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# ARCHAEOLOGICAL SOLUTIONS LTD

## LAND AT 12 OAK STREET, NORWICH, NORFOLK

### GREY REPORT

Authors: Tom Woolhouse	
NGR: TG 2281 0902	Report No. 3383
District: Norwich	Site Code: 26535N
Approved: Claire Halpin	Project No. 1375
Signed:	Date: March 2008

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**OASIS SUMMARY SHEET**

<b>Project details</b>			
Project name	<i>Land at 12, Oak Street, Norwich</i>		
Project description (250 words)	<i>In April 2001, Hertfordshire Archaeological Trust (HAT, now Archaeological Solutions (AS)) carried out an archaeological excavation on land at 12 Oak Street, Norwich, in advance of residential development. A trial trench evaluation by Norfolk Archaeological Unit in summer 2000 had revealed possible late Saxon structural remains and evidence of ironworking from the 10<sup>th</sup> – 14<sup>th</sup> century. The excavation identified four phases of activity. The earliest remains (10<sup>th</sup> – 12<sup>th</sup> century; Phase 1) were of one or more timber buildings evident from surviving beam slots. During Phase 2 (11<sup>th</sup> – 14<sup>th</sup> century), a post-built structure replaced the earlier buildings and extensive quarrying took place, possibly to extract sand for building or iron ore from the underlying natural gravels. The resulting pits were then backfilled with large quantities of domestic waste and ironworking slag, the latter probably residual material deriving from an earlier smelting and smithing area in Evaluation Trench 1. At some point in the mid-13<sup>th</sup> to mid-14<sup>th</sup> century, the west of the site may have been flooded from the river Wensum. This area was subsequently levelled in the 15<sup>th</sup> – 16<sup>th</sup> century (Phase 3) to make way for a sequence of post-medieval buildings with flint and brick rubble footings, which were partially revealed within the excavation area (Phase 4). From Phase 1 onwards, the structural features were consistently aligned with respect to the axes of Oak Street and St Miles' Alley, possibly suggesting that precursors of these streets were already in existence in the late Saxon period.</i>		
Project dates (fieldwork)	<i>April 2001</i>		
Previous work (Y/N/?)	<i>Y</i>	Future work (Y/N/?)	<i>N</i>
P. number	<i>1375</i>	Site code	<i>26535N</i>
Type of project	<i>Archaeological excavation</i>		
Site status			
Current land use	<i>Light industry/Vacant</i>		
Planned development	<i>Residential</i>		
Main features (+dates)	<i>Quarry pits, tanning pits, waste pits, beams slots 10<sup>th</sup> 18<sup>th</sup> century</i>		
Significant finds (+dates)	<i>Cu alloy pin, worked bone, whetstone 15<sup>th</sup> – 16<sup>th</sup> century</i>		
<b>Project location</b>			
County/ District/ Parish	<i>Norfolk</i>	<i>Broadland</i>	<i>Norwich</i>
HER/ SMR for area			
Post code (if known)			
Area of site	<i>0.09 hectares</i>		
NGR	<i>TG 2281 0902</i>		
Height AOD (max/ min)	<i>3 - 4m AOD</i>		
<b>Project creators</b>			
Brief issued by	<i>NLA</i>		
Project supervisor/s (PO)	<i>Tom Woolhouse</i>		
Funded by	<i>Hopkins Homes Ltd</i>		
Full title	<i>Land at 12, Oak Street, Norwich; an archaeological excavation</i>		
Authors	<i>McDonald, T. &amp; Crank, N.</i>		
Report no.	<i>3383</i>		
Date (of report)	<i>March 2008</i>		

## EXCAVATIONS AT 12 OAK STREET, NORWICH

By Thomas Woolhouse MA

With contributions from Martin Tingle, Berni Sudds, Andrew Peachey, Nina Crummy, Jane Cowgill, Ian L. Baxter, Sheila Hamilton-Dyer and Val Fryer. Graphics by Tamlin Barton; illustrations by Caroline George.

## **SUMMARY**

*In April 2001, Hertfordshire Archaeological Trust (HAT, now Archaeological Solutions (AS)) carried out an archaeological excavation on land at 12 Oak Street, Norwich, in advance of residential development. A trial trench evaluation by Norfolk Archaeological Unit in summer 2000 had revealed possible late Saxon structural remains and evidence of ironworking from the 10<sup>th</sup> – 14<sup>th</sup> century. The excavation identified four phases of activity. The earliest remains (10<sup>th</sup> – 12<sup>th</sup> century; Phase 1) were of one or more timber buildings evident from surviving beam slots. During Phase 2 (11<sup>th</sup> – 14<sup>th</sup> century), a post-built structure replaced the earlier buildings and extensive quarrying took place, possibly to extract sand for building or iron ore from the underlying natural gravels. The resulting pits were then backfilled with large quantities of domestic waste and ironworking slag, the latter probably residual material deriving from an earlier smelting and smithing area in Evaluation Trench 1. At some point in the mid-13<sup>th</sup> to mid-14<sup>th</sup> century, the west of the site may have been flooded from the river Wensum. This area was subsequently levelled in the 15<sup>th</sup> – 16<sup>th</sup> century (Phase 3) to make way for a sequence of post-medieval buildings with flint and brick rubble footings, which were partially revealed within the excavation area (Phase 4). From Phase 1 onwards, the structural features were consistently aligned with respect to the axes of Oak Street and St Miles' Alley, possibly suggesting that precursors of these streets were already in existence in the late Saxon period.*

## **INTRODUCTION**

In April 2001, Hertfordshire Archaeological Trust (HAT, now Archaeological Solutions Ltd (AS)) carried out an archaeological excavation on land at 12 Oak Street, Norwich (NGR TG 2281 0902; HER 26535N; Fig. 1, Pl. 1). The excavation was commissioned on behalf of Hopkins Homes Ltd, in advance of proposed residential redevelopment. The potential of the site for late Saxon and medieval archaeology had been demonstrated by a trial trench evaluation carried out by Norfolk Archaeological Unit in summer 2000 (Adams 2000). Following the evaluation, a mitigation strategy was devised to enable the preservation *in situ* of the potentially important late Saxon/early medieval ironworking remains identified in Trench 1. The aims of the excavation were to record as much information as possible on the nature of the social, economic and industrial activities on site. Specific goals were to seek to record any evidence of activity or occupation in the late Saxon period and to attempt to resolve the relationship between the possible structures and the ironworking remains identified during the evaluation. Full descriptions of all features and contexts revealed by the excavation can be found in the interim report (McDonald & Crank 2005).

## SITE BACKGROUND

### Location, topography and geology

The site is located in Coslany, to the north-west of Norwich city centre (Fig. 1). It lies at 3 – 4m AOD on slightly higher ground at the edge of the Wensum valley, with the line of Oak Street delineating the limit of the river's former floodplain. The site would have originally sloped gently downwards to the west towards the river, but the natural topography has been partially obscured by past ground levelling. The solid geology of the area is chalk, overlain by sands and gravels of glacial and fluvial origin. The site comprises a total area of around 0.14ha, bounded by Oak Street to the west, Rosemary Lane to the east and several recently converted properties fronting Oak Street to the north. Immediately to the south, on the opposite side of St Miles' Alley, is the Church of St Michael Coslany, which is thought to be a pre-Norman foundation. The site was formerly occupied by a light industrial building, which replaced a 19<sup>th</sup> century Mission Hall.

### Archaeological and historical background

The fate of the Norwich area following the withdrawal of the Roman army and the abandonment of the town and administrative centre at *Venta Icenorum* is obscure. A 5<sup>th</sup>/6<sup>th</sup> century cremation cemetery at Eade Road (Green & Young 1981, 9, fig. 6) and a 7<sup>th</sup> century graveyard at Harford Farm (Penn 2000) indicate a level of early Anglo-Saxon activity, but remains of the settlements inhabited by these people have not yet been found (Ayers 1994, 22).

Substantial quantities of Ipswich ware found on various sites across Norwich suggest the presence of settlements in the area by the 8<sup>th</sup> century. In addition, a number of street and area names in the city have middle Saxon origins, including Westwick, Conesford, Northwic and Coslany, where Oak Street is located. However, attempts to locate these early settlements, let alone establish whether they were anything more than isolated farmsteads, have so far met with limited success (Evans & Atkin 2002, 236). The '-wic' place-name element in Northwic has been suggested as indicating the presence of a middle Saxon trading emporia (Campbell 2004, 46), an idea which archaeology has so far failed to support.

There is still debate as to whether the later urban centre grew from a number of small discrete middle Saxon settlements, or whether development at this time was in a ribbon along the course of the river, perhaps with an early nucleus on the north bank around Fyebridge Street (Ayers 1994, 22-4). From c. 870 to 917, proto-urban Norwich was under Danish control. The city's Scandinavian heritage is reflected in numerous surviving street names and church dedications, but understanding of the impact of the Viking settlers and their contribution to the city's development is limited (Ayers 1994, 25). It is likely that to date their contribution has been underestimated (Evans & Atkin 2002, 237), as elsewhere in Britain, in contrast to much of Europe, the Vikings seem to have been a stimulus to urban growth (Clarke & Ambrosiani 1991, 90).

Excavations on St George's Street, to the east of the site, have revealed the ditch of the fortified 10<sup>th</sup> century *burh*, the outline of which can still be traced in the

topography of the streets north of the river Wensum. There is evidence that this 'D'-shaped enclosure was augmented by an east to west ditch running through the north-west corner of Pitt Street and St Martin's Lane (Sites 173N and 852N; Adams 2000, 2). It remains unclear whether the *burh* was created during the period of Scandinavian rule (Ayers 1994, 27), or was an English creation following the West Saxon reconquest of East Anglia (Evans & Atkin 2002, 237). The origin of the east to west ditch is also uncertain. It could represent part of the original defended circuit, or be a later creation to fortify newly developed land to the west of the original burh, perhaps added at some point in the late Saxon period. The presence of the ditch might imply that Coslany was well enough established by the late Saxon period to merit inclusion within the growing town's defences. Two possible pre-Conquest churches, St Mary Coslany and St Michael Coslany, the latter lying just a few metres south of the site, further add to the picture of the area's growing population and importance (Ayers 1994, 23).

Between Edward the Elder's re-conquest in 917 and 1066, Norwich grew into a densely populated centre and numismatic evidence indicates that a mint was established by the second quarter of the 10<sup>th</sup> century. Settlement initially remained concentrated north of the river, but soon spread southwards in a development which displays considerable regularity and may have involved central planning in the laying out of the main streets (Atkin *et al.* 1985, 2, fig. 2; Ayers 1994, 33; Evans & Atkin 2002, 237). There is some evidence that by this time, a second set of defences had been established around the settlement on the south bank (Ayers 2004, 10-11). A late 13<sup>th</sup> century source suggests that the Godwine family, earls of East Anglia in the early 11<sup>th</sup> century, had a palace by Tombland, but this has yet to be verified (Campbell 2004, 43). By the time of the Norman Conquest, Norwich was among the richest and most populous cities in England, with some 1320 burgesses recorded in Domesday Book (Williams & Martin 1992, 1057) and an estimated population of at least 5000, a figure which some have considered conservative (Brodt 2000, 643).

By the end of the 11<sup>th</sup> century, the topography of the city centre had been completely altered by the imposition of the new royal castle, market place and French Borough (Ayers 1994, 45). The construction of the Cathedral, priory and bishop's palace between 1096 and the 1140s also had a significant impact on the city's layout, governance and economy. Settlement on the north bank of the river gradually declined to subordinate status, reflected in the name of the medieval *leet*, *Ultra Aquam*, or 'over the water'. However, areas close to the banks of the river still attracted industries which required a water source, including cloth dyeing, leather tanning, fulling and hornworking. The Enrolled Deeds of c. 1285 – 1311 record a concentration of leather and textile workers, particularly tanners, in the Coslany area (Kelly 1983, 20-3). However, the Deeds record ownership of property rather than the occupations of tenants, and as such this does not constitute clear evidence of the type of economic activity in medieval Coslany (Kelly 1983, 13). Oak Street is recorded as a King's Highway in medieval records, while Rosemary Lane is recorded from 1279, albeit under a different name (Adams 2000, 4).

Outbreaks of plague from the mid-14<sup>th</sup> century may have killed as many as one in three of the population (Ayers 1994, 77), but recovery seems to have been swift and rich domestic buildings, churches and public works such as the new guildhall attest to the wealth and confidence of Norwich's late medieval elite. The oligarchy's growing

sense of corporate identity was formalised in 1404 with the grant of civic self-government (Ayers 1994, 78-9). The city was devastated by two fires in 1507 and its economy further suffered in the early 16<sup>th</sup> century from the decline of the worsted industry. However, a massive influx of migrant Dutch cloth manufacturers helped to revitalise the stagnant cloth trade and the city's post-medieval economy was dominated by textile production, finishing and distribution (Ayers 1994, 96-7).

From the 1700s, large-scale industrial activity occupied the area to the west of the site and by the late 19<sup>th</sup> century, brewing, ironworking and the milling of corn and paper were all taking place in Coslany, exploiting the proximity of the river Wensum for water and transport (Ordnance Survey 1885). These industries declined during the 20<sup>th</sup> century.

### **The archaeological evaluation (Adams 2000)**

The evaluation involved the excavation of three trial trenches (Fig. 1). In Trench 1, positioned close behind the Oak Street frontage, were late Saxon structural features and 10<sup>th</sup> – 14<sup>th</sup> century working surfaces associated with considerable evidence of ironworking. The assemblage of ironworking debris suggested that these represented a sequence of floor surfaces within a smithy where primary smithing of iron bloom to bar was being undertaken (Cowgill 2000, 3). Trench 2 contained 11<sup>th</sup> century structural features, sealed by remains of later medieval occupation in the form of a clay floor and postholes. Later, levelling layers observed in Trenches 1 and 2 prepared the ground for post-medieval buildings. Trench 3 contained an 11<sup>th</sup> – 12<sup>th</sup> century quarry pit and domestic debris of similar date, in addition to medieval and post-medieval pits.

## **THE EXCAVATION**

### **Methodology**

The excavation area measured 11 x 8m and was situated within the footprint of the main proposed new residential building, adjoining the west side of Evaluation Trench 2 in the centre of the site (Fig. 1).

The area was mechanically excavated using a 360° tracked excavator fitted with a toothless ditching bucket. Undifferentiated overburden of recent date was removed mechanically down to the first significant archaeological horizon; thereafter all further excavation was undertaken by hand. Exposed surfaces were cleaned manually and examined for archaeological features and finds. Archaeological features were recorded using *pro forma* recording sheets, drawn to scale and photographed. Excavated spoil was searched for finds and a metal detector was used to regularly scan archaeological features/layers and spoil.

Finds were retrieved by hand and recovery may therefore have been biased towards larger objects and fragments. A programme of purposeful environmental sampling was undertaken with the aim of obtaining information relating to the past environment and economy of the site.

### **Deposit model**

A thick layer of brick rubble (L2136=L2137) was encountered across the excavation area to a depth of up to 0.80m. This is likely to represent the demolition of a former building following World War II bomb damage. Remnants of gravelly orange sand subsoil, L2000, survived in isolated patches, but the subsoil had largely been removed by past human activity. Immediately below demolition layer L2136=L2137 were the first archaeological horizons, comprising foundations, floor surfaces and build-up layers relating to post-medieval buildings (see Phases 3 and 4, below). The natural glacio-fluvial drift (L2001), comprising yellow brown gravelly sands, was encountered at c. 2.10 - 2.70m AOD, from west to east across the area of excavation. This was cut by Saxo-Norman and medieval features (Phases 1 and 2).

## Phasing

The excavated features and layers were phased primarily on the basis of a combination of stratigraphic relationships and finds dates. However, the high quantity of residual pottery contained in later contexts sometimes hindered the accurate dating of features. Consequently, phasing often relied on the interpretation of structural or functional relationships between features, rather than strict adherence to finds dates.

Four broad phases of activity were identified:

Phase	Date	Principal features
1	10 <sup>th</sup> – 12 <sup>th</sup> century	Beam slot structure(s)
2	11 <sup>th</sup> – 14 <sup>th</sup> century	Post-built structure, quarry/refuse pits
3	15 <sup>th</sup> – 16 <sup>th</sup> century	Levelling layer, wall foundations
4	Post-medieval	Partial remains of two consecutive buildings

*Table 1: Phase summary*

Some of the features found in Evaluation Trench 2 (Adams 2000) are also discussed in this report, as they appear to be directly associated with features recorded in the excavation. A plan (see Figs. 2 - 5) and section drawing (see Fig. 8) of Trench 2 have been reproduced with kind permission of Norfolk Archaeology Unit.

### Phase 1: 10<sup>th</sup> – 12<sup>th</sup> century (Fig. 3)

The earliest features on the site were a number of beam slots cut into the natural gravel, some of which yielded small assemblages of 10<sup>th</sup> – 12<sup>th</sup> century Thetford-type ware. They are thought to have been associated with one or more late Saxon or Norman buildings.

Five fairly narrow (0.25 - 0.50m wide), shallow (0.10 - 0.30m deep) linear features ran at irregular intervals on parallel approximately north-west to south-east alignments perpendicular to St Miles' Alley (F2123, F2127, F2131, F2035 and F2031) (Fig. 8 south-west and north-west facing sections, Pl. 2). They generally had fairly steep to steeply sloping sides and flat bases and were fairly short, measuring between 0.70 and 3.65m long, although it is very likely that they originally extended further prior to being truncated by later features.

Another structural slot (F244), of similar profile to the other beam slots, but larger (0.68m+ wide x 0.44m deep), was found at the west edge of Evaluation Trench 2. It ran for 3m on an approximate north-west to south-east alignment parallel to the slots found in the excavation and extended in both directions beyond the limits of the trench. Based on its similar size and profile, it is thought that F2033 (0.60m+ wide x 0.18m deep) (Fig. 8 south-west and north-west facing sections), which was partially revealed in the eastern corner of the site, was associated with F244. It ran for 2.60m on an approximate south-west to north-east alignment and may have intersected with F244 just beyond the south-eastern limit of the site, forming the corner of a building (Structure 1, see below). A further short beam slot (F2125) was also aligned on a north-east to south-west axis, perpendicular to F2123, which cut it to the north-east.

All the beam slots were straight, with the exception of F2131, which at its southern terminus, turned abruptly through 90° to a north-easterly orientation and continued for a further 0.40m. Posthole F2025 (0.50m wide x 0.25m deep), which lay 1.15m north-east of this, seems to have been related based on its spatial relationship with the southern terminus of the beam slot. The gap between the two features may have formed an entrance way.

The beam slots appear to represent the remains of a row of several small earth-fast timber buildings fronting St Miles' Alley to the south-east (see Fig 1). The small area of the excavation meant that it was impossible to define the relationships between the structural features and reconstruct the ground plans of individual buildings with certainty. However, it is tentatively suggested that Beam Slots F2131, F2033 and F244 were foundations for the west, south and east sides (respectively) of a single narrow rectangular building running back from St Miles' Alley (Structure 1). There was no sign of a northern end to the building; this had either been destroyed by the post-medieval foundation trench (F2129) which cut F2131 to the north, or lay beyond the limit of the excavation. Figure 3 indicates the suggested configuration of features making up Structure 1; the extent of the continuation to the north is entirely conjectural. Beam Slots F2123, F2125 and F2127 may represent the surviving east side of a neighbouring building, the rest of which has been entirely destroyed by the medieval pits clustered in the west of the excavation area (Fig. 2). Most of these pits contained quantities of residual Saxo-Norman pottery, suggesting that they had truncated earlier features.

The positioning of Beam Slots F2035 and F2031 on the south-east side of Structure 1 is of interest. These were positioned very close together, with the gap between them narrowing to the south (0.80 – 0.63m) (see Pl. 2). It seems unlikely that they represent foundations for internal walls, as the small space between them makes little sense even as a storage area. It is of course possible that they predated the building and were unrelated to it, or that they represent successive constructions of the same wall whose position shifted between the two; however, two alternative suggestions can be made. First, they may have been related to an internal fitting or item of furniture within the building, such as a table or work bench. Secondly, they could have supported a staircase of some kind, allowing access to a second storey. This latter interpretation would help to explain the unusual identical profiles of the two slots, which were shallow and gently sloping at their northern terminals and deeper and more steep-sided to the south. Their increasing depth to the south might reflect the larger timber supports required as the height of the stairs, and thus the load,



increased. The width of the beam slots supporting the external walls of Structure 1, particularly F244 and F2033, might further reinforce the suggestion that it had an upper storey. They could have held timbers of considerable size and stand in contrast with the rather ephemeral foundations of some other late Saxon and Norman timber buildings excavated in Norwich and elsewhere.

The surviving evidence is insufficient to enable a confident reconstruction of the Phase 1 buildings. However, what the surviving beam slots appear to show is a regular layout based on an approximate north-west to south-east axis perpendicular to St Miles' Alley to the south and parallel with Oak Street to the west. This might suggest that the extant street grid in this part of Coslany was already in place in the late Saxon period, possibly from as early as the 10<sup>th</sup> century.

## **Phase 2: 11<sup>th</sup> – 14<sup>th</sup> century (Figs. 4 and 5)**

### *Structural remains (Fig. 5)*

At some point during Phase 2, the earlier buildings were replaced by a new structure (Structure 2) evident from ten surviving post pits (F2154, F2121, F2117, F2115, F2062, F2055, F241, F298, F253 and F283). These were generally sub-circular or oval in plan, steep-sided and flat or round-based and measured 0.60 - 0.90m across by 0.45 - 0.60m deep. Pits F2062 (Fig. 8) and F2055 were of similar size to the other post pits, but were of less regular appearance; these have been tentatively interpreted as related structural features based on their apparent spatial associations with the other post pits and on the regular, sub-rectangular appearance of F2055, which contrasted with the irregular shape of many of the contemporary quarry pits. The size of the pits suggests that they would have originally held substantial timber uprights.

Several apparent alignments suggest that the post pits formed a single rectangular building at least 7.25m long and orientated north-east to south-west, perpendicular to Oak Street and parallel with St Miles' Alley. Postpits F2062 and F2055 may have supported a porch or entrance way extending forward slightly to the south-east. A suggested reconstruction of the features' structural configuration is shown in Fig. 5, but this is tentative and alternative configurations are possible. It is not certain, for example, whether the full extent of the building was revealed within the site. The north-west to south-east alignment comprising Postpits F283, F253, F298 and F241 formed a plausible external wall at the building's east end, but no corresponding configuration of post pits was found to the west. It may be that the structure continued westwards, but that the structural features relating to this end of the building were destroyed by the medieval pitting in this area. It also seems highly likely that the structure was wider than the surviving post pits indicate, as the gap between Post Pits F2154 and F2121, for example, would allow for a very narrow internal space of not much more than *c.* 2.5m. It seems more likely that the structure continued to the north-west, where all trace of it has been destroyed by later medieval pitting and post-medieval foundations.

There was some discrepancy in the dating evidence for Structure 2. A date during the first half of Phase 2, perhaps the 11<sup>th</sup> – 12<sup>th</sup> century, is suggested by the stratigraphic sequence. Several of the medieval quarry pits were dug within the building's footprint (e.g. F2037, F2068 and F2071), suggesting that it had fallen derelict or been

dismantled by the later part of the phase. If this approximate date range is correct, little time would have elapsed between the disuse of the Phase 1 building(s) and the construction of Structure 2. However, some uncertainty over a date early in the phase remains, as one of the associated postholes (F283) yielded eight sherds of 14<sup>th</sup> century Grimston ware (Adams 2000, 8).

A narrow slot (F2104; Fig. 4), identical in form to the Phase 1 beam slots, ran parallel to St Miles' Alley to the south of Structure 2. Stratigraphically, it cannot have formed part of the same building and may have been associated with a later structure for which no other evidence survives.

#### *Quarry and rubbish pits (Fig. 4)*

Extensive medieval quarrying had resulted in a large number of intercutting pits, distributed across the site, but concentrated particularly towards its western boundary. There was wide variation in their size and shape, but some were very large. The portion of Pit F2106 that lay within the site, for example, measured 2.25m across by 1.32m deep. Many of the pits were cut into the natural subsoil and may have originally been dug to extract raw building materials, or to prospect for the iron ore contained in the natural gravels. The ceramic evidence indicates that the majority of the pits belong to the second half of Phase 2 (13<sup>th</sup> – 14<sup>th</sup> century) and it therefore seems that following the disuse of Structure 2, the excavation area became waste ground, perhaps a yard to the rear of a property fronting Oak Street. A few pits contained pottery of possible 14<sup>th</sup> – 15<sup>th</sup> century date (e.g. F2037 L2112, F2048 L2049 and F2053 L2054) and it may be that these were still partially open by Phase 3, having not yet completely filled in.

Alternative functions can be suggested for two of the pits, both shown in Fig. 8. Pit F2037 (1.35 x 1.30 x 0.86m deep) may have been intended to retain liquid, as its base was lined with soft light greenish grey clay 0.05m thick (L2114). It could have been used in an industrial process which required water, such as dyeing, tanning or steeping horncores to remove the sheath from the core prior to working. Pit F2048 (Pl. 3) was exceptionally deep (1.75m) and extended below the water table; it may have been a cess pit or well.

Whatever their original purposes, the pits were backfilled with large quantities of waste material. Tip lines were observed in several of the pits (e.g. F2048 and F2094; Fig. 8), indicating the direction from which they had been deliberately filled in. Their backfills contained abundant finds of both domestic waste and debris from ironworking, suggesting that the site lay close to dwellings and to forges/metal workshops. A notable assemblage of more than 5kg of pottery was recovered from Pit F2048, while 1.7kg of animal bone and 3kg+ of iron slag was found in F2106. The pottery was generally in good condition, indicating that it had probably not moved far from its point of use. However, this material probably reveals more about the disuse of the pits than their original functions.

Towards the end of Phase 2, a thin layer of light brown sandy silt (L2073) accumulated over the western edge of the site, sealing the cluster of earlier pits in this area. The deposit contained mid-13<sup>th</sup> to mid-14<sup>th</sup> century pottery and may represent an episode of flooding from the river Wensum.

### **Phase 3: 15<sup>th</sup> – 16<sup>th</sup> century (Fig. 6)**

In the 15<sup>th</sup> – 16<sup>th</sup> century, a layer of brown silt clay loam (L2022) up to 0.48m thick was deposited in the western half of the site over earlier silt layer L2073. It contained a considerable quantity of pottery, animal bone and ironworking slag, suggesting that it may have been a deliberate dump of waste material intended to consolidate and level the ground in this area following the possible flooding at the end of Phase 2.

The terminus of a large foundation trench, F2082 (1.64m wide x 1.50m deep; Fig. 8), ran into the site midway along the north-western boundary. Its basal fill, L2093, consisted of a thick band of loose light brown-yellow mortar containing masonry rubble, probably representing the remains of a robbed-out wall. A similar cut (F2129), also with near-vertical sides and a flat base, ran north-east at a right angle to F2082 and may have been a related wall foundation trench, although it was irregular in plan and its exact purpose remains uncertain. The alignments of F2082 and F2129 respected the positions of Oak Street and St Miles' Alley and it is likely that they represent the remains of plot-dividing or structural walls.

Four pits of varying size and shape were scattered across the site and were also dated to the 15<sup>th</sup> – 16<sup>th</sup> century (F2023, F2045, F2015 and F2064). Shallow circular Pit F2023 (1.15 x 0.30m deep), located 3.00m south-west of Foundation Trench F2082 was notable for its unusual fill, which comprised a large quantity of knapped flint debris and more than 8kg of animal bone. The flint may represent construction waste from building work nearby, or alternatively, the material could be a packing deposit intended to form a crude soakaway to assist drainage. Flat-based rectangular Pit F2015 (1.63 x 1.10 x 0.65m deep), situated 3.00m from the south-east corner of the site, was also of interest (Pl. 4). The vertical sides of the pit were lined with large unfinished flint cobbles (up to *c.* 200 x 150 x 150mm; L2014) five to seven courses deep, bonded in a coarse mortar. It may have been a cess pit to the rear of a building represented by F2082 and F2129.

### **Phase 4: Post-medieval (Fig. 7)**

Phase 4 activity was concentrated towards the south and west edges of the excavation area and comprised the partial remains of two consecutive post-medieval buildings.

In the south-west corner of the site, a group of probably related structural features were cut through Levelling Layer L2022. They comprised a linear slot or foundation trench (F2027) (Fig. 8 north-east facing section) and two other smaller foundation trenches (F2043 and F2041) (Fig. 8 north-west facing section) orientated perpendicular to F2027 and containing light yellow crumbly mortar, probably the remains of robbed-out walls. A vertical-sided, flat-based rectangular pit (1.85 x 1.50 x 0.45m deep), F2011, cut F2027 to the east; it may have been a cess pit, but had been filled in with demolition rubble. A short, irregularly-shaped shallow slot (F2039) may also have been associated with the structure, perhaps the incomplete remains of another wall foundation.

It is probable that these features represent the rear end of a building which continued beyond the site to the west, towards the Oak Street frontage. The main foundation

trenches were aligned either east-north-east to west-south-west, parallel to St Miles' Alley, or north-north-west to south-south-east, perpendicular to the alley way and parallel with Oak Street. Stratigraphically, the building post-dated 15<sup>th</sup> - 16<sup>th</sup> century Levelling Layer L2022, but the majority of the associated pottery was residual medieval material, preventing closer dating. The building's probable cesspit yielded a few fragments of late medieval transitional and early post-medieval pottery, suggesting a likely 16<sup>th</sup> century date (F2011 L2012).

The rest of the site was devoid of evidence of activity at this time and may have been part of a garden area to the rear of the building. This is perhaps reinforced by several irregularly-shaped features cut through L2022 in the north-west of the site: F2020 and F2018, which may represent tree boles and F2016, a *c.* 2m long irregular linear feature which may be the partial remains of a grubbed-out hedgerow running parallel to Foundation F2027.

Slightly later, the building was demolished, the ground across the site was levelled with layers of dumped soil (L2139, L2138, L2148 and L2153) and the structure rebuilt. The features relating to this second post-medieval building were mostly recorded in section only and comprised the robbed-out remains of two flint and brick foundation walls bonded with sandy mortar, F2169 (Fig. 8 north-east facing section) and F2147 (Fig. 8 north-west facing section), which appeared to closely adhere to the positions and alignments of the earlier building's foundations (F2027 and F2041, respectively). Between the walls were the remains of two consecutive clay and mortar floor surfaces (L2151 and L2149), separated by a dark occupation layer (L2150). A probably related wall foundation, F2145, was recorded in section in the south-east of the site *c.* 7.20m east of F2147 (Fig. 8 north-west facing section).

Pit F2004 was cut through F2011 and appears to have been related to the second Phase 4 building. It was of similar plan, profile and dimensions to F2011 and housed a small rectangular structure represented by two surviving courses of pinkish orange bricks (120 x 240 x 60mm) bonded with off-white mortar. The coursing was irregular and the bricks appeared rough and were probably recycled. There was a narrow gap or entrance in the north face of the construction. The feature was probably a cess pit attached to the rear of the building, with an outflow on its north side.

