived within the damp conditions at the base of the pit. These included fragments of horizontal timbers surviving *in situ* against its side, and further fragments lying horizontally on its base that had probably collapsed from its sides. Several timbers were recovered, although their poor condition meant that they were not suitable for



Fig. 16 View looking N of timber-lined well 4330

dendrochronological analysis. The base of the pit was filled with a 0.72m thick deposit of soft, very dark green-grey sandy silt containing wood fragments that presumably accumulated after the well had ceased to be used. It contained two sherds of Stafford-type ware and waterlogged plant remains which suggest that the immediate area around the well was kept relatively clear since there was little sign of the growth of typical wasteland plants such as stinging nettles (Hunter and Nicholson, below). The well seems to have been deliberately levelled with mid grey-brown silt, sand, and a small dump of charcoal containing a few sherds of Stafford-type ware, a small quantity of animal bone, and some hammerscale, the latter presumably waste from nearby occupation. Only its upper fill (4333), a very dark brown charcoal-rich sandy silt, contained any appreciable quantity of Stafford-type ware and it is likely to represent soil that later developed and subsided over the infilled well.

AREA 1 (Fig. 17)

Pit 366 was located close to the highest point on the site on the western side of the trench (Fig. 17; for section locations see Fig. 8). It was sub-circular with straight near-vertical sides and a flat base that sloped down to the south. It contained a thick succession of fills at its base that comprised weathered natural sand and gravel, suggesting that it had remained open for an appreciable period of time. These produced no finds, apart from fill 374 which contained several sherds of Stafford-type ware, a small quantity of animal bone, and a large fragment of vitrified hearth lining. Above was a thick charcoal-rich rubbish dump (377) that contained a further large fragment of hearth lining and a smithing hearth bottom, together with a fair quantity of cattle bone. The pit was levelled with further rubbish-rich fills interleaved with dumps of re-deposited natural, the uppermost fill (250) being particularly rich in pottery and containing ironworking debris. This included many sherds from Stafford-type jars, a smithing hearth bottom, and a large slag-run fragment, the latter possibly derived from the smelting of iron. A sample from fill 381 was rich in charred cereals (rye, oat and free-threshing wheat).

Wattle-lined pit 556, probably a well, was located towards the eastern end of Area 1, some 12.0m NW of Kiln 4287 in Area 4. It was set in a sub-circular vertical shaft, *c*. 1.4m in depth, and originally *c*. 1.30m in diameter (at its base), though the diameter of its upper level measured *c*. 2.0m due to the subsidence of its sides. It was lined with a woven circular wattle structure, constructed with horizontal wattles around an arrangement of wattle uprights that were spaced *c*. 0.3m apart, presumably to hold back the soft surrounding sand. Waterlogging had preserved the base of the

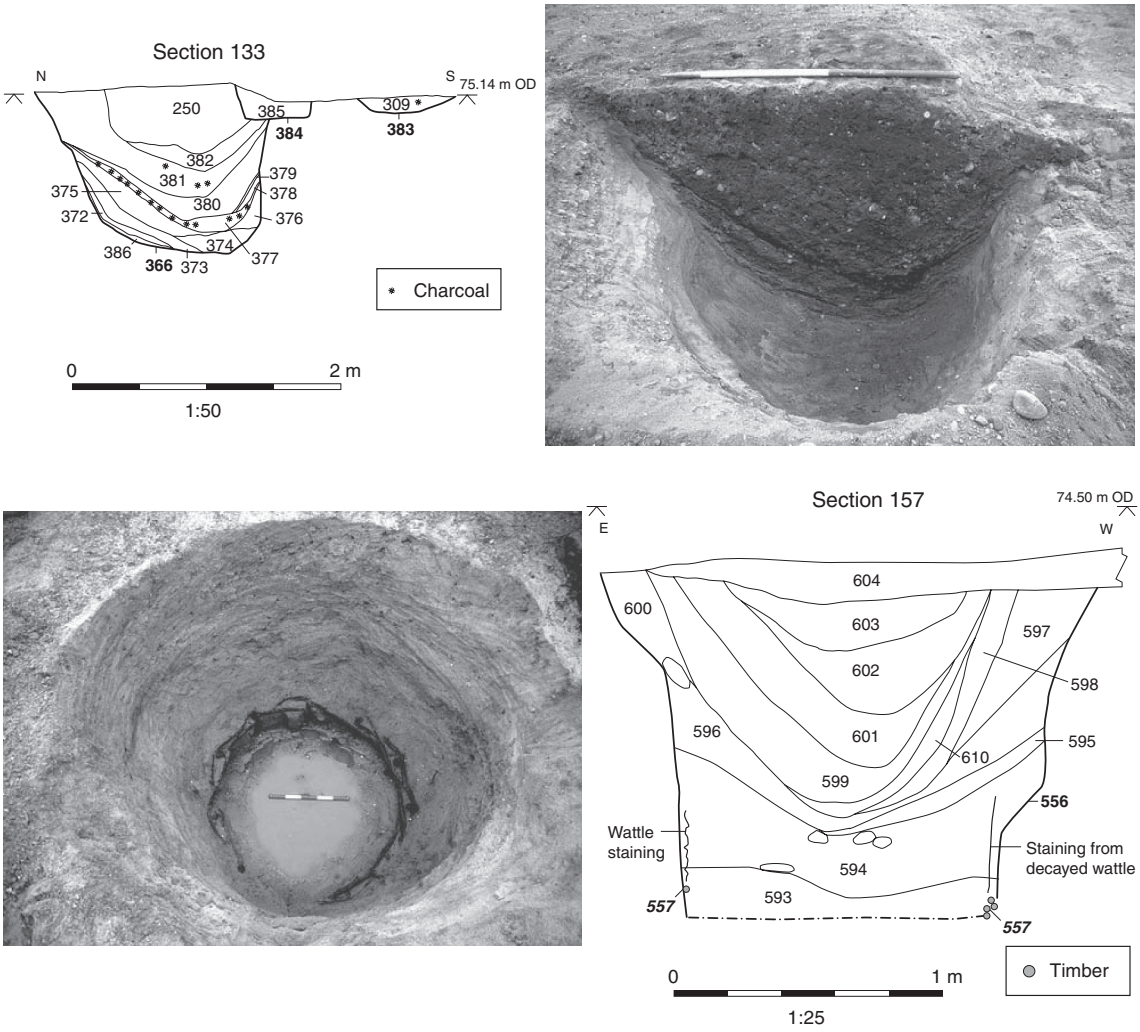


Fig. 17 Area 1: view looking E and section of pit 366; view and section of wattle-lined well 556

lining, though staining suggests that above this level the lining had probably decayed *in situ*. The wattles were mostly from 4- to 6-year-old alder or hazel. The lowest fills were thick deposits of sterile re-deposited sands (593 and 594), devoid of finds, that were presumably washed in after the well had ceased to function. The fills immediately above (595–598, 610) comprised organic-rich silting possibly from decayed vegetation and re-deposited sandy soil formed from weathering of the pit sides. These deposits were largely devoid of anthropogenic material, though several cattle skull/mandible fragments were present in fills 595 and 596 and charred grain was noted in 597 during the charred plant assessment (Sample 23). The upper fills of the pit comprised dark grey sandy silts (599–603) that may have formed from subsiding overlying soil layers that probably post-dated the filling of the pit. These contained a small quantity of animal bone, and three small sherds from possible Stafford-type ware pottery that were recovered from fill 601.

AREA 2 (Figs 18–20)

Pit 2052 (Fig. 18)

This pit contained a series of deliberate tips comprising fired clay, charcoal, and burnt debris. Ovoid in shape, 1.3m wide, 2.06m long, and 1.1m deep, the pit had a concave base and steep to vertical sides. The possibility that this feature was in fact a kiln base has been considered, but the absence of *in situ* burning or any *in situ* structure, and the mixed character of the fills, suggest that this is extremely unlikely.

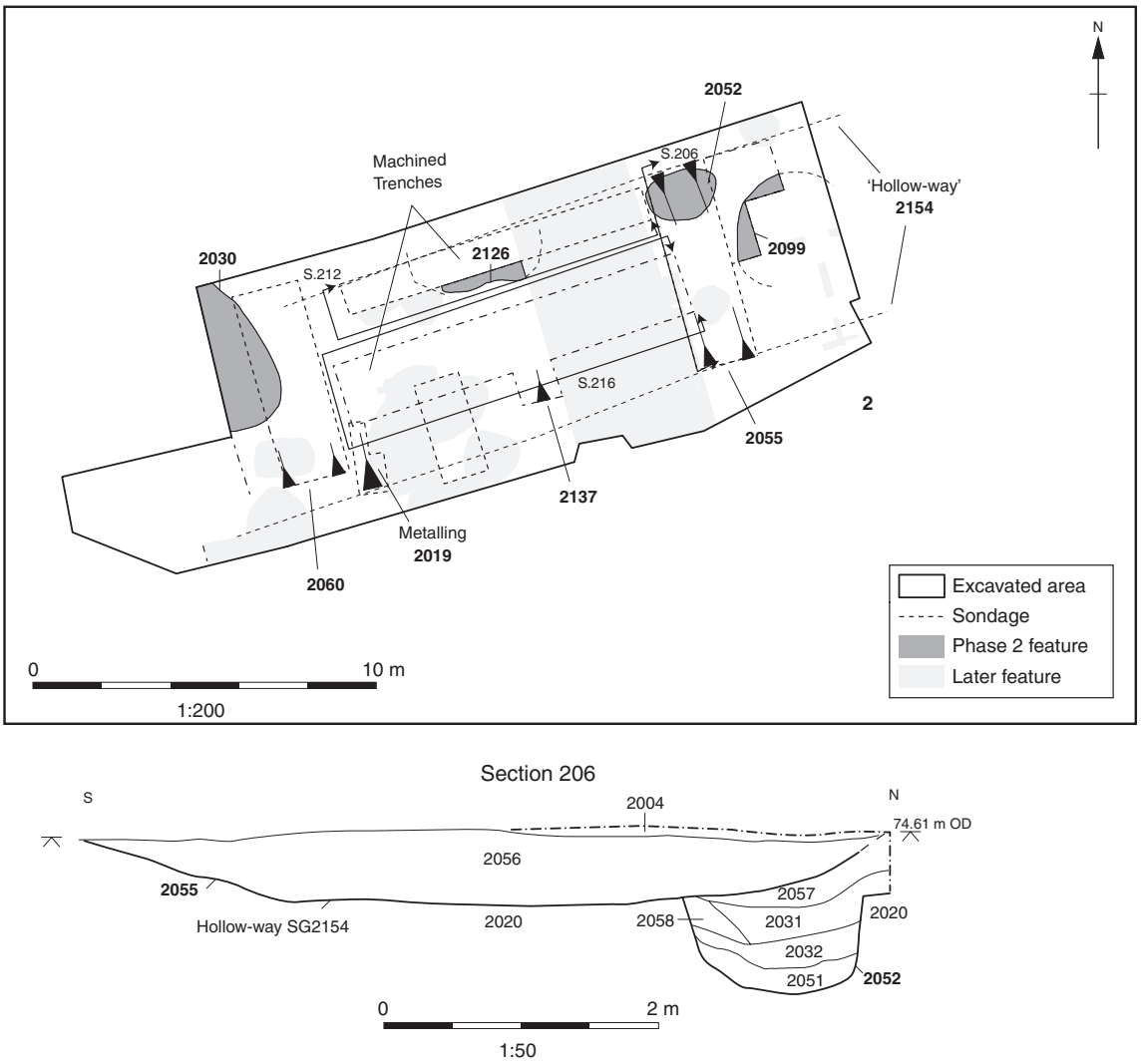


Fig. 18 Area 2, plan; section 206 showing pit 2052 and hollow way 2154

Covering the base was a mixed deposit 2051. This layer consisted of large lumps of fired clay, lumps of raw clay slightly discoloured to pinkish brown, sandstone fragments, and large quantities of Stafford-type ware pottery in a matrix of dark grey-black sand containing a high density of charcoal, which included large fragments of a range of species. This was overlain by 2032, a black silty sand containing a high density of charcoal fragments, occasional stones of sandstone and rounded pebbles, and a large quantity of Stafford-type ware pottery and fired clay. Above this against the south edge was a deposit of greenish-grey sand and gravels *c*. 30mm (layer 2058) but containing low quantities of pot and fired clay compared to the other layers. This was probably a slumped layer of the natural sand and gravels mixed with some dumped debris. This in turn was covered by a deposit of loose black silty sand (2031) again containing high densities of Stafford-type ware pottery, fired clay, unfired pink clay, charred cereal grain, and charcoal fragments. This was overlain by 2057, 2102, and 2101, which represent the upper fill extending over the pit edge to the north. Layer 2057 consisted of a dump of Stafford-type ware pottery and wasters, and fired and unfired clay in a black silty sand rich in charcoal and charred cereal grains. It included areas excavated as part of 2102, described as a dump of kiln waste, and 2101, a black silty sand containing frequent charcoal and unfired pink clay, though both these layers appear to be more extensive layers not confined to the pit.

The pit contained a total of 2256 fragments of fired clay (44.5kg) distributed through all layers, though the largest quantities occurred in 2051 and 2031 (30% and 40% respectively). The different elements of kiln structure and furniture within the layers of pit 2052 are described in detail in the full report, available in the research archive. Kiln wall, wall lining, and base floor were the commonest



Fig. 19 Pit 2052: a. end and side views of kiln floor fragment with large pole impression; b. fired clay kiln structure with stone slab impressions on the back

structural elements, accounting for nearly two thirds of the group and occurring in all the layers with fired clay. Pieces in this category ranged from 10–70mm thick and were fired to red, reddish orange, and brownish red often with a buff, cream, pale grey or dark grey surface. Typical pieces of kiln wall or lining were characterised by a fairly smooth moulded surface, undulating from finger marks and depressions. The effect on some pieces showed that the clay was quite wet and sticky at the time it was used, while others were smooth and well finished, on occasions with fine striations from wiping. Several pieces of walling had impressions of pot sherds indicating these were occasionally built into the structure. The pieces interpreted as pedestal are essentially the same as the kiln wall in general character and finish, but are differentiated by the convex or plano-convex shaping of the surface. They were confined to layers 2031, 2032, 2101, and 2102. All have rough moulded surfaces generally fairly smoothly finished, but some pieces with more distinctive finger marks and striations from wiping and shaping. One piece has a smooth regular convex surface with what appears to be a groove 16mm in diameter piercing it. The groove could be a wattle possibly from the framework for the floor resting on the pedestal. Another piece has depressions in the surface that may have resulted from firebars luted onto it. The largest of the curving surfaces may indicate the size of a cylindrical pedestal, but it is equally possible that these are in fact the arcs of oval or sub-rectangular pedestals. The smaller fragments possibly reflect the sharply rounded angles of a rectangular pedestal or were possibly part of the stokehole arch, rather than the pedestal.

Fragments interpreted as elements of the suspended floor separating the lower and upper chambers of the kiln accounted for almost all the fired clay from layer 2051, with additional pieces found in layers 2031, 2057, and 2101. The general impression is of a substantial structure up to 100mm thick supported on large poles and squared timbers 30–60mm wide with the edges set into a ledge or luted to the top of the walls of the lower chamber with the clay pressed hard into position to secure the joint. The substantial size of the timbers may imply that no pedestal was present or that

these pieces represent the section of floor bridging the flue and forming the stokehole arch. Large blocks of the kiln suspended floor form part of a rough flat plate supported on large timber poles or lengths of split small trunks (Fig. 19, a), and include areas at the junction of floor and walls. A small number of firebar fragments were also found indicating that part of the floor was formed with these bridging a gap between pedestal and wall. These pieces have an irregular finger marked moulded surface with evidence of one or more wattle impressions on the opposite side and measure 5–55mm thick. The wattles, ranging in size from 11–32mm diameter, do not appear interwoven but lie parallel bunched together. One piece appears to have an additional lump of clay adhering apparently pressed over the bar to lute it into the kiln structure.

The evidence of the fired clay from pit 2052 suggests the kiln was similar to the three found *in situ* elsewhere on the site. It is of course not possible to reconstruct its size and shape, but the surviving structural elements bore similarities to those found in the other kilns. The wall structure was very similar to kiln 3408 suggesting that the walls of the lower chamber were of clay, lining a subsurface pit cut into the sand natural. The flue walls and walls of the upper chamber were constructed of clay and stone blocks with an internal clay skin. Evidence for the pedestal also suggests a clay and stone block structure with a curved surface (Fig. 19, b). It could possibly be circular but the variations in the curvature of the surfaces suggest it was sub-rectangular with bowed sides and rounded corners. Evidence for the suspended floor suggests a somewhat different method of construction to the firebars found associated with kilns 3408 and 3401. Although there is some evidence for rounded firebars the majority of pieces indicate a flat slab floor supported on larger split or squared timbers, compared to the wattle reinforced firebars. No kiln furniture was found in this group.

'Hollow-way' 2154 (Figs 18 and 20)

An apparent linear feature 2154 ran in an approximately SW–NE direction along the entire length of Area 2. Only its southern edge could be defined with any degree of certainty and its full width was recorded only at the eastern end of the area (Fig. 18) where it was seen to post-date pit 2052 but pre-date medieval ditch 2106 (see Phase 4 below). To the west of pit 2052 only the southern edge of this feature was defined in plan. It measured approximately 5.8m in width and up to 0.52m in depth with shallow sloping sides and a flat base, its profile and depth suggesting that it represented a hollow-way rather than a deliberately cut feature. A section excavated towards the west of the trench (2063) revealed 'metalling' (2019) along its southern edge composed of round/sub-rounded pebbles, apparently forming a surface (Fig 20), though no such evidence was found elsewhere along its length. The feature had been levelled with fairly loose mid-dark greyish brown silty sand containing a few sherds of Stafford-type pottery, suggesting gradual infilling.

Pit group SG 2157 (Figs 6 and 18)

Pit 2126 was cut by medieval ditch 2106 and medieval pit 2115 and was possibly circular, measuring at least 2.3m across and 1.69m in depth, with slightly irregular sides and a concave base. It contained several fills of dark grey silt sand, the earliest containing sherds from a Stafford-type jar,



Fig. 20 View looking W of metalling 2019 within hollow way 2154

whilst its upper fill produced a greater variety of rubbish including animal bone and fragments of fired clay, the latter probably derived from a kiln. Pit 2099 was also probably circular, measuring at least 2.0m in diameter and 0.52m in depth, with moderately steep sides and a concave base. It contained a fair quantity of sherds from at least one Stafford-type jar and a large lump of slag with ferruginous sandy concretion, both from its upper (main) fill. A large ovoid pit 2030, measuring at least 4.4m across and 0.92m in depth, was only investigated within a limited-sized sondage. Its lower fills comprised dumps of re-deposited natural containing no finds, whilst its upper fills were predominantly charcoal-rich silts, the upper of which contained a single fragment of animal bone.

PHASE 3 **(later 11th to 12th century)** (Fig. 21)

Structural evidence

At least two possible post-built structures were revealed, both of which stratigraphically post-date features containing Stafford-type ware pottery. Structure 636, the more complete, was located within Area 3 and overlay the demolished remains of Kiln 3401, whereas the second structure (630) lay at the west end of Area 1 and partially over Phase 2 pit 366.

Structure 636 (Fig. 22)

A rectangular arrangement of postholes suggests the presence of a structure measuring 7.3m in width and 12.3m or more in length. The structure would have been aligned NE–SW and its eastern extent cut across the demolished remains of Phase 2 Kiln 3401, though it would have respected the line of Phase 2 gully 3315 that lay immediately to the east of the kiln. The south wall of the structure is represented by a line of fairly substantial oval post-pits, three of which were seemingly paired with smaller and more rounded postholes. The SE corner of the structure was probably



Fig. 21 Features of Phase 3, 11th and 12th centuries

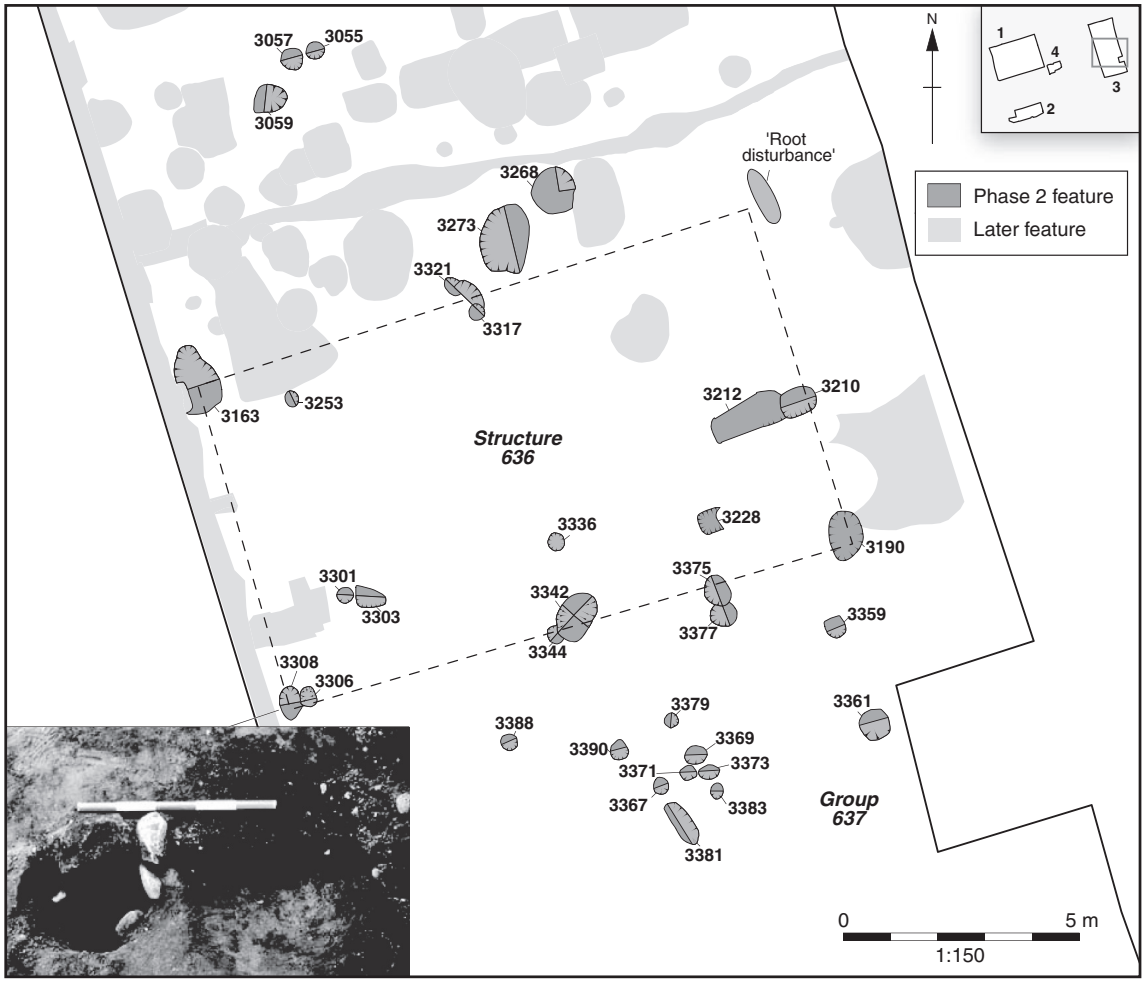


Fig. 22 Area 3, plan of Structure 636; view of postholes 3308 and 3306

marked by pit 3190, which had cut into the lining of Kiln 3401; it was 1.0m across and 0.38m in depth and contained stones at its base, possibly representing a post-pad. Posthole 3342 occupied a position centrally along the line of the south wall and was identical in size and depth. Posthole 3308, which may have marked the SW corner of structure, was smaller and fairly shallow at 0.18m depth and contained no evidence for a post-pipe, suggesting that the post had been removed. It predated the adjacent and smaller circular posthole 3306, which may have been a later replacement. This posthole measured 0.42m in diameter and 0.48m in depth and contained large packing stones that seem to have been dislodged by the removal of the post. The postholes that marked the north wall of the structure (3163 and 3317/3321) were positioned directly opposite their counterparts on the south wall though no evidence was recorded for a corresponding post that marked the NE corner of the structure. However, an unexcavated feature, assumed to have been root disturbance, corresponded closely to where this post should have been. All were of similar depth (0.28–0.30m), although irregular pit 3163 that may have marked the NW corner of the structure was considerably larger at *c*. 1.40m across, possibly disturbed during the removal of the post. A further substantial post-pit (3210) marked the position of the east wall and cut into pit 3194, possibly a sand extraction pit associated with the kiln. Further postholes contained within the structure may have been contemporary, possibly forming part of one or more partitions. Pit 3212, adjacent to posthole 3210, could have formed part of a substantial installation located within the SE corner of the structure; alternatively it could have been dug to assist the removal of the post. Almost all finds came from the postholes that cut into the remains of the kilns and comprised Stafford-type pottery and kiln debris, undoubtedly occurring residually. However, posthole 3308 in the SW corner of the structure contained an iron-rich sandy ware sherd of a utilitarian vessel datable to the 11th–12th centuries, and a small fragment of medieval roof tile was found within internal posthole 3303. Located immediately to the

north of the structure were two small and shallow rubbish pits (3268 and 3273) that were probably associated with the use of the structure. Pit 3273 contained a considerable quantity of sherds from at least one cooking pot in an iron-rich sandy ware.

Posthole group 637

Immediately to the south of Structure 636 was a cluster of postholes that may have been contemporary, possibly forming part of an adjacent structure or perhaps an extension to it. No coherent arrangement was evident, although, like Structure 636, the postholes all lay to the west of Ditch 3413 (Phase 2, above). Most were circular and smaller in size than those of the adjacent structure, implying a more flimsy construction.

Structure 630 (Fig. 23)

Structure 630 represents the possible remains of a timber structure that was partially revealed on the south-western corner of Area 1 and during the watching brief (Fig. 23). The area outlined by this possible structure was respected by pit groups 632 (Phase 3) and 631 (Phase 4). Only the eastern side was exposed and comprised a line of three pairs of postholes over a distance of *c*. 11.0m, the northernmost of which (384) clipped the southern edge of Phase 2 pit 366. Posthole 427 may have marked the position of the northern wall of the structure given the absence of similar postholes further north, and posthole 280 would have been positioned just inside the structure. The postholes that defined the eastern wall were largely sub-circular, measuring 0.42–0.72m in diameter and 0.12–0.48m in depth; no evidence of posts survived. A glazed iron-rich sandy sherd, possibly from a (?12th-century) pitcher was found in posthole 280 and a sherd from a possible Stafford-type vessel was found within posthole 277. A sherd from a probable cooking pot in iron-rich sandy ware was found in posthole 284.

A thin layer of charcoal-rich silt (300) was found immediately to the west of the postholes and slightly overlapped the fills of postholes 383 and 384 and Phase 2 pit 366. It contained fragments of fired clay, some with wattle impressions, probably from an oven, together with charred grain. Layer 300 was overlain by a 50mm-thick layer of compacted clay (277), that had been scorched purplish-red by heat. The surviving scorched area measured 1.74m by 1.28m and is probably the remains of a hearth or area of a floor over which an oven had been built (Fig. 23, bottom left). A single sherd of pottery, identified as possible Stafford-type ware, was found sealed below this layer and sampling revealed that it contained small quantities of spherical and flake hammerscale and microslags.

PITS

Pit Group 632 (Fig. 23)

Located immediately to the north/northeast of Structure 630 in Area 1 was a line of four sub-rectangular pits (154/310, 206, 183, and 130). The nature of their fills and the general lack of finds suggest that they served primarily as quarries and that they were the earliest in a dense sequence of pits in this area. The pits were somewhat irregular in shape with steep profiles. They measured 1.9 to 3.3m across and varied in depth from 0.54 to 1.50m. All four pits showed a similar pattern of filling, and contained thick lenses of largely sterile re-deposited natural sand and gravel at their bases, suggesting that they were left open for a period during which weathering of their sides occurred. Their upper fills tended to have a higher degree of soil content. The latest of these developed within pit 154 (226; Fig. 23, bottom right), probably in a hollow left after the pit had been levelled; this contained all the small quantity of animal bone and pottery (mainly iron-rich sandy wares) recovered. A ceramic spindlewhorl came from a lower fill (155) within pit 154 in association with a sherd of possible iron-rich sandy ware. A smithing hearth bottom was found in fill 188 from pit 183, perhaps derived from activity from adjacent structure 630, again found with a sherd from an iron-rich sandy cookingpot/jar.

Part of a pit (260, 0.92m deep) was recorded close to the northwest corner of Area 1 (see Fig. 21). This was the only pit to contain a significant quantity of refuse, and it represents the earliest in a group of intercutting pits in this area (see Phase 4, below). It contained two fills of dark grey brown sandy silt. The lower fill produced a fairly large group of iron-rich sandy wares, including a possible Stafford glazed pitcher which would suggest a 12th-century date. A notable find was a small copper alloy folding coin balance (Scott, below).

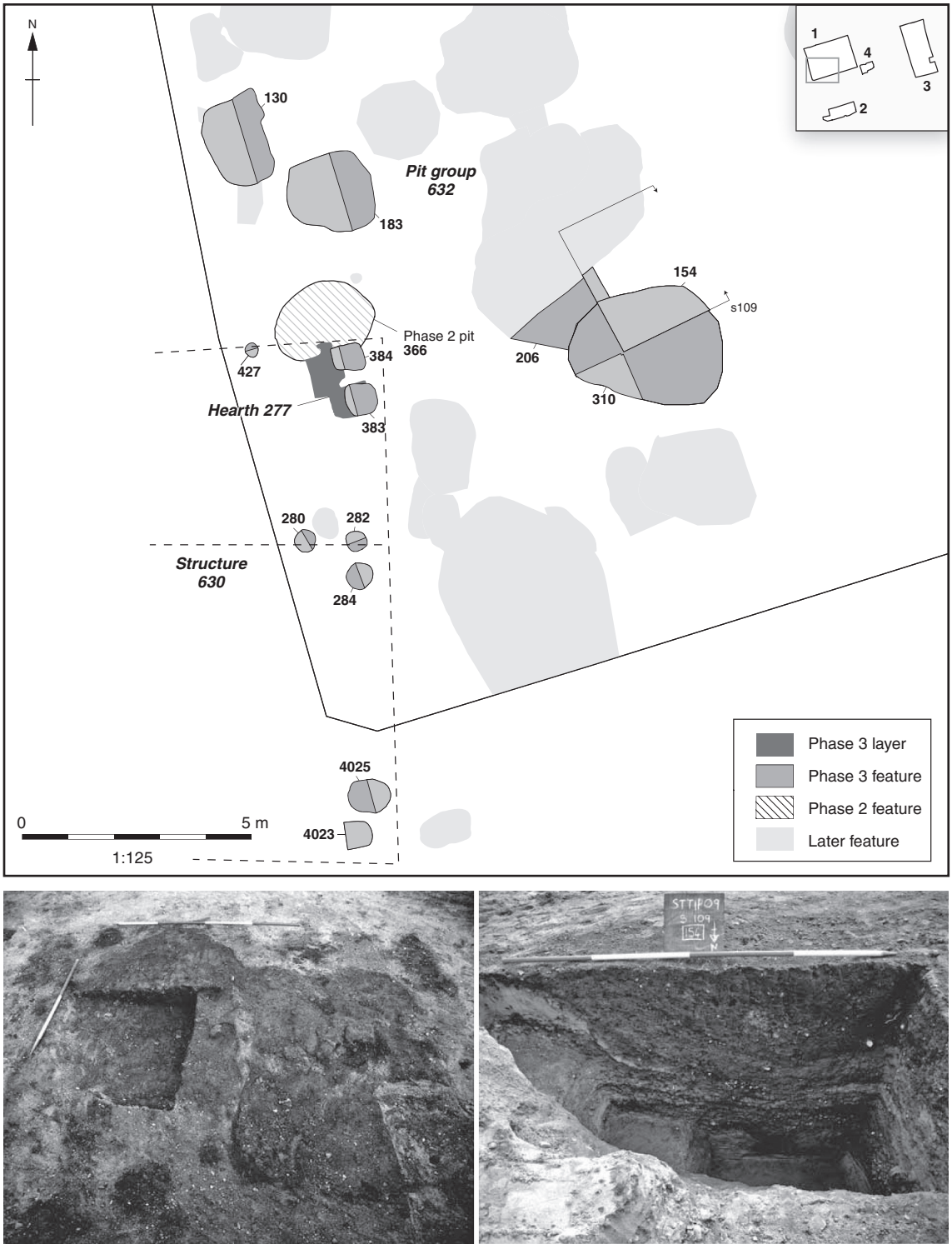


Fig. 23 Area 1, plan of Structure 630; (*bottom left*) view looking E of hearth 277; (*bottom right*) view looking S of pit 154

Pit Group 635

A small group of features were found at the eastern end of Area 1 (see Fig. 21). The largest, sub-rectangular pit 535, was only partially exposed but measured 3.7m by at least 2.8m and 0.84m in depth and had vertical sides and a flat base. It contained thick, soft organic silt at its base with a few fragments of Stafford-type ware, but also at least one fragment of iron-rich sandy ware. Its upper fills contained similar pottery and several animal bone fragments. The form of this feature, together

with the scarcity of occupation debris, suggests that it was a quarry pit. Pit 291, measuring 0.60m in depth, contained a thick deposit of weathered sand at its base, suggesting it may also have been a quarry, before being filled with charcoal-rich soil containing hammerscale and a fragment from a glazed jug or pitcher in an iron-rich fabric. To the south of these features were the remnants of a shallow linear feature (417), aligned NE–SW. It measured 1.26m in width and 0.24m in depth and had shallow sides and an irregular base. It was filled with dark brown stony sandy silt that contained a sherd of iron-rich sandy ware. Notably, this feature is on the same alignment as the later gully 3418 located to the east in Area 3 (see Phase 4) and could represent a boundary, perhaps a hedge marking the rear of a property on Tipping Street.

PHASE 4 **(13th to mid 14th century)** (Figs 24–26)

Ditches

Crossing Area 2 was a large NW–SE aligned feature (2106) that appears to be a large ditch at right-angles to the line of South Walls (Figs 24 and 25; see also Fig. 6, above). A slot excavated into it revealed it to be *c*. 5.5m in width and 1.2m deep with moderately and somewhat irregular (weathered?) sides with a concave base. It cut across possible hollow-way 2154 and clipped the eastern side of pit 2126 (see Phase 2 above) and was itself sealed by post-medieval garden soil 2108. Its primary fill (2105) comprised re-deposited natural sand weathered from its sides, containing a mixed group of pottery. This included sherds from iron-rich sandy ware cooking pot, Midlands white ware jug sherds, and sherds from a baluster jug in probable Orange ware, the latter suggesting a late 14th-century or later date. Above was a heavily rooted, thin humic silty sand, possibly a turf (2120), which contained no finds. A thin, charcoal-rich, silty sand (2104), again humic, developed over it and contained some pottery and animal bone, the former predominantly sherds from one or more iron-rich cooking pot/jars or pitchers together with fragments from a jug in a Midlands white ware suggesting a 13th- or 14th-century date. Its upper fill comprised a thick and homogenous deposit of dark brown silty sand (2094) that probably accumulated fairly rapidly and contained a similar assemblage of pottery. Further evidence for the continuation northwards of this ditch was revealed in section during the watching brief within the pile caps located to the north of Area 2. Here a large feature of similar dimensions occurred in the two pits located immediately to its north (TP 3 and 7) before apparently turning towards the west (TP 10 and 11). Although no finds were recovered from any of these observations, the feature was recorded as being sealed below post-medieval garden soil. The purpose of this ditch is uncertain but it presumably represents a substantial boundary: it is notable that the ditch closely follows the line of a NW–SE boundary evident on 19th- and 20th-century maps (see wall 64, Phase 7, below).

A second and far less substantial ditch or gully (3418; Fig. 24) ran on an approximately NE–SW alignment across Area 3 and cut through Phase 2 ditches 3411 and 3315. Probably heavily truncated, it survived to a maximum depth of 0.16m and varied in width from 0.18–0.85m and had a shallow concave profile. It had a single fill of dark grey-brown silty sand and contained sherds of Midlands white ware and an abraded sherd of iron-rich ware. It may have represented a boundary, perhaps marking the division between the rear of properties fronting onto Tipping Street and South Walls, and may perhaps be a later version of Phase 3 gully 417 located 38m to its SW (see above).

Structures

Post-built structure 634 (Figs 24 and 26)

On the north side of Area 1 was a rectangular arrangement of large circular postholes that appear to represent part of a substantial post-built structure measuring at least 11.7 × 7.0m (Figs 24, and 26). The eastern wall of the structure closely follows the line of a Tipping Street property boundary shown on 19th-century and later maps. Contained within the structure, close to its south-west corner, was a heavily-robbed stone-lined well (607), the robber pit respecting the walls of the structure.

