

**THE FORMER DRILL HALL SITE,
HIGHBRIDGE STREET,
WALTHAM ABBEY,
ESSEX**

RESULTS OF AN ARCHAEOLOGICAL EXCAVATION:

ARCHIVE REPORT

Site Code: WA8

National Grid Reference (NGR)
TL 3780 0051

On behalf of:
George Wimpey Homes

September 2005

On behalf of: George Wimpey Homes
McLean House,
Bluecoats
Hertford
Hertfordshire
SG14 1PB

Prepared by: Les Capon

Contributors: Ian Betts
Peter Huggins
Beth Richardson
Sylvia Warman
Lucy Whittingham

Excavation by: Les Capon
Dan Eddisford
Alasdair Harper
Mike House
Beatrice Hudson
Andy Leonard
Jenny Marchant
Melissa Melikian

Illustration by: Chris Adams
Les Capon
Jonathan Moller

Timing: Excavation: 8th September-21st October 2003
Watching Brief: 8th June 2005

Post-Excavation Assessment: August 2004

Final Report: September 2005

Enquiries to: AOC Archaeology
Unit 7
St. Margaret's Business Centre
Moor Mead Road
Twickenham TW1 1JS

Tel: 020 8843 7380
Fax: 020 8892 0549
E-mail: admin @aocarchaeology.co.uk

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SUMMARY

This document presents the results of the archaeological excavation at the former Drill Hall Site, Highbridge Street, Waltham Abbey, Essex. The excavation was conducted by AOC Archaeology Group on behalf of George Wimpey North London over two months from September to October 2003 and was allocated site code WA8. A Watching Brief was also undertaken, in June 2005. As well as a text describing the deposits, features and buildings excavated, the report offers full interpretation of the archaeological material and its significance to the local area. Full analysis by specialists has been undertaken on the artefacts collected from the site.

The site was first occupied in the medieval period, when it was little more than a marshy extension of the River Lea. Midden clearance and pit-digging characterised the first anthropogenic activity in site during the medieval period. During the 14th century, the first structure and industrial use of the site was established; a shelter for tanning, a working surface and a tanning pit indicate direct habitation, as do three small cesspits.

During the 16th century, the site was used for small industries; both tanning and leatherworking were conducted. Following the Dissolution of Waltham Abbey after 1540, houses began to be constructed along the Highbridge Street frontage using stonework from the Abbey, with a metre of made ground raising the site above the water table. There appear to have been two individual plots of land, one to the east and one to the west. The occupants of at least one of these houses appear to have been horn-workers, the waste from their work filling several pits.

A range of new houses was built in the 1780s to provide accommodation for workers at the Gunpowder factory, the largest being the Storekeeper's House that lay in the east of the site. These houses were demolished in the 20th century, making way for the Drill Hall and Government House, which was founded on immense concrete foundations.

1 INTRODUCTION

SITE LOCATION (*Figure 1*)

- 1.1. The site is located on the south side of Highbridge Street, on the northwest edge of Waltham Abbey town centre. It is centred at National Grid Reference TL 3780 0051, covers an area of approximately 4,120m² and is situated at approximately 18.90m OD. The site is now developed as two blocks of housing with car parking behind. To the south and east of the development site lies the canalised River Lea.

PLANNING BACKGROUND

- 1.2 A planning application was received from George Wimpey Plc for the construction of two buildings comprising 43 combined residential and retail properties with associated car parking, access roads and landscaping.
- 1.3 The applicant was advised by Essex County Council that a programme of archaeological work was required ahead of any remediation works, groundworks and foundation construction in case significant archaeological deposits survived on site. Following evaluation, the results were deemed significant enough for a programme of excavation to be undertaken by way of mitigation. A brief was prepared for the work by Vanessa Clarke, Archaeological Officer for Essex County Council. The results of the work were presented in Post-Excavation Assessment (AOC Archaeology 2004), which included a programme of suggested further analysis of the records and the finds that would bring the project to completion.

2 ARCHAEOLOGICAL BACKGROUND

- 2.1 An evaluation of the archaeological survival was undertaken in December 1999, when six trenches were excavated. These found significant remains of pits and houses of post-medieval date, and earlier made ground. There have been no previous archaeological investigations on site.

3 HISTORICAL BACKGROUND (Figures 2-5)

GENERAL

- 3.1. This information is taken mostly from *An Archaeological Desk-Based Assessment and Field Evaluation, Drill Hall and Government House Site, Highbridge Street, Waltham Abbey* (Essex County Council 1999a), the *Waltham Abbey Historic Town Project Assessment Report (1999b)*, the *Royal Gunpowder Factory, Waltham Abbey, Essex, an RCHME Survey (RCHME 1993)* and the *Victoria County History Essex V (VCH 1966)*.

PREHISTORIC

- 3.2. There have been numerous stray finds dating to the prehistoric period scattered throughout the town and Abbey area, but there is limited evidence for significant occupation. The only exception to this is a ditch uncovered during 1993 investigations at Church Street, some 200m east of the site, on the other side of the River Lea and on higher ground. Organic material from the ditch, which measured 2.70m wide by 1.20m deep, was dated to between 1420 and 1105 BC. The proximity of the subject site to the river edge, however, raised the possibility of encountering ecofactual and other organic deposits dating to the prehistoric period, as well as the opportunity to investigate the changing nature of the river itself, including earlier revetments and/ or canalising structures.

ROMAN

- 3.3. Sporadic deposits and features of Roman date have been recovered from within the area of the historic town, but there is, to date, no evidence that the settlement was of a substantial size or impact. Occasional finds of ceramic building material of Roman date, both roof and flue tile, indicate the presence of at least one significant building in the area. The centre of Roman occupation is likely to be on the slightly higher ground in the area of the Abbey itself, or the town's market place.

SAXON

- 3.4. The place-name Waltham derives from 'wealdham', meaning 'the high forest's administrative centre', so there are clearly Saxon origins for the town. Traditionally, these are based upon a church established in c. 1030, although archaeological evidence places the first church structure to the 7th century (*ECC 1999b*). The primary settlement of the Saxon period, which, according to the Domesday survey of 1086, was of a considerable population, appears to have been centred to the south of the Old River Lea, across the river from the site. The area surrounding the Abbey was devoted to a royal enclosure on the north, the Eldeworth enclosure to the south of the Abbey, and the Abbey precinct itself.
- 3.5. No evidence of direct Saxon occupation has been recovered from the area of the site: it lay at 1.80m below current ground level and was marshland during the Saxon period. It faced regular inundation by the River Lea and was very soft

ground. Evidence for an early crossing of the river potentially lies beneath Highbridge Street itself.

MEDIEVAL

- 3.6 As the name indicates, Highbridge Street relates to early bridging over the River Lea and its subsidiary streams. Highbridge Street is mentioned in a rental from c.1320, when it was known as *Weststrate*, but its origins may be earlier, possibly the location of a bridge of Saxon date. It is thought possible that evidence of such structures may remain underneath the northeastern corner of the site.
- 3.7 It was originally thought that the land was occupied by housing in the medieval period, extending outwards from Waltham Abbey town centre. Excavations at the Drill Hall site do not prove this, however. The location of the road demarks it as an important historic thoroughfare between Waltham Abbey and Waltham Cross to the west. The medieval settlement appears to have been focused to the north and south of the Abbey itself, with the main built up area to the south and east of the subject site, centred approximately 300m to the east. At Waltham Abbey, the medieval period is considered to finish with the Dissolution of the Abbey, showing the importance and duration of monastic power rather than the more ephemeral whims of royalty (*ECC 1999b*).
- 3.8 The site was largely marshland in the medieval period, therefore was not divided into burgage plots; it was only by raising the ground level in the post-medieval period that the land became good enough to establish permanent housing. Documentary research now suggests that small scale industries were developing on the perimeter of the town.

POST-MEDIEVAL

- 3.9 The site is first depicted in c.1600, a 'Map of Waltham Park', and shows houses established along Highbridge Street leading west to Waltham Cross. These appear to have been the first permanent structures erected on site, but their owners/tenants are not recorded. Names of the possible owners or tenants are discussed later in this report (Section 8). By the mid 18th century a map of the Waltham Abbey area, surveyed by Chapman and André (1777), shows that housing extended along both the north and south sides of Highbridge Street. The Waltham Abbey Gunpowder Factory was first established in the mid 1660s, at which time a series of water and horse-driven mills along the Millhead stream were utilised. The works were purchased by the Government in 1787, which resulted in a major expansion program. This expansion continued into the second half of the 19th century with the erection of several steam-driven mills. The area of the site was never directly involved with the gunpowder works other than providing residence, as the main sites of manufacture were centred to the north and southwest. Post-medieval mills were located along this stretch of the Old River Lea, but they do not appear to encroach upon the boundaries of the site. According to historic maps, the nearest is the steam mill, used for both flour and corn, situated some 50m to the west. This does not, however, preclude the

- possibility of an earlier mill. The area in question was among the land purchased by the Ordnance Board from 1808 onwards, when they, “bought houses in the town, many in the High Bridge Street, which they rented to factory employees,” (VCH). In 1809 the Ordnance Board also bought the water rights to Cornmill Stream, as part of the move to channel the existing streams as power for the munitions factory.
- 3.10 The 1826 town map (*Figure 2*) clearly shows that the site was then occupied by the storekeeper’s House and Workmen’s Cottages associated with the nearby Royal Gunpowder Factory. The storekeeper’s House was situated in the northeast quadrant of the site, fronting Highbridge Street to the north and the canal to the east. The Workmen’s Quarters were situated to the west of the storekeeper’s House, again fronting Highbridge Street. Two footbridges spanning the Old River Lea connected the site with the town centre to the east, and the gardens and factory buildings to the south.
- 3.11 The more detailed First Edition Ordnance Survey Map of 1870 (*Figure 3*) shows the addition of a building in the central portion of the site fronting Highbridge Street. Other additions include a small greenhouse at the rear of what was called the Storekeeper’s House, and a third footbridge. Represented in some detail, to the south of these buildings, lies a garden area. This garden area occupies the majority of the central area of the site and appears to have some formal demarcations. A range of buildings of unknown function running north-south were situated to the west of the residential buildings and main garden. Further to the west, on the northwestern corner of the site, a smaller garden was situated.
- 3.12 Two 19th century photographs of the rear of the Storekeeper’s House show that the building was up to three storeys high, with a gabled roof and two chimney stacks, sash windows and weatherboard cladding (Figures 4 and 5).
- 3.13 By the end of the Second World War, many of the cottages erected on the site for the workers at the Gunpowder factory had been demolished, and a new building, Government House erected in the northeast corner. This incorporated the Storekeeper’s House. In the west of site, the Drill Hall was erected. By 1998, all buildings had been demolished and the site levelled.

4 STRATEGY (Figure 6)

- 4.1 The excavation comprised two large open-area trenches (Trenches 7 and 8), covering the footprints of the proposed buildings. The excavation and recording was carried out in accordance with English Heritage AGP 3: *Standards and Practices in Archaeological Fieldwork*.
- 4.2 A unique site code was allocated to the excavation by Essex County Council for the evaluation and the excavation (WA8).
- 4.3 At the time of the evaluation in December 1999 the water table was high, being approximately 0.80m below current ground level. However, as the 1999 evaluation was conducted in winter it was thought that the water level would be lower during the excavation (September-October 2003). A geotechnical ground investigation conducted in May 2003 hit groundwater at between 3.30m and 4.50m, significantly lower than during the evaluation. This level was subsequently seen to be misleading as area excavation located groundwater at between 1.50m and 1.60m below the surface.
- 4.4 The open-area trenches were situated as indicated in the Written Scheme of Investigation. These trenches were excavated down to the base of the pile caps required for foundation construction and the base of the required remediation works, both by hand and, where possible, machine. There was no archaeological impact below the levels outlined above other than in the area of three lift shafts which were hand excavated down to the base of impact. The base of each trench, where dry, was covered by a protective layer of Terram and sand to protect the underlying archaeology, as agreed with Vanessa Clarke of Essex County Council.
- 4.5 The hard-standing towards the western side of the site was removed by machine, using a 360° tracked excavator fitted with a breaker. After the removal of the hard-standing, a machine fitted with a toothless ditching bucket was used to remove the overburden in 20cm spits down to the uppermost level of archaeology including surviving 17th to 19th century structures. These were excavated by hand, recorded, surveyed and sampled. After recording, the upper levels were removed by machine. Underlying archaeologically sterile layers, as determined by the evaluation, were recorded and then removed by machine in successive 10cm spits until the lower layers were uncovered, which were then hand excavated, recorded, surveyed and sampled. The areas of the lift shafts were then excavated from the base of this level by hand, where possible. In each trench provision was made to pump out any water seepage caused by the height of the water table using a diaphragm pump. This became impossible in Trench 8, where an active well supplied greater incoming water than could be pumped.
- 4.6 After removal of the hard standing, a metal detector was used to scan the site to locate metal finds which may have been overlooked during rapid machining.

- Metal detection was also used on individual features that were half-sectioned, to ensure maximum artefact recovery.
- 4.7 Further works in the form of a Watching brief was carried out in June 2005, to monitor removal of contaminated ground.
- 4.8 In this report, context numbers for the main excavation trenches are used, apart from features excavated during the evaluation which were no longer extant after backfilling. Context numbers are shown in brackets (1234) and small finds thus: <56>.

5 AIMS OF THE INVESTIGATION

5.1 The main aim of the excavation was to determine the location, extent, date, character, condition, significance and quality of any surviving archaeological remains liable to be threatened by the proposed development. This applied to remains of all periods, and includes evidence of past environments.

5.2 The following objectives were also addressed:

- To record the evidence for medieval occupation or land use.
- To record the evidence for surviving medieval structures in the area.
- To record the evidence for post-medieval occupation and land-use.
- To record the evidence for surviving post-medieval structures in the area.
- To analyse the ecofactual and environmental potential of the archaeological features and deposits.

5.3 Analysis of the results for the Post-Excavation Assessment identified further themes for research:

- The animal bone: *In addition to information on industrial processes, horn cores also offer a unique window into the population structure of the post medieval cattle herds. Any complete horn cores can be measured and used to identify not just age but also sex and breed.*
- *The adult horse skeleton showed no signs of having been butchered, rather the age of the beast and the fusion of some vertebrae suggest a working animal. It is possible that some of the straps and other leather items are part of its furniture, and it may even have been used by the horner.*
- *The presence of red deer in the form of a sawn antler fragment may be more indicative of antler working than the consumption of venison.*
- *Further analysis of the animal bone can reveal the size and health of the animal population as well.*
- The leather: *The leather has good potential. The survival of leather at Waltham Abbey is mixed and the recovery of this material from well-dated contexts will be of interest for leather studies in the area as well as for the interpretation of the site.*
- *Most of the leather was recovered from two early post-medieval pits. The leather objects are all finished items which have been used (heavily so in some cases), many repaired, and then discarded. The leather has the potential to inform about the inhabitants of Waltham Abbey in the late medieval period, both from the sizes and styles of footwear that they wore, and their activities and status, in terms of the large number of repaired shoes.*
- Diet: *A range of species have been identified from the various phases of occupation at the site. The main domesticates; cattle, horse, sheep/goat and pig are present throughout. Wild species are present but only in small numbers. There appears to be evidence for a broader diet in the medieval*

period with three bird species identified, chicken, goose and duck. Fish were also consumed.

- *Economic Status: Can the assemblages of artefacts recovered from the site provide evidence of the economic status of the inhabitants?*
- *Land Use and Environment: Large parts of the site seem to have been regularly inundated by the River Lea. Does this suggest a focus on Highbridge Street during the medieval period, or a more river-based outlook?*

5.4 The final aim is to make available to interested parties the results of this excavation, subject to any confidentiality restrictions.

6 RESULTS

6.1 NATURAL DEPOSITS

6.1.1 The earliest deposit recorded during the excavations lay at between 17.24 and 17.10m OD and was an organic, fibrous layer of silt with well-preserved fragments of twigs and other woody materials (8157). This layer sloped down gradually towards the river at the south of the site. No finds were present in this deposit, and it is likely that there was minimal human input towards its formation. It is most likely that the site had been marshland in the early medieval period, and also during prehistory. The River Lea that now bounds the south and east of the site would have spread across the site, depositing silts upon the marshland, as recognised by a widespread layer of pale grey silty clay (8156/ 8170) of alluvial origin. Within the silty clay were patches of decayed wood fragments and a very small amount of animal bone.

6.2 MEDIEVAL (1080-1400) (*Figure 7*)

General 1080-1250

6.2.1 The earliest evidence of direct human intervention on the marshland at Highbridge Street was represented by a layer of organic sandy silt up to 0.40m thick (7132 and 8106) that was rich in finds, and typical of assemblages deriving from midden clearance. No individual dumping actions could be discerned, rather there were thin lenses of cultural material. The origin of the soil matrix is likely to be manure, either from the town, or perhaps from animals roaming the marshland. The cultural material included high quantities of pottery sherds, animal bone, building material and one metal small find. The majority of the pottery was made locally and in London, and was largely from utilitarian household objects: bowls, cooking pots and jugs. There were also sherds from Roman and Saxo-Norman vessels and fragments of Roman building material, indicating that a significant Saxo-Norman settlement within Waltham Abbey had been disturbed. The animal bone showed signs of both butchery and weathering, confirming its use as a food item and its discard onto a midden. One cow mandible was from a very old individual indicates some degree of care for a herd. A single small find was a small iron reinforcing plate from an indeterminate object <22>. This resultant land surface was at 17.70mOD, dropping to 17.45mOD at the west of the site.

Minor Dumping c.1250

6.2.2 It was possible to identify a single household dump that is thought to be slightly later in date; its identification is likely to be due to different conditions prevailing, perhaps drier (8130). The dump contained pottery, bone and a little building material. Some of the bone showed weathering and cessy deposits, proving redeposition, and one cow maxilla had an abscess. Peg roofing tiles found in the dump indicate a late 12th or early 13th century date. Even London did not see their use until the mid-late 12th century.

6.2.3 Two types of peg tile are present: a thinner type (around 10-13 mm thick) with moulding sand attached to the tile sides and base, and a thicker type (14-20 mm)

- with knife trimming on part, or all, of the tile edges and part of the sanded base. There are also differences in fabric, the sanded edge tiles were made from a clay with few quartz inclusions (MoL type 2271) whilst the trimmed edge tiles were made from distinctly sandy clays (MoL fabrics 2273, 2583 near 2273). The same two roofing tile types have also been recorded from Cornmill Street, Waltham Abbey.
- 6.2.4 Both peg tile types were made from clays found in the London area, but the tilemakers operating on the outskirts of London did not trim the edges of their peg tiles. This suggests that the knife-trimmed tiles may have been made close to or even by Waltham Abbey for use on the Abbey buildings, whilst the non-trimmed tiles could derive from the London area and have been used on secular buildings. The possibility that the knife trimmed tiles may have been produced by or for Waltham Abbey is supported by the use of similar knife trimmed peg tiles at Merton Priory in south London during the 13th century. These also have a partly knife trimmed base, although only around the bottom of the peg holes.
- 6.2.5 Nine features were cut into the dumped deposits covering the marshland, dating to between 1180 and 1400: a line of four postholes with an associated surface, three pits, a ditch and a gully. A date towards the upper end of the range is most likely, since the dumped deposits below are broadly contemporary. The features of medieval date were recorded to the east of the site, with none to the west, where the ground was lower-lying, and may have been subject to deeper flooding.

Line of Posts and Working Surface. 1250-1400+

- 6.2.6 Towards the centre of site, two compact areas of sandy clay with high pebble and gravel content were identified (8150 and 8190). The layers had irregular, poorly defined edges, and were thought to be the remnants of a single surface. Charcoal and oyster shell within the dumps indicated that their origin lay partly from household clearance, but because their main component was stone, deliberate deposition to form a working surface is the most likely interpretation. Four contemporary postholes cut this surface. The postholes (8164, 8179, 8177 and 8175) ran at 90 degrees to Highbridge Street and were regularly spaced 1.70m apart. Each was round, up to 0.35m in diameter, up to 0.40m deep with straight sides and a flat base. The posts were probably driven as there was no sign of any packing material.
- 6.2.7 The line of four posts are likely to be part of a building or shelter associated with the features of this phase, including a tanning pit (8125), a ditch and a number of pits. Peg roofing tiles were found mixed with the gravel surface and indicate a late 12th century date or later, and may be evidence of the roofing material of this shelter. Also upon the working surface was a small sandstone hone <9>. It is a fine whetstone used for sharpening bladed tools. Incomplete, it may have been discarded once broken, or may have been lost.

6.2.8 Two of the postholes (8177 and 8179) contained fragments of Roman tegula roofing. They are in fabric group 2815 (individual types 2459A, 3006) which indicated manufacture from a tiler situated somewhere in the London/ South Hertfordshire area during the first–mid second century AD. A small number of Roman roofing tiles and bricks belonging to the same fabric group were also found in later contexts. There are two main possibilities for its presence here; they may represent local Roman building activity, since occasional Roman tile found has been found elsewhere in the Waltham Abbey area. Alternatively, they may represent material brought into the area during the medieval period, perhaps for work at Waltham Abbey. There are many examples of Roman tile being used in early medieval monastic buildings, notably at St Albans Abbey and St Botolph's Priory, Colchester. In the London area there is evidence for the reuse of Roman tile at Bermondsey Abbey and further south at Merton Priory. This reuse was by no means confined to monastic buildings; Roman tile was also employed in the construction of parish churches. Substantial quantities were found in the 11th -13th century church phases of St Nicholas Shambles, Newgate Street, London.

Pits, 1250-1400+

- 6.2.9 Three pits (8125, 8132, and 8134) dating to this period were recorded. All were shallow; less than 0.20m deep, and oval in shape. The shallowness of the pits may be due to the high water-table; pits dug until groundwater was located.
- 6.2.10 One pit (8125) was filled with a high proportion of oak bark (8124), suggesting that this had been a tanning pit, and a perforated hone, possibly worn around the neck <7> was present. This was made from Norwegian Ragstone, and would have been used for sharpening bladed tools. The top part of the fill contained a small assemblage of local pottery and food waste, likely to be evidence of deliberate backfill. Two further fragments of peg tile with knife trimmed edges and base (fabric 2273) were in the pit: one is up to 20 mm thick in places, which is unusually thick for ceramic roofing material.
- 6.2.11 The second pit (8134) was almost circular, but with one straight edge, and contained domestic waste; bone, oyster shell and pottery being present within the silty clay fill (8133). The pottery came from London and an unidentified local source. The fill is thought to represent an individual household's waste. Pieces of broken peg-tile indicate late 12th-13th century tiled houses in the town. One of the peg tiles is almost complete, it measures 264 mm in length, 150-153 mm in breadth and 12-14 mm in thickness (fabric 2271). There are two round nail holes, the standard arrangement found on the vast majority of peg tiles made in the London area, measuring c 14 mm in diameter.
- 6.2.12 The final pit (8132) was filled with sand and gravel, different in character from all other pits of this date. It may have been deliberately backfilled, but its original function is unknown. The pottery finds from both date to the 12th century and one of the fills (8131) contained a small sandstone hone <8>.