## SPECIALISTS' REPORTS

### The flint

By Martin Tingle

#### *Introduction*

The assemblage is composed of four worked pieces weighing 56g and two pieces of burnt flint (9g). It was recovered from contexts forming components within a series of Saxo-Norman, medieval and post-medieval features. The large quantity of knapped flint in Phase 3 Pit F2023 probably represents waste from post-medieval building construction.

#### *Raw Materials*

Most of the flint with surviving dorsal cortex appears to derive from secondary flint deposits.

#### *Composition and Technology*

<b>Feature</b>	<b>Context</b>	<b>Find</b>	<b>No.</b>	<b>Weight</b>	<b>Comment</b>
F2015	L2013	Scraper	1	20	
F2023	L2024	Burnt flint	2	9	
F2027	L2028	Broken flake	1	6	Dorsal blade scars
F2035	L2036	Retouched flake	1	9	
F2080	L2081	Secondary flake	1	21	
		<i>Total</i>	<i>6</i>	<i>65</i>	

Table 2: The composition of the assemblage

#### *Distribution*

The 4 pieces of worked flint derived from 4 separate contexts.

#### *Dating*

There are no datable pieces in the assemblage. However, the dorsal blade scars on the piece from F2027 (L2028) and the scraper made from an unusually thin flake would not be out of place in an earlier Neolithic assemblage.

#### *Conclusion*

The assemblage is too small for any firm conclusions to be established.

#### *Terminology*

Throughout this analysis the term 'cortex' refers to the natural weathered exterior surface of a piece of flint, while 'patination' denotes the colouration of the flaked surfaces exposed by human or natural agency. Following Andrefsky (1998, 104) dorsal cortex is divided into four categories; the term primary flake refers to those with cortex covering 100% of the dorsal face, while secondary flakes have cortex on

between 50% to 99% of the dorsal face. Tertiary flakes have cortex on 1% to 49% of the dorsal face, while flakes with no dorsal cortex are referred to as non-cortical.

A blade is defined as an elongated flake whose length is at least twice as great as its breadth. These often have parallel dorsal flake scars, a feature that can assist in the identification of broken blades that, by definition, have an indeterminate length/breadth ratio.

## **The pottery**

By Berni Suds

A total of 852 sherds weighing 17,938g were collected through excavation at 12 Oak Street, Norwich. This report provides a date range and quantification for the features containing pottery.

Dating is based on the identification of fabric and where possible, form. The spot date for each context is provisional. Where appropriate, a date range is given and comments are directed towards the condition of the majority of the material. Quantification was carried out using both sherd count and weight for each fabric. A summary of the results is presented in Table 3. Unless stated otherwise, all percentages quoted in the report are derived from the sherd number per fabric type expressed as a percentage of the total assemblage or phase group as appropriate.

All sherds were briefly examined using a x20 microscope. Type fabrics, particularly for the local and regional wares, were provided through a consultation with Richenda Goffin at Norfolk Archaeological Unit (NAU). Those contexts kindly examined are denoted in Table 3 with a \*. No detailed fabric description of the assemblage or comparison with other material of a similar nature was attempted. To facilitate cross-reference and comparison, the NAU fabric series and coding system has been followed. Any cross-joining sherds identified during this assessment have been assigned a unique number and are prefixed with **CJ** (Cross-join).

## ***Fabric key***

### Saxo-Norman and medieval fabrics

STAM:	Stamford-type ware (mid 9 <sup>th</sup> – mid 12 <sup>th</sup> C)
THET:	Thetford-type ware (10 <sup>th</sup> – 11 <sup>th</sup> C)
EMW:	Early medieval ware (11 <sup>th</sup> – 12 <sup>th</sup> C)
EMWS:	Early medieval ware shelly (11 <sup>th</sup> – 12 <sup>th</sup> C)
EMSW:	Early medieval sandwich ware (11 <sup>th</sup> – 12 <sup>th</sup> C)
YARM:	Yarmouth-type ware (11 <sup>th</sup> – 12 <sup>th</sup> C)
LMU:	Local medieval unglazed (11 <sup>th</sup> – 14 <sup>th</sup> C)
MCW/G:	Medieval coarsewares, all variants (late 11 <sup>th</sup> – 14 <sup>th</sup> C)
ANDE:	Andenne-type ware (12 <sup>th</sup> – mid 13 <sup>th</sup> C, ?earlier)
GRIM:	Glazed Grimston type (late 12 <sup>th</sup> – 14 <sup>th</sup> C)
SAIN:	Saintonge ware (mid 13 <sup>th</sup> – 15 <sup>th</sup> C)
MISC GL:	Miscellaneous glazed / decorated (?12 <sup>th</sup> – 14 <sup>th</sup> / 15 <sup>th</sup> )
MISC OX:	Miscellaneous oxidised (?12 <sup>th</sup> – 14 <sup>th</sup> C)
MISC IMP:	Miscellaneous import

### Late medieval and post-medieval fabrics

LMT:	Late medieval transitional (15 <sup>th</sup> – late 16 <sup>th</sup> C)
EPMW:	Early post-medieval ware (?16 <sup>th</sup> C)
RAER:	Raeren stoneware (late 15 <sup>th</sup> – 16 <sup>th</sup> C)
DUTR:	Dutch redware (15 <sup>th</sup> – 17 <sup>th</sup> C)
IGBW:	Iron-glazed blackwares (16 <sup>th</sup> – 18 <sup>th</sup> C)
WEST:	Westerwald stoneware (late 16 <sup>th</sup> – 18 <sup>th</sup> C)

<b>Feature</b>	<b>Context</b>	<b>Ceramic data</b>	<b>Spot date</b>	<b>Comments</b>
F2005	L2006	1x IGBW (231g)	16 <sup>th</sup> – 18 <sup>th</sup> C	Mug base.
F2007	L2008	2x THET (36g) 2x LMU (14g)	11 <sup>th</sup> – 14 <sup>th</sup> C	LMU: External sooting.
F2009	L2010	1x THET (3g) 1x ?GRIM (2g)	L.12 <sup>th</sup> – 14 <sup>th</sup> C	?GRIM: Olive glaze.
F2011	L2012*	2x THET (34g) 2x LMU (9g) 1x LMT (10g) 1x EPMW (18g)	?16 <sup>th</sup> C	THET: 1x everted, hollowed rim. LMT: LMT-type. Decorated with external rilling and green glaze. EPMW: ?Lid. External green copper glaze.
F2011	L2013*	3x THET (13g) 3x LMU (15g) 1x GRIM (5g) 17x LMT (774g) 2x LMT /LEPM (67g) 3x ?LMT /MISC (346g) 1x ?DUTR (32g)	15 <sup>th</sup> – L. 16 <sup>th</sup> C	THET: 1x external sooting and internal residue. LMU: All are partially externally sooted. GRIM: Olive glaze, iron-oxide slip. LMT: Rounded bowl with everted, internally bevelled rim: Undecorated bung-hole jar. Body sherd with half of bung-hole preserved: Body sherd incised with horizontal straight and wavy line decoration and dark green glaze: Body sherd with partial green glaze (copper added): Body sherd with olive green glaze and iron-oxide vertical strips. LMT / LEPM: Horizontally incised (oxidised) jug sherds (same vessel). External green glaze (with copper). Possibly Local early post-medieval. LMT / MISC: Thumbed sagging base, occasional splashes of glaze. External sooting. Precise thumbing. ?DUTR: Base and single foot of tripod vessel.
F2016	L2017	7x THET (65g) 5x LMU (38g) 1x GRIM (4g)	L.12 <sup>th</sup> – 14 <sup>th</sup> C	THET: 2x bases (?flat). LMU: 1x sagging base. All examples demonstrate partial external sooting / residue. 3x internal residue. GRIM: Olive glaze.
F2018	L2019*	5x THET (56g) 12x LMU (117g) 1x MCW (12g) ?1x LMT (7g)	15 <sup>th</sup> – L.16 <sup>th</sup> C	THET: ?Everted, thumbled rim: Flat base: Small body sherd decorated with ?diamond notched rouletting. LMU: 3x simple everted rims (1x external sooting): 2x ?sagging bases (sooted): Body sherds, 3x external sooting, 3x internal residue. ?LMT: Partial clear glaze.



F2020	L2021	1x THET (9g) 3x LMU (20g)	11 <sup>th</sup> – 14 <sup>th</sup> C	<b>LMU:</b> 2x external sooting, 2x internal residue / burnt residue.
F2020	L2022*	26x THET (394g) 1x EMW (27g) 1x EMWS (16g) 8x YARM (67g) 8x MCW (43g) 34x LMU (349g) 34x GRIM (523g) 1x ?SAIN (1g) 1x MISC IMP (26g) 5x LMT (167g)	15 <sup>th</sup> – L. 16 <sup>th</sup> C	<b>THET:</b> 2x everted, slightly hollowed rims: 2x flat bases: 3x external sooting. <b>YARM:</b> 1x base fragment. 4x external sooting. <b>MCW:</b> 4x simple everted rims, ? <i>early</i> : 3x external sooting. <b>LMU:</b> 4x developed rims, both open and closed forms (cooking pots and a single bowl). One cooking pot rim decorated with a plain applied thumbled strip around the neck and a thumbled and combed vertical strip down the body: 5x flat base sherds (1x sooted): 8x sagging base sherds (all externally sooted, 3x internal residue): Body sherds; 4x external sooting, 2x internal burnt residue. <b>GRIM:</b> 17x plain olive green glazed body sherds (predominantly jug sherds): 8x unglazed and partially glazed examples, including three bases (1x sagging, 1x thumb decorated, 1x kiln scar and with partial glaze from vessel stacked above in kiln): 5x green glazed, decorated with applied vertical iron-oxide strips or iron-oxide slip strips painted straight onto the body: 1x applied scale decoration and olive green glaze: 1x olive green glazed spout fragment: 2x strap type handles (1x olive green glazed, 1x partially green glazed and thumb decorated). <b>?SAIN:</b> External copper green glaze and ?rilling. <b>LMT:</b> 1x jug, upright rim with a ridge around the neck, partial external green glaze: Body sherd with external shallow horizontal rilling / grooves and runs of yellow glaze: Body sherd with external shallow horizontal rilling / grooves and partial green glaze. <b>MISC IMP:</b> Collared rim, ?jug. ?Dutch.
F2023	L2024*	1x ?THET (7g) 1x LMU (3g) 1x GRIM (8g) 9x LMT (678g) 1x RAER (201g)	L. 15 <sup>th</sup> – L. 16 <sup>th</sup> C	<b>LMU:</b> Sooted base fragment. <b>GRIM:</b> 1x olive glazed body sherd. <b>LMT:</b> Jug, upright rim with a ridge around the neck, vertical looped strap handle, partial external olive green glaze: Jug, everted neck, internally bevelled rim. Vertical looped angled rod handle, flattened on top and decorated with an incised foliate motif. External horizontal incised grooves (evenly and broadly spaced) and partial green glaze (predominantly on body, containing copper): 2x body sherds ?same vessel as decorated LMT base from (2065). <b>RAER:</b> Jug base.
F2025	L2026*	2x THET (35g)	10 <sup>th</sup> – 11 <sup>th</sup> C	
F2027	L2028*	1x YARM (8g) 4x LMU (31g) 2x GRIM (21g)	13 <sup>th</sup> – 14 <sup>th</sup> C	<b>YARM:</b> Everted rim. <b>LMU:</b> 2x external sooting. <b>GRIM:</b> 1x olive green glaze and applied vertical iron-oxide strips (?painted), 1x unglazed.

F2031	L2032*	13x THET (97g) 1x EMWS (6g) 3x LMU (70g)	11 <sup>th</sup> – 14 <sup>th</sup> C	<b>THET:</b> Everted, hollowed rim: 1x flat base: 1x body sherd with internal residue. <b>LMU:</b> 1x unusual double thumbed rim (around neck and on top of rim).
F2033	L2034*	1x THET (7g) 1x EMW (7g)	?11 <sup>th</sup> – 12 <sup>th</sup> C	<b>EMW:</b> Simple everted rim.
F2035	L2036*	7x THET (78g)	10 <sup>th</sup> – 11 <sup>th</sup> C	
F2037	L2038*	3x THET (100g) 1x ?EMW (7g) 35x LMU (675g) 2x MCW (9g) 4x GRIM (64g) 2x ?MISC IMP (46g)	Mid 13 <sup>th</sup> – Mid 14 <sup>th</sup> C	<b>THET:</b> 1x flat base: 1x ?THET body sherd decorated with an applied thumbed strip. <b>EMW:</b> Everted rim, possibly LMU. <b>LMU:</b> 1x ?lid: 2x decorated with vertical applied thumbed and combed strips: 5x decorated with horizontal combed bands: 1x body sherd decorated with a raised linear strip of clay: 5x base sherds, sagging (4x ?same vessel, internal residue): Many of the body sherds appear to have come from the same vessel that has an internal residue (same vessel as the base sherds above). 2x external sooting. <b>MCW:</b> Base sherd, thin walled. ?LMU: 1x everted rim, possibly early. <b>GRIM:</b> 1x arm fragment from a ?face jug: 3x green glaze (2 partial): 1x glaze splashes. <b>?MISC IMP:</b> Fine whiteware, copper glaze. ? <i>Saintonge ware</i> .
F2039	L2040	4x ?THET (116g) 2x LMU (19g) 1x GRIM (4g)	L.12 <sup>th</sup> – 14 <sup>th</sup> C	<b>?THET:</b> 3x one vessel (sagging base). <b>LMU:</b> 1x base. <b>GRIM:</b> Olive glaze.
F2041	L2042	3x LMU (37g)	11 <sup>th</sup> – 14 <sup>th</sup> C	1x everted rim: 1x internal sooting / residue.
F2045	L2046*	9x THET (124g) 23x ?THET (490g) 2x ?EMSW (32g) 41x LMU (530g) 3x MCW (37g) 4x LMT (194g)	15 <sup>th</sup> – L.16 <sup>th</sup> C	<b>THET:</b> <b>CJ.5:</b> 6x body sherds decorated with plain applied strips. ?Same vessel as sherds from (2047). <b>?THET:</b> <b>CJ.6:</b> One vessel, highly fired - 6x base sherds, one decorated with a continuous thumbed strip where base meets body - 6x body sherds decorated with applied plain strips - Internal residue (x7 sherds) - Fuming evident on some sherds - <i>Possibly an LMU product?</i> ?Same vessel as sherds from (2047): 1x base sherd. <b>?EMSW:</b> Early medieval sandwich ware, possibly ?Late Thetford-type ware. Slightly everted rim with ?notched decoration. Con-joining body sherd. <b>LMU:</b> 6x rims, including simple everted cooking pot types and more developed cooking pot and open form (?bowl) types (3x sooting) - Including <b>CJ. 7</b> (bowl rim), same vessel (2047), ?(2072); Jug with slightly everted rim and strap type handle: Strap handle and body sherd: 6x base sherds (4x sooted, 2x internal residue): Plain body sherds (15x sooting, 4x internal residue). <b>LMT:</b> 2x flat strap handle. Olive green glaze, thumbed at either end onto body. Fabric not typical

F2045	L2047	2x THET (17g) 7x ?THET (65g) 15x LMU (147g) 2x GRIM (11g)	L.12 <sup>th</sup> – 14 <sup>th</sup> C	transitional fabric but form late: 2x fine, thin walled partially olive glazed oxidised body sherds. <b>THET: CJ.5:</b> 1x sherd decorated with plain applied strip. ?Same vessel as sherds from (2046). <b>?THET: CJ.6:</b> One vessel, highly fired - 1x base sherd - 3x body sherds decorated with applied plain strips - Internal residue (x3 sherds): Fuming evident on some sherds. <i>Possibly an LMU product?</i> ?Same vessel (2046). <b>LMU: CJ.7:</b> Flat topped bowl rim. Same vessel (2046), ?(2072) - External sooting: 5x sagging bases (all sooted), one decorated with a thumb impression where the base meets the body (internal residue): 4x body sherds demonstrate sooting, 1x internal residue. <b>GRIM:</b> Both olive glazed jug sherds, 1x applied ?strip / pellet decoration.
F2048	L2049*	2x LMU (134g)	14 <sup>th</sup> – 15 <sup>th</sup> C	<b>LMU:</b> 1x ? <b>CJ. 4:</b> Late bowl rim - ?14 <sup>th</sup> – 15 <sup>th</sup> C. Developed, externally folded and internally thickened rim. Decorated internally with long thumbbed depressions and on top with a wavy incised line. ?Same vessel as rim from context (2112).
F2048	L2050*	8x LMU (68g) 1x MCW (8g)	L.11 <sup>th</sup> – 14 <sup>th</sup> C	<b>LMU:</b> 1x everted rim: 1x shoulder / neck sherd with a horizontal line of impressed decoration: 1x base (sooted), One other sherd sooted.
F2048	L2051	1x ?THET (7g) 3x ?LMU (46g) 11x MCW (145g) 1x ?LMT (10g)	15 <sup>th</sup> – L.16 <sup>th</sup> C	<b>LMU:</b> 1x flat base (sooted). <b>MCW: CJ. 8:</b> 1x one vessel, ?cooking pot, heavily sooted. Decorated with incised horizontal lines but ?wheel made. ?Same vessel (2052). <b>?LMT:</b> Body sherd decorated with horizontal incised lines and green glaze.
F2048	L2052*	1x THET (8g) 7x LMU (27g) 2x MCW (86g) 2x GRIM (26g) 1x LMT (26g)	15 <sup>th</sup> – L.16 <sup>th</sup> C	<b>LMU:</b> 1x rim: 2x external sooting, 1x internal residue (?burnt). <b>MCW: CJ. 8:</b> 2x one vessel, sagging based ?cooking pot, heavily sooted (1x internal residue). ?Same vessel (2051). <b>GRIM:</b> External olive glaze, 1x ?incised decoration. 1x sooting. <b>LMT:</b> 1x partially glazed body sherd.
F2053	L2054*	5x THET (59g) 1x YARM (19g) 1x MCW (5g) 4x LMU (54g)	?14 <sup>th</sup> – 15 <sup>th</sup> C	<b>THET:</b> 2x everted, hollowed rims (1x sooting / residue). <b>MCW:</b> <i>Possibly ?EMSW.</i> <b>LMU:</b> 1x late LMU oxidised body sherd from a ?storage jar. Decorated with a diagonal thumb applied strip: 2x sooted.
F2055	L2056	1x LMU (5g)	11 <sup>th</sup> – 14 <sup>th</sup> C	
F2057	L2058	2x THET (29g)	10 <sup>th</sup> – 11 <sup>th</sup> C	1x everted, hollowed rim.
F2057	L2059*	1x ?STAM A (6g)	13 <sup>th</sup> – 14 <sup>th</sup> C	<b>?STAM A:</b> Fine applied vertical strip. External light green glaze. <i>Possible import?</i>

		<p>1x THET (8g)  2x ?THET (42g)  21x LMU (335g)  2x MCW (18g)  14x GRIM (1025g)  14x MISC OX (250g)  3x MISC GL (106g)</p>		<p><b>THET:</b> Slightly hollowed rim.  <b>?THET:</b> 1x ?upright rim.  <b>LMU:</b> 2x one upright, developed cooking pot rim: 1x slightly everted rim, decorated with thumb impressions along internal edge: 2x bases (1x sooted, 1x internal residue): 11 body sherds demonstrate sooting, 2x internal residue.  <b>GRIM:</b> <b>CJ.1;</b> 7x large ? squat jug with a strap-type handle and sagging base. The base demonstrates a circular kiln scar and is decorated with four pairs of equally spaced thumb impressions where the base meets the body. Cross-joins with sherds from (2060) and (2061). Olive green glaze and vertical iron-oxide slip strips. Internal residue: 3x one thumb jug base, occasional runs of olive green glaze: 1x upright jug rim, partial olive glaze and vertical iron-oxide slip strips: 1x jug sherd / neck with strap handle (riveted to body). Olive glazed, splash of iron-oxide. The strap handle has two thumb impressions where it joins the vessel wall and three slight ridges down the outside face.  <b>CJ.2;</b> 1x olive glazed body sherd decorated with applied pairs of vertical iron-oxide strips with applied iron-oxide pellets spaced vertically between. ?Not typical Grimston. Same vessel as context (2060): 1x unglazed body sherd, internal residue.  <b>MISC OX:</b> All sherds con-join to form the base and half the body of a small baluster jug. Partially clear glazed (upper body). The vessel also has a horizontal raised ridge around the circumference of the body just above the maximum diameter. This ridge may have been decorated with applied decorative pellets (?one remaining). The base of the vessel is thumb decorated and has a partial green glaze (derived from another vessel being stacked on top during firing). <i>Possible medieval predecessor to LMT.</i>  <b>MISC GL:</b> Reduced sandy fabric containing moderate / abundant calcareous inclusions (shell / limestone). External green glaze. Similar to calcareous fabrics from Cambridgeshire. Possibly an Ely / Colne product?: 2x light buff fabric with pinkish-buff /pink external surface, applied decoration and polychrome glaze (yellow, green, brown). ?<i>Possible import.</i></p>
F2057	L2060*	<p>17x LMU (630g)  1x MCW (27g)  32x GRIM (893g)</p>	13 <sup>th</sup> – 14 <sup>th</sup> C	<p><b>LMU:</b> 6x developed rims; (?4 / 5 vessels) - 1x decorated with a vertical applied thumb strip - 1x <b>CJ.9,</b> ?Same vessel as (2061): 7x bases, sagging (5x external sooting, 5x internal residue / burning): 1x externally sooted body sherd.  <b>MCW:</b> External sooting.  <b>GRIM:</b> <b>CJ.1;</b> 11x large ?squat jug with a strap-type handle. Cross-joins with sherds from (2059) and (2061). Olive green glaze and vertical iron-oxide slip strips. Internal residue: <b>CJ.2;</b> 3x olive glazed</p>

F2057	L2061*	9x LMU (139g) 9x GRIM (1310g) 2x ?MISC IMP (69g)	Mid 13 <sup>th</sup> – Mid 14 <sup>th</sup> C	body sherds decorated with applied pairs of vertical iron-oxide strips with applied iron-oxide pellets spaced vertically between. ?Not typical Grimston. Same vessel as context (2059): 9x one slightly sagging ?jug base. The base demonstrates a circular kiln scar and is decorated with pairs (originally four pairs) of equally spaced thumb impressions where the base meets the body. Fine fabric but not particularly micaceous, possibly ?LMT: 1x olive glazed body sherd with an vertical iron-oxide slip strip: 4x body sherds with partial olive glaze: 4x body sherds with partial olive glaze and some iron-oxide slip decoration (strips / occasional splashes). Of these body sherds five demonstrate heat discoloration or sooting.
F2062	L2063	1x ?THET (7g) 1x MCW (22g)	L.11 <sup>th</sup> – 14 <sup>th</sup> C	<b>LMU: CJ.9:</b> 1x developed cooking pot, fine walled, ?Same vessel as (2060). <b>GRIM:</b> 1x olive green glazed ?face jug with occasional ?vertical iron-oxide slip strips. Differs from the ‘typical’ Grimston face jug style with Grimston products in that the arms are relatively thick and are not decorated with repeated thumb nail impressions. Two thumb impressions decorate the join of the strap handle to the neck: 1x thumb jug base. The base demonstrates a circular kiln scar from the rim of another vessel stacked on top during firing (both upside-down): <b>CJ.1;</b> 5x large ?squat jug with a strap-type handle. Cross-joins with sherds from (2059) and (2060). Olive green glaze and vertical iron-oxide slip strips. Internal residue: 2x partially olive glazed body sherds. <b>MISC IMP: CJ.3:</b> Globular vessel decorated with partial external white slip, copper glaze and an incised and stamped diamond lattice design (from below the neck down). Top of rim missing. <i>Possible Dutch import.</i> Cross-joins to sherds from (2070), ?same vessel as context (2069). <b>MCW:</b> Everted rim. <i>?Possibly YARM-type ware.</i>
F2064	L2065*	1x MCW (6g) 1x LMU (7g) 1x ?LMT (93g)	15 <sup>th</sup> – L.16 <sup>th</sup> C	<b>MCW:</b> ?Early. <i>?Possibly YARM-type ware.</i> <b>LMT:</b> 1x decorated flat base, surfaces flaky. Remains of ?pairs of thumb impressions at intervals around base. 2x body sherds from ?same vessel in (2024). <b>?ANDE:</b> ?Andenne-type costrel, external yellow glaze. <b>GRIM:</b> 1x upright, externally bevelled jug rim: 1x body sherd: Both olive glazed. Body sherd decorated with applied scales. <b>MISC IMP: CJ.3:</b> Globular vessel decorated with partial external white slip, copper glaze and an incised and stamped diamond lattice design. <i>Possible Dutch import.</i> ?Same vessel as context (2061) and (2070).
F2068	L2069*	2x LMU (8g) 2x ?ANDE (16g) 2x GRIM (19g) 7x ?MISC IMP (74g)	Mid – Late 13 <sup>th</sup> C	<b>GRIM:</b> Olive green glazed ?jug rim. <b>MISC IMP: CJ.3:</b> Globular vessel decorated with partial external white slip, copper glaze and an
F2068	L2070*	1x ?GRIM (4g) 1x ?MISC IMP (190g)	L.12 <sup>th</sup> – 14 <sup>th</sup> C	

F2071	L2072	7x THET (116g) 3x ?THET (15g) 16x LMU (226g) 5x MCW (37g) 5x GRIM (75g)	13 <sup>th</sup> – 14 <sup>th</sup> C	incised and stamped diamond lattice design (from below the neck down). Top of rim missing. <i>Possible Dutch import</i> . Cross-joins to sherds from (2061), ?same vessel as context (2069). <b>THET</b> : 2x everted, hollowed rims: 1x flat base. <b>?THET</b> : Possibly later. <b>LMU</b> : 1x everted rim: <b>CJ.7</b> : Flat topped bowl rim. ?Same vessel (2046), (2047): 2x bases (1x sagging and sooted): 3x body sherds with internal residue / sooting, 2x external sooting: Rod handle with continuous diagonal incisions around its circumference (spiral effect), ?13 <sup>th</sup> – 14 <sup>th</sup> C. <b>MCW</b> : 1x everted rim: 1x ? <i>possible YARM-type product</i> : 1x ? <i>EMWS</i> . <b>GRIM</b> : 1x upright, collar-type jug rim, partial external olive glaze.
F2071	L2073	6x THET (62g) 1x EMW (12g) 1x EMWS (6g) 1x MCW (12g) 1x ?MCW (124g) 8x LMU (98g) 2x GRIM (77g) 2x MISC GL (22g)	Mid 13 <sup>th</sup> – Mid 14 <sup>th</sup> C	<b>THET</b> : 1x everted, hollowed rim: 1x internal burnt residue. <b>EMW</b> : External sooting. <b>EMWS</b> : Internal burnt residue. <b>?MCW</b> : Sagging base. <i>Possibly earlier, ?S/N</i> . <b>LMU</b> : Simple everted and developed closed and open form rims (1x external sooting): 2x bases (both sooted, 1x sagging). <b>GRIM</b> : 1x strap-type handle, olive glaze: 1x olive glazed are fragment from a ?face jug. Decorated with nail impressions down the outside edge. <b>MISC GL</b> : 1x partial external green glaze: 1x external ?iron-oxide ?painted curvilinear decoration. Highly fired sherd (?over-fired).
F2074	L2075	1x LMU (9g)	11 <sup>th</sup> – 14 <sup>th</sup> C	Base, ?sagging. External sooting.
F2076	L2077	1x THET (12g) 2x ?THET (27g) 1x MCW (29g)	L. 11 <sup>th</sup> – 14 <sup>th</sup> C	<b>THET</b> : Everted, hollowed rim. <b>?THET</b> : Very thin walled, possibly later (?highly fired greyware).
F2078	L2079*	2x YARM (26g) 1x MCW (21g) 1x GRIM (49g)	Mid 13 <sup>th</sup> – Mid 14 <sup>th</sup> C	<b>YARM</b> : 1x base fragment. <b>MCW</b> : ? <i>LMU base</i> . Internal residue. External sooting over break. <b>GRIM</b> : 1x burnt body sherd. Beard / arm element of an anthropomorphic face jug. Decorated with applied vertical iron-oxide clay strips and pellets.
F2080	L2081*	3x THET (36g) 1x EMW (33g) 16x LMU (156g) 2x MCW (33g) 4x GRIM (63g)	13 <sup>th</sup> – 14 <sup>th</sup> C	<b>EMW</b> : 1x everted cooking pot rim / small vessel. <b>LMU</b> : 1x everted rim: 1x developed rim: 1x vertical applied thumbed strip: 9x body sherds with external sooting / burnt residue, 1x internal residue. <b>GRIM</b> : 1x upright jug rim, decorated with short vertical incisions around the neck and olive glaze: 1x oval rod-type handle with vertical grooves down the length and olive glaze.