The posts of the west wall of the structure (Fig. 26, bottom left) were 0.71.0m in diameter and varied in depth from 0.18m to 0.44m, whilst those on its south wall (143, 172, and 287) were more substantial, measuring 1.1–1.3m in diameter and 0.64–0.92m in depth. The shallow remains of a possible beamslot (289), 0.40m in width, joined posthole (287) and this feature may mark the east

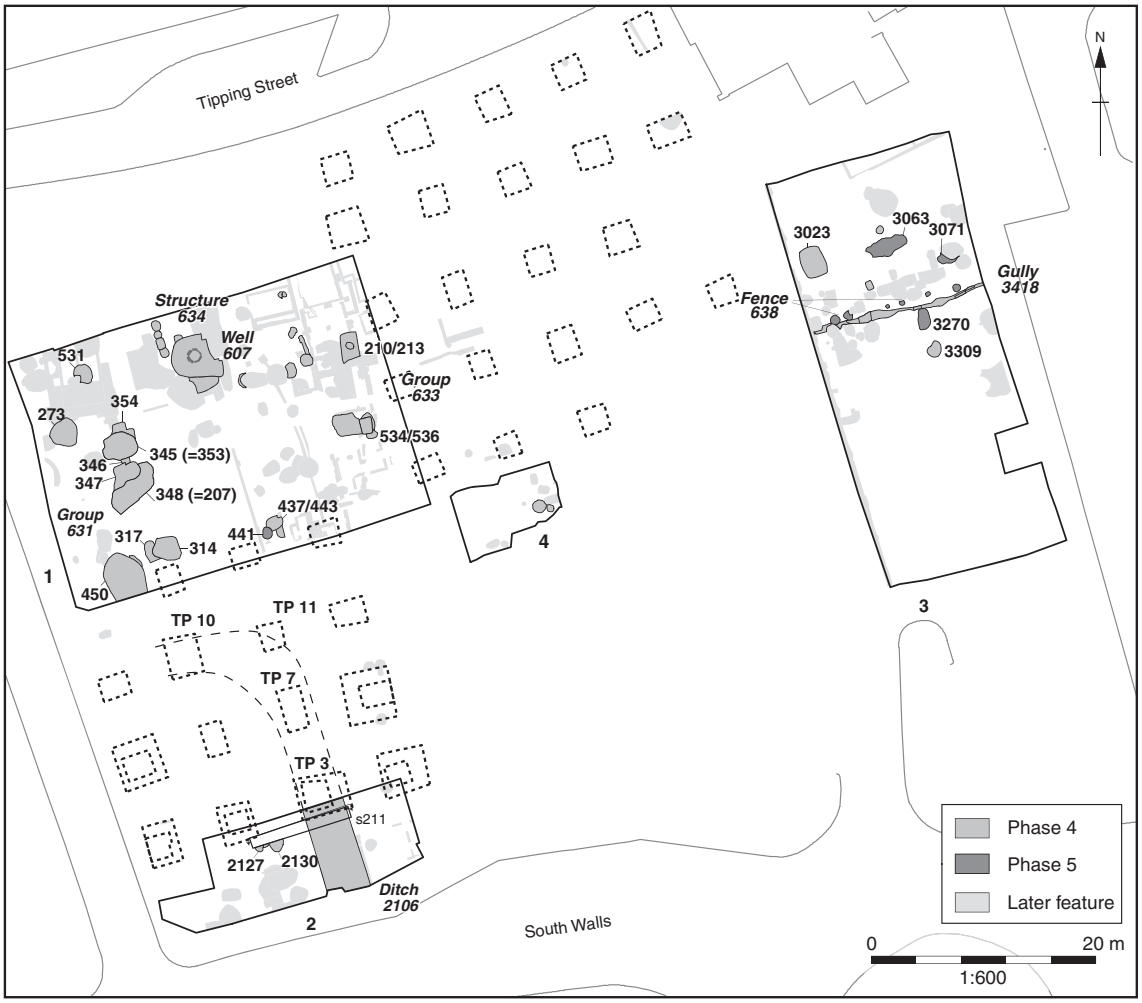


Fig 24 Features of Phases 4 and 5, 13th to mid 14th century and late 14th to 16th century



Fig. 25 View looking N of ditch 2106

wall of the structure. The only possible internal feature was a large rectangular posthole (488) that contained a flat stone that may have acted as a post-pad. It could have formed part of an internal structure surrounding the well. Postholes 561 and 563 were cut by posthole 567, which may result from the replacement of a post here. None of the postholes, apart from 561 which contained large packing stones, showed any evidence for the positioning of the post, suggesting that they had all been deliberately removed. Several of the postholes contained 13th- to 14th-century pottery (287,

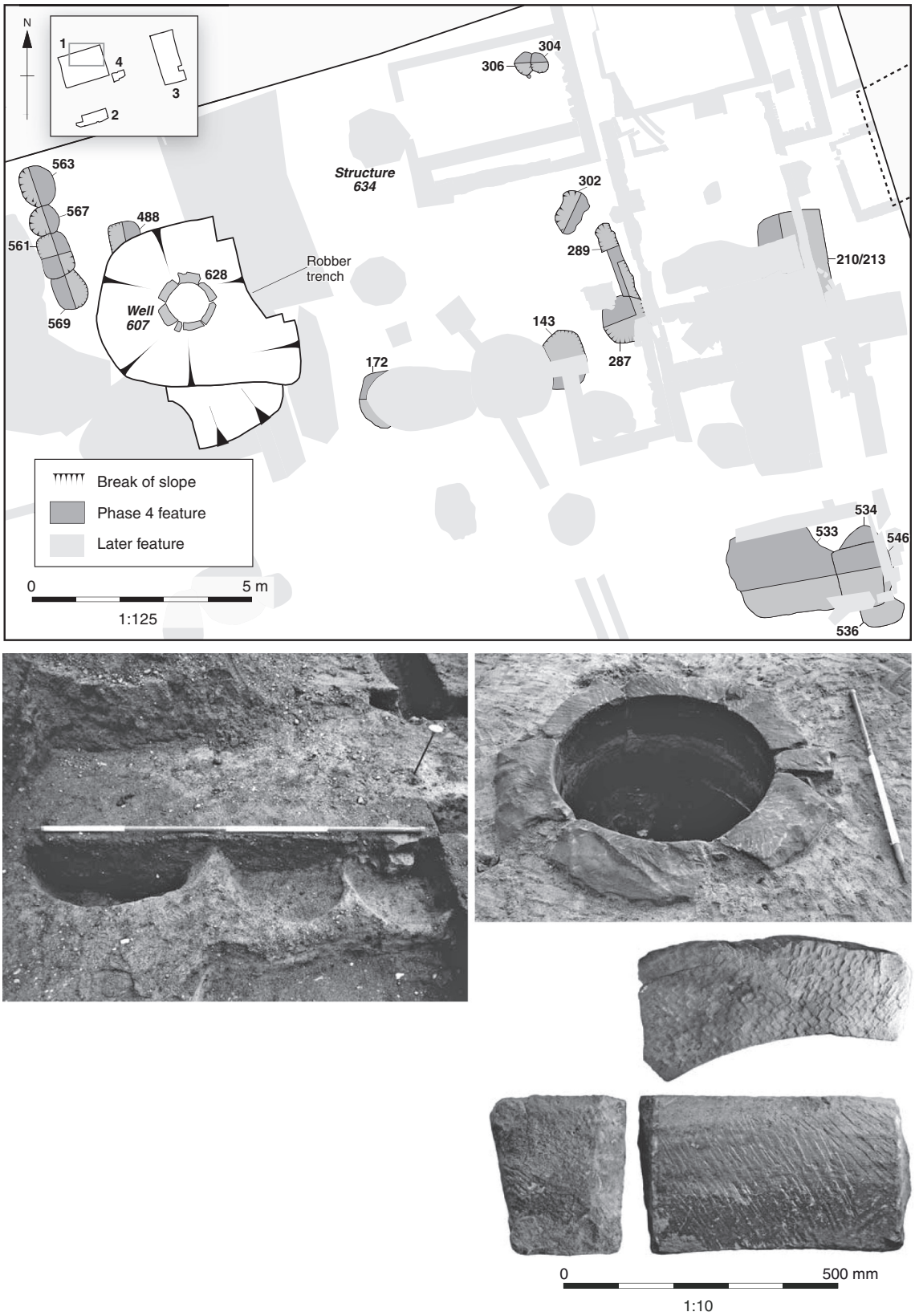


Fig. 26 Area 1, plan of structure 634; (*bottom left*) view looking E of the west wall of structure 634; (*bottom right*) view of well 607; stone ST03 from the well lining showing tooling marks

488, 561), whilst postholes 143 and 172 produced fragments of medieval tile, materials presumably deposited after the posts had been removed.

Well 607 (Fig. 26, bottom right) had been robbed of its stone lining and only its lowest course had survived. The surviving stones were locally sourced New Red Sandstone, shaped into a curve for use in the well with an ashlar-like internal face; parallel diagonal tooling marks probably made with a chisel of approximately 10mm width were clearly visible on several faces. The well was built freestanding within a vertical shaft 1.46m in diameter, the gap between the edge of the shaft and the lining being packed with gravel. The internal diameter of the well was 0.92m and its depth, as measured to the base of the lining, was *c*. 2.1m. Only about 0.30m of its basal fills survived, comprising loose sands containing dumps of rubbish that were presumably deposited soon after the well had ceased to be used. This included a considerable quantity of sherds from glazed jugs of Midlands White ware dating to the 13th to 14th century, along with some animal bone and frog remains.

Pits

As in Phase 3, most pits were concentrated within Area 1 (Fig. 24) and represent a continuation of the earlier activity. The pits form two main groups (631 and 633), each possibly representing activity within separate properties fronting Tipping Street. Given the complexity of the pits within Group 631 located at the western end of Trench 3, some may have originated in Phase 3 but were finally levelled in this phase.

Group 631 included several large, irregularly shaped pits, probably sand/gravel quarries. These were cut in places where there was no evidence for previous pits, which supports the suggestion that they had been dug to extract sand and gravel. It is notable that the pits did not encroach into the area of Phase 3 structure 630, which suggests that there may still have been a standing structure here. The largest pit (450=320) was partially exposed on the south side of Area 1; it was 1.18m deep with an irregular base, with possibly a step on its north side. Pit 207/348 was of a similar size but deeper at 1.58m and probably represented an extension to the area previously quarried, located immediately to its south (see Phase 3 pits 206 and 310). The rather irregular nature of its north side is possibly the result of its systematic enlargement northwards, and the northernmost pit (345/353) probably represents the latest in this sequence of quarries. This pit measured 3.1m by 2.4m and 1.14m in depth, and was filled at the same time as shallower pit 354 that probably represented a step on its northern side. A similar step may have existed on the north side of pit 207/348, represented by pit 346. Amorphous pit 273, which measured at least 1.05m in depth, had highly irregular sides that suggest that it was originally also a quarry. The lower fills of the pits comprised predominantly re-deposited natural or slumped topsoil that presumably accumulated as the sand or gravel was being extracted, and were generally devoid of finds. The only finds from the earlier fills came from pits 207 and 353 where a small number of Midlands White ware sherds were found, in association with sherds of iron-rich sandy ware. The upper levels of the pits comprised darker fills of sandy silt containing relatively small quantities of refuse and were deposited after the pits ceased to be quarries. Most of the animal bone was recovered from the upper fill of northernmost pit (531), which also contained a group of extremely over-fired Midlands White wares/iron-poor wares.

Group 633 comprises pits located to the east of Structure 634. The largest, rectangular pit 213, measured at least 2.8m by 1.50m with straight vertical sides and a flat base, and was 0.74m deep. It had been rapidly filled with two thick deposits of mid-dark grey-brown silty sand, the lack of weathered sand at its base suggesting either that it did not remain open for any significant time or that its sides had originally been lined. It contained relatively little rubbish, though abundant vetch and some rye were noted during the assessment of samples from its lower fill and a quantity of sherds from iron-rich and Midlands White ware were found in its upper fill. A small ovoid rubbish pit (210), 1.3m deep, was later cut into this pit; it contained similar pottery and some animal bone, including a bone from a bantam. A second similar pit (536) was found some 7m to its south and contained organic-rich silt at its base and similar pottery.

The only other pits of note were pit 437, located to the rear of Structure 634 in Area 1 and pit 3023 found towards the north of Area 3. Pit 3023 was rectangular, measuring 2.75 by 2.10m and, despite its relatively shallow depth of 0.66m, had a basal fill described as waterlogged dark grey sandy silt containing leather off-cuts. Also present was a fair quantity of animal bone and sherds of iron-rich ware including part of a large glazed jug or pitcher and single sherd of green-glazed Midlands white ware. The assessment of a sample from this fill noted frequent amorphous concretions, but no

mineralised remains were identifiable. The animal remains included several horncores. This evidence would be consistent with some small-scale leather preparation and working in the vicinity. Small oval pit 437 was not bottomed at a depth of 0.80m but contained a smithing hearth bottom together with fragments from a Midlands White ware jug.

PHASE 5 **(late 14th to 16th century)** (Fig 24)

This phase saw a dramatic reduction in the level of identifiable activity over most of the site; all but one of the features datable to this phase were found within the northern part of Area 3. Here, boundary gully 3418 (see Phase 4 above) was replaced to its immediate north by posthole alignment 638 that probably represented a fence. It was composed of circular postholes 0.35–0.80m in diameter and 0.13–0.44m in depth. A sherd of late medieval Midlands Orange ware was found in posthole 3166 and a sherd of late medieval Purple ware was found within adjacent posthole 3144. To the north of this possible fence were two shallow rubbish pits (3063 and 3071) each containing small assemblages of late medieval pottery and large fragments of ceramic roofing tile. A third pit (3270), the deepest at 0.40m, was located immediately to the south of the fence and contained a similar assemblage of finds. The only other feature, shallow pit 441, was found on the southern side of Area 1 and represented the latest in a small group of intercutting pits. It contained sherds from a late medieval Orange ware jar and pan.

PHASE 6 **(17th to mid 18th century)** (Fig. 27)

This phase saw a marked resurgence of activity across the whole of the site, represented by the digging of pits in the backyards of properties. The pits were, on the whole, significantly smaller and shallower than those from the medieval phases, and given their shallow depths some were possibly associated with horticultural activity. These groups are each summarised according to the area of the site in which they were found.

AREA 1

Group 639 comprised seven pits in two clusters along the western edge of Area 1 and included at least three rubbish pits (158/266, 163, and 421). The rubbish pits were sub-circular, measuring 1.7–2.1m across and varying in depth from 0.72–1.24m. Most can be dated to the mid to late 17th century by the pottery contained within them. The other pits were shallow and contained smaller amounts of refuse and could represent more transient rubbish disposal.

Group 640 consists of a scattered group of 16 pits; most were fairly small and less than 0.70m deep. However, those to the north (173, 461, 505, and 555), were noticeably larger and deeper, the largest (505 and 555) possibly originating as sand/gravel quarries. Most contained reasonable quantities of domestic refuse and can be closely dated by the pottery found within them to around the mid to late 17th century. Some (156, 173, 356, 365, 455, and 501) also contained quantities of both medieval roofing tile and post-medieval brick/roofing tile, suggesting debris derived from modifications or rebuilding of structures that were presumably located further north towards the street frontage. The assemblage from pit 455, in the area later occupied by the Turk's Head Inn, included a worn and decorated relief glazed tile of medieval date and a post-medieval malting floor tile.

AREA 2

The pits within Group 644 were located along the southern side of Area 2, adjacent to South Walls. They comprised fairly small and largely circular shallow pits, two of which contained cessy deposits (2084 and 2135). Three of the pits contained mid to late 17th-century pottery and a large quantity of roofing tiles was found in pit 2002.

AREA 3

Group 643 comprised up to 18 shallow pits that clustered against the northern side of possible boundary fence 638 (see Phase 5 above), suggesting that the boundary still existed at this time. Most of the pits were small and shallow, being only 0.3m or considerably less in depth, and tended to be filled with dark grey silty sands similar in nature to the garden soils that overlay them, suggesting some contemporaneity. They included a line of three rectangular pits (3051, 3280, and 3260), measuring no more than 0.11m in depth, that ran parallel to, and less than 1m to the north

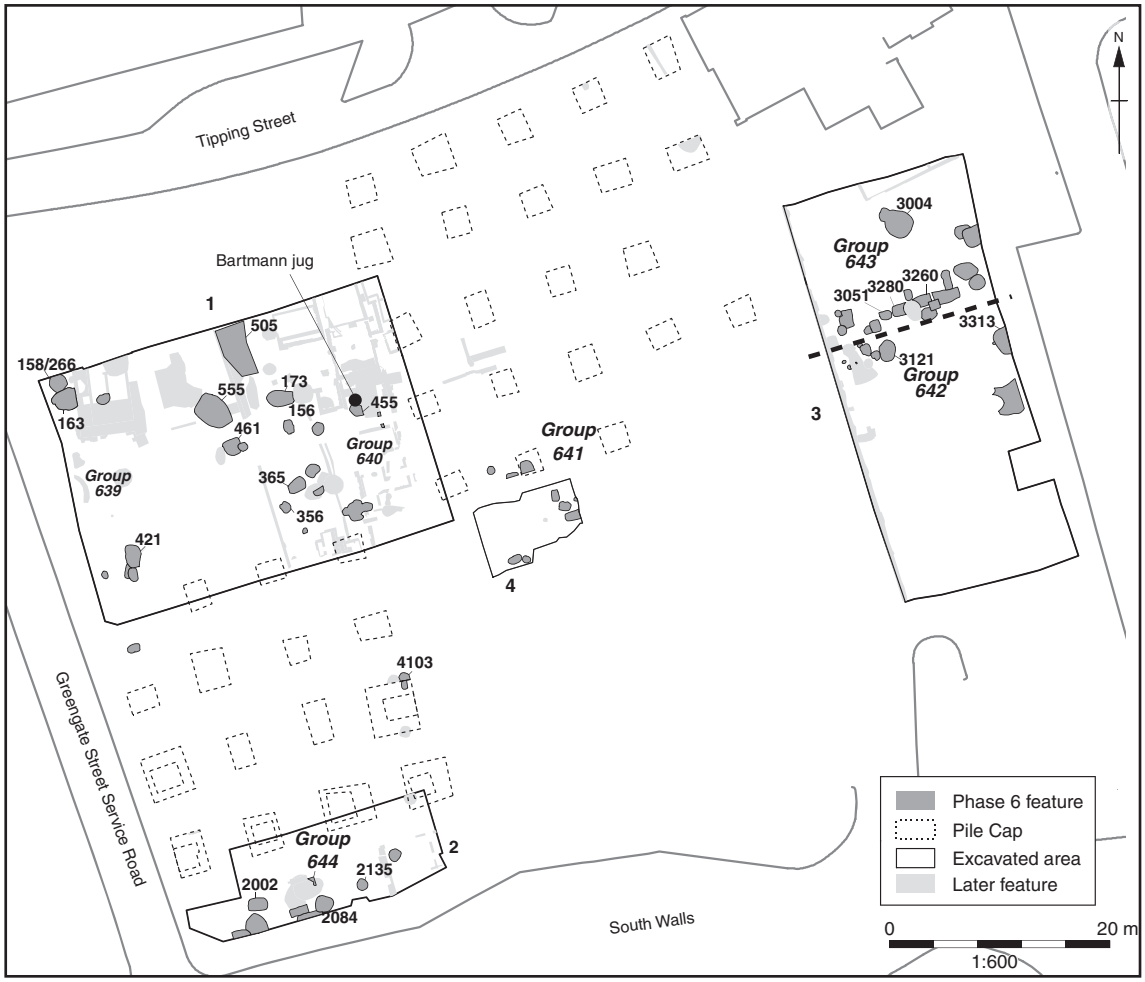


Fig. 27 Features of Phase 6, 17th to mid 18th century

of, the earlier fence. It is possible that these may represent the base of bedding areas for horticultural use. A number of adjacent pits, given the lack of rubbish within them, might possibly have been planting pits. The only features that were obviously used for the disposal of rubbish were pit 3002 (seen in section in the north edge of the trench) and pit 3004, both of which were located closer to the street frontage. Pit 3002 contained a large quantity of pottery and glass including white salt-glazed stoneware and fragments from glass pharmaceutical bottles that suggest a mid 18th-century date. Circular pit 3004 measured 2.4m in diameter and 0.60m deep and represented the deepest pit from Group 643. Its size suggests that it may have been dug for the extraction of sand before being filled with rubbish that included late 17th-century pottery and a significant quantity of roofing tile fragments.

Group 642 was located to the south of boundary fence 638 and included several mostly shallow pits; of these, pit 3313 contained mid to late 18th-century pottery and discarded medieval roof tiles, and pit 3121 may have been a cess pit.

Watching brief

Most features of this phase were found in an area located immediately adjacent to the SE corner of Area 1 (Pit Group 641), which comprised a scattered cluster of nine small shallow pits, some possibly formed by bioturbation. A small amount of late 17th- or early 18th-century pottery was recovered.

PHASE 7 **(later 18th century and later)** (Figs 28–30)

Garden Soils

Where 19th-century or later features did not remove it, all Phase 6 and earlier features on the site were sealed by a thick accumulation of dark grey garden-type soils, that in places survived to over 0.70m in thickness. This reflects the cartographic evidence that suggests that by the early 19th century much of the site behind the street frontages had been set aside as gardens. These deposits were largely removed by machine and most of the material recovered from them can be dated to the 19th century or later, presumably having been deposited during the final working of the soils. However, it is likely that earlier soils and layers had been subject to this reworking, since over most of the site this 19th-century soil directly overlay natural. Where it was protected by overlying structures of late 18th- or early 19th-century date in Area 1, this soil produced earlier pottery dating from the mid to late 17th century.

Structural remains (Fig. 28)

A large number of structural remains including buildings, outhouses, and boundary walls were recorded across the site, particularly in Area 1 where the remains of the Turk's Head Inn were investigated in more detail. Much of this evidence can be closely correlated with early 19th-century and later building plots as depicted on contemporary maps of the area, the boundaries of which are shown to extend from Tipping Street to South Walls. The remains of the Turk's Head Inn are described below together with a brief description of the other remains. Those on the Tipping Street frontage are described by the plot number, following the 1959 Ordnance Survey map.

Nos 22 and 23 Tipping Street

Nos 22 and 23 comprised a large single plot (The Vicarage) with a house on the frontage and an extensive ornamental garden to the rear stretching back to South Walls. The Vicarage was formed by the amalgamation of two houses here that were purchased for the purpose in 1882, although the vicar apparently did not move in until the early 20th century. A modern concrete-founded redbrick wall (64) that extended across the site to the South Walls frontage wall marked the eastern boundary of these plots and corresponds with the boundary shown on the Ordnance Survey maps. Brick, tile, and concrete footings of a rectangular modern structure and an adjacent raised terrace found in Area 1 probably represent an extension to the house, and a structure here is first depicted on the 1959 Ordnance Survey map. Several late 18th- or early 19th-century pits (459, 612, 2043) show that rubbish continued to be buried within the garden.

Nos 20 and 21 Tipping Street

Several brick-built structures together with a number of soakaways and connecting drains were recorded. The northernmost structure corresponded to the rear of the frontage structure depicted on the 1881 Ordnance Survey map, and a cellared structure (76) located within the garden, feasibly an icehouse, and a third structure, possibly an outhouse or a later extension of the frontage structure, are also shown on this map. The possible outhouse was built over a rubbish pit (270) containing pottery datable to the period *c*. 1800–10.

No. 19 Tipping Street (The Turks Head Inn) (Figs 28–30)

The Turk's Head Inn is first depicted on John Wood's town plan of 1835 (where it is labelled as '42') which clearly shows that its buildings did not extend southwards onto the excavated area at this time. However, by the time of the 1881 Ordnance Survey map the inn had been extended southwards across most of Area 1, and the structures shown on the map correspond closely to the remains found in the excavation. As with the remains from the other plots, they were constructed over thick garden soils containing 17th-century or later material, implying that the area previously remained open. Apparently contained within this soil was a complete Bartmann (or Bellarmine) 'witch bottle' jug of mid to late 17th-century date (Fig. 29). It was found upright and undamaged, suggesting that it had been deliberately placed within a pit, though no such feature was discernible in the ubiquitous garden soil. No seal/stopper was found on the bottle and analysis of the soil contained within it revealed highly vitrified charcoal, a resinous black fragment that may be anthracite/ clinker or possibly bitumen, together with a pebble. The bottle was found immediately adjacent to the western boundary wall of the plot and predated its construction (Fig 30). In its earliest form Wall 6 survived

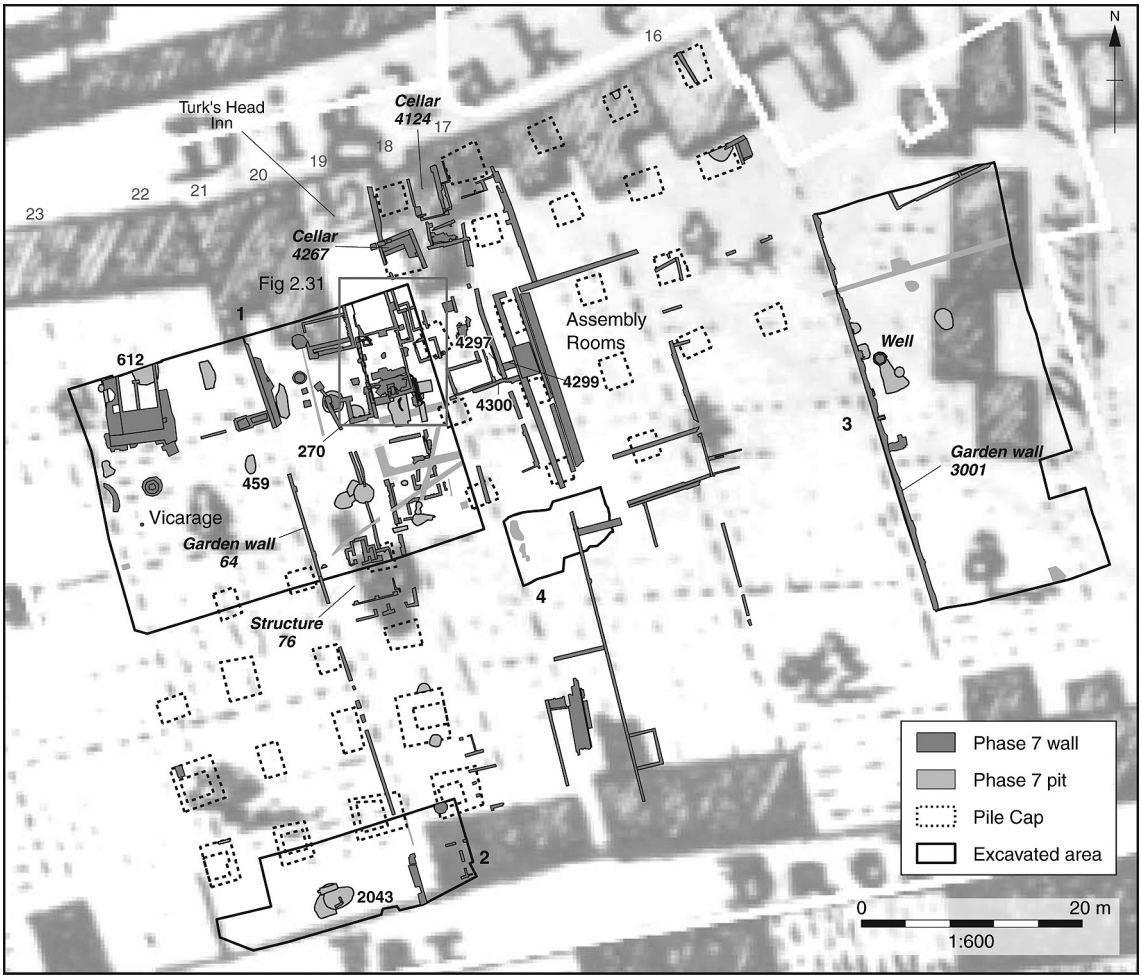


Fig. 28 Features of Phase 7, late 18th century and later compared with Wood's map of 1835

as a single course of unmortared sandstone blocks before being rebuilt in brick. Contemporary with the earlier wall, a second sandstone wall (120) of similar construction ran perpendicular to it across the width of the plot, and was possibly the back wall of a structure that utilised boundary wall 6, though no other elements survived. Located immediately to its south and built against the boundary wall was the base of small rectangular stone-built tank (104) that had been levelled with greenish brown silt that contained late 18th- or early 19th-century pottery.

Subsequently a new structure was built (Fig. 30), with its rear wall constructed over the infilled tank. Inserted at its southern end was an installation of five brick-built chambers (8) arranged around a central paved area. Each chamber was rectangular, measuring internally 0.7–0.8 in length and 0.38m in width, with a stone slab base that sloped away from the central area. They presumably had a non-domestic function, presumably connected with brewing given their location within the boundary of the inn. They could have represented flues providing ventilation below a suspended floor, perhaps associated with malting of barley or the drying of hops. A rectangular timber-lined cesspit (151) located immediately against the east wall of the structure contained an assemblage of hops found in association with early to mid 19th-century pottery, which suggests that an oast house (for the drying of hops) was located close by. The installation seems to have gone out of use by the late 19th or early 20th century, after which the building was extended further south and a cellar (5) was inserted into its northern section (within Area 1). A second cellar of similar date was found towards the street frontage during the watching brief.

No. 18 (Fig. 28)

A narrow plot measuring just *c*. 4.5m in width contained several brick-built structures of probable 19th-century or later date that were revealed during the watching brief. These included a vaulted

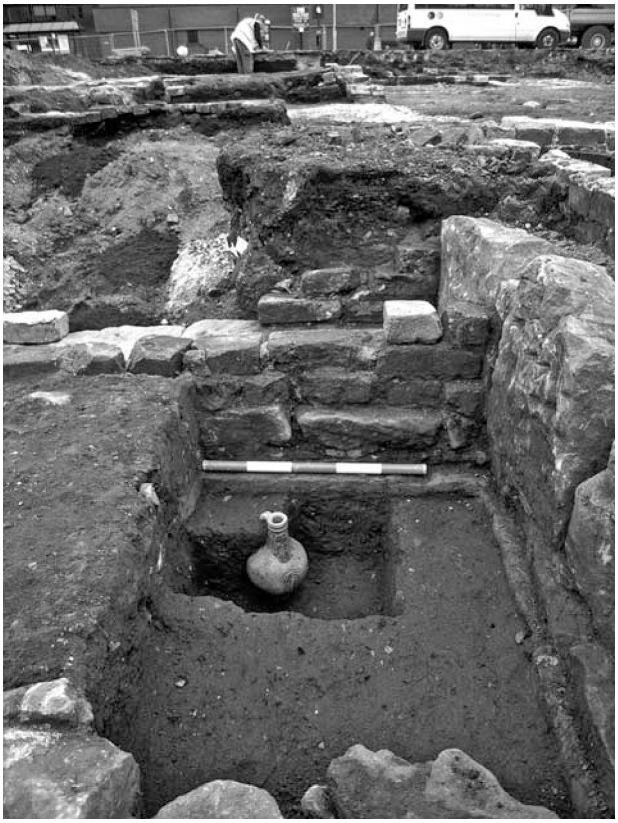


Fig. 29 Area 1, view looking W of the Bartmann 'witch bottle' jug found in garden soils to the rear of No. 19, the *Turk's Head*

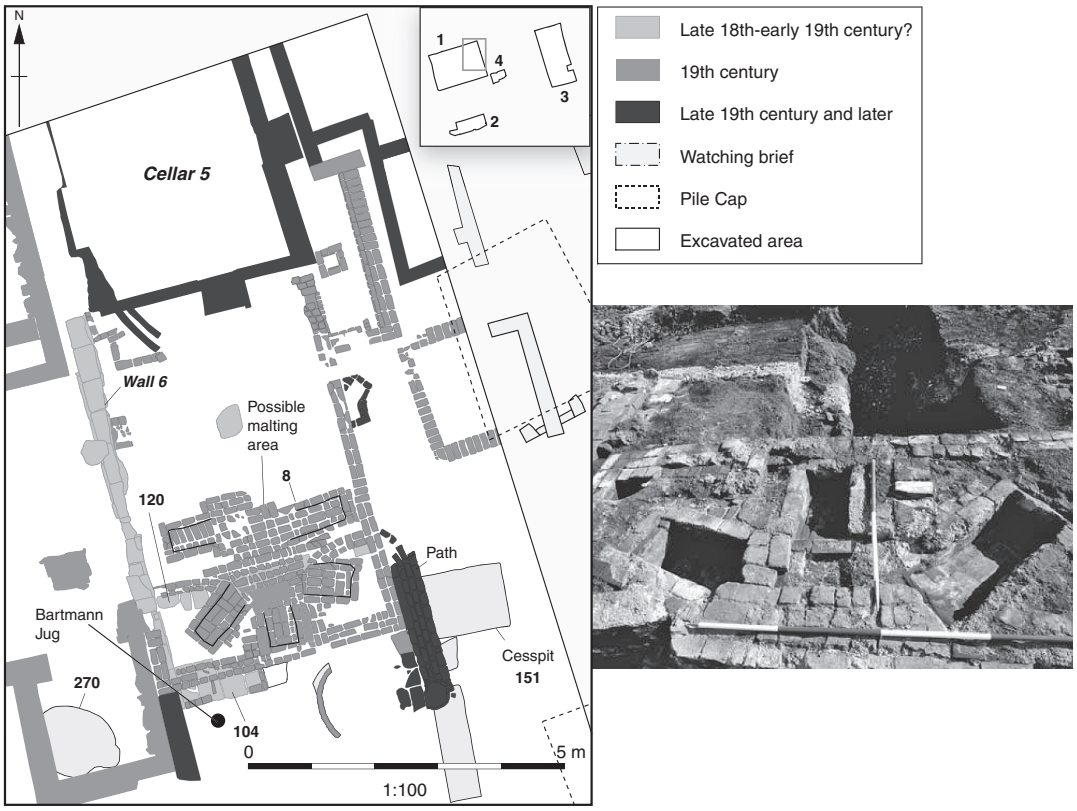


Fig. 30 Area 1, detail plan of structures to the rear of No. 19, the *Turk's Head*; view looking S showing three of the brick-built chambers or flues of the possible malting or brewing installation

cellar (4124) that was probably attached to the main building on the frontage, several outbuildings to its rear, and plot boundary walls.

Nos 16 and 17 (Fig. 28)

This plot largely comprised the brick foundations of the Assembly Rooms that were revealed during the watching brief. The building was set back from Tipping Street and corresponds with the structure as depicted on the 1881 Ordnance Survey map and still extant on the 1977–78 map. To its rear were further remains of a large structure that corresponds to a building depicted on the1881 map, possibly a structure to the rear of a property fronting onto South Walls. A substantially founded wall (3001) marked the eastern boundary of plot 16; it probably originally extended as far as the South Walls frontage. It was constructed on a series of relieving arches in order to support the foundations over the soft underlying deposits. It is depicted on the 1835 and later maps as a boundary wall, the nature of its foundations suggesting it represented a garden wall of some height.

THE POTTERY *by Jonathan Goodwin*

STAFFORD-TYPE WARES

Introduction

The full analysis of Stafford-type wares recovered from Tipping Street, Stafford, follows an earlier assessment of all pottery finds from the site (Goodwin 2011). This process earmarked the Stafford-type wares for further study, due to their potential to increase understanding of the town's late Saxon pottery industry. The Stafford-type ware assemblage was amassed from four separate areas on site and comprises a total of 7,460 sherds (132, 978g), of which 6,869 (125,791g) were recovered from Saxon (phase 2) deposits, and the rest (591 sherds, 7,187g) found in earlier or later contexts. All sherds were examined macroscopically and quantified by sherd count and weight. EVEs (estimated vessel equivalents) were also calculated for vessel forms within the assemblage; they were primarily determined using rim percentages (100% = 1 EVE), but in one instance (a pedestal fragment from 3206) a base EVE was calculated. A full catalogue of the Stafford-type wares, and quantification by EVEs, phase and context is available in archive.

Nature of the assemblage

The assemblage represents production waste associated with the operation of at least three kilns excavated on site. Despite the close proximity of the Tipping Street excavation areas, there is a marked variation in the quality and finish of wares, particularly between Areas 2, 3, and 4. This suggests that each area group is indicative of the output of individual kilns, of which at least two were fired in succession. All groups are populated by wares of an identical fabric in a very limited range of forms. There are no apparent signs (such as sooting) of any vessels having been used in a domestic context.

Evidence of severe or catastrophic firing failure within the assemblage is small. Faults such as warping, fire-cracking, or spalling are discernible on approximately 1% of sherds within the assemblage (most of which are jars). There is considerable variation in fabric colour within the assemblage, with many sherds displaying full or partial reduction. It is uncertain, however, if this is a defining characteristic of spoiled vessels (see Fabric, below). Small numbers of obvious wasters have been recorded on other late Saxon pottery production sites: only 6% of sherds recovered from a shelly-ware kiln excavated at Silver Street, Lincoln, were spalled, warped, or cracked, whereas no discernible wasters featured within groups associated with two other kilns on the same site (Miles *et al*. 1989, 205). At the Kilnyard site in Thetford, Norfolk, few wasted sherds (less than 3%) featured in groups recovered directly from kilns, although misfired wares were more common in pit fills from the site. This discrepancy was thought to be evidential of the regular removal and disposal of wasters from the kilns; sherds found within kiln and stokehole fills did not, therefore, represent *in situ* failed loads, but a gradual build-up of debris that was not cleared out after each firing (Dallas 1993, 67). The number of vessels within these groups was found to be high: the sherd total from each kiln was approximately equal to the estimated number of vessels and there were few complete pots. There is no obvious replication of these traits amongst the Tipping Street assemblages: material recovered from contexts seemingly related to the use (rather than the construction or abandonment) of kilns 3408

(3195, 3203), 3401 (3201), and 4287 (4304, 4306, 4338, 4343, 4346 and 4319) includes a greater concentration of misfired sherds (*c*. 2.3% to *c*. 4.5%) than from waste pits such as 2052 (*c*. 0.3% of the combined sherd count for all fills). In addition, the estimated vessel count is comparatively low within all Tipping Street contexts, although a wider range of jar and, to a lesser degree, bowl rim sizes feature within the fills of 2052 than in any of the kilns.

Fabric, production, and finish

Fabric

Although the quality of Stafford-type wares varies throughout the assemblage, all exhibit the same fine, iron-rich fabric tempered by well-sorted quartz fragments. They are typically hard fired and dense, although softer-fired, 'soapy' examples are also present. Fabric colour varies considerably, from oxidised orange/red to a reduced dark grey. Many largely oxidised sherds display a grey reduced surface or core. Similarly, reduced wares can be found with oxidised orange cores. Others feature alternating bands of oxidised and reduced fabric on the interior of the vessel. Approximately 18% of sherds are entirely grey with no hint of oxidization, but it is not clear if these wares are the result of deliberate reduction firing. The presence of similar wares has been noted in other Stafford-type ware assemblages; 20% of sherds from production waste deposits previously excavated at Tipping Street (ST17 and ST32) were grey, but only 7% of those within a domestic group from St Mary's Grove (ST29). Other groups found outside Staffordshire, however, including a 395-sherd assemblage from Hereford, contained no grey wares (Ford 1998–9, 34). Such differences in colour may not be a characteristic of Stafford-type wares in general, but simply a trait of those from waster groups.

Production techniques

Although the method of production is not always discernible, it is probable that a combination of techniques was used in the manufacture of Stafford-type ware. Both Klemperer (Ford 1998–9, 20) and Carver (2010, 79) suggest that most vessels were hand-formed from a combination of clay coils and discs and finished on a wheel. It is possible, however, that wheel-throwing played a more significant role: a preliminary reassessment of selected Stafford-type wares from Tipping Street ST32 and St. Mary's Grove ST29 has indicated that the majority of vessels could have been wheel-made, with some degree of hand-forming, principally on the bases (D. Klemperer unpublished research notes, 2002). This echoes observations made on the manufacture of possible Stafford-type wares from Chester (Rutter 1985, 42), although the characteristics of hand-building and wheel-finishing have also been noted (Carrington 1975, 3).

The Area 3 sherds represent the most finely-potted examples from the 2009 Tipping Street assemblage, but betray few conspicuous signs of manufacture. Given the quality of this material, bodies and rims may well have been thrown, perhaps even manufactured as a single unit. Others display evidence of piece forming: a number of jar sherds, notably examples from 2031 and 2032, demonstrate a slight thickening and somewhat angular profile just below the shoulder which is indicative of an overlapping join between body and rim. Signs of hand-working are apparent on the bodies of comparatively coarse vessels from Areas 2 and 4, although the quality of finish is variable. Some vessels have an even, well-smoothed interior surface, whilst others, particularly two jar sherds from 2051, have deep horizontal and oblique grooves on the inside wall (see Fig. 35, a). Vessel exteriors also show evidence of smoothing with a wet hand or cloth, which in some examples has resulted in a slurried surface. None of the vessels from the assemblage have a burnished exterior in the manner of a jar recovered from Tipping Street in 1977 (ST17; Ford 1998–9, 21).