Ditch 1250-1400+

- 6.2.13 A ditch (8137) ran at 90 degrees to Highbridge Street and had regular sides at 60° and a flattish base. It was heavily truncated so only a short length survived. It was filled by dark brown silty clay (8136) with occasional small rounded stones, which became more frequent towards the base, and seemed to have been deposited gradually. The pottery, in common with the dumps of household waste in the pits of this date, was dominated by jugs and cooking pots manufactured locally, in London and in Hertfordshire.
- 6.2.14 Two fragments of peg tile within the fill illustrate separate parts of a building. One has splash glaze on the upper surface. Glaze, where present, normally covers the bottom third of the tile (the area exposed to the weather) the remaining two-thirds being covered by the overlapping tile above. Significantly, none of the knife trimmed tiles are glazed, nor are any of those found at Cornmill Street, which is further evidence that they derive from a separate production source to those with sanded sides.
- 6.2.15 The other tile appears to have had one edge burnt to a white colour. If this is the result of burning then the tile almost certainly comes from a hearth. Peg tiles were frequently set on end to make hearths in medieval buildings, particularly before the widespread introduction of brick in the late medieval period.

Gully 1250-1400+

- 6.2.16 A shallow gully running east-west was recorded towards the south of the site (6026). It was seen for a length of 1.00m, was 0.40m wide and 0.07m deep. It was filled with silty clay and wood fragments. The function of this feature is unclear.

Household dumps 1300-1400+

- 6.2.17 There were four discrete layers, rich in finds, that did not seem to be cut features, rather dumps of household waste that had become pressed into the underlying marshy deposit (8106). Layer (8139) covered an area greater than 2.0m by 1.2m, but the full extent was truncated by a modern concrete foundation. It was composed of soft grey clay with inclusions of pebbles, oyster shell, pottery and animal bone. The quantity of 13th century pottery and bone present was at least 60% by volume, the pottery coming from London, Northern France and Rouen. One of the more interesting finds, a complete small copper alloy buckle with pin <5>, came from this dump. It is a medieval 'D'-shaped buckle, comparable to 'D'-shaped buckles from London.
- 6.2.18 Both types of peg tiles discussed earlier were present– the thicker type with knife trimmed sides and the thinner type without trimming. At Highbridge Street knife trimmed peg tiles are found up until the 16th century, but it seems unlikely that any were made after the 13th century. The peg tiles without knife trimming, on the other hand, continued in use well into the post-medieval period.

- 6.2.19 Another dump (8128) had been pressed into the marshland forming a hollow 0.10m deep (8129). A few fragments of pottery, both locally made and from London, and butchered animal bone indicate its domestic origin.
- 6.2.20 The third dumped deposit (8107) was a thin spread of reddish brown sandy clay measuring 1.24m by 0.23m. It was only 0.04m deep at its thickest, and contained frequent oyster, shell, bone and locally-produced pottery of medieval date. It was lying in a hollow (8108) that probably represents little more than the compaction of the dump into the layer below. This was the result of a single dumping action.
- 6.2.21 A patch of wood fragments (6027), one of which had a cut edge, may be working waste from the site. This too had been pressed into the underlying marshy deposits, forming a shallow hollow 0.04m deep (6028).

6.3 **MEDIEVAL (1400-1540)** (*Figure 8*)

General

- 6.3.1 There is a later medieval phase, spanning the years 1400-1540 that is represented in the east of the site by two pits cut into the working surface (8150), three cess-pits, a large post and one tree-pit, and to the west by two tanning pits, an associated cesspit and a line of posts probably part of a shelter.

Refuse pits

- 6.3.2 The largest pit measured 1.41m by 0.98m (8173), contained the most cultural inclusions. Its fill (8172) was rich in food waste including bones from cattle, sheep, chicken and pigeon as well as oyster shell. Jars and cooking pots, manufactured in South Hertfordshire in the 12th-13th centuries, dominated the pottery assemblage.
- 6.3.3 The second pit cutting the working surface (8166) was smaller and contained less domestic waste. The fill is thought to have been brought to the site, since it was notably sandy (8165), whereas the majority of deposits were silty clay.

Cess pits

- 6.3.4 The largest of the eastern three cess pits (8117) was oval, measuring 1.30m by 1.10m and 0.54m deep with a rounded base. There were three distinct fills. The primary fill (8116) was greenish grey and appeared to be cess. It contained oyster shell and animal bone, fragments of mostly locally manufactured pottery cooking pots and jars and a fragment of Roman brick, indicating disturbance of an earlier site in the vicinity. It also contained a large undecorated gold-plated copper-alloy brooch <3>. A small fragment of medieval window glass <24> that had the remains of a painted design of parallel curving lines on one surface, and was likely derived from Waltham Abbey itself.
- 6.3.5 The second cess-pit (8121) was also oval, measuring 1.04m by 0.90m and 0.23m deep with a flat base. The fill (8120) was mostly dark brown silty clay, but had a greenish tinge suggestive of cess. Animal bones and pottery were collected from the fill and the pottery, which was produced in London, Hertfordshire as well as locally, showed the feature to date from 1400-1485.
- 6.3.6 The smallest cess-pit (8145) was rectangular, only 0.98m by 0.82m and 0.26m deep, with a flat base. The fill (8146) was greenish yellow silty clay, containing a few sherds of 14th century pottery and a number of peg-tiles, including one with a line made by a finger, probably part of a batch mark. Similar marks are frequently found near the peg holes on London medieval tiles.
- 6.3.7 More interesting is what appears to be an early medieval floor tile or brick. There are no surviving size measurements so precise identification is difficult although the two vertical knife-cut sides suggesting the most likely use is as flooring. It is at least 33 mm thick and is in the same sandy fabric (type 2273) used to make

many of the knife trimmed peg tiles. Floor tiles dating to the mid 12th early 13th century and made from the same sandy clay are known to have been used at Bermondsey Abbey, Merton Priory and Stratford Langthorne Abbey, whilst early Coggershall-type brick, again made from the same clay, were used at Merton priory in the 1220s and possibly also at Stratford Langthorne.

Large Post

- 6.3.8 A single very large timber was recorded to the west of Trench 8. It was part of a large upright post (8143), unconverted except for the base, which had been shaped to a rough point. The diameter was 0.38m, and it survived for a depth of 0.68m. This lay within a cut (8140) rather than being solely driven, and the post packed around with silty clay (8141) that contained pottery dating from 1270-1400. The post was lying at an angle of 60°, in a small void (8162), assumed to be caused by attempts to remove it at the end of the medieval period. This clearly had not succeeded, as the post had been cut off at ground level, the base remaining in the ground. The post was beginning to fragment, but was mostly in good condition.

Tree Pit

- 6.3.9 The tree-pit (8119) was an irregular-shaped oval pit only 0.20m deep with a very uneven base, and thought to have been caused by the falling of a tree as opposed to felling. The silty clay fill (8118) contained shell, bone and pottery; much of the pottery dated to the Saxo-Norman and early medieval periods, clearly deriving from the underlying marshland deposit, but other pottery proved this to be late medieval in date. Peg tile and a small fragment of brick was also present, the latter probably late medieval in date (fabric 3224). Later bricks in the same fabric measure 204 mm in length by 98-102 mm in breadth by 38-53 mm thick.

Undated Medieval Features

- 6.3.10 Several otherwise undated features are identified as medieval, since they cut the marshy deposits dating to the 11th century and earlier, and are sealed by made ground of post-medieval date.
- 6.3.11 A rectangular pit with rounded corners 1.44 m by 0.56 m was located in the eastern part of the site (8196). The sides were near-vertical and the base slightly irregular. It was 0.44 m deep, and the fill (8195) was very fibrous and friable in texture. The fill was also virtually stone-free and lacked any finds except for fragments of medieval peg-tile. Full excavation of this feature was not possible due to flooding by groundwater, but the fill had similar character to these features interpreted as tanning pits. Potentially, this pit is of a date with that of the earlier phase (see 6.2.9 above), and is part of the layout of the probable tannery.

Postholes

- 6.3.12 There were three postholes that were single posts with no others associated, that may represent individual actions such as mooring posts against the river, or tethering posts for livestock (8153/8154, 8186/8187/8188, and 8167). Each

posthole was round, and exhibited different diameters and depths, and had flat bases.

Stakes and Stake holes

- 6.3.13 Seven individual stakes (8149, 8151, 8152, 8158) and stake holes (8122/8123, 8126/8127, 8148/8149) were recorded, in varied states of preservation. They did not form any coherent group and were scattered across Trench 8. It is possible that the bases of further stakes are preserved in the underlying silty clay, but these were not located during the excavations. Three (8151, 8152 and 8158) may be associated, being only 1.50m from one another. The stakes measured between 0.05m and 0.16m in diameter and were driven between 0.15m and 0.57m below the surface. The surviving stakes were roughly pointed roundwood, apart from 8152, which was a box-quartered stake chopped on all four sides to form a point. The stake holes contained the fragmentary remains of decomposed stakes.

Further Dumping

- 6.3.14 During the late medieval period, the site witnessed a widespread episode of dumping (7113), raising the ground level in the western part of the site to the same level as the east. The dumped deposits contained household waste, as shown by finds of butchered animal bone, cooking pots and jars dating to the 15th century and items of clothing: shoes, both adult and child's were present, preserved by the damp conditions. There was also evidence of industry; sawn antler and horn from cattle were both present. This deposit was sampled for evidence of diet and environment (Samples 1, 2 and 3). Towards the northwest of the trench was a shallow spread of yellowish brown clay with no cultural inclusions (7110). There was no clear local origin for this clay, and it is thought to have been imported onto site. To the east of the site, a small dump of gravelly clay (8113) represented redeposition of further household waste.
- 6.3.15 A number of peg roofing tiles and a brick were found in the dumping (7113 and 8113). This includes a peg tile in fabric 2276 which is characterised by fine moulding sand attached to the tile sides and base. These roof tiles, which first appear in London around 1480, have a widespread distribution in the London area and are frequently found on both secular and monastic sites.
- 6.3.16 The tiler or tileries making these roof tiles is presumably located somewhere close to London as is the brickyard which made the red brick (fabric 3033) found with the roofing material. This is clearly from a brick floor as the top surface is severely worn.

Tanning Pits

- 6.3.17 A large, almost square pit was excavated in the western part of the site (7118). It measured 2.66 m by 2.52 m, and the corners were fairly sharp. The west end of this pit was near vertical, the other edges closer to 60°, and the base was flat and slightly undulating. The pit was a maximum of 0.30 m deep. The fill (7117) was firmly compact brown silty clay, virtually stone free, and containing a high

- quantity of oak bark, occasional fragments of wood, sticks, bark fragments, and occasional bone and pottery. The pottery assemblage included jugs and jars dating to between 1400 and 1600, but the stratigraphy suggests a date towards the earlier part of the range. It seems likely that the pottery and bone were discarded at the end of the pit's use, since the finds were concentrated at the top of the fill.
- 6.3.18 A second pit was larger, measuring 4.80 m east-west by 1.85 m north-south (7133). Excavation was difficult due to rising groundwater, but the base was reached. The corners of this rectangular pit were rounded. The east end was vertical, the other sides sloping at 60°. The fill (7123) was dark reddish brown silty clay, with a high quantity of oak bark within it. Moderate quantities of twigs and woody material were present as well as small patches of clay. This may indicate an episode of deliberate backfilling, possibly using waste bark from tanning. The finds within included a little animal bone, pottery, roof tile, and a horseshoe. The pottery assemblage was dominated by early medieval sherds that may have come from backfilling the pit with silty clay from elsewhere on site. A late medieval date was apparent from later pottery within, dating to 1480-1540.
- 6.3.19 The presence of oak bark is clear evidence that the pits were used for tanning hides, and the pits may have held the hides for a year, possibly three, showing a permanence of activity. The finds are unlikely to represent the original function of the pit. The tile could have been dumped on the site, and included in a backfilling exercise. The horseshoe <20> is small (diameter 95mm) with the worn remains of five square or rectangular nail holes. Because of its size, the shape of its nail holes and its angular inner profile this horseshoe is probably medieval, but it is very worn.
- 6.3.20 Pottery within the fills included Rhenish stoneware and locally produced redwares. Also, a number of peg tiles were found in the tanning pits, some with brown and green glaze. These are all in London area fabrics (types 2271, 2586, 3216) suggesting they may have been brought from London tilemakers. The tiles may have covered some structure associated with the tanning process, possibly that represented by a line of four posts (6.3.21).

Line of Posts/ Shelter

- 6.3.21 A row of posts that ran at 90° to Highbridge Street was recorded to the east of the tanning pits. There were four posts (7124, 7126, 7128, and 7131) in total; any further posts lie beyond the limit of excavation. Each post was converted from straight-grained wood, and all were boxed heart converted with a square profile 0.28 m across. Each was driven square to the four-post alignment. These four posts are most likely the remnants of a building used by both tanners and leatherworkers plying their trade. Part of the tanning process requires work in the dry, and this is a good candidate for a possible shelter. Tiles within the associated pits may have derived from this structure's roof.

Leatherworking

- 6.3.22 In the top of both of the backfilled tanning pits were quantities of leather goods. These do not reflect the tanning activities, but more likely a second livelihood: the repair of leather items, and their salvage for reuse into different objects. The leather assemblage from the smaller pit includes shoes, off-cuts and parts of straps <11-15>. Three shoes have front-lacing fastenings, a form not thought to have been common until the later 14th century and into the 15th century. Both <13> and <14> have remains of the lace in situ, but are only represented by the front portion of the upper. These probably had separate quarters, which are now missing. The third example is torn around the top of the central throat but was probably also fastened with a lace. This shoe is interesting as most of the upper remains, and appears to be one-piece with part of a side seam remaining or possibly one-piece with a side insert (now missing). Apart from this last example, all the soles have fairly narrow waists and pointed toes, all worn through and most show signs of repair. There were also two narrow straps <11> and <12>, possible parts of a harness. Also present was a double sheet with two seamed edges and two torn edges; probably part of a garment or cover. In association with the leather was a bone needle or tool <2>, made from a naturally pointed pig fibula, worked to a sharper point with a possible eye at the top. It would have been too coarse to have been used for sewing in leather working, and may represent activities like netting and mesh knitting.
- 6.3.23 The leather from the larger pit included parts of an adult shoe and fragments from two others. All exhibited signs of repair, and it is tempting to ascribe a common user of both pits of this period. A copper alloy awl <18> with a diamond-profile is too large to be a cobbler's awl, more likely a borer for piercing leather.
- 6.3.24 All the leather goods were finished items which have been used (heavily so in some cases), many repaired, and then discarded. The closure of the pits may be a symptom of a change in land-use, since made ground was deposited in preparation for the establishment of a stone-floored house later in the 16th century (Building 1)

Cess Pit

- 6.3.25 A small, circular pit (7115) was excavated towards the northwest of the site. It contained no finds to indicate a date. The pit had a concave profile, and only a single fill (7114), which was mottled greenish brown silty clay with lenses of iron-pan. It was most likely a cess pit, and is stratigraphically level with the tanning pits, potentially used by the tanners.

6.4 POST-MEDIEVAL 1540-1770 (*Figures 9 and 10*)

General

- 6.4.1 After the closure of the tanning pits and the discard of leather objects into their tops, two stakes were driven into the fill of the square tanning pit (7118) and do not appear to be part of it. One (7122) had a rectangular profile and was 0.28 m long. The other (7121) had a diameter of 0.10 m and was 0.55 m long. Neither seemed integral to the pit, and were most likely driven after it was filled (not on plan).
- 6.4.2 The ground level across the whole site was increased by the dumping of several layers, raising the ground surface to 18.00 m OD in the west of the site, and to 18.27 m to the east. Silt containing a high quantity of shell (7111) characterised the made ground to the west; towards the centre of the site, three patches of stony clay (8181, 8185 and 8138) were dumped before the thickest deposit raising the ground level was added; a layer of clay (8105) 0.55m deep. This layer is made ground associated with Building 2 ('Context 8105'), and contained various roofing tiles probably brought in from the Abbey building. These included a peg tile with partly knife trimmed sides and base, and a ridge tile with a brown and black glaze covering most of the top surface.
- 6.4.3 This was in turn sealed by a widespread layer of dark brown sandy silt (8086), finds-free, and with high gravel content. Two thin lenses of slightly paler clay (8180 and 8183) overlay the main deposit of clay at the centre of the site. The pottery from these layers dates to between 1480 and 1600, but a deposition date soon after the Dissolution in 1540 is most likely, since four sections of Reigate stone from the Augustinian Abbey were within the made ground.
- 6.4.4 The ground was not raised to the south of the site, and this low-lying area became a shallow pool on the edge of the River Lea (7109). It was up to 0.51m deep, with a gently sloping edge and flat base. This pool gradually filled through alluvial deposition and deliberate dumping during the ensuing years, and was completely filled and compact by the early 18th century.
- 6.4.5 Three buildings were established atop the layers of made ground; Building 1 lay to the east of the site and became a workplace for horn-workers, and Buildings 2 and 3 were to the centre of the site, Building 3 subsidiary to Building 2.

Building 1 *Figure 9*

- 6.4.6 Building 1 was rectangular, fronting onto Highbridge Street, its rear wall 8m north of the pond, and was built partly using stonework robbed or purchased from the dissolved Abbey. Parts of the foundation were brick and tile, although it was not possible to determine whether these had also been part of the fabric of the Abbey.

- 6.4.7 The northern limit of the building lay beyond the limit of excavation, but three wall foundations and a cobbled flint floor were available for examination. Truncation by recent service trenches had removed the centre of this building; the surviving walls suggested a single room 4.26 m east-west and over 6.70 m north-south.
- 6.4.8 The floor of Building 1 (7100) was composed of mostly rounded flints, none larger than 0.12m, embedded in soft brown silt. There was no regular patterning to the stones; rather they seemed randomly laid except for a line of larger stones that ran east-west along the northern edge of a shallow gully within the floor surface. This gully, which lay 0.04 m lower than the rest of the floor, was probably a drainage channel. The whole floor sloped down slightly to the west, at an average height of 18.10 m OD.
- 6.4.9 The east, south and west foundations (7112, 7135 and 7136) were built of masonry, brick and roofing tile laid flat, with the majority of the Abbey masonry in the eastern foundation (7112). The stone from the dissolved Abbey included Reigate stone, Kentish Ragstone and Purbeck marble. Some 24 pieces of stone were used in the foundation, of which 11 were retained, by virtue of exhibiting architectural features. The remaining seven were plain. The masonry from the Abbey had been laid flat directly onto the underlying deposit (7111). A single large flint was incorporated into the foundation. It was unfaced, but could have been part of the Abbey, possibly in a wall core.
- 6.4.10 The presence of masonry derived from Waltham Abbey was to be expected, given the proximity of the Abbey precincts and this suggests that the building dates to soon after the Dissolution. Only the eastern wall and the beginning of the southern wall include stone, suggesting that the building was built using available, second-hand materials rather than being planned with forethought. The eastern side is closest to the Abbey, and the disparity of build is likely to be the result of insufficient stone available to finish the foundation.
- 6.4.11 During the mid 17th century, the floor surface of Building 1 was replaced, and raised by 0.20m, as evidenced by three deposited layers. The lowest was a deposit of dark brown sandy silt (7099) dating to 1580-1600. Sealing this was a deposit of silty sand (7021) which acted as a bedding layer for a dump of compact orange sandy gravel (7013), either a floor surface itself, or the bedding for one above that had been subsequently robbed. This floor surface was truncated when Building 1 was rebuilt in the 18th century.
- 6.4.12 Building 1 was used by horners removing cattle horn from the cores and then disposing the cores in the immediate area. Whether this work was conducted by the buildings first inhabitants cannot be determined, but certainly this was the case in the 18th century. There were two pits filled with horn cores, two spreads of dumped horn cores, and the fill of the pool also contained horn cores.

Hornering

- 6.4.13 The waste from hornering was first discarded into the pool to the rear of Building 1, as were sherds of pottery and butchered animal bone (7107). A total of seven horn cores from cattle were collected from a sample section through the pool. The pool was gradually filled and became solid ground by the 18th century.

Pit

- 6.4.14 A substantial oval pit (5005) was filled with horn cores and small quantities of domestic waste including pottery dating from 1630-1700. The feature measured 2.45m by 0.85m, and was 0.42m deep. The sides were steep and the base flat and it was filled with stony dark greyish brown silt (5004, 7116). The 76 cores within had been stripped of their horn; the most common specimens were partial frontal bones with the horn core attached. It was noted that there were no instances of both sides of the frontal bone being present. In all cases the skulls appeared to have been split along or close to the medial suture of the frontal bone. These had been laid in two parallel rows that ran the length of the feature. A deliberate arrangement of horns like this seems almost ritualistic, and, in a 17th century deposit, rather unlikely. The arrangement of horn cores is more likely functional, an efficient way to fill the pit rather than an irregular jumble that would take up more space. The points of the horns were on the outside of the pit, the larger parts towards the centre.

- 6.4.15 The fill also contained the earliest pantile found on the site. It is possible this slipped from the roof of Building 1. Pantiles were first brought in to London from the Netherlands around 1630 and were made Daniel Defoe's factory at Tilbury from 1694 or 1695. Defoe's pantiles are often cited as the earliest such tiles made in England but there is documentary evidence that pantiles were made by William Westby as early as 1636 (Smith 1996), presumably copying the newly arrived Dutch examples.

Dump

- 6.4.16 A dump of 11 cattle horn-cores (7103) was deposited onto the filled pool (7109). These were similar to the horn cores within the pit (5005), being partial frontal bones with the horn core attached. Fragments of domestic bowls and jars among the horn-cores indicate that this was not a purely industrial dump. A clay tobacco pipe from this deposit indicated a deposition date later than 1660-1680.
- 6.4.17 Within this dump, along with roofing tile and brick, was the only fragment of certain floor tile from the site. It is unglazed and has a distorted round nail hole about 1.5mm in diameter in the top corner. Such holes normally indicate a Low Countries origin, but the fine moulding sand and fine sandy fabric (type 3092) indicate it could be a more local London/Essex area product of 17th 19th century date.

Tree-pit

- 6.4.18 To the south of the site, a tree pit was identified (6019) during the evaluation. It had been backfilled with household waste, including pottery and six fragmentary horn-cores (6018). These are likely to be from the same source as the other horn-cores of this phase.

Pit

- 6.4.19 A small, round, vertically sided pit with a flat base (7106) was located to the south of the yard. It was 0.54m in diameter and 0.38m deep. It may have been a hole, but whatever its function, it was filled with brown sandy silt (7105) containing a high proportion of animal bone and no other finds. The cattle represented here stood 1.2-1.3m high at the shoulders, typical of the size range expected for the period.

Working Animal and Horse Furniture.

- 6.4.20 Within the pit lined with horncores (5005) were significant parts of a single male horse carcass from a mature individual with pathologies to the skull and spine. There is a healed fracture on the left nasal bone. The vertebrae also show some fusion in the lumbar region and bulges of extra bone. This may be a result of overloading as a pack animal or for traction, but is also a symptom of the condition known as 'Bamboo Spine'. The horse shows no sign of butchery. This is interesting because although horse flesh was generally not consumed, when a horse died the skin was often used for leather working. If this has been the case, some cut marks on the feet or the back of the skull would be expected. An examination of the incisors indicated a level of wear that is consistent with an age of 8-10 years. Analysis of the horse skeleton indicated a withers height of 14 hands (1.43m). A modern analogue for this size of animal would be one of the larger pony breeds such as the Highland pony or the Welsh Cob pony. These breeds are a suitable comparison in that this specimen was quite robust for its size and well muscled as indicated by the condition of the limb bone surfaces. The skull survives sufficiently well to get an idea of the facial profile which is convex rather than the concave shape seen in breeds with Arab and Thoroughbred blood.
- 6.4.21 At the same stratigraphic level as the horse carcass, on the surface of the dried pool (7092/ 7107), were pieces from the fittings of a carthorse and it is tempting to ascribe a common source. One object <16> was the remnants of a draft collar. One long side has a line of fine decorative stitching along its edge, and a line of larger more widely-spaced diagonal stitch holes just below it.
- 6.4.22 The major find was a cart saddle <17>. Saddles are designed to transfer loads on a horse's back away from its spine through upholstered pads known as *panels* on either side. Cart-saddles are worn only by the shaft horse(s) in a team, and bear the weight of the shafts, and in carts (i.e. two-wheeled vehicles) a proportion of the payload as this assists traction.