F2082	L2083	3x THET (74g)	10 <sup>th</sup> – 11 <sup>th</sup> C	2x everted, hollowed rims.
F2082	L2084	1x THET (23g) 1x MCW (13g) 2x GRIM (59g)	13 <sup>th</sup> – 14 <sup>th</sup> C	<b>THET:</b> Some abrasion evident. <b>MCW:</b> Collared rim. ? <i>LMU</i> . <b>GRIM:</b> 1x ?GRIM variant; highly micaceous and very light (light grey) fabric. Applied iron-oxide decoration: 1x ?jug sherd decorated with incised horizontal lines (?around shoulder).
F2082	L2087	1x ?THET (10g)	10 <sup>th</sup> – 11 <sup>th</sup> C	
F2082	L2088	1x MCW (18g)	L.11 <sup>th</sup> – 14 <sup>th</sup> C	
F2082	L2090	1x LMT (19g)	15 <sup>th</sup> – L.16 <sup>th</sup> C	Splashes of glaze (external).
F2082	L2092	6x ?LMU (112g)	11 <sup>th</sup> – 14 <sup>th</sup> C	?One jug with slightly everted rim, strap handle and sagging base. ? <i>Possibly earlier</i> .
F2094	L2095	1x THET (13g) 3x MCW (15g)	L.11 <sup>th</sup> – 14 <sup>th</sup> C	<b>THET:</b> 1x wire cut base. <b>MCW:</b> ? <i>LMU</i> . 1x internal residue.
F2094	L2096	1x GRIM (16g)	L.12 <sup>th</sup> – 14 <sup>th</sup> C	External olive green glaze.
F2097	L2099	4x LMU (74g)	11 <sup>th</sup> – 14 <sup>th</sup> C	2x everted, flat topped cooking pot rim (external sooting).
F2100	L2101	1x YARM (8g) 1x GRIM (6g)	L.12 <sup>th</sup> – 14 <sup>th</sup> C	<b>GRIM:</b> Green glaze.
F2102	L2103	6x LMU (38g) 1x MCW (126g)	L.11 <sup>th</sup> – 14 <sup>th</sup> C	<b>MCW:</b> Strap-type handle and ?slightly everted rim. <b>LMU:</b> 1x everted rim (external sooting); 1x base (external sooting, internal residue): 2x body sherds external sooting, 3x internal residue.
F2104	L2105	3x THET (58g) 1x ?ANDE (2g)	?12 <sup>th</sup> – 13 <sup>th</sup> C	<b>THET:</b> 1x everted, hollowed rim: 1x base, ?flat. <b>?ANDE:</b> Body sherd, external yellow glaze.
F2106	L2108	12x THET (191g) 3x ?YARM (77g) 5x LMU (51g) 1x MCW (12g) 1x GRIM (5g) 5x MISC GL (95g)	13 <sup>th</sup> – 14 <sup>th</sup> C	<b>THET:</b> 3x everted, hollowed rims: 1x upright rim: 2x flat bases: 1x body sherd with applied strip. <b>?YARM:</b> 2x one upright ?cooking pot rim. <b>LMU:</b> All partially sooted, 2x internal residue. <b>GRIM:</b> External olive glaze and an iron-oxide slip strip, ?internal residue. <b>MISC GL:</b> Unprovenanced glazed. Olive glazed, iron speckling from the body. Applied iron-oxide curvilinear strip and pellet decoration. Similar style to GRIM products but unusual fabric.
F2106	L2109	2x THET (70g) 1x EMWS (12g)	?11 <sup>th</sup> – 12 <sup>th</sup> C	<b>THET:</b> 1x everted, hollowed rim decorated with an applied thumbled strip around the neck (external).
F2110	L2111	1x MCW (3g)	L.11 <sup>th</sup> – 14 <sup>th</sup> C	
F2037	L2112	2x THET (11g)	?14 <sup>th</sup> – 15 <sup>th</sup> C	<b>LMU:</b> 1x everted rim: 1x slightly everted developed rim: ? <b>CJ. 4:</b> Late bowl rim - ?14 <sup>th</sup> – 15 <sup>th</sup> C.

			3x LMU (127g) 1x GRIM (26g) 1x ?GRIM (83g) 1x MISC GL (8g)		Developed, externally folded and internally thickened rim. Internal rim decorated with long thumbbed depressions and on top with a wavy incised line. ?Same vessel as rim from context (2049). <b>GRIM:</b> Olive glaze and applied iron-oxide strips. <b>?GRIM:</b> Upright jug rim with an external ridge (just below the rim) and strap-type handle. Olive glaze. Possibly late Grimston-type ( <b>GRILL</b> ). <b>MISC GL:</b> ?Upright, flat topped jug rim. Fine white fabric with distinctive bright / deep green glaze. Decorated with a diagonal slash. ? <i>Import</i> .
F2037	L2113		1x LMU (20g) 6x GRIM (57g)	13 <sup>th</sup> – 14 <sup>th</sup> C	<b>LMU:</b> Slightly everted developed rim. <b>GRIM:</b> Olive glaze and vertical iron-oxide slip strip decoration.
F2119	L2120		2x THET (38g) 1x MCW (49g) 1x GRIM (3g)	L.12 <sup>th</sup> – 14 <sup>th</sup> C	<b>THET:</b> 1x everted, hollowed rim, 1x base. <b>MCW:</b> 1x externally thickened rim decorated with thumb impressions along the outer edge. <i>?Possibly late LMU.</i>
F2121	L2122		1x THET (37g)	10 <sup>th</sup> – 11 <sup>th</sup> C	<b>GRIM:</b> Olive glaze, single horizontal incision / groove. Flat base.
F2123	L2124*		4x THET (229g)	10 <sup>th</sup> – 11 <sup>th</sup> C	<b>THET:</b> 1x clubbed (externally thickened) rim and strap handle of a storage jar. Top of rim decorated with a pair of thumb impressions: 2x wire cut flat bases
F2129	L2130		11x THET (328g) 1x WEST (16g)	L.16 <sup>th</sup> – 18 <sup>th</sup> C	<b>THET:</b> 1x everted, hollowed rim: 1x everted, slightly hollowed rim: 3x flat bases (two vessels, 1x visibly wire cut): 1x body sherd decorated with square notched rouletting: 1x ?storage jar sherd decorated with an applied, partially thumbbed strip. <b>WEST:</b> Jug sherd.
F2133	L2139		1x ?EMWS (12g)	11 <sup>th</sup> – 12 <sup>th</sup> C	Base sherd. Fabric contains iron stained flint and quartz.
F2147	L2153		1x LMU (20g)	11 <sup>th</sup> – 14 <sup>th</sup> C	Simple, finely thrown everted rim.
F2154	L2155		2x THET (52g)	10 <sup>th</sup> – 11 <sup>th</sup> C	
F2158	L2159		3x THET (101g) 1x ?YARM (17g) 4x LMU (36g) 1x GRIM (10g)	Mid 13 <sup>th</sup> – Mid 14 <sup>th</sup> C	<b>THET:</b> 1x everted, hollowed rim. <b>?YARM:</b> Everted rim. <b>LMU:</b> 1x everted, developed rim. <b>GRIM:</b> Glazed jug sherd. ?Beard / arm element of a face jug.
F2161	L2162		1x LMU (20g) 1x ?ANDE (6g) 4x GRIM (98g) 1x SAIN (2g)	Mid 13 <sup>th</sup> – 14 <sup>th</sup> C	<b>LMU:</b> 1x everted, developed rim. <b>?ANDE:</b> Body sherd, external yellow glaze. Abraded glaze. <b>SAIN:</b> Body sherd, copper glaze. <b>GRIM:</b> All olive glazed. 2x applied iron-oxide vertical strips.
F2161	L2164		1x ?THET (34g)	13 <sup>th</sup> – 14 <sup>th</sup> C	<b>LMU:</b> 1x everted, developed rim: 1x sagging base (external sooting, internal residue).



F2165	L2166*	2x LMU (39g) 1x GRIM (39g) 4x THET (49g) 6x LMU (129g) 6x GRIM (64g) 1x ?SAIN (5g)	?14 <sup>th</sup> – 15 <sup>th</sup> C	<p><b>GRIM:</b> Olive glaze. Decorated with a single incised horizontal line and applied vertical and linked diagonal iron-oxide strips.</p> <p><b>THET:</b> 2x everted, hollowed rims: 1x everted, slightly hollowed rim: 1x flat base: The THET examples demonstrate signs of abrasion.</p> <p><b>LMU:</b> 1x late LMU rim, open form. Decorated with a vertical applied thumbed strip: 1x developed bowl rim (external sooting): The body sherds are all externally sooted.</p> <p><b>?SAIN:</b> Body sherd with external copper glaze and ?applied vertical strip decoration.</p> <p><b>GRIM:</b> All examples olive glazed, 2x applied vertical iron-oxide strips.</p>
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Table 3: Ceramic catalogue

## Results

With an average sherd weight of 21g, the majority of the pottery is in excellent condition and very diagnostic. Although material of late medieval and post-medieval date is evident, the assemblage is dominated by Saxo-Norman, early medieval and medieval products. In contrast to the group recovered during the previous evaluation of the site, however, the medieval period is best-represented, accounting for 66% of the total assemblage (Goffin 2001). In general the site is well-stratified, demonstrating relatively intense activity and obvious continuity and reuse, but within certain features, later disturbance, both medieval and late medieval, has given rise to a high level of residuality.

Fabrics	Sherd Count	% Count	Sherd Weight	% Weight	Avg. Sherd Weight
Saxo-Norman and early medieval	237	28%	3890g	22%	16g
Medieval	564	66%	11,159g	62%	20g
Late medieval and early post-medieval	48	6%	2610g	14%	54g
Post-medieval	3	Present	279g	2%	93g
<i>Total</i>	<i>852</i>		<i>17,938g</i>		

Table 4: Quantification of sherds by period as identified through ware types

Some difficulty was encountered in identifying certain of the more non-diagnostic local reduced coarsewares and there remains the possibility that some material may be incorrectly assigned. Additionally, although the Thetford-type wares are generally quite distinctive in appearance, some variation has been observed, giving rise to doubt in the identification of certain plain body sherds. A small proportion of the assemblage (1%) is assigned to a general medieval coarseware group (MCW) that remains undivided at this stage. In order to represent the variation present within these sand-based reduced coarsewares and to determine and/or refine their dating further fabric analysis is required.

### *Saxo-Norman and early medieval (Phase 1)*

Accounting for 28% of the site assemblage, the Saxo-Norman wares are proportionally less well represented than encountered during previous investigations at 12 Oak Street (*Ibid.*, 12). Similarly, however, at 87% the phase group is dominated by Thetford-type wares. Examples are very hard and predominantly reduced light grey to dark grey although the occasional sherd appears to demonstrate some fuming. Forms include cooking vessels/jars with simple everted or everted hollowed rims. The strap handle and thumb-impressed externally thickened (clubbed) rim of a storage jar was also recovered. Other decoration includes both plain and thumbed applied strips (usually across the body, but also around the neck) and horizontal bands of diamond or square notched rouletting. Bases are predominantly flat (often wire cut), but occasional slightly sagging examples have been recorded. Evidence of both external sooting and internal residue (sometimes burnt) has also been noted. The only other contemporaneous fabric is represented by a single non-diagnostic Stamford-type ware body sherd decorated with an applied vertical strip and external light green glaze.

Although only a small proportion of the total site assemblage at 4%, and accounting for just 13% of the phase group, several early medieval fabric variants were observed, all of which date to the 11<sup>th</sup> - 12<sup>th</sup> century. The locally produced fabrics are predominantly sand-based, but early shelly wares have also been recovered. Cooking vessels with simple everted rims represent the only form

identified, one example being decorated with notched indents around the top of the rim (early medieval sandwich ware). Regional Yarmouth-types are also evident, outnumbering local material. Rim forms noted in this fabric are either upright or everted, probably from cooking vessels. A number of the early medieval examples demonstrate external sooting.

Considerably more early medieval wares were recovered during previous investigation of the site, and contrary to findings during the current phase, Yarmouth-type ware represented only a small proportion of the phase group (*Ibid.*, 13). This is probably of no real significance given the small size of the present early medieval assemblage and the possibility that some early medieval examples have not been securely identified. During previous excavations on site, the incidence of Thetford-type wares and early medieval wares within the same deposits was noted and it was argued that some of former was likely to be residual. The same can be said of the excavation groups, particularly given the level of medieval and later activity, but the possibility remains that Thetford-type wares, early medieval fabrics and Local medieval wares are contemporaneous in some instances.

### ***Medieval (Phase 2)***

The medieval assemblage is the largest represented on site and at 57% of the phase group, Local medieval unglazed wares (LMU) represent the most commonly occurring fabric (as encountered during previous work on site, *Ibid.*). Forms identified include cooking vessels, jugs, bowls and a single lid fragment. Cooking vessels demonstrate simple everted, upright, everted flat-topped and more developed 'hammerhead' or everted and externally bevelled rim types. Only one slightly everted rim has been recorded for jug forms, but both strap and rod type handles have been observed, one of the latter being decorated with incised lines and ?twisted to form a spiral effect. Within the open forms, flat-topped and externally beaded and internally thickened rim types are included. LMU bases are predominantly sagging, but occasional flat examples are evident. Some vessels demonstrate internal residue and external sooting is common.

Local medieval unglazed rim forms develop from simple everted types (as observed with contemporary early medieval wares) to more developed and complex types during the lifespan of the industry and can consequently be of some assistance with dating. Decoration is not limited to specific form types, but certain combinations between form and decoration are repeated. Techniques include applied plain, thumb- impressed and thumb-impressed and combed vertical strips, horizontal combed bands and incised, thumbed and impressed/stabbed decoration. One unusual rim sherd is decorated with thumb impressions around the top of the rim in addition to an applied thumbed strip around the neck.

A late form of LMU tentatively dated to the 14<sup>th</sup> – 15<sup>th</sup> centuries has also been observed. Forms include storage jars and bowls, with externally thickened and more developed externally folded and internally thickened rims. The latter bowl type is decorated in one instance with internal thumb impressions and a wavy incised line around the top. Other decoration includes vertical and diagonal applied thumbed strips. With local and regional products, the evident continuity and longevity of certain decorative techniques (primarily thumbing) from Saxo-Norman through to late medieval times is a notable feature.

Grimston glazed ware accounts for over a quarter (26%) of the medieval assemblage and is primarily comprised of jug forms with upright, upright and internally bevelled and collar type rims. Bases are predominantly sagging and both strap and rod type handles have been recorded, the latter sometimes decorated with vertical ridges. The vast majority of sherds are olive green glazed, occasionally partial, but always externally. Decoration is often a good indicator of date, with such

vessels generally ranging from the 13<sup>th</sup> to 14<sup>th</sup> centuries, and highly decorated wares (such as anthropomorphic face jugs) dating from the mid-13<sup>th</sup> – mid-14<sup>th</sup> centuries. Applied and slipped vertical and diagonal iron-oxide strip and pellet decoration is relatively common. Thumbled bases and handles, applied scale decoration and incised horizontal and vertical lines are also encountered. A number of face jugs are represented, identified from beard elements and arm fragments decorated with repeated horizontal thumbnail impressions. One unusual Grimston face jug demonstrates relatively thick and undecorated arms, but no other anthropomorphic decoration.

The general medieval coarsewares (MCW) group includes cooking vessel and jug forms with simple everted, collared and internally thickened rim types. Bases are sagging and sherds demonstrate both internal residue and external sooting. Decoration includes incised horizontal lines and thumbled impressions. Unidentified medieval wares account for 4% of the phase group. These are primarily represented by glazed jugs of unknown origin. One oxidised baluster jug is decorated with a clear glaze and applied pellets arranged around a horizontal ridge (MISC OX). It is possible this vessel represents a medieval precursor to Late medieval transitional ware (R. Goffin, pers. comm.). The Miscellaneous glazed (MISC GL) category includes potential regional (Cambridgeshire/Lincolnshire) and national imports.

Imported wares account for just 3% of the medieval assemblage, occurring alongside local medieval products. Small quantities of yellow glazed Andenne ware, dating to the 12<sup>th</sup> – 13<sup>th</sup> centuries, and copper glazed and decorated Saintonge ware, dating to the mid-13<sup>th</sup> – 15<sup>th</sup> centuries, were both recovered. Within the miscellaneous import group (MISC IMP), two possible Dutch products may be present. One is a globular vessel decorated with a stamped diamond lattice design, white slip and green glaze and the second an oxidised collar type rim.

#### ***Late medieval and post-medieval (Phases 3 and 4)***

At just under 6% of the entire site assemblage, the late medieval and early post-medieval periods are quite poorly represented. A single imported Raeren jug base has been recovered, but as encountered on other sites in Norwich during this period, much of the remaining material is comprised of locally produced late medieval and transitional products (Goffin 2000, 14). Bowls with everted, internally bevelled rims, jugs with upright and slightly everted internally bevelled rims and one undecorated bunghole jar represent those forms identified. Decoration comprises external rilling and grooves, horizontal and wavy incised lines and clear, copper green and ?yellow glaze (sometimes partial). The duration of certain techniques is demonstrated through the presence of a thumbled base and an olive glazed jug sherd with iron-oxide slipped strips. One jug, decorated with external rilling and green glaze, has an angled rod handle flattened on top and incised with a foliate motif. A possible early post-medieval ware lid with a copper green glaze is also likely to be contemporary with this phase group.

The remainder of post-medieval period is even less well represented in the site assemblage, accounting for less than 1%. A single iron-glazed blackware mug base and an imported Dutch redware tripod vessel and Westerwald stoneware jug represent the only post-medieval wares recovered.

#### ***Discussion***

As a whole, the assemblage shares evident similarities with the evaluation phase and with other sites in this area of Norwich, but also demonstrates certain differences.

Unlike some parts of Norwich, no material evidently predating the late Saxon period was recovered. This parallels findings from previous investigations on site and on at least one other site in the vicinity (7 Oak Street, *Ibid.*, 15). Contrary to the evaluation phase, the assemblage was not dominated by Saxo-Norman and early medieval wares. However, as in the evaluation, Thetford-type wares accounted for the vast majority of the phase group.

The presence, quantity and range of medieval wares recovered established not only the continuation, but also the development of settlement on site during this phase. The current assemblage would suggest that medieval activity was on a greater relative scale than was demonstrated through previous work on the site. As noted then, Local medieval unglazed wares represent the most common fabric within the group, followed by glazed Grimston-type ware. The assemblage also includes a slightly increased range of glazed wares and imports, but these wares are still relatively marginal.

The paucity of late medieval and early post-medieval wares is reflected in the evaluation assemblage from 12 Oak Street and in assemblages from other nearby sites such as 7 Oak Street and Coslany Street (Anderson in Goffin, *Ibid.*). In this context, the absence may indeed be representative of a decline in activity, at least in this part of Norwich. Contrary to sites in the vicinity, however, the quantity of post-medieval material was also small, although this is likely to be due in large part to sampling procedures and probably does not accurately reflect the situation on site.

A relatively sizeable assemblage has been collected from excavations 12 Oak Street, adding to existing understanding of the nature and extent of occupation in this area of the city. The range of forms and evidence of sooting and residues on wares might be suggestive of domestic activity of some kind. A number of unusual form and decorative variations for local and regional wares have also been observed (see Fig. 9).

Cross-joins, both within and between features, are a relatively common feature on site and clearly aid understanding of site morphology and issues of dating. As each phase is differentially represented within the evaluation and excavation assemblages recovered from 12 Oak Street, and indeed with other sites in the vicinity, it is difficult to draw a meaningful understanding of spatial and temporal developments.

### **The ceramic building material**

By Andrew Peachey

Excavations produced a total of 76 fragments (13,803g) of 14<sup>th</sup> - 16<sup>th</sup> century CBM sparsely distributed in layers, pits and structural features. The CBM is considerably abraded, although some fragments of 16<sup>th</sup> century flat tile are only slightly abraded. The fabric of all the CBM is moderately sand-tempered and oxidised shades of red-orange.

The CBM comprises both brick and tile types, as well as a single re-used Romano-British fragment. The brick in the assemblage is of a single medieval type in Pit F2004 (L2003), Pit F2015 (L2013), Layers L2073 and L2083 and Foundation Trench F2129 (L2130). It has dimensions of 240-245 x 115 x 40-45mm with creased faces, irregular arrises and heavy straw/grass marks on the base. This type of brick is typical of the 14<sup>th</sup> - 15<sup>th</sup> centuries, although as some fractured fragments demonstrate traces of mortar over breaks, they may have been recycled. Pit F2015 (L2013) contained partial fragments of at least five bricks (3226g) as well as a single fragment of similarly reused Romano-British tegula roof tile. Two complete examples of this brick type were present in

the Phase 4 Pit F2004 (L2003), while the remaining contexts contained only relatively small fragments.

The other major component of the CBM assemblage is 14mm thick flat tile, probably not produced before the mid to late 15<sup>th</sup> century and throughout the 16<sup>th</sup> century. Small but notable groups were present in F2005 (L2006), Layer L2022 and Foundation Trench F2129 L2130, and while their probable source is the structures recorded on the site, they are too insubstantial to make a direct link.

### **The small finds and ironwork**

By Nina Crummy

Fig 10.1. SF 1. L2022. Levelling Layer. Fragment of a hone in a fine-grained micaceous siltstone. Length 50mm, width 23mm, maximum thickness 9mm. A hone made from the same stone came from a late 15<sup>th</sup> - 16<sup>th</sup> century pit at Colchester and there may be another example at Exeter (Crummy 1988, 79, no. 3150; Allan 1984, 298, fig. 168, 24).

Fig 10.2. SF 2. F2015 L2013. Fill of cess pit. Part of a bone tuning peg with a small perforation through the base, an example of Lawson's Type A (1990, 711). The shaft is round in section for most of its length but is broken at the point where it widens into the grip, which is usually, but not always, square in section. Length 51mm. Similar pegs were used on a variety of stringed instruments and many examples have been found in later medieval and early post-medieval urban contexts (Geddes & Clarke 1977, 314, no. 21; Crummy 1988, 45; Lawson 1990, 711-18; Egan 1998, 285-7; MacGregor *et al.* 1999, 1978-9).

L2022. Levelling Layer. Iron knife blade fragment, partly shattered. The back is straight, the edge slopes up to the rounded tip. Surviving intact length 61mm, width 30mm.

L2022. Levelling Layer. Nail, tip missing. Length 23mm.

F2037 L2038. Pit fill. Rectangular head and a short part of the shank of a T-clamp. Length/width of head 40 by 20mm, surviving length of shank 29mm.

F2048 L2059. Pit fill. Amorphous lump. 37 by 30 by 26mm.

L2083. Layer. Nail, tip bent. Length 48mm.

F2082 L2087. Pit fill. Narrow knife blade with only the stump of the tang remaining; the tip is missing. The back and edge are straight, curving gently together at the tip. Length 105mm, width 16mm.

F2082 L2088. Pit fill. Fragment of tapering blade or strip. Length 48mm, width 23mm.

F2110 L2111. Pit fill. Amorphous lump, possibly slag. 50 by 42 by 27mm.

## **The metalworking debris**

By Jane Cowgill

### *Introduction*

An evaluation of the 12 Oak Street site was undertaken by Norfolk Archaeological Unit in 2000, when three trenches were excavated to assess the importance of this large site close to the walls of the medieval city. Two areas to the west of the site, on the other side of the street, east of the river Wensum, had previously been excavated (Coslany Street, Site 26435N (Cowgill 1997) and Oak Street, Site 26503N (Cowgill forthcoming)). Both were found to have, as some of their earliest activity, large deep dumps of iron smelting and smithing slag, which were dated to the 10<sup>th</sup> to 13<sup>th</sup> centuries.

Evaluation Trench 1 on the present site, close to the Oak Street frontage, produced evidence of a stratified sequence of iron smithing debris (probably bloom smithing because of the high percentage of spheroidal hammerscale) that was contemporary with the large slag dumps identified at the sites on the opposite side of the street. The proximity of this site (Trench 1), which also had evidence of contemporary iron production as well as smithing, to those previously studied, was deemed to be of enormous importance because it reinforced the sheer unprecedented scale of the ironworking industry in Norwich at this date. The assessment report concluded that:

*'The potential of the site is therefore not only to examine the technology employed and the unique nature of the slags recovered, but also whether this technology developed over time. It should also allow the organisation of this large and significant industry and its spatial layout to be examined. There can be no doubt that iron production must have generated for Norwich, or perhaps for the organisation in control, a significant income. In both employment and financial terms (taking into account the fuel production and conversion to charcoal, clay and ore extraction and the boats and boatmen needed) this must have had a big impact on Norwich and the region. This is a rare and very important opportunity to examine what must have been a significant part of Norwich's industrial past and may help to account for some of the reasons for the City's rapid expansion and wealth in the early medieval period'* (Cowgill 2000).

Due to the scale and potential importance of the ironworking remains revealed in Trench 1, a mitigation strategy was put in place to preserve the archaeology *in situ* for this area of the site. It was therefore not further explored in the subsequent excavation undertaken by Archaeological Solutions, when an 8 x 11m area was excavated next to the original Evaluation Trench 2.

The excavation at Coslany Street (the southern end of Oak Street) produced a large assemblage of slag weighing 82.02kg (Cowgill 1997) and an even larger one was recovered from 7 Oak Street some 100m further upstream. Although the latter has been seen by the author it has yet to be recorded and reported upon. These sites, along with Evaluation Trench 1, will be published by the Norfolk Archaeological Unit (Wallis in prep.). A third site was excavated at New Mills Yard (Site 26587N) by the Hertfordshire Archaeological Trust (now AS), at the northern end of Oak Street, but only 8kg of slag was found (Cowgill 2001). All three sites have, however, produced slag assemblages with the same distinctive characteristics.

### ***Recording methodology***

A total of 14.362kg of slag (243 pieces) were submitted for recording. The slag was washed when necessary, dried and identified solely on morphological grounds by visual examination, sometimes with the aid of a x10 binocular microscope. It was recorded on *pro forma* recording sheets and this information was entered into a Microsoft Access database using the following encoded fields: site; context; type; count; weight; craft; fuel; condition; comments. A note of probable fuel type has been recorded when fragments were incorporated within the slag. Any soil in the bags that contained the slag was checked with a magnet for the presence of hammer scale. The Catalogue forms Appendix 3.



Context	IRON SMELTING SLAGS										IRON SMITHING SLAGS				MISCELLANEOUS		
	BLOOM	CHANNEL	FINGER	FURNACE	ORE	SLAG	TAP	VOLCANO	HAMMS	HB	SLAG	IRON	TUYERE	VITCLAY			
2013							1 : 10a										
2017							3 : 105a										
2019							9 : 305a			2 : 325a							
2021							4 : 271a										
2022							25 : 848a										
2032							5 : 107a		c. 10 :-			1 : 2a	1 : 40a	1 : 129a			
2038							2 : 37a										
2046							2 : 43a							1 : 32a			
2049			1 : 64a				1 : 21a										
2050							1 : 12a										
2052						1 : 8a											
2056							1 : 105a										
2059							3 : 39a										
2063							1 : 40a										
2072						12 : 71a			c. 10 :-					1 : 18a			
2073			1 : 34a	1 : 832a			7 : 874a				1 : 22a			1 : 124a			
2075							1 : 57a										
2077	1 : 28a						5 : 124a		c. 5 :-		1 : 39a						
2079					1 : 6a		1 : 64a										
2081				1 : 266a			1 : 8a										
2092							1 : 33a										
2101							2 : 29a										
2103							2 : 161a										
2105							1 : 204a										
2108	1 : 110a		1 : 54a	3 : 135a			35 : 1493a	4 : 1112a	c. 10 :-			16 : 55a		1 : 119a			
2109							2 : 96a										
2112							1 : 92a										
2124						1 : 44a	2 : 140a		c. 25 :-								
2126						1 : 378a	5 : 316a		c. 25 :-	1 : 85a							
2130																	
2135							2 : 633a										
2155						1 : 421a	3 : 423a		c. 10 :-								
2159							10 : 322a	1 : 814a	c. 25 :-			1 : 44a	3 : 52a				
2162							3 : 71a										
2164							6 : 405a		c. 25 :-		1 : 26a						
2166							6 : 846a		c. 25 :-								

Table 5: A summary of the evidence for iron smelting and smithing (count: weight)

The codes used in the above table:

FURN = Furnace slag; HAMMS = Hammerscale; HB = Plano-convex slag accumulation (commonly called hearth bottom); VITCLAY = Vitriified clay

During the recording 21 iron objects were extracted (some may be bloom fragments) and eight pieces of iron pan.

### *Description of the slags*

The majority of the slags are a by-product of iron smelting, with tap slags dominating the assemblage (Table 5). These are generally black and glossy, with the characteristic flow lines on the upper surface. There are some pieces with a flat 'plate-like' upper surface, but more commonly they are a mass of small flows that have built up, one above the other, into multi-layered pieces. Often the bases of the slags have been moulded by previous flows; on the actual basal slags, sand inclusions with occasional charcoal imprints are apparent. Small dribbles of tap are also present, sometimes as inclusions on the bases of larger pieces.

The presence of 'volcano'-shaped tap slags is a characteristic of the Oak Street and Coslany Street assemblages. A remarkably complete piece was found during the 1996 Coslany Street excavation in layer 2310 and was described as follows: 'The slag is c. 120mm high and appears to have been poured into the tapping pit from a curved c. 20mm wide channel. The 'back' of the slag has flowed down a 60mm, expanding to 75mm, semi-circular near-vertical channel. The base is coated in sand'. All the pieces from this site are fragmentary but would, if complete, be similar in size. Some appear to be inverted volcanoes because they seem to have furnace slag attached to the wide 'base' (an example is from context L2159). This may be misleading (all the pieces are fragmentary), or some furnace-type slag may have fallen from the furnace with the tapped slags. These volcano pieces indicate that there was a drop from the furnace into the tapping pit alongside it.

Only one piece of channel slag was found (Table 5); this is slag that has cooled in the channel connecting the furnace to the tapping pit. It is 40mm wide, well within the range of 35-50mm of the 13 pieces from Coslany Street. It, like them, has a curved base.

Three of the usually rare finger slags were found (Table 5) and these are marginally smaller than the twelve from Coslany Street, having a diameter range of 16 - 20mm as opposed to 20 - 35mm (although seven were 20mm in diameter). Most of the pieces do not have a glossy upper surface; instead the complete circumference has a similar dull-matt knobby surface that is usually a mid-dark grey. The curved surfaces appear to have formed in a long round hole over 70mm long and commonly 20mm wide; this may have been the, or one of several, air holes through the side of the furnace.

There are only five pieces recorded as furnace slag (Table 5), the mixture of slag and charcoal (and sometimes ore) that cooled inside the base of the furnace. These are all small compared to those from 7 Oak Street, which appeared to resemble very large moulded hearth bottoms weighing several kilograms. Two of the pieces only have medium-sized charcoal imprints, whereas all the other sites consistently had the more normal very large imprints, confirming that large pieces of charcoal were needed for successful iron production (to support the charge - the ore and charcoal fed into the furnace to generate the bloom - and allow an adequate air-flow through the furnace). The three from context L2108, however, have the more normal large imprints.

There are two tuyere fragments, probably from the bloom-smithing hearths; however, the eight pieces of vitrified clay may be fragments of the smelting furnaces (Table 5). The clays are all reduced fired (iron smelting is a reduction process) and most have a magnetic iron-rich vitrified face, which would have been the inside surface of the furnace. Some are rounded in profile (due to the expansion of the clays during vitrification), while others are flat. The clays are deeply vitrified, almost to the full thickness of the pieces. One (context L2108) has what appears to be part of an air hole *c.* 35mm in diameter (although heat distortion may have affected its apparent dimensions). This would be very large for the hole in a tuyere, but if the interpretation of the fingers is correct, probably too large for a furnace air hole (although one finger from Coslany Street had a diameter of 35mm). It is this zone within a furnace, however, that is the hottest during a smelt and during experimental iron smelts it tends to be the only part of a furnace that vitrifies and suffers enough damage to warrant repair. These pieces are all relatively small, especially when compared to those recovered from Evaluation Trench 1 (one measured over 200 x 200mm across and was over 50mm thick).

There is only one possible piece of ore (context L2079). It appears to have been roasted (undertaken on a bonfire), but as it was never crushed, perhaps it was deemed unsuitable for smelting.

The method of smelting iron in the early medieval period is known as a direct process because the iron never melts in the furnace. Instead it forms a bloom, a spongy mass of iron and slag that is attached to the furnace wall just below the air hole in what is the hottest part of the furnace. After extraction from the furnace, the bloom has to be gently smithed to consolidate the iron and drive out the slag. Blooms are for obvious reasons, rare archaeological finds, and only one possible piece from one was tentatively identified (context L2077). Due to their metallic iron content, they are always magnetic and it is possible that some of the iron objects are bloom fragments, or iron-rich slag from bloom smithing. It has been noted above that bloom smithing is likely to have been undertaken at the frontage of 12 Oak Street.