Rims are typically well crafted, even on coarser vessels, again suggesting either thrown or skilfully hand-formed and wheel-finished elements. Late Saxon Lincoln Kiln-type ware vessels excavated from Silver Street and Flaxengate, Lincoln, include examples with rims thought to have been shaped by simple 'formers' or ribs, perhaps fabricated from worn pottery sherds (Miles *et al*. 1989, 205). No such evidence has been encountered at Stafford, although a large bowl from Tipping Street North (ST32) has fine marks on the interior wall that may point to the use of a shaping rib (D. Klemperer unpublished research notes, 2002).

Base fragments, both flat and sagging, commonly demonstrate finger marks on the interior surface, notably at the junction with the vessel wall. Some bases show a possible overlap with the pot body, visible as a slight thickening (sometimes with finger impressions) of the exterior lower 10–20mm of the vessel. Several base sherds from 2031 are sub-circular. Knife-trimming has been carried out

on some bases, creating a sharp basal angle. This treatment has not been applied to all vessels in the assemblage; a number of bases, including examples from 2031, have a rounded exterior junction with the pot body and a generally crude finish.

Glaze

The exterior surfaces of three sherds (one example each from 2031, 2032, and 3407) have traces of a greenish-brown vitreous substance that could represent glaze. Two of the sherds are jars and feature splashes on the rim, shoulder and upper body. The third sherd is of unknown form, but has vitreous patches on the vessel body. Possible glaze has previously been recorded on only a handful of Stafford-type wares, including several sherds from previous excavations at Tipping Street (ST32). Some of the ST32 sherds, however, featured a vitreous coating over breaks in the vessel body, suggesting that the substance might have found its way onto the pots after disposal, perhaps as a waste product of nearby industrial activity (Ford 1998–9, 28). This interpretation is perhaps supported by a further 54 sherds from 2051, all of which feature a yellowish-brown glassy material that is present over exterior surfaces and breaks.

Dating evidence for Stafford-type ware production

A summary of the dating evidence for Stafford-type ware production is offered by Klemperer (Ford 1998–9, 18), with a more detailed review provided by Griffiths and Linford (below). In brief, prior to the 2009 project the most robust evidence for late Saxon pottery production in Stafford derived from radiocarbon and archaeomagnetic dates derived from three kilns excavated on Tipping Street, one in 1977 (ST17) and two in 1982 (ST32 F238 and F246, which produced the archaeomagnetic date). These generated mid 9th- to 10th-century dates. Another kiln at Salter Street in Stafford produced an archaeomagnetic date of 1000–1080 (Ford 1998–9, 18). Based on these results, the production of Stafford-type ware has for some years been attributed to the 9th to 11th centuries, and its origins tied to the founding of Stafford *burh* in 913 (Carver 2010, 139). However, the radiocarbon and archaeomagnetic dating of samples taken from kilns 3408, 3401, and 4287 during the 2009 Tipping Street excavations (which were subject to Bayesian analysis) indicate that activity on the site began during the period 790–880, well before the founding of Stafford *burh* in 913, and ended at some point between 930 and 1020 (Griffiths *et al*., below).

Vessel forms

A total of 124.70 EVEs are present in the Stafford-type ware assemblage (from all contexts and phases), 95% of which are jars. Bowls (4.6%) and pedestalled hollow wares (0.4%) are the only other discernible forms. The overall ratio of jars to bowls is 20:1, significantly higher than that calculated for any other collection of Stafford-type wares. Material found at Tipping Street during the late 1970s and 1980s (ST17 and ST32) had ratios of 2:1 and 3:1; wares from St Mary's Grove (ST29) produced a 2:1 ratio; and a 6:1 was recorded for an assemblage of 192 sherds from Shrewsbury (Ford 1998–9, 34). We should be cautious, however, in using these figures to assess the output of the Tipping Street kilns: the significant bias towards jars in the 2009 assemblage could be the result of a higher failure rate for this form than others produced on site. Pedestalled and/or stemmed forms, on the other hand, do not appear to have been a major product of the Stafford-type ware industry: in addition to those from the 2009 Tipping Street excavations, only four examples of such vessels have been recognised from other Stafford groups (Tipping Street ST32 and ST33, and St Mary's Grove ST29) (Ford 1998–9, 24).

Jars – 118.43 rim EVEs (Fig. 31)

Jar sizes were determined by rim size and generally fit into the sizes noted by Ford (1998–9, 21): small, with diameters up to 110mm; medium with rims of 110mm–160mm; and large with diameters in excess of 160mm but smaller than 450mm. Medium jars, particularly those of 120mm (18.1% of all jar EVEs), 130mm (25%), and 140mm (29.9%) rim diameters, are most common from Tipping Street. Smaller vessels with rims of 80mm–110mm diameter are represented by a total of 11.78 EVEs (9.9% of all jar EVEs), whereas larger vessels with rims of 170mm–290mm account for only 0.62 of jar EVEs (0.5%) in the assemblage.

Rims are predominantly everted, although some variation to the basic form is evident (Figs 31and 35, b). A slightly more upright, yet nonetheless everted, profile is characteristic of Area 4 jar rims, particularly those from (4319) and (4343) (Fig. 31.6). Others are flattened, thickened and/or squared

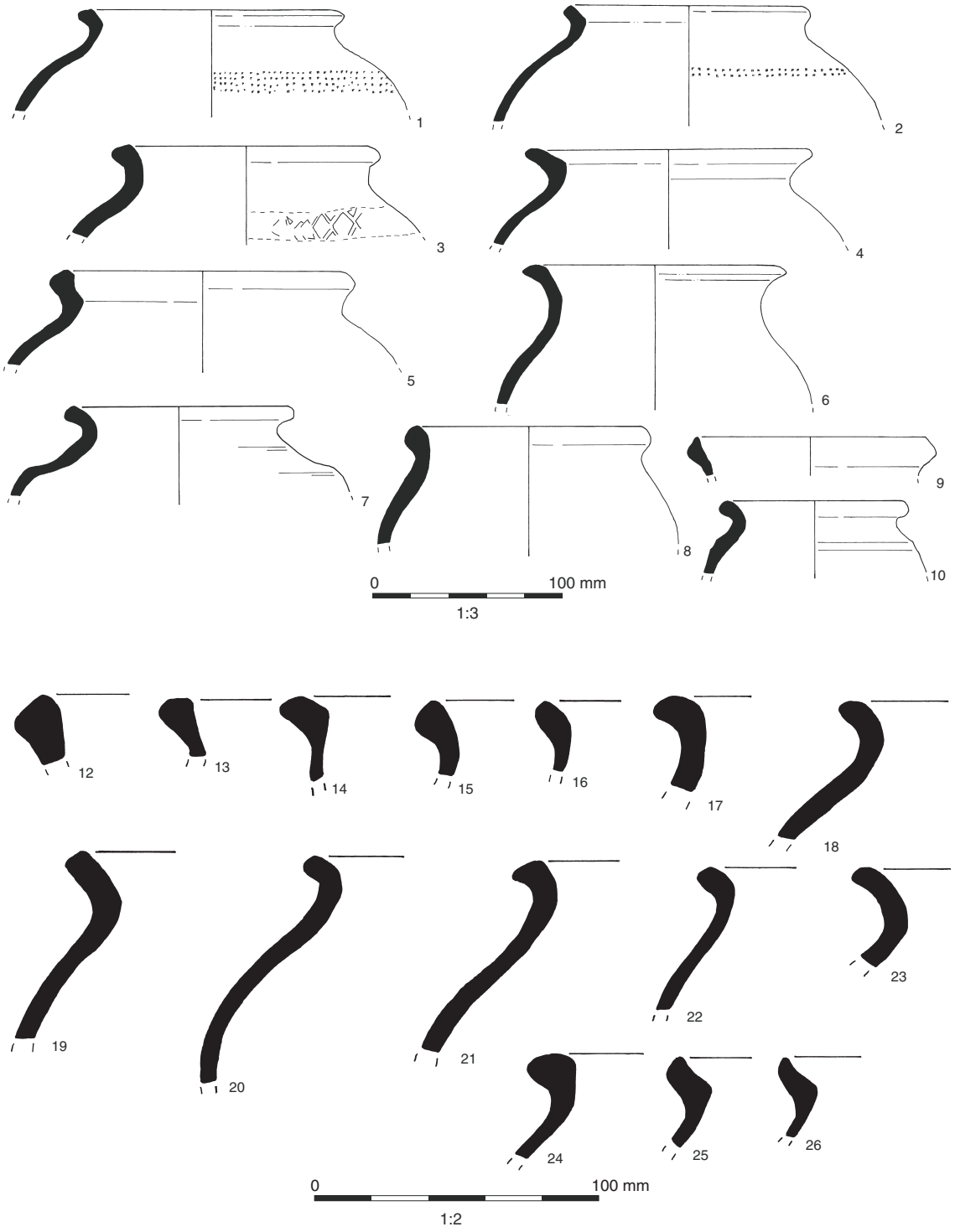


Fig. 31 Stafford-type ware: 1–10 jars; 12–26 common jar rim profiles

(Fig. 31.24), whereas some are thinned towards the outer edge (Fig. 31.21). A single example of an in-turned jar rim is present in 2101 (Fig. 31.9). Several rim sherds have slight internal thickening or concave profile on the interior that could be indicative of a lid seating (Figs 31.5, 25–26). Rim diameter seems to have no bearing on form. The few base sherds that can be definitively linked to jars are of a sagging profile, although it is possible that some jars featured flat bases. Context 2031, for example, contains the greatest concentration of jars (31.4 EVEs) in the entire assemblage, yet has very few base sherds that are sagging — just 14 sherds compared to the 126 that are flat. As the

context produced very few bowls (just 0.72 EVEs), it is likely that some of these bases originated from jars. This cannot be confirmed, however, as there are no complete profiles for flat-based jars within the assemblage.

Jars are the only vessels to feature decoration, typically rouletting (Fig. 31.1–3) and/or singular or multiple incised horizontal lines around the shoulder. Only three sherds (one from 3213 and two from 4319) have decoration on the body of the jar, in the form of single incised horizontal lines. Although not all decorated sherds can be associated with a particular rim diameter, where this relationship is discernible decoration seems to be limited to jars with rims of between 100mm and 150mm. Within this range, jars of 120mm and 140mm diameter are most likely to be decorated, followed by those with rims of 110mm and 130mm. These sherds feature square or, in one example, lozenge rouletting; none of the examples with incised horizontal lines can be related to a specific rim diameter.

Bowls – 5.72 rim EVEs (Figs 32 and 35)

Bowls appear in a wide range of rim diameters, with most (95.5% of all bowl EVEs) measuring between 100mm and 280mm. Outside this range are two examples with 290mm rim diameters (0.16% EVEs) and one of 390mm diameter (0.05% EVEs). Ford (1998–9, 23) suggests that open vessels with rims of less than 120mm diameter may be cups or goblets rather than bowls. This observation may well hold for small, cuplike vessels with 100mm–130mm diameter rims from 2093, 3213, and 3213 (Fig. 32.33–35). Bowl profiles are rounded, sloped or almost straight-sided.

Bowl rim forms display greater variety than the jars. They are often thickened and/or flattened (Fig. 32.32), sometimes squared (Fig. 32.41) and bevelled (Figs. 32.29,38, 39, and 41). Simple rounded (Fig. 32.34) and everted (e.g. Fig. 32.27 and 30) rims also feature. Slight internal flanges appear on some of the thickened and bevelled forms, including examples from 2101, 2031, and 2032, which may have served as lid seatings. One 160mm diameter everted rim with internal thickening from 3197 incorporates a projecting socket (Fig. 32.36). A small section of the rim and upper vessel wall has been removed, over which the socket has been attached. Vertical smoothing marks are visible on the exterior of the vessel where the socket has been joined to the bowl. Another rim sherd from 3198 has evidence of pinching near to a break, which may suggest the former presence of a socket. Five other socket sherds are present in contexts 2031, 2032, 2093, 3167, and 3406, with another possible fragment in 3407. None of these fragments are still attached to rims. These sockets were probably designed to accommodate a wooden handle, indicating that the vessels could have served as saucepans (Ford 1995, 38; 1998–9, 23) or skillets (Carver 2010, 92). Carver, however, also suggests that the socket may have actually been a spout (Carver 2010, 92).

Only two base sherds from 3177 can be categorically identified as belonging to bowls, both of which have a slightly sagging profile. As with the jars, however, it is likely that at least some of the bowls originally had flat bases.

Pedestalled forms – 0.55 EVEs (0.25 rim EVEs; 0.30 base EVEs) (Fig. 33)

Previous excavations at Tipping Street (ST32 and ST33) and St Mary's Grove (ST29 1607) generated five examples of small open-mouthed vessels with stems or pedestals, thought to have been used as lamps, goblets, or serving dishes (Ford 1998–9, 24; Carver 2010, 92). A pedestal base sherd from 3206 (Fig. 33.42) and a shallow bowl fragment with a 90mm-diameter everted rim from 545 (Fig. 33.43) represent similar vessels, although their precise form is unknown. A Thetford-ware vessel of comparable profile to that from 545 was found at Bircham, Norfolk, the function of which was thought to be a cup, lamp, or lid (Rogerson and Adams 1978, 39; fig. 21: 13).

Decoration (Figs 34 and 35; Table 2)

Decoration features on 195 jar sherds from Tipping Street, accounting for 2.6% of the total assemblage by sherd count. Decorated sherds from earlier Tipping Street excavations (ST17 and ST32) constituted 2% of the combined assemblages, whereas 3% of fragments recovered from St Mary's Grove (ST29) featured decoration (Ford 1998–9, 34). Unlike the 2009 Tipping Street material, these earlier assemblages also included examples of decorated bowls and, in the case of St Mary's Grove, a pedestal lamp. A band of small rouletted squares (Figs 31.1–2; 34.44), applied around the vessel shoulder, is by far the most common decorative technique in the 2009 assemblage, constituting 79.5% of decorated pieces by sherd count. These bands are typically between two and four rows thick, although two sherds from 3206 and 3227 comprise five rows. Four sherds (2.1%) from 3407 combine a band of rouletted squares with two groups of three incised horizontal lines (Fig. 34.46).

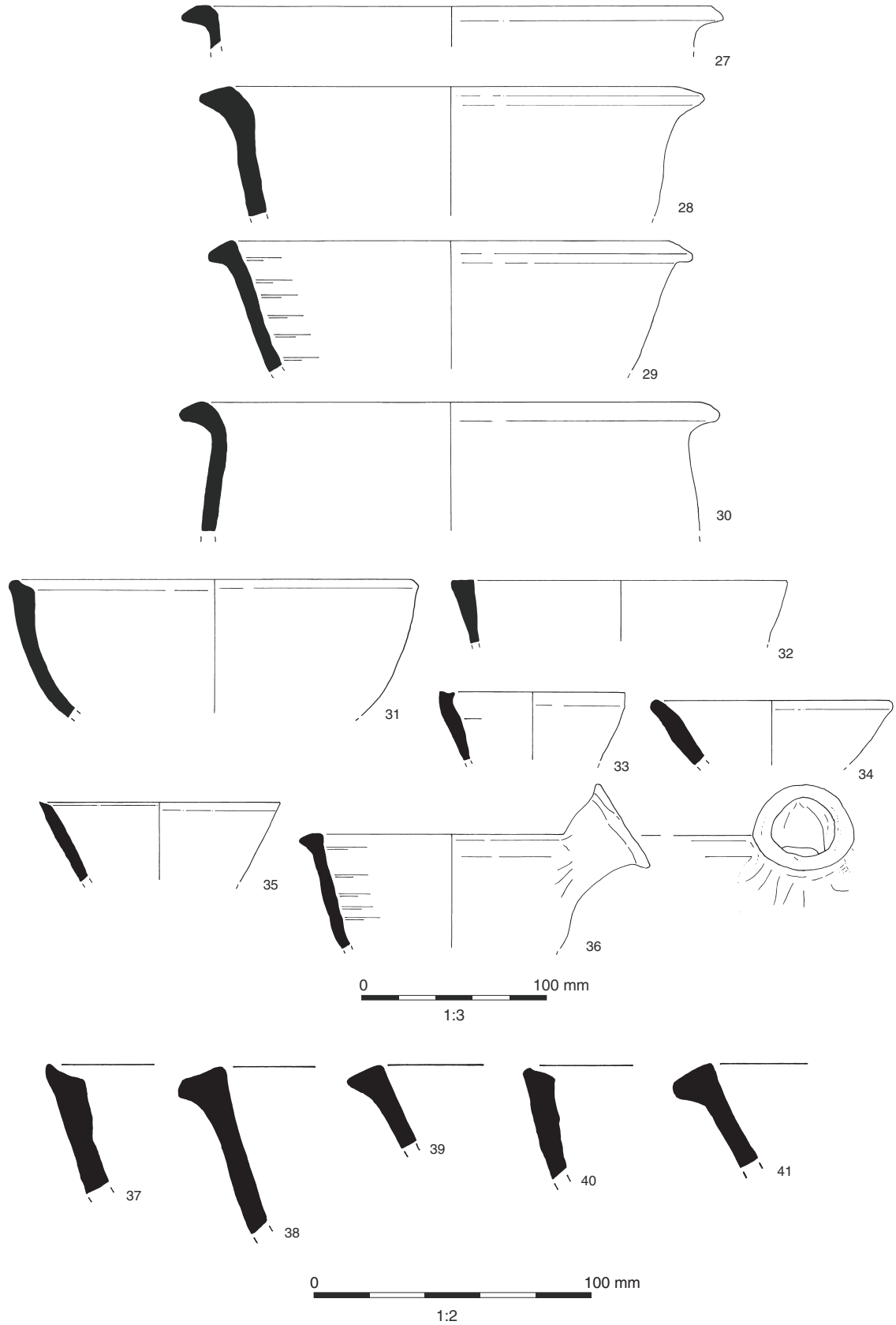


Fig. 32 Stafford-type ware: 27–32 bowls; 33–35 small bowls or cups; 36 socketed bowl; 37–41 common bowl profiles

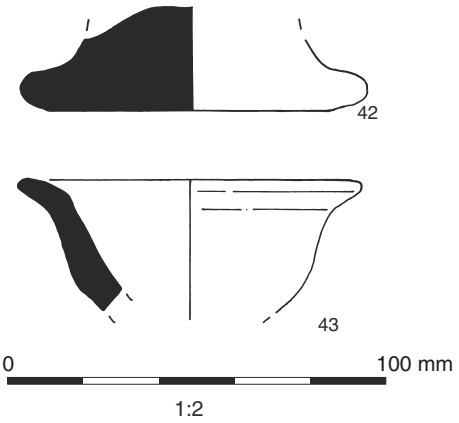


Fig. 33 Stafford-type ware pedestal base and shallow bowl

A variant of this design appears on a single sherd (0.5%) from 495, which has a band comprising two rows of rectangular rouletting (Fig. 34.45). Bands of lozenge rouletting, again applied to the shoulder, appear on 5.1% of the decorated sherds (Figs 31.3; 34.47). One example from 3167 features a frieze of lozenge rouletting within a chequered border (Fig. 34.48). Rouletted decoration, whilst not common, also features on late Saxon Thetford wares and Lincoln Kiln-type wares. Kilns 25/55 and 200 at Silver Street, Lincoln, produced 7% and 4% decorated vessels respectively, of which 68% and 79% featured rouletted designs (Miles *et al*. 1989, 212). As with Stafford-type wares, rouletting most frequently occurs on the shoulders (or occasionally rims) of Thetford and Lincoln jars or pitchers, and less frequently on bowls and dishes (Miles *et al*. 1989, 207; Dallas 1993, 148). Incised horizontal lines appear on 12.8% of decorated fragments, either singly (Fig. 34.50) or in groups of two, three (Fig. 34.49) or four. Grouped lines are confined to the vessel shoulder and/or upper body, whereas single lines can occur over the whole pot body.

Discussion

Approximately 92% of the Stafford-type wares from the 2009 Tipping Street excavation were recovered from late Saxon (phase 2) contexts. This unadulterated material provides the best overview of the Stafford-type wares from the site and, as such, is considered in more detail below. All phase 2 Stafford-type ware groups exhibit an extremely limited range of vessel types, with jars

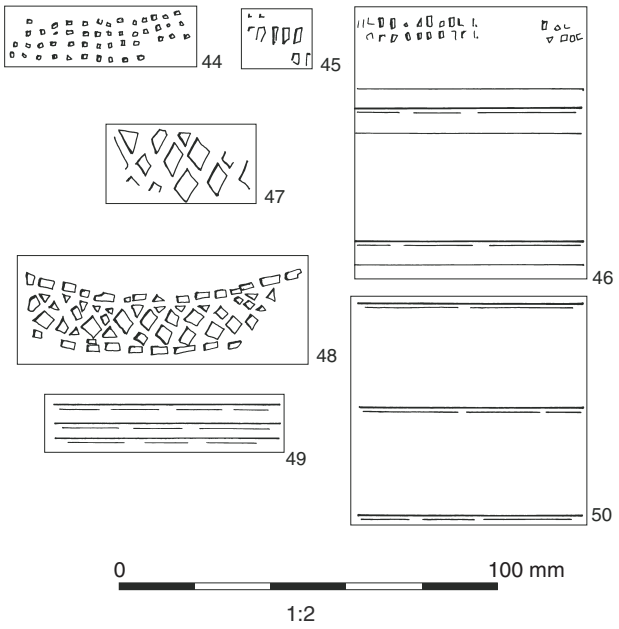


Fig. 34 Stafford-type ware typical decorations

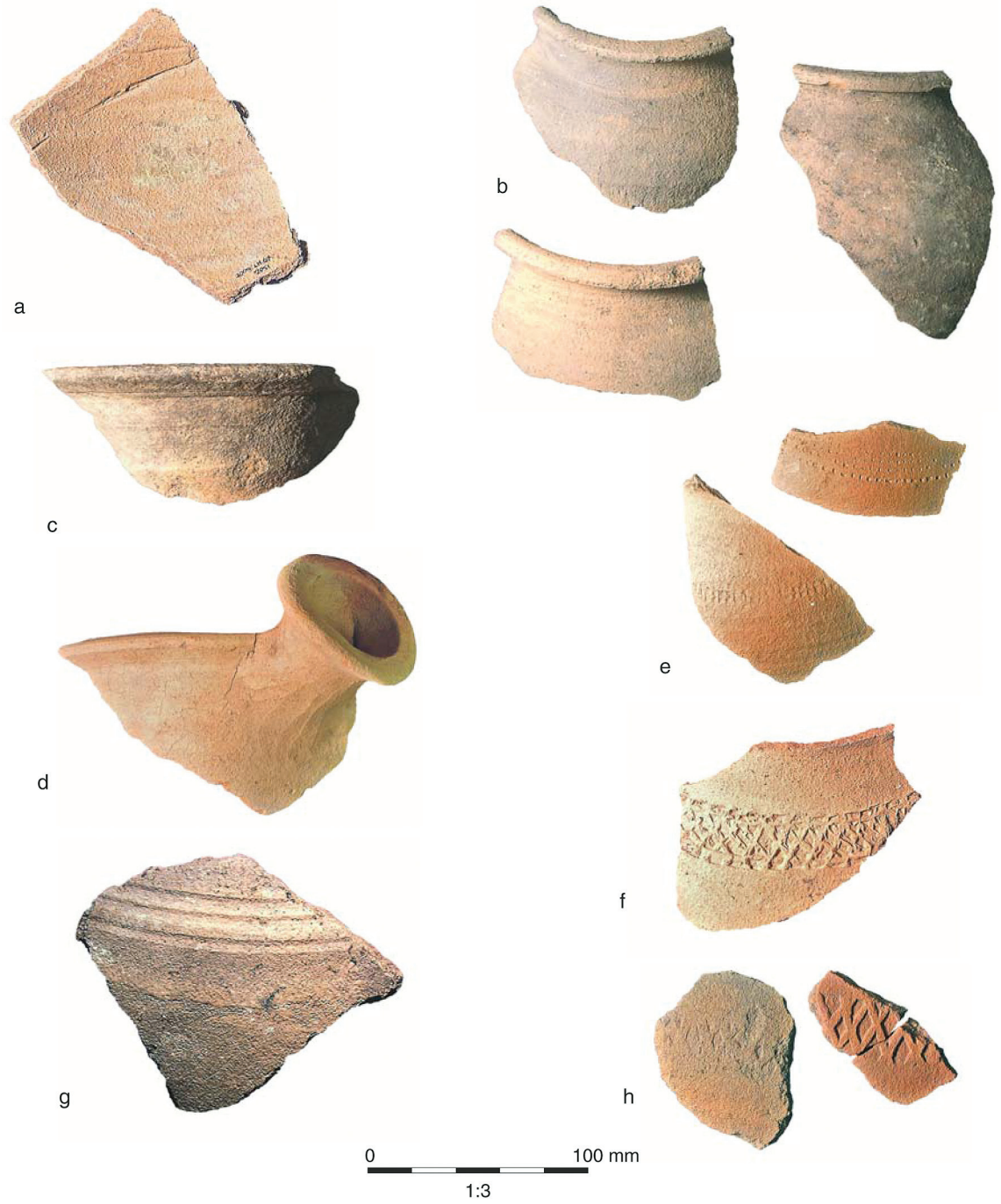


Fig. 35 a. Stafford-type ware jar sherd from pit 2052 with deep grooves on the inside wall; b. Stafford-type ware everted jar rim types; c. Small Stafford-type ware bowl from (545); d. Stafford-type ware bowl fragment with socket; Stafford-type ware decoration on jars: e. square rouletting; f. lozenge and chequered rouletting; g. incised horizontal lines; h. lozenge rouletting

representing the dominant or only form in all but context 3401, where bowls slightly outnumber jars (0.47 EVEs to 0.39 EVEs) amongst the small quantity of material recovered. The ratio of jars to bowls, however, varies from group to group and is most extreme in the three largest collections of material from the site SG2157 (*c*. 45:1), SG2154 (*c*. 63:1), and SG2155 (*c*. 113:1). Elsewhere the ratio is significantly less dramatic; *c*.13:1 in the sherds from pit 366 and between *c*. 5:1 and c.10:1 in the majority of Area 3 groups.

There is a degree of diversity in the standard vessel forms between each of the four area groups. For example, 84.4% of base sherds from Area 2 have a flat profile, compared to 35.3% in Area 1, 5.6% in Area 3, and 18.8% in Area 4, where sagging bases are ubiquitous. Similarly, a distinctive

Table 2 Types of decoration used on vessel forms within late Saxon (phase 2) contexts. Key: HL – horizontal lines; SR – square rouletting; SR & HR – horizontal lines and square rouletting; LR – lozenge rouletting

Area	Group	jars (EVEs)	bowls (EVEs)	ped forms (EVEs)	no dec (shds)	type dec (shds)			
						HL	SR	SR & HL	LR
1	Pit 366	2.85	0.22						
	Well 556	0.06							
2	Pit group 2157	54.15	1.2		8	5	2		1
	Ditch group 2154	14.58	0.23		5	5			
	Pit 2030	0.43							
	Mislabelled 2301	1.38			2	2			
3	Ditch group 3411	0.1							
	Ditch group 3413	0.5	0.24		6	2			4
	Pit 3230	0.12			1		1		
	Kiln 3408	1.11	0.18		14		14		
	Demol kiln 3408 – 3415	2.38	0.47		30	3	23	4	
	Kiln 3401	0.39	0.54		5		5		
	Demol kiln 3401 – 3416	8.56	1.22	0.3	67	2	65		
	Pit group 3417	2.68	0.25		14		14		
4	Working Area 2155 (incl kiln 4287)	22.66	0.2		5	5			
	Well 4330	0.52							
	Buried soil sequence 2156	0.12							
	Totals	**112.59**	**4.75**	**0.3**	**157**	**24**	**124**	**4**	**5**

everted, yet slightly upright jar rim form is manifest in Area 4 SG 2155, but rare in the other groups. Of the 157 decorated Stafford-type ware sherds present within the phase 2 contexts, 137 (87.3%) come from Area 3, notably SG3416 (3177, 3205 and 3206) which relates to the demolition of kiln 3401. In comparison, no decorated sherds feature within the phase 2 material from Area 1, with only 15 from Area 2 and five from Area 4. Similarly, there is little consistency in the type of decoration used between area groups. Square rouletting, by far the most common decorative technique from Tipping Street, is almost entirely confined to Area 3, with just two sherds from Area 2. Sherds decorated with horizontal lines are few in number, but are most common in Area 2, which features 12 examples; seven sherds appear in Area 3 and five in Area 4.

The Area 3 contexts are populated by finely potted, well-finished vessels, the quality of which is not matched by the comparatively coarse wares present in Areas 1, 2, and 4. The finish evident in each of the coarser groups is not uniform — the Area 4 sherds are generally finer than those of Areas 1 and 2, which are broadly comparable.

In contrast to the variations in finish, decoration, and composition evident in Stafford-type wares from each area, the homogeneity of material within each group is marked. This appears to hold even for the material recovered from kilns 3408 and 3401 (and their respective demolition deposits – 3415 and 3416), where some contrast between the products of the two successive kilns might perhaps have been anticipated. A combined total of 612 sherds were taken from kiln 3408 and SG3415, of which 44 (18.2%) are decorated, most with square rouletting. On the same basis, kiln 3401 and SG3416 produced 72 decorated sherds (11.8%), the majority of which again feature a band of square rouletting. The total jar to bowl ratio in both 3408/SG3415 and 3401/SG3416 is 5:1. Given these similarities, it is unlikely that there was a significant hiatus in production between the construction of the two kilns – 3401 probably quickly succeeded 3408.

Do these characteristics represent the broadly contemporaneous output of individual kilns or potters on the site, or chronotypological developments within material generated from successive phases of production? This is difficult to resolve as Stafford-type wares recovered from stratified sequences within each of the Tipping Street excavation areas exhibited few typological differences. A small group of Tipping Street North (ST32) Stafford-type wares, which were both comparable to the 2009 Area 2 and 3 material and had been sorted into preliminary phase groups (Klemperer pers. comm. 2012), were examined by the author, but also featured no obvious differences in fabric, form, or decoration between the phase I and II wares. It should be noted, however, that these groups comprised mainly ‘cherry-picked’ examples and that the stratigraphic information upon which the phasing was based was not provided at the time of assessment. Variations in the quality of jars from

Tipping Street sites ST17 and ST32 were interpreted as the work of several potters, producing vessels at different times (Ford 1998–9, 21). The Kilnyard, Thetford, however, may provide a more complete model for understanding the composition of the 2009 Tipping Street assemblage. Here, trends in decoration, finish, and range of forms evident in the late Saxon Thetford ware groups were linked to the output of specific kilns operating sequentially during a generation of potting activity on the site (Dallas 1993, 58–59, 130). As such, changes in production could be observed over time: the products of the earliest kilns were characterised by finer fabrics, a more limited range of forms and a slightly higher number of decorated examples than later groups; fluctuations in the frequency of vessel types were traced; and a general decline in the quality of pottery noted towards the end of the site's use, probably during the late 10th century (Dallas 1993, 130).

CONCLUSIONS

The 2009 Tipping Street assemblage has supplemented the sizeable corpus of existing production evidence for Stafford-type ware within the town. In terms of fabric and finish, range of forms, and applied decorative motifs, the 2009 material compares well with earlier groups recovered from the town. Nonetheless, there are differences: some of the more uncommon forms encountered in previous excavations do not feature in the 2009 assemblage. Large handled jar forms, some with applied thumbed and/or stamped clay strips, others with bungholes, are absent, although these are known only from a handful of sherds, all but one of which were recovered from production waste deposits at Tipping Street North (ST32) (the exception is a possible bunghole jar handle found on Clarke Street ST15) (Ford 1998–9, 21–23). In addition, a hitherto unknown rouletted design of lozenges within a chequered border was found in (3167), and, in comparison to other Stafford groups, there are some marked differences in the composition of the 2009 assemblage, specifically the ratio of jars to bowls. Taken as a whole, however, the material within the Stafford sites presents a relatively consistent view of production in the town.

The production of Stafford-type ware clearly constituted a major, well-organised late Saxon industry, of which our understanding is limited. The need for a comprehensive study of the Stafford-type ware industry was recognised over a decade ago and resulted in an English Heritage funded programme to catalogue, analyse and publish the extensive collection of pre- and post-Conquest pottery generated by the 1970s and 1980s excavations in Stafford town centre. This was to include the detailed examination of all Stafford-type ware assemblages from the town, including fabric analysis, the identification of distribution patterns and a comparison with other late Saxon pottery centres (Ford 2000, 4). Unfortunately the project was not completed and its interim findings remain unpublished. Research into Stafford-type ware subsequently stalled and has progressed little over the past ten years. A new initiative is long overdue, and it is hoped that the 2009 Tipping Street excavations will provide impetus for such a project. To answer the questions about the industry that remain outstanding, any future research should consider the following themes.

Development and production

The origins of Stafford-type ware are obscure. Archaeological evidence presents a fully-formed industry, with little evidence for its development. However, the current Tipping Street assemblage and those from earlier Stafford excavations hint at chronotypological trends within the ware, and this should be investigated further. The identification of products of individual potters or workshops would also be valuable, as would a review and clarification of production techniques.

Distribution

Most finds of Stafford-type ware have come from the West Midlands, although examples are also known from Chester, North Wales, and Dublin (Ford 1998–9, 33). Stafford remains as the only production centre, with seven kilns now positively identified. Doubts persist over whether examples from these find-spots actually represent the same ware. Only material from earlier Stafford sites was viewed during the reporting of the 2009 Tipping Street sherds, as finds from other Staffordshire sites held in the stores of The Potteries Museum, Hanley were not accessible. Some comparative thin-section analysis has been undertaken on Stafford-type ware sherds from Salter Street and Tipping Street, and possible examples originally recorded as Chester-type ware from Lower Bridge Street, Crook Street- and Hunter Street in Chester (Williams 2001). This concluded that, in petrological terms, the two groups were virtually identical, both sets having been fabricated from clay of the Keuper Marl beds. As these are local to both Stafford and Chester, however, it was not possible to

determine if the Chester finds originated in Stafford. Klemperer noted the close similarities between Stafford- and Chester-type wares during a brief examination of finds in Chester (unpublished research notes 2001). However, it was stated there that a yellow/buff partial oxidation exhibited by some of the Chester-type wares had not been seen on any of the material found in Stafford. Klemperer also confirmed the presence of Stafford-type wares amongst a selection of material from Fishamble Street and Winetavern Street in Dublin (unpublished research notes, 2001). Further work into the provenance of Stafford-type wares discovered outside of the town is required.

Factors affecting the distribution of Stafford-type ware need to be assessed, including the organisation of the industry, its purpose, access to markets, and the impact of political events. Within the limits of 10th-century Mercia, former Æthelflædan *burhs* have produced most assemblages of Stafford-type ware, although this may simply reflect the choice of excavation sites rather than chart a genuine distribution network (Ford 1998–9, 33). Carver (2010, 139) in particular ties the production and distribution of Stafford-type ware with the creation of Stafford as a *burh* in 913, suggesting that the pottery industry was introduced at this time to distribute foodstuffs via a military network. As the dating evidence from the 2009 Tipping Street material suggests that Stafford-type ware commenced prior to the founding of the *burh* (see below), this interpretation needs to be revisited. The transportation of brine has also been presented as reason for the distribution of Stafford-type ware, perhaps conveyed along the Cheshire saltway that lay to the east of the town (Ford 1998–9, 33). Research into the pre-Domesday routeways, fairs, and market sites of Staffordshire is required to define early trade networks (Ford 1998–9, 34). Also of potential interest is Blinkhorn's (2012, 32) study of the mid Saxon Ipswich-ware industry, which concludes that larger vessels (chiefly pitchers) were primarily produced as containers for goods traded outside of the kingdom of East Anglia. The study revealed that such vessels appeared less frequently on sites within the region, where smaller pots (with rim diameters less than 180mm) were more common. A comparison of the composition of Stafford-type ware assemblages from domestic contexts in Stafford (St Mary's Grove ST29 and pre-kiln deposits from Tipping Street North ST32) with those found outside of the town may reveal similar distinctions.

Context

The similarities between the Stafford-type ware industry and those in other late Saxon potting centres, notably in Norfolk and Lincoln, have been remarked upon in previous studies (see Ford 1995, 29–32; Ford 1998–9, 34). The Thetford-ware industry persisted from the late 9th/early 10th century until the end of the 11th century (Dallas 1993, 70), whereas Lincoln Kiln-type wares flourished from the late 9th to the early 11th century (Miles *et al*. 1983, 210–12). Stafford-type wares share many characteristics with Thetford and Lincoln Kiln-type shelly-wares, including kiln types (in the case of Thetford), vessel forms, decoration, and production techniques. It has been suggested that skilled potters moving between major urban centres created links between these industries (Ford 1998–9, 34). Others point to the existence of English regional ceramic traditions, distinguished in the late Saxon period by the adoption of wheel-throwing as a production technique, but possibly defined by political boundaries (Vince and Jenner 1991, 39–40). Indeed, Stafford is thought to have been on the fringe of a wheel-thrown pottery 'heartland', which included the Thetford, Stamford, and Ipswich ware industries, the influence of which was more profound upon adjacent areas than those located further afield (Vince and Jenner 1991, 40). A fuller understanding of the relationships between the English late Saxon industries will provide a regional and national context for the production of Stafford-type ware.