- 6.4.23 The essential parts of the cart-saddle are the rigid wooden saddle-tree which acts as a bridge across the horse's spine and as a point of attachment for boards and panels and for straps. The cart shafts are supported by a back-chain passed over a trough formed across the saddle-tree. In this case, the panels, probably textile, did not survive, and the wooden boards were fragmentary. Four straps radiate from beneath the centre of the tree. Two were simple girth straps broken off short, but a section of a decoratively stitched strap end also survived <10>, probably from the girth adjustment. It is also possible that a thin leather 'tube' which survives in fragments originally fitted around the girth strap and padded it for the horse's comfort. Two longitudinal straps are heavier in construction, being doubled and stitched over iron buckles. One would have buckled to the draught collar and the other to the crupper strap.
- 6.4.24 The housing is surprisingly elaborate, consisting originally of four stout leathers stitched as one and nailed around the upstanding part of the tree using brassed round-headed studs of 'upholstery' type. Where the leather is best preserved, it can be seen that the stitching had been prepared with a saddlers' harness awl of diamond section. Diamond-shaped holes produced a decorative stitch which lay neatly in the corner of the diamond and zigzagged between the closest corners of adjacent holes.
- 6.4.25 In general, the Waltham Abbey saddle has expensive stitching that is largely decorative, as were the brassed nails/studs around the tree. Its exact form may be of a previously unrecorded pattern. This saddle's careful finish, and the eye-catching brass studs nailed around the saddle-tree, confirms the considerable care and expense that might go into the appearance of draught horses in the later 17th century.

Building 2 (Figure 10)

- 6.4.26 Building 2 was located in the middle of the site, and would have fronted onto Highbridge Street. This building contained a complex arrangement of walls and fragmentary floors. Modern truncation had removed most of the east wall and the front wall lay beyond the northern limit of excavation. The building incorporated high quantities of worked stone reclaimed from the Abbey buildings. The foundations used the stone as wall cores, and were faced with brick.
- 6.4.27 The strongest element of this building was the chimney stack (8047 and 8051). Its foundations were 0.73m deep and consistently 0.50 m wide. It was built entirely from hand-made bricks, the largest 250 mm by 120 mm by 50 mm although shorter and deeper bricks were also present. Half bricks were also present, suggesting some reuse of materials. It was bonded with buff sandy mortar with notable flecks of lime. There was no cut for this structure apparent, rather the chimney stack was founded during the deposition of made ground (8105) and (8086), and is therefore contemporary. The chimney breast (8047 and 8051) faced north, and the surviving hearth area was composed of a mixture of half bricks and small pieces of Ragstone and Portland stone (8052). The surface of these had a

- skim of mortar surviving atop them, indicating that stone slabs may have been laid above to form the hearth.
- 6.4.28 The room served by the fireplace was of unknown dimensions. The north wall lay beyond the limit of excavation and the east wall was truncated by later foundations. A narrow foundation to the west of the fireplace (8078) was made of tile and mortar, the tiles measuring 195 mm by 180 mm and 15 mm thick. There were very few whole ones, adding weight to the suggestion that the majority of Building 2 was built with salvaged building materials. This was an internal partition rather than a load-bearing wall. No finished floor level survived and only a layer of compacted sandy clay 0.04 m thick (8080) was present. This was also seen beneath the bricks within the fireplace and is sub-floor made ground.
- 6.4.29 A second room in the northwest corner of Building 2 also lay mostly beyond the limit of excavation. The east wall of this room (8027) also formed the eastern wall of the building. The foundation courses were of tile, bonded with soft sandy mortar that had degraded. The southern wall (8025) was built of similar materials and was only 0.30 m wide suggesting that it was an internal partition rather than a supporting wall. There was a break in the build, as if the outer wall was an extension or later addition, but the most likely explanation for the break is likely to be prosaic, for example that it represents the end of a days building work. The floor consisted of a bedding layer of compacted silty clay (8031), (similar to 8080 in the northeastern room) with a tiled surface (8079) above. Whether either of the front rooms had further floor levels above the tile could not be determined.
- 6.4.30 A third room in the southwest of Building 2 had an internal partition and contained building elements that suggest a possible location for a kitchen. The external walls of the building (8027, 8070) were composed of tiles bonded by sandy mortar common to the majority of the build. The floor surface was also consistent with the rest of the building and was compact sandy clay (8030 and 8035) overlain by tiles (8029), although the latter did not survive in any great quantity. To the northeast of this room was a partition wall (8034), which was only 0.11m wide and enclosed a small, narrow area 2.80m by 0.80m. On the eastern side of this enclosed space was an area of well-made brickwork (8048, 8049 and 8050) that backed onto the chimney stack. It is possible that this was the location of an oven or perhaps a smaller fireplace, its flue feeding into the main chimney. There was the suggestion of a line of bricks (8066) that formed a threshold, but this was not definite. Part of the oven area is likely to have been a supporting wall for a floor above.
- 6.4.31 The rest of the external wall to the south was composed of a mass of masonry unlike any other building element on site. It was constructed with a stone core faced with brick (8011). The stone consisted of shafts from columns of Purbeck Marble derived from the Augustine Priory. These were of varying diameters, perhaps indicating that they were salvaged from different elements of the Priory.

- The lowest level of foundation, however, was constructed of tile laid flat (8071), as elsewhere in the building.
- 6.4.32 To the east of this was another room, and the eastern wall (8220) had been heavily truncated. This was also the eastern wall of Building 2. The floor surface was made of brick (8053) overlying compacted silty clay (8054).
- 6.4.33 Another small area of foundation (8058) was heavily truncated by concrete foundations for Government House. This was also part of Building 2, a possibly return of the eastern wall before it ran north again.
- 6.4.34 Building 2 also incorporated large size bricks reused from the Abbey buildings. These were used in the chimney stack (8051) and what may be an oven (8048) backing onto the chimney. These bricks are almost identical to bricks found during excavations at Cornmill Stream, Waltham Abbey and are very similar to others dated 1498 used in Grestingthorpe church tower in Essex.

Building 3 (*Figure 10*)

- 6.4.35 Building 3 was located to the rear of Building 2, and was a rectangular building with a single room, subsidiary to Building 2, and contemporary with it. It measured 6.92 m east-west by 5.7 m north-south and survived only at foundation level. Most of the southern wall had been truncated by the cut for drainage in the 18th century. The surviving foundation was established 0.20 m higher at the front of this building than the back; this seems unlikely to have been the topography when the building was founded, and more the result of later groundwork.
- 6.4.36 The foundation (8063) was composed of a maximum of three tile courses overlaid flat on half-bricks, suggesting that these materials had been re-used from a demolished structure. It had been truncated in places during its demolition but most of the footings survived (8082, 8083 and 8084). The bonding material was soft and degraded, being composed of sand with moderate lumps of lime. Within the foundations, a 'great brick' from the Abbey complex had been used, further evidence that the Abbey ruins were providing building materials for this phase of housing in Waltham Abbey.
- 6.4.37 There was no floor surface apparent, but a layer of silty clay resembling brickearth (8067) within the foundation formed a flat horizon, and was the base for a bedding layer of mortar up to 0.1 m thick (8085) for a floor surface.
- 6.4.38 After Buildings 2 and 3 were established, further deposits of brown silty clay (8073, 8086 and 8093) was added around them, raising the ground level by up to 0.15m, to approximate floor level.

Buildings 2 and 3 Construction

- 6.4.39 There was very little brick in the demolition horizon relating to Buildings 2 and 3; the majority of the building material collected was tile. It is most likely that the

houses were timber-framed, with sill beams atop the tile courses or lying atop low walls, and vertical posts and wall panels above. The best-surviving elements masonry elements were the central chimney-breast, the possible oven and part of the southern wall with its rubble core. The roofs would have been tiled. The number of storeys and the location of windows and doors could not be deduced from the surviving foundations.

- 6.4.40 Part of the floor of Building 2 was sealed by a compact spread of sandstone and flint (8060), which was a demolition deposit, since it sealed demolition material (8059). This suggests that there had been further masonry elements of the house.
- 6.4.41 Notable among scatters of demolition debris (8012, 8032, 8036, 8055, 8061, 8067 and 8072) in direct association with these foundations was the lack of ceramic building materials apart from roof tile. The most common building material represented was mortar and/or plaster. Although the lack of materials may suggest that they were salvaged for re-use, many brick fragments would be expected from the demolition of a brick building. It is, therefore more likely that Buildings 2 and 3 were timber-framed, with the sill beams resting on the tile courses described above. The date of demolition for Buildings 2 and 3 may be the 18th century, immediately prior to the construction of the Storekeeper's House and workers cottages.

Dumped deposits

- 6.4.42 During the later 18th century, the whole of the western part of the site, excepting Building 1, was sealed by a series of dumped deposits that raised the ground surface well above the water table. The most widespread of these was thick greyish brown silty clay (7134) that contained no finds, which was up to 0.51m thick. To the west, a layer of firm brown gravely sandy silt was deposited (7104) with fragments of pottery indicating a 17th century date. Also within the deposit was a post-medieval horseshoe <21> with rectangular nail-holes, and an arch stone from the Abbey. Further thin lenses of dumped sandy clay (7097) and sandy silt (7104) formed the ground surface when Buildings 4 and 5 (see below) were established. The latter of these resembled topsoil, possibly even a cultivated, garden soil.
- 6.4.43 One of the layers deposited to raise the ground level in the centre of the site after Buildings 1-3 went out of use included a small lens of redeposited cattle horn cores in poor condition (8159). This was not an individual cut feature but made ground, and may be a remnant of an earlier feature that had become redeposited. A single sherd of pottery indicated a date of 1600-1900.

6.5 POST-MEDIEVAL 1770-1820 (FIGURES 11-12)

General

- 6.5.1 The 18th century witnessed the foundation of more houses along the Highbridge Street frontage.

Building 4 (Figure 11)

- 6.5.2 Building 1 was rebuilt in the 18th century. The new building, Building 4, measured 4.26m wide and more than 7.5m north-south; its front (north) wall was beyond the limit of excavation. This construction used the east and west walls of Building 1 but the south wall (7026) was moved 1.20m southwards. The wall construction cuts (7025 filled by 7024, 7023 filled by 7093 and 7022, and 7090 filled by 7087) all yielded pottery with a date range of 1740-1880. All of the walls of this building were built of bricks that measured 220mm by 100mm by 60mm and were bonded with yellow, gritty mortar. The build was irregular, but this is thought to be due to the functional requirements of foundations. The uppermost surviving courses suggested that either 'English Garden Wall' or 'English Cross' bond was used.
- 6.5.3 There was a dividing wall across the property (7031), giving the rear room a north-south dimension of 4.00m (13 feet) by 4.26m (14 feet). In the centre of the north and south walls of this room were two short stub walls (7035 and 7074), which did not seem to have a function at this level, but may have been structural supports for a second floor above. Both the eastern wall (7018) and the western wall (7030/7034) showed signs of rebuild (7083 and 7018) at the junction with the partition wall, indicating that the partition post-dated the initial construction of Building 4. A small remnant of the sub-floor of the front room (7032) survived truncation by modern services. This consisted of sandy clay, with a thin layer of gravel (7033) above it. There was no evidence of a fireplace or chimney stack in the excavated area: if Building 4 had a chimney, then its location lay beyond the limit of excavation.

Building 5 (Figure 11)

- 6.5.4 Building 5 survived as the remains of a north-south wall and an associated brick floor with its bedding. Heavy truncation from service trenches, root disturbance and a later building episode had removed much of the masonry. It was adjacent to Building 4.
- 6.5.5 Only the western wall (7016/7076) survived within the excavated area, composed of similar bricks to those of Building 4. The rear wall was mostly truncated, but a return was evident (7082), indicating that the rear wall lay 0.34m further south than that of Building 4. The surviving floor (7012/7043) was made of bricks laid east-west, in rows off-set by half a brick laid on their beds on a thin skim of mortar (7011).

- 6.5.6 To the rear of these two buildings, the ground level had been raised by four separate dump deposits. The lower of these was sand, remarkably clean and with no coarse components or finds (7102), the second was a layer of very compact stony clay (7101), the third was fragments of tile (7091) and the fourth was a thin layer of medium sized gravel (7086). It became the bedding for a spread of rammed chalk (7027 and 7029). This supported a layer of gravel that only survived patchily (7028), but was solid enough to show that this had been a yard surface. The yard was external, and appears to have served both Buildings 4 and 5. The yard was bound by a wall to the west. No wall survived later intrusions to the south and east, but the patchily surviving wall (7049, 7036 and 7037) was built of bricks measuring 220mm by 100mm by 60mm, identical to those of the buildings. The mortar was greyish yellow, similar enough to indicate a concurrent date.
- 6.5.7 These may be the buildings shown on the 1825 Town map, but they are not shown in the same position on the map as they are on the ground. They may predate new housing erected for the workers at the Gunpowder factory (Buildings 6-10).
- 6.5.8 Buildings 4 and 5 do not align with any structures shown on the 1870 Ordnance Survey Map, and their demolition is represented by scatters of small pieces of building material (7017 and 7020). This occurred before the construction of Buildings 9 and 10, proved by construction cuts for these latter intruding on the earlier buildings. The date of their demolition is unknown, but could be either late 18th century, when Buildings 6, 7 and 8 were established, or it could be early 19th century, immediately prior to the construction of Buildings 9 and 10.

Pit

- 6.5.9 An oval pit (7120) to the rear of Building 4 measured 1.23m by 0.84m and had a rounded base. The fill (7119) was very dark brown silty clay that contained 25 cattle horn cores and pottery that indicated a late 18th century date of deposition. This included a teapot with a broken spout, designed by Wedgewood during 1759 <6>. This is a high status piece, and its presence in the waste from horn-working was unexpected. It has intrinsic and artistic value, being a famous design in the form of a cauliflower. Other finds in this deposit were a number of pig shoulder-blades that are likely to have been a preferred joint of meat, being from sub-adult animals.

Building 6 (The Storekeeper's House) (Figure 12)

- 6.5.10 Building 6, located in the northeast corner of the site is interpreted as the Storekeeper's house, the best surviving element of which was a cellar with a flagstone floor. The northern and eastern walls lay beyond the limits of excavation, but other external and internal walls were present. Some floors were of modern origin and were made of concrete. They may have replaced earlier, wooden floors, although there was no direct evidence of joist locations.

- 6.5.11 The cellar of the Storekeeper's house was located in the northwest corner of the building, a metre east of the outside wall (8222). It was founded within a cut (8194) into earlier made ground. The first elements of the foundation were made of timber: beneath the western cellar wall were four wooden battens each 0.10m square laid in a rough rectangle (8204). They were not jointed to one another but were in too poor condition to determine tool marks. Each came from a box-quartered timber, and it is possible that all were made from the same piece of wood. It was not clear if these had had a previous use.
- 6.5.12 Above the timbers, but largely resting on what had been medieval marshy deposits were three wide oak planks that supported the east, south and west walls of the cellar. Each of the three planks (8201, 8202 and 8203) lay flat; each was 0.38m wide and 0.05m thick and thought to be oak. The largest plank lay beneath the southern wall and was 4.41m long. None of the three planks survived in a condition to make retention viable. The walls atop the planking were also 0.38m wide, suitable for holding three storeys of brickwork above. The east wall (8193) survived to a height of 0.92m, whereas the western wall (8198) was only 0.33m high. The southern wall (8197) ran between the two, and was thicker, at 0.45m. The walls of this building were brick laid in 'English Cross' bond and bonded with hard, white, lime mortar.
- 6.5.13 The floor of the cellar was laid after the walls were built. There was a sub-floor made of bricks laid north-south on beds (8200), not mortared together, but making a fairly flat surface. These bricks had a skim of lime mortar above, which was the bedding for the floor. The floor was composed entirely of York stone flags (8199), regularly measuring 0.80m by 0.56m and 0.05m thick, laid in rows running north-south. Some smaller slabs were used to fit into corners and narrow areas. The stone was in poor condition, splitting horizontally into thin laminates, thought to be caused by the damp ground below.
- 6.5.14 The maximum surviving height of this cellar was 0.92m, and to be a useable room, it would have to be around 1.80m, putting the ceiling well above current street level. This is confirmed by the 1870 Ordnance Survey plan, that shows a short flight of steps between the back of the house and the garden, which must lead down from the room above the cellar.
- 6.5.15 The rest of the building was built on foundations up to 0.45m deep, although the internal walls and partitions had shallower footings. The western and southern walls of the Storekeeper's house were made of the same brickwork as the cellar, and also used very hard lime mortar for bonding. This indicates a single phase of construction for the exterior of the house.
- 6.5.16 The northeast corner of the Storekeeper's house featured a single room. Its full dimensions were not apparent in the excavations but cartographic evidence suggests that it may have measured c. 8m by 9m. Within the room were a series of low foundations oriented east-west, only 0.24m wide, standing two courses high

- and at intervals of 1.52m (5 feet). These would have supported joists upon which would have been floorboards.
- 6.5.17 Between the northeast room and the cellared area was a narrow room which must have been a hall, since it measured only 2.00m wide. Its eastern wall also formed the west wall of the northeast room (1003), and its western wall also formed the outside wall of the building (1013). At regular intervals within the hall were low foundations (1005) that are thought to have held joists, as seen in the northeast room. Within the hall area was a small area of flint with patchy mortar (1004) that was not seen elsewhere in the building, and is now assumed to have been dumped during construction, since the low foundations provided a base for a wooden floor. A possible sandstone door sill (1017) was incorporated into the north-south internal wall (1003), but there was no other evidence to suggest that this was a doorway, so this may have been a re-used piece.
- 6.5.18 South of the hall, and possibly still internal to the Storekeeper's house was a layer of concrete (1011) overlying a layer of rubble (1010). This is thought to be a modification of the floor, following removal of boards of the original build. There was no evidence of brickearth or mortar beddings for floors within the whole building, suggesting the use of joists and floorboards.
- 6.5.19 Brick samples from two walls (1/003 & 1/007) were dated to the 16th/17th century. However, given the stratigraphic sequence, the building was clearly late 18th century and the bricks must have been reused, possibly from any other structures on site. A late 19th century photograph of the rear of the Storekeeper's house shows it to have been a weatherboarded building, with at least two storeys. No examples of this weatherboarding were identified.
- 6.5.20 Running west from the cellared part of Building 6 was another foundation that butted up to its walls. The clearest surviving foundation (8043) ran west for 8.00m before turning south (8220). Both of the walls were made of bricks measuring 250mm by 140mm and only 5cm thick and were poorly bonded with yellow sandy mortar. These walls bound the area that includes a brick-built cess pit (8095) and a brick-lined soakaway (8022). This suggests a private yard or garden area, walled off from the public.
- 6.5.21 A path made from irregular slabs of limestone laid flat (8024) ran from the rear of the Storekeeper's house, oriented north-south. The stones terminated after 4.00m. This was clearly a garden path, of a style commonly called 'crazy paving'. Whether it was laid in the 20th century, or whether it was earlier, was not determined.
- 6.5.22 When the building went out of use, it was demolished, and appears to have been comprehensively stripped of its materials. Very little brick, tile or mortar was found in close association with the foundations, suggesting that the materials were

salvaged for re-use. If the superstructure were timber-framed and weatherboarded, there would have been little rubble created by its demolition.

Building 11 (Greenhouse)

- 6.5.23 A rectangular building (1025) with short internal supporting walls (2015) was located to the south of the Storekeeper's House. It featured a brick cistern (2014) and represents an extension to the Storekeeper's House, possibly a greenhouse, as illustrated on the Ordnance Survey Map (*Figure 4*). To the west of this building was a thick layer of humic sandy silt (8004), probably garden soil.

Buildings 7 & 8 (The Workers' Cottages) (Figures 12 and 15)

Building 7

- 6.5.24 The remains of this building are heavily truncated, both by a modern service (8216) and by salvage of many of its building materials. Two rooms were apparent, divided by a wall which may have held a fireplace.
- 6.5.25 Two sections of the east wall (8213 and 8221) and the west wall (8207) survived as a single course of bricks. The southern wall (8208) was represented by a single layer of tile laid flat, very similar to the construction of Building 3. These were roofing tiles, with two peg holes in the top edge. The southern room measured 3.20m east-west and 2.20m north-south. No evidence of a doorway was apparent, although there may have been access alongside the possible chimney stack. The floor of the southern room was composed of bricks laid atop a spread of mortar (8209). The bricks were laid forming a pattern, represented by two areas. One (8210) was oriented north-south, the other (8214) oriented northeast-southwest. Both of the patches are considered contemporary, suggesting a decorative floor. There was the remnant of a brick drain (8217) to the south.
- 6.5.26 The northern room of the building was 4.51m wide, and the east wall here (8221) also formed the west wall of Building 8, suggesting they were built in a single action. A securely mortared arrangement of bricks (8211) formed a probable fireplace. Only a mortar sub-floor (8212) was apparent within the fireplace and it may be that the floor here was constructed of slabs, since no floor level survived. North of the fireplace, the surviving sub-floor was brickearth (8219).
- 6.5.27 Beneath the fireplace was a drain of brick and stone, running east-west. The function of this drain was unclear, since its ingress and egress points were both truncated.

Building 8

- 6.5.28 To the east of Building 7 were fragmentary foundations that represented another individual structure. Its demolition horizon (8062) of brick fragments and mortar showed most building material was salvaged. Large parts of the northern part of the building had been removed by 19th and 20th century building processes.

- 6.5.29 The elements of this building included bricks laid flat to form the southern wall foundation (8042), the northern face of which seemed to be a separate build (8044). The bonding material varied from sandy clay to pale grey coarse mortar. It had been heavily truncated during its demolition, becoming very fragmentary to the east (8045); there was little more than a stain upon the underlying clay deposit. The western wall was shared with Building 7 (8221).
- 6.5.30 To the north of this foundation were two spreads of mortar, (8046 and 8089) thought to represent the remains of a floor surface. The demolition horizon of this building appeared truncated, the largest patches being a spread of off-white mortar (8092) and two stones (8090) that suggested that there may have been a stone element to the building.
- 6.5.31 Within the probable limits of the building was another foundation, the function of which was unclear (8094 and 8091). It was an area of half-bricks which had been disturbed during the demolition, and may have been the location of a chimney stack, as suggested by its form.

Drainage

- 6.5.32 Building 6 was served by a brick drain (8008) with a circular profile and an internal diameter of 0.26m that fed into a soakaway in the centre of site. It was laid within a wide cut (8207), which had truncated some of the foundations of Building 3. At two locations, the drain was fed by shallow tile and brick channels that directed overflow from two brick-built cess pits or septic tanks (8006 and 8095). The channels had tile bases and a three-course brick surround. They fed into the main drain through a hole in the top the size of a single brick. One of the channels was behind Building 8 (8104), the other may have related to Building 7 (8007).
- 6.5.33 One of these brick tanks (8006) was part-excavated in order to determine its date. It was mostly built of re-used half bricks, but occasional whole ones were present, measuring 230mm by 100mm by 70mm, suggesting an 18th century date of manufacture. Finds from the fill dated to 1825-1900, showing that this went out of use at the end of the 19th century.
- 6.5.34 The other brick tank (8095) had an underground pit with brick sides and a brick base that was oriented east west. It was rectangular with a curved western end and measured 3.30m by 1.25m.
- 6.5.35 West of Building 7 was a soakaway (8075) measuring 1.10m by 0.70m. The base of the cut (8077) was beyond the limit of excavation, so the depth was not known. It had a domed brick roof that had collapsed, and its feeder pipe was not located, cut away by later foundations.
- 6.5.36 South of Building 8 was a circular, brick lined pit of 1.55m diameter (8022). The bricks were in poor condition, most likely caused by damp conditions, and

measured 230mm by 100mm by 60mm. The full depth of the pit could not be determined, since it continued lower than the deepest excavated level. The diameter seems too large for a well, so it is thought to be another soakaway.