Few iron-smithing slags were identified with any confidence, partly because all contenders were extremely encrusted with corrosion products and soil, masking all surface features. There is also very little hammerscale from the site and most of this is crushed, probably by trampling underfoot by the medieval occupants. Most may be residual, given the vast quantities of large fresh scale recovered from Evaluation Trench 1 (over 60% of some sample residues by weight).

Only small pieces of slag were recovered from the site, both during the evaluation and excavation (including Trench 1). The larger pieces that were discarded in the pits and dumps to the west in the Coslany and Oak Street excavations sometimes weigh over 1kg and one from 7 Oak Street weighs 6.5kg.

Charcoal (peat or wood) was the only fuel suitable for iron smithing in the medieval period. Thirteen samples of charcoal associated with the slag or embedded within it from the Coslany Street excavations were examined by Rowena Gale (Cowgill 1997) and these indicated that oak, in particular heartwood, provided the bulk of the fuel used. The age at which heartwood forms in oaks is variable but is generally between

15 and 70 years, which suggests that they were not using young round wood or stems or poles from a short coppice cycle.

### *Site discussion*

The majority of the slag was recovered from the Phase 2 inter-cutting pits, which may in part have been excavated for sand extraction (T. Woolhouse, pers. comm.). At Coslany Street most of the slag was recovered from pits that have been given a similar interpretation, but there they were deemed to be too small for iron pan/ore prospecting/extraction (Cowgill 1997). Some of the sand extracted may have been used for furnace and hearth construction and repair, but it was probably mainly used for making mortar and as a sand temper in the Thetford pottery being produced within the City walls during the 10<sup>th</sup> - 12<sup>th</sup> centuries (I. Lentowicz, pers. comm.). The clay for the pottery and the furnace construction would have had to be imported into the City and the boats carrying it may have docked alongside the riverside sites to offload some clay and take some sand on board.

At Coslany Street, virtually no domestic rubbish was found amongst the slag in the pits, whereas at this site the slag is often a minor component compared to the quantity of pottery sherds and animal bones being discarded. Only in a very few contexts does the weight of the slag (a very dense and heavy material) outweigh the combined weights of the pottery and bone (for example, contexts L2073 and L2108, both dated to the 13<sup>th</sup> - 14<sup>th</sup> century). It is therefore evident that at this site the slag is being discarded, or more likely redeposited, with domestic rubbish and that this was probably a habitation area during the medieval period. The lack of hammerscale reinforces the latter interpretation.

The iron smelting appears to be at its peak during the 10<sup>th</sup> - 12<sup>th</sup> centuries, but continued into the 13<sup>th</sup> and possibly the 14<sup>th</sup> century (the New Mills Yard dumps were dated to the 13<sup>th</sup> - 14<sup>th</sup> century, but again this may be redeposited material), although possibly some hint of it might be expected in the documentary records if it had continued at this late date. Dating the demise of the industry is problematic because it is inevitable that quantities of slag will be found in any features cut into the industrial deposits long after the iron production has moved elsewhere. Just over half of this assemblage (129 pieces, 7.90kg) comes from pits dated to the 13<sup>th</sup> - 14<sup>th</sup> century, admittedly partly because the largest assemblage from the site comes from Pit F2106 (fill L2108), which is of this date. All the remaining larger groups are from 15<sup>th</sup> - late 16<sup>th</sup> century contexts (Tree Throw F2018 and Layer 2022), where they must be redeposited. The earliest dated contexts that contain slag are Beamslot F2123 and Pit F2154, both of which may be 10<sup>th</sup> - 11<sup>th</sup> century in date and could be contemporary with the industry. Again, however, the lack of hammerscale suggests that these features are beyond the limit of the main focus for the iron industry.

### *Discussion: the wider context of the Oak Street/Coslany Street iron industry*

It seems likely that the iron smelting furnaces and smithing hearths were situated on the east side of Coslany/Oak Street, with the waste products being dumped across the road along the river bank to raise and consolidate the area (and to dispose of the slags). The actual extent of this industrial zone and its duration still have to be determined. The scale of the industry and its proximity to the rapidly expanding city

is surprising. Although not a noxious industry *per se* (the furnaces for example would not produce visible smoke), it is very noisy and dusty. Also, it is normal to situate the industry where the fuel is produced (charcoal) because it is required in such enormous quantities, but in this instance the fuel (and clays and possibly the ores) must have been imported, presumably by river. With an industry on this scale this would have required the movement by boat of some thousands of tonnes of charcoal (wood or ?peat). One cannot but help wondering if the Church or Crown were not in control.

Given the suggested scale of the industry it is not surprising to find some slag on this site, only some 20m away from Evaluation Trench 1. The excavated area, however, like New Mills Yard, appears to be outside the main industrial zone and the fills of the pits appear to be more domestic in nature. All the slag on the site is probably redeposited and much may be residual as it is uncertain whether, or how far into the 14<sup>th</sup> century the industry continued.

The fact that bloom smithing was a major activity on the site during the 10<sup>th</sup> - 13<sup>th</sup> centuries cannot be denied given the evaluation results, but on this occasion, the implementation of a mitigation strategy has resulted in the excavation producing no further understanding of this major part of Norwich's industrial past.

### **The mammal and bird and fish bones**

By Ian L. Baxter

#### *Introduction*

A total of 35kg of animal bones were recovered from 12 Oak Street, amounting to 422 'countable' (see below) fragments. Bone preservation ranged from poor to excellent and was generally good. This is an assemblage of moderate size, but appears to indicate differences between the medieval and late medieval/transitional periods.

Following the report on the pottery (Sudds, this report), the animal bone has been divided into six chronological periods.

- 1) Saxo-Norman, 10<sup>th</sup> - 11<sup>th</sup> century AD (early Phase 1)
- 2) Early medieval, 11<sup>th</sup> - 12<sup>th</sup> century AD (later Phase 1)
- 3) Medieval, 11<sup>th</sup> - 15<sup>th</sup> century AD (Phase 2)
- 4) Late medieval/early post-medieval (late medieval/transitional), 15<sup>th</sup> - 16<sup>th</sup> century AD (Phase 3)
- 5) Early post-medieval, 16<sup>th</sup> century AD (early Phase 4)
- 6) Late(r) post-medieval, 16<sup>th</sup> - 18<sup>th</sup> century AD (later Phase 4)

Most of the material derives from the medieval and late medieval/transitional periods (Periods 3 and 4) and was found in pits, mostly refuse pits or quarry pit backfills, but also in make-up layers. A smaller number of bone fragments came from structural features including foundation trenches and beam slots.

Norfolk Archaeological Unit recovered approximately 10kg of animal bones during the evaluation of the site. Most of the assemblage (80%) derived from a Period 6 equid burial. Most of the other bones came from Period 2 (11<sup>th</sup> - 12<sup>th</sup> century)

contexts. The animal bones from the evaluation have been reported by Curl (2000) and are not included in this report.

### *Methods*

All of the animal bones from Oak Street were hand-collected. Consequently, an under-representation of smaller species and body parts due to recovery bias is to be expected from this site.

The mammal bones were recorded following a modified version of the method described in Davis (1992) and Albarella & Davis (1994). In brief, all teeth (lower and upper) and a restricted suite of parts of the skeleton was recorded and used in counts. These are: horncores (if measurable), skull (zygomaticus), atlas, axis, scapula (glenoid articulation), distal humerus, distal radius, proximal ulna, carpal 2+3, distal metacarpal, pelvis (ischial part of acetabulum), distal femur, distal tibia, calcaneum (sustenaculum), astragalus (lateral side), centrotarsal, distal metatarsal and proximal parts of the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> phalanges. At least 50% of a given part had to be present for it to be counted. The presence of large (cattle/horse size), medium (sheep/pig size) and small (cat/dog size) vertebrae and ribs was recorded for each context, although these were not counted.

For birds, the following were always recorded: scapula (articular end), proximal coracoid, distal humerus, proximal ulna, proximal carpometacarpus, distal femur and distal tibiotarsus.

'Non-countable' elements of particular interest were recorded but not included in the counts.

The separation of sheep and goat was attempted on the following elements: dP<sub>3</sub>, dP<sub>4</sub>, distal humerus, distal metapodials (both fused and unfused), distal tibia, astragalus, and calcaneum using the criteria described in Boessneck (1969), Kratochvil (1969) and Payne (1969 and 1985). Equid postcrania were assigned to species using criteria summarised in Baxter (1998).

The closely related galliforms – domestic fowl (*Gallus gallus*), guinea fowl (*Numida meleagris*) and pheasant (*Phasianus colchicus*) – are difficult to distinguish. The presence of a spur on tarsometatarsi was considered a diagnostic character of male domestic fowl/pheasant (being absent from guinea fowl), whereas the lack of a continuous posterior keel on the tarsometatarsus was considered a diagnostic character for distinguishing between pheasant and domestic fowl/guinea fowl. Therefore a spurred tarsometatarsus lacking the posterior continuous keel was securely identified as domestic fowl. The presence or absence of an air-sac foramen on the proximal end of the femur was used to distinguish between pheasant and domestic fowl/guinea fowl. MacDonald's (1992) criteria for the scapula and carpometacarpus were used to distinguish domestic fowl/pheasant from guinea fowl.

Wear stages were recorded for all P<sub>4</sub>s and dP<sub>4</sub>s as well as for the lower molars of cattle, sheep/goat and pig, both isolated and in mandibles. Tooth wear stages follow Grant (1982).

Measurements are listed in Appendix 2. These in general follow von den Driesch (1976). All pig measurements follow Payne and Bull (1988). Humerus HTC and BT and tibia Bd measurements were taken for all species as suggested by Payne and Bull (1988) for pigs. The width of sheep/goat teeth represents the 'maximum' width.

Taxon	Period						Total
	1 Saxo-Norman (10 <sup>th</sup> -11 <sup>th</sup> AD)	2 Early Medieval (11 <sup>th</sup> -12 <sup>th</sup> AD)	3 Medieval (11 <sup>th</sup> -15 <sup>th</sup> AD)	4 Late Medieval- Early Post- Medieval (15 <sup>th</sup> -16 <sup>th</sup> AD)	5 Early Post- Medieval (16 <sup>th</sup> AD)	6 Late Post- Medieval (16 <sup>th</sup> -18 <sup>th</sup> AD)	
Cattle ( <i>Bos</i> f. domestic)	1	3	72	82	-	-	158
Sheep/Goat ( <i>Ovis/Capra</i> f. domestic)	1	3	64	55	1	2	126
Sheep ( <i>Ovis</i> f. domestic)	(-)	(1)	(20)	(19)	-	(1)	(41)
Goat ( <i>Capra</i> f. domestic)	(-)	(-)	(-)	(2)	(-)	(-)	(2)
Fallow deer ( <i>Dama dama</i> )	-	-	1	-	-	-	1
Pig ( <i>Sus</i> f. domestic)	-	-	41	18	-	-	59
Horse ( <i>Equus caballus</i> )	-	-	-	2	-	-	2
Hare ( <i>Lepus</i> sp.)	-	-	-	1	-	-	1
Rabbit ( <i>Oryctolagus cuniculus</i> )	-	-	-	6 <sup>1</sup>	-	-	6
Domestic fowl ( <i>Gallus</i> f. domestic)	1	-	31	7 <sup>2</sup>	-	-	39
Goose ( <i>Anser/Branta</i> )	1	1	21	2	-	-	25
Duck ( <i>Anas</i> sp.)	-	-	1	-	-	-	1
Pigeon ( <i>Columba livia</i> )	-	-	1	1	-	-	2
Bird ( <i>Aves</i> )	-	-	1	1	-	-	2
<b>Total</b>	<b>4</b>	<b>7</b>	<b>233</b>	<b>175</b>	<b>1</b>	<b>2</b>	<b>422</b>

Table 6: Number of hand-collected mammal and bird bones (NISP)

'Sheep/Goat' also includes the specimens identified to species. Numbers in parentheses are not included in the total of the period. '+' means that the taxon is present but no specimens could be 'counted' (see text).

<sup>1</sup> includes five bones from a partial skeleton

<sup>2</sup> includes three bones from a partial skeleton



### *Frequency of species*

As with all European urban sites of any period, the animal bone assemblage from 12 Oak Street is dominated by the bones of the main domestic mammals – cattle, sheep and pig (Table 6). Domestic birds (fowl, goose, duck and possibly pigeon) are also fairly common and their number is certainly grossly under-estimated due to a recovery bias. Wild species are rare, suggesting that hunting played a negligible role in the food provision of the town.

Cattle are the most common species in both the medieval (Period 3) and later medieval/transitional (Period 4) periods, according to the number of identified specimens (NISP). However, when the minimum number of individuals (MNI) is taken into account, sheep are more numerous than cattle in the medieval period. Pig is the third most common species in both periods (Table 7).

When the Oak street assemblage is compared with the somewhat larger assemblage from Castle Mall (Albarella *et al.* 1997), it can be seen that pig seems to be relatively more important at Oak Street in the medieval period and cattle in the later medieval/transitional period compared with Castle Mall. Sheep frequency, however, is reduced in the late medieval/transitional period at Oak Street by comparison with the level at Castle Mall (Fig. 9a). Both sites show a relative decline in pig frequency from the medieval to the late medieval/transitional periods. This is probably connected to increased deforestation and a consequent reduction in areas suitable for the practice of pannage.

Geese are more frequent relative to domestic fowl at Oak Street in the medieval period than at Castle Mall or at either site in the late medieval/transitional period (Fig. 9b). Pigeons, possibly domestic (see below), are present at Oak Street in the medieval and later medieval/transitional periods, but absent at Castle Mall, although they occur at the latter site both before and after these periods.

The minor domesticates are very scarce at Oak Street, with only horse present at very low frequency. Fallow deer bones occur in two medieval contexts and both hare and rabbit remains are present in late medieval/transitional contexts.

Taxon	Period							
	3 (Medieval: 11 <sup>th</sup> -15 <sup>th</sup> AD)				4 (Late Medieval/Early Post-Medieval: 15 <sup>th</sup> – 16 <sup>th</sup> AD)			
	NISP	%	MNI	%	NISP	%	MNI	%
Cattle ( <i>Bos taurus</i> )	72	41	4	29	82	53	9	56
Sheep/Goat ( <i>Ovis/Capra</i> )	64	36	7	50	55	35	5	31
Pig ( <i>Sus scrofa</i> )	41	23	3	21	18	12	2	13
Total	177		14		155		16	

Table 7: Periods 3 and 4. Frequencies of the three most common domestic mammals by number of identified specimens (NISP) and by minimum number of individuals (MNI)

Element	Taxon								
	Cattle			Sheep/Goat			Pig		
	NISP	MNI	%	NISP	MNI	%	NISP	MNI	%
Upper deciduous + permanent incisors							-	-	<b>0</b>
Upper deciduous + permanent canine							1	1	<b>33</b>
Upper deciduous + permanent premolars	8	2	<b>50</b>	-	-	<b>0</b>	2	1	<b>33</b>
M <sup>1/2</sup>	12	3	<b>75</b>	3	1	<b>14</b>	-	-	<b>0</b>
M <sup>3</sup>	5	3	<b>75</b>	2	1	<b>14</b>	-	-	<b>0</b>
Lower deciduous + permanent incisors	-	-	<b>0</b>	2	1	<b>14</b>	12	2	<b>67</b>
Lower deciduous + permanent canine							5	3	<b>100</b>
Lower deciduous + permanent premolars	10	2	<b>50</b>	24	4	<b>57</b>	11	2	<b>67</b>
M <sub>1/2</sub>	4	1	<b>25</b>	23	6	<b>86</b>	11	3	<b>100</b>
M <sub>3</sub>	3	2	<b>50</b>	13	7	<b>100</b>	1	1	<b>33</b>
Horncore	3			2					
Cranium	1	1	<b>25</b>	-	-	<b>0</b>	2	1	<b>33</b>
Atlas	2	2	<b>50</b>	3	3	<b>43</b>	-	-	<b>0</b>
Axis	-	-	<b>0</b>	-	-	<b>0</b>	-	-	<b>0</b>
Scapula	2	1	<b>25</b>	2	1	<b>14</b>	1	1	<b>33</b>
Humerus dist	3	2	<b>50</b>	1	1	<b>14</b>	2	1	<b>33</b>
Radius dist	2	1	<b>25</b>	3	2	<b>29</b>	-	-	<b>0</b>
Ulna prox	-	-	<b>0</b>	1	1	<b>14</b>	2	1	<b>33</b>
Carpal	-	-	<b>0</b>	-	-	<b>0</b>	-	-	<b>0</b>
Metacarpal dist	8	4	<b>100</b>	2	1	<b>14</b>	2	1	<b>33</b>
Pelvis acetabulum	5	3	<b>75</b>	4	2	<b>29</b>	1	1	<b>33</b>
Femur dist	-	-	<b>0</b>	2	1	<b>14</b>	1	1	<b>33</b>
Tibia dist	2	1	<b>25</b>	4	2	<b>29</b>	1	1	<b>33</b>
Astragalus	6	3	<b>75</b>	1	1	<b>14</b>	2	1	<b>33</b>
Calcaneum	5	3	<b>75</b>	1	1	<b>14</b>	3	2	<b>67</b>
Centrotarsal	2	1	<b>25</b>	-	-	<b>0</b>	-	-	<b>0</b>
Metatarsal dist	7	4	<b>100</b>	4	2	<b>29</b>	2	1	<b>33</b>
Phalanx 1 prox	6	1	<b>25</b>	5	1	<b>14</b>	-	-	<b>0</b>
Phalanx 2 prox	1	1	<b>25</b>	-	-	<b>0</b>	1	1	<b>33</b>
Phalanx 3 prox	1	1	<b>25</b>	-	-	<b>0</b>	-	-	<b>0</b>

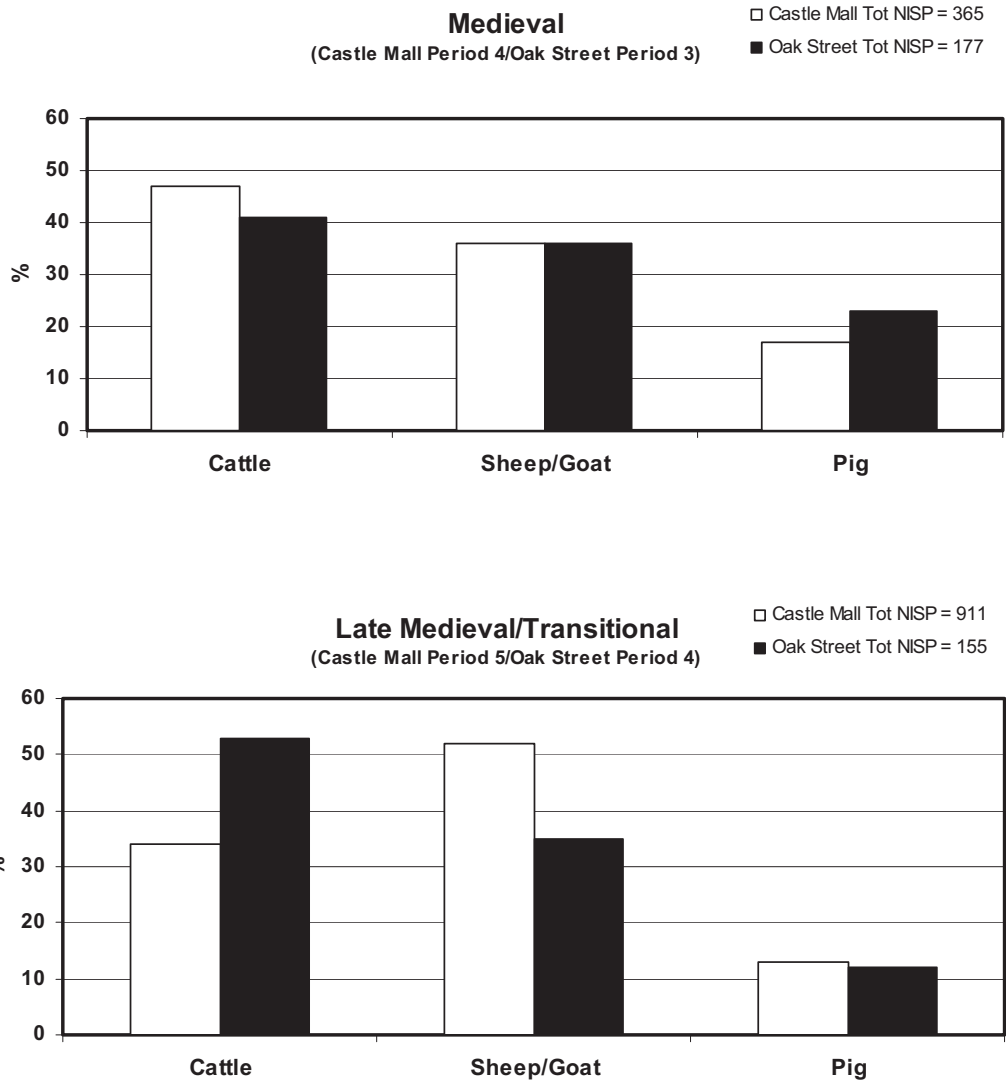
*Table 8a: Period 3. Body parts of the main domestic mammals by number of fragments (NISP) and minimum number of individuals (MNI)*

Unfused epiphyses are not counted. Only hand-collected material is included. The MNI has been calculated as follows: incisors have been divided by 8 for cattle and sheep/goat and by 6 for pig, deciduous + permanent premolars by 6, M1/2 by 4, phalanges by 8 and all other elements, except metapodials and vertebrae, by 2. Metacarpal = (MC1 + MC2/2 + MP1/2 + MP2/4) / 2; Metatarsal = (MT1 + MT2/2 + MP1/2 + MP2/4) / 2, where: MC1 = complete distal metacarpal; MC2 = half distal metacarpal; MT1 = complete distal metatarsal; MT2 = half distal metatarsal; MP1 = complete distal metapodial; MP2 = half distal metapodial. Pig metapodials are considered the equivalent of cattle and sheep/goat half metapodials. % = frequency of an element in relation to the most common one (by MNI). Sheep/goat horncores include 2 sheep.

Element	Taxon								
	Cattle			Sheep/Goat			Pig		
	NISP	MNI	%	NISP	MNI	%	NISP	MNI	%
Upper deciduous + permanent incisors							-	-	0
Upper deciduous + permanent canine							-	-	0
Upper deciduous + permanent premolars	4	1	11	10	2	40	4	1	50
M <sup>1/2</sup>	2	1	11	6	2	40	2	1	50
M <sup>3</sup>	2	1	11	4	2	40	2	1	50
Lower deciduous + permanent incisors	1	1	11	-	-	0	1	1	50
Lower deciduous + permanent canine							1	1	50
Lower deciduous + permanent premolars	13	3	33	10	2	40	2	1	50
M <sub>1/2</sub>	4	1	11	16	4	80	3	1	50
M <sub>3</sub>	2	1	11	9	5	100	-	-	0
Horncore	2			4					
Cranium	-	-	0	3	2	40	1	1	50
Atlas	1	1	11	1	1	20	-	-	0
Axis	-	-	0	-	-	0	-	-	0
Scapula	3	2	22	7	4	80	2	1	50
Humerus dist	17	9	100	8	4	80	2	1	50
Radius dist	4	2	22	4	2	40	3	2	100
Ulna prox	1	1	11	2	1	20	-	-	0
Carpal	-	-	0	-	-	0	-	-	0
Metacarpal dist	4	2	22	2	1	20	-	-	0
Pelvis acetabulum	6	3	33	2	1	20	-	-	0
Femur dist	3	2	22	-	-	0	1	1	50
Tibia dist	3	2	22	3	2	40	-	-	0
Astragalus	5	3	33	-	-	0	-	-	0
Calcaneum	2	1	11	1	1	20	1	1	50
Centrotarsal	-	-	0	-	-	0	-	-	0
Metatarsal dist	6	3	33	2	1	20	-	-	0
Phalanx 1 prox	3	1	11	-	-	0	-	-	0
Phalanx 2 prox	-	-	0	-	-	0	-	-	0
Phalanx 3 prox	3	1	11	-	-	0	-	-	0

Table 8b: Period 4. Body parts of the main domestic mammals by number of fragments (NISP) and minimum number of individuals (MNI)

Unfused epiphyses are not counted. Only hand-collected material is included. The MNI has been calculated as follows: incisors have been divided by 8 for cattle and sheep/goat and by 6 for pig, deciduous + permanent premolars by 6, M<sub>1/2</sub> by 4, phalanges by 8 and all other elements, except metapodials and vertebrae, by 2. Metacarpal = (MC1 + MC2/2 + MP1/2 + MP2/4) / 2; Metatarsal = (MT1 + MT2/2 + MP1/2 + MP2/4) / 2, where: MC1 = complete distal metacarpal; MC2 = half distal metacarpal; MT1 = complete distal metatarsal; MT2 = half distal metatarsal; MP1 = complete distal metapodial; MP2 = half distal metapodial. Pig metapodials are considered the equivalent of cattle and sheep/goat half metapodials. % = frequency of an element in relation to the most common one (by MNI). Sheep/goat horncores include 2 sheep and 2 goats.



*Fig. 9a Frequency of the main domestic mammals at 12 Oak Street and Castle Mall, Norwich*  
Castle Mall based on Albarella *et al.* (1997)

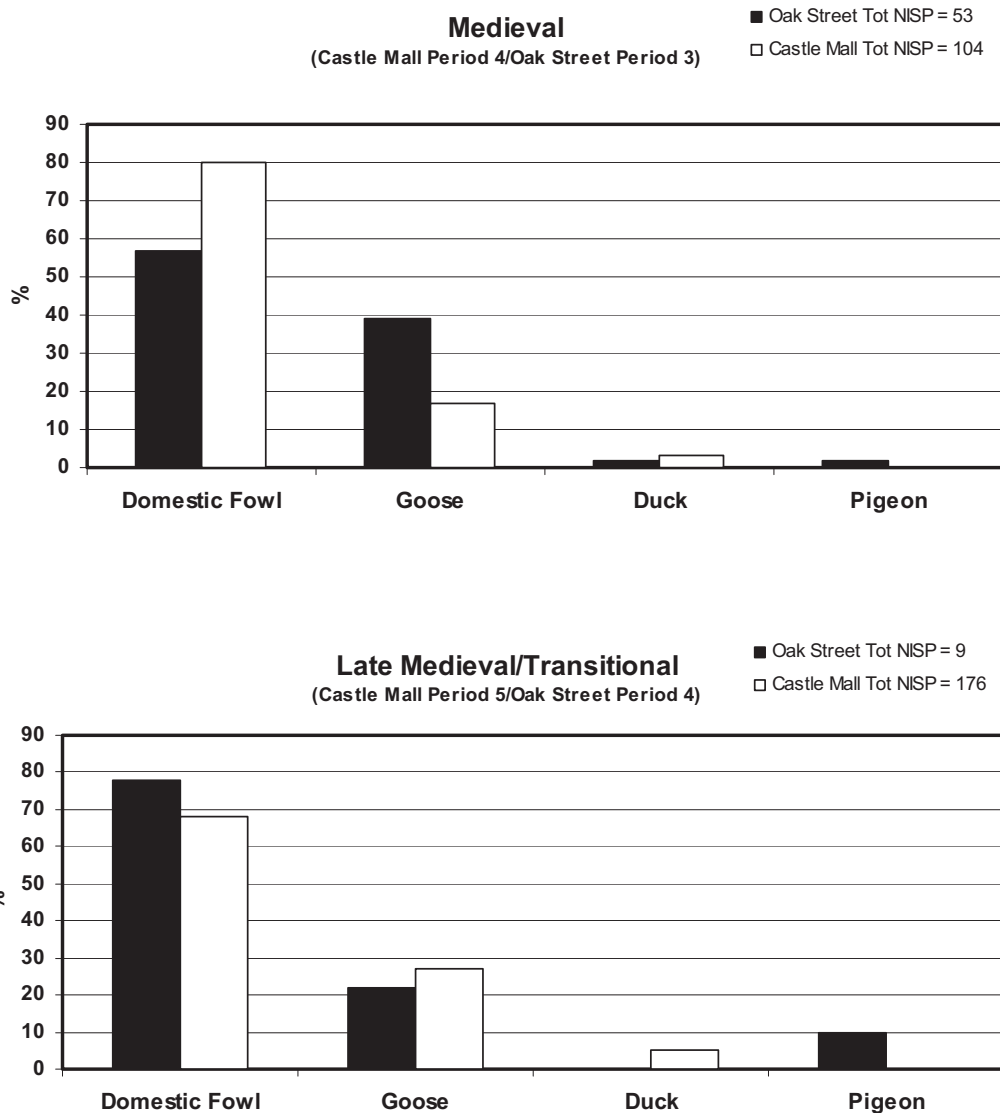


Fig. 9b Frequency of the domestic birds at 12 Oak Street and Castle Mall, Norwich Castle Mall based on Albarella *et al.* (1997)

### Cattle

The available evidence indicates the presence of shorthorned cattle in both the medieval and late medieval/transitional periods. No cattle bones suitable for calculating withers heights were sufficiently complete, but other measurements suggest a general increase in the size of cattle between the medieval and late medieval/transitional periods (Fig. 9d). Few cattle mandibles with recordable mandibular wear stages were recovered from Oak Street. The available evidence suggests that adult and elderly beasts formed the majority in both the medieval and late medieval/transitional periods, with a relative increase in the numbers of elderly and juvenile animals in the late medieval/transitional period (Table 8). There is a concomitant increase in the recovery of unfused cattle epiphyses in later medieval/transitional features (Tables 10a-b; Fig. 9c). These include three perinatal metacarpals, five metatarsals and three other postcranial bones in Layer L2022.

Butchery marks were frequent on the cattle bones. Most long bones have been chopped midshaft and other marks seen include astragali chopped across the proximal articulation, and chopped calcani. Bisected cattle-sized vertebrae and rib fragments are widespread. A cut of meat including the distal humerus, and at least sometimes the proximal radius, seems to have been particularly popular in the late medieval/transitional period as thirteen cattle distal humeri were recovered from Pit F2023 (Table 11).

A metacarpal from Period 3 F2119 L2120 has the distal epiphysis broadened stage 2, a second metacarpal from the same context and a third from F2106 L2108 have the distal epiphysis broadened stage 3 (Bartosiewicz *et al.* 1997). These bones may originate from draught cattle. A mandible from Period 3 F2119 L2120 has P<sub>2</sub> absent. A mandible from Period 4 F2023 L2024 has calculus deposits on all teeth and a maxilla from F2045 L2046 has metallic calculus.