Catalogue of illustrated Stafford-type wares from Tipping Street

Figure 31

1 Jar (rim diameter 140mm) with square rouletted decoration of four rows. 2031
2 Jar (rim diameter 130mm) with square rouletted decoration of two rows. 3195
3 Jar (rim diameter 140mm) with lozenge rouletted decoration. 2032
4 Jar (rim diameter 150mm). 2032
5 Jar (rim diameter 160mm) with slightly concave interior to rim, possibly evidential of a lid seating. 2032
6 Jar (rim diameter 140mm) with upright rim. 4343
7 Jar (rim diameter 120mm). 250

8 Jar (rim diameter 130mm) 2051
9 Jar (rim diameter 130mm) with inturned rim. 2101
10 Jar (rim diameter 100mm). 2391
12–26 Common jar rim profiles

Figure 32
27 Bowl (rim diameter 290mm). 2101
28 Bowl (rim diameter 270mm). 381
29 Bowl (rim diameter 260mm). 368
30 Bowl (rim diameter 290mm). 4287
31 Bowl (rim diameter 220mm). 2031
21 Bowl (rim diameter 180mm). 2031
33 Bowl (rim diameter 100mm). 2093
34 Bowl (rim diameter 130mm). 3167
35 Bowl (rim diameter 130mm). 3213
36 Socketed bowl (rim diameter 160mm). 3197
37–41 Common bowl profiles

Figure 33
42 Pedestal base (90mm diameter). 3206
43 Shallow bowl (rim diameter 90mm). 545

Figure 34
44 Square rouletted decoration. 3205
45 Rectangular rouletted decoration. 495
46 Square rouletted decoration with incised horizontal lines. 3407
47 Lozenge rouletted decoration. 495
48 Lozenge rouletted decoration with chequered border. 3167
49 Incised horizontal lines in a group of three. 2032
50 Single horizontal lines. 4319

Figure 35
a Stafford-type ware jar sherd from pit 2052 (context 2051) with deep grooves on the inside wall.
b Typical Stafford-type ware everted jar rim types.
c Small Stafford-type bowl from (545).
d Stafford-type ware bowl fragment with socket.
Stafford-type ware decoration on jars: e. square rouletting; f. lozenge and chequered rouletting; g. incised horizontal lines; h. lozenge rouletting

MEDIEVAL and POST-MEDIEVAL POTTERY

Introduction

The excavations generated a total pottery assemblage of 9,930 sherds (196,426g by weight), spanning the 9th to the 19th centuries. The great majority of this comprised Stafford-type ware, which was prioritised for further analysis and reporting owing to its secure association with the kilns, and is reported on above. The remainder of the assemblage was also reviewed by the author at assessment stage (Goodwin 2011), examined macroscopically and divided into fabric/ware types and vessel forms. The material was quantified by means of a sherd count and a minimum vessel count was undertaken for the medieval wares. Wherever possible, fabric and ware types were related to the Staffordshire medieval and post-medieval typologies outlined by Ford (1995) and Barker *et al*. (1999). A context-by-context description of the assemblage was provided as part of the assessment report (Goodwin 2011), with a general overview of the key components of the medieval and post-medieval pottery assemblages reproduced below.

The medieval wares

Iron-rich sandy ware (Fig. 36, a-c)

Iron-rich sandy wares appear with some frequency amongst the medieval fabrics, totalling some 831 sherds (8% of the total assemblage). The iron-rich fabric features moderate to abundant rounded quartz inclusions and displays a variety of colours from a pale orange/pink to dark grey/black. Reduction is often uneven and can be confined to the surface or core of a vessel. Glaze is present only on the table wares and varies from a rich green to a reduced brownish-yellow. Iron-rich sandy wares date from the 11th to the 14th or 15th centuries (Ford 1995, 33). A minimum of 60 iron-rich sandy ware vessels are present in the assemblage, of which 53 (88%) are large cooking pots/jars. Most of these feature everted rims (Fig. 36, a), although upright and collared, and clubbed and flattened examples also feature. Cooking pot/jar rims range from 130mm to 280mm in diameter. Decoration in the form of an applied, finger-impressed vertical clay strip is present on examples from (226) and (3027), whereas a cooking pot/jar from (3026) has incised horizontal lines. Evidence of sooting is common on the exteriors (and sometimes the interiors) of the cooking pots/jars. Fragments of a jar with everted rim and a dark green glaze from (493) may not have been used for cooking. Part of a single pipkin with everted rim and pouring lip is present in (614). One sherd of a possible dripping pan was recovered from context (615).

A minimum of four jugs or pitchers also feature amongst the iron-rich sandy wares. Of note amongst these is a small collection of well-glazed sherds from (140), which include an everted and slightly thickened rim fragment (*c*. 160mm in diameter), that may represent a Stafford Green-Glazed Pitcher. Produced in Stafford during the 12th and 13th centuries these distinctive vessels have a characteristically squat appearance with a wide mouth and are coated in a rich green glaze (Ford 1995, 32). Other jug or pitcher sherds have glazes that are more unevenly applied, usually around the upper parts of the vessel and handle. Where present, rims are collared, with strap handles attached in line with, or just below, the rim. Two diagnostic jug or pitcher bases survive from (445) and (3027), both of which are flat and pinched around the edge. Incised, stabbed, slashed, or applied decoration is common to jug or pitcher bodies (Fig. 36, c) and handles. One spout/lip sherd from (568) features an applied clay hand, similar to an example from St Mary's Place, Stafford (Ford 1995, 44; fig. 13: 66) (Fig. 36, b).

Midlands white ware (Fig 36, d)

Some 361 white ware fragments are present, constituting 4% of the total assemblage (by sherd count). The white wares have fine, iron-poor fabrics with well-sorted quartz inclusions. The fabric colour can be cream, pink, orange, or a reduced light-dark grey; reduction is often patchy. Glazes are typically deep copper green to a pale greenish-yellow in colour. Jug fragments from (545) have a hard-fired fabric, orange/brown on the surface with a cream/buff core and may represent an over-fired white ware, but could equally be evidential of an iron-poor ware. Although similar in many respects, and certainly overlapping in use, the two wares are quite distinct and have been recognised as such in assemblages from north Warwickshire (Mayes and Scott 1984) and Staffordshire (Rátkai 2004, 12; Goodwin 2005, 23). In Staffordshire at least, white wares broadly date from the mid 13th to the late 14th or early 15th centuries, whereas iron-poor wares are known from 13th to 15th century groups in the south of the county (Rátkai 2004, 12) and may have persisted into the 16th century in north Staffordshire (Goodwin forthcoming). Most (82%) of the white ware vessels are jugs, which typically have narrow necks with collared rims (*c*. 80mm–90mm in diameter). Strap handles are attached below the rim. Glaze is frequently applied to the upper parts of the vessels, although patches are also found on the lower body. Decoration takes the form of lines incised into the body of the vessel; applied clay strips, often incised, slashed, pinched or thumb impressed; vertical lines of red paint; and rouletted decoration (Fig. 36, d). Strap handles can also be embellished with finger and thumb impressed and stabbed decoration. A sherd of a tubular jug spout features in (274). The only other discernible white ware forms are bowls and a cooking pot or jar. A minimum of two bowls are present, one with a squared rim (*c*. 230mm in diameter), the other everted (*c*. 250mm in diameter). The cooking pot or jar has a squared rim, *c*. 110mm in diameter.

Deritend ware

A single small sherd of possible Deritend ware was recovered from context (451). The fine orange fabric is hard with well-sorted, rounded quartz inclusions. Lines of white strip have been

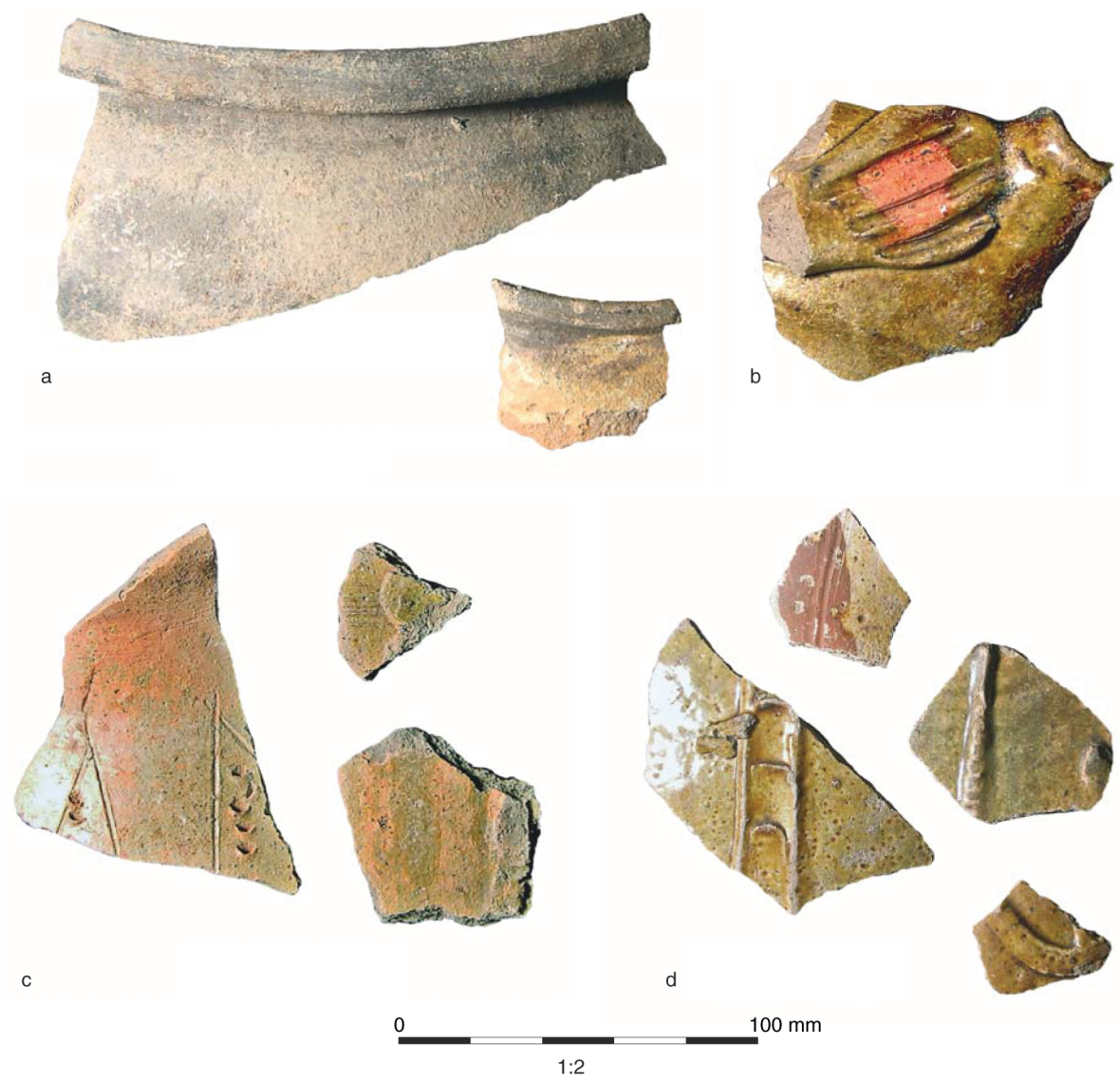


Fig. 36 a. Iron-rich sandy ware everted cooking pot rims; b. Iron-rich sandy ware spout/lip sherd with applied clay hand from (568); c. Iron-rich sandy ware jug or pitcher sherds with green glaze, incised, stabbed (*left*) and applied (*right*) decoration; d. Midlands white ware jug sherds, most glazed, with applied or painted (*top*) decoration

applied to the exterior surface, over which is a greenish-yellow glaze. Deritend ware was produced in Birmingham from the early 13th to the early 14th centuries and appears on sites in Warwickshire, parts of Worcestershire, and south Staffordshire. The ware was identified during excavations at Stafford castle (fabric B31) (Rátkai 2007, 67).

Late medieval orange ware/ Midlands Purple ware

Late medieval orange wares and Midlands Purple wares are essentially the same fabric, with the latter being more highly fired than the former. The difference between the two, however, can be difficult to determine. The Tipping Street late medieval orange wares are typically hard fired, with a dense, near-stoneware consistency for the Midlands Purple wares. The fabric has quartz and iron ore inclusions and a body colour that can be orange, purple or a purplish grey. Late medieval orange/ Midlands Purple wares date from the late 14th century at Chilvers Coton in north Warwickshire (Mayes and Scott 1984, 40–41), but are not thought to predate the late 15th century in north Staffordshire (Ford 1995, 36–37). Midlands Purple wares continued to be produced into the 18th century as a characteristic jar form known as a butter pot. Most of the Midlands Purple wares from Tipping Street are post medieval in date (see below). Definable late medieval orange wares constitute a small percentage of the assemblage (0.1% by sherd count). Fragments of a pan with everted rim,

slender baluster jug with roughly trimmed base, a jar and a jug or pitcher are represented amongst the sherds. A patchy, greenish brown glaze is present on the baluster jug.

Cistercian wares

Cistercian wares were produced in Staffordshire from the late 15th to the early 17th century, and represent another transitional medieval/post-medieval element of the Tipping Street material. They form less than one percent of the total assemblage (by sherd count) and appear most commonly as cups. The hard, iron-rich fabric is fine, red to dark grey/purple in colour, typically well coated with a lead glaze that ranges from yellowish-brown to black.

'Tudor Green'

One hollow ware sherd from (2046) has a fine white/cream fabric with rich copper green lead glaze on the exterior. This is probably a 'Tudor Green' vessel, produced in the Surrey–Hampshire border region in the late 15th century (Pearce 1992, 2). As such, it represents one of the few non-local medieval wares in the assemblage.

Summary of the post-medieval wares (Figs 37–38)

Post-medieval wares represent 13% of the assemblage by sherd count. The pottery comprises a fairly standard range of wares produced during the period *c*. 1650 to *c*. 1900. The earlier part of the period is dominated by locally produced coarsewares, notably thrown slipware dishes with trailed decoration or press-moulded examples with trailed and combed slip or embossed designs; mottled ware hollow wares, including porringers, mugs, and at least one chamber pot; yellow-ware dishes, jars, and a porringer; and blackware cups, mugs, and other hollow wares. Midlands Purple wares

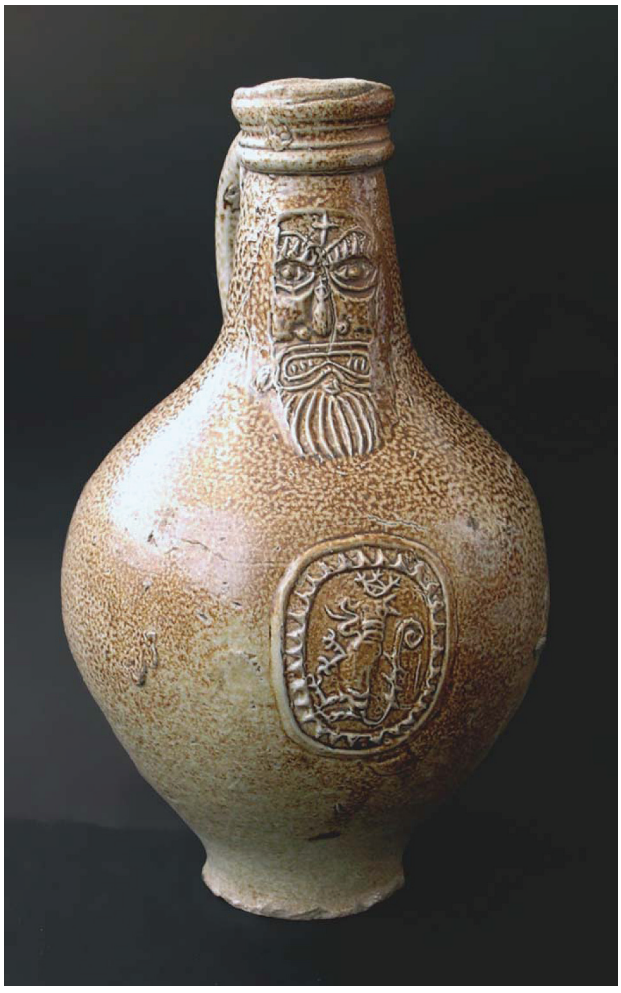


Fig. 37 Bartmann stoneware jug (a possible 'witch bottle') from (101): height 222mm; max width. (across belly) 120mm; rim diam. 40mm; base diam 57mm

persist in the 17th- to mid 18th-century groups, commonly as jars and specifically as examples with collared rims known as 'butter pots'. Coarse earthenware pans appear amongst the 17th-century material, although this ware type and form continued into the 18th and 19th centuries.

A small number of German stonewares of mid 17th-century date feature in contexts (101), (129), (179), (196), and (560). Where diagnostic, these represent bottles or jugs, a complete example of which comes from (101). The (101) example (Fig. 37) is a Rhenish *Bartmann* jug, with a facemask and a medallion similar to a Frechen vessel found in Norwich (Gaimster 1997, 93; fig. 3.53: 817). This particular vessel was found close to a property boundary wall and may have been deliberately deposited as a protective charm, as *Bartmann* bottles with facemasks were sometimes used as 'witch bottles' during the second half of the 17th century. These were ritual items used to protect against or provide an antidote to witchcraft, during a period when the fear of witches was widespread. Although the Tipping Street example was found to be empty, witch bottles often contained items such as leather scraps or pieces cut into heart shapes, bent pins, bent nails, and textiles, along with hair, nail clippings, and urine from the individual in fear of persecution (Gaimster 1997, 140). The bottle was thought to have the power to throw back a spell upon its creator and 'tie up' a witch by making it impossible for her to urinate (Rudkin 1973, 71). Although popular concerns about witchcraft gradually subsided, witch bottles are known from the 19th century, when their use, or indeed re-use, was principally amuletic rather than as a cure or deterrent for evil spells (Portable Antiquities Scheme).

The 18th-century wares are characterized by refined tea and table wares, the majority of which are almost certainly north Staffordshire products. By the second quarter of the 18th century, coarseware production was in decline in Staffordshire, with emphasis placed instead on the manufacture of refined stone and earthenwares. Context (3003) offers a glimpse of the fine wares available in the middle of the 18th century. White salt-glazed stonewares dominate the group with some 130 sherds, representing a minimum of nineteen vessels, most of which are tea or tableware forms. The total absence of creamwares from the group may help to date the wares to the 1740s or 1750s; by the early 1760s creamware was enjoying a meteoric rise in popularity, whereas the fashion for white salt-glazed stonewares was in decline.

Eleven salt-glazed stoneware plates (including a soup plate) are present and are either circular (ranging from 7 inches to 13 inches in diameter) or octagonal. Rim types can be plain, scalloped, roped, reeded or star/dot and diaper moulded (Fig. 38, a). At least two saucers, a tea bowl, a cup with reeded decoration, a slop(?) bowl, a jug(?), and two chamber pots also feature. Although these wares seem to have stemmed from a domestic context, some appear to be imperfect; at least one plate rim is severely warped, another has a gash along the vessel wall, one has a slumped and cracked base, and a saucer has very pronounced kiln furniture scars on the interior base and underside (Fig. 38, b). The sale of less-than-perfect vessels was, and indeed still is, a common practice amongst pottery manufacturers. Writing in the 1820s, Simeon Shaw cites a scale of prices published in 1770, which lists up to six quality grades for salt-glazed stoneware and creamwares (Shaw 1829, 207). Quality had a significant impact on price; plates on the list range from 2*s*. for a 'best' example, to 9*d*. for a vessel of the lowest standard (ibid.). Ceramics were readily available within the immediate environs; Pitcher Bank at the junction of Eastgate and Tipping Streets had an established pottery market by 1835. In this instance at least, the decision to acquire wares of inferior quality appears to have been one based upon financial means rather than opportunity.

Context (3003) also contains a brown salt-glazed cylindrical mug and the remains of a painted tinglazed earthenware plate and plate or shallow bowl. Unlike most of the wares in the group, these latter vessels were not produced in Staffordshire and probably originated in Liverpool or Bristol (M. Goodby pers. comm. 2011). Coarsewares complete the (3003) material, with a coarse earthenware pan and chamber pot, a slipdecorated dish, and a mottled ware chamber pot.

Creamwares are common in predominantly late 18th- to early 19th-century groups such as (269) and (560). Most are table and, to a lesser extent, tea ware forms, the majority of which are lacking either applied or moulded decoration. Those few examples that are decorated are slipcoated and turned, overglaze painted, or have mould-applied reliefs. Aside from the creamwares, the 19th-century material is characterised by decorated tea, table, and toilet wares. Underglaze transfer printed designs feature on early to mid 19th-century pearlwares (whitebodied earthenwares with a cobalt tinted lead glaze), later whitewares, and bone chinas. Common designs are identifiable, with examples of 'Willow', 'Broseley' (which appears on both earthenware and bone china vessels), and 'Asiatic Pheasants'. Underglaze painted pearlwares and whitewares appear less frequently, but

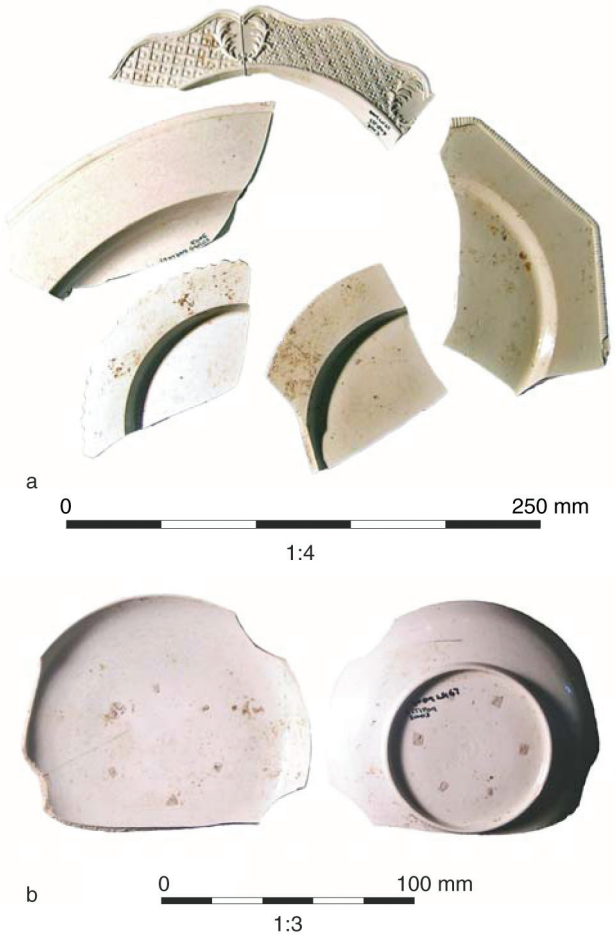


Fig. 38 a. White salt-glazed stoneware plate rims from (3003); star/dot and diaper (*top*); reeded (*left*); scalloped (*bottom left*); plain (*bottom right*) and roped (*right*); b. White salt-glazed stoneware saucer sherd from (3003); contact scars from a crown or ring stilt can be seen on the interior base and the underside of the vessel

include examples of shell-edged moulded plates with blue painted rims. Only two bone china sherds (from 4314) have painted decoration in the form of overglaze horizontal bands applied in conjunction with gilded detail. Underglaze slipdecorated pearlwares, white wares and yellow wares are poorly represented, as are sponge decorated wares.

A handful of undecorated refined earthenwares with coloured bodies, specifically buff or blue, are present in (35), (38), and (195). One mid to late 19th-century undecorated ironstone type sherd was recovered from (3174). A coloured-glaze ware and a majolica are present in (4314) and (46) respectively. Porcelain (as opposed to bone china) vessels feature in mid 19th-century contexts (112) and (4019). The latter, a perforated inset for a fish dish, may actually be somewhat earlier than the other material in the group and appears to be of Oriental origin.

FIRED CLAY *by Cynthia Poole*

The small quantity of fired clay not directly associated with the kilns was found in a range of features, mainly pits, ditches, quarries, and a well, ranging in date from late Saxon to mid 18th century. This included much residual kiln structure and most of the remainder was classified as indeterminate oven structure, though some of this could also be kiln debris. The only items of note were a fragment of vitrified furnace lining from quarry pit 291 (fill 294), oven wall with wattle impressions from a burnt layer rich in grain (300), both of 11th- to 12th-century date and one small fragment (11g) found in gully 2143, which is interpreted as a possible roundhouse drip gully. This had a convex smooth outer surface and flatter back face and measured 13mm thick and *c*.120–130mm in diameter. In terms of colour it is similar to the material from the Saxon kilns, but the fabric is

much grittier and sandier, suggesting this may be contemporary with the gully, rather than intrusive later material. However, without any diagnostic features it is impossible to date.

The only small clay object was a complete spindle whorl from quarry 154 (fill 155) of 11th- to 14th-century date. The spindle whorl (SF2) was sub-spherical with flattened ends and a wide cylindrical perforation 11mm diameter (Fig. FC1.2 in archive). It was well finished and measured 33mm diameter by 17mm high, with a weight of 14g. It is typically Saxon–Norman in general character and similar in size and form to spindle whorls previously found at Stafford (Carver 2010, 97–8, fig.4.34).

METAL and GLASS FINDS *by Ian Scott*

Small assemblages of metalwork and glass were assessed by the author (OA 2011, Appendix A.5 and A.6). Much of the metalwork assemblage comprised miscellaneous fragmentary and unidentifable pieces, half of them from the latest contexts, and there were only three items of note: a silver cut farthing of the second half of the 13th century re-deposited in a Phase 7 context; an incomplete copper alloy folding balance; and a late medieval knife. These are catalogued below. Only a single nail was recovered from late Saxon contexts. The glass assemblage was dominated by fragments of drinking glasses and wine bottles dating from the late 17th century to the early 20th century. The only individual object of note is the single tiny glass bead recovered from the charcoal and ash layer (3201) over the floor of kiln 3401. Full details of the assemblages are available in archive.

Illustrated objects (Fig. 39)

1 **Silver cut farthing**, cut from a silver penny. *Obverse*: poorly preserved with little visible; *Reverse*: voided long cross, part inscription reads: '. . . NIC . . . ' possibly for the moneyer Nicole of the mint at Canterbury. Context 14306. Phase 7. [ID 48]

The 'Long cross' penny with voided cross was introduced in 1247 in the reign of Henry III (1216–72) and continued in use into the reign of Edward I (1272–1307) until replaced by a new 'Long Cross' coinage in 1279. Here, the coin was found re-deposited in a much later context.

2 **Folding balance**, comprising two tapering arms pivoting at each end of a short beam. This example is missing the pointer, which would have been fixed to top the central beam, and also the stirrup by which the balance would have been suspended. The latter may well have been secured to the base of the missing pointer. L overall: *c*. 140mm; L of arms: 65mm and 66mm; L of beam: 28mm. Context 261, pit 260. Phase 3. [ID 82]

Small equal balances are known from the Roman, Saxon, and medieval periods. Roman and early Saxon balances were usually non-folding balances (Kruse 1992, 72; Scull 1990). Folding arms appear in the late Saxon period (Kruse 1992, 723) and seem to have continued in use into the medieval period. There is an example from London associated with pottery of the late 14th century (Egan 1998, 326 and fig. 243, no. 1055), and others from medieval contexts in the French Quarter, Southampton (Scott 2011, 169 and figs 5.23:1315 and 5.24:16). Small balances such as this example were used to weigh bullion in the absence of struck coinage, and to weigh coins. Their distribution in the late Saxon period seems to coincide with areas of Scandinavian influence in the North and East Anglia (Kruse 1992, 84–5, 89) and is limited to trading centres such as York and Ipswich. The link with trading centres persists with later medieval examples.

3 **Knife with plate tang**. The long narrow blade has a straight back, curved choil, and gently curved edge. Fe. L: 262mm; L of blade: 177mm; W of blade: 13mm. Context 3310, pit 3309. Phase 4. [ID 30]

The form of the knife suggests a late medieval date. Scale tang knives of broadly similar form have been found in late 14th-century (Cowgill *et al*., 1987, fig. 63:118; fig. 64:126) and early to mid 15th-century contexts in London (Cowgill *et al*., 1987, fig. 66: 262; fig. 67: 265 and 270).

4 **Glass bead**, wound annular bead in very dark blue metal. D: 2.5mm. Context 3201, charcoal and ash in the base of kiln 3401. Phase 2

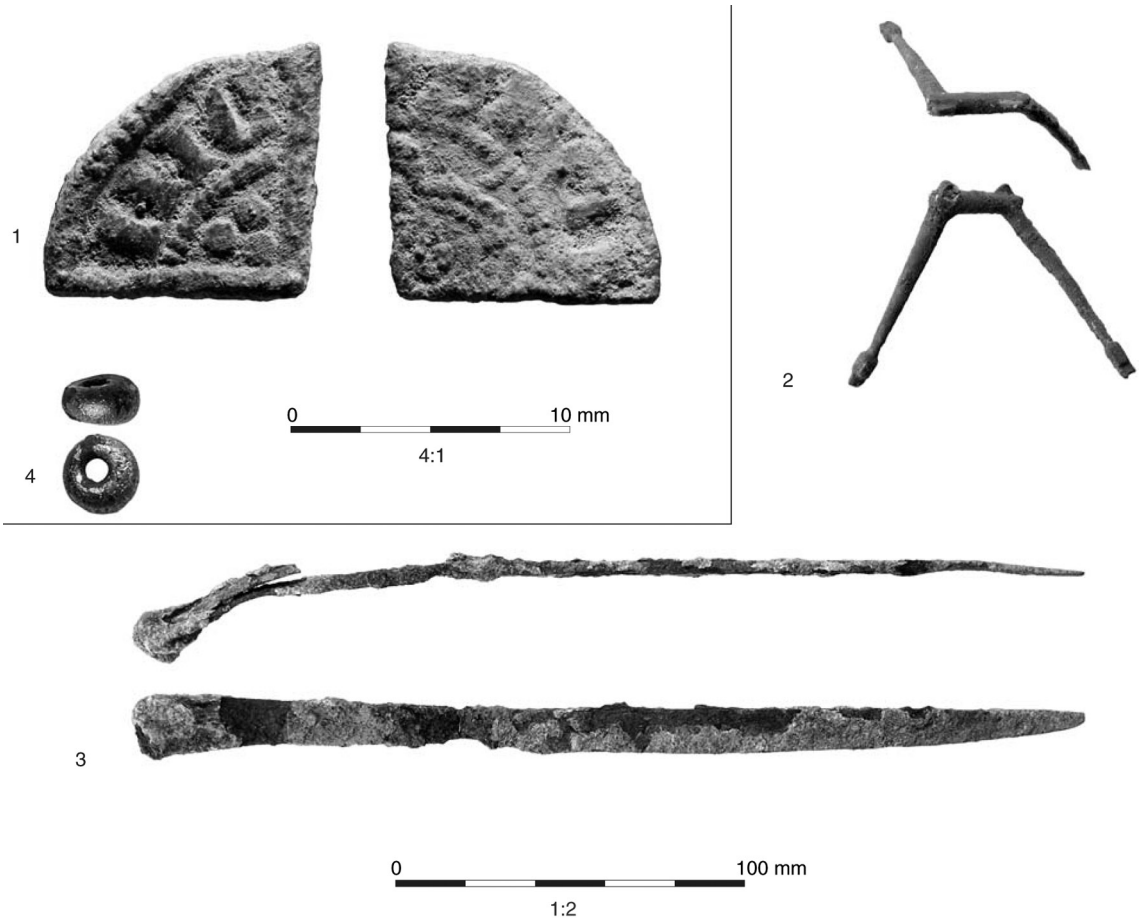


Fig. 39 Objects of metal and glass: (1) silver cut farthing; (2) folding balance; (3) scale tang knife; (4) glass bead

WORKED STONE (Fig. 40) *by Ruth Shaffrey*

THE SAXON QUERNS

Three rotary quern fragments from two querns were found re-used in the west flue wall of Kiln 4287. While the querns as found were clearly in a secondary context they could represent grinding on or near the site during the Saxon period. Both querns are heavily worn suggesting extensive use but neither has any evidence for harped grooving or furrows, a pattern more commonly associated with Roman querns (Watts 2002, 38). Both are quite damaged but one appears to be significantly larger than the other suggesting that they represent two different querns. The larger (lower) quern (Fig 40.1) has a sub-circular socket on the upper face into which a narrower spindle hole appears to have led; this probably secured an adjustable spindle. The upper stone has a perforation cut from both sides of the stone (Fig 40. 2). Both querns are made of coarse-grained and slightly pebbly sandstone probably from the Millstone Grit, although a source from the former Bunter pebble beds, now part of the Sherwood Sandstone group (Stimpson and Floyd 2012, 9) is also possible (Whitehead *et al*. 1927). Neither stone was available from within Stafford although the Millstone Grit sources near Stoke-on-Trent are said to have been used for querns (Hains and Horton 1969, 108).

Research for this report could not produce any archaeologically published examples of rotary querns from Stafford. Significant evidence has been found for the baking of bread and oat bannocks at nearby St Mary's Grove and it has been suggested that the grain was dried and then taken elsewhere for grinding (Carver 2010, 72). A mill at Stafford is recorded in Domesday Book but it seems very unlikely that all the Saxon town's grain would have been ground there, as restrictions on the use of rotary querns did not come into place until around the 14th century (Watts 2002, 41). The question of what has happened to all the rotary querns from Stafford is puzzling. Querns from closely dated Saxon contexts are not particularly common unless they are part of a significant assemblage, such as those from the Saxon mill at Tamworth, but they do usually materialise in

archaeological contexts eventually. The two querns from Tipping Street are proof that individuals ground grain in the Saxon period and hints at the possibility that some, or all of the grain was not moving very far to be ground.

It is difficult to interpret the finding of two quern fragments, both in positions of reuse, but given their rarity in Stafford, it is important to offer an explanation. Small numbers of querns are usually interpreted as representing domestic activity, and that may well be the case here. Given that they were found on a site with evidence for cereal processing, however, it must be borne in mind that they may have been utilised in a non-domestic setting. Further excavation in Stafford will hopefully serve to explain how and where the town's grain was being ground.

OTHER WORKED STONE

Several blocks of stone were retained from well 607 (Fig. 26; Phase 4, 13th to mid 14th century). A further block was burnt and blackened suggesting prior use elsewhere. These were all made from a fine-grained pale brown sandstone from the New Red Sandstone (Hains and Horton 1969), which could almost certainly have been collected very locally; parallel diagonal tooling marks probably made with a chisel of approximately 10mm width were well preserved on several faces. A single piece of a fissile limestone may have been used for roofing but does not retain a perforation (3362). A single limestone disc was recovered from Phase 5 pit 3071 (3072; mid 14th to 16th century). It is slightly irregular but could possibly have been used as a spindlewhorl or light weight. Post-medieval contexts produced a slate pencil (garden soil 46) and a possibly rotary quern fragment (334). Fragments of slate roofing may indicate how the buildings in the area were roofed, but the evidence is very limited (4104, 3249).

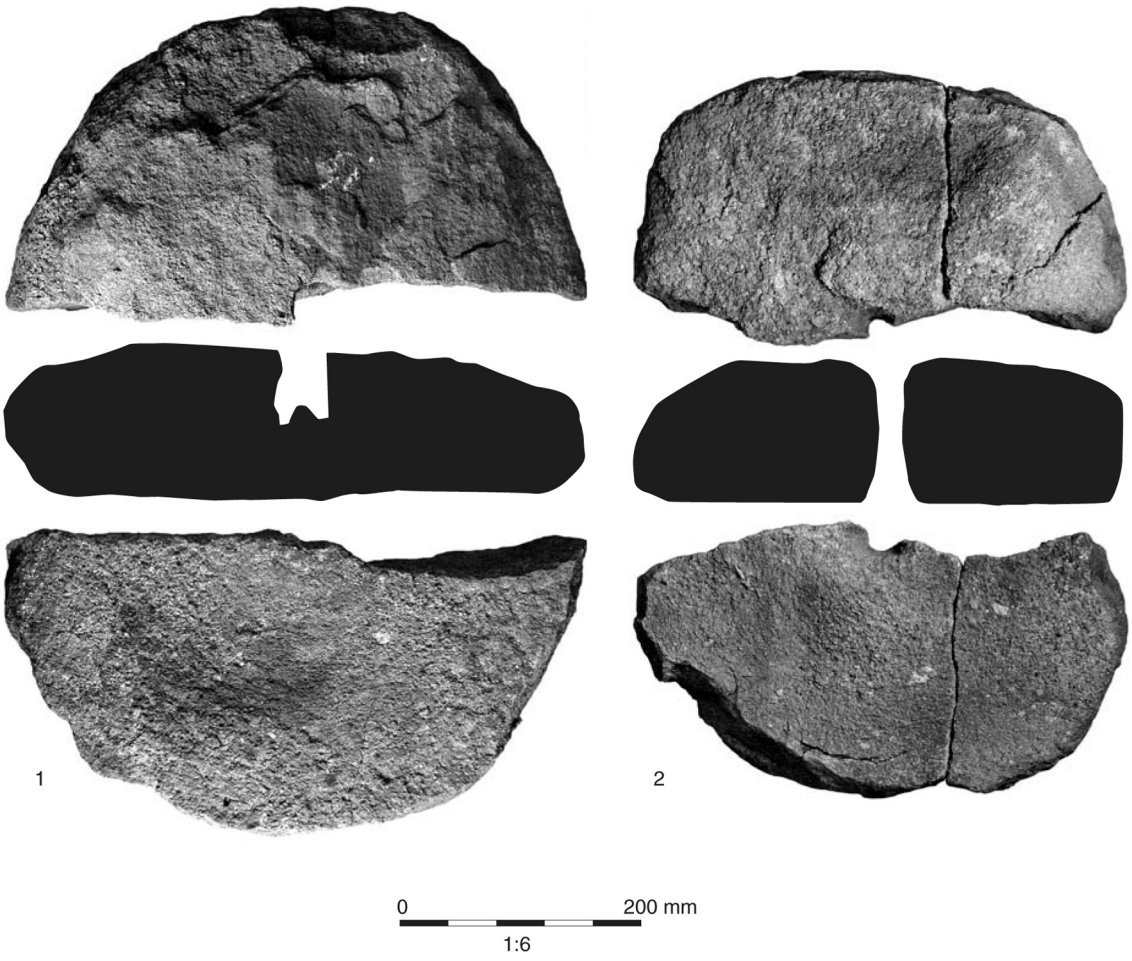


Fig. 40 Querns

Illustrated Worked Stone (Fig. 40)

1 **Half an upper rotary quern.** Millstone Grit. Large fragment with sub-square socket on under surface measuring 46mm diameter × 60mm deep. This probably joined up with a much narrower spindle hole suggesting that a fitting was positioned in the wider part of the socket underneath. The grinding surface is worn into concentric grooves. The under surface is rough and the edges are damaged so the quern may have been larger. Measures 480mm diameter × 115mm thick. SF 4073. Fill 4357 of kiln 4355. Phase 2, late Saxon.

2 **Rotary quern fragment.** Millstone Grit. Two adjoining fragments. Very thick with worn concentric grooves on grinding surface. Biconical perforation that has been cut from both sides. Measures >420mm diameter × 110mm thick. SF 4074. Masonry 3457. Phase 2, late Saxon

ENVIRONMENTAL REMAINS

ANIMAL BONE (Table 3) *by Andy Bates*

In total 1752 bone fragments or number of individual specimens (NISP), weighing *c*. 20 kg, were recovered from the three areas of the site. Of these, 439 (25%) were identified to a species level or lower order group (Table 3). The great majority of the animal bone was recovered by hand collection, with few identifiable bones coming from soil samples. Generally, the animal bone within each period was in a good condition being fairly robust and with limited surface erosion, but the late Saxon material was in slightly poorer condition and more fragmented than the later assemblage.

Fairly small numbers of animal bones identifiable to a species level were recovered from each period and the relative numbers of the main domestic species presented in Table 3 are probably unreliable as a guide to the proportion of beef, mutton, lamb, and pork consumed by the inhabitants of the site. Sheep are likely to dominate the sheep/goat category, although some goat bones were identified from the site in the later periods. The vast majority of animal bones were recovered from pits, reflecting the nature of the archaeology of the site, with few bones recovered from other feature types. Too few mandibles or loose teeth were present for an analysis of the mortality profiles of the stock animals. Similarly, there were too few metrical records to undertake a biometric study, although where measurements were recorded they were of a size consistent with each period. Full bone records and a discussion are available in the site archive.