Garden Features

- 6.5.37 The 1870 Ordnance Survey map shows gardens to the south and southwest of Buildings 6, 7 and 8. A number of features were excavated that most likely represent these gardens. One such feature was a rectangular planting pit (8111), measuring 0.74m by 0.46m and 0.26m deep. It had steep sides and a flat base and three distinct fills. The lowest of these was yellowish green sandy clay (8110) and set into the centre was a secondary deposit of clay (8112), seemingly deliberately placed, perhaps part of the root ball of an exotic shrub. The top fill was compact and stony (8109), and was felt to be a consolidation deposit.
- 6.5.38 A triangular cut (8038) measuring 0.90m by 1.00m was filled by very dark grey humic sandy silt (8037) that was probably the remains of either an individual planting pit or a flower bed.
- 6.5.39 Another small, circular deposit of pale grey silt (8033) measuring 0.50m diameter and containing no finds was also interpreted as the base of a garden planting.
- 6.5.40 A number of small features filled with very dark brown sandy silt were identified intruding into the surfaces of Buildings 3 and 4. Two of these were excavated and proved to be garden features. One was a small square planting pit (7085, filled by 7084); the other was rectangular (7079, filled by 7078).
- 6.5.41 To the west of building four was a buried wooden box (5007). It had been buried in a cut (5009) through the topsoil (7104). It was well-preserved by the damp environment on site, but was not collected due to localized pollution. The box was constructed from small sawn planks 0.60m long, 0.06m wide and 0.04m thick, set vertically on the east and west sides and horizontally north and south. The corner joints appeared to be nailed and presumably the planks had tongue and groove edges. The box had an upper fill of compact brownish grey silty clay with small pea gravel (5006), 0.28m thick and with finds of 18th century pottery. A lower fill of firm humic black/brown mottled silt (5010) was reached but not excavated due to the upwelling of polluted ground water. This box is likely to have held an ornamental planting.

6.6 POST-MEDIEVAL 1820-1945 (Figure 13)

Building 9

- 6.6.1 Three sides of Building 9 were recorded on the eastern edge of Trench 7. These cut the metalled yard surface (7028) of the previous phase. The construction cut (7052) also removed a large portion of the rear wall of Building 5. The structure formed a space 3.7m north-south and greater than 2.00m east-west. The building continued east beyond the limit of excavation, and was not seen in Trench 8, four metres to the east. The bricks of the wall (7045 and 7046) measured 230mm by 110mm by 65mm, and were frogged, unlike the bricks of the earlier buildings. The building had been demolished into itself (7047). This building is shown on the 1870 Ordnance Survey Map as part of a range of buildings beyond the perimeter of the Storekeepers' Garden.

Building 10

- 6.6.2 Three wall foundations that ran north-south and a fragmentary east-west foundation were recorded at the southern edge of Trench 7. These are likely to be part of the same structure and have the same orientation as Building 9, suggesting that they are contemporary. The foundations survived for two courses, and consisted of assorted red and yellow bricks, suggesting re-use of some materials. The westernmost foundation (7041/7042) was built within a cut (7089 filled by 7088), as was the central foundation (7060/7061), the cut of which (7064) was filled with dark brown sandy silt (7063) and contained finds of varying date, including part of a razor <19>. The northern wall foundation was composed of various unmortared bricks laid on edge (7059), and bricks bonded by cement (7053 and 7058). The eastern wall was the most substantial, with footings (7055) 0.17m deeper than the rest of the building. The bricks atop this (7054) were a mixture of frogged and unfrogged, indicative of re-use of materials. Within these walls, a compact layer of gravel (7040) was recorded and this may have been a floor surface.
- 6.6.3 The precise layout of this late structure was unclear. A short stub wall was located less than a metre inside the eastern limit of the building (7057) and this may have been an internal floor support. A dump of four worked stones (7056) lay between this foundation and the outside wall. These had no architectural features and are considered to have been dumped during a demolition phase.
- 6.6.4 A late 19th century date seems most likely for Buildings 9 and 10, since there are structures apparent on the 1870 Ordnance Survey Map. They are not of the same date as Buildings 6, 7 and 8, but may be part of an ongoing building programme for workers at the Gunpowder factory.

Building 12

- 6.6.5 Further made ground was added to the west of Trench 7. Three deposits were identified; clay, with some tile fragments (7096), loose grey sandy silt (7098) and compact brown sandy clay (7095). These were thin deposits of low archaeological

significance. Foundations and services were cut into these. Three shallow wall foundations survived, two ran north-south (7070 and 7071/7072), and a third east-west (7065/7069). Within the bounds of the foundations, five York Stone paving slabs had been laid (7068). This appears to be between two structures shown on the 1870 Ordnance Survey map, so the slabs represent an access point to the rear. Further parts of the associated buildings were not apparent. A small tree-pit had slightly disturbed the remains (7067 filled by 7066). To the south and west of the slabs was a compact gravel surface (7073), apparently contemporary with the slabs. This had been heavily truncated elsewhere by groundwork associated with modern concrete.

- 6.6.6 In the 20th century, Buildings 7 and 8 were demolished, making way for Government House. Following their demolition, general clearance and levelling was undertaken, as shown by widespread deposits of mixed sandy clay silt (8009), a layer of pebbles (8015), and a scatter of oyster shell that may once have been a midden (8041) and a dump of tile fragments (8014).

6.7 MODERN, 1945-1998

General

- 6.7.1 Buildings 9 and 10 were demolished in the mid-20th century. Those building materials not salvaged for re-use were scattered over the foundations and the site was levelled (7003, 7004, 7005, 7006, 7007 and 7008). Few finds were present, the most common being pottery and clay pipes of a 19th or 20th century date. Other parts of Buildings 5, 9 and 10 were heavily disturbed by the roots of trees that had grown to maturity (7014 and 7044).
- 6.7.2 The surviving parts of Buildings 4, 5, 9, and 10 were all truncated by substantial drainage pipes laid in the 20th century (7010). All truncations by services were given a single number for identification, as was the fill (7009).
- 6.7.3 The southern part of the site contained a layer of cinders up to 0.40m thick, lensing out northwards (7002). This was thought to be a relatively modern deposit, associated with a reported iron-works that may have temporarily used the site. This was also seen in the area of the Watching Brief.

Building 13 (Government House) (*Figure 14*)

- 6.7.4 A huge strip of concrete, over 1.80m thick, formed the foundation for Government House, built during the 1950s. It had cut through stratigraphy of each phase identified on site, and had to be removed to enable the foundations of the new building to be piled. Removal of this was archaeologically monitored. It overlay the locations of Buildings 7 and 8, and was an extension of the former Storekeeper's House.
- 6.7.5 Services for Government House were numerous, and had disturbed or partially removed elements of the post-medieval archaeological sequence. All Government House services were given the same number for the cut (8057) and its fill (8056). These removed parts of Buildings 2 and 3. To the west of the site, a major east-west drain had cut through Buildings 4, 5, 9 and 10 (7010).
- 6.7.6 The Drill Hall, reported to have been to the west of the site, left no archaeological record, so may have been a relatively light building, with little in the way of permanent foundations.
- 6.7.7 The Drill Hall and Government House were demolished in the late 20th century. The rubble generated was compacted and reworked into the previous demolition horizon (8003). This layer was very mixed, and included clay pipes from the 17th to the 19th centuries. Above this, a layer of brick rubble (8002) was spread with occasional concentrations of broken-up tarmac (8184) that provided a solid base for concrete laid as hard standing (8001).

Over the top of all the demolition material and made ground was a layer of material (7062 and 8002) deposited to provide a level surface prior to the laying

of concrete (7001 and 8001) for a car-park, the last use of the site before the current development. The demolition horizon (8003) and brick rubble (8002) were considered contaminated (*Vertace 2003*), and spread from the edge of the excavated trenches towards the south of the site. This was removed and replaced with uncontaminated soil. No further archaeological features were observed during the removal of this deposit.

7 FINDS

7.1 POTTERY (FIGURE 16)

- 7.1.1 In all, 1291 sherds of pottery were found. Two of these were Roman, residual among later deposits. The medieval pottery numbered 577 sherds, and the post-medieval 617 sherds. All the pottery was identified to fabric and origin. Sherds from each different vessel were then individually recorded by sherd count and minimum vessel count (ENV) on an Excel spreadsheet using Museum of London fabric and form codes and the local type series where applicable. The post-Roman assemblages were then considered in relation to the stratigraphy, as understood from the site matrices.
- 7.1.2 There is a small assemblage of early medieval/ Saxo-Norman coarse shell or quartz -tempered hand-built cooking pots. The majority of the assemblage is of late 11th to early 13th-century date, as indicated by the presence of coarsewares in the form of cooking pots and decorated jugs of 12th to early 13th century London type ware, Mill Green ware and Hedingham ware. The absence of highly decorated jugs in London type ware indicates that the medieval assemblage predates the mid 13th century. A small late medieval assemblage is also represented by 14th and early 15th century jugs with slip painted decoration.
- 7.1.3 The post-medieval assemblage is primarily associated with 32 deposits. Within these some can be distinguished as earlier; there is a concentration from the 15th to 16th centuries and another group can be closely dated as 17th century. The remaining post-medieval contexts date from the late 18th and early 19th centuries but contain a considerable quantity of residual early post-medieval material. Cross-joins in residual 17th century material have been noted in early 19th century Contexts showing some degree of disturbance of earlier stratigraphy in the early 19th century.
- 7.1.4 This assemblage is significant for Waltham Abbey as it contains a range of local and imported wares which extend from the Saxo-Norman to post-medieval period. Unfortunately there is little evidence of medieval building on this site to accompany the assemblage which is primarily associated with pits, cesspits and industrial activity such as leather working or horn-working. The assemblage appears to relate to wasteland and not to building plots which might indicate patterns of street development within the area but the variety and range of wares, extending over such a long period, indicates that this is the waste of nearby domestic occupation. The composition of this assemblage compares well with other excavated sites within Waltham Abbey and it would appear to be as large and diverse a range of medieval material as have previously been published from medieval sites within the town.

7.2 CERAMIC BUILDING MATERIALS

- 7.2.1 The site produced a considerable number of bricks and roofing tiles, principally peg tiles with small amounts of other types. Roman, medieval and post-medieval material is present.
- 7.2.2 The Roman material is residual but suggests some sort of Roman occupation in the area, although it may represent material brought in for reuse at the Abbey. Some of the medieval bricks and roofing tile represent the remains of Waltham Abbey. The post-medieval roofing tile and brick comes from the building developments on the site from the 16-19th centuries.

7.3 MASONRY (FIGURES 17-20)

- 7.3.1 Stonework from the Augustinian monastery is commonly found in town excavations at Waltham Abbey. The stone collected from the present excavations, after broken pieces had been reassembled, amounted to 33 pieces from eight contexts. There was Reigate stone, polished Purbeck Marble, Kentish Ragstone, and Caen stone. The stonework from the site has added significantly to the corpus of such material which derived from the Augustinian Priory, later Abbey. Some items can be attributed to one or the other phases of construction. Some pieces yield new information, others can be paralleled with earlier discoveries.

7.4 ANIMAL BONE

- 7.4.1 All the contexts containing animal bone are dated to the medieval and post medieval periods. Generally the material was in good condition. The assemblage weighed a total of 11.6kg, comprising 1177 bones in 1541 fragments. The material was examined by context and the details of the species and elements present recorded in a database. Some additional information was recorded as the assemblage was so rich in horn cores. The number of horn cores and horn core fragments was noted: this information is useful not just for measurement but also for ageing, sexing and identifying breeds.
- 7.4.2 A range of species has been identified from the various phases of occupation at the site. The main domesticates cattle, horse, sheep/goat and pig, are present throughout. Wild species are present but only in small numbers. There was a broad diet in the medieval period with three bird species identified, chicken, goose and duck. The presence of red deer, in the form of a sawn antler fragment, is more indicative of antler working than the consumption of venison.
- 7.4.3 The early post-medieval phases are mainly of interest as they cover periods of transition. However the animal bone samples from these phases are rather small. The main domestic species are present. No wild taxa were found in the contexts from these phases. The age at death of the specimen and the limited range of body parts present suggest that these animals were not kept or reared on site and that this is largely domestic waste.

7.4.4 The post-medieval material is the most interesting part of the assemblage and is largely industrial rather than domestic waste. The large quantities of cattle horn core and skull fragments point towards hornering. The presence of a single mostly complete horse skeleton is of interest, firstly as an example of a working horse of the period with sufficient long bones to estimate a withers height of 14 hands. In addition it also shows pathological changes in the bone at two locations, a healed fracture in the nasal bone of the skull from a facial injury and the fusion of several lumbar vertebrae just above the sacrum. This damage is thought more likely to be the result of hard work rather than a congenital deformity.

7.4.5 None of the cattle horn cores with skull still attached show both sides of the frontal bone of the skull. This may be the result of processes connected with the removal of the horn sheath. In order to separate the horn sheath from the horn core the material was left for the soft parts to rot or sometimes soaked. Alternatively the presence of the horn cores may relate to their reuse as packing in the pits. Horn core has been identified as a building material in its own right, rather than just waste from hornering. In addition to information on industrial processes horn cores also offer a unique window into the population structure of the post medieval cattle herds.

7.5 LEATHER (FIGURES 22-26)

7.5.1 All the leather dates to the medieval and post-medieval periods and the assemblage consists of 40 shoe parts, 3 straps, a possible horse collar and a smaller quantity of other leather. All the shoes are of turn-shoe construction, and many are worn, sometimes heavily. Parts of five shoes are illustrated and presented within the full appendix.

7.5.2 The most interesting object is a cart saddle, a composite item of wood, metal and leather with iron fittings and associated leather straps and leather sheet fragments; it was deposited during the late 17th century, but may be of earlier date. Approximately 60% of the saddle survives.

7.5.3 The assemblage of leather is of important local significance and will add greatly to the existing knowledge of shoes and other leather artefacts from Waltham Abbey.

7.6 GLASS

7.6.1 There were 78 sherds of glass collected from the excavations, the majority from wine bottles from 1700-1900 and tonic bottles from the late 19th century. A single piece of medieval painted glass is thought to have derived from Waltham Abbey. It predates the Dissolution, and may indicate repairs and subsequent distribution of glass fragments around the town.

7.7 CLAY TOBACCO PIPE

7.7.1 A surprisingly low number of pipes were collected, given the continual occupation of the site since the 16th century. The clay pipes do not contribute

greatly to the interpretation of the site, most examples of bowls being residual in later features.

7.8 METAL

7.8.1 Objects of iron and copper were collected during the excavation. Iron nails were the most common object, followed by copper objects, then iron objects. Metal finds of intrinsic or historical interest were registered. The most interesting pieces were a copper alloy piercing tool, a copper alloy buckle and an iron horseshoe of medieval date. One copper brooch was plated with gold <3> and may have some connection with the Abbey.

7.9 REGISTERED FINDS (FIGURES 21-26)

7.9.1 A table of registered finds is presented below. They include examples from all of the main types of material category found on other sites in Waltham Abbey. Although the objects are of limited value, they can inform regarding the social status of the people occupying the site; the buckle and leather show aspects of clothing, the leather working, piercing tools and hones show aspects of occupation, while the horseshoe and harness straps indicate exploitation of horses as working animals.

SF Number	Context	Material	Object	Period
1	7005	Cu alloy	Coin/ token	Post med
2	7117	Bone	needle	med
3	8116	Cu ally, Au	brooch	med
4	8105	Cu alloy	button	C20th
5	8139	Cu alloy	buckle	med
6	7119	pottery	teapot	Post med
7	8124	stone	hone	med
8	8131	stone	hone	med
9	8190	stone	hone	med
10	7107	leather	strap	Post med
11	7117	Leather	Strap	Med
12	7117	Leather	Strap	Med
13	7117	Leather	Shoe	Med
14	7117	Leather	Shoe	Med
15	7117	Leather	sheet	med
16	7107	leather	collar	Post med
17	7092	composite	saddle	med
18	7123	Cu alloy	Piercing tool	med
19	7063	Cu alloy	object	Post med
20	7123	iron	horseshoe	med
21	7104	Iron	horseshoe	Post med
22	7132	metal	object	med
23	7113	leather	shoe	med
24	8116	glass	window	med
25	7117	leather	shoe	Med
26	7117	leather	shoe	Med

8 RESEARCH CONCLUSIONS

8.1 MEDIEVAL OCCUPATION OR LAND USE.

- 8.1.1 Prior to any activity on site, the site had been marshland at 17.10m OD, a damp fringe of the Old River Lea and part of the marshy floodplain that stretches west to Cheshunt. Waltham Abbey is likely to have been accessed from the west by a bridge over the Lea since the Bronze Age, and Highbridge Street may have prehistoric origins (*ECC 1999b*). Saxon and medieval Waltham Abbey was built east of the Lea upon a gravel terrace, higher ground to the east. While the site was marshy, good for neither crops nor pasture, dumps of domestic waste from the town were added, raising the ground level by 0.40m. This dumped material is thought to be redeposited from middens and cesspits, and reveals some evidence of the townspeople's diet, economy and trading links.
- 8.1.2 The site appears to have been partially embanked during the 13th century; and had ceased being so marshy, but still prone to seasonal flooding. Deposits of household waste continued to be dumped during the 14th century, also thought to derive from midden clearance from across the river. By the end of the 14th century, however, the site began to be occupied, although no dwellings appear to have been built until the 16th century.
- 8.1.3 During the site's first occupancy, a post-built structure was built, at 90 degrees to Highbridge Street, with a layer of pebbles and smaller gravel forming a working surface. The structure had a single row of posts and is thought to have been little more than a covered shelter, although possibly with a tiled roof. The shelter is considered part of the first evidence of low-level industrial activity on site. The river would have been a useful source of water for medieval industries, so this site would have been ideal.
- 8.1.4 One rectangular pit between the shelter and the river was used for one specific industry. It was filled with oak bark, and despite the lack of leather goods, is considered a tanning pit. The pit also included a perforated hone, possibly worn around the neck or from a belt, and a second hone was found upon the gravel working surface. It is likely that these two hones were used by the tanner for sharpening tools. A third hone was collected from one of two backfilled cesspits. It seems likely that the cesspits are contemporary with the tanner's shelter.
- 8.1.5 A possible reference to the site from 1402, in a document regarding houses on the Marsh Bank opposite, identifies the land as occupied by '*Mr Hale, fellmonger and wool dealer*'. This documentary record adds weight to the idea of the use of the site as an industrial area as early as the 14th century. Further features of this date are thought to lie beyond the limit of excavation.
- 8.1.6 A heavily truncated ditch to the south west of the shelter may be evidence of division of the site into separate properties, but with a length of only 2.14m seen, interpretation is limited.

8.2 MEDIEVAL STRUCTURES IN THE AREA.

- 8.2.1 The only medieval structure on site was built of timber; a shelter with a possible tiled roof. Four posts at regular intervals formed a structure over 5m long, the posts along the central axis. The posts were associated with a surface of compacted pebbles and gravel 2.80m wide, suggesting a possible width of the building. There was no evidence for walls, suggesting that this was an open-sided building. The evidence for the roofing material is the presence of unglazed peg tiles upon the compacted gravel surface.
- 8.2.2 Towards the centre of site, a single massive post was established, supported by packing stones. As much as 0.68m of the post lay below the contemporary ground surface, suggesting a height of 2.00m or more for the post when erected. With no other posts in association or of this size on site, its function remains unproven, but it could relate to the tannery in some way.

8.3 POST-MEDIEVAL OCCUPATION AND LAND-USE.

- 8.3.1 The site in the post-medieval period seems to have been partitioned into two messuages. There are changes in occupation, but much of the land-use is similar to that of the medieval period. Until the middle of the 16th century, tanning and leatherworking was carried out, but by the 17th century, there was more diversification.
- 8.3.2 It seems that tanning was still continuing in the 16th century, with subsidiary occupations being conducted at the same time. These other occupations included leather working and reworking, and net-making, as shown by the piercing tool and bone needle. The concentration of features is to the west of site, which may represent a kind of rotation of land-use, leaving previous tanning pits to consolidate, and moving across site when excavating new ones. This does suggest that the whole of the site was under single ownership, but more features may lie beyond the footprint of the new development which can reveal more information.
- 8.3.3 Two tanning pits were recorded dating to the early post-medieval period; certainly they were infilled in the mid 16th century. The fills of the pits were, as in the medieval phase, dominated by shredded oak-bark, but it is the backfilled material that reveals other occupations carried out on the site. The most common find in the filled pits were leather goods: shoes, straps, part of a garment and part of a harness. All of these items had been repaired, heavily in some cases, so it is likely that one occupation was the salvage and repair of leather. A small awl from one of the pits is either a cobbler's awl, or a borer for piercing leather, suggesting that leather items were worked upon, rather than just dumped. Another small find, a bone needle, is suitable for mesh or net-making. A single cesspit between the pits and Highbridge Street was also recorded, suggesting semi-permanent occupation, yet no direct residence. There was a post-built structure in association with these pits, thought to be similar to that erected during the medieval period to the east.

- 8.3.4 All these finds suggest that there were tanners on site who turned their hand to other tasks: tanning a hide can take a year, so income and employment would be required during the year of waiting, thus the collection of leather and the tools. The tanning industry can result in unpleasant odours and by-products, so it is to be expected that this type of industrial activity was kept away from the town centre, despite the prevailing west wind.
- 8.3.5 In the late 16th century, the ground adjacent to the street was made up by approximately one metre, forming solid ground which was to witness the first permanent buildings on site. The river still inundated the site, as shown by a pool to the south, the northern edge formed by the dumped deposits, the southern edge being the Lea. This pool was gradually filled, and eventually dried and was consolidated by the end of the 18th century. The industrial evidence for the site's use in the 17th and 18th centuries is dominated by horn-working, with the discarded material, in the form of horncores, being buried on site. Whether actual finished items were made on site, or whether the raw materials were simply separated was not determined during the excavation
- 8.3.6 Industrial activity was still being undertaken after the raising of the ground, and only ceased when Newell Connop Junior lost his tannery to Government purchase in 1816. The latest archaeological evidence for industrial use of the site is late 18th century, when all features are sealed by further made ground. However, when the site was conveyed in 1816, it was described as '*a freehold messuage or tenement with the tan yard, vats, sheds buildings etc late in the occupation of Edward Valentine Clayson*'. Clearly, although the tanning and other industrial features had gone from the area of excavation by c.1775, the site was still being used. This evidence is likely to survive in the southern part of the site.
- 8.3.7 In the late 18th and 19th centuries, housing for the workers at the Gunpowder factory were constructed, and the rear of the properties appear to have been either unused or given over to leisure. One sale from 1816 records the '*garden of Mrs Dorothy Jessop widow*' and this is likely to be the garden area shown on the 1870 Ordnance Survey Map.