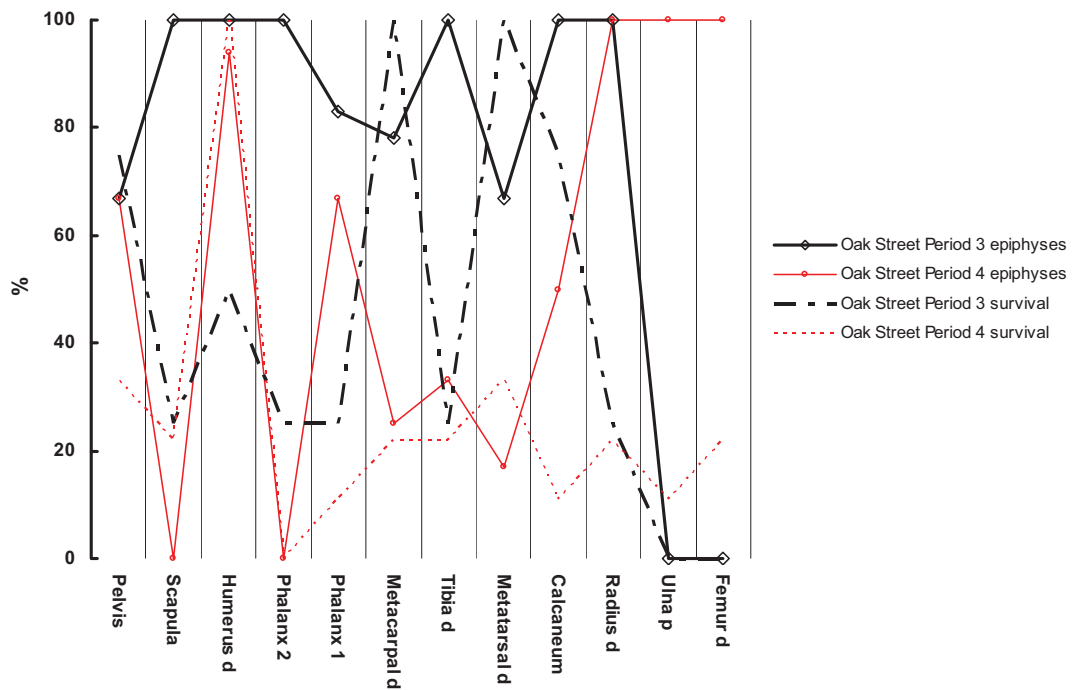


Fig. 9c Percentage of fused/fusing cattle epiphyses compared with percentage survival of body parts  
Fusion sequence based on Silver (1969)

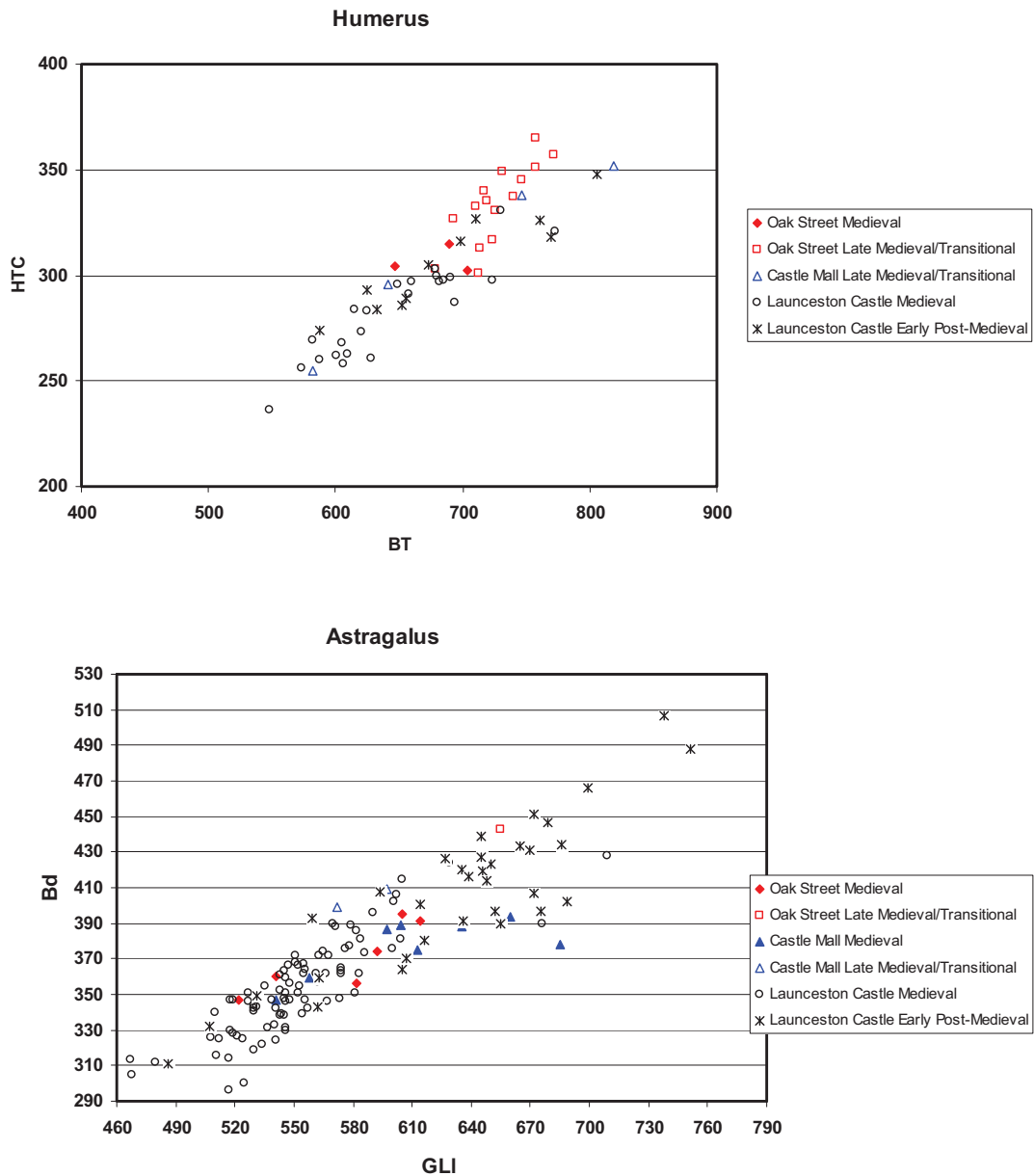


Fig. 9d Size of the cattle at Oak Street compared with Castle Mall, Norwich and Launceston Castle, Cornwall (Periods 5-8 and 9)

Measurements in tenths of mm

Castle Mall based on Albarella *et al.* (1997); Launceston Castle based on Albarella & Davis (1996)

Period/Taxon	Mandibular wear stages												
	A		B		C		D		E		F		Total
	N	%	N	%	n	%	N	%	n	%	n	%	n
3 Sheep/Goat	-	0	-	0	1	6	8	50	7	44	-	0	16
4 Sheep/Goat	-	0	1	7	2	14	5	36	6	43	-	0	14

Period/Taxon	Mandibular wear stages											
	Juvenile		Immature		Subadult		Adult		Elderly		Total	
	N	%	n	%	N	%	n	%	n	%	n	
3 Cattle	-	0	-	0	-	0	4	100	-	-	0	4
4 Cattle	1	25	-	0	-	0	1	25	2	50	4	4
3 Pig	1	14	3	43	2	29	1	14	-	0	7	7
4 Pig	-	0	1	50	1	50	-	0	-	0	2	2

Table 9: Periods 3 and 4. Mandibular wear stages (following Crabtree 1989 and O'Connor 1988)

See Appendix 1 for a complete list of individual mandibles. Only mandibles with two or more teeth (with recordable wear stages) in the dP<sub>4</sub>/P<sub>4</sub> – M<sub>3</sub> row or isolated M<sub>3</sub> are considered.



Element	Taxon								
	Cattle			Sheep/Goat			Pig		
	N	n <sub>f</sub>	%	n	n <sub>f</sub>	%	n	n <sub>f</sub>	%
Scapula	1	1	100	1	1	100	-	-	0
Humerus dist	3	3	100	1	1	100	2	1	50
Radius dist	2	2	100	3	1	33	-	-	0
Ulna prox	-	-	0	1	-	0	2	-	0
Metacarpal dist	9	7	78	2	2	100	2	1	50
Pelvis acetabulum	3	2	67	3	3	100	1	1	100
Femur dist	-	-	0	2	1	50	1	-	0
Tibia dist	2	2	100	5	5	100	1	-	0
Calcaneum	4	4	100	1	1	100	3	-	0
Metatarsal dist	6	4	67	4	4	100	1	-	0
Phalanx 1	6	5	83	3	3	100	-	-	0
Phalanx 2	1	1	100	-	-	0	1	1	100

*Table 10a: Period 3. Number and percentage of fused epiphyses for the main domestic mammals.*

Fused and fusing epiphyses are amalgamated. Only unfused diaphyses, not epiphyses, are counted. n = total number of fused/fusing epiphyses and unfused diaphyses; n<sub>f</sub> = total number of fused/fusing epiphyses; % = percentage of fused/fusing epiphyses out of the total number of fused/fusing epiphyses and unfused diaphyses.

Element	Taxon								
	Cattle			Sheep/Goat			Pig		
	N	n <sub>f</sub>	%	n	n <sub>f</sub>	%	n	n <sub>f</sub>	%
Scapula	-	-	0	5	5	100	2	2	100
Humerus dist	17	16	94	8	7	88	2	2	100
Radius dist	4	4	100	4	4	100	3	1	33
Ulna prox	1	1	100	2	1	50	-	-	0
Metacarpal dist	4	1	25	2	2	100	-	-	0
Pelvis acetabulum	3	2	67	2	2	100	-	-	0
Femur dist	3	3	100	-	-	0	1	-	0
Tibia dist	3	1	33	3	1	33	-	-	0
Calcaneum	2	1	50	1	1	100	1	-	0
Metatarsal dist	6	1	17	2	2	100	-	-	0
Phalanx 1	3	2	67	-	-	0	-	-	0
Phalanx 2	-	-	0	-	-	0	-	-	0

*Table 10b: Period 4. Number and percentage of fused epiphyses for the main domestic mammals.*

Fused and fusing epiphyses are amalgamated. Only unfused diaphyses, not epiphyses, are counted. n = total number of fused/fusing epiphyses and unfused diaphyses; n<sub>f</sub> = total number of fused/fusing epiphyses; % = percentage of fused/fusing epiphyses out of the total number of fused/fusing epiphyses and unfused diaphyses.

Element	Period											
	3 (Medieval: 11 <sup>th</sup> -15 <sup>th</sup> AD)						4 (Late Medieval/Early Post-Medieval: 15 <sup>th</sup> -16 <sup>th</sup> AD)					
	Cattle		Sheep/Goat		Pig		Cattle		Sheep/Goat		Pig	
	%	MNI	%	MNI	%	MNI	%	MNI	%	MNI	%	
Teeth	3	75	7	100	3	100	33	5	100	1	50	
Upper limbs	3	75	2	29	1	33	100	4	80	1	50	
Lower limbs	3	75	2	29	2	67	33	2	40	2	100	
Feet	4	100	2	29	1	33	33	1	20	-	0	

Table 11: Periods 3 and 4. Frequency by MNI of the main parts of the body of the main domestic mammals (Data from Tables 9a and b)

'Upper limbs' includes scapula, humerus, pelvis and femur; 'Lower limbs' includes radius, ulna, tibia, carpal, astragalus and calcaneum; 'Feet' includes metapodials and phalanges

	C	V	E	H	U	a	b	c	d	e	f	g	H	j	k	l	m	n	o	p
dP <sub>4</sub>							2	2												
P <sub>4</sub>			1							1	1	1								
M <sub>1</sub>			1											1	2		1			
M <sub>2</sub>											1				2	2				
M <sub>3</sub>							1					3			1					
M <sub>1/2</sub>																				

Table 12: Periods 3 and 4 combined. Cattle wear stages of individual teeth (following Grant 1982).

Both teeth in mandibles and isolated teeth are included. "a" includes unworn isolated teeth that could have been in one of the eruption stages (C, V, E, H, U).

	C	V	E	H	U	a	b	c	d	e	f	G	h	j	k	l	m	n	o
dP <sub>4</sub>												1							
P <sub>4</sub>											1	9	1		1	2			
M <sub>1</sub>											1	13	2	1		1	2		
M <sub>2</sub>			1							1	2	13		1			1		
M <sub>3</sub>	3							2	1	9		10	1						
M <sub>1/2</sub>																			

Table 13: Periods 3 and 4 combined. Sheep/Goat wear stages of individual teeth (following Grant 1982).

Both teeth in mandibles and isolated teeth are included. "a" includes unworn isolated teeth that could have been in one of the eruption stages (C, V, E, H, U).

## *Sheep/goat*

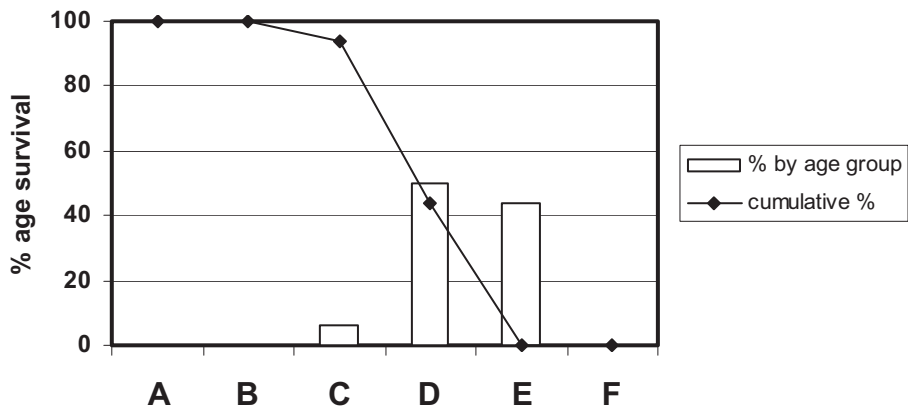
Sheep/goat remains comprise the second most frequent taxon in Periods 3 and 4 by NISP, but are the most frequent by MNI in Period 3. The only goat remains identified are two horncores from Period 4 F2045 (L2046) and F2048 (L2051). Of all sheep/goat bones and teeth, 33% can be positively identified as sheep. Sheep would seem, therefore, to comprise the overwhelming majority of the sheep/goat assemblage. Sheep horncores recovered originate from ewes with the exception of two from Period 3 F2048 (L2060) which may belong to wethers (castrates). While generally displaying female characteristics these cores have quite large basal dimensions, a combination that may be expected in wethers (Hatting 1974). Sheep bones suitable for calculating withers heights indicate shoulder heights of 62-66cm in Period 3 (medieval) and 47-59cm in Period 4 (late medieval/transitional), based on the multiplication factors of Teichert (1975). Sample sizes are small, however, with two out of three Period 3 bones deriving from the same individual, and it would be unwise to draw the conclusion that the Period 4 sheep were any different in their size and proportions from those of Period 3. Certainly at Castle Mall Albarella *et al.* (1997) could discern no significant differences between the medieval and late medieval/transitional sheep, and the mean withers height for both populations is 57 cm.

An interesting aspect of the sheep/goat mandibles recovered is the high proportion from Period 3 at wear stage 'D', originating from animals aged between two and four years (Table 9 and Fig. 9e). In Period 4 there is a relative increase in mandibles at wear stage 'E', representing older animals aged between four to eight years. At Castle Mall, the position is reversed, with more mandibles at 'D' in Period 5. However, as all of these animals could have been around four years old when slaughtered these differences are probably not significant. The evidence from both sites suggests that sheep were primarily kept for wool production at this time. The few epiphyses available do not suggest a significant difference in the slaughter pattern at Oak Street during Periods 3 and 4 (Tables 10a and b). Perinatal sheep/goat remains were found in Period 4 F2045 L2051.

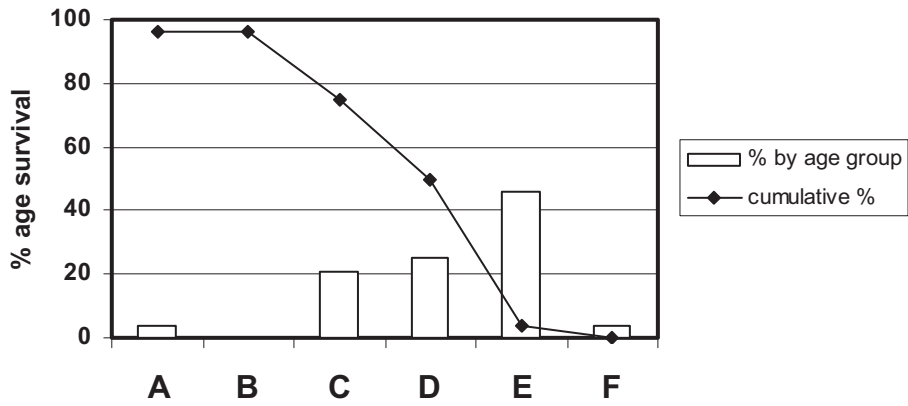
There is evidence for the chopping off of both goat and sheep horncores. Apart from marks on the cores themselves (uncounted), sheep crania with the horns removed were found in Period 3 F2106 L2108 and Period 4 F2023 L2024. One of the two crania from F2106 had been poleaxed. Bisected sheep-sized vertebra and rib fragments were widespread in all periods, suggesting the butchery of whole carcasses.

A ewe horncore from Period 4 F2023 (L2024) has 'thumb prints' and probably came from an animal suffering from environmental stresses such as malnutrition or breeding in elderly animals (Albarella 1995). Similar examples were also found at Castle Mall (Albarella *et al.* 1997, 35). A sheep radius with a proximal exostosis or 'penning elbow' was found in the same context. This condition is thought to be due to trauma when the animals are put through pens or races (Baker and Brothwell 1980). Humeri with 'penning elbow' were reported from Castle Mall (*op. cit.*, 36). Dental abnormalities include: sheep/goat mandibles from Period 3 F2048 (L2059) and layer L2073 with P<sub>2</sub> absent; a mandible from Period 3 F2048 L2060 with interstitial wear between P<sub>3</sub> and P<sub>4</sub> and alveolar osteoporosis; another from Period 4 F2023 (L2024)

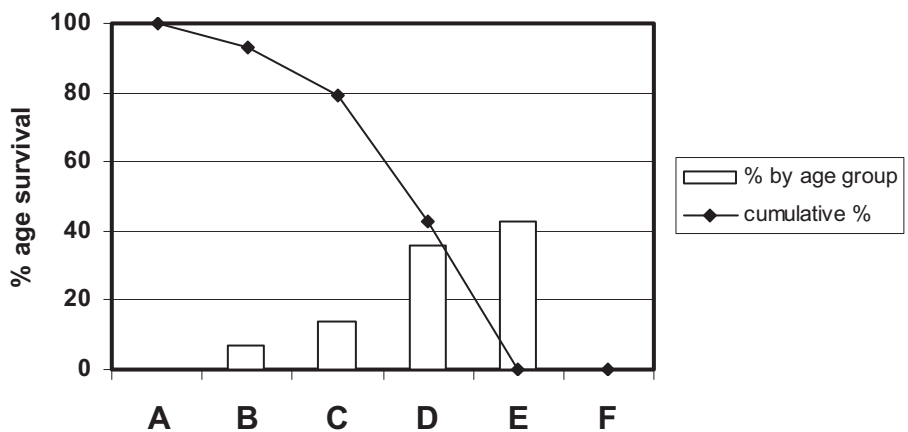
has severe interstitial wear between P<sub>4</sub> and M<sub>1</sub>; and two mandibles from Period 4 layer L2022 have hypsodont teeth.



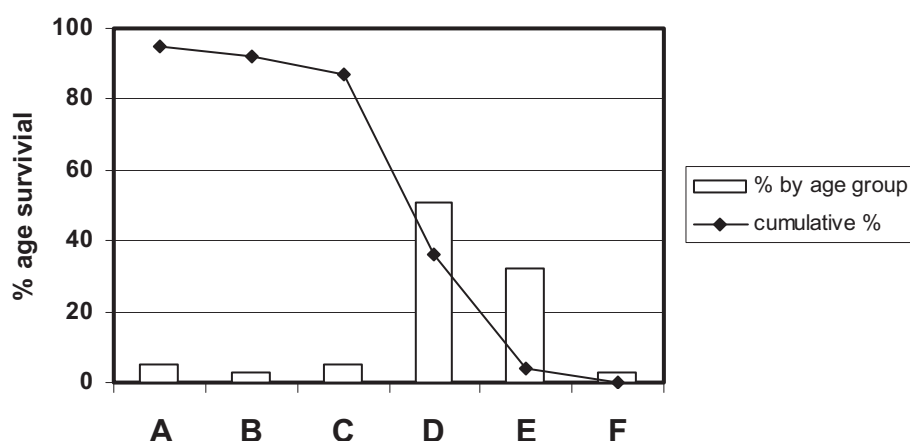
Period 3 (Medieval) n=16



Period 4 (Medieval) n=24



Period 4 (Late medieval/Transitional) n=14



Period 5 (Late medieval/Transitional) n=37

*Fig. 9e Distribution of sheep/goat mandibles at Oak Street, Norwich and Castle Mall, Norwich*

Castle Mall based on Albarella *et al.* (1997)

Age stages as defined by Crabtree (1989)

Approximate ages: A = 0-6 months; B = 6-12 months; C = 1-2 years; D = 2-4 years; E = 4-8 years; F = 8-10 years.

### **Pig**

Pig remains are particularly frequent in Period 3, accounting for 23% of the main domestic species. In Period 4, pig frequency is reduced, a situation also encountered in contemporary levels at Castle Mall (Fig. 9a). It can be speculated that this may be a result of less suitable woodland being locally available in the late medieval/transitional period and a concomitant reduction in the herds of pigs being sent for 'pannage'. Period 3 canines show an approximate equivalence between males and females with 0 male and 2 female uppers and 4 male and 1 female lowers. The seven mandibles recovered from Period 3 deposits include only 1 adult and 3 immature specimens (Table 9). No late fusing epiphyses were fused from amongst the few recovered (Table 10a). The data from Period 4 is inadequate to draw any conclusions. A perinatal radius diaphysis was found in Period 4 F2045 (L2046) and an ulna diaphysis from an animal a few weeks old in Period 4 F2045 (L2047). The adult mandible from Period 3 F2048 (L2061) has M<sub>1</sub> worn to the roots.

Bones suitable for calculating withers heights were recovered from Period 4 F2045 (L2050) and Period 3 F2071 (L2072). These are respectively an astragalus and a Mc.IV which came from animals approximately 70 cm and 74 cm high at the shoulder based on the multiplication factors of Tiechert (1990).

An ulna diaphysis from Period 3 Layer L2073 has diagonal cut/chop marks on the processus anconaeus and lateral shaft.

	C	V	E	H	U	a	b	c	D	E	f	g	h	j	k	l	m	n
dP <sub>4</sub>												4						
P <sub>4</sub>			1			1												
M <sub>1</sub>						1	1	2		1	1	1				1		
M <sub>2</sub>	1	1				2	2			1				1				
M <sub>3</sub>	6									1								
M <sub>1/2</sub>																		

**Table 14: Periods 3 and 4 combined . Pig wear stages of individual teeth (following Grant 1982)**

Both teeth in mandibles and isolated teeth are included. 'a' includes unworn isolated teeth that could have been in one of the eruption stages (C, V, E, H, U).

## *Other domestic mammals*

### Horse

Only two horse fragments were recovered from 12 Oak Street and no remains of dog or cat. A lower third incisor found in Period 4 Layer L2022 came from an animal approximately 15 years old (Barone 1980). A complete radius found in Period 4 F2023 L2024 came from a pony-sized animal around 13 hh (130cm), based on the multiplication factors of Kiesevalter (1888).

### *Birds*

Bird species account for slightly less than 24% of all fragments recovered from Period 3 deposits and just over 6% from Period 4. Both figures are probably considerably affected by a recovery bias in favour of the larger bones. However, the decline in importance of birds between the medieval and late medieval/transitional periods is marked. Species present include domestic fowl, geese (domestic and possibly wild), duck (probably domestic) and pigeon (wild or domestic).

Goose seems to have been particularly important in Period 3; relatively much more so than in contemporary features at Castle Mall (Fig. 9b). While most of the geese were probably domestic, the inclusion of wild species larger than Brent goose (*Branta bernicla*) cannot be ruled out. Butchery marks on goose bones include: a proximal cut mark on an ulna from Period 3 F2037 (L2038), multiple cut marks on the medial lower shaft of a femur from Period 3 F2071 (L2072) and a transverse cut mark on the external condyle of a distal tibiotarsus from Period 4 F2082 (L2084). Given the larger size of the goose compared with domestic fowl, geese were probably contributing more meat than fowl in Period 3.

Domestic fowl are the most common bird species in both Period 3 and Period 4. Bantam-sized birds are present in both periods alongside larger birds. Juvenile remains attributable to chickens were relatively frequent in both periods and include a partial skeleton in Period 4 F2015 (L2013). All of the bones that could only be identified as bird species are juvenile and most probably also derive from domestic fowl. Medullary bone, indicating a hen in egg-laying condition (Driver 1982), was observed in a broken femur from Period 3 F2071 (L2072). Tarsometatarsi that could be sexed comprise up to five males and one female in Period 3, with inadequate survival in Period 4. As with goose, cut marks are relatively frequent on the chicken bones and include: a humerus from Period 3 F2048 (L2060) with multiple cut marks on the head, a tibiotarsus with distal cut mark from F2071 (L2072), a tibiotarsus from F2082 L2084 with a cut mark on the distal internal condyle (this specimen has an exostosis above the internal condyle), and a tarsometatarsus from F2082 (L2088) which has been cut off proximally at an oblique angle.

Only one duck bone was recovered from the site, a coracoid from Period 4 F2082 (L2084). This is of domestic size, but could also possibly belong to a male mallard (*Anas platyrhynchos*).

Three immature pigeon (*Columba livia*) bones were recovered from the site. These comprise a distal humerus from Period 3 F2106 (L2017) and a femur and (uncounted) radius from Period 4 F2018 (L2019). Whether these remains should be considered wild or domestic is presently unclear. The exact status of the pigeon as a domesticated or as a commensal scavenger in medieval urban contexts is presently obscure (O'Connor 1993, 157). However this may be, they are present at Oak Street in both the medieval and late medieval/transitional periods, but absent at Castle Mall at this time (Fig. 9b), although they are present both earlier and later at that site (Albarella *et al.* 1997).

#### *Wild species*

A fallow deer (*Dama dama*) mandible was found in Period 3 F2048 (L2060). This articulates well with a female cranium in the author's collection and is, therefore, most probably female. The mandible has multiple transverse chop marks in the region of the broken vertical ramus. An (uncounted) fallow deer proximal metatarsal fragment was found in Period 3 F2161 (L2162). The presence of deer bones on low-status sites can be explained either as occasional poaching or a gift from an aristocrat (Albarella *et al.* 1997, 45).

A hare (*Lepus* sp.) innominate fragment was found in Period 4 Layer L2022 and a rabbit (*Oryctolagus cuniculus*) femur in the same context. Also in Period 4, a rabbit partial skeleton (five bones) was found in Pit F2015 (L2013). Lagomorph bones were relatively frequent in the contemporary (Period 5) deposits at the Castle Mall barbican well (Albarella *et al.* 1997, 21). In the medieval period, rabbits were exclusively kept in warrens and their meat was very expensive (Davis 1987, 194).

#### ***Fish bones and crustacean remains***

By S. Hamilton-Dyer

##### Introduction

A total of 33 fragments were submitted for analysis. These were comprised of 32 fish and one crustacean. Species identifications were made using the author's modern comparative collections. All fragments were identified to species and element where possible. Recently broken bones were joined where possible and have been counted as single fragments. Measurements of fish bones follow Morales and Rosenlund (1976) and are in millimetres unless otherwise stated. Archive material includes metrical and other data not presented in the text and is kept on paper and digital media.

##### Species representation

###### Crustacean

There is a single, partial dactylus of edible crab (*Cancer pagurus*) from Pit F2015 L2013.



## Fish

The 32 fish bones are all from hand-collected material; it is expected, therefore, that the species list will be heavily biased in favour of large bones of large species. Two species could be positively identified: 14 bones are of cod, *Gadus morhua*, and one is of haddock, *Melanogrammus aeglefinus*. Other bones are fin rays and other undiagnostic elements of large fish, probably also of large Gadidae.

The fish bones are not well-preserved, but are in a fair condition typical of most British material of the period. The elements that have survived are those which are large, but also sturdy. Both head and vertebral elements are present, indicating that whole fish are represented. Some of the bones are from fish of considerable size (over one metre) and are, therefore, more likely to be from offshore rather than from a local inshore fishery. These fish almost certainly came though Yarmouth. Large Gadidae were frequent in the assemblage from Fuller's Hill, Yarmouth, along with several other species (Wheeler and Jones 1976). Previous assemblages from Norwich have produced a limited range of species, including cod and haddock, which appears to change little over time (Jones 1983, Jones and Scott 1985). Herring bones, which were common at these sites, were not found in this present sample. This is, however, unlikely to be an accurate representation of the fish utilised; herring bones are small and are very rarely collected by hand. Sieved samples are necessary for a more complete understanding of fish exploitation.

Feature	Context	Cod		Haddock		Gadidae		Fish sp.	Total
		No.	Element	No.	Element	No.	Element		
F2002	L2003	1	premaxilla	-		-		-	1
F2011	L2013	1	Cleithrum	-		-		4	5
F2018	L2019	-		-		-		3	3
F2045	L2047	1	post cleithrum	-		-		-	1
F2048	L2050	1	caudal vertebra	-		-		-	1
F2048	L2051	-		-		-		2	2
F2057	L2059	-		1	cleithrum	-		-	1
F2057	L2060	1	precaudal vertebra	-		-		1	2
F2062	L2063	-		-		-		1	1
F2071	L2072	1	articular	-		-		-	1
F2074	L2075	1	post cleithrum	-		-		-	1
F2074	L2075	1	preopercular	-		-		-	1
F2076	L2077	1	cleithrum	-		-		-	1
F2080	L2081	-		-		1	caudal vertebra	-	1
F2082	L2084	1	articular	-		-		-	1
F2082	L2087	-		-		-		1	1
F2082	L2088	2	dentary	-		-		-	2
F2082	L2088	1	maxilla	-		-		-	1
F2082	L2090	-		-		-		2	2
F2094	L2096	1	maxilla	-		-		-	1
F2100	L2101	-		-		-		1	1
F2158	L2159	-		-		-		1	1
	<b>Total</b>	<b>14</b>		<b>1</b>		<b>1</b>		<b>16</b>	<b>32</b>
	<b>percentage</b>	<b>43.8</b>		<b>3.1</b>		<b>3.1</b>		<b>50</b>	

Table 15: 12 Oak Street, Norwich. Fish bones

## *Discussion and conclusion*

The cattle in both main periods (3 and 4) were shorthorned. There is evidence to suggest a relative increase in size of the cattle between the medieval (Period 3) and late medieval/transitional (Period 4) periods. Also, more juveniles appear to have been slaughtered and more elderly beasts kept in the late medieval/transitional period. This may reflect a change in emphasis towards dairying and arable agriculture during this period. There is evidence for the employment of draught cattle in both periods. Beef was the main meat consumed in both periods.