The limited quantity of material did not support detailed analysis of any individual phase assemblage, and the most useful group of bone was recovered from late Saxon rubbish pit 366. This pit (see Fig. 17) was located in the western end of Area 1. It contained 13 deposits, of which three produced animal bone, although it is the seventh deposit, 377, which contained significant numbers of bone. Most of the identifiable bones from deposit 377 have been burnt. Fragments of cattle horn core, axis (second vertebra), left and right radius and ulna, right metatarsal, and a first and second phalanx were present. None of these bones were complete. Only one bone had butchery marks upon it, a radius with chop marks from where the lower foreleg (including the distal end of the radius) was removed. Of the bones of the forelimbs, the left and right radii and ulnas are clearly of the same limbs, but the opposing sides are of different animals. In addition two fragments of a sheep or goat skull, the jugular bone and the occipital condyle, are feasibly of the same skull. Two bones from this deposit were identified as possibly residual, but most of this material was deliberately discarded into this feature. It would be tempting to see this material as having been burnt in the adjacent kilns. However, if this were the case, we might expect all of the bone to be burnt at a high enough temperature to be turned blue or white in colour (calcined), which occurs at around 500–550°C. The burnt bone may have been the result of cooking meat on the bone, but perhaps more likely this small collection of primary and secondary butchery waste, initially with the ulnas still attached to the radii, was incidentally added to a fire and then discarded.

DISCUSSION

Few sites have been excavated which provide comparative archaeozoological material in Stafford. Animal bone from St Mary's Grove, Clarke Street, and on the opposite (north) side of Tipping Street are summarised in Carver and Hummler (2010). Those from excavations on Broad Street are published in Brown and Hancox (2009). The animal bone from Clarke Street comprised predominantly bone from domestic consumption and industrial waste dumped at the edge of the marsh, on land used

Table 3 Total NISP and percentages of animal bone (numbers in brackets bone from soil samples)

Species	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Total
Equid	5	2	7		24	2	40
Cattle	56 (3)	12 (2)	57	13	76 (2)	31	245 (7)
Pig		1	9	1	13	12	36
Sheep/Goat	2 (1)		18	4	31	22	77 (1)
Sheep	1		1		12	4	18
Goat					1	1	2
Deer						1	1
Dog			1				1
Rabbit						5	5
Red Deer			1				1
Fallow Deer					2		2
Cattle/Red Deer	7		8	2	10	14	41
Sheep/Goat/Roe Deer			1		2	3	6
Red/Fallow Deer			1				1
Medium Mammal	5 (25)	1	35 (2)	5	167 (1)	14	227 (28)
Large Mammal	67 (12)	15	112	1	97	43	335 (12)
Small Mammal	(1)				1		1
Unidentified Mammal	141 (156)	2 (54)	32 (46)	9	128 (1)	32	344 (257)
Bantam			1				1
Domestic Fowl			1			1	2
Domestic/ Greylag Goose			1		2		3
Dom. Fowl/Pheasant			1				1
Unidentified Bird					2		2
Frog			(12)		(13)		(25)
Total	284 (198)	33 (56)	287 (60)	35	568 (17)	185	1392 (331)
NISP identified to a species level or low order group	64 (4)	15 (2)	97	18	161 (2)	79	434 (8)
Principal Stock Animals							
Cattle	94.92		67.06		57.58	44.93	
Sheep/Goat + Sheep			10.59		9.85	17.39	
Pig	5.08		22.35		32.58	37.68	

increasingly as the town midden between the 10th and 13th centuries. St Mary's Grove contained animal bone from domestic consumption of prepared joints, with some features containing industrial waste from horn working (horn cores). Excavations from Broad Street recovered bone predominantly from late Saxon and 11th- to 13th-century ditch deposits of the castle at Broadeye. They included bones interpreted as primary butchery waste of cattle and sheep/goat, although lesser quantities of other material are also noted. Excavations on the northern side of Tipping Street produced few bones thought to be of interpretative value.

As at Tipping Street, at each of these sites the nature of the features excavated and the general low sample of bone have affected the overall proportion of stock animals from each, giving an unreliable picture of their relative importance. A summary of animal bone from late Saxon to 14th-century Stafford that adds the present results to those noted above was compiled for the archive report, but it is highly likely to be affected by preservation and recovery factors, probably over-representing cattle bones and under-representing pig bones, although pig appears to be more abundant in late Saxon deposits. Beef is likely to have made a significant contribution to the diet in all periods, if for no other reason than that beef cattle may contribute ten times the amount of meat when compared to mutton of an adult sheep (Harvey 1993).

CHARRED PLANT REMAINS (Tables 4–6) *by Denise Druce*

Introduction

During the excavations, 61 bulk and 23 smaller incremental soil samples were taken from secure and potentially datable deposits across the site, based on a strategy implemented after consultation with archaeobotanist Wendy Smith, English Heritage Science Advisor Lisa Moffett ,and OA environmental manager Rebecca Nicholson. Spatial samples were taken from the kilns to investigate the distribution of the different kinds of charred remains within the features and to provide well

stratified material for radiocarbon dating. Following the assessment by W. Smith of 59 dry flots from the processed samples, 11 were recommended for full analysis of the charred plant remains (CPR), based on the abundance and diversity of charred remains within the samples as well as their potential to provide information pertaining to activities taking place at the site (OA 2011). Nine of the samples come from late Saxon features and include four from Area 3, with two from Kiln Group 3408, one from Group 3415, and one from Kiln Group 3401. Four samples come from Area 4 and include two from pottery Kiln Group 4287, and an associated pit (fill 4319) and well (4330). One sample comes from a large refuse pit (366), situated in Area 1. The two remaining samples come from buried soil (2114), which is believed to pre-date the earliest late Saxon activity at the site, and the fill of medieval (13th to mid 14th century) ditch (2106), both in Area 2. The aim of this analysis was to provide information pertaining to the agricultural practices and economy of possible pre-Saxon, late Saxon and medieval Stafford and in particular to explore the types of cereal/food-related activities taking place at the site. The assessment had indicated the possibility that the late Saxon kilns were being used for parching/drying of cereal crops and/or other food preparation as well as pottery production (OA 2011), and this suggestion is explored further in this analysis. Patterns of rubbish disposal are also addressed through the investigation of samples from the other selected features and deposits.

Methodology

Up to forty litres of each sample was processed using a modified Siraf flotation machine. Processed soil volumes are given in Tables 4–6. In all cases, where samples proved not to contain anaerobically preserved material 100% of the collected soil was processed for the recovery of charred plant remains. The resulting flots were collected onto a 250μm mesh, airdried, and examined with a Leica MZ6 binocular microscope. The charred material was quantified and identified where possible, and other material, such as charcoal, bone fragments, and metal waste was noted. Identification was aided by comparison with the modern reference collection held at OA North and with reference to the Digital Seed Atlas of the Netherlands (Cappers *et al*. 2006). Nomenclature follows Stace (2010). The results of the analysis are shown in Tables 4 to 6 where the charred plant remains, namely seeds, are given as actual counts, and other remains, such as fine cereal chaff (lemma/palaea, awn fragments), charcoal, and bone are quantified on a scale of 1 to 4 where 1 = <5 items and 4 = >100 items. A number of the samples contained non-charred seeds; however, most of these were considered to be modern contaminants and are not included in the results table. The cereal remains and cereal chaff are listed separately, and the weed seed taxa are grouped according to habitat types that broadly correspond with the following ecological groups (after Druce *et al*. in preparation, which followed Huntley and Hillam 2000). It is acknowledged, however, that many taxa may grow in more than one habitat.

1 Ruderals and weeds of arable and cultivated land: include ruderal plant communities found growing on waste or fallow ground and annuals found in arable fields and cultivated ground. Ruderal plants are usually perennials or biennials and inhibit the growth of annuals.
2 Grassland plants are to be found growing in open grassland or meadows.
3 Damp/wet ground plants are to be found growing on wet marshy ground, on river, ditch and pond banks and in water meadows.
4 Heath/bog: plants that grow on areas of heath or bog often in acidic conditions.
5 Woodland/scrub plants comprise trees and shrubs, and the ground flora common in woodland clearances and hedgerows.
6 Plants belonging to broad ecological groupings, which are not characteristic of any one community but are found in several.

RESULTS

LATE SAXON KILNS and ASSOCIATED FEATURES

The cereal remains

The cereal remains from the late Saxon contexts were broadly similar and dominated by grains, with little accompanying cereal chaff. The assemblages were dominated by three main cereal types and although relative values varied between samples, all three, namely *Avena* sp (oat), *Secale cereale*

(rye) and *Triticum* sp (wheat) were consistently represented. Only three of the late Saxon samples (11, 205, and 412) contained *Hordeum vulgare* (barley) grains; however, values were extremely low compared to the other cereal types. The remains of lemma/palaea on many of the *Hordeum* grains suggests a hulled variety, although most were too poorly preserved to be able to tell whether the crop consisted of six-row or two-row barley. Apart from the slightly higher number of cereals, including indeterminate grains, in demolition layer 3205, the probable kiln rakeout 4319, and pit fill 381 (pit 366), there were no discernible differences in the proportion of cereal types in the late Saxon features.

Many of the *Triticum* grains were squat and plump, resembling a variety of freethreshing wheat, such as *T. aestivum* (bread wheat). Positive identification of wheat, however, is not possible unless diagnostic rachises are present, which, unfortunately, was not the case in these samples. It is possible that at least two varieties of wheat were represented, although this is tentative, based on the morphological variety of cereal grains. Similarly, although cultivated oat cannot be positively identified based on the morphology of the grain alone, many were large and possessed the prominent depression behind the embryo, and 'slipperlike' apex, characteristic of the cultivated variety *Avena sativa*. This, coupled with the presence of abundant diagnostic *Avena sativa* floret bases in a number of the samples, certainly suggests that cultivated, rather than wild, oat was represented.

Other types of diagnostic cereal chaff were markedly scarce and included rare to frequent *Secale cereale* rachis fragments and a single freethreshing *Triticum* sp rachis node from fill 4339 of well 4330. Other less diagnostic cereal chaff included rare to common awn fragments, large (straw?) culm nodes, and *Avena* sp? lemma/palaea fragments, which were particularly abundant in stoke pit 3203 (sample 221), demolition layer 3205, pit fill 381, and well fill 4339. Much of the fine cereal chaff from the latter was silicified, due to the material being burnt at extremely high temperatures (Robinson and Straker 1991). Rare to frequent detached embryos were recorded, however no coleoptiles were observed.

Other edibles/cultivated plants

Other possible cultivated foodstuff was rare and included one or two possible *Pisum sativum* (garden pea) in stoke pit 3202 (sample 205) and pit fill 381, and a single possible *Vicia faba* (broad bean) in demolition layer 3205. In addition, rare *Linum usitatissimum* (flax) seeds were recorded in fill 4306 and the demolition layer (4305) of kiln 4287. However their low numbers do not support any evidence for the processing of flax for linseed or fibre. Instead, the flax seeds, along with the peas and bean, are likely to represent casual invaders of the main crop, perhaps as a result of rotations in planting (Letts 2001). Evidence for collected wild food was similarly scarce and includes rare *Rubus* sect. 2 *glandulosa* (blackberry) in pit fill 381, and rare to frequent *Sambucus nigra* (elderberry) seeds, *Corylus* sp (hazel) nut fragments, *Prunus padus/spinosa* (bird cherry/blackthorn/sloe) stones and possible *Prunus domestica* (wild plum) stone fragments in demolition layer 3205.

The Weed Flora

Weed seeds were particularly abundant in Sample 205 (stoke pit) and the demolition layer 3205. A suite of typical crop weeds were present, including *Agrostemma githago* (corncockle), *Anthemis cotula* (stinking chamomile), *Brassica* sp (mustards/cabbages), *Fallopia convolvulus* (black bindweed), *Persicaria lapathifolia* (pale persicaria), and *Stellaria media* (common chickweed). *Glebionis segetum* (corn marigold) and *Spergula arvensis* (corn spurry) were also recorded in pit 366. The latter is indicative of acid soil conditions. The number of crop weed/ruderal seeds, however, was low (generally <10 seeds per taxa) compared to the high quantities of cereal grains. The only exception was *Chenopodium album* (fathen), which was extremely abundant (>200 seeds) in stoke pit 3202 (sample 205). Although another ubiquitous weed of cultivated land, fathen may have been tolerated by farmers as a minor food source in its own right, especially in times of food shortage (Moffett 2006). Corncockle, however, would certainly not have been tolerated, being highly toxic to humans.

Poaceae (grass family) seeds of varying sizes were fairly well represented in all the samples, although many of the larger seeds (>4mm) are likely to be poorly preserved *Avena* sp grains. *Bromus* sp (brome) seeds were recorded in just one sample, 221 from stoke pit 3202. *Bromus* sp is commonly found in cereal assemblages, and like fathen, may have been a tolerated crop weed. Seeds of grassland taxa, such as *Plantago lanceolata* (ribwort plantain), *Rumex acetosa* (common sorrel), and *Rumex acetosella* (sheep's sorrel) were recorded in a number of the features. Like the

Table 4 The charred plant remains from Kiln Group 3408/3415/3401. All figures are actual counts except those in brackets, which are scored on a scale of 1 to 4, where 1 = <5; 2 = 6–25; 3 = 26–100; and 4 = >100 items. Cbm = ceramic building material

			Kiln Group 3408 (earlier kiln)		Group 3415	Group 3401
		Context No	3203	3203	3205	3201
		Sample No	205	221	204	203
		Fill description	Stoke pit 3202	Stoke pit 3202	Demolition layer of kiln 3408	Kiln floor (last firing?)
		Phase	2	2	2	2
		Date	AD 900–1100	AD 900–1100	AD 900–1100	AD 900–1100
		Sample Size L	20	1.5	36	30
Cereal grains						
Avena sp	cultivated? oat		113	10	188	88
Hordeum vulgare hulled	hulled barley		5			
Secale cereale	rye		111	23	140	26
Triticum sp	free-threshing wheat		151	7	318	150
Indeterminate cereals			158	25	390	180
Total cereal grains			**538**	**65**	**>1000**	**444**
Indeterminate cereal fragments			(3)	(3)	(4)	(3)
Cereal chaff						
Avena sativa floret base	cultivated oat			>100	2 (1 with enclosed grain)	
Secale cereale rachis nodes	rye		4		2	4
Total cereal chaff			**4**	**>100**	**4**	**4**
Lemma/palaea fragments				(4) probably *Avena* sp	(4)	
Avena sp awn fragments			(1)	(2)	(2)	
Triticum sp? awn fragments					(2)	
Culm nodes (large)			(2)		(2)	(1)
Detached embryos			(1)	(2)	(1)	
Edibles/cultivated seeds						
Pisum cf *sativum*	cf garden pea		1			
Pisum sativum/ *Vicia faba*	garden pea/broad bean				1	
Sambucus nigra	elder				2	
Weed Seeds						
Ruderals and arable/cultivated land						
Agrostemma githago	corncockle		9 (incl part of seed head)		4	2
Brassica sp	mustards/ cabbages				4	
Chenopodium album	fat-hen	fertile, well drained soils	220		76	8
Fallopia convolvulus	black-bindweed		2		2	
Persicaria lapathifolia	pale persicaria					2
Grassland						
Poaceae seeds >4mm	grass family		20	27	26	8
Poaceae seeds 2-4mm	grass family		3	18	6	16
Poaceae seeds <2mm	grass family		8		8	2
Rumex acetosa	common sorrel		2			

			Kiln Group 3408 (earlier kiln)		Group 3415	Group 3401
		Context No	3203	3203	3205	3201
		Sample No	205	221	204	203
		Fill description	Stoke pit 3202	Stoke pit 3202	Demolition layer of kiln 3408	Kiln floor (last firing?)
		Phase	2	2	2	2
		Date	AD 900–1100	AD 900–1100	AD 900–1100	AD 900–1100
		Sample Size L	20	1.5	36	30
Damp/wet places						
Carex lenticular	Sedges two-sided seeds		1		18	
Carex trigonous	sedges three-sided seeds				8	
Isolepis setacea	bristle club-rush				20	2
Broad						
Bromus sp	bromes	lighter, well-drained soils		29		
Fabaceae seeds < 4mm	pea family	associated with decreasing soil fertility	2		10	8
Galeopsis tetrahit	common hemp-nettle		1			
Polygonum aviculare	knotgrass		6		2	8
Rumex obtusifolius	broad-leaved dock		4		12	
Rumex sp	docks		2		6	
Indeterminate seeds			11	2	16	4
Unknown seeds					2	
Total weed seeds			**292**	**76**	**223**	**60**
Other plant remains						
Corylus nut fragments	hazel		1		20	
Prunus padus/ spinosa stone	bird cherry/ blackthorn (sloe)				2	
Prunus cf *domestica* stone fragments	wild plum				6	
Poaceae stem fragments (snall)	grass family		(4)		(3)	(2)
Poaceae stem bases	grass family		(1)			
Culm nodes (small)			(2)		(3)	
Other remains						
Charcoal			(4)	(4)	(4)	(4)
Bone (mammal)					(1)	
Cbm			(2)		(1)	(2)
Daub			(2)			
Metal waste						(1)

crop weeds, these were a minor component of the assemblages, and are likely to represent casual invaders of the cereal crops.

Seeds of plants indicative of damp/wet conditions, such as *Carex* spp (sedges) *and Isolepis setacea* (bristle clubrush), were particularly prevalent in demolition layer 3205. A single *Sparganium erectum* (branched burreed) fruit was also recorded in well fill 4339. It is unclear whether these represent seeds from plants growing in the damper margins of cultivated fields, or are the remains of other settlement debris, such as roofing or flooring/bedding.

Table 5 The charred plant remains from Area 4. All figures are actual counts except those in brackets, which are scored on a scale of 1 to 4 where 1 = <5; 2 = 6–25; 3 = 26–100; and 4 = >100 items. Cbm = ceramic building material

		Context No	4306	4319	4305	4339
		Sample No	405	406	404	412
		Feature	Kiln 4287	Pit	Kiln 4287	Well 4330
		Fill description	Kiln base	Contains probable kiln rake out	Demolition deposit?	Contains hammerscale and bone
		Phase	2	2	2	2
		Date	AD 900–1100	AD 900–1100	AD 900–1100	AD 900–1100
		Sample Size L	25L	36L	15L	9L
Cereal grains						
Avena sp	cultivated? oat		224	232	44	18
Hordeum vulgare undiff	barley					1
Secale cereale	rye		84	164	17	37
Triticum sp	free-threshing wheat		84	256	47	23
Indeterminate cereals			92	216	38	30
Total cereal grains			**484**	**868**	**146**	**109**
Indeterminate cereal fragments			(4)	(4)	(3)	(2)
Cereal chaff						
Avena sativa floret base	cultivated oat					3
Secale cereale rachis nodes	rye			6		6
Triticum sp rachis node	free-threshing wheat					1
Total cereal chaff				**6**		**10**
Lemma/palaea fragments						(2) some silicified
Avena sp awn fragments			(2)	(1)	(1)	(3) some silicified
Culm nodes (large)				(2)		(3)
Straw fragments						(4)
Detached embryos			(1)			
Edibles/cultivated seeds						
Linum usitatissimum	flax		4		2	
Weed seeds						
Ruderals and arable/cultivated land						
Agrostemma githago	corncockle		4	2		1
Anthemis cotula	stinking chamomile	heavier calcareous clay soils	4		1	2
Chenopodium album	fat-hen	fertile, well drained soils	8	2	1	1
Fallopia convolvulus	black-bindweed		8	10		
Persicaria lapathifolia	pale persicaria		4		2	
Stellaria media	common chickweed					1
Grassland						
Plantago lanceolata	ribwort plantain					1
Poaceae seeds >4mm	grass family		8	12	1	

		Context No	4306	4319	4305	4339
		Sample No	405	406	404	412
		Feature	Kiln 4287	Pit	Kiln 4287	Well 4330
		Fill description	Kiln base	Contains probable kiln rake out	Demolition deposit?	Contains hammerscale and bone
		Phase	2	2	2	2
		Date	AD 900–1100	AD 900–1100	AD 900–1100	AD 900–1100
		Sample Size L	25L	36L	15L	9L
Poaceae seeds <2mm	grass family		4		1	2
Rumex acetosella	sheep's sorrel	poor, well-drained acid soils	8	2		3
Broad						
Cirsium sp	thistles			2		
Fabaceae seeds < 4mm	pea family	associated with decreasing soil fertility		2	1	2
Galeopsis tetrahit	common hemp-nettle		4			
Luzula sp	wood-rushes					27
Polygonum aviculare	knotgrass		4			1
Ranunculus sp	buttercups					1
Rumex sp	docks				1	
Indeterminate seeds			8		2	2
Total weed seeds			**100**	**66**	**15**	**46**
Other plant remains						
Corylus nut fragments	hazel				1	
Prunus padus/ spinosa stone	bird cherry/ blackthorn (sloe)				1	1
Raphanus pods	radishes		8	6		1
Sparganium erectum fruit	branched bur-reed					1
Poaceae stem fragments (small)	grass family		(1)		(1)	
Other remains						
Charcoal			(4)	(4)	(4)	
Bone (mammal)				(1)	(1)	
Bone (mammal-calcined)				(2)		
Cbm				(2)	(4) comminuted	

THE PRE-LATE SAXON BURIED SOIL 2114

This supposed buried soil contained abundant cereal grains, which, like the late Saxon assemblages, consisted of reasonably equal amounts of positively identified *Avena* sp, *Secale cereale* and freethreshing *Triticum* sp. The sample also contained abundant indeterminate and frequent *Hordeum vulgare* grains. Cereal chaff was more or less absent. Other edibles/cultivated plants were represented by a single possible *Pisum sativum*, a couple of *Raphanus raphanistrum* Ssp. *Raphanistrum* (wild radish) pods, plus frequent *Corylus avellana* nut fragments. Weed seeds, including crop weeds, were generally sparse. Large Poaceae seeds (probably poorly preserved *Avena* sp) were common, and, unlike the late Saxon assemblages, Fabaceae (pea family) seeds, including some positively identified *Vicia sativa* (common vetch) seeds (OA 2012), were abundant.

MEDIEVAL DITCH 2106, FILL 2104

The charred plant remains from this medieval ditch, which has been dated to the 13th to mid 14th century, were very similar to those from the earlier features. Dominated by cereal grains, the sample appeared to contain at least two types of free-threshing *Triticum* and rare *Hordeum vulgare* grains. As with the other samples from Tipping Street, the ditch fill contained a low diversity of weed seeds and very little cereal chaff. Of note, however, were the relatively higher number of seeds from the crop weed *Anthemis cotula*, and abundant Fabaceae seeds. Also of interest is the presence of a couple of probable rachis nodes from the tetraploid free-threshing wheat *Triticum durum/turgidum* (macaroni/rivet wheat), characterised by the trapezoid shape of the rachis internode, and the conspicuous rounded humps below the glume insertion point (Moffett 1991; 2010). It is not possible to distinguish *T. durum* rachis from *T. turgidum*, but it is more likely to be the latter, which is better suited to the British climate. Evidence from southern Britain suggests rivet wheat was cultivated from at least the 11th century (Moffett 1991; 1996).

DISCUSSION

The late Anglo-Saxon features and fills

The charred assemblages investigated during this phase of works at Tipping Street are similar to those taken from other late Saxon kilns/ovens and associated features excavated in the 1970s and 80s (Moffett 2010). Like the current assemblages, a number of the kiln samples from the earlier works were dominated by cereal grains comprised of varying proportions of wheat (possibly two types), rye, oats (including two types of cultivated oat), and barley; these were the main cereal crops of Anglo-Saxon and medieval Britain (Moffett 2006). Surprisingly, barley is poorly represented at Tipping Street, which suggests it did not form a major crop in the area or, due to different handling methods or end-uses, it did not end up as part of the kiln assemblages. There is good evidence to suggest that barley ceased to be an important cereal for human consumption during the middle part of the Anglo-Saxon period in Britain. This may be partly due to a change in preference, but is also probably due to an improvement in climate and the more successful cultivation of bread wheat (Banham 2003). That is not to say, however, that barley did not continue to be cultivated in areas of Britain for both human and animal consumption.

Moffett (2010) discusses in detail the various qualities of the main medieval crops, and it is apparent that the local soils in Staffordshire allowed for the cultivation of the whole range. Rye, in particular, seems to be particularly suited to the sandy soils of Staffordshire and the West Midlands region (Greig 1991; Moffett 1994). In addition, documents from local medieval manors suggest that oat was a major crop during some periods (Moffett 2010). Growing a range of crops is advantageous both in terms of end product and uses, and to reduce the risk of crop failure (Moffett 2006; Smith 2012). Mixed cereal crops, such as maslins (winter wheat and rye) and dredge (spring barley and oats) are often referred to in medieval documents (Moffett 2006). Other factors, such as economic demands, may have also influenced the type and range of crops grown (Greig 1996). Another medieval site in Staffordshire, at 9 High Street, Stone, produced a mixture of waterlogged cereal remains believed to represent the remains of thatch (Moffett and Smith 1996). Older varieties of rivet/macaroni wheat, bread wheat, and rye can reach 6ft or more in height, making them ideal crops for straw thatch, flooring, or bedding (Letts 2001; Moffett and Smith 1996).

Like the material from the previous investigations, three of the samples from Tipping Street contained abundant (fine) chaff, which suggests at least part of the assemblages may represent crop-processing waste being utilised as fuel for firing the kilns. With the exception of one of the stoke pit samples (221), the 'primary' or *in situ* deposits (kiln bases and stoke pits) show a dominance of grains, with little chaff, and moderate amounts of weed seeds. The higher number of weed seeds in stoke pit sample 205 is a result of very abundant fat-hen seeds.

As may be expected, the assemblages from the 'secondary' deposits, such as well fill 4339, pit fill 4319, and demolition layers 3205 and 4305, contain considerably larger charred assemblages, perhaps because they represent material from multiple firing events and/or dumping episodes. By contrast, demolition layer 4305 produced the least material, which may suggest the kiln was cleaned out prior to its abandonment/demolition. The well fill (4339) was slightly anomalous, and, like stoke pit sample 221, was dominated by chaff, including silicified chaff.

Given the dominance of cereal grains in a number of the kiln samples from this and the earlier phase of work, it is tempting to interpret the assemblages as representing the remains of clean, or

nearly clean grain. If this is the case, there are grounds for suggesting that the kilns were being used for both pottery production, and for the parching or drying of cereal grains (for a fuller discussion of the arguments for and against this see Moffett 2010). However, given that cereal chaff may be underrepresented in the assemblages due to differential survival rates, it is difficult to gauge with any accuracy grain to chaff ratios, and thus the components of the pre-burnt product.

A study has shown that the chaff from free-threshing cereals, such as bread wheat and barley, appears to be particularly prone to disintegration when burnt (Boardman and Jones 1990). Indeed, this may explain the general lack of cereal chaff in most medieval plant assemblages (Moffett 1991). All things considered, it is possible that even the grain-dominated assemblages from Tipping Street represents the remains of crop-processing waste. The abundant weed seeds in many of the samples also attest to this, and are likely to represent the waste from winnowing or sieving (Moffett 2010). The larger items, such as the corncockle seed head, the odd pea/bean and radish pod perhaps represent handpicked contaminants of the processed grain.

It is interesting that where chaff is well represented or dominant, it consists mainly of fine chaff such as oat awn fragments and (oat?) lemma/palaea fragments, and/or cultivated oat floret bases. Other chaff, such as rye and wheat rachis nodes, occurs in much smaller quantitites (see below). It is possible that harvested oat was handled/used differently at the site. A 13th- to 14th-century oven/kiln at Parks Yard, Wigan (Lancs.), contained thousands of oat grains, hundreds of oat awn fragments and palaea/lemma fragments, and thousands of weed seeds. It was interpreted as representing oat sheaves from a very weedy crop, which was being dried in the oven/kilns (OA North in prep).

The range of weed seeds recorded in this and the earlier investigations indicate that a range of soil types, from acid sandy soils, to heavier clay soils, were under cultivation. As Moffett (2010) suggests, cultivation was likely to have taken place locally on the nearby well-drained river terraces, perhaps encroaching onto those areas of the floodplain less at risk of flooding.

The Pre-Late Saxon Buried Soil 2114 and the Medieval Ditch 2106, fill 2104

There was very little discernible difference between these and the Anglo-Saxon assemblages; so much so, that it is possible they contain both contemporary and reworked/residual floor debris. This said, evidence from Stafford College, Broadeye, suggests that the whole range of cereals recorded during the Anglo-Saxon period in Stafford continued to be cultivated into the 13th to 14th centuries (Smith 2012). However, a number of distinctive features can be identified. The only charred remains unique to 2114 were rare *Arrhenatherum elatius* Var. *bulbosum* (onion couch grass) tubers. Archaeologically, the presence of onion couch grass tubers usually suggests that there were cleared areas near to the site that were not being agriculturally utilised, and this may support the interpretation of the deposit as a buried soil; however onion couch grass is also an invasive weed of arable crops and may have been harvested along with cereals, although harvesting with a sickle is unlikely to produce the tubers. In addition, the only charred remains unique to the 13th- to 14th-century ditch were a couple of rivet wheat rachis nodes, which is consistent with evidence from elsewhere that rivet wheat was being cultivated in Stafford from the 12th century onwards (Moffett 2010). Another notable difference in the assemblages from the buried soil and medieval ditch is the higher number of legumes, including common vetch. Possibly a sign of decreasing soil fertility, small legumes, such as common vetch, were often grown as a fodder crop during the medieval period in Britain (Moffett 2006, 2010).

CONCLUSION

The charred plant remains from the Anglo-Saxon pottery kilns are likely to represent the remains of crop-processing waste being used as fuel or tinder. The charcoal evidence from Stafford (Druce, this report) suggests that mature oak wood was the main wood used to fire the kilns, and this too may represent a by-product, from the timber industry. The kilns may also have been used for parching or drying cereal grains, or even sheaves, perhaps utilising the heat left over from a pottery firing. However given the difficulties of calculating the grain:chaff:weed seed ratios with Anglo-Saxon and medieval assemblages, this interpretation is open to debate. The reason why oat chaff seems to be better represented at Stafford is unclear and may suggest that oat was handled differently from the other cereal crops. Its dominance in well fill 4339 is due, in part, to silicification. The evidence suggests that a range of cereals, including free-threshing wheat, oat and rye were grown locally, perhaps as a mixed crop. The paucity of barley suggests that it was not grown locally, or was handled differently to the other main cereals. It appears that Stafford was well-placed for both agriculture and

Table 6 The charred plant remains from Areas 1 and 2. All figures are actual counts except those in brackets, which are scored on a scale of 1 to 4 where 1 = <5; 2 = 6–25; 3 = 26–100; and 4 = >100 items. Cbm = ceramic building material

		Context No	381	2114	2104
		Sample No	11	115	118
		Feature	Refuse pit 366	Buried soil	Ditch 2106
		Fill description	Contained pot, bone, slag and hammerscale		
		Phase	2 (Area 1)	1 (Area 2)	4 (Area 2)
		Date	AD 900–1100	Pre-Late Saxon?	13th-mid14th C
		Sample Size L	40	20	40
Cereal grains					
Avena cf *sativa*	cultivated? oat		382	68	90
Hordeum vulgare undiff	barley			7	2
Hordeum vulgare hulled	hulled barley		24		
Secale cereale	rye		378	76	38
Triticum sp	free-threshing wheat		222	68	22
Indeterminate cereals			c 600	179	188
Total cereal grains			**>1600**	**398**	**340**
Indeterminate cereal fragments			(4)	(4)	(3)
Cereal chaff					
Avena sativa floret base	cultivated oat		4		
Secale cereale rachis nodes	rye				2
Triticum durum/ turgidum rachis node	macaroni/rivet wheat				2
Total cereal chaff			**4**		**4**
Indeterminate rachis fragments			(1)		
Lemma/palaea fragments			(2)		
Avena sp awn fragments			(3)		(1)
Culm nodes (large)				(1)	
Detached embryos			(2)		
Edibles/cultivated Seeds					
Pisum cf *sativum*	cf cultivated pea		2	2	2
Rubus sect. 2 *glandulosus*	bramble		2		
Sambucus nigra	elder			1	2
Weed seeds					
Ruderals and arable/cultivated land					
Agrostemma githago	corncockle		6		6
Anthemis cotula	stinking chamomile	heavier calcareous clay soils			18
Chenopodium album	fat-hen	fertile, well drained soils	6		
Glebionis segetum	corn marigold		4		8
Persicaria lapathifolia	pale persicaria		2	2	
Spergula arvensis	corn spurry	calcifuge	2		
Tripleurospermum inodorum	scentless mayweed	fertile, well drained soils			2
Grassland					
Poaceae seeds >4mm	grass family			32	36
Poaceae seeds 2-4mm	grass family		22	4	
Poaceae seeds <2mm	grass family		4		
Rumex acetosa	common sorrel		4		
Damp/wet places					
Isolepis setacea	bristle club-rush		2		

		Context No	381	2114	2104
		Sample No	11	115	118
		Feature	Refuse pit 366	Buried soil	Ditch 2106
		Fill description	Contained pot, bone, slag and hammerscale		
		Phase	2 (Area 1)	1 (Area 2)	4 (Area 2)
		Date	AD 900–1100	Pre-Late Saxon?	13th-mid14th C
		Sample Size L	40	20	40
Broad					
Bromus sp	bromes	lighter, well-drained soils		1	
Fabaceae seeds < 4mm	pea family	associated with decreasing soil fertility	2	90	44
Galium sp	bedstraws			1	
Rumex obtusifolius	broad-leaved dock			4	
Indeterminate seeds			10		
Total weed seeds			**68**	**137**	**118**
Other plant remains					
Corylus nut fragments	hazel			8	4
Indeterminate nut fragments (large)			4		
Prunus padus/spinosa stone fragments	bird cherry/ blackthorn (sloe)		2		
Raphanus pods	radishes			3	
Arrhenatherum elatius Var. *bulbosum* tuber	onion couch grass			1	
Other remains					
Charcoal			(4)	(4)	(4)
Bone (mammal)					(2)
Bone (mammal-calcined)			(2)	(1)	(1)
Cbm			(2)		(1)
Metal waste			(1)		
Heat affected vesicular material				(1)	(2)

timber production (see charcoal report). It would have made perfect economic sense for the local pottery industry to utilise their by-products.

WATERLOGGED PLANT REMAINS (Table 7) *by Kath Hunter and Rebecca Nicholson*

Like the charred plant assemblages, which provide information about arable agriculture and the use of the late Saxon kilns, the waterlogged assemblage from Tipping Street appears to provide evidence for arable crops, weeds and elements that might originate from the immediate environment close to or within the feature. After assessment (OA 2011) one waterlogged sample was prioritised for further recording and analysis. Sample 411, the primary well fill 4344 in timber-lined pit or well 4330, contained a relatively rich and diverse assemblage of waterlogged plant remains likely to reflect material that entered the well with the cereal remains, as well as material from the environment immediately around the feature and material incorporated as a first phase of backfilling. This sample was selected to provide some information about the local environment at the site during the period of kiln use and also to extend the range and types of plants for the location in the late Saxon period. Pit or well 4330 was located immediately to the NE of kiln 4287 and was probably associated with its use. A 1L sample was processed by bucket flotation (washover technique) with the flot retained on a 1mm mesh and the residue on a 0.5mm mesh. The flot and residue from the sample was examined using a Leica and MTL10 stereomicroscope and any identifiable plant remains were extracted and recorded (Table 7). The identification of the plant macrofossils was carried out in comparison with modern reference material and standard reference texts (Cappers *et al*. 2006;

Table 7 The waterlogged plant remains from Area 4, Well 4330

TAXA	COMPONENT	COMMON NAME	NO. ITEMS
Cereals			
cf.Triticum/ secale	grain	wheat/rye type	1
Secale cereale	rachis fragments	rye	10
cf. Secale cereale	rachis fragments	rye type	2
Cereal NFI	grain	Unidentified cereal	1
Cereal NFI	straw internode	Unidentified cereal	1
Cereal NFI	possible straw internode	Unidentified cereal	***
Cereal NFI	straw culm node	Unidentified cereal	1
Cultivated species			
Linum cf.usitatissimum L.	capsule fragment	flax	1
Weeds			
Potentilla sp	achene	cinquefoils	2
Urtica dioica L.	achene	common nettle	2
Urtica urens L.	achene	small nettle	27
Raphanus raphanistrum spp.raphanistrum L.	mericarp fragment	wild radish	1
Persicaria maculosa Gray	achene	redshank	3
*Polygonum aviculare*L.	achene	knotweed	10
Fallopia convolvulus (L.) Love.	Achene	black bindweed.	4
Rumex acetosella spp pyrenaicus (Pourr.) Ackeroyd	achene with tepal	sheep's sorrel	8
Caryophyllaceae	seed		1
Stellaria media (L.) Vill.	seed	common chickweed	18
*Stellaria neglecta*Weihe	seed	greater chickweed	2
Stellaria graminea L.	seed	lesser stichwort	4
Spergula arvensis L.	seed	corn spurry	3
Agrostemma githago L.	seed	corncockle	1
Agrostemma githago L.	seed capsule frag	corncockle	1
Chenopodium sp. .L (Blitum L.)	seed	goosefoots	8
Anagalis arvenis L.		pimpernel	4
Solanum sp. L.	seed	nightshade	1
Stachys sylvatica L.	seed	hedge woundwort	1
Prunella vulgaris L.	seed	self heal	1
Lapsana communis L.	achene	nipplewort	2
Soncus asper (L.) Hill	achene	prickly sowthistle	3
cf.Achillea milifolium	achene		1
Anthemis cotula L.	achene (Charred)	stinking chamomile	9
Glebionis segetum (L.)Fourr.	achene	corn marigold	1
Poaceae indet.	caryopsis	grasses	14
Wet / Damp Places			
Cyperaceae		sedges	2
Eleocharis sp.	nut	spike-rush	1
Carex sp.	nutlet (biconvex)	sedge	2
Carex sp.	nutlet (trigonous)	sedge	6
Other			
Moss	leaf/stem	moss	5
indet	root/stem fragments		***
	leaf/stem fragments	monocotlydon	**
		WL wood	****

Jacomet 1987; Berggren 1981; Beijerinck 1947). The nomenclature for the identification of the plant remains follows Stace (2010).The term seed in this text may refer to achene, nutlet etc.