8.4 POST-MEDIEVAL STRUCTURES IN THE AREA.

- 8.4.1 The site in the post-medieval period seems to have been partitioned into two messuages: the western messuage saw the construction of Building 1, superseded by Buildings 4 and 5; the range extended by Buildings 9 and 10. To the east, Buildings 2 and 3 were established. These were demolished and houses erected for the workers at the gunpowder factory, a range that included the Storekeeper's house. These were largely demolished after the Second World War, and a Drill Hall for cadets was erected. The Storekeeper's House was also modified.
- 8.4.2 The earliest post-medieval structure was post-built, and is thought to be a shelter for tanners and leather-workers. Four posts were recorded, forming the central axis of the building, and it may have had a tiled roof. The tiles post-date 1630, but

- may represent a repair or modification. This shelter may have been established in the medieval period, but continued in use.
- 8.4.3 The first masonry structures were based on the made ground at the northern edge of site, and stood near the edge of the pool formed at the south of site, while fronting onto Highbridge Street. Building 1, to the west, incorporated stone and tile from the Abbey buildings, and therefore post-dated the Dissolution of the Abbey and subsequent sale of building materials. This building was used by hornworkers, but whether as a residence, workshop, or both cannot be determined.
- 8.4.4 Building 2 was based around a central chimney with a possible oven to its rear, and four rooms; two to the front, two to the rear. The wall foundations were tile, and are thought to have held sill beams for a timber-framed structure above. There was very little brick in the demolition horizon of this building, suggesting a timber frame. Building 3, to its rear, was unpartitioned, and may have been a work shop. No flooring materials survived in Buildings 2 or 3 to indicate the function of any of the rooms, but the bill of release from 1816 indicates that there had been a '*stable yard and appurtenances*' on the site. Possibly, Building 3 was a stable.
- 8.4.5 It seems likely that the site had been split into two messuages or tenements before these houses were built, although no property boundary was identified during excavation.
- 8.4.6 Building 1 was rebuilt in the latter part of the 18th century, probably around 1775, and became a two-room cottage (Building 4). To its east was a less substantial building with a brick floor that may be considered subsidiary to Building 4 (Building 5), perhaps little more than an outhouse. Building 4 is thought to have been timber framed, as indicated by one definite and two possible locations for upright posts. At the same time, a wall was built to the rear of the properties, enclosing a gravel yard based upon a rammed chalk bedding layer.
- 8.4.7 This cottage and outhouse were conveyed in 1816 when the Government purchased them from Newell Connop Junior for workers at the Gunpowder factory. The range of buildings was extended during the 19th century, with two separate structures (Buildings 9 and 10) built to the rear. Another structure, which had been heavily truncated by the construction of the Drill Hall after 1945, left very scant traces (Building 12). These are shown on the 1826 Town Map and the 1870 Ordnance Survey Map.
- 8.4.8 Buildings 2 and 3 were demolished before 1816, as indicated by the 1816 sales, since there is a reference to a newly erected messuage tenement and Office. They were replaced by two cottages, Buildings 7 and 8. If there were further cottages along the street front to the west, apart from Buildings 4 and 5, they left no evidence in the archaeological record. Buildings 7 and 8 were both built with

shallow foundations. Their demolition was thorough, with very little of their foundations surviving.

- 8.4.9 The grandest structure on site was the Storekeeper's House, adjacent to the river to the east of the site, and butted by Building 7. It replaced an earlier building that was used as offices, perhaps for an official at the Royal Gunpowder Factory, since the new building, Building 6, was occupied by the Storekeeper, identified as Henry Seymour Matthews. The Storekeeper's House had a cellar, was three storeys high, and had a garden area that included a greenhouse. Two photographs of the rear of the house that survive show it to be weatherboarded. (Figures 4 and 5)

8.5 THE POPULATION OF POST-MEDIEVAL CATTLE HERDS

- 8.5.1 A large number of cattle horncores were recovered from contexts in dating from 1540-1770. Many were sufficiently complete to be aged. All of the specimens were only one side never both, thus totals have to be calculated separately for right and left sides to avoid duplication. Young adult and adult cattle were the most common providers of the horn core, although individuals of all ages were present.
- 8.5.2 The presence of a large number of horncores enables the identification of specimens as male female or oxen (castrated male). Wherever possible the sex of specimen was established, and all three sexes were present.

8.6 THE NATURE AND PATHOLOGY OF THE HORSE SKELETON

- 8.6.1 The horse bones and teeth from derive from a single individual thus dental and fusion methods of ageing can be combined. The only unfused element was a thoracic vertebra with the caudal epiphysis missing. This fuses at 5 years according to Silver. All of the long bones identified are fully fused including the pelvis which confirms an age of at least 5 years (Silver 1969). With the individual appearing to be skeletally mature the best line of evidence for ageing remains the dentition. An examination of the incisors indicated a level of wear that is consistent with an age of 8-10 years, although how abrasive the diet is obviously influences this process.
- 8.6.2 Measuring the bones gives a withers height of approximately 14 hands, similar to a largish breed of modern pony, such as the Highland pony.
- 8.6.3 The horse spine in context 7116 (1650-1700) shows some abnormal skeletal fusion: a single specimen was found, formed by what are usually five separate lumbar vertebrae which articulate with the cranial end of the sacrum. The vertebra have fused together particularly along the transverse processes. There are also slight bulges of extra bone on the ventral surface. This may be the condition referred to by many authors as Sponylosis Deformans or Bamboo spine.

8.7 THE SIZE AND HEALTH OF THE ANIMAL POPULATION

- 8.7.1 Only the post-medieval assemblage of animal bone produced sufficient specimens to draw any conclusions regarding the size and health of the animal population. However, occasional bones from medieval contexts offered some information. One such example is a cattle maxilla from a medieval dump, which shows an abscess and recession of the bone at the root of a tooth. A second cattle bone, part of the mandible, shows symptoms of old age. The teeth are very worn, and there is some lipping on the medial side of the articulation with the skull and looks quite polished. Below the articulation on the medial side some destruction and increased porosity is present suggesting thinning of bone. The presence of such an aged creature suggests a degree of care for its herd.
- 8.7.2 The best group of bones for measuring the height of the cattle population in the 18th century came from a small pit (7105). The cattle would have been 1.2 to 1.3 metres tall at the shoulder, which is within the size range expected for cattle from this period. One of the metatarsals from this feature has undergone a sequence of changes: the proximal articular surface shows area of extra bone growth (extoses), caused either by damage or disease.
- 8.7.3 A number of the cattle skull fragments with horncores attached exhibit an interesting feature of a number of small holes at the back of the skull where the frontal and parietal bones meet. The holes vary in size and have smooth edges indicating they are not the results of post-mortem damage or damage at the time of death, more likely congenital.

8.8 THE LEATHER SHOES

- 8.8.1 There is mixed survival of leather items at Waltham Abbey in general. The leather collected from these excavations will be of interest for leather studies in the area, as well as suggesting that leather goods were recycled on site.
- 8.8.2 The leather shoes and shoe parts are all finished objects which have been used, in some cases heavily. Some show signs of repair, usually through the addition of a clump sole or soles. It may be considered that the shoes were past repair, and were collected for recycling into other items. The wear pattern on the shoes is generally biased to the ball of the foot and the outside of the heel. This may suggest that some of the 15th century inhabitants of Waltham Abbey were pigeon-toed, but it is fair to say that some may have been flat-footed. The best preserved adult soles show a range of foot sizes from 22.6cm to 24.7cm, corresponding to sizes 4-6 in modern terms. This covers only 4% of the current English male adult population and 64% of the female population. Unless the majority of the shoes were women's shoes, this suggests that medieval people were slightly smaller than today.
- 8.8.3 The shoes themselves are generally of turnshoe construction made from a single piece sole sewn directly to the upper. A rand incorporated at the join helped keep the shoes waterproof, and the shoe was reversed so that the stitching was on the

inside. The most complete item in the group is a one-piece or 'wrap around' ankle shoe (<25>) with the joining butt seam positioned towards the heel on the inner side of the foot. The shoe has a high front and a central slit, the left (outer) side of which has edge-flesh stitch marks for a reinforcement cord or tongue. The sole has a wide natural shape with an oval toe, and front and rear clump soles. It most likely held a thong for tightening.

- 8.8.4 Because the shoes are deposited in the 16th century but date to the 15th century, they have to be dated by their shape, constructional and fastening details, and by parallels from other sites. They are difficult to date with precision, partly because it is a small group with few complete or near-complete shoes and partly because this is a rural site, and they are not necessarily directly comparable with (for example) the shoes from the well-dated waterfront groups in nearby London.

8.9 DIET

- 8.9.1 The animal bones from the medieval phases on site largely derive from dumped material from Waltham Abbey, the townspeople clearing their cesspits and middens, and dumping them into marshland, and therefore offer information regarding their diet rather than people living or working on site. A range of species have been identified from the medieval period, chiefly cattle, sheep/goat and pig, whereas horse does not appear to have been consumed. The diet was supplemented by fish, shellfish and fowl, including chicken, dove and wild species such as mallard and goose.

- 8.9.2 The post-medieval diet is not very evident from the excavations; many of the features indicate industrial use rather than household debris, and the number of bones relating to industry far outstrips those that may indicate diet. However, one interesting aspect of the Post-Medieval assemblage is the high quantity of pig bone. There is a large number of adult and sub adult pig scapulae which have been chopped or sawn at the point this bone articulates with the humerus. This pattern may point to a particular butchery practise, possibly the production of the cut currently referred to as prime fore hock.

8.10 ECONOMIC STATUS

- 8.10.1 In the early medieval period, the dumped deposits from the town indicate the economic status of some of the inhabitants of Waltham Abbey. The pottery brought to the site shows a wide range of sources, from London to Hertfordshire and the Continent. Much of the pottery is utilitarian, everyday objects such as cooking pots and jugs manufactured locally, but the medieval assemblage includes pottery influenced by French styles, notably Rouen and, and this may be a symptom of Norman French influence following the events of 1066. There is no evidence of a hiatus encouraged by national events such as the Plague or the Peasant's Revolt; rather the inhabitants of Waltham Abbey appear to be using the site to dump their domestic waste. Occasional pieces of cattle and sheep horn-core within the dumps show that some industries were being carried out in the town

- during the medieval period, but any location for this cannot be proved from the finds alone.
- 8.10.2 The later medieval period shows a wider range of pottery vessels, and this may represent an upturn in the prosperity of the town, but is more likely to show the diverse range of vessels available in the 14th and 15th centuries.
- 8.10.3 The most high-status artefact collected during the excavations is the gold plated copper alloy brooch <3>. This could have a connection with the Abbey complex, since it came from a deposit that also contained decorated window glass. If these items do come from the Abbey, then this suggests that the Friars are also using the site for dumping, not just the townsfolk. If these finds are the result of midden clearance, then their source could be anywhere within the town, not necessarily the Abbey.
- 8.10.4 In the post-medieval period, leather and hornworking were carried out. This industrial use of the site does not immediately indicate high economic status. Horn-breakers, tanners and leatherworkers worked their raw materials using dirty, malodorous processes. Although the finished items of leather and horn may have commanded high prices, the production of tanned hides and usable horn does not appear to have raised the tanner's economic status as reflected in the finds. However, the profession must have provided sufficient income to enable the tannery to have continued in use, as seen by the reuse of the site in 1816, where it was purchased from Newell Connop Junior; late of Edward Valentine Clayson. It is possible that Building 1, interpreted as a horn-workers house, was built and occupied by the owner of the property, which would suggest some degree of financial security.
- 8.10.5 The position of the site, west of the medieval town centre, may be considered to reflect both the monopoly the church had on the land to the north and west of the Abbey, and the unsavoury nature of the industrial processes. A good water supply is a requirement of tanning and hornering, so the Old River Lea provided an easily accessible source, and may also be significant in the choice of this site as an industrial centre.
- 8.10.6 Much of the post-medieval pottery shows utilitarian, functional types, including jars, dishes, jugs and chamberpots mostly manufactured in Essex, but there is one piece that stands out; the teapot in the form of a cauliflower is a high status piece from the Staffordshire potteries, and was most unexpected in an industrial context. There were other pieces of household waste, so it is possible that the economic status is higher than at first apparent.
- 8.10.7 The workers on the site probably owned a horse for pulling carts, indicated by the skeleton of an adult horse and his associated saddle. This would have been an important animal for traction, and this saddle's careful finish, with eye-catching brass studs nailed around the saddle-tree, confirms the considerable care and

expense that might go into the appearance of draught horses in the later 17th century. The saddle may have been 'old' and worn out when thrown away; nonetheless it might not be expected to have had a very long life. The discard of both the horse and a harness is thought purely functional: a disused hornworking pit may have required infilling, so the nearest available waste was used.

8.11 LAND USE AND ENVIRONMENT

- 8.11.1 Until the mid 13th century, the site was regularly inundated by the Old River Lea, as identified by thin lenses of silty clay within the major marshy deposits that predate the medieval activity. These silty clay deposits included very little in the way of coarse components, but include fragments of twigs that may be considered brought in by the flooding river. The excavations revealed no human input to the site apart from the dumping of household waste, but it must be recognised that the margins of the river were not examined in this excavation due to environmental constraints.
- 8.11.2 The site does seem to have been embanked to some degree during the medieval period. The identification of the site as a tannery from 1402 records that it lies opposite the Marshbank, on the north side of Highbridge Street, and, since features and a working surface are established by the 14th century, the site either witnessed a drop in river level, or, more likely, a protective embankment.
- 8.11.3 The site lay at 1.80m below current street levels, but the town centre of Waltham Abbey was accessible from the west during the medieval period, as proved by the route taken by the funeral cortege of Eleanor of Castile, and a document recording the existence of Weststrate in 1320. This road crosses the Lea Valley flood plain, and is potentially the location of a prehistoric trackway leading from Cheshunt.
- 8.11.4 The first medieval activity on site is dumping of town waste. Had the site been split into burgage plots or messuages, then the scatter of dumped deposits is unlikely to have been present. The land seems first to have been used for low intensity industry, tanning is indicated; an industry settled enough to merit a post-built shelter, with the occupants using cesspits.

8.12 INDUSTRY

Horn-working

- 8.12.1 Horn is separated from its core by a process of soaking in either barrels or pits. The softened material was then heated, and prised off with a knife or tongs. The colour of horn ranges from rich dark brown to cream, and can become translucent when affected by heat or pressure. This process is called either horn-pressing or horn-breaking. The by-products of horn-breaking were the most common evidence of industry on the site, specifically large quantities of horn-cores left after the removal of the horn. These were largely confined to individual pits, and may indicate that the pits which became the repositories for the horn waste may have been the pits that the horn was soaked in. However, given the proximity of

the River Lea, naturally flowing water could have been used for the soaking process.

- 8.12.2 After removal of the horn, the waste cores at this site were deliberately placed in pits, one of which seemed to show a lining of horn cores. This may have been used to help drainage through the pit, but may equally be the result of a pair of horn-breakers working on opposite sides of the pit and placing their waste carefully. There were no pieces of horn collected from site. This may indicate that horn was being converted into semi-manufactured sheets, for selling on to manufacturers of everyday items such as lanterns, combs, spoons, tool handles and even gaming pieces. Alternately, items made from horn may have rotted and did not survive.
- 8.12.3 The horn cores offer a unique window into the population structure of the exploited post medieval cattle herds. Most of the cattle horn cores came from young adult beasts, so may be considered to have also been used as meat animals and their hides for tanning. Analysis of the complete horncores has enabled the size of the cattle to be determined: 1.2-1.3m at the shoulder, within the size range expected for cattle from this period.

Tanning and Leatherworking

- 8.12.4 The process of tanning also required the soaking of the raw material; this was frequently done using oak bark as an accelerator to the process, and three such pits were found on the site (7133, 7118 and 8196). The fills contained a high proportion of oak bark.
- 8.12.5 Advances in technology saw the introduction of chemicals such as aluminium sulphate, which whitened the leather during the tanning process, but there were no deposits of this substance identified during the excavations.
- 8.12.6 Articles made from leather in the medieval period included shoes, clothes, belts, straps, buckets, saddles, chair covers, book bindings, and, in connection to monastic life, vellum, made from calf skin.
- 8.12.7 When the raw hides were delivered to the tanneries, there would frequently be body-parts still remaining, usually the feet and parts of the head. This would account for the preponderance of skull and foot bones of cattle, pig and sheep, largely in absence of other body parts.
- 8.12.8 The leather remains show many signs of wear and repair. It seems likely that a leatherworker was working on or near the site during the late medieval period. Whether this was done in conjunction with tanning cannot be determined, but it seems likely that the tanners supplemented their income with subsidiary industries. The presence of horn cores in the medieval period and later suggests that this part of Waltham Abbey became an industrial area for the exploitation of animal products.

9 CONCLUSIONS

PRE-OCCUPATION TOPOGRAPHY

- 9.1 The topography of the site prior to the earliest dumping on the site can only be surmised, since excavation ceased at 17.10m OD, and water-lain silts rather than pre-Holocene deposits were present at that level. The area was marshland, little more than an extension of the River Lea that was frequently flooded, as shown by the presence of thin lenses of silt and clay across the site. No prehistoric finds or features were encountered during these excavations, but Highbridge Street potentially has its origins as a causeway across the Lea Valley Marshes from Cheshunt.

ROMAN OCCUPATION

- 9.2 Roman roof tiles and scarce fragments of Roman pottery on the site do not indicate direct occupation of the site during the Roman period: rather the finds are residual in dumps brought from the centre of Waltham Abbey. These most likely represent the remains of Roman habitation disturbed during the medieval period.

SAXO-NORMAN WALTHAM ABBEY

- 9.3 The derivation of Waltham from the Saxon '*wealdham*', and the record of the town in the Domesday Book (1086) as a sizeable town with a growing population, both indicate the town's importance in the late Saxon/early medieval period. The primary settlement of the Saxon period appears to have been centred across the river from the site, and the Eldeworth enclosure to the south of the Abbey is currently thought to define the Saxon town boundary.
- 9.4 The large number and variety of early medieval/Saxo-Norman pottery from Thetford, London and Germany collected from this excavation show trading links within England and the continent. Whether these items were traded locally or at larger emporia such as Gipeswic or Lundenwic before distribution cannot be determined. Certainly, trade with London would require a crossing of the River Lea (unless all cargo was carried aboard ship), thus a bridge had most likely been established by or during the Saxon period.
- 9.5 No direct evidence of Saxon occupation was recovered from the area of the subject site: the Saxo-Norman finds derive from clearance within the town. The site lay at 1.80m below current ground level, and was marshland until the 13th century. It faced regular inundation by the River Lea and was very soft ground. Although no evidence for a bridge or other structure fording the river was located in the excavation, the necessity of a crossing over the Lea suggests that there may be remains of it beneath Highbridge Street itself.

MEDIEVAL DUMPING, 1080-1300

- 9.6 While the site was still marshland in the 11th and 12th centuries, it was used to dump waste from the town, thought to derive from clearance of rubbish pits or middens. The finds from these layers indicate both diet and economy; pottery

found in this phase was manufactured locally, in Hertfordshire, Surrey and London. Some of the London pots have French-influenced decoration, likely to be an indication of the influx of Norman culture after 1066. There is evidence for a broad diet in the medieval period; cattle, sheep and pig were consumed, as were birds: chicken, goose and duck. Fish were also eaten. Notably, horses do not appear to have been consumed, being far more important as working animals, although there had been a Papal edict by Gregory III against the consumption of horses in 732. The presence of unglazed roof tiles suggests the form of the roofs of some of the houses in the town. Two short nails with square shafts potentially represent roof fixings.

- 9.7 All types of waste from the town were dumped onto the marsh. Fragmentary horncores indicate that some working of horn was carried out in Waltham Abbey prior to the 14th century, but there is no evidence of direct occupation.
- 9.8 The sacking of the town and the subsequent burning of the town houses by Geoffrey de Mandeville in 1144 did not appear in the archaeological record, but the nature of the 12th century landscape would have precluded this.

MEDIEVAL DUMPING AND EXCAVATED FEATURES, 1250-1400+

- 9.9 Waste from the town was still being dumped in the 13th century, both in pits and as widespread layers. Despite being dominated by local wares, French influence is again seen in the pottery, both in the Rouen style (Picardy) and from Saintonge (Poitiers). The dietary evidence was similar to the previous phase. One item of personal clothing was collected; an undecorated copper alloy buckle <5> with oval frame and narrow bar that is comparable to others found, for example in London. It is small, and may be from a shoe or narrow strap.
- 9.10 It seems likely that the River Lea had been partially embanked during the 13th century. Some drying must have occurred, since individual features of this date were identified: a ditch that ran perpendicular to Highbridge Street, a number of rubbish pits and cess pits, a tanning pit and the first structure to be erected on site. Highbridge Street is mentioned in a rental from c.1320, when it was known as *Weststrate*, but its origins may be earlier, as suggested by the orientation of these features. The road must have been established before 1290, since following the death of Edward 1's wife, Eleanor of Castile, she lay in state at Waltham Abbey for several weeks while her funeral was prepared in London. The Eleanor Cross was erected two miles west of the Abbey, to mark the course of Eleanor's funeral procession.
- 9.11 One of the more interesting finds from this phase was an incomplete slightly curved hone <8>, unused and therefore probably lost rather than discarded. It was within a cesspit that contained general waste, but potentially belonged to someone working on the site.

- 9.12 One pit showed direct evidence of the earliest industrial profession on site: a rectangular pit close to the eastern limit of site was filled with oak bark. This is interpreted as the used materials left at the end of the tanning process: the tanned hides have been removed from the pit, leaving the oak and manure behind. A heavily worn small hone <7> with a suspension hole (worn around the neck or belt) was within the fill, and it may be that this tool was used by the tanner, for sharpening tools. There was some general household waste within the upper levels of the fill, suggesting deliberate backfilling.
- 9.13 The tanning process required a shelter for work in the dry, and a line of four posts in association with a compact spread of gravel is a good candidate for a simple roofed structure supported by a centrally placed line of posts. Unglazed peg tiles mixed with the surface suggest the form of the roof and a tool possibly used on the site was also collected, a small, broken sandstone hone <9>.
- 9.14 The meaning of Highbridge as a street name is not entirely clear. It may be indicating a crossing of the Lea at a higher point than a second bridge downriver, or it may be a reflection of the topography. During the medieval period, the land lay over 1.70m below the current street level, so in order to access the town centre from the west, the bridge and its attendant roadway would have been raised above the marshy riverside.
- 9.15 There is no evidence for the establishment of housing or burgage plots extending outwards from Waltham Abbey town centre during the medieval period: the short length of ditch cannot be proved to have this function. The site was marshland, gradually being reclaimed by episodic dumping. The location of the road demarks it as an important historic thoroughfare between Waltham Abbey and Waltham Cross to the west. The medieval settlement was focused across the Lea, south of the Abbey itself, with the main built up area centred approximately 300m to the east.