The sheep in both the medieval and late medieval/transitional periods were primarily kept for wool production. Goats are only present in the form of horncores. The horns of cattle, sheep and goats provided a useful raw material at this time and were routinely separated from the skull for further processing. Deposits of horncores, possibly associated with hornworking activities, have been found nearby at Coslany Street (Wallis forthcoming).

Pigs were kept exclusively for meat and generally slaughtered before reaching skeletal maturity. The reduction in relative pig numbers in the late medieval/transitional period is probably associated with a decline in the availability of suitable local woodland for the practice of pannage. In the medieval period pig meat was probably more important than that of lambs or sheep.

There is very little evidence of the minor domestic mammals at Oak Street, with only horse present at very low frequency. Birds were an important food resource in the medieval period, with goose probably contributing more meat to the diet than chicken. Birds seem generally to have been economically much less significant in the late medieval/transitional period.

There is some evidence for the consumption of venison in the medieval period, possibly as an aristocratic gift. Lagomorphs (hare and rabbit) only occur in the late medieval/transitional period. Prior to this period, rabbit meat was considerably more expensive than that of chicken.

Large sea fish, including cod and haddock, were probably imported through Yarmouth. Lack of sieving has precluded the recovery of smaller species.

### **Plant macrofossils**

By Val Fryer

The samples were bulk floated by Archaeological Solutions and the flots were collected in a 500 micron mesh sieve; two were submitted for analysis. The dried flots were scanned under a binocular microscope at magnifications up to x16 and the plant macrofossils and other remains noted are listed on Table 16. Nomenclature within the table follows Stace (1997). Although most plant remains were charred, some de-watered seeds were also recorded and these are suffixed in the table by a lower case 'w'. At the time of writing, it is not known whether these may be contemporary with the contexts from which the samples were taken.

Sample 6 is from the 13<sup>th</sup> - 14<sup>th</sup> century fill of Pit F2158. The assemblage is very small, with charcoal forming the main component. The larger pieces of charcoal within the sample appear to be predominantly of a ring-porous species (probably oak) and are very noticeably abraded and rounded. Although both oat (*Avena sp.*) and barley (*Hordeum sp.*) grains are present within Sample 6, the density of material is very low and it is considered most likely that the assemblage is derived from a small deposit of refuse of unknown origin. It should be noted that, although both hammer scale and ferrous globules are recorded from Sample 6, this material may well be residual within this context, as the Oak Street area of Norwich was intensively used for metalworking during the late Saxon and medieval periods.

Sample 7 is from the fill of Pit F2165, which is provisionally dated to the 14<sup>th</sup> century, with some intrusive material. Large and abraded charcoal fragments are again present, along with a number of heavily burnt cereal grains, many of which are too puffed and distorted for accurate identification. Although the assemblage is too small for any accurate interpretation of its content, it is perhaps most likely to be derived from domestic hearth waste.

In summary, as only two small assemblages were available for study, accurate interpretation of the contexts from which they were taken is not possible. Although it is apparent that cereals were being utilised on the site, it is not possible to state whether they are solely derived from domestic refuse, or whether they may be related to grain storage or pastoral activities.

Sample No.	6	7
Feature No.	F2158	F2165
Context No.	L2159	L2166
Context type	Pit	Pit
Phase	2	2
<b>Cereals</b>		
<i>Avena</i> sp. (grain)	xcf	
<i>Hordeum</i> sp. (grains)	X	x
<i>Triticum</i> sp. (grains)		xcf
Cereal indet. (grains)	x	xx
<b>Herbs</b>		
<i>Chenopodium album</i> L.		xw
<i>Lamium</i> sp.		xw
Large Poaceae indet.		x
<i>Solanum nigrum</i> L.		xw
<b>Wetland plants</b>		
<i>Eleocharis</i> sp.		x
<b>Tree/shrub macrofossils</b>		
<i>Sambucus nigra</i> L.	xxw	xxw
<b>Other plant macrofossils</b>		
Charcoal <2mm	xxx	xxx
Charcoal >2mm	xx	xx
Ericaceae indet. (stem)		x
Indet.culm node		x
<b>Other materials</b>		
Black porous 'cokey' material	x	x
Bone	x	
Fish bone	x	x
Ferrous globules	x	
Hammer scale	x	
<b>Sample volume (litres)</b>	<b>15</b>	<b>15</b>
<b>Volume of flot (litres)</b>	<b>&lt;0.1</b>	<b>&lt;0.1</b>
<b>% flot sorted</b>	<b>100%</b>	<b>100%</b>

Table 16: Plant macrofossils

Key to Table

x = 1 – 5 specimens    xx = 5 – 10 specimens    xxx = 10 – 100 specimens

w = de-watered macrofossils

## DISCUSSION

### The site and the development of Coslany

The excavation found no evidence of activity before the 10<sup>th</sup> century; Phase 1 features were cut into clean natural gravel, with no indication of any previous land use in the area apart from a handful of undiagnostic prehistoric flints. It has been suggested that Norwich grew from several small discrete middle Saxon settlements, including a nucleated 'Coslany' at the southern end of Oak Street, on the north bank of the river (Ayers 1994, 23). Although conclusions must be tentative given the small size of the excavation area, the absence of even residual middle Saxon material at 12 Oak Street is in conflict with this interpretation. This negative evidence mirrors the absence of middle Saxon activity at other sites in the area (e.g. Coslany Street, Wallis

forthcoming; 7 Oak Street, Penn 1999) and it seems increasingly likely that despite the middle Saxon origin of the name ‘Coslany’, there was no pre-Viking settlement in this part of the later city.

The finds associated with the Phase 1 structural remains indicate a late Saxon or Norman date for the first activity on the site. At several other locations nearby, there are indications that the ground was originally too marshy for settlement and had to be reclaimed through large-scale dumping of industrial debris before it could be built on in the later medieval period. At 7 Oak Street, for example, layers of ash, peat and metalworking slag were dumped to consolidate the wet ground and survived to up to 1.35m thick at the Oak Street frontage (Site 26503N; Penn 1999, 20). By contrast, there was no sign of any build-up deposits being laid prior to the construction of the first buildings at 12 Oak Street. The position of the site on well-drained sandy gravel subsoil, at a slightly higher elevation between the low-lying river margins to the west and the Muspool Marsh to the east, may explain why it was chosen for settlement.

The picture from the site fits in well with the growing body of evidence for Coslany’s development from the late Saxon period onwards. The area lay outside the original *burh* fortifications and was presumably not considered important enough to warrant defending when these were created, probably either during the period of Danish rule (c. 870 – 917) or shortly after the West Saxon ‘reconquest’ in 917. This decision is unsurprising given the apparent absence of activity prior to the 10<sup>th</sup> century at most sites west of St George’s Street (the western boundary of the *burh* enclosure). From the 10<sup>th</sup> century, there are signs of increasing urban development in Coslany, with remains of occupation and industrial activity identified at several sites. Nearby on Coslany Street, partial structures, evidence of ironworking and wooden revetments at the river frontage have been dated to the mid-10<sup>th</sup> to early 12<sup>th</sup> century, mirroring the first development on the present site (Wallis forthcoming). This picture of development might reinforce the suggested pre-Conquest origins of two nearby churches, St Mary Coslany to the north-east and St Michael Coslany immediately to the south. They may have been founded to serve a growing population in the area in the late Saxon period. Alternatively, the churches may have been involved in a two-way process, being founded to serve a growing population and then acting as focal points around which further new settlement coalesced. The evidence for the development of Coslany from the late Saxon period would also provide a context for the westward extension of the original *burh* defences to include it (see Archaeological and historical background, above).

The 10<sup>th</sup> – 12<sup>th</sup> century beam slots were consistently aligned either north-north-west to south-south-east, perpendicular to St Miles’ Alley and parallel with Oak Street, or west-south-west to east-north-east, parallel with the alley and at right angles to Oak Street.

The evidence from the site also suggests long-term continuity in the layout of buildings and the organisation of space, perhaps from as early as the 10<sup>th</sup> century and continuing to the present day. Throughout Phases 1 – 4, the buildings and possible boundary lines (e.g. Wall Foundation F2082) were consistently orientated along the axes described above, with respect to the positions of St Miles’ Alley to the south and Oak Street to the west. A similar picture of continuity has been found at Westwick Street and Calvert Street, where 12<sup>th</sup> century property boundaries lasted into the 20<sup>th</sup>

century (Ayers 1994, 70). Similarly, at Alms Lane, 13<sup>th</sup> century land divisions lasted until the 20<sup>th</sup> century and successive buildings occupied the same basic plots as the first houses established on the site in c. 1400 (Atkin & Margeson 1985, 9). This continuity in Norwich mirrors the picture in some other major medieval towns. At Pavement in York, for example, structures dating from the late 9<sup>th</sup> – 11<sup>th</sup> centuries were clearly aligned parallel or at right angles to the modern street and many of the earlier wall lines were in approximately the same positions at those succeeding above them (Oakey 1991, 229). Future fieldwork in Coslany should further investigate this apparent continuity of spatial organisation, looking in particular for evidence of early burgage plot divisions, the absence of which at 12 Oak Street can possibly be attributed to the small size of the excavation.

It is unfortunate that on this occasion it was not possible to further investigate the ironworking area identified in Evaluation Trench 1 (Adams 2000; Wallis forthcoming). The deep levelling deposits of slag and ironworking debris found at several sites on the opposite side of Oak Street (Coslany Street, Site 26435N (Cowgill 1997) and Oak Street, Site 26503N (Cowgill forthcoming)) indicate that an iron smelting and smithing industry of considerable scale was operating in this area of late Saxon and early medieval Norwich. The results of the Evaluation suggest that the frontage at 12 Oak Street has well-preserved stratified remains of this important industry, with the potential to greatly increase our understanding of the technology employed and the spatial organisation and social context of the activity. The mitigation strategy has allowed the preservation of these remains *in-situ* and it is to be hoped that in the future an opportunity will arise to investigate them again, either at 12 Oak Street or on an adjacent site on the east side of Oak Street.

This industry may hold a key to understanding Norwich's rapid growth in the late Saxon period and its apparent wealth by the time of the Domesday survey. The scale of the iron industry revealed by the slag dumps at sites on Oak Street and Coslany Street, especially when considered alongside the logistical difficulties of supplying the huge quantities of charcoal required to fuel production, suggests that the Crown or Church may have been involved in its organisation (Cowgill, this report). The employment opportunities generated would almost certainly have been an important stimulus for growth in Coslany (and elsewhere in the City), with people involved in the industry requiring housing, food provision and new parish churches to provide for their pastoral care.

The snapshot of medieval Coslany provided by the Phase 2 site suggests an area in which domestic occupation, evidenced by considerable quantities of well-preserved household pottery, and industrial activity, in the form of quarrying, took place in close proximity. The extensive quarry pitting mirrors findings from other sites and reinforces the impression that medieval Coslany was not a densely built-up urban area where space was at a premium. Instead, it brings to mind the known character of the medieval city as one of wide meadows and open spaces, with areas within the city walls given over to cattle grazing, horticulture and waste ground (Campbell 2004, 32).

Towards the end of Phase 2 (mid-13<sup>th</sup> to mid-14<sup>th</sup> century), a silty deposit (L2073) accumulated over the west side of the site. This may represent flooding from the river Wensum, episodes of which periodically affected areas of medieval Norwich which lay close to the river. A particularly bad flood in 1290 recorded by Bartholomew

Cotton 'overturned some houses and bore them along' (Ayers 1994, 69). The Wensum was an important resource for industries such as dyeing and tanning, and also as an artery for trade, but living alongside it could occasionally cause problems. At Whitefriars downstream from Oak Street, a timber-framed building had been flooded at least three times, leaving layers of silt sandwiched between successive clay floors (Atkin 2002, 195). However, the flooding represented by L2073 appears to have been an isolated event; except during times of exceptionally heavy rainfall, flooding in Coslany probably did not extend eastwards beyond the line of Oak Street.

### **The buildings**

The earliest building(s) on the site, dated to the 10<sup>th</sup> - 12<sup>th</sup> century, were of earth-fast timber construction. The beam slots may have held timber sleeper beams laid directly into the ground, onto which upright posts were then attached. A similar construction method was used in a 10<sup>th</sup> century building at Skeldergate in York, where the timber ground sill beam was preserved *in situ* in one of the wall slots (structure D, Donaghey 1986, 44-7, fig. 13). Alternatively, the slots may be all that remains of a post-in-trench construction, with vertical timbers placed directly into the foundation slot at intervals and held in place by packing the remainder of the trench with backfilled soil. This latter method was used in several late 9<sup>th</sup> – early 11<sup>th</sup> century structures at Flaxengate in Lincoln (e.g. structures 4, 7 and 18, Perring 1981, 36). Numerous examples of late Saxon and Norman timber buildings have now been excavated in Norwich, many of them constructed in a similar way. Identical vertical-sided, flat-bottomed slots, in this case filled with stone packing to hold upright posts in place, were found at 1-9 Bishopgate (Site 154N) and dated to the 12<sup>th</sup> century (buildings A/1 and B/1, Evans 2002, 12). No trace of wood survived in the acidic sandy soil on site, but the fact that not even any discolouration was observed in the beam slots might suggest that the building(s) were dismantled rather than being allowed to decay.

As with all earth-fast timber buildings, those on site are likely to have been short-lived, as the wood at the point where it rises out of the ground is vulnerable to the alternate phases of wetting and drying that cause rot (Grenville 1997, 32; Quiney 2003, 113). The maximum lifespan of the structures at Flaxengate was no more than 30 years, with some evidence that this degree of longevity was only achieved by adding bracing posts to replace original uprights which had begun to give way (Perring 1981, 38). At Pavement, York, the sequence of earth-fast timber buildings suggested even more frequent rebuilding, approximately every 11 years (Oakey 1991, 233). A lifespan somewhere between these estimates seems likely for the Phase 1 building(s), as timbers may have lasted slightly better in the well-drained sandy gravel soil on site than they did in the waterlogged ground conditions at Pavement, York. By the 13<sup>th</sup> century, sill beams were generally placed above ground level on dwarf walls to protect the wood (Grenville 1997, 34; Evans & Atkin 2002, 240).

No evidence for the infilling between the wall posts of Structure 1 was present. Wattle and daub panelling, as used in Anglo-Scandinavian and late Saxon buildings at Coppergate and Skeldergate in York (Grenville 1997, 32) and in Dublin (O Riordain 1971, 73-4), may have been used. In one structure at Skeldergate, the surviving ground sill beam had a groove on its upper surface, which may have held a pre-fabricated wattle hurdle (Hall 1986, 50). Evidence for wattle and daub walls has been found in Norwich, for example in a post-built Saxo-Norman building at St. Martin-at-

Palace Plain (structure F, Ayers 1987, 9). However, it seems highly improbable, even if the building was dismantled and its materials taken for reuse elsewhere, that not even a few fragments of daub would have been left on site. A second, perhaps more likely possibility, is the use of horizontal clapboards pegged or nailed to the wall posts, as seen in some late Saxon and early medieval buildings excavated in London (Goodburn 1994, 49, fig. 5h). Horizontal riven oak planks were also used as wall cladding from the mid-10<sup>th</sup> century at Coppergate in York (Addyman 1982, 167). The planks could easily have been salvaged and reused in other buildings when Structure 1 was dismantled. The building's roof structure must also remain a matter for conjecture. Given that the wall posts were either attached to sleeper beams or positioned at intervals along a common foundation slot, they would have been well lined-up. This would have enabled the use of a 'normal assembly' method of joining the rafters to the wall frame, with the wall plate resting directly on top of the wall posts and transverse tie beams lapped above.

The suggested ground plan for Structure 1 (Fig. 3) is tentative given the fragmentary nature of the structural evidence. However, if correct, the building would have measured approximately 3.40m wide by at least 5.25m long (the distance between the south wall, F2033, and the surviving northern limit of Beam Slot F2131), although it is likely that it originally extended further to the north. The narrow timber buildings (late 9<sup>th</sup> – 12<sup>th</sup> century) at Flaxengate were up to 10 - 16m long (Perring 1981, 36). If similar, Structure 1 could have continued well beyond the northern boundary of the site, which was only 8.5m across. Based on its surviving extent, it was probably of comparable size to other low-status late Saxon and Norman buildings excavated in Norwich. A late 11<sup>th</sup>/early 12<sup>th</sup> century building at World's End Lane (Site 156N), for example, was 3.20m wide by 5.60m+ long (Evans 2002, 27-8).

The possibility that the building had a second storey is interesting as no two-storey timber structures of this date have yet been found in Norwich and there are few examples nationwide. The evidence for this is far from clear-cut, but the size of Beam Slots F244 and F2033 (0.68m wide and 0.60m+ wide, respectively) might suggest timbers larger than necessary to support a building of only one storey. The beam slots of building I at World's End Lane, by contrast, were only 0.30 - 0.50m wide (Evans 2002, 27-8). The identification of Beam Slots F2031 and F2035 as supporting a staircase (see above, Excavation Results) is also tentative. These internal slots could equally have been related to fittings or items of furniture within the building.

Possible parallels for a two-storey timber building of this date include four tenements at Coppergate in York, which were rebuilt in the 970s with substantial upright posts and supporting horizontal planks, thought to represent a means of enlargement through an upper storey (Hall 1994, 64). However, the lower storeys in this case were below-ground basements possibly intended to provide a cool storage space (Hinton 2000, 230-1) and the building is therefore not directly comparable with that suggested at Oak Street, which may have had two storeys built entirely above ground level. The size of the posts in some of the later sunken-featured buildings in Ipswich has also been seen as a possible indication that they carried one or even two upper storeys (Quiney 2003, 141). If Structure 1 did have an upper floor, it may, of course, have been little more than a loft space.



Considerations of function are hindered by the paucity of evidence. The good condition of the 10<sup>th</sup> – 12<sup>th</sup> century pottery found during the excavation indicates domestic occupation either on the site or close by (see below). There was no evidence of a hearth, which is often taken as evidence of domestic use, in Structure 1, but cooking could have been done outside the building on an external hearth or fireplace not revealed within the excavation area. The earliest houses at Alms Lane, although later (c. 1400 – 1500) had external hearths set on clay bases against the side walls (Atkin & Margeson 1985, 14). However, it is equally possible that the building was used for storage or work rather than as a house. The similar broadly contemporary buildings excavated at Bishopgate (Sites 154N and 156N) also had little evidence of hearths and were thought to possibly represent sheds or workshops (Evans 2002, 44).

Structure 2 was post-built with large timber uprights inserted directly into the ground, without a foundation trench to help align them with any precision. As with the earlier Saxo-Norman building(s), it would have been vulnerable to rot and similarly short-lived. There was no evidence that construction techniques had developed since Phase 1 and this is not necessarily surprising given that the buildings may not have been separated by more than a few decades. In many parts of Norwich, earth-fast foundations were replaced around the turn of the 13<sup>th</sup> century by clay wall plinths to raise the timbers above ground level (Evans & Atkin 2002, 240). This might imply a date earlier during Phase 2 for the construction of the building, an observation possibly supported by the fact that later in the phase, several quarry pits were dug within its former area. Presumably it had fallen derelict or been dismantled by this time. However, new earth-fast timber buildings were still being erected in the semi-rural suburb of Heigham into the 13<sup>th</sup> century (Evans & Atkin 2002, 240). The ‘primitive’ construction technique used in Structure 2 might similarly be a reflection of medieval Coslany being somewhat of a ‘backwater’ relative to the city centre, reflected in its inclusion in the area referred to in medieval documents as *Ultra Aquam*, or ‘over the water’.

Considerations of form and function must be cautious given the probability (see Excavation Results, above) that the structural remains identified on site represent only part of the original building, which probably extended further to the south-west and north. The large size of the post pits (generally c. 0.60 - 0.90m wide x 0.45 – 0.60m deep) is in contrast to the small postholes of many broadly contemporary timber buildings. At Flaxengate, postholes associated with the late 9<sup>th</sup> – early 11<sup>th</sup> century buildings were generally only 0.10 - 0.20m wide (Perring 1981, 36). The posts of one of the 12<sup>th</sup> century structures at Bishopgate (Site 154N, building A/1) were c. 0.25m in diameter (Evans 2002, 12). This difference in size might imply that the timber uprights of Structure 2 needed to be substantial enough to support the weight of a second storey. There was no positive evidence of the use to which Structure 2 was put. It may have been some kind of warehouse, perhaps associated with the ironworking area at the west end of the site (see Site economy and status, below). It could, for example, have housed iron bars or finished iron goods prior to distribution, but this can be no more than conjectural.

From the 15<sup>th</sup> – 16<sup>th</sup> century, the structural remains show an evolution in building methods, with rubble and mortar wall foundations (e.g. F2082, and slightly later, F2043 and F2041) replacing the earlier earth-fast timbers. The surviving features might suggest that the late medieval/post-medieval buildings had rubble-walled

ground floors, perhaps supporting jettied timber-framed first floors above. Buildings of this type are abundant on the 1541 Sanctuary Map of Norwich (Evans & Atkin 2002, 240) and appear to also be shown on Cunningham's view of the city (1558). The second of the Phase 4 buildings partially revealed in the south-west of the site had flint and brick wall footings (e.g. F2169 and F2147) and a clay and mortar floor which appears to have been renewed at least once. Evidence from other sites suggests that the main period of use of flint and brick in domestic buildings in Norwich was from around 1400 into the 1630s (Evans & Atkin 2002, 240), the present example probably dating from fairly late in this range given that it replaced a structure of no earlier than 15<sup>th</sup> - 16<sup>th</sup> century date. At Bishopgate (Site 154N), the earlier clay-walled structures were replaced by buildings with walls of flint and brick rubble in *c.* 1600 – 1700 (building B/3, Evans 2002, 16). The new more durable building materials were probably partly a response to the series of disastrous fires that struck the city in the early 16<sup>th</sup> century (Atkin & Margeson 1985, 14).

### **Site economy and status**

Evidence for the standard of living and way of life of the first people to use the site is sparse. The 10<sup>th</sup> – 12<sup>th</sup> century pottery assemblage consists mainly of cooking and storage vessels, a picture of everyday domestic activity reinforced by the food residues and external sooting from cooking observed on some of the sherds (Sudds, this report). The quantity of pottery and animal bone directly associated with Phase 1 features was small, but large amounts of residual Saxo-Norman pottery were found in medieval contexts. It thus seems likely that people lived close to, or actually on, the site at this time. The locally and regionally-produced wares in use do not suggest any great degree of wealth and status, although a single residual sherd of green-glazed Stamford-type ware (from Pit F2048 L2059) might indicate some higher-status occupation in the vicinity.

The industrial activity evidenced from the 10 – 11<sup>th</sup> century onwards in Trench 1 (Adams 2000, 7) was not paralleled in the main excavation area. No remains of hearths, working surfaces or furnaces were identified, nor does it seem likely that any were ever present. If these had been destroyed by later activity, lenses of ash and burnt/discoloured natural and subsoil would almost certainly have been redeposited in later contexts, something which was not observed anywhere on site. The paucity of hammerscale reinforces the picture of the excavation area being away from the principal focus of the ironworking activity.

With these considerations in mind, it is unclear whether there was any connection between the 10<sup>th</sup> – 12<sup>th</sup> century (Phase 1) structure(s) found in the excavation area and the probable smithy in Trench 1. They were almost certainly contemporary, and given their spatial proximity the building could plausibly have been the home of an individual or family involved in the industry. An alternative interpretation as sheds or workshops connected with the ironworking process itself or with the storage and distribution of finished products seems less likely. A few fragments of slag were found in association with Phase 1 beam slots (Cowgill, this report), but not enough to directly support any link in function. These few fragments are more likely to have been discarded from the adjacent ironworking area and found their way into the beam slots through natural processes after the disuse/demolition of the building(s). The small size of the excavation area prevented a clearer understanding of exactly how the

structural remains and the ironworking area in Trench 1 may have been related. It is entirely possible that in the Saxo-Norman period, the two areas were separated by a tenement boundary and were in completely different occupation or ownership. What is apparent from the household pottery recovered during the excavation and the *in-situ* working surfaces found in Trench 1, only 20m away, is that in late Saxon and Norman Coslany, there was no clear zoning of domestic and industrial areas; people and industry coexisted in close physical proximity.

Large quantities of pottery and animal bone point to an intensification of domestic occupation in the 11<sup>th</sup> – 14<sup>th</sup> century. It is unclear whether the Phase 2 post-built structure was a dwelling or was used as a warehouse or workshop, but the finds evidence certainly suggests domestic inhabitation near the site. As in the Saxo-Norman period, the pottery was predominantly from household cooking and storage vessels and tableware. Again, the evidence suggests a population of low to moderate status, the majority using local unglazed pottery, with occasional imported glazed vessels attesting to Norwich's trading links with Continental northern Europe.

The medieval population appears to have had a relatively meat-rich diet, with frequent butchery marks on the cattle bone in particular. There was also some evidence for the utilisation of goat and sheep horn cores, perhaps for small-scale cottage industry taking place on site. Evidence of medieval hornworking has been found nearby at Coslany Street Site 26435 (Wallis forthcoming), to the south on the corner of Coslany Street and Colegate (Site 166, Norwich Survey 1972) and north-west at Site 39691N (Hall 2003, 9). Proximity to the river Wensum and its tributary cockeys made such sites ideal, as the horns had to be steeped in pits of water and urine to remove the tine prior to working (Ayers 1994, 52). However, there was no evidence that such activity took place on the present site on anything more than a household scale. Sheep were primarily kept for their wool (Baxter, this report). Some may have grazed within the city walls, as large areas of the medieval city, particularly on the north bank of the river, were semi-rural, with areas of pasture and allotments (Evans 1985, 142).

The large medieval pits distributed across the excavation area were probably the result of open-cast quarrying of sand and gravel. Similar pits have been found on sites across Norwich. The quarried material may have been used for building, road surfacing or the consolidation of low-lying land along the river margins. However, an alternative explanation, and one which ties in with the evidence for ironworking on the site, is that the pits were dug to prospect for the iron ore contained in the natural gravels. Similar large medieval pits dug to extract iron ore have been identified nearby at Alms Lane (Atkin 1985, 242-4) and at Botolph Street & St George's Street (Evans 1985, 86-143). The extracted ore was then used in the ironworking industry concentrated north of the river (see below). However, the natural gravel on site did not have the heavily mineralised appearance noted at some sites nearby, notably 63-65 Duke Street (Site 39367N; Percival 2003, 7). In addition, the pitting appears to have largely post-dated the ironworking area on the Oak Street frontage. Many of the pits were cut through the earlier Saxo-Norman beam slots or lay within the footprint of Structure 2, their stratigraphic relationships suggesting that they belonged to the second half of Phase 2, perhaps the 13<sup>th</sup> – 14<sup>th</sup> century. The ironworking revealed in Trench 1 was probably drawing to a close by this time (Cowgill, this report). The possibility therefore remains open that the quarried material was used for building rather than to supply ore for iron smelting.

However, it is of course possible that ore was being extracted for use elsewhere. An ironworking complex of *c.* 1275 – 1400, with roasting hearths, smelting furnaces and a smithy building, has been excavated at Alms Lane (Atkin 1985). Ore roasting hearths, dated to the 13<sup>th</sup> – 14<sup>th</sup> century and probably associated with some form of buildings or covered working area, have also been found on Botolph Street (Davison & Evans 1985, 117). Medieval records show a significant concentration of smiths in the sub-leet of St Clement Fyebridge, to the east of Coslany (Kelly 1983, 27).

The evidence for ironworking on the site contrasts with the evidence of the Norwich Enrolled Deeds, which record dyers, clerks (probably literate men in minor orders) and fishermen as owning property in the area bounded by Rosemary Lane and the cemetery of St Michael Coslany in *c.* 1285 – 1340, but no smiths (Adams 2000, 3). A similar divergence between the Enrolled Deeds and the archaeological evidence was noted at Alms Lane (Site 302N), where a late 13<sup>th</sup>/ early 14<sup>th</sup> century brewery and ironworks was excavated on a site which was owned at the time by leather-workers (Evans & Atkin 2002, 241). It seems increasingly unproductive to use the Enrolled Deeds as evidence of medieval land use in a given area of the city, when they record the owners of properties rather than the occupations of the tenants.

At 12 Oak Street, as at other sites in the city, the late medieval period saw the introduction of more permanent sanitary arrangements. A flint-lined cesspit (F2015) was constructed in the 15<sup>th</sup> – 16<sup>th</sup> century, possibly to serve a building partially revealed a few metres to the north. The Phase 4 buildings also had cesspits built into their rear walls (F2011 and F2004). Rubbish was no longer dumped on site and was presumably collected for disposal elsewhere, mirroring documentary references to organised rubbish collections in some areas of the city from as early as 1518 (Ayers 1994, 101). The unfortunate consequence of this reduction in the amount of everyday occupation debris is that we know far less about the site's post-medieval inhabitants.

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## APPENDIX 1: Mandibular wear stages for the main species

Tooth wear stages for cattle, sheep/goat and pig follow Grant (1982). Mandibular wear stages for cattle and pig follow O'Connor (1988) and for sheep/goat follow Crabtree (1989). Only mandibles with two or more teeth (with recordable wear stage) in the dP4/P4-M3 row and isolated M3s are given.