The sorted portion of the waterlogged flot and residue contained the remains of seeds from around 30 species of plant, predominantly weeds of cultivated, disturbed and waste ground. Sample 411 also included some waterlogged cereal remains from rye (*Secale cereale*), but a larger part of this sample, processed by bulk flotation and dried for the assessment of charred plant remains, included a fairly rich charred and partially charred assemblage of rye, *Avena* sp. (oat) and *Triticum* sp. (wheat) (OA 2012). While cereal remains are not abundant in the subsample processed and sorted for waterlogged remains, the wet flot contained a number of seeds associated with cultivation such as *Agrostemma githago* (corncockle), *Anthemis cotula* (stinking chamomile), *Raphanus*

raphanistrum (wild radish), *Persicaria maculosa* (redshank) and *Lapsana communis* (nipplewort), the latter now a plant of hedgerows and waste ground but archaeologically often found associated with cereals. These were probably contaminants of the cultivated crop. The stinking chamomile, which prefers a heavy base rich soil, and *Spergula arvensis* (corn spurry), which is found growing on sandy soils, suggest the possibility of two different soil types being cultivated. Apart from the cereals, a *Linum usitatissimum* (flax) capsule hints at the cultivation of this crop for oil or fibre. Small numbers of flax seeds have been found in other wells at Tipping Street and elsewhere in Stafford (Moffett 2010).

Plants such as *Urtica dioica* and *U. urens* (common and small nettle), *Stellaria media* (chickweed), *Polygonum aviculare* (knotweed) and *Sonchus* sp. (sowthistle) may also have been growing around the well; stinging nettle in particular quickly colonises waste ground and produces large quantities of seeds which are often the main component in well assemblages (see, for example, Wilson 1981 cited in Moffet 2010). The fact that this sample contains a relatively small number of these seeds may indicate that the area around the well itself was kept relatively clear. Grassland plants were present, including cinquefoil (*Potentilla* sp.). Sheep's sorrel (*Rumex acetosella* spp *pyrenaicus*) and sowthistle (*Sonchus asper*); these are well adapted to light soils and disturbed ground and may have been growing around the site. Several of the seeds were from plants associated with damp places, including *Carex* sp (sedges) and *Eleocharis* sp. (spikerush.) as well as *Stellaria neglecta* (greater chickweed). The presence of *Stachys sylvatica* (hedge woundwort) and *Solanum* sp. (nightshade) may suggest an area of scrub/ woodland or hedgerow nearby. However, these could also have been introduced with the cereal remains as field margin plants or, in the case of the single nightshade seed, have been dropped by a bird.

THE CHARCOAL (Table 8) *by Denise Druce*

Introduction

Following assessment of 59 bulk samples taken during the excavations, recommendations were made for further charcoal analysis of three *in situ* late Saxon kiln deposits and the fill (4319) of a pit believed to contain kiln rake out (OA 2011). The aim of the charcoal study was to investigate the type of wood fuels used for firing the kilns, and to explore any evidence for associated activities.

Methodology

The samples were processed using a modified Siraf flotation machine, the flots being collected onto a 250μm mesh, airdried, and subsampled where necessary. Analysis followed standard procedure where at least 100 fragments >4mm in size were extracted and grouped together based on the characteristics observed in transverse section at up to X40 magnification. Representative fragments of each group were then fractured to reveal both radial and tangential sections, which were examined under a Meiji incidentlight microscope at up to X400 magnification. Identifications were made with reference to Schweingruber (1990), Hather (2000) and modern reference material. Nomenclature follows Stace (2010).

RESULTS

The results of the analysis by fragment count are shown in Table 8. Eight taxa were positively identified, including four to species level. The taxonomic level of identification varied according to the observed genera/family and/or the state of preservation. In many cases the fragments could only be taken to an approximate level of identification due to the similarities of species within genus or subgroup, eg *Quercus* sp (oak) which could be *Q. robur* (pedunculate oak) or *Q. petraea* (sessile oak) in Britain, or *Salix* (willow) and *Populus* (poplar), which are anatomically similar. Maloideae, which is referred to as hawthorntype in the text, could be hawthorn, whitebeam, apple or pear. The similarity of many of the *Prunus* species, including *Prunus avium* (wild cherry), *P. padus* (bird cherry), and *P. spinosa* (blackthorn/sloe) often makes them difficult to tell apart. Similarly, distinguishing between *Alnus glutinosa* (alder) and *Corylus avellana* (hazel) is often difficult if their properties in tangential section are not clear. Many of the *Alnus*/*Corylus* fragments from Stafford, for example, were infused with sediment, making observation difficult.

All four samples were dominated by *Quercus* sp charcoal. Many of the fragments consisted of small roundwood and heartwood. The two samples from the floor of kiln group 3401 and kiln 4287 also contained rare to frequent fragments of shortlived taxa, including *Alnus glutinosa*/*Corylus*

Table 8 Results of the Charcoal analyses from selected late Saxon features from Tipping Street. Figures are actual counts. KEY: u = undetermined maturity; r = roundwood; h = heartwood; s = sapwood

		Area 3		Area 4	
		Kiln Group 3408	Kiln Group 3401	Kiln 4287	Pit
Context No		3203	3201	4306	4319
Sample No		205	203	405	406
Fill description		Stoke pit 3202	Kiln Floor (last firing?)	Kiln base	Contains probable kiln rake out. Abundant >10mm fragments
Phase		2	2	2	2
Sample Size L		20	30	25	36
% >4mm analysed		75%	50%	100%	33%
Alnus glutinosa/ *Corylus avellana*	alder/hazel	7	1	2	7
Alnus glutinosa	alder	5			6
Corylus avellana	hazel	2			
Fraxinus excelsior	ash	cf 1			1
Ilex aquifolium	holly	1			
Maloideae	hawthorn-type	2		1	
Prunus sp	sloe/blackthorn or wild cherry	1			cf 1
Quercus sp	oak total	96	94	96	84
	oak maturity	61u, 2r, 26h, 7rh	60u, 12r, 17h, 5rh	73u, 8r, 14h, 1rs	55u, 9r, 17h, 9rh, 4rs
Salix/*Populus* sp	willow/poplar	7	5		
Indeterminate/bark		17	7	3	10
Total		**128**	**107**	**101**	**119**

avellana, Maloideae, and *Salix*/*Populus*. Stoke pit 3203 and pit fill 4319, however, contained a slightly higher percentage of nonoak taxa, comprising *Alnus glutinosa* and/or *Corylus avellana*, *Fraxinus excelsior* (ash) and *Prunus* sp (sloe/blackthorn or wild cherry). Stoke pit 3202 also contained rare *Salix*/*Populus*, plus a single fragment of *Ilex aquifolium* (holly).

DISCUSSION

The charcoal evidence suggests that oak was the chosen fuel wood for heating the pottery kilns. This would have been a good choice, given that seasoned oak is regarded as a superior fuel wood (Edlin 1949), and would have provided the sustained heat a pottery kiln required (Gale 2007). Calculations based on figures in Domesday Book suggest that Stafford was one of only four counties that still supported over 25% of its natural woodland (Rackham 2003). Given the high demands pottery production would have made on wood fuel, the presence of abundant woodland may have contributed to the development of the Stafford pottery industry. Further evidence suggests that during the Anglo-Saxon period woodland was highly valued as wood-pasture and for construction and fuel. As such, most woodland was likely to have been carefully managed through pasture rotations, pollarding and/or coppicing (Hooke 2003; Rackham 2003).

Much of the oak used to heat the Stafford kilns came from a mature tree or trees over at least 50 years in age (characterised by the presence of tyloses). Although it is possible that mature oaks were felled purely for fuelwood, it is more likely to have come from the branchwood of trees felled for construction, or offcuts from timber manufacturing. Indeed, this seems even more plausible given the labour that would have been required to reduce trunk wood to pieces small enough to fit in the stoke pit or flue entrance of an Anglo-Saxon kiln. Oak was also the favoured fuelwood for medieval pottery kilns at Barnett's Mead (East Sussex) and Clacket Lane (Surrey) (Smith 2002). Robinson (1997, cited in Smith 2002), suggests the by-product of the timber industry was also possibly used at Clacket Lane.

The assemblage producing the most non-oak wood fragments came from stoke pit 3202. It is tempting, therefore, to interpret it as kindling. Wood for kindling was likely to have been collected locally. The presence of alder and possible willow indicates collection from wet areas, such as the nearby river floodplains; Stafford is situated near quite extensive areas of wetlands, e.g. the Doxey

Marshes (Leah 1998). The 'scrubby' taxa, such as holly, hawthorn/blackthorn type would have been collected from woodland margins or possibly hedges.

CONCLUSION

The charcoal evidence from Stafford suggests that mature oak wood was the preferred fuel wood for the pottery kilns. Mature trees would have been highly valued during the Anglo-Saxon period, when timber was the main material for construction. It is plausible, therefore, that the wood used represents the by-product from another industry such as the manufacture of timber.

ANALYSIS OF CHRONOMETRIC RESULTS *by Seren Griffiths, Anne Dodd, Steve Teague, Rebecca Nicholson, Cathy Batt, Sarah Jane Clelland and Gordon Cook*

Introduction

Six radiocarbon results produced at the Scottish Universities Environmental Research Centre (SUERC), and one archaeomagnetic date detailed in Clelland and Batt (2010), were produced on samples from kilns excavated by Oxford Archaeology at the Tipping Street site.

Objectives and sampling strategy

The radiocarbon programme was designed to achieve the following objectives:

1 to provide robust estimates to date the use of the kilns
2 to date contexts with robust association with Late Saxon Stafford-Ware
3 to inform on the role of the site as part of the development of late Saxon Stafford – was the activity at the site related to the documented foundation of the Stafford *burh* by Æthelflæd in AD 913?

Samples were selected to provide robust estimates for the use of the kilns at the Tipping Street site. Shortlived, single entity samples, which had functional associations with the deposits from which they were recovered, were submitted (cf. Ashmore 1999; Waterbolk 1971). These were chosen from deposits which contained late Saxon Stafford Ware with the aid of Bayesian simulation models using the R_Simulate function in OxCal. In addition, a single archaeomagnetic date produced on kiln GRP3408 (Clelland and Batt 2010) was intended to date the last firing of this feature (see below).

Radiocarbon methods, results, and calibration

Samples were pretreated by the acid-base-acid protocol (Stenhouse and Baxter 1983) and CO_2 obtained by combustion in pre-cleaned sealed quartz tubes (Vandeputte *et al*. 1996). The purified CO_2 was converted to graphite (Slota *et al*. 1987) for subsequent AMS analysis using the method outlined in Xu *et al*. (2004) and Freeman *et al*. (2007). SUERC maintains continual programmes of quality assurance procedures, in addition to participation in international inter-comparisons (e.g. Scott 2010), which indicate no laboratory offsets and demonstrate the validity of the precision quoted.

The radiocarbon results are given in Table 9 in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). They are conventional radiocarbon ages (Stuiver and Polach 1977). The calibrations of the results, relating the radiocarbon measurements directly to calendar dates, are given in Table 9 and in Figure 41. All have been calculated using the calibration curve of Reimer *et al*. (2009) and the computer program OxCal (v4.1; Bronk Ramsey 1995; 1998, 2001; 2009). The ranges cited in the text are quoted in the form initially recommended by Stuiver and Polach (1977, but adapted for the increased precision available in later datasets), with the end points rounded outwards to 10 years as the error terms are greater than 25 radiocarbon years. The ranges quoted in italics are *posterior density estimates* derived from Bayesian modelling outlined below. The ranges in plain type in Table 9 have been calculated according to the maximum intercept method (Stuiver and Reimer 1986).

Table 9 Radiocarbon dates produced from the recent Oxford Archaeology work at Tipping Street

<Sample number> (Context number)	Dated material	Context description	Laboratory number	Radio-carbon result	$\delta^{13}C$	Calibrated date range (95.4% confidence; cal AD)	Posterior density estimate (95.4% probable; cal AD; Fig. 9)
Kiln 3408 <205>, (3203)	*Triticum* sp. seed	Fill of stoke pit.	SUERC-38774	1160±30	–22.3 ‰	770–980	*780–950*
	Alnus glutinosa charcoal fragment	Contained Stafford Ware.	SUERC-38773	1230±30	–26.2 ‰	680–890	*760–900*
Kiln 3401 <203> (3201)	*Triticum* sp. seed	Fine grey charcoal and material on kiln floor.	SUERC-38778	1105±30	–25.0 ‰ assumed	880–1020	*880–990*
	Corylus avellana charcoal fragment	Contained Stafford Ware.	SUERC-38779	1130±30	–25.9 ‰	780–990	*880–990*
Kiln 4287 <407> (4338)	*Triticum* sp. seed	Ashy, charcoal-rich base of kiln.	SUERC-38997	1160±30	–23.2 ‰	770–980	*800–980*
<403> (4304)	*Triticum* sp. seed	Contained Stafford Ware.	SUERC-38780	1100±30	–20.1 ‰	880–1020	*880–1010*

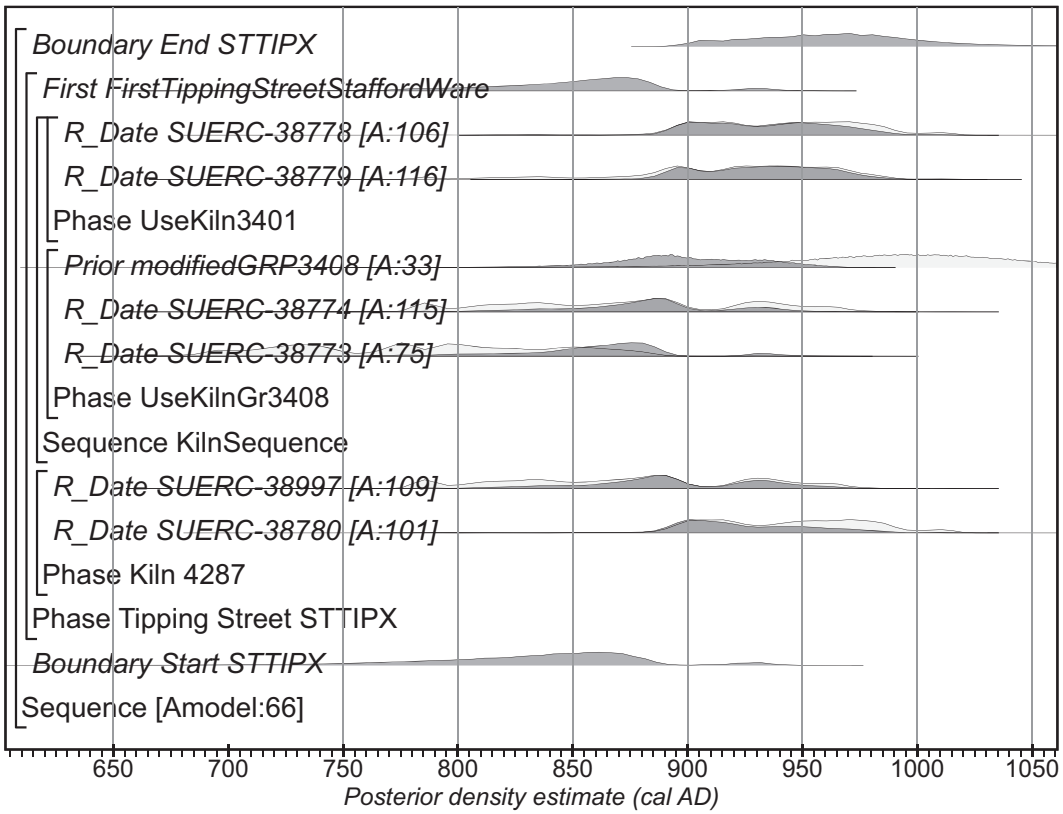


Fig. 41 Probability distributions of dates from Tipping Street

Each distribution represents the relative probability that an event occurred at a particular time. For each of the radiocarbon measurements two distributions have been plotted: one in outline (the result of simple radiocarbon or archaeomagnetic calibration); and a solid one (the output from the chronological model used). The other distributions are estimated from the model.

The large square brackets and OxCal v4.1 CQL2 keywords define the overall model exactly.

The Bayesian Methodological Approach

The archaeomagnetic (Table 10) and radiocarbon measurements from this site have been analysed using a Bayesian statistical model (Buck *et al*. 1991; 1992; 1996). Bayesian modelling imposes a statistical distribution on data, and can result in more precise estimates for radiocarbon and archaeomagnetic dates. In addition, the use of a Bayesian statistical model allows us to estimate the timing of events of archaeological interest that are not directly dated. It is appropriate to impose a statistical distribution on data from the Tipping Street site because they are not independent measurements; they sample activity that was related, in this case associated with the late Saxon activity on the site, and specifically with the use of the kilns. The Bayesian models presented here have been implemented in OxCal v4.1 (Bronk Ramsey 2001; 2009). The program uses a form of Markov Chain Monte Carlo (MCMC) sampling and the MetropolisHastings algorithm. Readers are directed to Bronk Ramsey (2009, and the online manual) for details of the algorithm and program construction.

The posterior density estimates generated from the models presented here are robust, explicit, and probabilistic, and avoid the inherent difficulties of 'visual inspection' of radiocarbon dates (Bayliss *et al*. 2007). However, posterior density estimates are informed by archaeological observations or 'prior information', and as such they are not 'absolute' but will change depending on the interpretation of the most appropriate treatment of the prior information (e.g. Steier and Rom 2000). The algorithms used in the model described below can be derived from the structure shown in the diagrams and the Command Query Language 2 (CQL2) keywords (Bronk Ramsey 2009).

RESULTS

Kiln 3408

Two statistically consistent (T'=2.7; T'5%=3.8; v=1; Ward and Wilson 1978) radiocarbon dates were produced on material from the stokehole (3203) of kiln GRP3408. These results could be of the same actual age, and the dated samples are interpreted as resulting from the last firing of the kiln. SUERC38774 produces a calibrated date range for a wheat seed from the context dating to cal AD 770–980 (95.4% confidence) or cal AD 820–940 (68.2% confidence). The result produced on alder from the stokehole calibrated to cal AD 680–890 (95.4% confidence) or cal AD 710–860 (68.2% confidence; SUERC38773). An archaeomagnetic measurement produced on the fired clay from this kiln (Table 9) gave a calibrated range 866–1089 cal AD (95% confidence; Clelland and Batt 2010). The radiocarbon results and the archaeomagnetic result are statistically significantly different at 95% confidence (T'=6.9; T'5%=6.0; v=2; Acomb=26.9%; An=40.8%; Bronk Ramsey 2009; Ward and Wilson 1978).

Kiln 3401

The results from context (3201), the deposit on the base of kiln GRP3401, are statistically consistent (T'=0.3; T'5%=3.8; v=1; Ward and Wilson 1978), and could be of the same actual age, dating the last firing of the kiln. The result on a wheat seed from this context calibrates to cal AD 880–1020 (95.4% confidence) or cal AD 890–990 (68.2% confidence; SUERC38778). The result on hazel charcoal from this context calibrates to cal AD 780–990 (95.4% confidence) or cal AD 880–970 (68.2% confidence; SUERC38779).

Table 10 The Tipping Street archaeomagnetic date produced for the recent Oxford Archaeology work. NOTE: calibrated ranges, and resultant posterior density estimates have been constrained to be later than 1 AD

Context number	Sampling, and measurement method	Measured samples	Context description	ChRM (°)		Number of samples used for mean calculations	alpha-95	Calibrated date range (95 % confidence; cal AD)
				Dec at Meriden	Inc at Meriden			
Contexts 3403 and 3404	Sampling and measurement Clelland and Batt (2010)	42	Pottery kiln GRP3408 structure.	29.6	65.1	33	3.3	866–1089

Kiln 4287

Two statistically consistent (T'=2.0; T'5%=3.8; v=1; Ward and Wilson 1978) results on two wheat seeds from the floor of kiln GRP4287 estimate the last firing of the feature. SUERC38997 calibrates to cal AD 770–980 (95.4% confidence) or cal AD 820–940 (68.2% confidence). SUERC38780 calibrates to cal AD 880–1020 (95.4% confidence) or cal AD 890–990 (68.2% confidence).

MODEL

All the radiocarbon results from the Tipping Street kilns are not statistically consistent (T'=12.8; T'5%=11.1; V=5; Ward and Wilson 1978), and suggest that the activity sampled from the site took place over a period of time.

The model shown in Figure 41 is based on the interpretation that the three late Saxon kilns represent related activity, and also makes use of the stratigraphic sequence — kiln GRP3401 overlies GRP3408. The archaeomagnetic result from the firing of kiln GRP3408, when calibrated against the current reference curve (Zananiri *et al*. 2007), indicates that the kiln was last fired between either 1000–745 cal BC or cal AD 880–1090 (95.4% confidence). The result produced two distributions due to the nature of the secular variation of the geomagnetic field. Because the dated feature has a morphology which is indicative of late Saxon activity, the calibration has been constrained so that only the portion of the probability distribution which dates to after AD 1 has been included in the model shown in Figure 41.

The model shown in Figure 41 has an acceptable agreement ($A_{overall}$=69.3%) between the radiocarbon results and stratigraphy. However, the archaeomagnetic result has poor individual agreement (A=32.6%); this result is apparently too late for its stratigraphic position. Because the radiocarbon data were produced on single entity, distinct biological entities, which were functionally associated with the deposits from which they were recovered we regard these data as accurate estimates for the last firing of the parent features. In addition, these measurements, when modelled without the archaeomagnetic date, are internally consistent. The archaeomagnetic date itself was produced on a large number of samples (n=33), taken from three different areas of the structure, and it showed no anomalous behaviour on demagnetisation. We considered the possibility that later reheating of structures above Kiln 3408 could have affected its magnetic direction. However, this seemed extremely unlikely given that three different areas of Kiln 3408 were sampled, namely the pedestal, floor, and walls. They all gave the same mean magnetic direction (within the expected precision). When the samples were demagnetised there was no indication of a secondary component, which would have suggested a later heating to a lower temperature. The magnetisation is largely single component, which means that temperatures would have to have exceeded the original heating in all areas sampled. The wall tops are close to the later feature so that might be possible, but the floor is significantly below and, if the kiln infill had all been heated to such a high temperature it would have been evident on excavation. It seems reasonable to conclude that there is no evidence that the magnetisation of the lower kiln had been reset at a later date. The other possibility considered is that there is a previously undetected anomaly in the archaeomagnetic calibration curve at this period.

Although it is not clear at this stage why there is an offset between the archaeomagnetic and the radiocarbon measurements which should date the same event, it was decided to exclude the archaeomagnetic date from the model used for analysis (Fig. 42); the overall model agreement is acceptable ($A_{overall}$=107.7%). It is this alternative model that is employed for the analysis presented here.

The model shown in Figure 42 estimates the start of kiln use at the Tipping Street site in *cal AD 670–900 (95.4% probable)*, probably cal AD 790–890 (68.2% probable; Start STTIPX; Fig. 42). From the sample available, the estimate for the end of use of kilns at the Tipping Street site is cal AD 890–1070 (95.4% probable), probably cal AD 900–990 (68.2% probable; End STTIPX; Fig. 42). The duration of activity represented by the last firing of all the kilns is estimated as 0–340 years (95.4% probable), probably 40–210 years (68.2% probable; Duration STTIPX; Fig. 43).

There are relatively few data in this model, and further appropriate, single-entity short-lived samples robustly associated with activity in late Saxon Stafford would assist in exploring this pattern.

From the currently available sample of data, it is highly probable (*98.8% probable*) that the posterior density estimate for the start of the kiln use sampled at Tipping Street occurred before the historically attested establishment of the *burh* in AD 913 (Fig.44). It is quite probable (*67% probable*) that the posterior density estimate for the start of activity on the Tipping Street site occurred in the 9th century cal AD (Fig. 45). It is highly probable (*90% probable*) that the Tipping Street kilns were established before the Viking raids documented in AD 874 (Ford 1988–89; Fig. 46). It

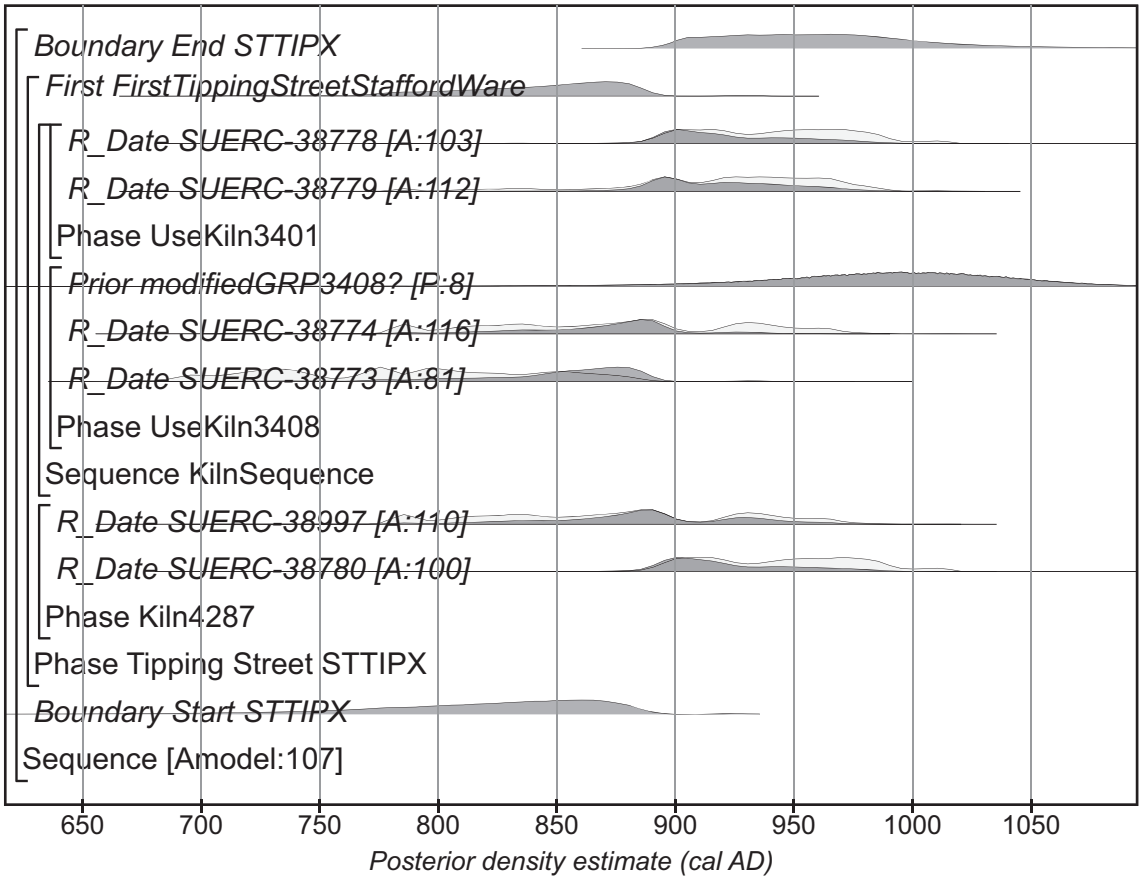


Fig. 42 An alternative model for the probability distributions from Tipping Street

In this model a revised interpretation is made that the archaeolomagnetic event sampled by GRP3408 is actually the firing of kiln GRP3401.

The large square brackets and OxCal v4.1 CQL2 keywords define the overall model exactly.

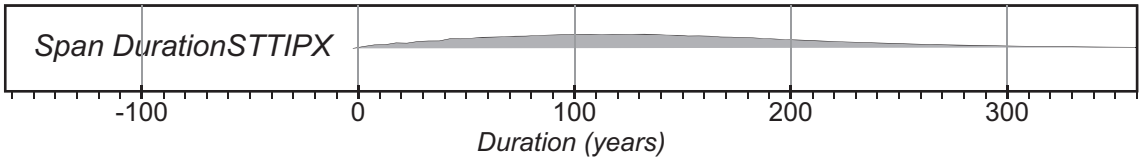


Fig. 43 The duration of the interval between Kilns 3408 and 3401 and the duration of activity samples from the Oxford Archaeology radiocarbon results from Tipping Street, as calculated in the model shown in Fig. 42

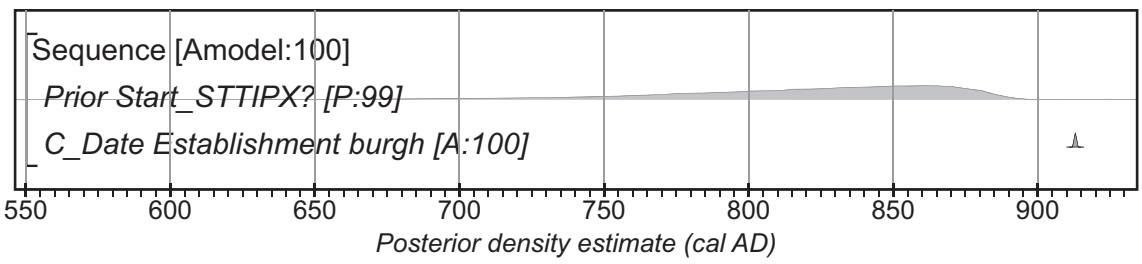


Fig. 44 The probability that the posterior density estimate for the start of activity at Tipping Street (Fig. 42) occurred before the date of the establishment of the *burh* in AD 913

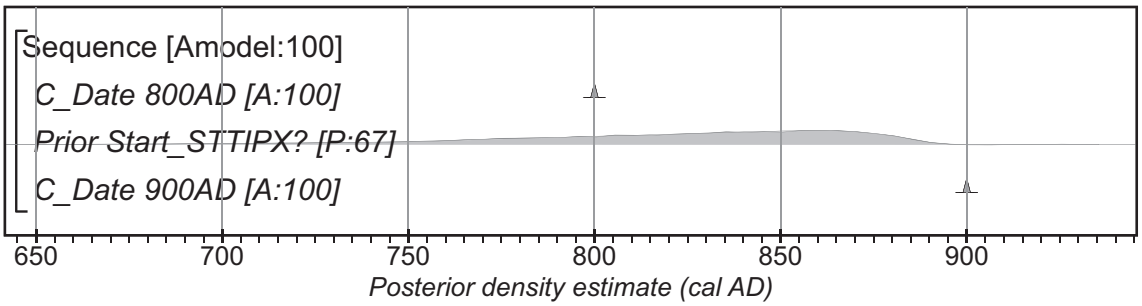


Fig. 45 The probability that the posterior density estimate for the start of activity at Tipping Street (Fig. 42) occurred in the 9th century AD

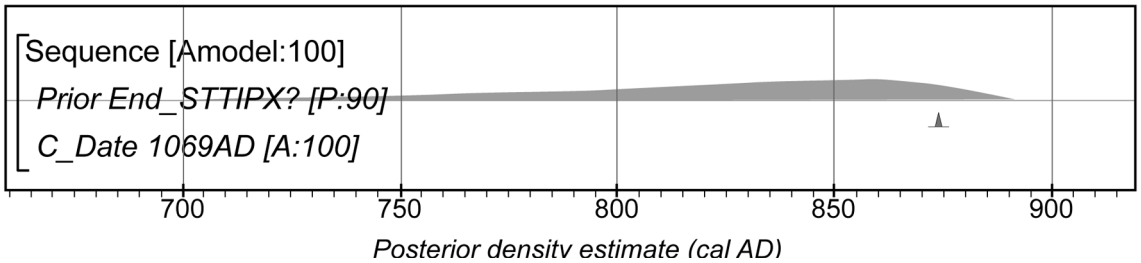


Fig. 46 The probability that the posterior density estimate for the start of activity at Tipping Street (Fig. 42) occurred before the date of Viking raids attested in AD 874

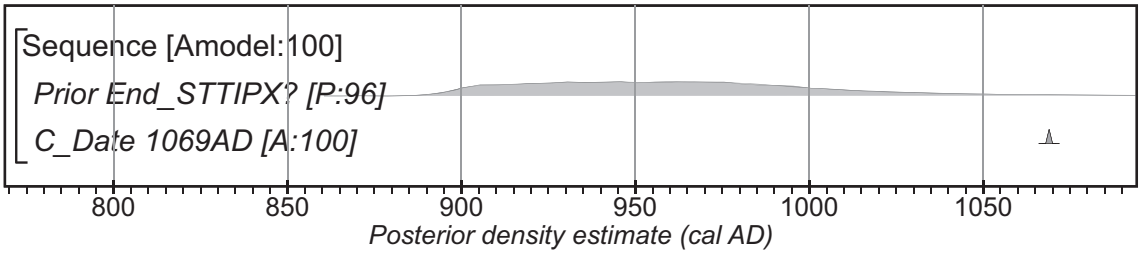


Fig. 47 The probability that the posterior density estimate for the end of activity at Tipping Street (Fig. 42) occurred before the date of the post-Conquest revolts in AD 1069

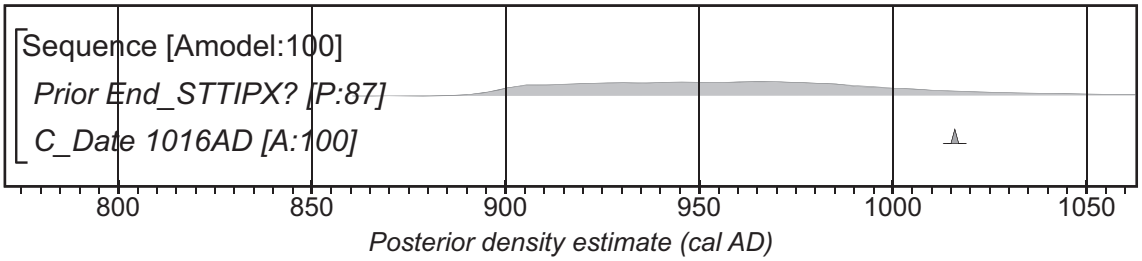


Fig. 48 The probability that the posterior density estimate for the start of activity at Tipping Street (Fig. 42) occurred before the date of the raids in Staffordshire by Edmund Ironside in AD 1016

is highly probable (*96.1% probable*) that the posterior density estimate for the end of activity at the Tipping Street site occurred before the historically attested post-Conquest revolts in AD 1069 (Fig. 47). It is also probable (*87.4% probable*) that the posterior density estimate for the end of activity at the Tipping Street site occurred before the historically attested raids on the region by Edmund Ironside in AD 1016 (Fig. 48).

CONCLUSIONS

From the currently available data, it is most probable (*67% probable*) that the activity at Tipping Street sampled here began in the 9th century cal AD (Fig. 45). It is highly probable (*98.8% probable*) that the activity at the site began before the establishment of the *burh* in AD 913 (Fig. 44). Further data are required to explore the chronological development of late Saxon Stafford. Further discussion of the context of these dates in late Saxon Stafford is provided below.

It has been suggested that the kilns at the site were used for the production of Stafford Ware, but the interpretation of the features as kilns for the *manufacture* of the pottery may benefit from being revisited. The quantity of grain recovered from the featres may suggest that they were used, at least at the end of their lifecycle, as grain driers or bread ovens, though they may have fulfilled other functions earlier in the history of their use. This said, all the contexts dated by radiocarbon (3203), (3201), and (4338) (and other contexts from the kiln sequences) contained material identified as Stafford Ware (Oxford Archaeology archive). In addition, Stafford Ware has been recovered from the deposits stratified *between* kiln GRP3408 and the overlying kiln GRP3401.

Given the material culture recovered from the dated context the posterior density estimates for the site should also provide posterior density estimates for the currency of the use of Stafford Ware on the site, although perhaps not the demonstrable manufacture of Stafford Ware here.

This work has raised an interesting issue with regard to the relationship between the radiocarbon and archaeomagnetic dates which can not be entirely resolved here. Dating similar features in future is a priority, and based on the results presented here it is suggested that a programme of Bayesian analysis is considered at the outset of any excavation, to allow targeted radiocarbon and archaeomagnetic sampling.

CHRONOLOGICAL CONTEXT OF TIPPING STREET IN LATE SAXON STAFFORD and the CURRENCY OF STAFFORD WARE

by Seren Griffiths and Paul Linford

Introduction

This section provides a review of the evidence for the date of the start of late Saxon activity in Stafford and the chronology of Stafford Ware.

Methods

Radiocarbon samples dated before the start of this project were pre-treated and measured as indicated in Table 11 and calibrated as outlined above. Archaeomagnetic samples were collected using the disc method (Clark *et al*. 1988) and partially demagnetised as outlined in Table 12 to remove secondary magnetisation components. A mean thermoremanent magnetisation direction was established for each feature and this was adjusted to that which would have pertained at Meriden, the central reference location, for comparison with the UK calibration curve. For the purposes of this report the original archaeomagnetic measurements have been recalibrated using the most recent calibration curve for Britain (Zananiri *et al*. 2007) and the RenDate program (Lanos *et al*. 2005; Linford pers. comm. 2012). All the archaeomagnetic results analysed here, which are associated with Saxon material culture, have been constrained as part of the calibration process to postdate AD 1. Bayesian modelling was carried out as outlined above. Data have been incorporated into the models based on the nature of the dated samples, and the archaeological associations outlined above and below.

Data

In addition to the results produced from the Oxford Archaeology intervention at Tipping Street, several other Saxon sites have produced radiocarbon and archaeomagnetic dates; these include dates robustly associated with Stafford Ware (Tables 11 and 12; Carver 2010). Two models are presented below, one of which presents data associated with late Saxon activity in Stafford; the other provides a chronological currency model for late Saxon Stafford Ware from the town as a whole and another findspot.

Other late Saxon Stafford radiocarbon dates

St Mary's Grove (ST29)

Three radiocarbon dates (HAR7039–41) were produced on charcoal from a single sample taken from a Saxon grain-drying kiln or baking oven (Feature 584, S12) at St Mary's Grove. The dated material was not identified to species level and could have included charcoals with inbuilt 'old wood' offsets (Bowman 1990). This said, the results are statistically consistent (T'=3.5%; T'5%=6.0; v=1; Ward and Wilson 1978), and this could be taken to indicate that measurements include limited material with significant inbuilt offsets. A relatively neutral approach is taken here and the results are all included as *termini post quos* in the model for late Saxon Stafford. While Stafford Ware was recovered from the St Mary's Grove site, the deposit from which the radiocarbon sample was recovered does not appear to have been robustly associated with Stafford Ware.

Bath Street (ST34)

Late Saxon activity at Bath Street comprised a smithy and/or stable area, from which deposits produced Stafford Ware (Carver 2010 FR5.3). A single radiocarbon result was produced on charcoal from a deposit which may have represented a charcoal spread/possible hearth, or perhaps a posthole (cf. Carver FR5.3 and Carver FR8.7; Table 11). This result has been included in the model presented here as a *terminus post quem* for late Saxon activity. From the archive reports, it does not appear that Stafford Ware recovered was robustly associated with this deposit.

St Bertelin's church (ST01)

Three results were produced on samples recovered from St Bertelin's church. The taphonomy of the charcoal used for Birm136a and b is uncertain (Carver 2010, 26), and the oak coffin dated by Birm137 has a potential inbuilt offset. The nature of these results means that they have been included in the model for late Saxon Stafford as *termini post quos* for activity associated with the use of the cemetery.