LATE MEDIEVAL 1400-1540

- 9.16 The low intensity occupation continued into the 16th century. In the east, three cesspits and a tree pit are filled during this phase, and a single large vertical post sunk into the underlying marshland. The post had a square profile, but its full length is conjectural: 0.68m in the ground could equate to any height, but is thought to have been greater than 2.00 m. The function of this post is also unclear. It could have been a mooring post for boats on the margin of the Lea: it could be for tethering animals, or it could be for an unknown element of the tanning yard that was established.
- 9.17 One of the cesspits and the tree pit contain pottery from the same vessel, so the filling of at least two of the features was simultaneous. Despite the drop in the number of features, the forms of the pottery show more variety: in the early medieval period, the assemblage was dominated by cooking pots and jars: later, a wider range of forms, such as skillets, cooking pots/jars, large rounded jugs,

- handled bowls, a possible cistern and flanged bowl reflect the later medieval diversification.
- 9.18 Within the fill of one cesspit was a large gilded copper alloy brooch with traces of decoration on its outer surface <3>. It is different in character from all other finds, containing precious metal, and may have derived from or be connected in some way with the Abbey. If this is the case, then the evidence suggests that the occupants of the Abbey were also using this part of town for their waste.
- 9.19 The earliest leather items on site came from this phase, and included parts from children's turn-shoes. These are likely to have been lost or dumped rather than being evidence of cobbling or shoe manufacture.
- 9.20 The drop in number of features and downturn in number of finds may be explained by one of two known historical events. Possibly, plague caused a drop in the population of Waltham Abbey: it arrived in London in 1349, and returned throughout the rest of the 14th century, in 1361-64, 1368, 1371, 1373-75, 1390, and for the last time in 1405. It is estimated that 30-45% of the population died, although some towns would have had a higher mortality rate, others lower. An inscription from Hertfordshire, at Ashwell, shows the force of the Black Death: "wretched, terrible destructive year, the remnants of the people alone remain".
- 9.21 The drop in activity may also be due to the Peasant's Revolt of 1381. High taxes to fund the war in France resulted in an uprising, with rebels marching on London. Hundreds of people perished in the ensuing repression, and Essex was a centre for the revolt. It may be that a combination of forces caused a drop in the population of Waltham Abbey. Certainly, the damp environment of the Lea side would have been one of the less healthy parts of the town.
- 9.22 However, there is a possible reference to the site from 1402, where, opposite the Bank Houses on the north side of Highbridge Street, was a '*fellmongers yard and tan pits, occupied by Mr Hale, fellmonger and wool dealer*'. This may describe the series of tanning pits with the post-built shelter recorded to the east of the site, and may, if the tannery survived as a going concern for some years, be documentary confirmation for the archaeological interpretation. Despite no tanning pit of this precise date being proved during the excavations, it is documentary confirmation of activities on site during the medieval period, activities which continued into the 16th century. The potential for further industrial features beyond the limit of excavations remains, and may account for the sporadic nature of archaeological evidence during the 15th century.

TANNING AND LEATHER REPAIR

- 9.23 During the late 15th and early 16th centuries, the site's industrial use increased: two tanning pits were excavated, contemporary with a cess pit and a line of posts that represent part of a wooden structure, perhaps a shelter for the tanners. Both of the pits contained oak bark, typical of the active fill of tanning pits, and was

- probably left behind after the last tan. The presence of oak bark is clear evidence that the pits were used for tanning hides, and the pits may have held the hides for a year, possibly three, showing a permanence of activity.
- 9.24 When the pits went out of use, they appear to have been deliberately backfilled. The backfill is thought to contain items used by the workers on site as well as incorporating some earlier material, perhaps part of the contemporary horizon. This includes early medieval pottery and a medieval horseshoe. The contemporary material includes roofing tile, potentially from the nearby post-built structure, plus discarded leather items and two tools. These do not reflect the tanning activities, but more likely a second livelihood: the repair of leather items, and their salvage for reuse into different objects. The leather assemblage from the smaller pit includes shoes, off-cuts and parts of straps.
- 9.25 Three shoes have front-lacing fastenings, a form not thought to have been common until the later 14th century and into the 15th century. Most of the soles have fairly narrow waists and pointed toes, all worn through and most show signs of repair. All the shoes and shoe parts come from turn-shoes made with a single sole which was sewn directly to the upper, usually incorporating a rand, a narrow strip of leather which made the shoe more watertight. The shoe was reversed or 'turned' so that the stitching was on the inside. The turn-shoe method was the standard method of shoe-construction in the medieval period, developing into the modern double-soled or 'welted' method in the late 15th and early 16th centuries. About 40 shoe parts are present, consisting of soles, front and rear clump soles, heel stiffeners, pieces of rand, and mainly fragmentary pieces of upper. The interesting feature of the group is the large number of clump and repair soles: nearly every shoe has been repaired, and surviving pieces of rand are wide, with enough room for attachment of the clump sole to the existing sole and upper. On balance the shoes are almost certainly 15th century, and perhaps late 15th century as they were deposited in the early to mid 16th century. They are worn and presumably just dumped as rubbish with other leather pieces. There are two pieces of re-used leather or waste in the group, but both are sheep/goat hide (the shoes are cattle) and there is no real evidence that this is cobbling waste.
- 9.26 Of the two tools found on site, one is an awl made of copper alloy <18>. It was most likely a cobbler's awl or a borer for piercing leather. The second tool is a bone needle <2>, made from a naturally pointed pig fibula, worked to a sharper point with a possible eye at the top. It would have been too coarse to have been used for sewing in leather working, and may represent activities like netting and mesh knitting.
- 9.27 The closure of the pits was deliberate, and represents the end of one industrial use of the site before the ground level was raised and the first buildings established. There are three buildings constructed in the late 16th century, each of different character, but all using material reclaimed from the Abbey following its Dissolution in 1540.

MATERIAL FROM THE ABBEY

- 9.28 The excavations have uncovered several different types of building materials from the Abbey. These range from painted window glass to carved stonework, including a possible fragment from a tomb, as well as brick and tile. Although most of the material comes from post-Dissolution contexts, its source was clear from comparative study of materials still present in the Abbey complex.
- 9.29 The small fragment of medieval window glass dates from 1400-1500. The glass is pitted and distorted but it is possible to identify the remains of a painted design on one surface. The painted lines are curved and may be from a foliate scroll design. Its context predates the Dissolution of the Abbey, and may indicate repairs and subsequent distribution of glass fragments around the town.
- 9.30 The stonework recovered all came from post-Dissolution contexts and has added significantly to the corpus of such material which derived from the Augustinian Priory, later Abbey. Some items can be attributed to one or the other phases of construction.
- 9.31 The earliest piece is of Caen stone and is considered to date to the Norman period: it has a face finely polished as if part of a tomb or altar.
- 9.32 The Abbey masonry is typical of Abbey buildings in the south of England, Purbeck marble is also seen in the Abbeys at Salisbury, Winchester, Wells and Westminster. More locally sourced material is represented by Kentish Ragstone and Reigate Stone. These pieces are thought to be part of the Abbey complex erected during AD 1177-1242 and represent regular architectural features such as shafts, capitals, window jambs and arch stones. These are rare survivals in Waltham Abbey, since they have low value as building material in the post-Dissolution period: on the monastic site some such pieces were burnt to make lime (Huggins 1969).
- 9.33 There are also a number of medieval bricks which represent material salvaged from the Abbey. These include a perforated Waltham Abbey 'great brick' dated 1177 to 1370. Similar bricks previously excavated in the town include an example with a definite curved edge which may have been use around a doorway or window opening.
- 9.34 Part of a floor tile is also certainly from the Abbey. Floor tile and brick in the same distinctive sandy fabric have been found on other monastic sites in the Greater London/Essex area where they are dated to the mid 12th-early 13th century.
- 9.35 Roofing material from the Abbey is represented by a number of peg tiles, which have knife-trimming on their sides and base but are not glazed.

GENERAL, 1550-1750

- 9.36 The northern part of the site was made up by over 0.5m, leaving the southern part of site still marshy and damp, but having a better defined limit, forming a pool on the edge of the Lea. This pool gradually filled through alluvial deposition and deliberate dumping during the ensuing years, and was completely filled and compact by the late 18th century. It seems likely that the site was split into at least two messages, the western message featuring Buildings 1,4,5,9 and 10.
- 9.37 Three buildings were erected on the edge of the pool, Building 1 to the west, Buildings 2 and 3 to the east.

WESTERN MESSAGE, BUILDING 1

- 9.38 The first building in the western message, Building 1, became a workplace for horn-workers. It had a stone floor, and the wall foundations used brick and masonry from the Abbey complex. Only the rear of the house was found, the northern wall lying beyond the limit of excavation. No evidence for the location of doorways or windows was apparent. A shallow gully in the floor may have been a drainage channel, perhaps associated with the activities within. The surviving walls suggested a single room 4.26m east-west and over 6.70m north-south. The features to the rear contained the earliest pantile found on the site, which dates from after 1630: it is possible that this slipped from the roof of Building 1.
- 9.39 During the mid 17th century, the floor surface of Building 1 was replaced, and raised by 0.20m. This floor surface was truncated when Building 1 was rebuilt in the early 19th century.
- 9.40 Building 1 was used by horners removing cattle horn from the cores and then disposing of some, at least, of the cores in the immediate area. Whether this work was conducted by the buildings first inhabitants cannot be determined, but certainly this was the case in the 18th century. There were two pits filled with horn cores, a spread containing others, and a sample of the fill of the pool contained seven horn cores, indicating that hornering was undertaken over some years, the latest deposit dating to the mid 18th century. The 17th century features contained 119 horn-cores, the 18th century 129. The raw material may have been supplied by a tannery, although there is no archaeological evidence of a tanner on site after the 16th century, only a documentary reference.
- 9.41 It is possible that the two pits were used for soaking the horns prior to removing the horn from the core: the site's location next to the Lea would have provided a ready source of water, and the waterlogged nature of the site would have done away with the need for soaking barrels, for example.
- 9.42 The pottery dumped into the hornering pits included a chamber pot decorated with slip trail tree like motifs, and one high-status piece, a majolica teapot in the form

- of a cauliflower is preserved as a near complete vessel. The presence of the latter in the waste from horn-working was unexpected.
- 9.43 The carcase of a working horse and its cart saddle were also dumped into the pond. The horse has fused lumbar vertebrae, thought to be caused by the load on the saddle, which transfers the weight of the cart to the horse's back rather than the shoulders. It was not an elderly beast, and its cause of death is unknown, but the cart saddle is a rare find, and it most likely belonged to the horners.

BUILDINGS 4 AND 5

- 9.44 Building 1 was rebuilt in the 18th century as Building 4. The surviving foundations were brick, but only stood to floor level, so the true form of the building could not be determined. It is likely to have been timber-framed, one post location surviving in the western wall. There was a dividing wall across the property, but no other internal features were apparent. If Building 4 had a chimney, its location lay north of the limit of excavation.
- 9.45 Building 5 survived as the remains of a north-south wall and an associated brick floor with its bedding. Heavy truncation from service trenches, root disturbance and a later building episode had removed much of the masonry. It was adjacent to Building 4; its full limits were not recovered, but it was of a different form to Building 4.
- 9.46 To the rear of these two buildings, the waterside pool had dried and the ground was raised. Atop this, a layer of chalk was rammed and surfaced with gravel to form a yard area behind Buildings 4 and 5 that was enclosed by a contemporary wall.
- 9.47 These buildings were the last cottages constructed in the west of the site, and this area was sold on 22nd June 1816:
*Lease and release in fee of a freehold messuage or tenement with the tan yard, vats, sheds buildings etc late in the occupation of Edward Valentine Clayson situate in West Street in the town of Waltham Abbey in the parish of Waltham Holy Cross in the county of Essex. Abutted north by the said street, south by the Old River Lea, east by a messuage and premises belonging to His Majesty lately purchased of John Jessop, and west by a copyhold messuage lately belonging to Newell Connop senior, and by him surrendered to or in trust for His Majesty.
Newell Connop junior to His Majesty. (Treasury Solicitors Office)*
- 9.48 This documentary evidence gives the name of the property owner upon its transference to the crown, Newell Connop junior; the previous owner, Edward Valentine Clayson, and the work conducted in site, a tannery with vats, sheds and buildings.

- 9.49 The closure of the hornworks and associated industries may date as late as 1816. The eastern part of the site had already been purchased by the Government in 1806 for the workers at the gunpowder factory, defined as ‘*surrender of two cottages and premises at Waltham Abbey; William Clark to R.H. Crew in trust for his majesty*’. (Treasury Solicitors Office 1806)

BUILDINGS 9 AND 10, 1816-1945 (Figure 15)

- 9.50 Buildings 9 and 10 were constructed in the 19th century, and rather than being part of the range of buildings conveyed in 1816, they were built later in the century and are part of a range of buildings erected for the workers at the Gunpowder factory. Their condition was poor and the foundations greatly root-disturbed.

EASTERN MESSAGE, BUILDINGS 2 AND 3 1550-C.1800

- 9.51 Buildings 2 and 3 were very securely built on the edge of the pool, to the east of site, Building 3 subsidiary to Building 2. Building 2 was based around a centrally placed chimney stack facing north, its south side possibly incorporating an oven. Most floor surfaces had been removed, leaving scatters of mortar and brickearth that may have been bedding for floor tiles or bricks laid flat.
- 9.52 The wall foundations incorporated high quantities of worked stone reclaimed from the Abbey buildings and described a rectangular building with four rooms. The substantial nature of some of the foundations suggests a two-storey building at minimum.
- 9.53 Building 3 was located to the rear of Building 2, and was a rectangular building with a single room, contemporary with Building 2. The foundation (8063) was composed of a maximum of three tile courses overlaid flat on half-bricks. It is most likely that the houses were timber-framed, with sill beams atop the tile courses or lying over low walls, and vertical posts and wall panels above. Notable among scatters of demolition debris from this building was the lack of ceramic building materials apart from roof tile. The most common building material represented was mortar and plaster.
- 9.54 This range of buildings seems to have been demolished in the early 19th century, judging from the archaeological record and the documentary sources, and replaced by Buildings 7 and 8. The government purchase of the site gives the following information: for 17th January 1816:

Lease and release in fee of a newly erected messuage with the outhouses yards etc situate in West Street in the parish of Waltham Holy Cross in the county of Essex, formerly part of a messuage sometime since sold to His Majesty, part of which is now and was heretofore used as an office, and part was lately a cottage and occupied by John Davis, but which office and cottage have some time since been taken down by the said T.A. Jessop and the said newly erected messuage tenement and office built on the site thereof. Abutted south and west by a messuage belonging to His Majesty,

east by a messuage and garden of Mrs Dorothy Jessop widow and north by the said street.

Thomas Augustus Jessop to His Majesty. Consideration £600 (Treasury Solicitors Office).

- 9.55 This locates the messuage in the central northern part of the site, and indicates the occupant of the previous cottage (Building 2) as John Davis. Buildings 7 and 8 were identified in this area: both had well-built foundations of red brick and are thought to be entirely brick-built.

BUILDINGS 7 AND 8, 1816-1945 (Figure 15)

- 9.56 Building 7 was heavily truncated by later services, and had two rooms on the ground floor, one to the front with a fireplace and one to the rear. The floor of the southern room was composed of bricks laid atop a spread of mortar, with a suggestion of a decorative arrangement.
- 9.57 Building 8 lay to the east of Building 7, and had suffered heavier truncation, the southern foundation surviving strongest; the building's demolition horizon had also been truncated. The only internal feature was a possible fireplace.

- 8.58 Conveyed on the same date was another plot of land, in the central southern portion of the site:

Lease and release in fee of a messuage within the stable yard and appurtenances situate in the town of Waltham Abbey in the parish of Waltham Holy Cross in the county of Essex, abutted north by the said street, south by the Old River Lea, east by a messuage belonging to His Majesty then in occupation of Henry Seymour Matthews, Ordnance Storekeeper at Waltham Abbey, west by a tan yard belonging to Newell Connop junior.

John Jessop to His Majesty. Consideration £300 (Treasury Solicitors Office 1816).

- 9.59 This piece of land contained wells and cesspits, thought to have serviced Buildings 7 and 8. Each of these features was brick-lined and fed into a brick drain that ran parallel to the bank of the river, its lowest point in the centre of site.

BUILDING 6, 1806-1945

- 9.60 Building 6 has been identified as the Ordnance Storekeepers House, and had strong, well-built foundations that removed potential evidence for earlier structures within its footprint. It seems likely to have been built in 1806, as the government purchases of neighbouring messuages suggest it was a new building. One previous building on the plot was the Merry Wedders. Whether this is the house's proper title is unknown: a wedder is a spayed year-old ewe, perhaps a reference to the fellmongering of the past.

- 9.61 A government purchase of 21st August 1806 gives little details, but seems likely to refer to the purchase of this part of the site:
Surrender of two cottages and premises at Waltham Abbey.
William Clark to R.H. Crew in trust for His Majesty
- 9.62 The new building had a cellar sunk into the made ground of the early post-medieval phase, the walls resting on large wooden rafts lain on the wet marshland beneath. The cellar's floor was made from York stone slabs. The building stretched further back from the street-front than any of the other cottages on site, and was the largest building on site until the Drill Hall was erected in the 20th century.
- 9.63 Two late 19th century photographs of the rear of the Storekeeper's House show it to a gable-ended three-storey building with a double chimney stack. It is clad in weatherboarding and has various annexes to the east and south. The southern annexe was two storeys; the eastern annexe lay astride the Old River Lea.
- 9.64 The rear of the building complex was given over to gardening, with a greenhouse facing south. West of the Storekeeper's House and south of the Workmen's Quarters was a large area, which the 1870 Ordnance Survey Map shows as the position of a garden. This is probably the parcel of land described in the 1816 sale as '*garden of Mrs Dorothy Jessop widow*'.
- 8.65 By June 1816, the whole of the site had been conveyed to the government for staff at the nearby Gunpowder Factory and continued in this use until 1945.

DRILL HALL AND GOVERNMENT HOUSE.

- 9.65 After the closure of the Gunpowder Factory at the end of the Second World War, the Workers cottages 4, 5 9 and 10 were replaced by the Drill Hall. The Ordnance Storekeepers House was extended westwards using deep concrete foundations across the demolished buildings 9 and 10, renamed Government House, and was not demolished until after 1975. The site was cleared of structures, and was occupied by hard standing before the current development.

10 GLOSSARY

Aisle Respond	A half pillar or shaft as part of a wall, supporting the end of an arch or the springing of a vault.
Clump Sole	An extra sole on a shoe
Fellmonger	One whose job is to extract wool, pelts and vellum from animal skins, working in close association with a tanner
Fullering	A groove close to the outer margin of a horseshoe in which the nails are sunk
Grozed	The edge of glass smoothed with a grozing iron
Rand	A strip of leather added between the sole and upper to increase waterproofing
Vamp	The front part of the upper of a shoe
Wedder	A year-old spayed ewe.

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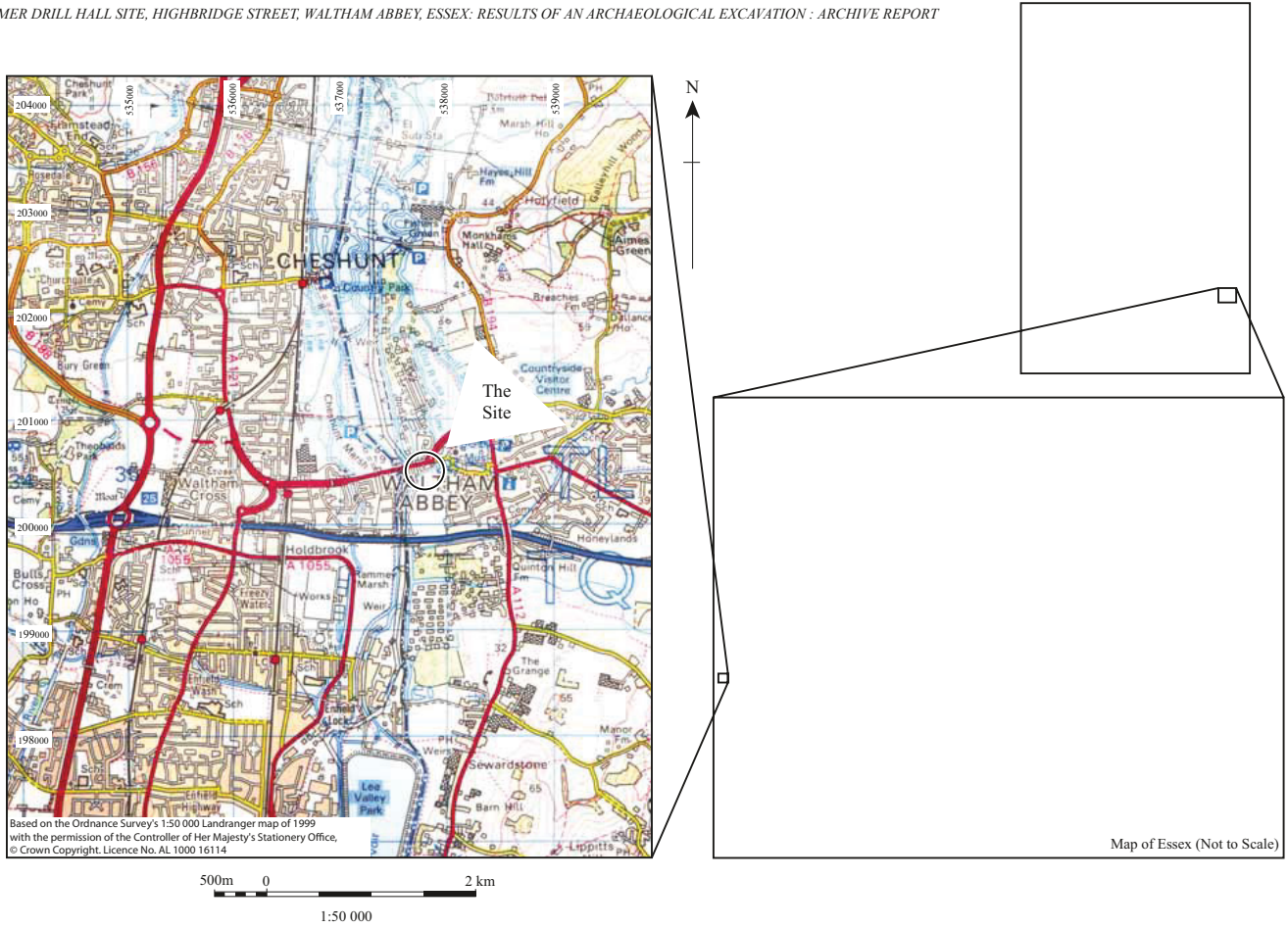
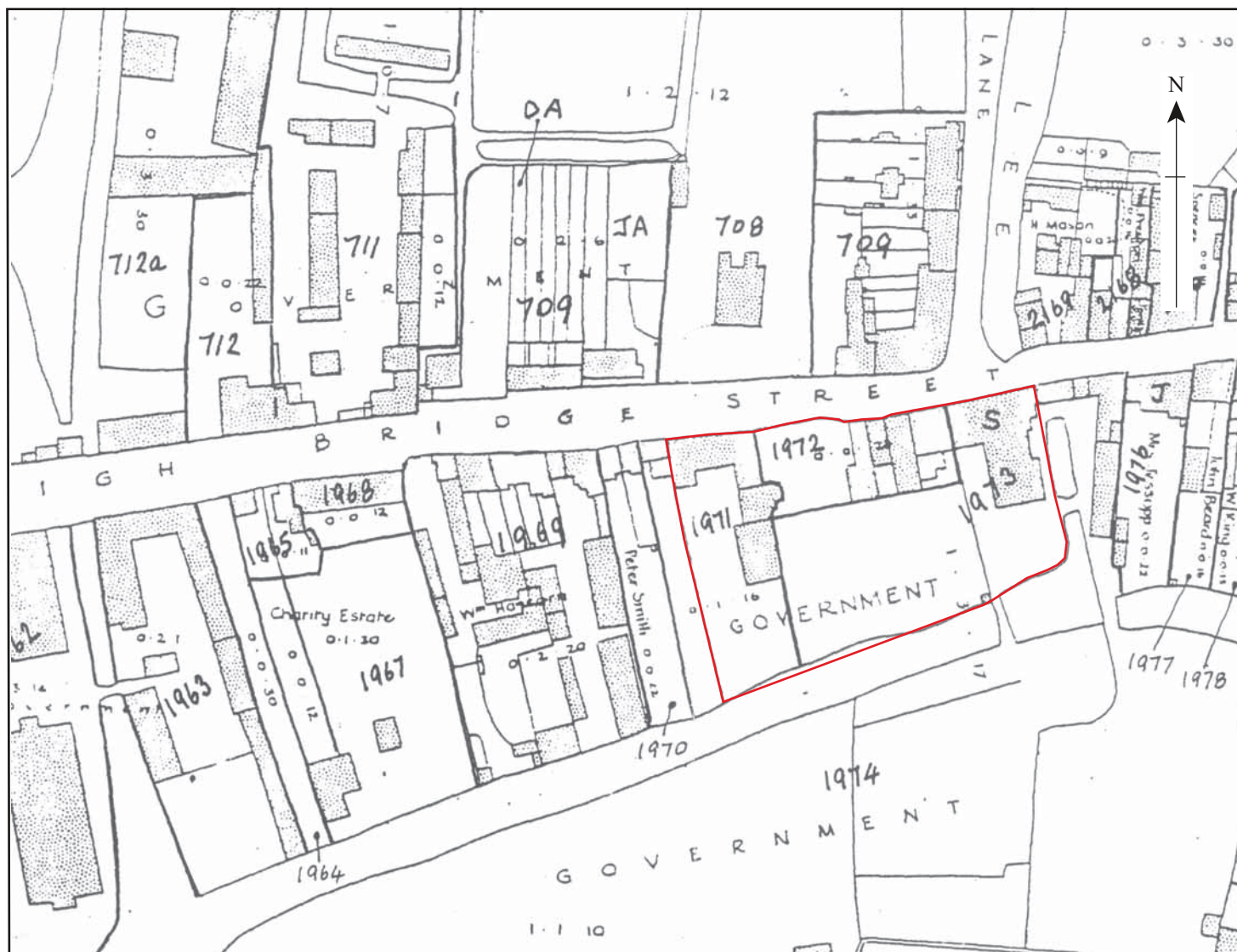