### Key

Taxa:

B	Cattle
OVA	Sheep
O	Sheep/goat
S	Pig

Codes used for mandibular wear stages in cattle and pig:

J	Juvenile	M1 not in wear
I	Immature	M1 in wear, M2 not in wear
S	Sub-adult	M2 in wear, M3 not in wear
A	Adult	M3 in wear
E	Elderly	M3 at J+

Codes used for mandibular wear stages in sheep/goat:

			Payne (1973) equivalent
A	<i>c.</i> 0-6 months	M1 unworn	A-B
B	<i>c.</i> 6-12 months	M2 unworn	C
C	<i>c.</i> 1-2 years	M3 unworn	D
D	<i>c.</i> 2-4 years	M3 coming into wear	E-F
E	<i>c.</i> 4-8 years	M3 in full wear	G-H
F	<i>c.</i> 8-10 years	M3 in heavy wear	I

Periods:

1	Saxo-Norman (10 <sup>th</sup> – 11 <sup>th</sup> AD)
2	Early Medieval (11 <sup>th</sup> – 12 <sup>th</sup> AD)
3	Medieval (11 <sup>th</sup> -15 <sup>th</sup> AD)
4	Late Medieval/Early Post-Medieval (15 <sup>th</sup> – 16 <sup>th</sup> AD)
5	Early Post-Medieval (16 <sup>th</sup> AD)
6	Later Post-Medieval (16 <sup>th</sup> – 18 <sup>th</sup> AD)

### Mandibular wear stages

Period	Taxon	P4	dP4	M1	M2	M3	Mandibular wear stage
3	B					g	A
3	B					b	A
3	B			k	K		A
3	B	E		k	k	g	A
4	B				l	l	E
4	B	G		m	l		E
4	B					g	A
4	B		c	E			J
3	OVA			g	f	C	C
4	OVA			f	E		B
4	OVA		m	g	e	C	C
1	O	G		j	g	g	E
3	O			h	g	g	E
3	O	G		g	g	e	D
3	O			g	g	e	D
3	O	G		g	g	e	D
3	O			g	g	e	D
3	O	K			j	g	E
3	O					g	E
3	O	L		m	g		E
3	O	G		g	g	e	D
3	O	G		h	g	d	D
3	O	H		j			E
3	O					c	D
3	O					c	D
3	O				g	g	E
3	O	G		g			D
3	O					g	E
4	O			l	g	g	E
4	O					e	D
4	O	G		g			D
4	O					g	E
4	O	L		m	m	h	E
4	O					e	D
4	O				g	g	E
4	O					g	E
4	O	G		g		e	D
4	O	G		g	g	e	D
4	O			g	e	C	C
4	O	F		g	g	g	E
3	S	E		e	a	C	I
3	S				e	C	S
3	S			f	b	C	S
3	S			l	j	e	A
3	S		g	c	V		I
3	S		g	a	C		J
3	S		g	c	a	C	I
4	S				b	C	S
4	S		g	b	C		I

## APPENDIX 2: Measurements of animal bones and teeth

Measurements are arranged by taxon, part of the skeleton, period and context. All measurements are in tenths of a millimetre. Measurements taken are as in Davis (1992), von den Driesch (1976), Payne (1969), Boessneck (1969), Payne & Bull (1988), and Albarella & Davis (1996). Measurements are given in taxon order for horncores, teeth and postcranial bones.

### Key to measurement tables

Taxa are coded as follows:

B	<i>Bos</i> (cattle)
OVA	<i>Ovis</i> (sheep)
CAH	<i>Capra</i> (goat)
O	<i>Ovis/Capra</i> (sheep/goat)
S	<i>Sus</i> (pig)
ORY	<i>Oryctolagus cuniculus</i> (rabbit)
GAG	<i>Gallus gallus</i> (domestic fowl)
GN	<i>Gallus/Numida</i>
GNP	<i>Gallus/Numida/Phasianus</i> (domestic fowl/guinea fowl/ pheasant)
ANS	<i>Anser</i> (goose)
COL	<i>Columba livia</i> (Pigeon)

The presence/ absence of a spur on a bird tarsometatarsus is coded as follows:

A = Absent

P = Present

S = Scar

Approximate measurements are designated:

c – within 0.2mm

e – within 0.5mm

Parts of the skeleton (Element) are coded as follows:

AS	Astragalus
CA	Calcaneum
HU	Humerus
MC1	complete distal metacarpal
MC2	half distal metacarpal
MT1	complete distal metatarsal
MT2	half distal metatarsal
PE	Pelvis
RA	Radius
UL	Ulna
FE	Femur
TI	tibia (tibiotarsus in birds)
P1	1st phalanx
TMT	Tarsometatarsus

Epiphyseal fusion/age is coded as follows:

F	fused
H	fused/fusing
G	fusing
UM	unfused diaphysis
UE	unfused epiphysis
UX	unfused diaphysis+epiphysis

### Measurement tables

#### *Horncore measurements*

<b>Taxon</b>	<b>Period</b>	<b>L</b>	<b>Wmax</b>	<b>Wmin</b>
B	3	820	369	297
B	3		429	351
B	3	1050	491	346
B	4	1300	397	351
B	4		375	244
CAH	4		538	353
CAH	4		547	390
OVA	3	1400	357	283
OVA	3	1300		255
OVA	4	1040	341	191
OVA	4	1230		247



*Lower tooth measurements*

Taxon	Period	dP4L	dP4W	dP4WP	M1W	M1WA	M1WP	M2W	M2WA	M2WP	M3L	M3W	M3WA	M3WC
B	3										329	139		
B	3										333	150		
B	3										323	140		
B	4										394	166		
B	4										365	137		
OVA	3				77			76						
OVA	3		69											
OVA	4				73									
OVA	4		71		75			77						
O	1				69			86				84		
O	3				72			79				82		
O	3				78			76				79		
O	3				79			84				71		
O	3				76			89				81		
O	3				72			77						
O	3							78				85		
O	3							80						
O	3													
O	3				69			78				86		
O	3							80						
O	3				75			72						
O	3				77			81				78		
O	3				65							80		
O	3													
O	3											86		
O	3							81				77		



*Bone measurements*

<b>Taxon</b>	<b>Element</b>	<b>Period</b>	<b>GLI</b>	<b>Bd</b>	<b>DI</b>
B	AS	3	592	374	318
B	AS	3	614	391	353
B	AS	3	522	347	297
B	AS	3	605	395	
B	AS	3	541	360	302
B	AS	3	582	356	319
B	AS	4	665	433	376
B	AS	4		355	325
B	AS	4		423	359
B	AS	4	655	443	378
OVA	AS	3	291	184	159
S	AS	3	380		
S	AS	3	439		

<b>Taxon</b>	<b>Element</b>	<b>Period</b>	<b>Fusion</b>	<b>GL</b>
B	CA	3	F	1100
B	CA	3	F	1111
B	CA	4	G	1294
OVA	CA	3	F	554
OVA	CA	4	F	514

<b>Taxon</b>	<b>Element</b>	<b>Period</b>	<b>Fusion</b>	<b>BT</b>	<b>HTC</b>
B	HU	3	F	704	302
B	HU	3	F	689	315
B	HU	3	F	647	304
B	HU	4	F	758	365
B	HU	4	F	693	327
B	HU	4	F	724	317
B	HU	4	F	726	331
B	HU	4	F	758	351
B	HU	4	F		300
B	HU	4	F	712	301
B	HU	4	F	678	303
B	HU	4	F	746	345
B	HU	4	F	714	313
B	HU	4	F	731	349
B	HU	4	F	772	357
B	HU	4	F	719	335
B	HU	4	F	740	337
B	HU	4	F	710	333
B	HU	4	F	717	340
OVA	HU	2	F	276	
OVA	HU	3	F	260	138
OVA	HU	4	F	264	140
OVA	HU	4	F	292	150
OVA	HU	4	F	284	147
OVA	HU	4	F	265	137
O	HU	4	F	264	130
S	HU	3	F	342	216

Taxon	Element	Period	Fusion	Bd	3	SD	BatF	a	b
B	MC1	1	F	587	298		525	294	
B	MC1	3	F	484	247		444	233	224
B	MC1	3	UX	538	268		520	262	249
B	MC1	3	F	578	252			282	289
B	MC1	3	F	576	281		521	278	266
B	MC1	3	F	538	251		480	261	241
B	MC1	3	F	570	272		525	274	274
B	MC1	3	F	503	240		462	242	241
B	MC1	4	F	550	262		504	266	257
B	MC1	4	UE	498	245			237	234

Taxon	Element	Period	Fusion	GL	Bd	SD	WC	WT	DV	Index(WT/DV.100)
OVA	MC1	3	F		247		119	111	157	71
OVA	MC1	3	F	1233	250	141	118	112	158	71
OVA	MC1	4	F		238		109	105	150	70
OVA	MC1	4	F		247		117	112	149	75

Taxon	Element	Period	Fusion	GL	Bd	SD
S	Mc.IV	3	F	726		

Taxon	Element	Period	Fusion	Bd	3	SD	BatF	a	B
B	MT1	3	F	449	239		435	211	211
B	MT1	3	F	440	229		399	220	201
B	MT1	3	F	468	239		435	225	216
B	MT1	3	F	458	253		426	219	209
B	MT1	3	F	480	248		428	232	227

Taxon	Element	Period	Fusion	GL	Bd	SD	WT	DV	Index (WT/DV.100)
OVA	MT1	3	F		223		106	157	68
OVA	MT1	3	F		229		93	148	63
OVA	MT1	3			233		93	146	64
OVA	MT1	3	F		216		92	147	63
OVA	MT1	4	F		221		91	147	62
OVA	MT1	4	F		235		103	163	63

Taxon	Element	Period	Fusion	LA	LAR	Rim Height
B	PE	3	F	550		143
O	PE	3	F	254		<i>no dip</i>
O	PE	3	F	245		
S	PE	3	F		331	

Taxon	Element	Period	Fusion	GL	LI	SD
OVA	RA	3	F	1650		167
OVA	RA	4	F	1345		155
OVA	RA	4	F	1178		133
OVA	RA	4	F	1395		158
EQC	RA	4	F	3100	3000	341

Taxon	Element	Period	Fusion	GL	SD
ORY	FE	4	F	836	69
ORY	FE	4	F	778	63

Taxon	Element	Period	Fusion	Bd
B	TI	3	F	541
B	TI	4	UE	630
OVA	TI	3	F	258
OVA	TI	3	F	247
OVA	TI	3	F	237
OVA	TI	3	F	233
OVA	TI	3	F	263
OVA	TI	4	F	230

Taxon	Element	Period	GL	Bd	SC
GNP	HU	3	704	158	78
GNP	HU	3	598	122	59
GNP	HU	3	621	141	71
GNP	HU	3	595	124	59
GNP	HU	4		163	78
COL	HU	3		102	

Taxon	Element	Period	GL	Bd	Dd	SC	Lm
GN	FE	3	709	134	115	63	668
GN	FE	3	817	167	140	76	765
GN	FE	3	698	132	109	61	653
GN	FE	3	725	143	119	71	677
GN	FE	3	759	154	131	69	702
GN	FE	3	753	155	139	69	697
ANS	FE	3	770	194	142	76	
ANS	FE	3		172	125		
ANS	FE	3	743	198	153	86	698

Taxon	Element	Period	GL	Bd	Dd	SC	La
GNP	TI	3		120	119	67	
GNP	TI	3	1094	114	116	64	1058
GNP	TI	3	972	102	104	57	944
GNP	TI	3		121	127		
GNP	TI	3		107	104		
GNP	TI	3	1036	121	123	66	988
ANS	TI	3	1421	177	170	92	1378
ANS	TI	3	1360	165	166	85	1318
ANS	TI	3		181	175		

Taxon	Element	Period	Spur	GL	Bd	SC
GN	TMT	3	P	702	143	78
GN	TMT	3	A	654	116	57
GN	TMT	3	P	705	128	67
GN	TMT	3	P	779	142	76
GN	TMT	3	P		136	76
GN	TMT	3	S	838	142	67
ANS	TMT	3		779	178	79

**APPENDIX 3: Catalogue of metalworking debris from the excavation at 12 Oak Street**

<b>Context</b>	<b>Type</b>	<b>No</b>	<b>Weight</b>	<b>Craft</b>	<b>Fuel</b>	<b>Condition</b>	<b>Comments</b>
2008	IRON	1	180				OBJECT CORRODED ONTO STONE
2013	TAP	1	10	FESMELT		FRESH	THIN FLOW
2017	TAP	1	9	FESMELT		V ABRADED	
2017	TAP	2	96	FESMELT		FRESH	MULTI-LAYERED FLOWS
2019	HB	1	160	FESMITH	CHARC	ENCRUSTED	PROBABLY COMPLETE; POSSIBLY ABRADED
2019	HB	1	165	FESMITH	CHARC	ENCRUSTED	WEAKLY MAGNETIC; ID BASED SOLELY ON SHAPE
2019	TAP	3	32	FESMELT		FRESH	MID GREY; FREQUENT VOIDS
2019	TAP	6	273	FESMELT		FRESH	DENSE MULTI-LAYERED FLOWS; TH: 20MM
2021	IRON PAN	1	34				
2021	TAP	1	247	FESMELT			VOLCANO FRAGMENT; MORTAR ON SURFACES
2021	TAP	3	24	FESMELT		FRESH	
2022	CLINKER	1	1				
2022	IRON	1	2				OBJECT OR BLOOM FRAGMENT?
2022	IRON PAN	2	15				
2022	SLAG	3	22	FESMITH	CHARC		1 X SMITHING SLAG LUMP?
2022	TAP	2	216	FESMELT		FRESH	NOT GLOSSY; IRON INCLUSIONS; VERY MAGNETIC
2022	TAP	23	632	FESMELT		FRESH	MULTI-LAYERED FLOWS AND PLATES; TH: 30MM
2024	IRON	1	15				OBJECT OR BLOOM FRAGMENT?
2032	HAMMS	0	0	FESMITH			C. 10+ CRUSHED
2032	IRON	1	5				OBJECT OR BLOOM FRAGMENT?
2032	IRON PAN	1	5				
2032	TAP	5	107	FESMELT	CHARC	FRESH	MULTI-LAYERED FLOWS; CHARC AND SAND ON BASE
2032	TUYERE	1	40				NO RIM/ AIR HOLE; FACE FLAT
2032	VITCLAY	1	129	FESMELT			THICK TUYERE? FURNACE? TH: 30MM; VITRIFIED LAYER 25MM TH; FACE FLAT
2038	IRON PAN	1	5				
2038	TAP	2	37	FESMELT		FRESH	PLATE FLOWS



2046	TAP	2	43	FESMELT		FRESH		PLATE AND FLOWS
2046	VITCLAY	1	32	FESMELT				REDUCED FIRED GREY/PURPLE; IRON SLAG ATTACHED
2049	FINGER	1	64	FESMELT		FRESH		L: 70MM; DIAM: 18MM; PART 8-SHAPED IN PROFILE
2049	TAP	1	21	FESMELT		FRESH		FLOWS
2050	IRON PAN	1	9					
2050	TAP	1	12	FESMELT		FRESH		FLOWS
2052	SLAG	1	8	FESMELT				MID-DARK GREY; LIGHT WEIGHT; LOTS OF VOIDS
2054	IRON PAN	1	9					
2056	TAP	1	105	FESMELT		FRESH		LARGE FLOW; TH: 35MM
2059	TAP	3	39	FESMELT		FRESH		FLOWS
2063	TAP	1	40	FESMELT		FRESH		MULTI-LAYERED FLOWS
2065	IRON PAN	1	2					
2072	HAMMS	0	0	FESMITH				C. 10+ CRUSHED
2072	SLAG	1	66	FESMELT				BLOOM FRAGMENT; IRON RICH; MAGNETIC
2072	SLAG	11	5	FESMELT		FRESH		TINY FRAGMENTS
2072	TAP	1	144	FESMELT		FRESH		SMALL VOLCANO FRAGMENT
2072	TAP	7	79	FESMELT		FRESH		FLOWS
2072	VITCLAY	1	18					REDUCED FIRED CLAY; MATT MAGNETIC IRON RICH SLAG ON ROUNDED FACE
2073	FINGER	1	34	FESMELT		FRESH		L: 60MM; DIAM 16MM; OVAL; GLOSSY TOP
2073	FURN	1	832	FESMELT	CHARC			MEDIUM SIZED CHARC; TOP VOLCANO ATTACHED
2073	IRON	1	22					OBJECT OR BLOOM FRAGMENT?
2073	TAP	7	874	FESMELT		FRESH		FLOWS
2073	VITCLAY	1	124	FESMELT				REDUCED FIRED CLAY; MATT MAGNETIC ROUNDED FACE; TH: 30MM
2075	TAP	1	57	FESMELT		FRESH		FLOWS
2077	BLOOM	1	28	FESMELT				BLOOM FRAGMENT? PARTIALLY MAGNETIC
2077	HAMMS	0	0	FESMITH				C. 5+ CRUSHED
2077	IRON	1	39					OBJECT OR BLOOM FRAGMENT?
2077	TAP	5	124	FESMELT		FRESH		MATT MID-DARK GREY; LOTS VOIDS; ALL LARGE FLOWS
2079	SLAG	1	14	FESMITH				PROTOHB? MAGNETIC; 30 X 40 X 18MM

2079	STONE	1	6					ROASTED ORE?
2079	TAP	1	64	FESMELT		FRESH		PLATES AND FLOWS
2081	FURN	1	266	FESMELT	CHARC			MEDIUM CHARCOAL; MAGNETIC; DENSE; MAYBE TOP OF INVERTED VOLCANO?
2081	TAP	1	8	FESMELT		FRESH		
2092	TAP	1	33	FESMELT		FRESH		FLAT MATT PLATE; SANDY BASE
2101	TAP	2	29	FESMELT		FRESH		SMALL FLOWS
2103	TAP	2	161	FESMELT		FRESH		1 X VERY LARGE FLOW; ABRADED?
2105	TAP	1	204	FESMELT		FRESH		MASS OF SMALL FLOWS
2108	CHANNEL	1	110	FESMELT		FRESH		WIDTH 40MM; GLOSSY TOP
2108	FINGER	1	54	FESMELT		FRESH		L: 40MM; DIAM 20MM = CIRCULAR END; OTHER END PEAR SHAPED
2108	FURN	3	135	FESMELT	CHARC			LARGE CHARC IMPRINTS
2108	HAMMS	0	0	FESMITH				C.10+ CRUSHED
2108	IRON	16	55					OBJECT OR BLOOM FRAGMENTS?
2108	TAP	1	26	FESMELT		FRESH		GLOSSY BUT LOTS OF VOIDS
2108	TAP	5	19	FESMELT		FRESH		DRIBBLES
2108	TAP	29	1448	FESMELT		FRESH		FLAT PLATES AND MULTI-LAYERED FLOWS; MAX TH: 40MM
2108	VITCLAY	1	119		CHARC			VERY LARGE TUYERE?? AIR HOLE DIAM 35MM+; APPEARS PARTIALLY MOULDED; FESLAG ATTACHED
2108	VOLCANO	2	498	FESMELT		FRESH		BASE; LOTS SMALL FLOWS
2108	VOLCANO	2	614	FESMELT	CHARC			FURN WITH TAP FLOWING FROM IT; TOP OVALISH 90 X 60MM
2109	TAP	2	96	FESMELT		FRESH		FLOWS; 1 X SANDY BASE
2112	TAP	1	92	FESMELT		FRESH		FLOWS
2124	HAMMS	0	0	FESMITH				C. 25+ FEW FAIRLY LARGE
2124	SLAG	1	44		CHARC			FESMELT/FESMITH; PART MAGNETIC; MATT
2124	TAP	1	42	FESMELT		FRESH		FLOWS
2124	TAP	1	98	FESMELT		FRESH		VOIDS ON TOP; NOT GLASSY
2126	HAMMS	0	0	FESMITH				C. 25+ CRUSHED
2126	HB	1	85			ENCRUSTED		PART MAGNETIC; ID BASED SOLELY ON SHAPE; BLOOM FRAGMENT??
2126	TAP	1	164	FESMELT		FRESH		VOLCANO BASE

2126	TAP	4	152	FESMELT		FRESH	FLAWS
2130	SLAG	1	378	FESMELT	CHARC		DENSE MAGNETIC LUMP; TAP WITH SOME BLOOM ATTACHED?
2135	TAP	1	77	FESMELT		FRESH	LARGE FLOW
2135	TAP	1	556	FESMELT		FRESH	MULTI-LAYERED PLATE OF MASS OF FLOWS
2155	HAMMS	0	0	FESMITH			C. 10+ CRUSHED
2155	TAP	1	32	FESMELT		FRESH	SMALL FLOWS
2155	TAP	2	391	FESMELT		FRESH	VERY LARGE FLOWS; BUBBLY BELOW SURFACE CRUST
2159	HAMMS	0	0	FESMITH			C. 25+; 1 X LARGE PLATE
2159	SLAG	1	421	FESMELT		FRESH	CHANNEL OR SMALL VOLCANO TOP; BASE LOOKS LIKE FINGER SLAG
2159	TAP	10	322	FESMELT		FRESH	LARGE PLATE OF LARGE AND SMALL FLOWS
2159	TUYERE	1	44				PURPLE BACK; AIR HOLE?
2159	VITCLAY	3	52	FESMELT			REDUCED FIRED; MAGNETIC MATT FLAT FACE; TH: 20MM; VITRIFICATION 15MM TH
2159	VOLCANO	1	814	FESMELT		FRESH	TOP WITH ATTACHED FURN SLAG; INVERTED VOLCANO; TOP OVAL - 100 X 70MM
2162	TAP	1	37	FESMELT		FRESH	BUBBLY BELOW SURFACE CRUST
2162	TAP	2	34	FESMELT		FRESH	FLOWS
2164	HAMMS	0	0	FESMITH			C. 25+; 1 X MEDIUM PLATE
2164	IRON	1	26				OBJECT OR BLOOM FRAGMENT?
2164	TAP	1	289	FESMELT		FRESH	LARGE TH 40MM FLOW; FREQUENT VOIDS
2164	TAP	5	116	FESMELT		FRESH	FLOWS
2166	HAMMS	0	0	FESMITH			C. 25+; 1 X MEDIUM SPHEROID
2166	TAP	1	376	FESMELT		FRESH	MASS FLOWS; PROBABLY VOLCANO BASE
2166	TAP	2	108	FESMELT		FRESH	FREQUENT VOIDS; PART BUBBLY
2166	TAP	3	362	FESMELT	CHARC	FRESH	FLOWS

THE CODES USED IN THE ABOVE CATALOGUE:

CHARC = Charcoal; DIAM = Diameter; FESMELT = Evidence for iron smelting; FESMITH = Evidence for iron smelting; FURN = Furnace slag; HAMMS = Hammerscale; HB = Plano-convex slag accumulation (commonly called hearth bottom); ID = Identified; L = Length; TH = Thick; V = Very; VITCLAY = Vitriified clay

## PLATES



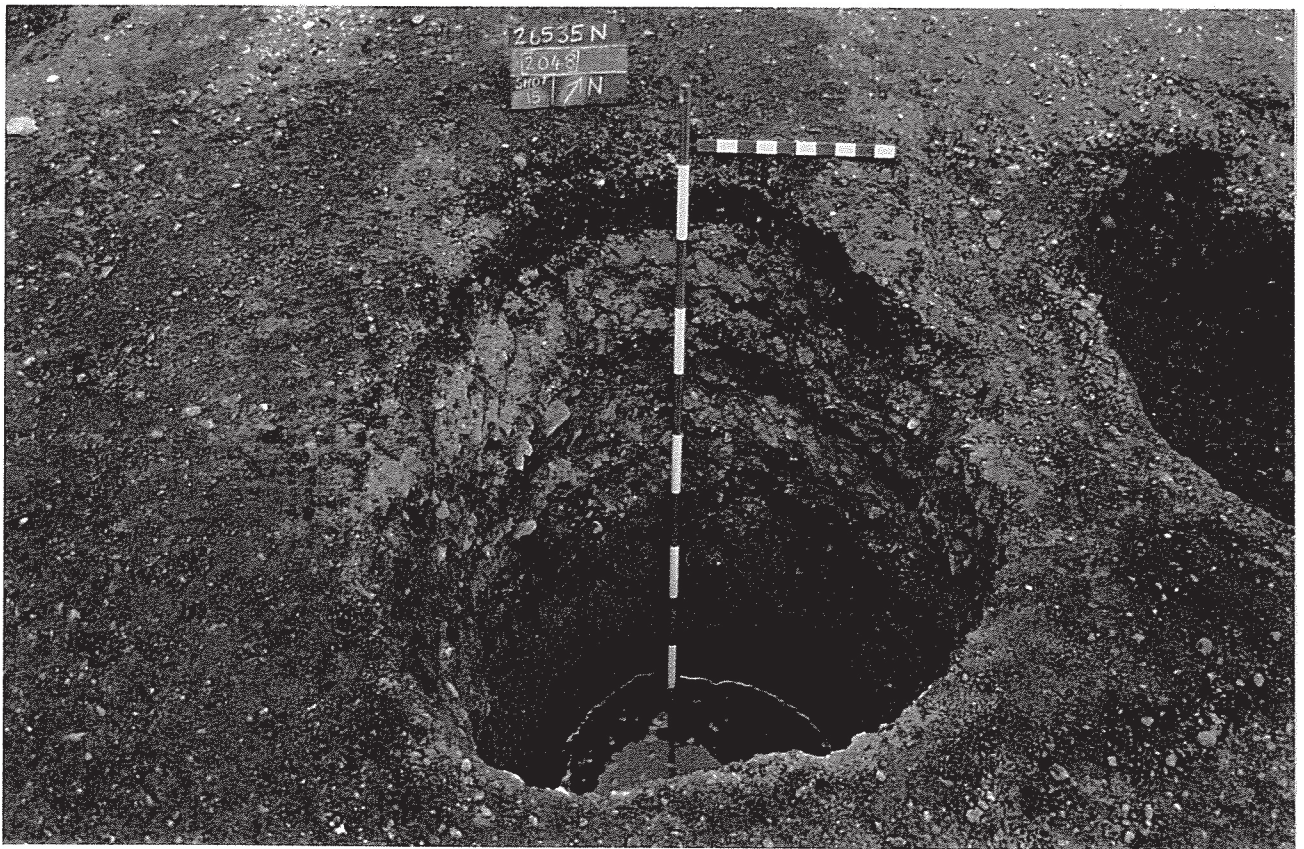
*Plate 1 The excavation in progress*



*Plate 2 The north-west facing site section. Note Beam Slots F2035, F2031 and (perpendicular) F2033 in the corner of the trench*



*Plate 3 Pit F2048*



*Plate 4 Pit F2015*

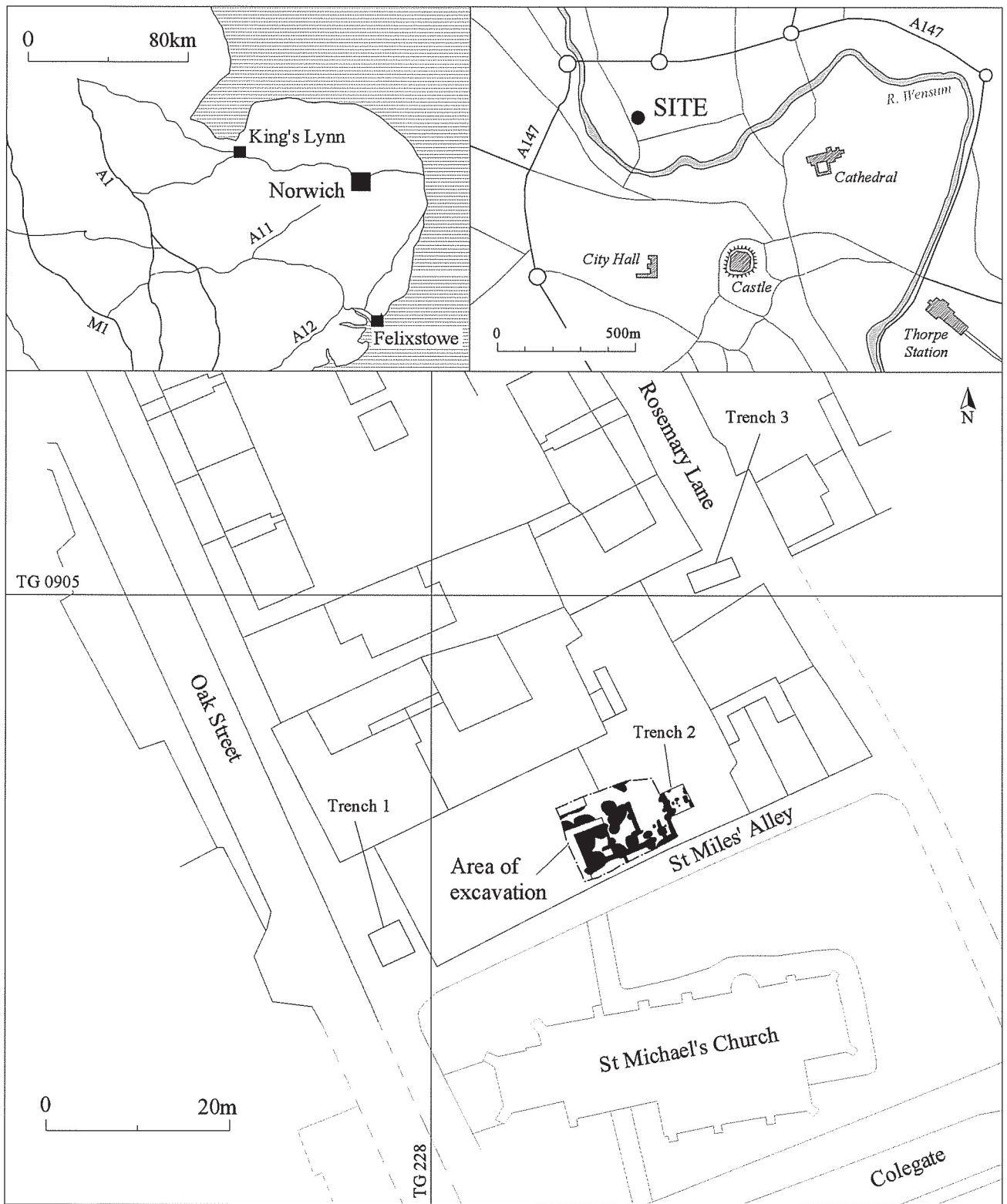


Fig. 1 Site location plan

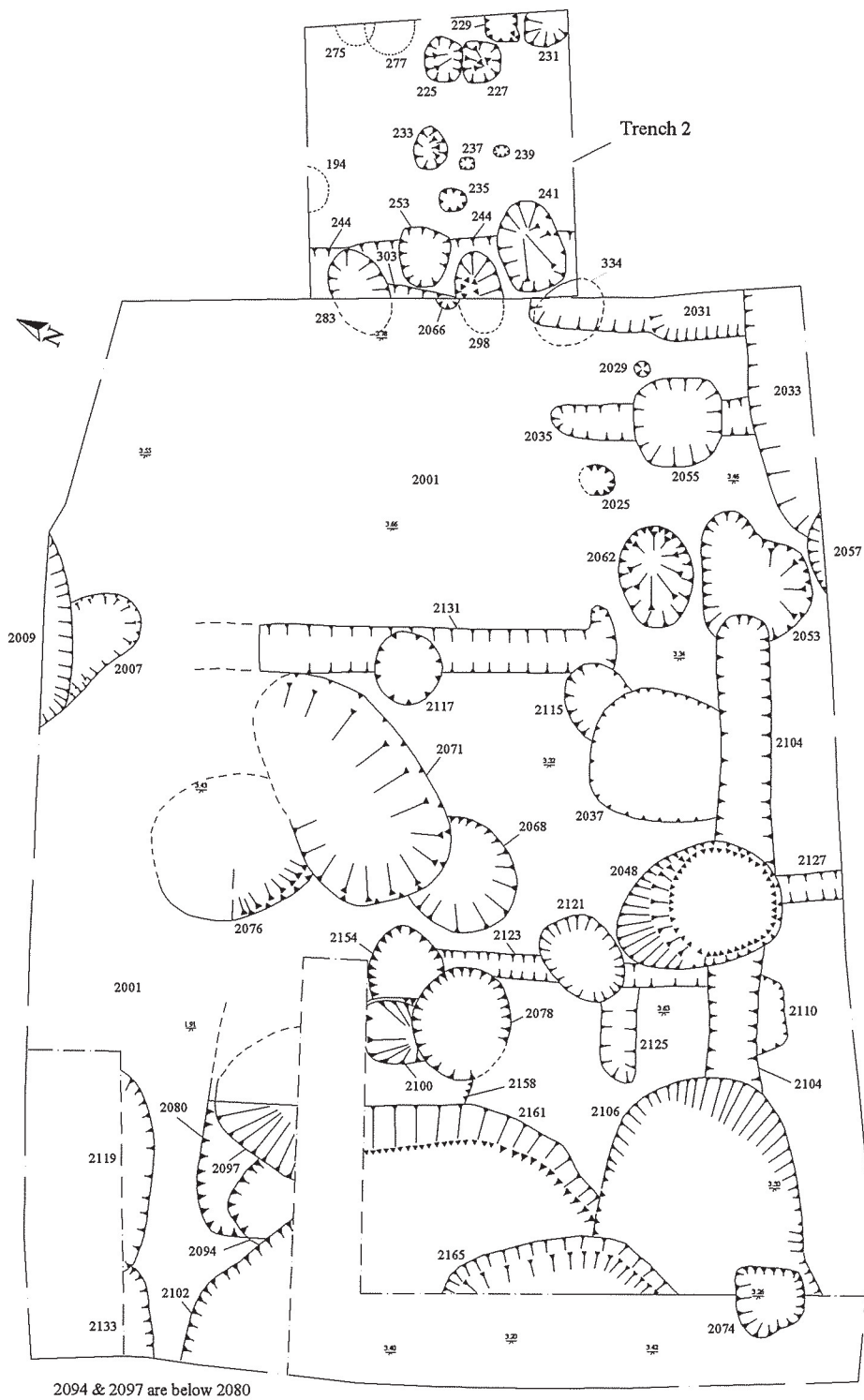


Fig. 2 Plan of features (Phases 1 & 2)