Other chronometric data robustly associated with Stafford Ware

Radiocarbon and archaeomagnetic dates exist from several sites located in the area that Carver (2010) identifies as the centre of Stafford Ware production.

Tipping Street North (ST32)

Kiln F238 produced Stafford Ware including material decorated with '70% squares, some lozenge, incised lines, 4 sherds thumbed strips containing punched circles'. The material mainly comprised '…cooking pots, some bowls, many show possible lid seatings' (Cane in Carver 2010, FR8.2). Charcoal samples from the last firing of the stokehole of the kiln were used to produce two radiocarbon measurements. The excess charcoal from HAR8239 was produced on *Quercus* sp. sapwood (92.7%), and *Ilex* sp. (7.3%) (Table 11; Carver 2010, FR8.7). The composition of the excess material indicates that, if the dated material had the same composition, it did not include an inbuilt 'old wood' offset. HAR8240 was produced on material that was dominated by *Quercus* sp. heartwood (Table 11; Carver 2010, FR8.7), and which might therefore include an inbuilt offset. This result has been included as a *terminus post quem* in the models presented below. This said, the results from kiln 2, F238, are statistically consistent (T'=0.1; T'5%=3.8; v=1; Ward and Wilson 1978), and therefore any offset may not be significant.

Archaeomagnetic samples from this feature were taken by A. J. Clark to date its last firing. The samples' behaviour suggests that any measurement should not be treated as reliable (A. J. Clark archive; Linford pers. comm. 2012; Table 12); the deposit was probably subject to post-firing disturbance. This result has not been included in the model estimating the currency of Stafford Ware.

Charcoal from the stokehole of kiln F246 was used to produce two radiocarbon dates. The kiln produced Stafford Ware including material described as '99% thumbed strips containing punched circles usually quadranted, 1 sherd incised lines'. Forms were '…as F238, although the decorated sherds seem to come from large jars and strap handled pitchers' (Cane in Carver 2010, FR8.2). In addition, this feature cut a pit (F387) that contained Stafford Ware (Carver 2010, 77). Of the excess charcoals from HAR8237 93% comprised *Quercus* sp. sapwood, and so the result is unlikely to include an inbuilt offset. HAR8238 was identified on the original sample submission forms (English Heritage archive) only as 'burnt wood'. The result therefore has been treated as a *terminus post*

Table 11 Legacy radiocarbon dates from other sites which are associated with late Saxon activity in Stafford

Site Sample number/ Context number	Measurement method	Dated material	Context description	Laboratory number	Radiocarbon result	$\delta^{13}C$	Calibrated date range (95.4% confidence; cal AD)	Posterior density estimate (95.4% probable; cal AD; Fig. 9)
Tipping Street North ST32								
Well sample	Standard LSC (Otlet 1977; 1979; Otlet and Warchal 1978; Tamers 1965)	Wood	Wood from timber lining of well, earliest fills of which contain medieval material culture. *TPQ* construction of well, not robustly associated with late Saxon activity.	HAR-5292	690±70	–30.5‰	1210–1410	n/a
F238 (kiln 1)	Higher precision LSC (Otlet 1977; 1979; Otlet and Warchal 1978; Tamers 1965; Otlet and Polach 1990)	Sample 32175301. Charcoal; remaining subsample of thin slivers identified; *Quercus* sp. sapwood (92.7%); *Ilex* sp. (7.3%); remainder unidentified	Burnt context just inside stokehole of Stafford Ware producing kiln F238, which is similar to kiln F246. Kiln is associated with pits containing very large amounts of Stafford Ware. Kiln produced Stafford Ware with "70% squares, some lozenge, incised lines, 4 sherds thumbed strips containing punched circles. Mainly cooking pots, some bowls, many show possible lid seatings" (Cane in Carver 2010d). Probably accurate estimate for the age of firing.	HAR-8239	1140±40	–26.0‰	770–990	*800–990*
	Higher precision LSC (Otlet 1977; 1979; Otlet and Warchal 1978; Tamers 1965; Otlet and Polach 1990)	Sample 32175302. Charcoal; remaining subsample identified; *Quercus* sp. heartwood (88.2%); *Quercus* sp. sapwood (11.8%); remainder unidentified	Burnt context just inside stokehole of Stafford Ware producing kiln F238, which is similar to kiln F246. Kiln is associated with pits containing very large amounts of Stafford Ware. Kiln produced Stafford Ware with "70% squares, some lozenge, incised lines, 4 sherds thumbed strips containing punched circles. (*continued over*).	HAR-8240	1120±40	–26.0‰	780–1020	*810–1020 (94.2% probable)*

Table 11 (*contd*.)

Site Sample number/ Context number	Measurement method	Dated material	Context description	Laboratory number	Radiocarbon result	$\delta^{13}C$	Calibrated date range (95.4% confidence; cal AD)	Posterior density estimate (95.4% probable; cal AD; Fig. 9)
F238 (kiln 1) (*contd*.)			Mainly cooking pots, some bowls, many show possible lid seatings" (Cane in Carver 2010d). Sample may have inbuilt 'old wood' offset. *TPQ* the age of firing					
F246 (kiln 2)	Higher precision LSC (Otlet 1977; 1979; Otlet and Warchal 1978; Tamers 1965; Otlet and Polach 1990)	Sample 32151601. Charcoal; remaining subsample of thin slivers identified; *Quercus* sp. sapwood (92.96%); *Quercus* sp. heartwood (7.04%); remainder unidentified	From context, just inside the stokehole, representing the last firing of a kiln producing Stafford Ware. HAR-8238 was produced on material from the same context. Similar to kiln F238. Kiln produced Stafford Ware with "99% thumbed strips containing punched circles usually quadranted, 1 sherd incised lines. [Forms were] as F238, although the decorated sherds seem to come from large jars and strap handled pitchers" (Cane in Carver 2010d). Cut pit (F387) also containing Stafford Ware (Carver 2010a, 77). Probably accurate estimate for the age of firing.	HAR-8237	1150±40	–25.5‰	770–990	*800–990*
	Higher precision LSC (Otlet 1977; 1979; Otlet and Warchal 1978; Tamers 1965; Otlet and Polach 1990)	Sample 32151602. Burnt wood.	From context, just inside the stoke hole, representing the last firing of a kiln producing Stafford Ware. HAR-8237 was produced on material from the same context. Similar to kiln F238. Cut pit (F387) also containing Stafford Ware (Carver 2010a, 77). *TPQ* for the age of firing.	HAR-8238	1140±40	–25.6‰	770–990	*770–990*

Table 11 (*contd.*)

Site Sample number/ Context number	Measurement method	Dated material	Context description	Laboratory number	Radiocarbon result	$\delta^{13}C$	Calibrated date range (95.4% confidence; cal AD)	Posterior density estimate (95.4% probable; cal AD; Fig. 9)
Tipping Street South ST17								
	Standard LSC (Otlet 1977; 1979; Otlet and Warchal 1978; Tamers 1965)	Mainly hazel/alder charcoal with some ash and oak. All from mature timbers (Carver 2010e).	ST 17 listed as *producing* "lozenge [decorated] mainly cooking pots, some bowls, few show lid seatings" (Cane in Carver 2010d). From a layer of charcoal associated with a late 10th century pottery kiln, sealing a later of charcoal and ash and two postholes (Jordan *et al.* 1994). *TPQ* firing of context.	HAR-3039	1160±90	–26.1	660–1030	*680–1020*
St Mary's Grove ST29								
Feature 584 S12	Standard LSC (Otlet 1977; 1979; Otlet and Warchal 1978; Tamers 1965)	Sample 29224701. Burnt wood, grain and plant remains.	Material recovered from a context probably representing the last firing of a chamber of a grain-drying kiln or baking oven (Carver 2010b). One of a series of four similar structures. Pottery and animal bone recovered from the feature, but not identified in Carver (2010b). *TPQ* last firing kiln.	HAR-7039	1270±70	–25.9‰	640–940	*640–900 (94.3% probable)*
	Standard LSC (Otlet 1977; 1979; Otlet and Warchal 1978; Tamers 1965)	Sample 29224702. Wood, grain and plant remains.		HAR-7040	1120±70	–26.3‰	710–1030	*770–1030 (93.4% probable)*
	Standard LSC (Otlet 1977; 1979; Otlet and Warchal 1978; Tamers 1965)	Sample 29224703. Wood, grain and plant remains.		HAR-7041	1310±90	–25.6‰	570–940	*560–900 (93.9% probable)*
Sample 29225301	Standard LSC (Otlet 1977; 1979; Otlet and Warchal 1978; Tamers 1965)	Wood, grain and other organic remains	Fill of a posthole forming part of a four-post structure sealed by Romano-British material culture. *TPQ* use of the four-post structure.	HAR-7042	2290±70	–24.2‰	Cal BC 510–200	n/a

Table 11 (*contd.*)

Site Sample number/ Context number	Measurement method	Dated material	Context description	Laboratory number	Radiocarbon result	$\delta^{13}C$	Calibrated date range (95.4% confidence; cal AD)	Posterior density estimate (95.4% probable; cal AD; Fig. 9)
Bath Street ST34 Sample 34108201	Standard LSC (Otlet 1977; 1979; Otlet and Warchal 1978; Tamers 1965)	Charcoal, remaining subsample consisted of large volume of charcoal but most fragments too small to identify; *Quercus*, sp. heartwood (85.4%); *Corylus* sp. (14.6%); remainder unidentified	Charcoal spread or possible hearth (Carver 2010e) but in other documents listed as "post-hole backfill" (Carver 2010c); uncertain association with Stafford Ware. *TPQ* formation of context.	HAR-5291	1320±70	–27.1‰	600–880	*600–880*
St Bertelins ST01								
–	GPC (using AAA protocol; Shotton *et al*. 1967). True replicate of Birm-136b (measurement made on separate portion of same material but methane prepared from different hydrogen sources).	Charcoal	'Associated' with wood believed cruciform coffin of St Bertelin. *TPQ* uncertain activity. ?construction of coffin.	Birm-136a	1105±90		720–1040 (1110±73; T'=0.0; T'5%=3.8; ??=3.8)	*720–1030*
–	GPC (using AAA protocol; Shotton *et al*. 1967). True replicate of Birm-136a (measurement made on separate portion of same material but methane prepared from different hydrogen sources)			Birm-136b	1120±120			
–	GPC (using AAA protocol; Shotton *et al*. 1967).	Oak	Believed part of cruciform coffin of St Bertelin. *TPQ* coffin construction.	Birm-137	770±78		1040–1390	*960–1200 (94.7% probability)* (poor individual agreement index A=23.0%)

Table 12 Legacy archaeomagnetic results from late Saxon features from Stafford. NOTE: Calibrated ranges and resultant posterior density estimates have been constrained to be later than 1 AD

Site Sample number/ Context number	**Sampling, and measurement method**	**Measured samples**	**Context description**	**ChRM (°)** Dec at Meriden	Inc at Meriden	**Number of samples used for mean calculations**	**alpha-95**	**Calibrated date range (95 % confidence; cal AD)**	**Posterior density estimate (95.4% probable; rounded out to decade; cal AD; Fig. 41**
Tipping Street North ST32									
F238 (kiln 1)	Sampling and measurement A. J. Clark c1984	14	Disturbed context from Kiln 238	18.8	61.6	7	3.7	-	- result not regarded as reliable (Linford pers. comm. 2012)
F246 (kiln 2)	Sampling A. J. Clark c1984; measurement Linford 2003 — sample measurements after 5mT partial demagnetisation	20	Samples from Kiln 246	22.3	68.2	17	2.4	774–1055	*820–1050*
Salter Street ST56									
Kiln 1	Sampling method A. Clark *et al.* (1988); measurement GeoQuest Associates (1995)	12	An area of reddened clay	15.9	54.6	2	5.7	-	- result not included in model; not robustly associated with Saxon activity
Kiln 2	Sampling method A. Clark *et al.* (1988); measurement GeoQuest Associates (1995)	13	Context 382; walls, floor and firebars of well-preserved pottery kiln	24.1	67.6	11	2.8	792–1067	*830–1050*

quem for the firing of the feature. This said, the two results from the F246 are statistically consistent (T'=0.0; T'5%=3.8; v =1; Ward and Wilson 1978), and this sample may therefore not include a significant inbuilt offset.

Archaeomagnetic samples from F246 were taken by A. J. Clark. These were re-measured by Linford in 2003 (Linford pers. comm. 2012; Table 12). Analysis of coercivity spectra by partial demagnetisation and the tight grouping of the individual samples' characteristic remanence directions indicate that the mean remanent direction provides a robust measurement of the last firing of the hearth.

Tipping Street South (ST17)

A single radiocarbon result (HAR3039) was produced on a charcoal sample from a Saxon pottery kiln excavated at Tipping Street South. The pottery assemblage included decorated material described as 'lozenge [decorated] mainly cooking pots, some bowls, few show lid seatings' (Cane in Carver 2010, FR8.2). The nature of the dated sample (Table 11) means that the result has been employed a *terminus post quem* in the models presented below.

Salter Street (ST56) (unpublished excavation; Blake pers. comm. 2012)

Two archaeomagnetic results were produced from Salter Street (Table 12). The dated features were identified as '…a well-preserved pottery kiln of possible Anglo-Saxon date together with an area of reddened clay marking the position of a further kiln of uncertain age' (GeoQuest Associates 1995). The well-preserved pottery kiln was a single flue Musty type 1b, which exclusively produced Stafford Ware (Clark 1998, 61; Ford 1998–9, 18). The kiln is of additional interest because the skeletal remains of a dog were recovered from the base of the feature (Clark 1998), a practice of deposition which has parallels with the treatment of human skeletal remains recovered from Tipping Street kilns (cf. Carver 2010). Some details of the unpublished excavation that followed the evaluation are reported in Garner (1994; Blake pers. comm. 2012) and by Clark (1998). The archaeomagnetic results are reported by GeoQuest Associates (1995; Walker pers. comm. 2012; Table 12). The archaeomagnetic date on the Saxon kiln dates its last firing. The other feature represents much later activity on the site; this result therefore has not been included in the models for late Saxon activity or the currency of Saxon Stafford ware.

Other chronological information for Saxon Stafford Ware

Chester hoard

Ford (1995, 29) describes a Stafford Ware cooking pot recovered from Chester, which produced 'a coin hoard dating to AD 972–3'. The coins from this vessel are described as dating to the reign of Edgar. A currency for the coins of AD 959–75 is included in the model for Stafford Ware below to reflect this. Because either the pot or the coins, or both could be old before they were deposited, there is an uncertain association between the date of the coins and the date of the currency of the vessel. In terms of estimating the *start* of the use of Stafford Ware a conservative interpretation is used here; the coins may provide a *terminus post quem* for the pottery type. Further work on the likely date of deposition of the assemblage, and the age profile of coins in the assemblage, could allow the inclusion of an age estimate in a model as an active likelihood on the estimate for the start of deposition.

RESULTS

A model of late Saxon Stafford

A relatively limited number of active data are included in the model for the chronology of late Saxon Stafford (Fig. 49). Given the results of this model, it may be worth exploring further the development of late Saxon Stafford with the commissioning of further appropriate single entity, short-life samples, robustly associated with diagnostic material culture and analysed within a Bayesian chronological model from sites in Stafford, as part of a regional research priority.

A model of the currently available evidence for the chronology of late Saxon Stafford is shown in Figure 49. This model has acceptable agreement ($A_{overall}$=80.3%). From the currently available evidence, activity at late Saxon Stafford began in cal AD 680–890 *(95.4% probable),* most probably in *cal AD 760–860 (68.2% probable;* Start Late Saxon Stafford*;* Fig. 49). From the currently available sample, presented in the model outlined above, it is highly probable that the start of late

Saxon activity in Stafford occurred before AD 900 and the establishment of the Saxon *burh* in AD 913 (*pace* Carver 2010); it is currently estimated as *99.9% probable* that activity in late Saxon Stafford occurred before AD 900. It is *70.9% probable* that the current estimate for the start of late Saxon activity (Fig. 49) occurred in the century between AD 750 and AD 850. This interpretation derives from the re-analysis work on the archive samples from Tipping Street North, and from the newly commissioned radiocarbon results from the Oxford Archaeology work at Tipping Street. The information about sample composition from the Tipping Street North and Bayesian statistical analysis was not available to Carver (2010), and together with the newly commissioned Oxford Archaeology results, allows a reappraisal of the chronological development of the late Saxon activity at Stafford. This is suggestive of a different history of development than that which suggests the foundation of the town with the *burh*. As outlined above, there are relatively few data in this model, and they predominantly originate from Tipping Street, and from within that the Oxford Archaeology site on Tipping Street. Further radiocarbon data that sample evidence for the chronology of late Saxon settlement across the area of Stafford would allow us to assess in more detail how robust this pattern is, and how much it reflects late Saxon Stafford as a whole.

The end of this phase of activity is less archaeologically meaningful, as data are only included in the model if they are associated with late Saxon activity, and activity is historically attested to have continued in the town *after* the Norman Conquest. The end of the sample of data associated with late Saxon activity occurred in cal AD 970–1220 *(95.4% probable*; or cal AD 1030–1110 *68.2% probable;* End Late Saxon Stafford; Fig. 49).

Excluding the results produced from the recent Oxford Archaeology interventions in the town, only three other results from Saxon Stafford, all from Tipping Street North (ST32), demonstrably provide robust, accurate estimates for late Saxon activity. Feature F238 was probably last fired to produce Stafford Ware in cal AD 800–990 *(95.4% probable*; or cal AD 870–980 *68.2% probable;* HAR8239*;* Fig. 49). Two estimates for the firing of feature F246 are provided by a radiocarbon and an archaeomagnetic date. The estimate for the last firing provided by the radiocarbon date is cal AD 800–990 *(95.4% probable*; or cal AD 860–970 *68.2% probable;* HAR8237; Fig. 49), while the estimate for the last firing from the archaeomagnetic date is *cal AD 820–1050 (95.4% probable*; or cal AD 880–1000 *68.2% probable; F246 calibration;* Fig. 49).

The short-lived posterior density estimates shown in Figure 50 illustrate that the results from the recent Oxford Archaeology intervention are not atypically early; they are consistent with late Saxon activity, which is also represented by results on short-lived samples from Tipping Street North (ST32). The first dated events from these two sites overlap at both 95.4% and 68.2% probability.

Given the currently available evidence, it is most probable that there was an interval of at least generation between the first estimate for late Saxon Stafford and the establishment of the *burh* in AD 913; there is a Difference of 30–240 years *(95.4% probable)*, and most probably 50–150 years *(68.2% probable)* between the estimate for the start of activity associated with late Saxon Stafford (Start Late Saxon Stafford; Fig. 49) and AD 913. Further appropriate results robustly associated with late Saxon Stafford would augment our understanding of this initial chronology of the development of the location.

A model of the chronology of Saxon Stafford Ware

A model of the currently available evidence for the chronology of data robustly associated with the production or use of late Saxon Stafford Ware is shown in Figure 51. This model has good agreement ($A_{overall}$=124.3%). From the available evidence, the first use of Stafford Ware occurred in cal AD 740–890 (*90.5% probable*), most probably in cal AD 800–880 *(68.2% probable;* Start Stafford Ware*;* Fig. 51). Because Stafford Ware actually went out of use, the end of the phase shown in Figure 51 may be an archaeologically meaningful estimate for the end of use of this pottery type. From the available data Stafford Ware went out of use in cal AD 950–1050 *(95.4% probable),* most probably in cal AD 960–1010 *(68.2% probable;* End Stafford Ware*;* Fig. 51). The available data indicate that Stafford Ware was in use for 50–210 years *(95.4% probable),* most probably 80–150 years *(68.2% probable;* Duration Stafford Ware; Fig. 52). It is highly probable that the manufacture of Stafford Ware ended before the Norman Conquest; it is *98.3% probable* that *End Stafford Ware* occurred before AD 1066. From the currently available data it is quite probable that Stafford Ware went out of use before the 11th century AD; it is *72.9% probable* that *End Stafford Ware* occurred before AD 1000. Further appropriate chronometric data would augment our understanding of the development of this pottery industry.

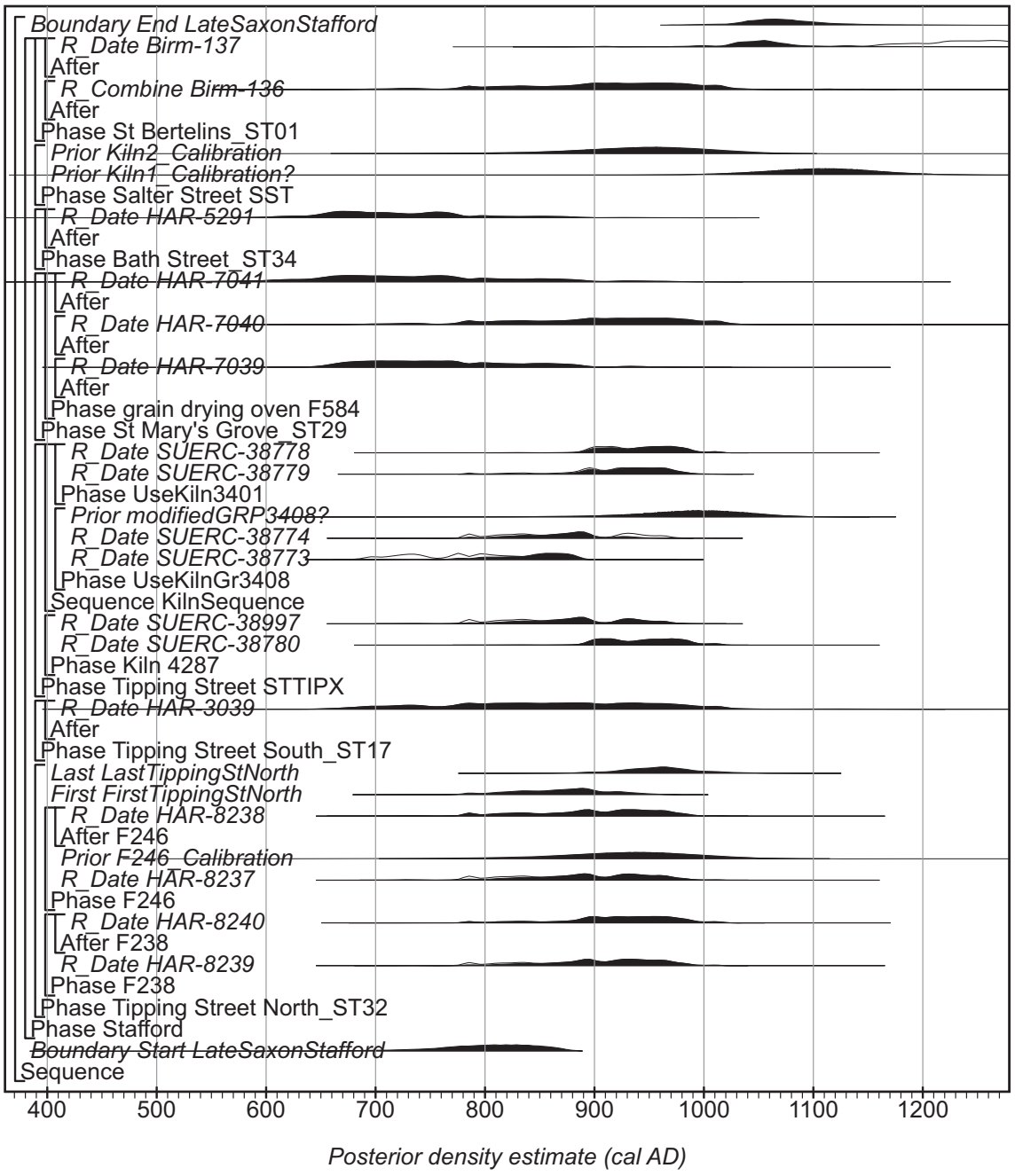


Fig. 49 Probability distributions of the radiocarbon and archaeomagnetic dates associated with late Saxon activity from Stafford

Each distribution represents the relative probability that an event occurred at a particular time. For each distribution two ranges have been plotted: the range in outline represents the calibrated radiocarbon result; and the solid distribution represents the posterior density estimate (i.e. the output from the Bayesian statistical model illustrated in the figure).

The large square brackets and CQL2 OxCal keywords define the model exactly. Boundary parameters estimate the start and end of activity associated with late Saxon Stafford.

GENERAL DISCUSSION

PREHISTORIC EVIDENCE *by Lisa Brown*

The stratigraphic sequence at Tipping Street indicates that two soil horizons were of early origin. The buried soil (SG 2156) in Area 2 clearly pre-dated the earliest Anglo-Saxon activity in this part of the site, and an accumulation of soil that sealed the natural in pile pit TP5 was cut by a feature

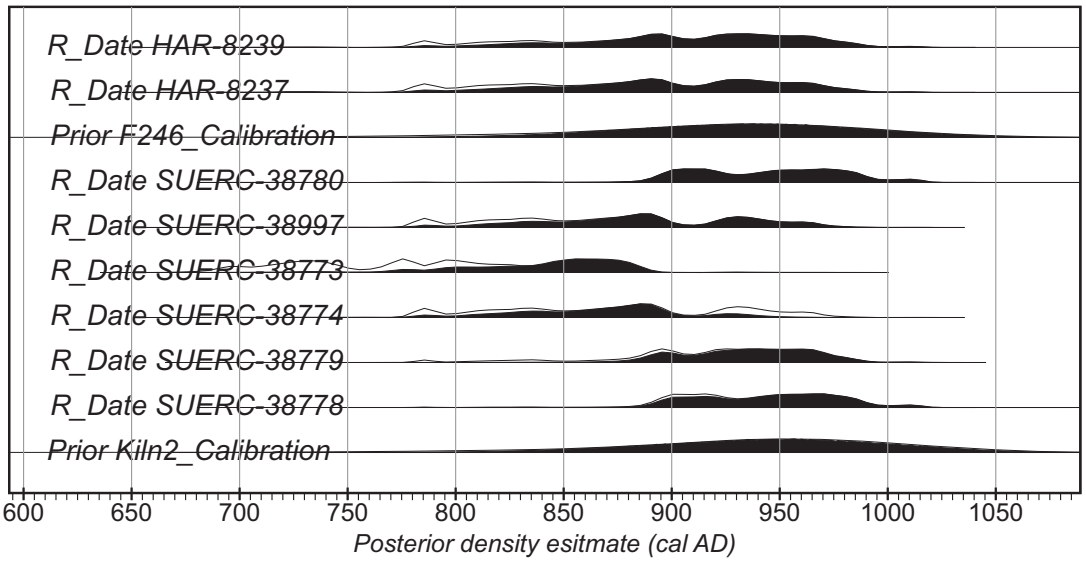


Fig. 50 Posterior density estimates (solid distributions) from radiocarbon dates produced on short-lived material and archaeomagentic dates from the model shown in Fig. 49

The ranges in light grey are shown at 68.2% probability; the ranges in dark grey are shown at 95.4% probability.

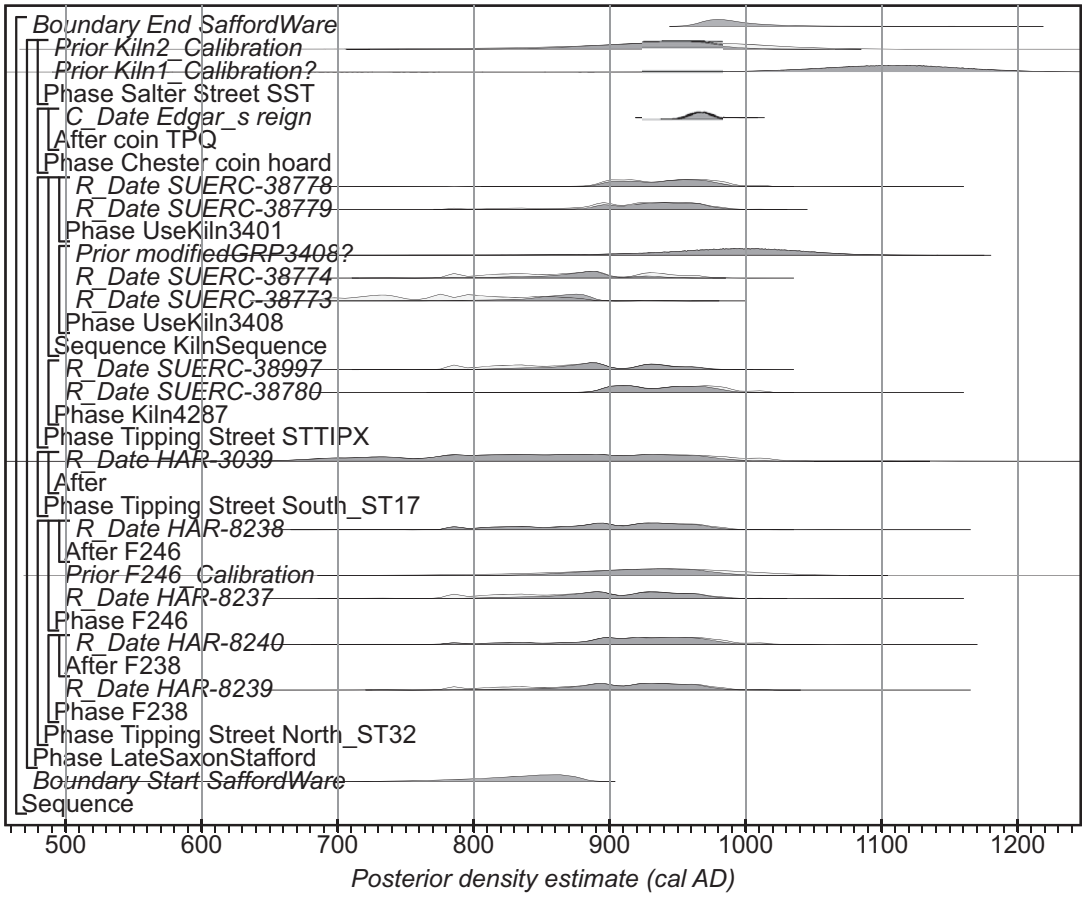


Fig. 51 Probability distributions of the radiocarbon and archaeomagnetic dates associated with late Saxon Stafford Ware

For each distribution two ranges have been plotted: the range in outline represents the calibrated radiocarbon result; the solid distribution represents the posterior density estimate (i.e. the output from the Bayesian statistical model illustrated in the figure).

The large square brackets and CQL2 OxCal keywords define the model exactly. Boundary parameters estimate the start and end of the use of Stafford Ware.

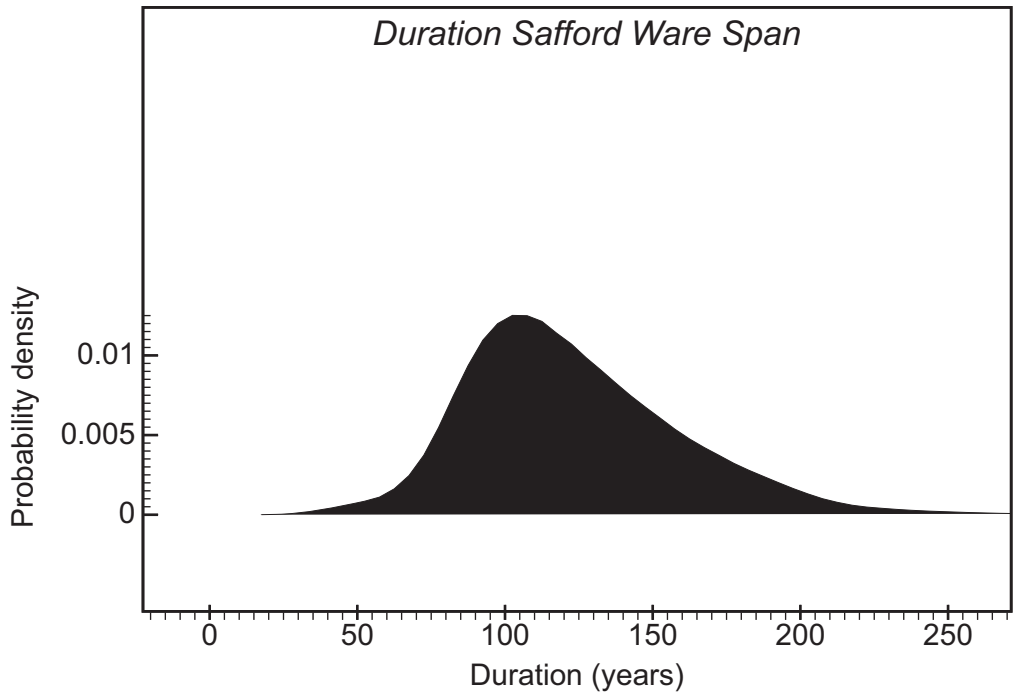


Fig. 52 The duration of the use of Saxon Stafford Ware calculated from the model shown in Fig. 51

of probable prehistoric date. The clearest indication of prehistoric settlement took the form of curvilinear gullies 3412 and 3414 in Area 3. Although they were poorly preserved and produced no datable finds, they are consistent in character with the remains of Iron Age circular structures found throughout southern Britain. If they were roof-drip gullies, the structures would have been 8m in diameter, allowing a 2m roof overhang. If (less likely) they were wall slots, the buildings would have had a diameter of *c*. 10m. These dimensions are typical of British Iron Age 'roundhouses' of medium size. A short length of gully (2143) exposed in a machine trench in Area 2, and another (4085) in the watching brief, may also represent circular structures but these too produced no dating evidence. The only clearly prehistoric finds recovered during the excavations were three flints, one burnt and unworked and two undiagnostic flakes that are probably residual earlier material (identifications by Michael Donnelly, Oxford Archaeology). A small piece of fired clay recovered from gully 2143 has no diagnostic features, but the fabric is much grittier and sandier than the Saxon kiln material and could be contemporary with the gully (Poole, Fired Clay, above). Charred plant remains from the buried soil comprised abundant grains of wheat, oat, and rye but, in contrast to the Saxon charred plant samples, rare tubers of onion couch grass were found, along with abundant barley and common vetch (Druce, Charred Plant Remains, above).

Presuming that all four gullies represented broadly contemporary Iron Age circular structures, they would have occupied an area roughly 100m across. Clearly, the dating is tenuous but it is worth considering these features in the light of other prehistoric activity identified in Stafford. Classical historians are virtually silent on the occupation of the West Midlands, although accounts of the conquest of southern England by Cassius Dio indicate that Staffordshire lay within the territory of the Cornovii. That there may be as many as eleven late prehistoric hill-forts in Staffordshire (Wardle 2007, 4) testifies to a significant late Bronze Age–Iron Age presence in the region, but their chronologies are imprecise. Earthwork surveys increasingly provide details of settlement and field system morphologies, but this type of evidence is inconsistent across the county, and rarely investigated.

One hill-fort, Berry Ring, lies only about 4km south of the modern town (see Introduction, above) but evidence for later prehistoric occupation in Stafford itself is, to date, extremely sparse, so the findings at Tipping Street are important. The roundhouses may have been contemporary with the four-post structures discovered just to the north of St Mary's Church (see Introduction, above). On the basis of associated spelt and emmer grains (Moffett, in Carver 2010, FR10.1 ST29), cereals cultivated extensively in Iron Age Britain, the structures were probably used as granaries, and were located only some 200–300m from the roundhouses. The remains of a timber bridge or retaining

wall exposed a similar distance to the east, at Queensway just to the north of the River Sow, may date to the Iron Age (Potteries Museum Field Archaeology Unit 2002, 5), and antler picks, possibly used in the construction of a causeway over marshland to the east of the river at Lammascote Road, may also be of Iron Age date (Robinson 1968–71, 7).

THE ANGLO-SAXON PERIOD (Phase 2)

THE EARLIEST FEATURES

Following what would appear to be a lengthy hiatus, use of the area resumed with the digging of a long, relatively shallow and narrow ditch (3411). Its function remains unclear, as its full extent was not seen within the excavated area; its alignment, at right angles to Tipping Street, suggests it may have functioned as a boundary marker, or perhaps for drainage. A similar feature (Gully F354) was found in association with the pottery kilns on the north side of Tipping Street (ST 32; Carver 2010, 76–9, fig. 4.18). Carver suggests that Gully F354 may have served as a water supply, subsequently replaced by a well. At the present site, ditch 3411 cannot have been functionally associated with the excavated kilns in Area 3, as it had filled up by the time it was cut through for the construction of the kiln stokehole; the fact that the stokehole was dug here suggests that this was not (or was no longer) a wet spot. The ditch appears to have been replaced on a similar alignment roughly 4m to the east (3413). Ditch 3413 was discontinuous and probably contemporary with the kilns, whose position it respects. At its southern end, ditch 3413 veered markedly to the south-west to cut into earlier ditch 3411, which suggests that the construction of the kilns had entailed a small diversion of the ditch line, although it is unclear why this was necessary. A large hollow at the southern end of Area 3 appears to terminate immediately west of the ditch line. It is possible that the hollow represents a large, shallow area of quarrying for sand. Alternatively, its size and profile suggest it may have been a continuation of the hollow way seen in Area 2 (feature 2154); this wide linear feature ran across Area 2 from southwest to northeast, with sparse remains of pebble metalling along its southern edge. No further evidence was seen in Area 2 for the possible defensive ditch proposed in earlier evaluation work, which had probably identified the edge of soils accumulating above the natural terrace here, rather than a manmade feature.

THE STAFFORD-TYPE WARE KILNS

Including the three discovered at the present site, a total of seven Stafford-type ware kilns have now been excavated within the town (see Introduction). Detailed analysis of the structural remains and the fired clay from the present site has enhanced our understanding of the nature of these kilns and the way in which they functioned; the information available from the earlier excavations suggests that all the kilns discovered so far would have been broadly similar in construction and operation. The kilns are relatively small. Those at the present site are similar in size to those found elsewhere in the town, between 1.6 and 1.9 m long and up to 1.35 m wide internally (Table 1); it has been suggested that a kiln of this size would be able to take a load of up to 40 cooking pots (Carver 2010, 79; Carver 2010, FR6.3 ST32 and FR.8.2.3). The kilns, according to Musty's classification, are all of the same type 1b, characterised by a single flue and evidence for an upper chamber (1974, 44). Apart from the present site, however, only kiln 382 at Salter Street (Ford 1998–9, 16–20) had evidence of a central circular stone and clay pedestal with part of a firebar remaining *in situ*. This kiln also had large stone blocks reinforcing the flue walls, a similar arrangement to the kilns from the present excavations. The two kilns previously found at Tipping Street North appear to have been constructed of clay and sandstone, but there is little detail recorded regarding their construction and the character of the superstructure.