Figure 1: Site Location



Not to Scale

Figure 2: Town Map of 1826

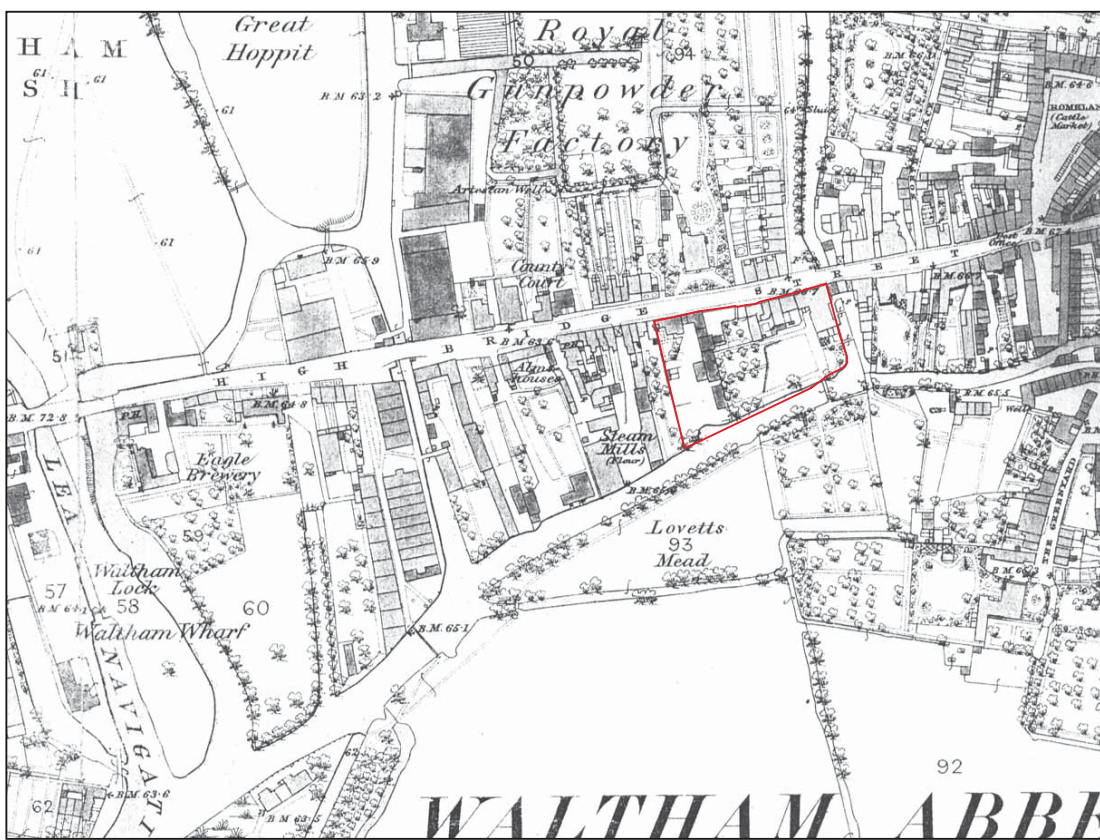


Figure 3: Ordnance Survey Map of 1870

Not to Scale



Figure 4: 19th Century Phtograph of the Rear of the Storekeepers House

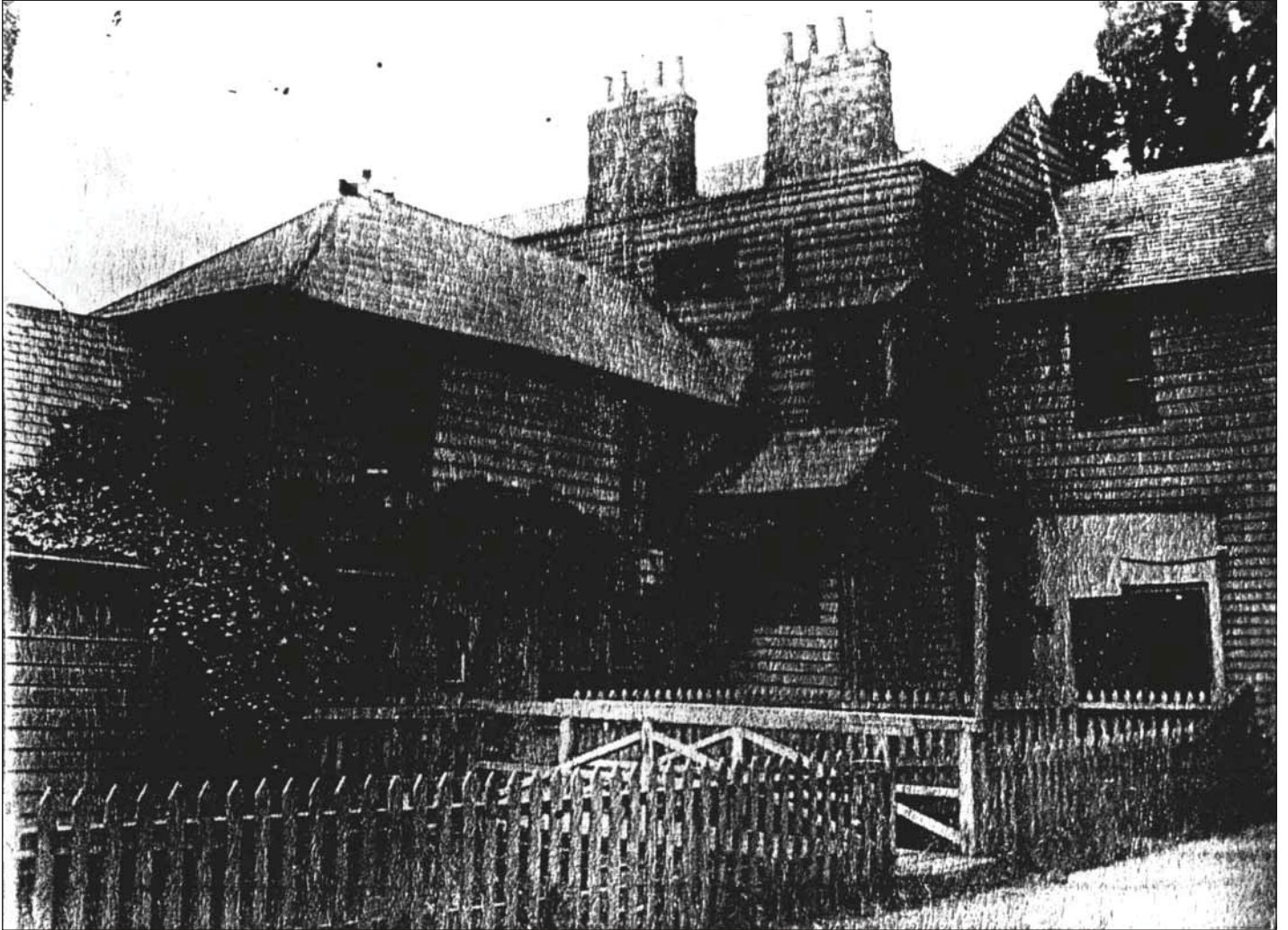
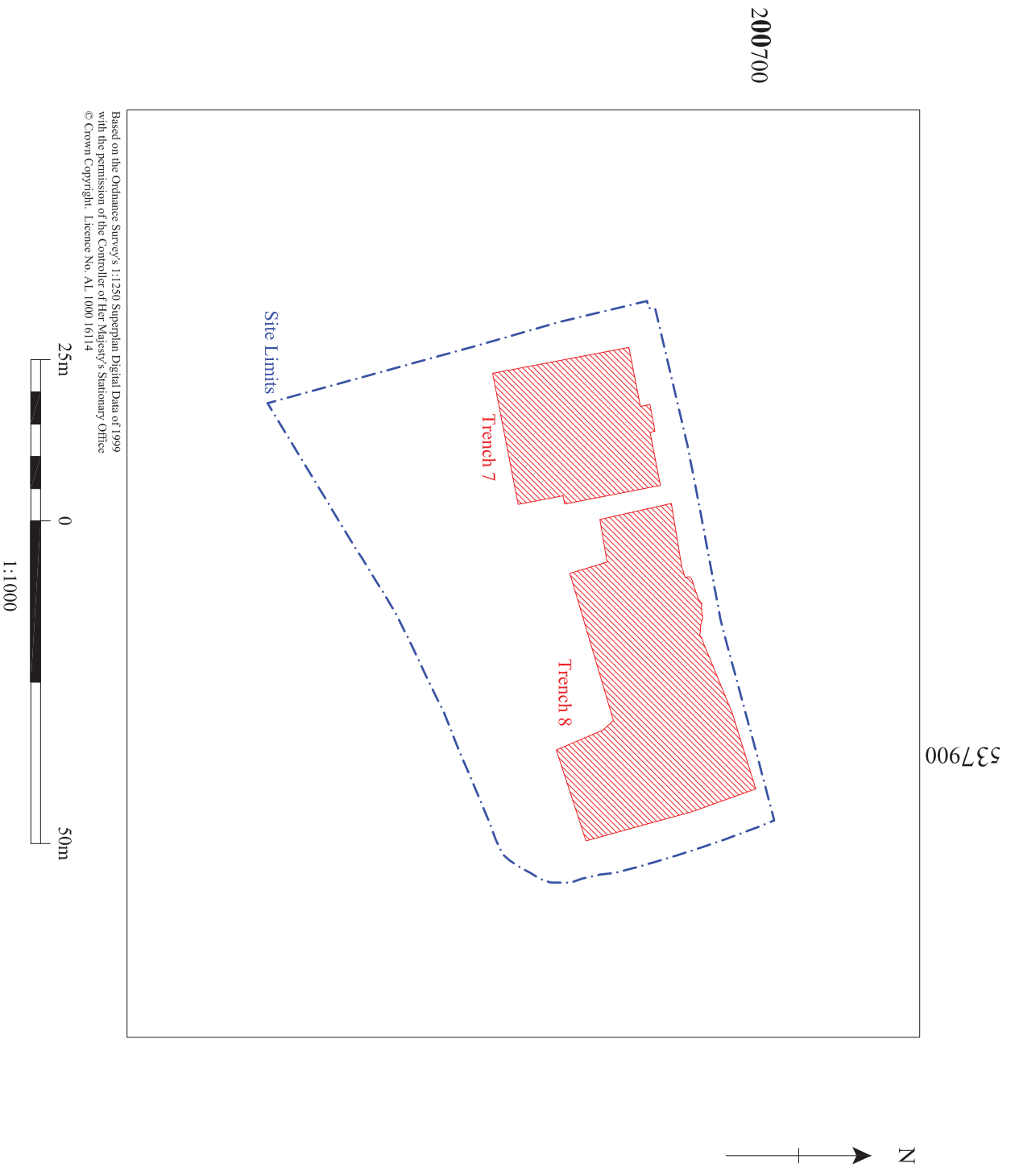


Figure 5: 19th Century Phtograph of the Rear of the Storekeepers House



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Figure 6: Location of excavated areas

- Internal Surface
- Stone
- Foundation Truncation
- - - Truncation
- ⋯ Truncated Wall
- Wall

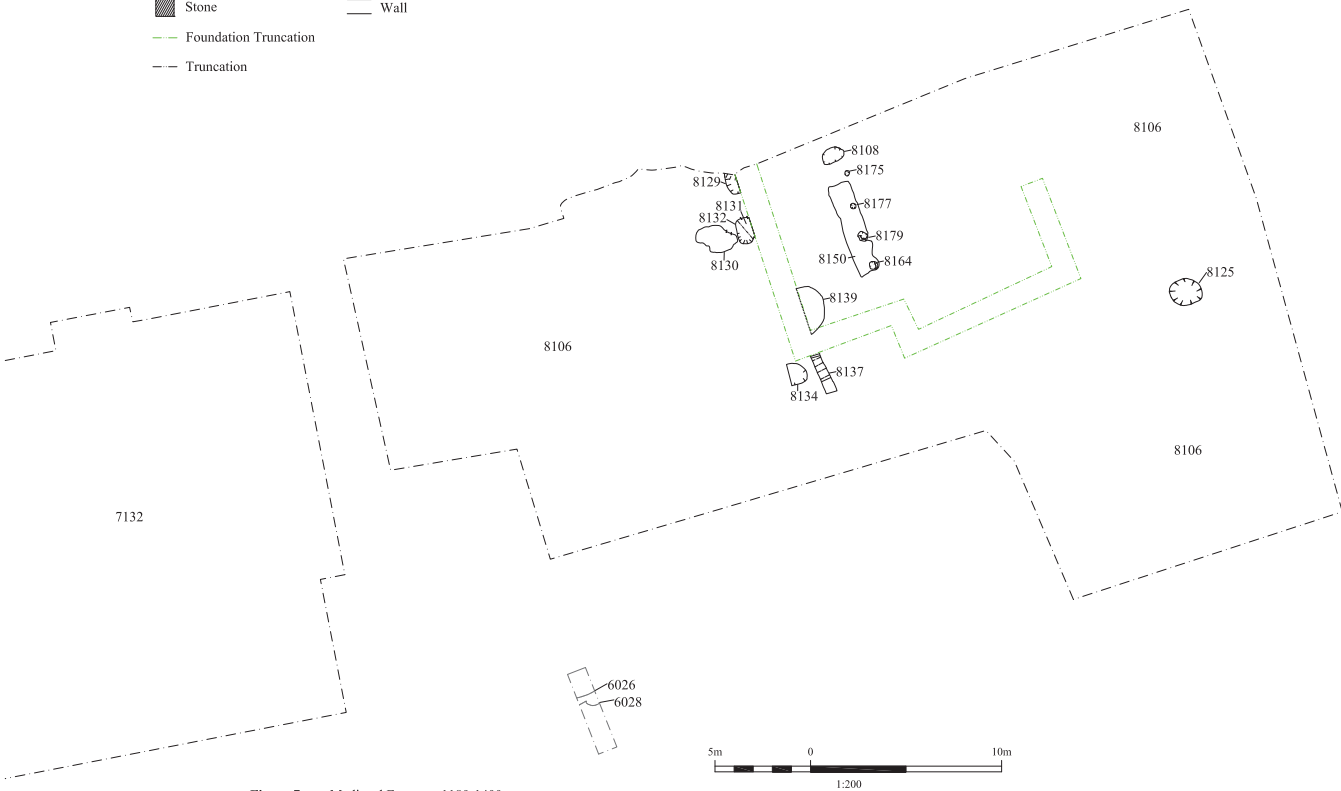


Figure 7: Medieval Features, 1180-1400

- Internal Surface
- Stone
- Foundation Truncation
- - - Truncation
- ⋯ Truncated Wall
- ▭ Wall