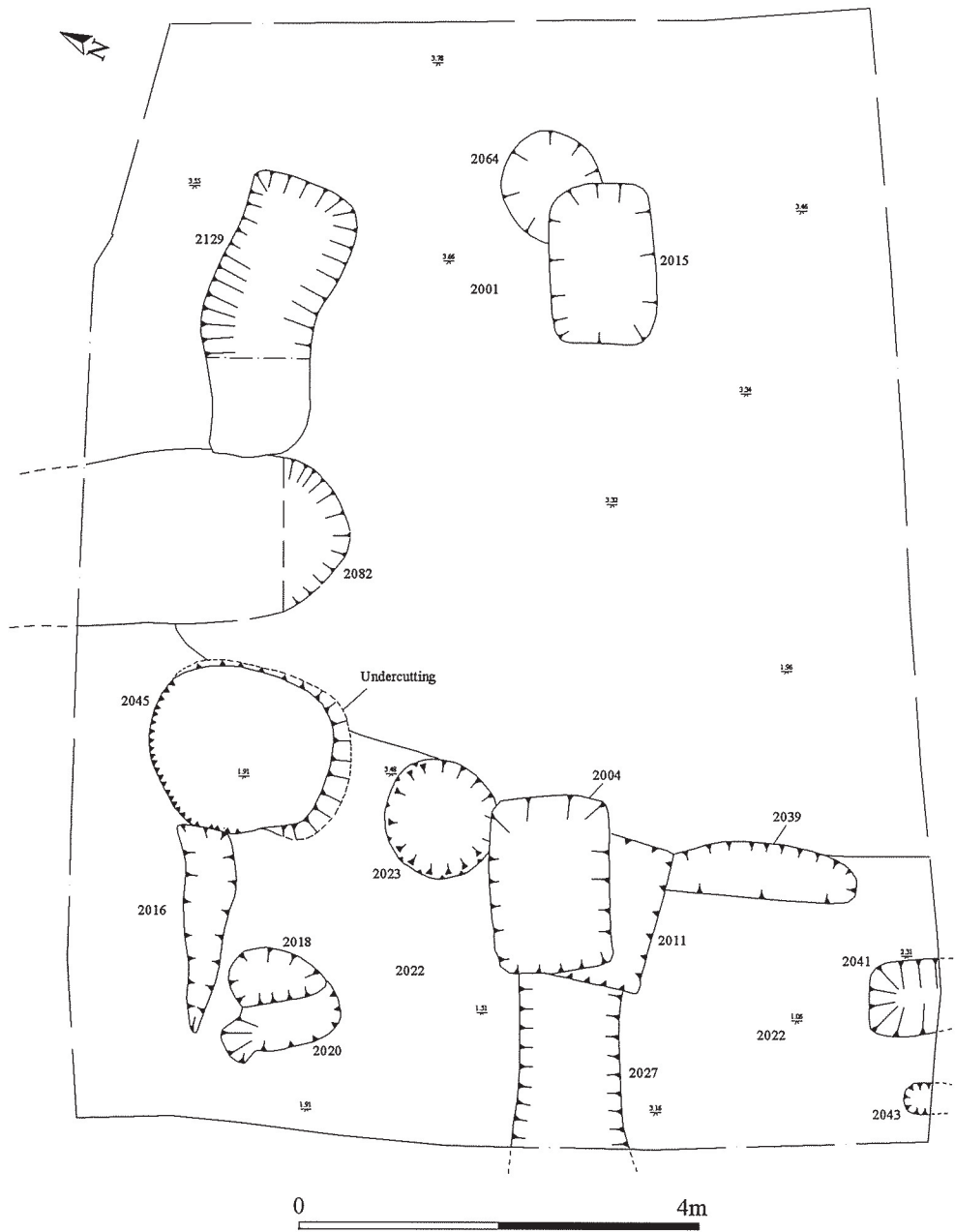


Fig. 2a Plan of features (Phases 3 & 4)



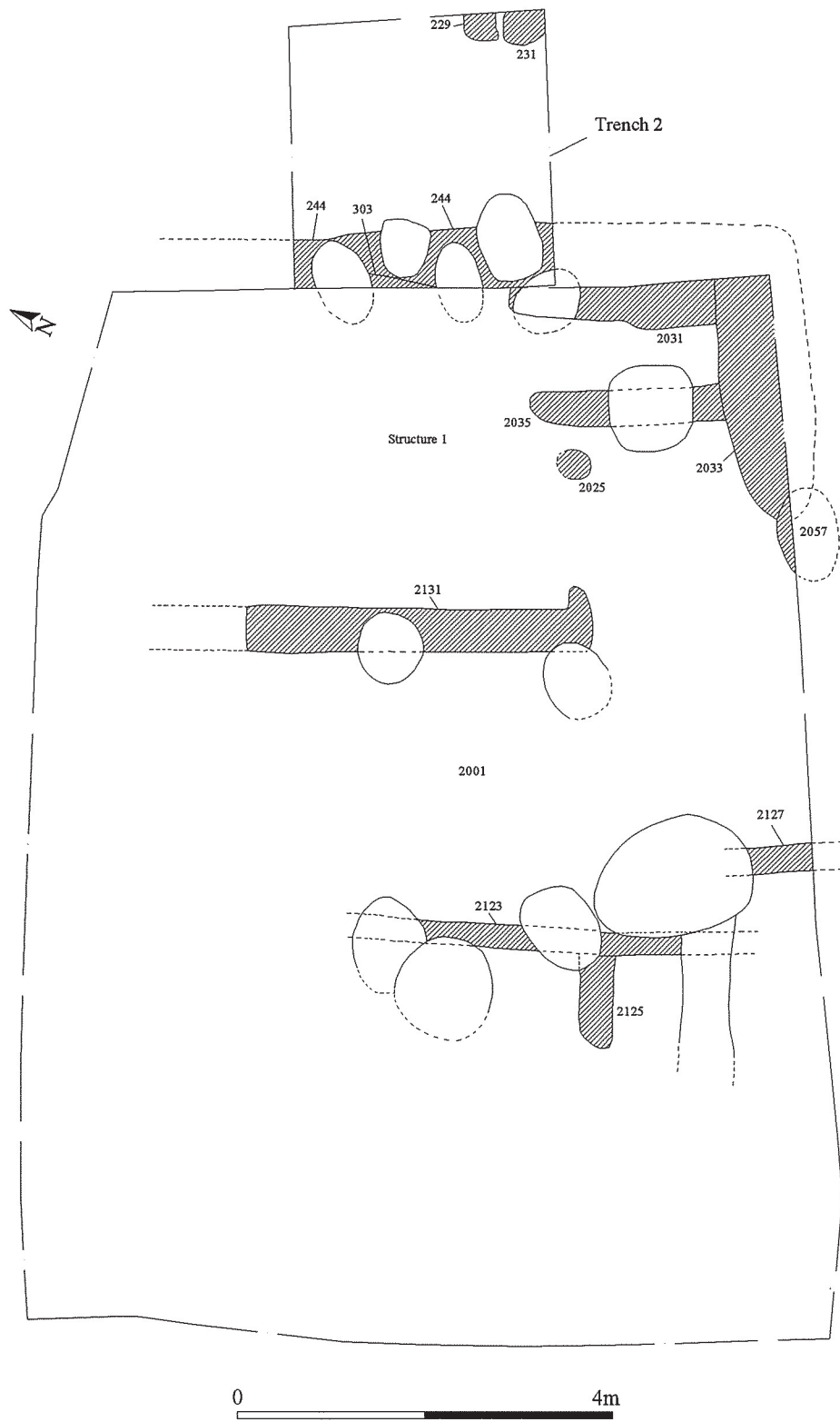


Fig. 3 Phase 1: 10th - 12th centuries AD



Fig. 4 Phase 2: 11th - 14th centuries AD

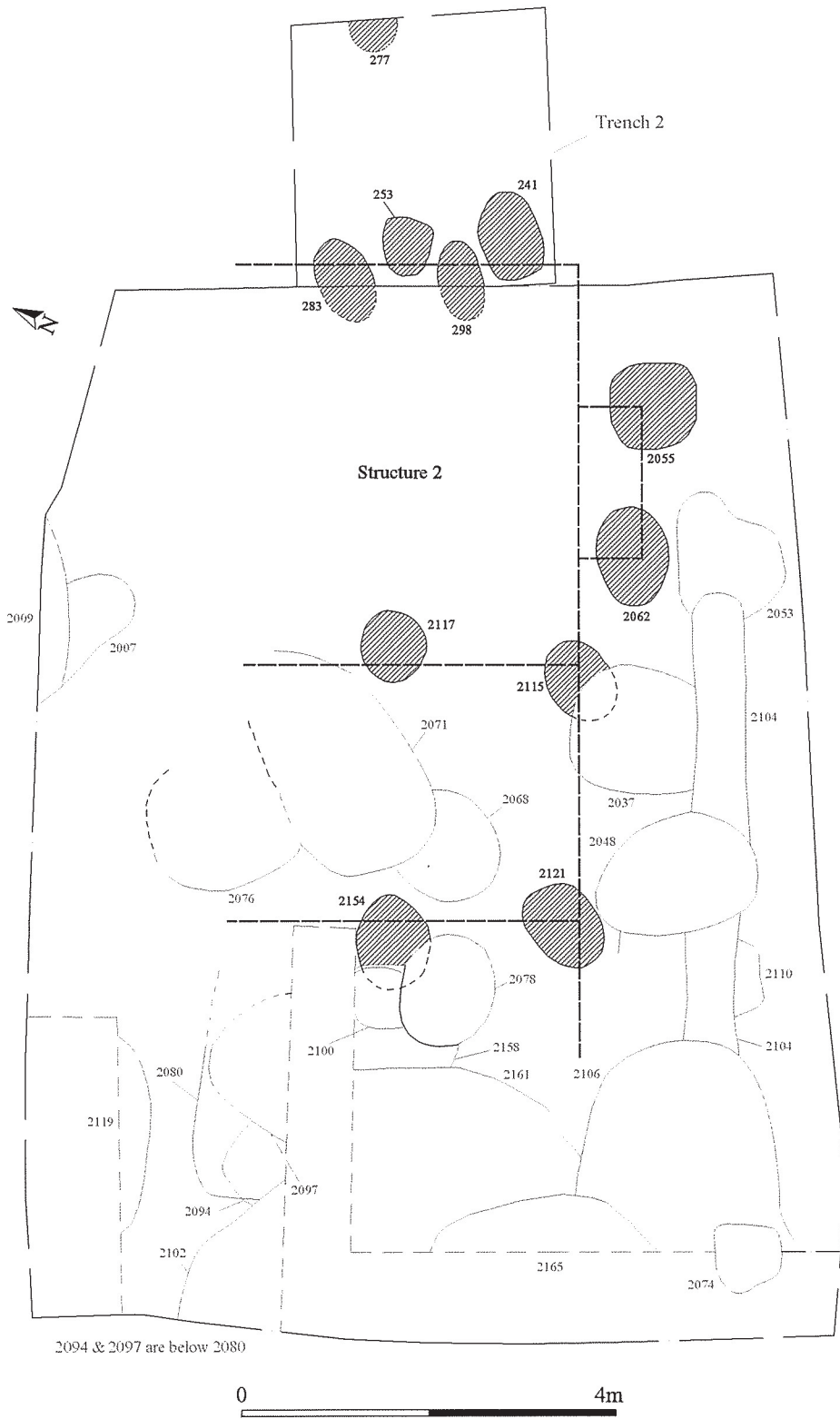


Fig. 5 Suggested reconstruction of phase 2 building

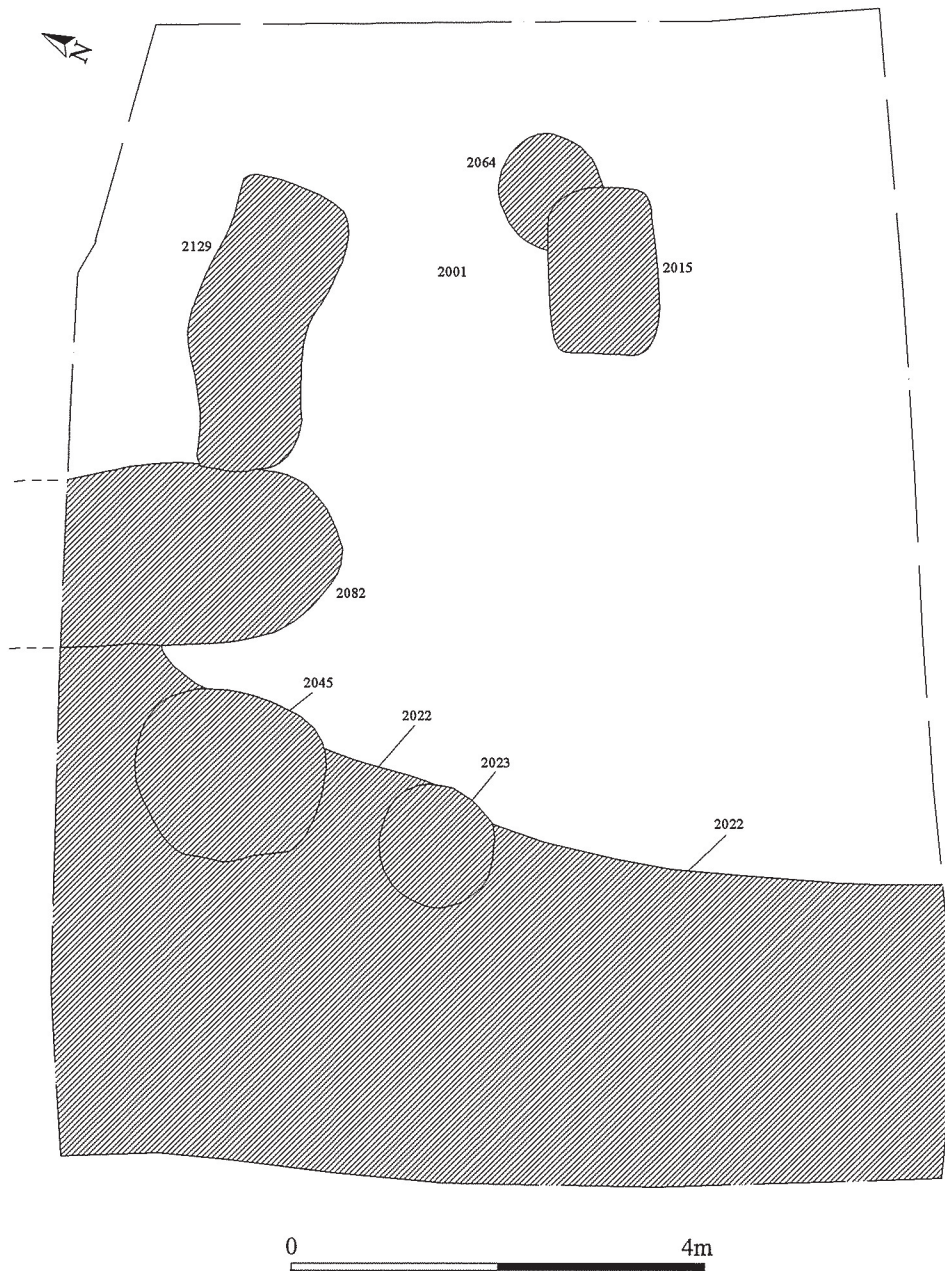


Fig. 6 Phase 3: 15th - 16th centuries AD

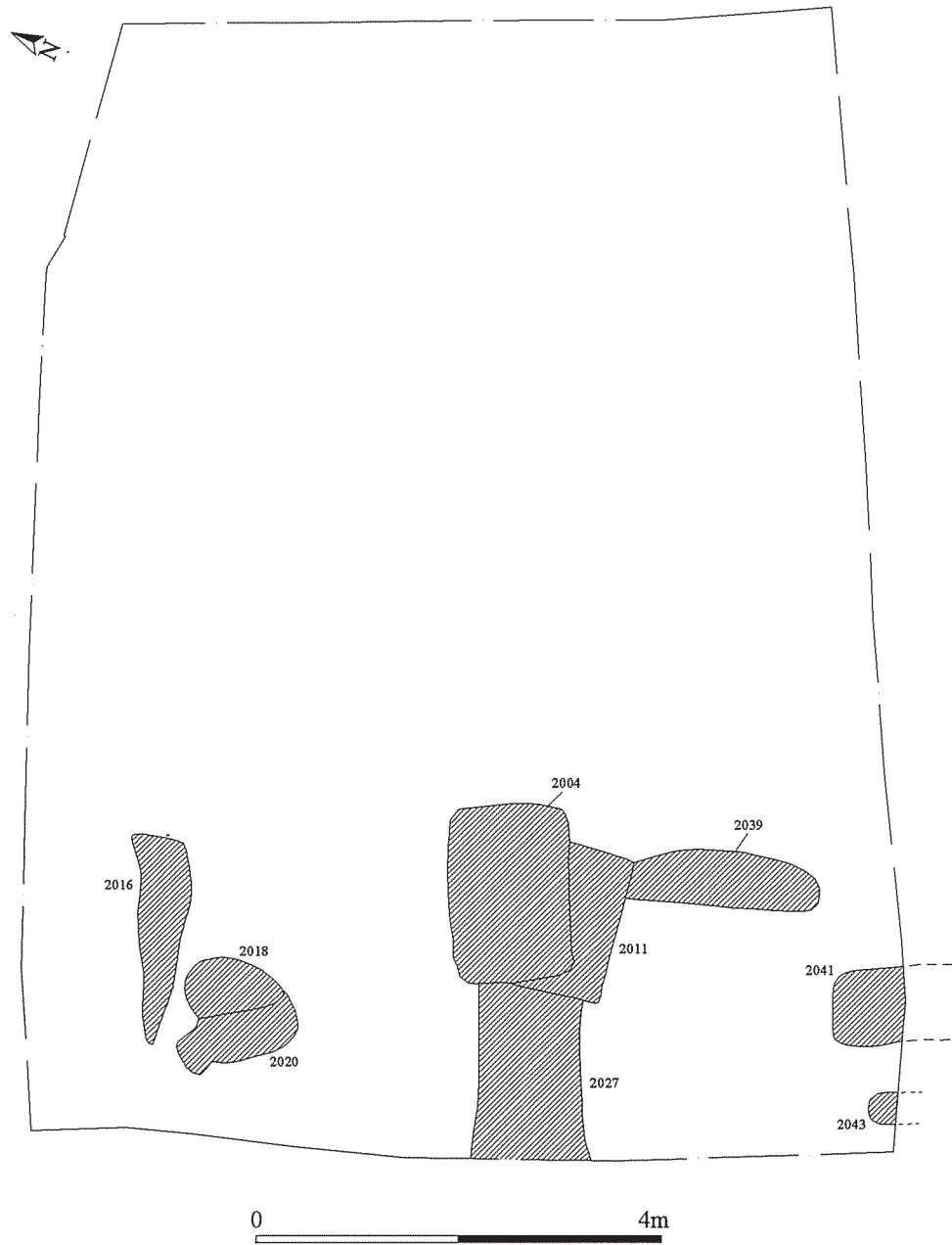


Fig. 7 Phase 4: Post-medieval

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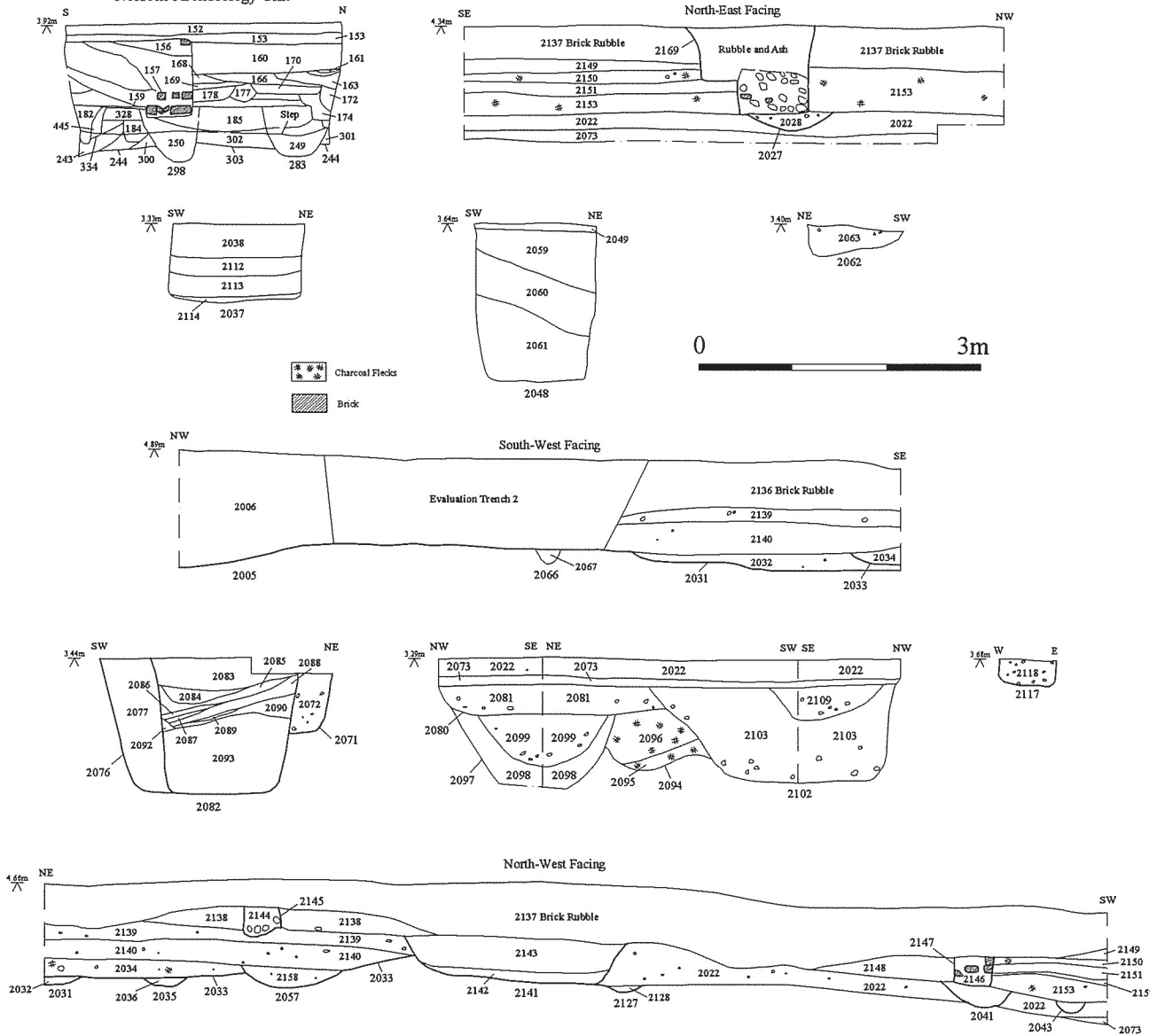


Fig. 8 Sections

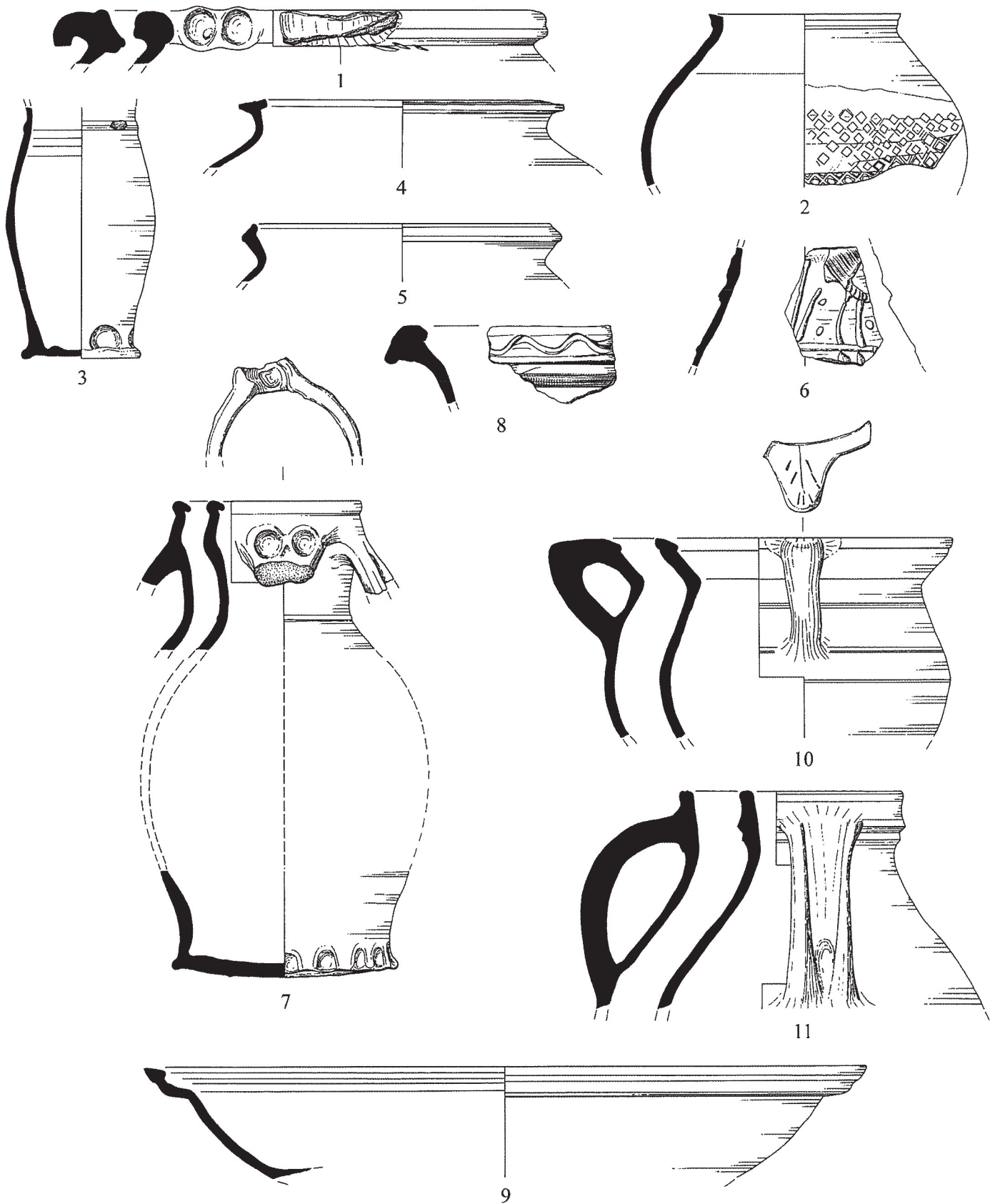


Fig. 9 Medieval pottery. Scale 1:4.

0 1:4 15cm

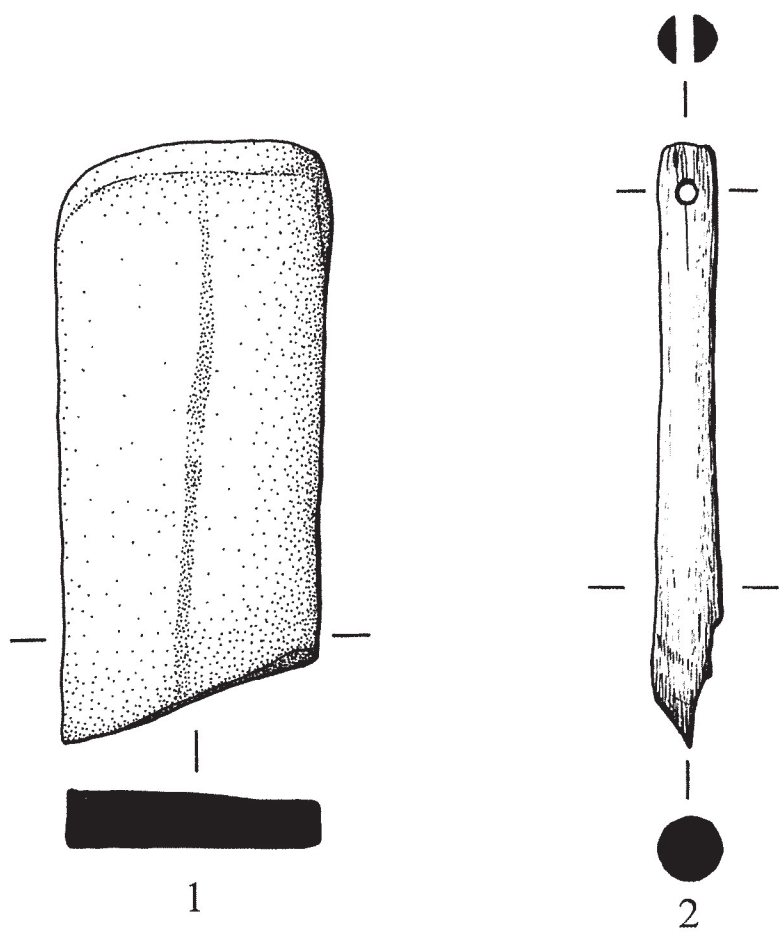


Fig. 10 Small finds. Scale 1:1.