Kiln 3408 is of the same type as the Salter Street kiln, in that it had a central circular pedestal which supported a floor constructed of trumpet shaped firebars reinforced with wattles luted to the kiln walls and probably forming an integral surface with the top of the pedestal, which did not survive. This is also very similar in character to kiln 1 at Torksey (Lincs.) (Barley 1964), which had walls with distinct finger marks and a large central circular pedestal with ten radiating firebars reinforced with wooden staves. Two of these survived *in situ* (ibid. plate XLIVa) and appear to be of integral construction with the pedestal but luted onto the walls, as is suggested for those found at Tipping Street in association with kiln 3408. A similar arrangement was found in kilns at Thetford (Norfolk)

(Davison 1967, 193, fig. 54), where the suspended floor in kiln C was constructed of bars reinforced with wattles and with trumpet shaped ends inset into the kiln walls. There they spanned the full width of the kiln chamber, which was narrower and teardrop shaped and effectively formed a series of arches to form the floor. At Thetford these arches stood 18 in. to 2 ft. (*c*. 0.45–0.6m) above the base of the lower chamber and at Torksey about 0.45m above the lower floor surface. This suggests that at least 0.25m has been truncated from the lower chamber of kiln 3408 and considerably more from the other two kilns. A Thetford type kiln at Langhale (Norfolk) (Wade 1976) had impressions of pot rims on the arches forming the suspended floor indicating the kiln was first loaded when the clay structure was still slightly soft, as also indicated for kiln 3408 (see above). The later kiln 3401 has a rectangular pedestal, whilst that in 4287 is a tongue pedestal attached to the rear wall of the kiln. It is suggested that the larger of the two kilns previously excavated at Tipping Street, F238, had a longitudinal pedestal (Ford 1998–9) though the evidence for this from the published illustrations is unclear, nor whether it was attached to the rear wall or freestanding. At Stamford (Lincs.) one Saxo-Norman kiln had two parallel pedestals (Wilson and Hurst 1969, 234–5), whilst in another kiln a longitudinal pedestal had been formed by creating a line of four conjoined cylindrical pedestals (Wilson and Hurst 1964, 294–5). A rectangular stone built pedestal was found in a medieval kiln at Olney Hyde (Bucks.) (Wilson and Hurst 1968, 207). Both of these at *c*. 1.4m long were much larger than the Tipping Street examples. Rectangular pedestals also occur in later medieval type 2 double-flued kilns (Musty 1974). Tongue pedestals appear to be less common, though the 'stub wall' on a late medieval kiln at Pottersbury (Northants.) (Jope 1950) may be of this type. A group of seven or more kilns with a tongue pedestal were found at Colchester and are dated to the mid 12th to early 13th century (Crummy 1984, 186–7).

Evidence for the form of the kiln dome or upper chamber has not been preserved on any kiln, though sometimes the junction of upper and lower walls is preserved indicating a ledge or offset as in the case of the previously excavated kilns at Tipping Street. The walls of the upper chamber were probably constructed of stone and clay, similar to other areas of the surviving structures. Collapsed or demolished superstructure has been noted in other kilns, but no detailed analysis of the material has been made to establish the character of the kiln dome. It has been suggested that because of the absence of clay fragments of double curvature, i.e. with both inner and outer wall face preserved, that permanent domes are unlikely (McCarthy and Brooks 1988, 44; Musty 1974, 54). However, the outer face is unlikely to have been thoroughly fired but possibly only lightly baked or reddened and therefore would not survive. Certainly the layers containing demolished kiln structure in all three of the kilns at the present site included light red or pink unfired, lightly heat-discoloured clay indicating that the exterior of the superstructure probably remained unfired. It has been noted above in relation to kiln 3401 that some large blocks of fired clay with the impressions of the body of a pot or large potsherds on one side with finger marks around the edges may represent the seal over the load of pots: the slab of clay may have been laid directly over the loaded pots or large sherds of pot placed over the loaded pottery and then covered by a slab of clay pressed into place. The use of potsherds as a covering to seal the dome is frequently invoked and both experimental firings and records of the Verwood potteries (Hants.) indicate this to be effective especially if an oxidised firing was desired (McCarthy and Brooks 1988, 48; Musty 1974, 55).

Kiln furniture used in stabilising the load of pots was limited in form and consisted of wedges of soft clay pressed between pots and small flat discs or plaques. These discs may have been used to span gaps and provide a more secure surface where necessary for stacking or to separate pots. At the Laverstock kilns (Wilts.) pieces of tile were used for this purpose (Musty *et al*. 1969) and at Upper Heaton (Yorks. WR) wedges of clay (Manby 1965, 100). In the Tipping Street kilns the wedges were only associated with kilns 3401 and 3408 and the plaques or discs, though less frequent, were associated with all three kilns. The association of the wedges only with kilns 3401 and 3408 may indicate greater care was taken in stacking the decorated pottery associated with these kilns.

At the time of Musty's analysis the type 1b kiln was identified as pre-Conquest with a distribution in eastern England. With a greater number of kilns having since been excavated, it is now clear that it is more widely distributed, and those at Stafford extend the type's distribution into the West Midlands. Estimates for the life of a kiln have varied considerably from a single season to ten or more years. For kilns protected within a structure (as were some of the later medieval kilns) the life-span was probably much longer. There is no evidence that the kilns at Tipping Street were under cover nor for refurbishment or relining of the kilns (3401 is a complete new build not a refurbishment of 3408), but there is no reason why the kilns should not have been in use for a number of

years. Even if use was seasonal the kilns may have been protected in some way, possibly purely by the accumulation of wasters around their sides, with larger broken sherds protecting the tops from the weather. At the Verwood kilns (Hants.) pottery wasters were allowed to accumulate around the kilns for insulation purposes (Musty 1974, 55) and there is no reason why the same practice could not have occurred in relation to the Stafford kilns. Sand, so readily available on the site, could also have been used to protect and insulate the exterior of the kilns.

The pottery industry

The kilns on the north side of Tipping Street (ST32) lay within a fenced working area, but there was little to suggest that the potters were actually living in the vicinity. Only very sparse food remains were recovered, and no contemporary domestic buildings, although it is suggested that two wattle-lined pits may have been latrines and other pits may have been for rubbish (Carver 2010, 79). Both kiln areas identified at the present site lay around 20 m south of the modern street frontage and there was a similar lack of evidence for domestic occupation in the vicinity. The abundant charred plant remains in the kilns are most likely to be waste from crop processing, and the composition of the assemblage is very similar to the material recovered from St Mary's Grove, where the quantities of material recovered suggested centralised processing on a large scale rather than domestic production. Similarly, at the present site there is little evidence of the domestic preparation of clean grain for baking, although parts of two well-used querns had been built into the flue of kiln 4287 and had presumably been used somewhere for grinding cereals into flour. Whether the potters at the present site were using waste from a centralised processing site such as St Mary's Grove, or from another source, remains unclear, although it is interesting to note that at both sites the range of weed seeds recorded indicate that crops were being brought in from a range of soil types, from acid sandy soils to heavier clay soils. However, at St Mary's Grove it appeared that rye chaff in particular had been used as fuel in the ovens, whereas at the present site the most abundant chaff identifiable was from oats. The wood used as fuel for the kilns at the present site was branchwood from one or more mature oaks felled for structural timber, or off-cuts from woodworking, and therefore also the exploitation of material left over from primary uses elsewhere. Slightly closer to the street, in Area 1, well 556 and pit 366 are more suggestive of nearby occupation that was not necessarily directly associated with potting. There was probably an oven there, with charred plant remains found in some quantity on its burnt surface and in nearby pit 366, and this could represent the remains of domestic food preparation. Nevertheless, even the assemblages from these features are not markedly domestic in nature, and include (in addition to the grain) charcoal, burnt primary and secondary butchery waste, and small quantities of smithing debris. It is also worth noting that none of the Stafford-type ware from the present site showed any trace of sooting (Goodwin, above), as might be expected if the assemblage included the remains of broken domestic cooking pots.

At both Tipping Street North and the present site there is evidence that the working areas were defined in some way, at Tipping Street North by a fenced enclosure and in Area 3 of the present site by an alignment of ditch segments and postholes. Both kiln 1 at Tipping Street North and kiln 3401 at the present site were surrounded by hollows and scoops, which Carver suggests might have been used for puddling the clay (2010, 79); at the present site, however, Poole has suggested the features may have been dug to store clay or obtain sand, potentially for use in making up kiln furniture or kiln superstructure as required during loading. Wood-lined wells were found at both sites in association with kilns, presumably to provide a convenient water supply.

On both sites (as on most excavated sites associated with pottery manufacturing), the kilns, stokeholes, and waster pits are highly visible, but there is little sign of where the pots were actually made, or where the potters were living, and this may be quite a significant factor in understanding how the industry was functioning. The excavated remains of the kilns represent only the late stages of a lengthy operation (described, for example, in McCarthy and Brooks 1988). This would have begun with the collection of clay, possibly from the nearby river. The clay would then have been left to weather for some months, and since frost action is useful in breaking it down and extracting large stones, clay was often left out over winter. Subsequently it may have been subject to further processing (by pounding, tramping, soaking, and sieving) to remove impurities before the tempering agent (here, sand) was added. When the clay was ready, a skilled potter could easily have produced a kiln load of 40 pots in less than a day (pers. comm. John Cotter, Oxford Archaeology), at Tipping Street apparently using a combination of hand-forming and wheel-throwing. Once the pots were formed there would have been another lengthy wait while they dried out, which could take several

weeks, even in the summer. The dry pots would then have been taken to the kiln and loaded, and in the case of the small Stafford kilns this must have been from above. Once the kiln was loaded, it would have been sealed; this was commonly done using layers of sherds, though the evidence suggests that turf and sand may also have been employed. It seems likely that at this site the lower walls of the upper chamber were permanent structures, but that a temporary superstructure of clay and stones was built over the top of the sealing for each firing, and then demolished in order to remove the pots at the end of the process. Once the kiln was loaded, the fire would be lit in the stokehole using branchwood, brushwood, chaff, and charred cereal remains as tinder; once the fire was burning well, oak branchwood was added, and probably pushed into the front half of the firing chamber itself, as far as the pedestal. Kilns consumed very large quantities of fuel (Musty 1974, 56) and the collection and delivery of wood for the kilns would have been a major part of the process (Cynthia Poole pers. comm.). It is not clear whether the fuel was added to the kilns in the form of wood or charcoal, although charcoal would not have been essential for the relatively low temperatures at which pottery was fired. Experimental work suggests that it would take approximately 12 hours for the kiln to reach the required operating temperature (Musty 1974, 56). The fire would have needed regular attention during this period, with ash being raked out and fresh fuel added (ibid., 57). At this point it would be closed down, by blocking the vent in the superstructure and probably also the flue. The kiln would then be left for another 12 hours while the pots baked in the residual heat. Finished and successfully fired pots were then presumably ready for their intended use, although precisely what this was in the case of the early Stafford-type industry is not immediately apparent.

The pottery found at the present site is discussed by Goodwin, above. Jars were much the commonest vessels present, outnumbering bowls by 20:1 overall. Amongst these, medium-sized jars with rim diameters of 120–140 mm were the commonest, followed by small vessels with rim diameters of 80–110 mm. Large jars (diameters of 170–290 mm) formed only a very small proportion of the assemblage. Bowls were present in much smaller quantities than jars, but in a range of sizes, generally between 100 mm and 280 mm diameter. Some of the smallest bowl forms may have been goblets or cups and a small number of socketed sherds were present, suggesting the manufacture of a few spouted vessels, or saucepans/skillets. There were only a few pedestalled hollow vessels, thought to have been used as lamps, goblets, or serving dishes, although these are generally very rare in the Stafford industry. There are no examples of the large handled jar forms that were found at the Tipping Street North site.

There is a marked difference between the assemblages from different areas of the present site, with Area 3 contexts containing finely potted, well-finished vessels, with comparatively coarser wares present in Areas 1, 2, and 4. Amongst the coarser wares, the vessels associated with kiln 4287 in Area 4 are generally finer than those from Areas 1 and 2. The great majority of decorated sherds also came from Area 3, with square rouletting almost entirely confined to these groups. Goodwin draws attention to the parallels previously noted by Ford (1995, 29–32; 1998–9, 34) between the Stafford industry and the contemporary Thetford and Lincoln potteries, with marked similarities in kiln types (at Thetford), vessel forms, decoration, and production techniques. He suggests that the differences in quality, decoration, and finish observed in the different Area groups at the present site might be compared with the sequence identified at Thetford (Dallas 1993, 58–9, 130), where the products of the earliest kilns were characterised by finer fabrics, a more limited range of forms and more decoration, with a general decline in the quality of pottery towards the end of the life of the industry, probably during the late 10th century. If the Stafford industry developed in the same way, this might suggest that the Area 3 kilns were the earliest in operation on the site, with the coarser wares from the waste pit in Area 2, and Area 1 representing later output.

CHRONOLOGY AND CONTEXT

The chronology of late Saxon Stafford has been the subject of much recent debate. A number of radiocarbon dates obtained in earlier excavations (summarised by Griffiths and Linford, above, Table 11) had given rise to a view that Saxon occupation at Stafford, and Stafford-type ware pottery, originated in the 9th century. Carver (2010) challenged this interpretation, suggesting that the presence of oak heartwood in charcoal samples had produced false early readings, and although an earlier origin was possible, no convincing evidence was available that activity at Stafford pre-dated the foundation of the *burh* in 913. With the discovery of kilns on the present site, a new programme of scientific dating was commissioned, with the careful selection of samples of grain and of charcoal

produced from fast growing, short lived tree species, from stratigraphically secure and related contexts associated with the operation of the kilns. As part of this programme, the results have been analysed using a Bayesian statistical model, which can give more precise estimates for the dates obtained, and provide a basis for estimating the timing of events that are not directly dated. The samples, methodology, and results are described by Griffiths *et al*. above.

Their model estimates that the use of the kilns at the present site began in the period cal AD 670–900 and ended in the period cal AD 890–1070 (95.4% probable), and probably began in the period cal AD 790–890 and ended in the period cal AD 900–990 (68.2 % probable). It is highly probable (98.8%) that the kilns came into use before the documented establishment of the Æthelflædan *burh* of 913, and indeed that the kilns were in use before the documented Viking raids in AD 874 (90%). It is probable (87.4%) that the kilns at the present site had gone out of use by 1015/16.

Griffiths and Linford (above) subsequently extended this work to incorporate the dates obtained from other sites in Stafford, to produce two models: the first for late Saxon activity within Stafford, and the second for the currency of late Saxon Stafford-type ware. The first model estimates that late Saxon activity in Stafford began in the range cal AD 680–890 (95.4%), probably (70.9%) within the period cal AD 750–850, and that there was most probably a difference of 50–150 years (68.2%) between the start of activity at Stafford and the foundation of the *burh* in 913. The second model estimates that Stafford-type ware came into use in the period cal AD 740–890 (90.5% probable), most probably (68.2%) in the period cal AD 800–880. Stafford-type ware probably went out of use in the period cal AD 960–1010 (68.2%). Using this model, it can be estimated that Stafford-type ware was probably in use for a period of 80–150 years (68.2%); it is 72.9% probable that it had gone out of use before AD 1000.

Griffiths and Linford note that these models have been constructed using a relatively limited number of active data, and that our understanding of the chronology could be improved in the future by the dating of further samples. Taken together, the estimates currently produced by the model suggest the likelihood that Stafford-type ware came into production some time around the middle of the 9th century, and that the industry lasted for up to 150 years, going out of use by the end of the 10th century. On this basis, it is likely that the pottery industry was introduced to a pre-existing settlement focus that had originated some time in the later 8th or earlier 9th century. This would suggest that a priority for future research will be the identification and dating of mid to late Saxon activity that pre-dates Stafford-type ware pottery, and an interesting pointer to this comes from Birmingham Archaeology's discovery of a site on North Walls where tanning seems to have been occurring before the late Saxon period (EUS 2.3.2.3; Staffs HER SST4309). Griffiths and Linford's review of the dates obtained from the earlier excavations at St Bertelin's Church, St Mary's Grove, and Bath Street suggests that the information currently available from these sites cannot resolve this question as the calibrated date ranges are too broad. However, it does seem plausible that early evidence may lie in this area. At St Bertelin's Church, one of the postholes attributed to a proposed late Saxon timber church (F16) cut an earlier grave (23), and a hooked tag was recovered from the posthole (EUS 2.3.3; Carver 2010, FR 3.2 ST01). This suggests the existence of a cemetery here before the building of the timber church, and the possibility that an earlier church or chapel stood somewhere in the vicinity. At Bath Street (Carver 2010, FR 7.3, ST34), there were a number of postholes that contained slag and iron fragments but no pottery, leading Carver to suggest that these may represent an early phase of activity at the site associated with stabling and smithing; this, too, could therefore potentially pre-date the introduction of pottery manufacturing. However, it appears from the published reports that Stafford-type ware was associated with all features at St Mary's Grove, suggesting that this activity was broadly contemporary with the pottery industry.

The context and nature of the re-occupation of the peninsula at Stafford thus remain key questions for future research, although we can now plausibly suggest that a substantial increase in activity here, including the introduction of pottery making, probably began around the middle of the 9th century. The refinement of the dating model that has been established by Griffiths and Linford with the incorporation of more scientific dating, and more work of the kind suggested by Goodwin (above) to refine the chronology of the Stafford-type ware industry, will help to clarify the relationship between the different kinds of activity (grain storage and processing, food production, smithing, and pottery making) that have produced such a strong archaeological signature here. Taken together, however, the results can currently be interpreted as evidence for the kind of organised and co-ordinated activity that would be consistent with the area functioning as some kind of estate centre or centralised resource. Carver argued that this was associated with the provisioning of the *burh* founded in 913,

and of the English armies' re-conquest of the Danelaw, and this is, of course, very likely to have been true, but the model derived from the recent radiocarbon dating programme points convincingly to an earlier origin. A place that was already functioning as an established centre for collection and processing of renders, if it was also defensible and of strategic value, would have been well worth securing. The incorporation of this place into the burghal network in 913 could be seen as bringing it decisively under Æthelflæd and Edward's control, with enhanced defences against Viking attack.

The results from the present site add to a growing body of evidence suggesting that the area around the royal residence at Tamworth became a particular focus for the last kings of Mercia in the early 9th century. Stafford lies only some 25 miles (40 km) from Tamworth, and charter evidence suggests that King Beorhtwulf (839/40–852) was frequently at Tamworth in the 840s, and King Burgred (852–74) was there in 855 (Meeson 1992, 15). As Meeson points out, there is a striking coincidence here with the dating of the excavated watermills at Tamworth (ibid.). Whether the mills were associated with the Mercian royal palace or not, it adds to the evidence from the radiocarbon model for the present site for a phase of significant investment in the exploitation of the resources of this region at this time. Current research on administrative organisation in the Mercian age suggests a wider context for 9th-century Stafford as a processing and production centre (John Blair pers. comm for the following information). Work on the archaeology of central places by John Blair, and on place-names by John Blair and Ann Cole, points to an organisational system, during the period *c*.750–850, in which functionally specialised adjuncts were grouped around royal central places. In the case of Stafford, no clear hierarchical centre can be identified (though since Iron Age hillforts were sometimes re-used it could have been Berry Ring), but the character both of the activity and of the place-name offer some pointers. As a site that was apparently (before Æthelflæd) unfortified, but where iron-working, grain-processing and pottery production occurred side-by-side, it has the aspect of an economic installation rather than a centre or stronghold: it can be compared, for instance, with the 8th-century stock-management and grain-processing site at Higham Ferrers (Northants.), probably a satellite of the nearby hillfort at Irthlingborough where King Offa is known to have held an assembly (Hardy *et al*. 2007). The place-name – *staið-ford*, 'landing-place ford' – emphasises its location at an intersection of land and water routes, and thus the transport of commodities. The pottery-making centres at Stamford and Thetford also have *-ford* names, and down-river from Torksey is another *staið-ford* (*Staffordebrig* in 1330) where a Roman road crosses the Trent. These topographical and onomastic patterns are unlikely to be random, and increasingly point to purposeful and recurrent modes of organisation under Offa and his successors. It could well have been in the context of such organisation that one of the last Mercian rulers established a pottery industry at Stafford, on a scale and of a quality that was revolutionary at the time. Although far from the economically-developed eastern peripheries where high-grade pottery industries would develop in the coming decades, Stafford lay in the Mercian political heartland: it was there, perhaps, that innovations from above had their first impact. This reading, which follows the re-definition of 'Viking-age' pottery as a Mercian initiative (Blinkhorn 2013), emphasises economic continuity rather than revolutionary change across the period of Viking invasion.

Whatever the contemporary association between Tamworth and Stafford, it is interesting to note that the two places were fortified more or less simultaneously by Æthelflæd in the early summer of 913. In a recent review of the important evidence for the early fortifications of Hereford, Tamworth, and Winchcombe (and less certainly Worcester), Stephen Bassett (2008) concluded that the defences of timber, turf, and soil of the late 9th and early 10th century did indeed, as has previously been suggested, succeed earlier substantial defences which are likely to date from the 8th or early 9th century. There is no evidence at present to suggest that Stafford had any defences at that time, although at Hereford, Tamworth, and Winchcombe the earlier defences were found beneath those of the late 9th and early 10th century, and it is possible that similar evidence remains to be discovered at Stafford. Taken together, however, these results provide an important archaeological counterweight to the Wessex-bias of the surviving documentary sources, and suggest that there is much more to be discovered about the power, reach, and strategy of the last Mercian kings than is apparent from the *Anglo-Saxon Chronicle*.

According to the model developed by Griffiths and Linford it is probable (72.9%) that Stafford-type ware went out of use before AD 1000, and Goodwin (above) has suggested that if it followed the same pattern as Thetford ware, it is likely that this was preceded by a decline from the high quality vessels produced earlier. It is interesting to note that a decline in the industry in the late 10th century would coincide with the hiatus in minting in the town noted by Nicholas Thomas in

the period 975–991, although coins from the short reign of Edward the Martyr (975–978) are very rare, and Stafford may not have issued any (Carver 2010, 95 and table 4.2). If minting did cease at Stafford for a while, it had resumed by the period of Aethelred's Long Cross penny of 997–1003, continuing throughout his reign and into the reign of Cnut (ibid.). There is evidence from a number of places that the defences of *burhs* were falling into disrepair in the late 10th century and that a widespread campaign of refortification was undertaken under Aethelred II ('the Unready') in the early 11th century, in the face of renewed Viking attacks. There is no evidence from the present excavations to shed light on whether this happened here, although it is likely. The results from the Broadeye excavations suggest that a very substantial enclosure was created at the west edge of the town in the late Saxon period, but this is not thought to have formed part of the defences but rather an urban property (or *haga*) held by the earl of Mercia or a follower, subsequently taken over by William the Conqueror for his castle of 1070 (Cuttler *et al*. 2009).

One very striking difference between the present site and Tipping Street North, however, was the discovery at the latter, in a scoop and a pit, of two fragmented adult human skulls; no similar evidence was recovered at the present site. The skulls do not appear to have been disturbed from burials in the vicinity as no other human bone was found. A third human skull was found in a dump of Stafford-type ware wasters at Clarke Street, again with no evidence of any other human bone present (Carver 2010, 79, 93 n. 74). If, however, the pottery industry had indeed more or less ceased to operate by the early 11th century, the area may have become relatively desolate, especially if it lay outside reinforced burghal defences. By that time, *burhs* were becoming a focus for judicial functions, and Reynolds has suggested there is an increasing association between execution sites and *burhs* (Hayman and Reynolds 2005). Ferocious legislation under Aethelred II prescribed the death penalty for a wide range of crimes, including breach of the peace within a town, and many offences also entailed loss of the right to burial in consecrated ground (Reynolds 2002, 103–5). Interestingly, fragments of a further human skull were found in the late Saxon ditch excavated at Broadeye (Cuttler *et al*. 2009, 53, 65–6), and this raises the possibility that the skulls might have been heads of decapitated prisoners (whether foreign enemies or native offenders); we might even envisage that the heads found at Tipping Street North could have been displayed on stakes along the line of Greengate Street, probably the main route in and out of the *burh*, and then discarded among the rubble of the disused potteries. 'The potter's field' would have had a particularly sinister Biblical resonance for contemporaries: St Matthew's Gospel tells that the Chief Priests used the 30 pieces of silver thrown back at them by a repentant Judas to buy 'the potter's field' for the burial of foreigners, and that ever after it was known as the Field of Blood. Andrew Reynolds comments that there are signs of a strong Biblical influence in the late Anglo-Saxon judicial system (2002, 110), which might just, perhaps, account for these otherwise bizarre discoveries here.

THE MEDIEVAL PERIOD (Phases 3–5: 11th to 16th century)

The excavations at the present site recovered evidence for occupation during the medieval period, although as noted above (Introduction), the important late Saxon results have been given priority in the programme of post-excavation analysis. The identification of broad medieval phases of occupation was based on the stratigraphic relationships between features, and the presence and absence of datable medieval pottery types, following a comprehensive assessment of the pottery by Goodwin (2011).

Phase 3 predates the appearance of Midlands White Ware, current from the 13th to the mid 14th century, and is characterised by the presence of iron-rich sandy wares, the utilitarian form of which dates to the 11th and 12th centuries, with occasional sherds from more diagnostic fragments from decorated and glazed jugs and pitchers current in the 12th and 13th centuries. At least two possible post-built structures were found (Fig. 34). Structure 636 (Fig. 35), in Area 3, was constructed across the area formerly occupied by kilns, and postholes that may have formed part of another post-built structure were seen in Area 1 (Structure 630) (Fig. 36). Elsewhere in Area 1 were numerous irregularly-shaped pits with largely sterile lower fills, that may represent sand quarrying; the only find of note from this group was a ceramic spindlewhorl. The most notable pit in Area 1 was the closest to Tipping Street; this pit (260) contained iron-rich sandy wares, including a possible glazed pitcher, along with a small copper alloy folding balance (Scott, above). At the east edge of Area 1, pit 291, which probably originated as a quarry, was backfilled with a charcoal-rich soil with some hammerscale, and contained a further sherd from a glazed jug or pitcher. Just to the south of this pit group was a shallow ditch or gully (417) on an east–west alignment. The function of this feature is

unclear, although it is parallel to Tipping Street and might possibly have marked a boundary at the back of a street frontage plot. The only dating evidence recovered from the fill was a single sherd of iron-rich sandy ware.

By the time of Domesday Book in 1086 there were between 128 and 146 houses in the town, of which 51 or 52 were described as waste (EUS 2.5.3). Stafford was by now the county town with a royal castle built in 1070 and possibly rebuilt in the 12th century. The royal castle and a collegiate church with 13 canons (possibly St Mary's or St Bertelin's) dominated the western part of the town centre; the eastern side of the town was becoming the commercial focus (ibid.). The market is thought to have been located in the present Market Square by the later 13th century, but it is suggested that an earlier market may have existed at the junction of Tipping Street and Eastgate Street (EUS 2.5.5). A fair granted in 1261 may also have been held there (ibid.). A significant stage in the development of the east side of the town is likely to be marked by the foundation of St Chad's church, to the east of Greengate Street. The evidence of surviving fabric within the church suggests it was built around the middle of the 12th century (Carver 2010, 199), and pits found at Tipping Street North (ST32) contained evidence for mortar mixing, perhaps associated with the church's construction (Carver 2010, 109 and n. 26). A number of pits at the present site are likely to have been sand quarries. Taken together, this suggests that in the middle of the 12th century Tipping Street may still have been relatively open and undeveloped, an area where the activities of a building site could spread over 100 metres or more. As such, it is possible that the two ephemeral structures seen in Areas 1 and 3 of the present excavations were in some way associated with this phase of activity. It has been suggested (Greenslade 1979) that the church was founded by the bishop of Lichfield for his tenants in the town, and Tipping Street lay within its small parish, which included South Walls and the south side of Eastgate Street (EUS 2.5.6.3). If this is true, it is quite possible that the foundation of the church and the creation of a new parish was part of a deliberate process of redevelopment of this part of the town.

Suburban development along the main north–south route through the town is documented from the 1170s onwards (EUS 2.5.3.1; Carver 2010, 109 and n. 25). At around the same time, a forge was established on the north side of Tipping Street, with an associated residential building or workshop on the street frontage (Carver 2010, 109). The forge seems to have continued in use into the late 13th or early 14th century (ibid., 115). A remarkable collection of finds was recovered from a pit (F234), interpreted as the debris from a clearing-out operation. A considerable variety of metalwork from the pit could represent objects being made, repaired, or melted down on the site, and included shears, scissors, axes, dividers, a draw knife, a spade iron, nails and structural ironwork, a copper-alloy buckle, and a decorative copper-alloy mount. Other items present included an unusual Scandinavian-style comb, two spindlewhorls, and horn debris that might suggest the forge had been producing or repairing handled knives (ibid., 110–117). A further spindlewhorl and some horn cores were found at the present site, but the most notable find was the folding balance recovered from pit 160 (Scott, above Fig. 39.2). This is likely to have been used to check the weight of coin, or to weigh small quantities of precious commodities such as spices. A farthing cut from a Long Cross penny datable to the middle of the 13th century was found at the present site (Scott, above), and five coins (Carver 2010, FR8.5.1) were found at Tipping Street North. This is quite a sizeable coin assemblage for two excavations on a single street, and may well reflect marketing in the area. The presence of sherds from glazed jugs or pitchers at both sites might suggest the presence of reasonably prosperous households nearby, and it is also likely that these decorative pots were being sold in the nearby fair and markets.

The most convincing evidence for the building-up of the area of the present excavations is perhaps that of Phase 4, which is dated from the 13th to the mid 14th century. A shallow gully parallel to Tipping Street seen in Area 3 seems likely to represent the boundary at the rear of a street frontage property. To the west, in Area 1, were the remains of a stone-lined well set within a timber well-house, which is likely to have been part of a substantial property on the street frontage. Sherds from a considerable quantity of glazed jugs in Midlands White ware were recovered from the fills, and it is interesting to note that the animal bone assemblage from this phase is the only medieval group to contain any animal bone other than the three main domesticates, with single bones of red deer, red or fallow deer, goose, and domestic poultry (Table 3 above). At the south of the site, in Area 2 and adjacent pile caps, were the remains of a substantial ditch (2106) 5.5m wide and 1.2 m deep. The ditch appears to run northwards from South Walls for 20m, before returning to the west. The latest pottery recovered from the fills comprised sherds from a baluster jug in probable Orange ware,

which would indicate the ditch was filling in the late 14th century or later, and it was overlain by post-medieval garden soil. The fills of the ditch were sampled for environmental remains, which were broadly very similar to those of the late Saxon period. Two notable differences, however, were the presence of rivet wheat, which may have derived from thatch, and an increase in legumes (Druce, above). The function of this ditch is unclear, but its alignment suggests that it may have been the boundary for a property fronting onto South Walls; it is possible that this is the single isolated property shown by Speed fronting onto South Walls within the area of the site (Fig. 3).

Features allocated to Phase 5 are dated by the presence of Midlands Orange and Purple wares, which were probably in production by the late 14th to 15th centuries (Ford 1995, 36). Very few features are datable to this period at the present site, something that would be consistent with a marked reduction in activity in the area at this time. The possible property boundary ditch seen in Area 3 in Phase 4 was replaced by a fence, and three shallow pits found to either side of the fence contained contemporary pottery and ceramic roof tile. In Area 1, a single pit contained sherds from a jar and pan in Midlands Orange ware. Taken together, this evidence suggests continuing occupation of the street frontage, and perhaps even a phase of rebuilding in Area 3, but at a less intensive level than seen previously. On the north side of Tipping Street, the forge probably went out of use by the early 14th century at the latest, and thereafter the site was used for cultivation. At Clarke Street buildings burnt down by the mid 14th century at the latest were not replaced, and the area appears to have been given over to cultivation (Carver 2010, 49), possibly market gardening (EUS 2.5.3).

POST-MEDIEVAL PERIOD (Phases 6 and 7:17th to 19th century)

Evidence from a variety of different sources suggests that parts of 16th- and 17th-century Stafford may have had a distinctly rural character. Speed's map of 1610 shows the frontages of Greengate Street and the streets in the eastern half of the town as fully built up (Fig. 3), but two early 17th-century surveys suggest that many tenements in the town included gardens that were highly prized by the occupants, and also record the keeping of pigs and especially the growing of fruit trees (EUS 2.6.3). Similar evidence has come from numerous excavations that have noted medieval and post-medieval cultivation soils across the town, much of which is likely to represent gardening (EUS 2.6.5.2). The townspeople continued to have pasturing rights on fields in Coton manor throughout the 17th century and agriculture may have been a significant part of the livelihood of many of the town's inhabitants (ibid.). The excavated evidence from the present site is entirely consistent with this impression of the town in the early post-medieval period. In Area 3, a group of very shallow pits are likely to have been horticultural beds and other pits may have been for planting. A thick accumulation of garden soils built up over the features of Phase 6 across the whole area of the excavations. However, at the same time, there is clear evidence for occupation and rebuilding in the vicinity. A number of pits interpreted as sand quarries were identified, and numerous pits contained both medieval and post-medieval roof tile, suggesting building and rebuilding activity nearby. Most of the finds from Phase 6 features are domestic in nature, and comprise many examples of glassware and pottery of the mid 17th to mid 18th centuries; a notable find from pit 455 in Area 1 was a post-medieval malting floor tile. A complete Bartmann jug (or Bellarmine) of mid to late 17th-century date was recovered from the garden soils near to the western boundary wall of the later Turk's Head Inn (No. 19 Tipping Street). It is likely that this had been buried whole in a pit, and its location suggests that it may have been placed here to protect the property, in the manner of the 'witch bottles' that are known from numerous other sites. No evidence for any charms or tokens had survived within the bottle.

During the 19th century there is evidence for the extension and expansion of occupation along the street. Increasing pressure for space in the town resulted in the building of cellars on most of the excavated tenements, and domestic and working room was extended by the construction of rear extensions and outbuildings. The most westerly property investigated, later Nos 22 and 23, stands out from this general pattern, however, and comprised a large single house with an extensive ornamental garden extending all the way back to South Walls. This is identifiable as St Chad's Vicarage house, converted from two private houses bought in 1882, although the vicar did not move in until the early 20th century (see Introduction, above). No. 19 provided the most interesting results. This was the site of the Turk's Head Inn, which appears on Wood's map of 1835; by the time of the 1881 Ordnance Survey map the inn had been extended southwards across most of Area 1. During the earlier part of the 19th century, it is possible that the inn had been brewing its own beer. A well-preserved structure (Fig. 30) with five brick-built chambers around a central paved area may have been for

activity associated with malting or brewing, although its form is unusual, and a deposit of hops was found in a cess pit located immediately outside the building. To the east, Nos 16–17 were leased as the Institute Club House for Siemens from 1908, and the southwards spread of buildings across the gardens can be associated with the extensive facilities offered for club members, which included a concert room, bar, billiard room, supper room, and large hall, with a bowling green at the rear.

CONCLUSIONS

The excavations in 2009–10 have produced important results. The new evidence for a possible Iron Age presence in the town centre adds to previous results, and reinforces the likelihood that there was a settlement here at the time, and that further remains may still survive within the urban core. The recovery of more information about the date, character, and extent of this settlement is likely to be an important aim for future research. A lack of excavated sites of this period has been highlighted in the West Midlands Research Framework (Hurst 2011, 1067), where it is suggested that adequate funding is needed to realise the full potential of later prehistoric sites and to develop active research programmes (ibid., 121).

The excavations have uncovered the first new evidence for Stafford-type ware production sites since the 1990s, and provided an opportunity to revisit earlier hypotheses about the dating of the industry using current techniques. The results, as reported above, are of considerable importance, and the Bayesian model developed for this project can be refined in the future as new opportunities occur to obtain further dating evidence. The dating model points to the development of Stafford from the late 8th or early 9th century, and that by the time a sophisticated pottery industry was introduced here around the middle of the 9th century Stafford may have been functioning as a place where renders were collected and centrally processed. This makes Stafford a significant place for understanding the policy of the Mercian elite, long overshadowed by the better-chronicled West Saxons, and also a significant place for current research into settlement hierarchy and the organisation of resources in the mid Saxon landscape. The likelihood that Stafford was already a valuable resource adds important contextual information for our understanding of why it was selected for fortification in 913, and for the range of motives that may have lain behind that. In turn, this feeds into our understanding of the early development of towns across the region and provides robust new dating to support the less well-dated evidence from other places. The decline of the pottery industry, which seems likely to have taken place by the end of the 10th century, may also be an important indicator of the way in which Stafford developed at this time. It suggests that we are not looking at a simple trajectory of continuous growth, accompanied by an increasingly buoyant market economy, but at a more complex picture in which the town's role as a marketing centre for its region may have been very slow to develop, and in which elite interest long remained a critical factor in its fortunes.

In addition, Stafford-type ware is a key ceramic marker, not only for Stafford but also for other places in the West Midlands and beyond, where there are no other distinctive regional pottery industries at this date. The results from the present excavations have suggested that a sequence of development may be discernible in the industry's output, with the finest pottery being the earliest, followed by a marked decline in quality, and Jon Goodwin argues (above) that the new results from the present excavations highlight the need for renewed study of this important regional industry, following a long hiatus. Continuing work on urban sites and detailed studies of ceramic evidence are among the research priorities identified for the period in the West Midlands Research Framework (Hooke 2011), and a better understanding of the development and chronology of Stafford-type ware would be important throughout the region.

The new results from Stafford are also of considerable interest for the study of the origins of the sophisticated new pottery industries that appear in the Danelaw in the late Saxon period. Why such an industry should appear in isolation at Stafford has always been particularly hard to understand. The dating derived from the new model, however, places the origins of the Stafford-type ware industry firmly in a Mercian context of the mid 9th century, and suggests the possibility that some of the industries active in the Danelaw in the later 9th century might have originated in a similar way.

For the later periods, the present excavations have produced evidence that largely supports existing models for the development of Stafford, but the area east of Greengate Street always seems to have had a distinctive character. In the late Saxon period it was used for pottery production, and there is very little evidence that anything else was carried on there. Following the decline of the pottery industry the area may have been relatively derelict until redevelopment in the later 12th century,

associated with the building of St Chad's church. During the 13th and earlier 14th centuries evidence suggests it was a thriving commercial district, but with marked retrenchment in the later medieval period. By the early post-medieval period much of the area was under cultivation, although finds from the present excavations suggest this was associated with a comfortable standard of living for its occupants, with evidence for the rebuilding of houses nearby. The Bartmann 'witch bottle' found in the garden soils dates from this period, when fear of witchcraft reached new heights; unfortunately, the contextual evidence cannot confirm whether it was buried at this time or later. The area may have seen little development before the middle of the 19th century, and in 1851 St Chad's parish had only 500 occupants and was described as 'destitute' (Greenslade 1979, 189). Although some industry (particularly brewing) was established in the area in the mid to late 19th century, it was to remain relatively stagnant over the next 100 years by comparison with other parts of Stafford, where there was rapid development. Cycles of urban growth and decline have been highlighted as priorities in the West Midlands Research Framework for the medieval period (Hunt 2011), and the results of this project add to previous evidence reviewed by Carver (2010) and others for the distinctive character of this area: Tipping Street and St Chad's parish could provide a very interesting case study for the way in which such cycles are reflected in the history, archaeology, and built environment of this area of Stafford.

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