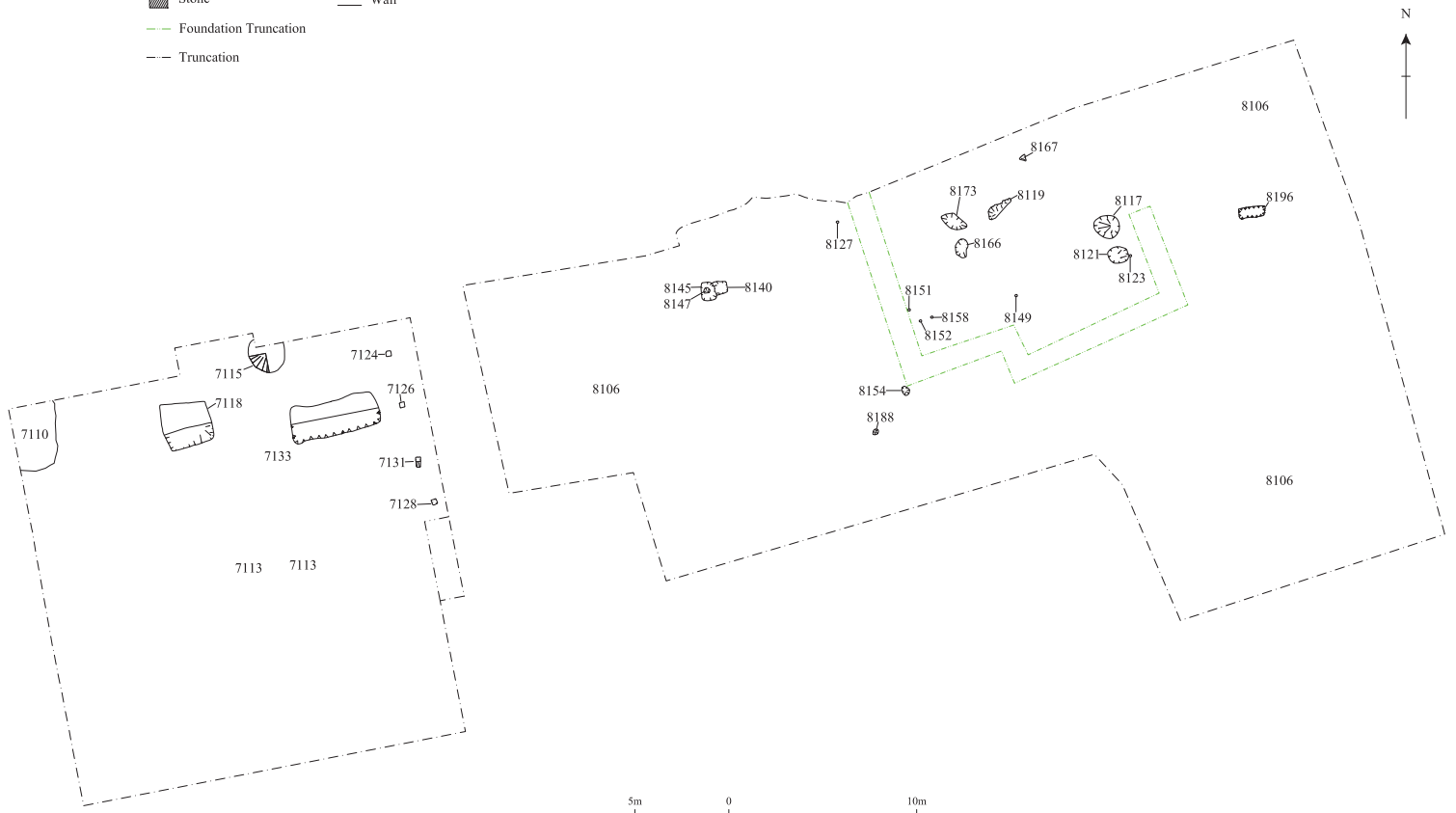


Figure 8: Medieval features, 1400-1540



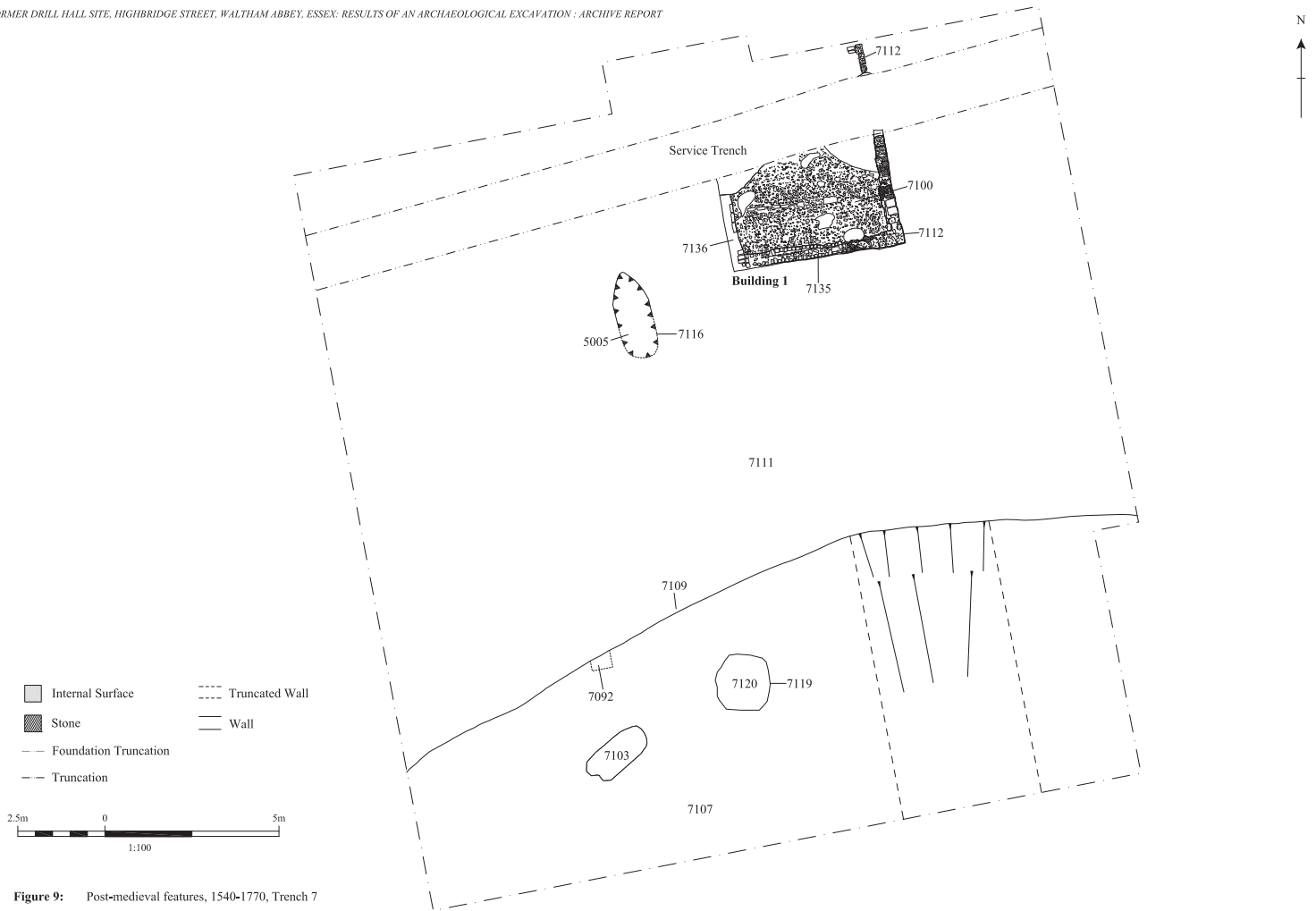


Figure 9: Post-medieval features, 1540-1770, Trench 7

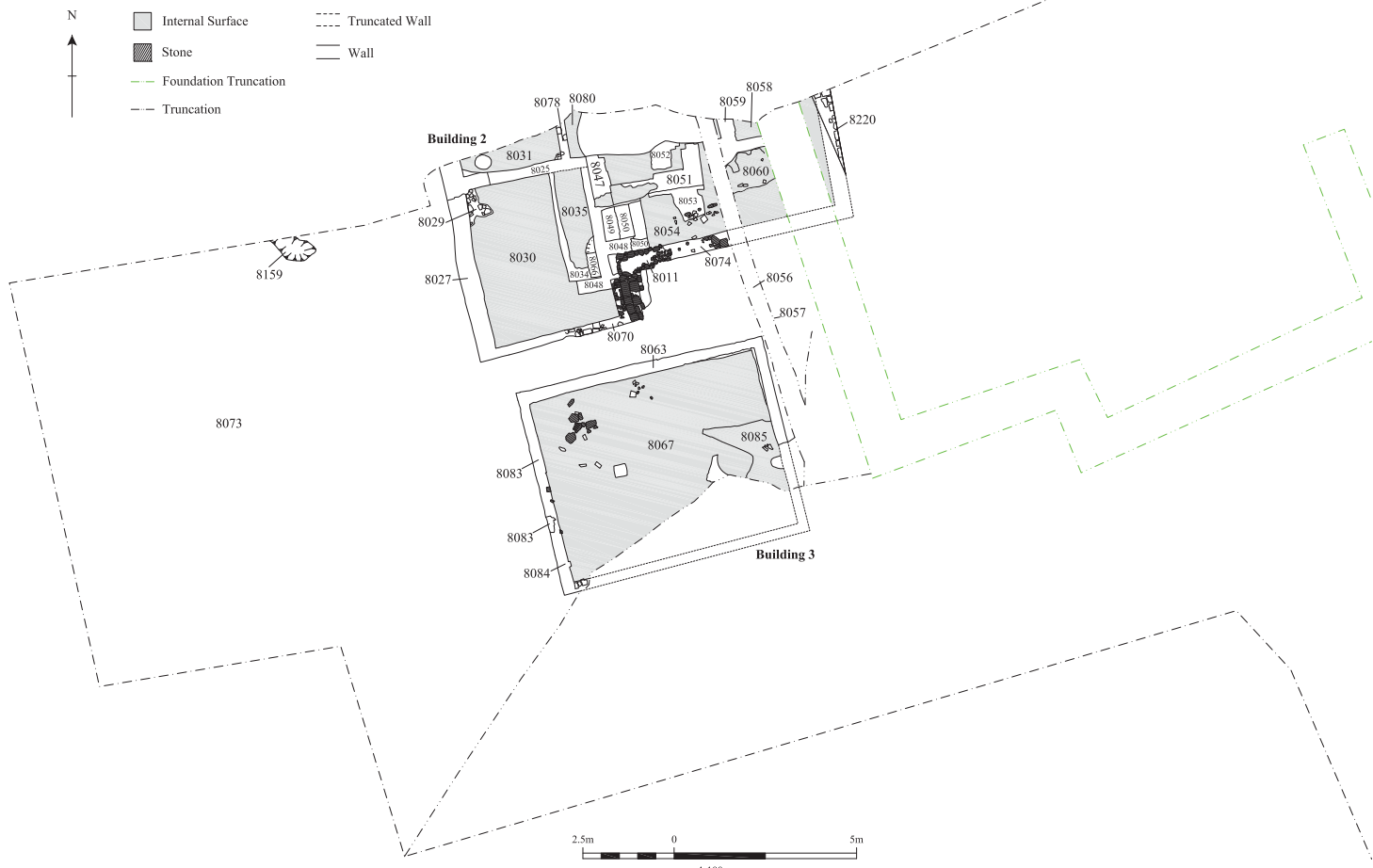


Figure 10: Post-medieval Features, 1540-1805, Trench 8



Figure 11: Post-medieval Features, 1770-1820, Trench 7

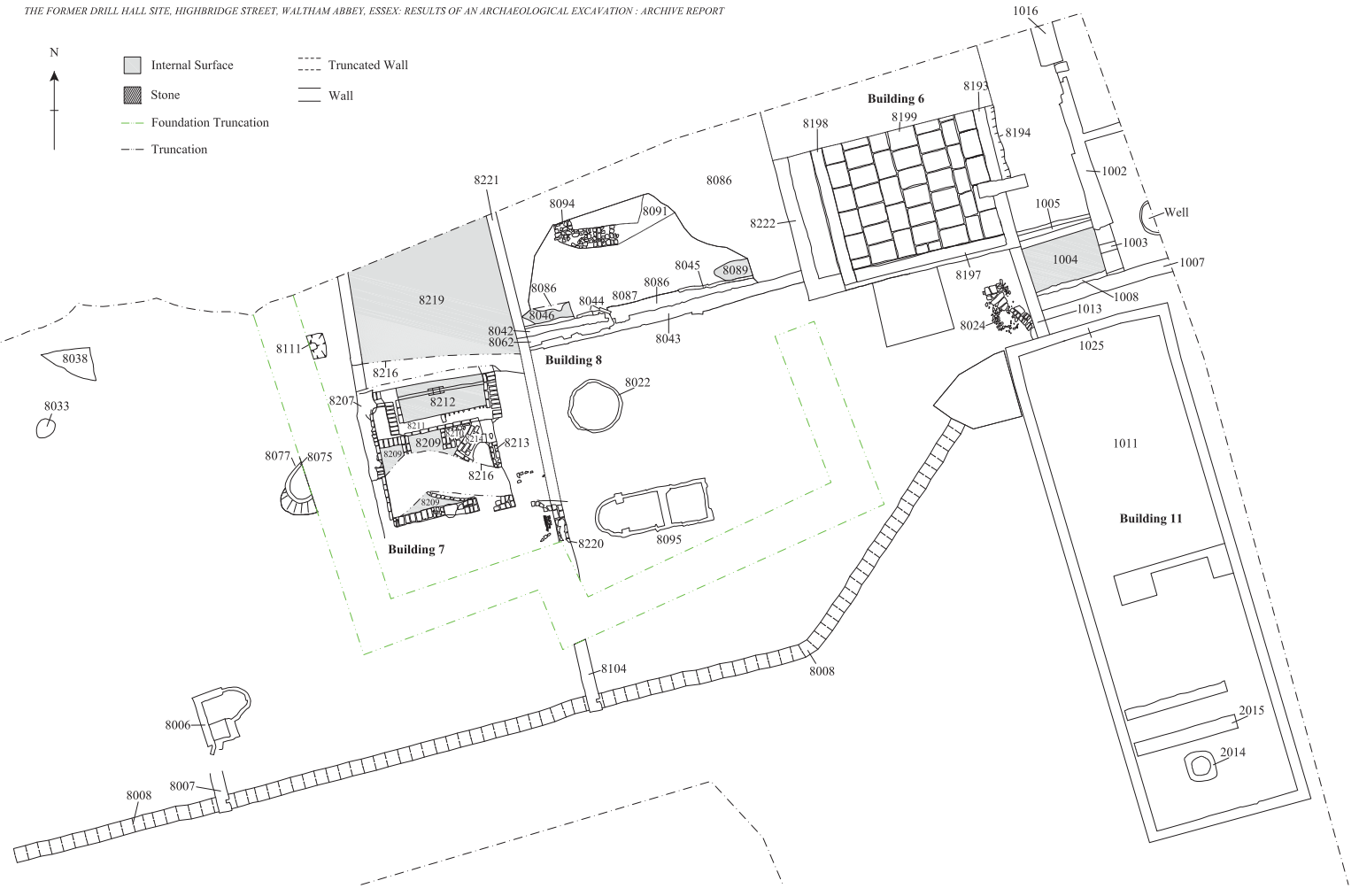


Figure 12: Post-medieval Features, 1805-1945, Trench 8



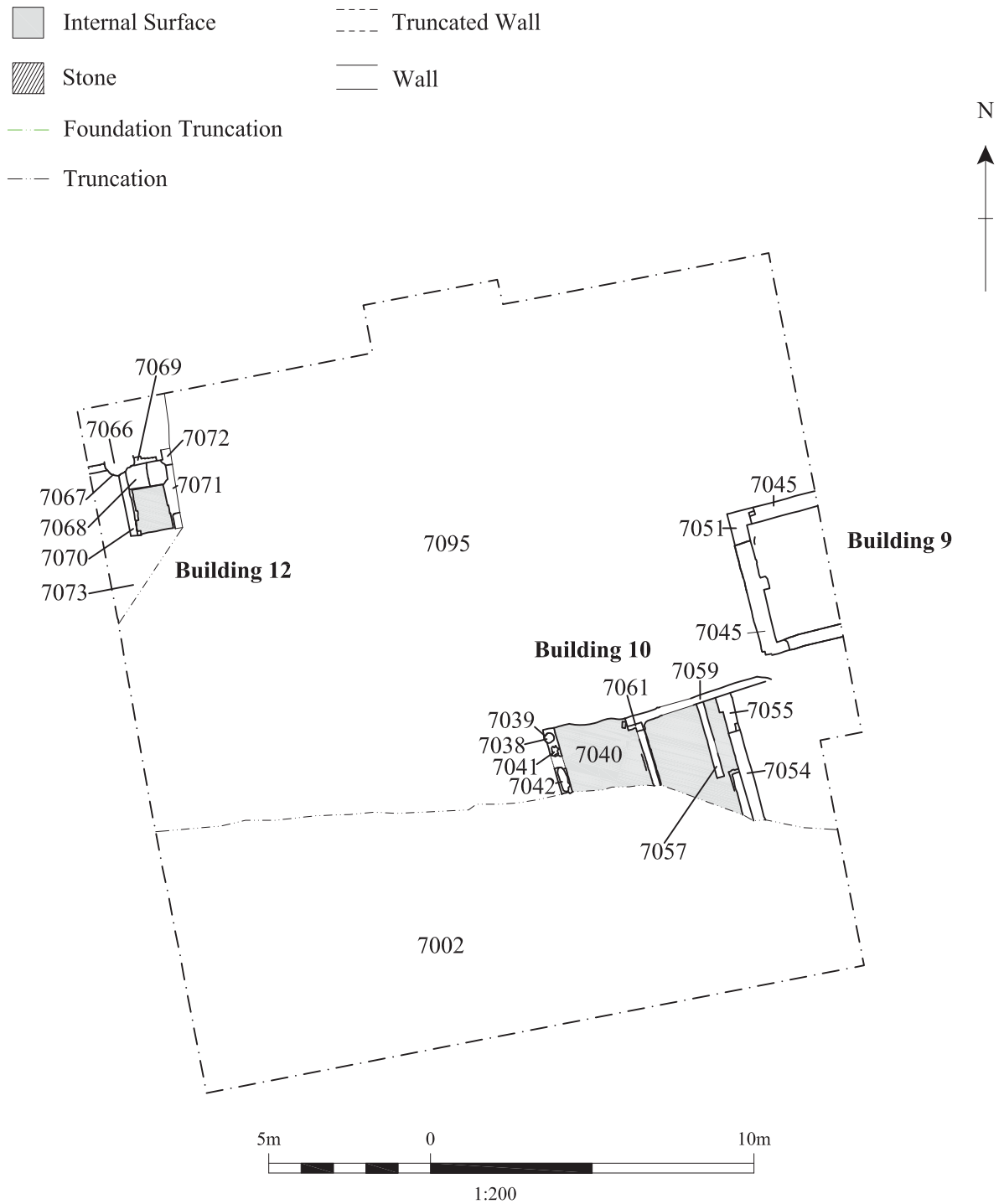


Figure 13: Post-medieval Features, 1820-1945, Trench 7



Figure 14: Location of Late 19th-early 20th Century Government House

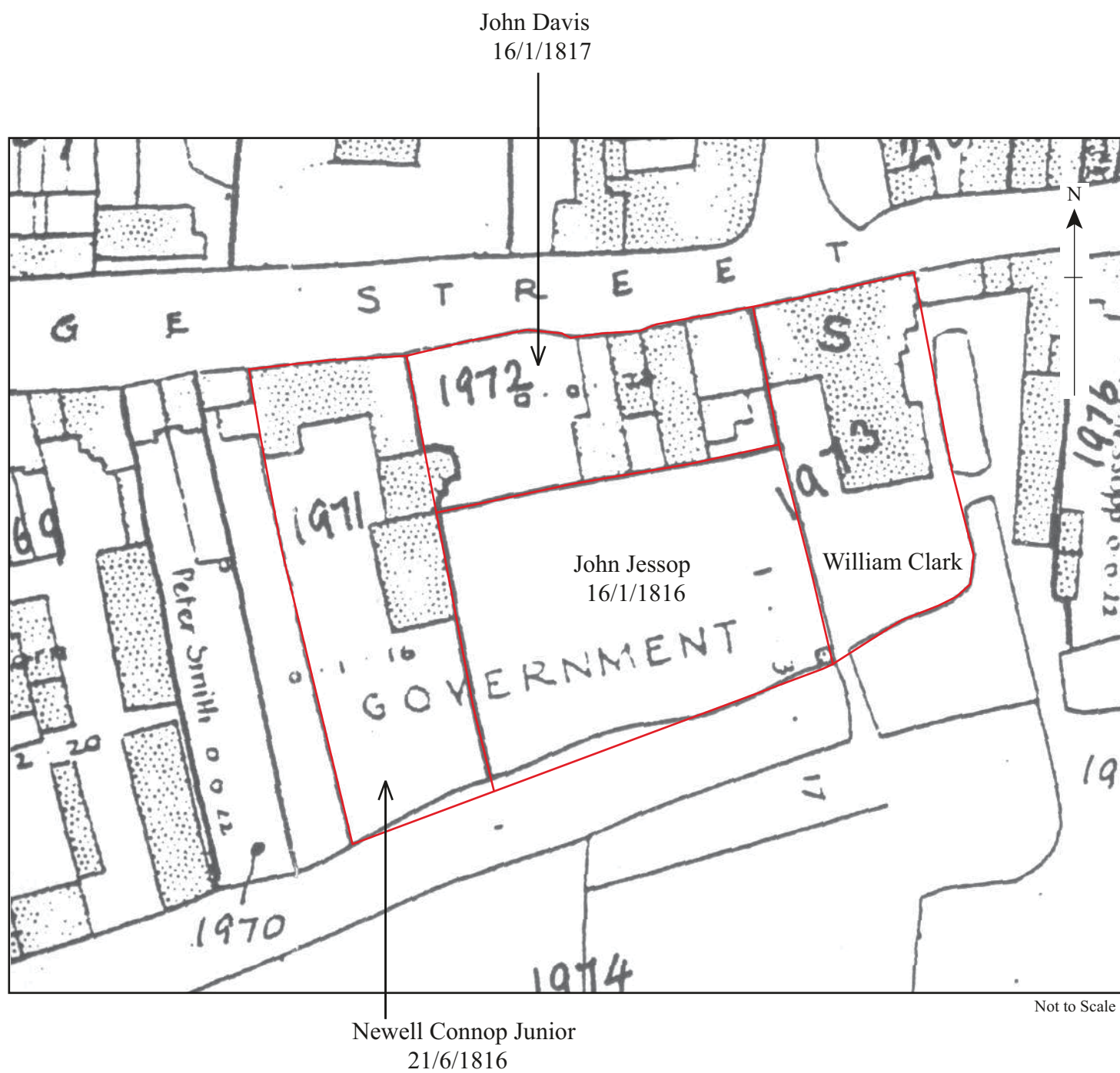


Figure 15: Town Map of 1826 Showing Previous Owners

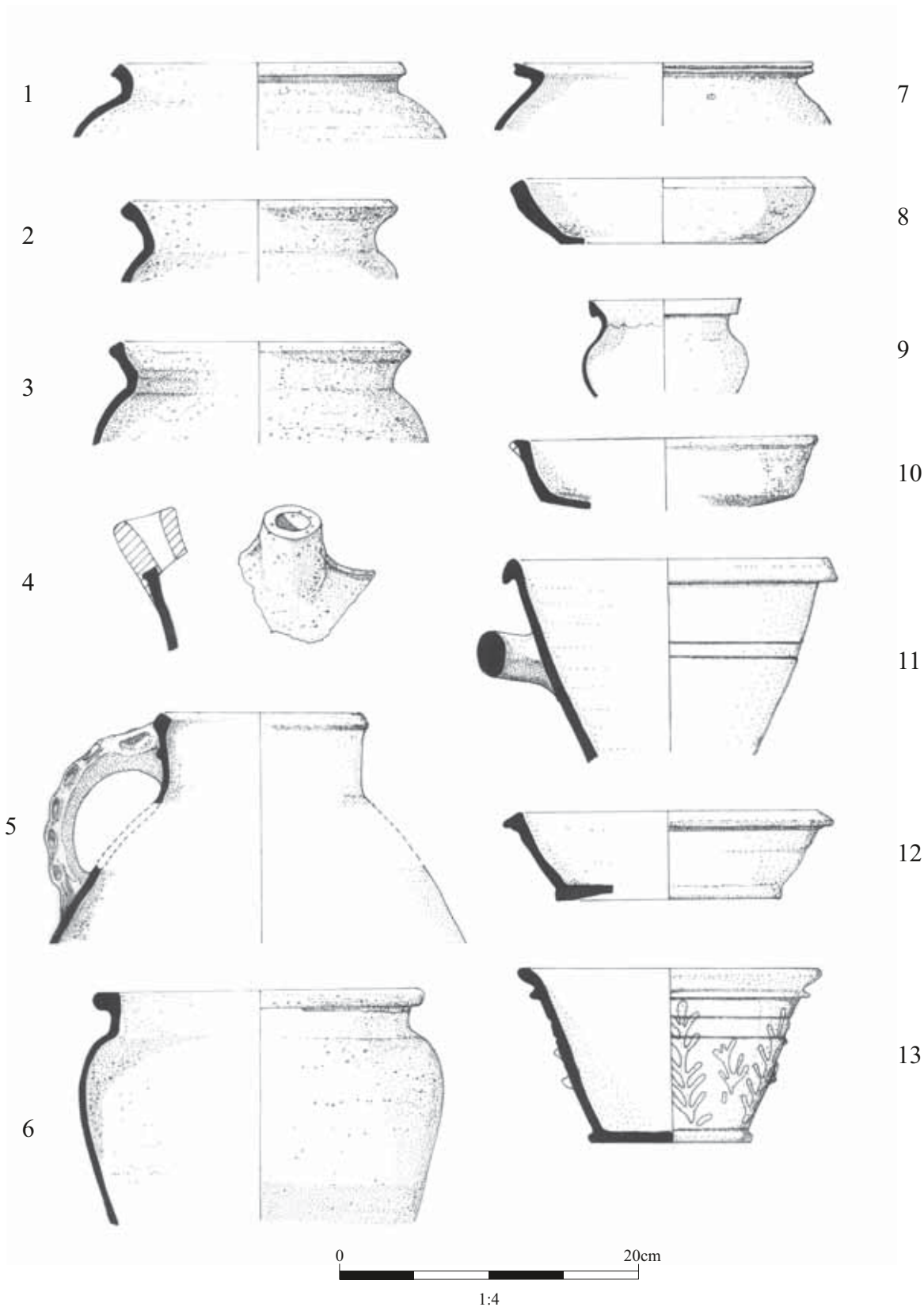
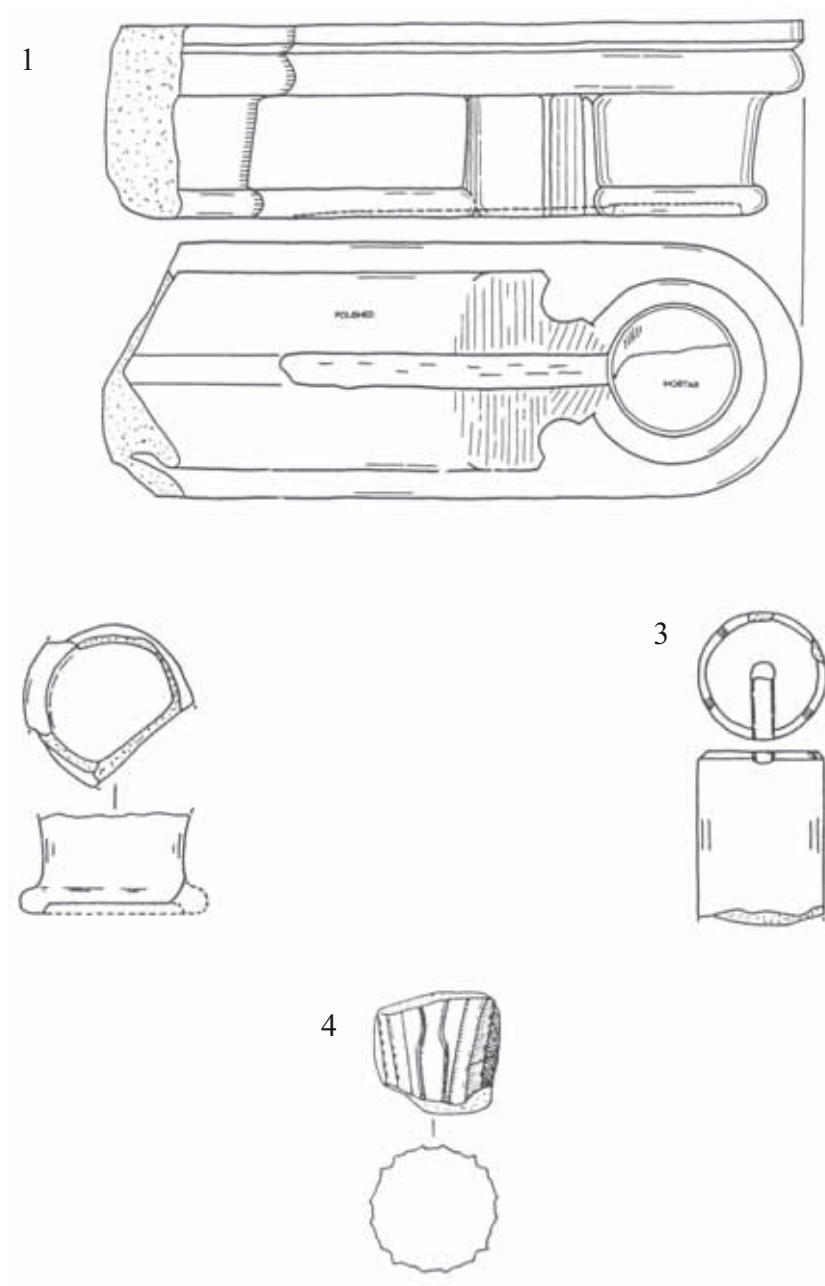


Figure 16: The Pottery Finds



- No.1 : Clerestorey lintel from 1989 excavations
No.2 : Fragment of similar bell capital, from context 8003
No.3 : Piece of shaft to suit 1 and 2, from context 8011
No.4 : Piece of moulded capital, context 7112

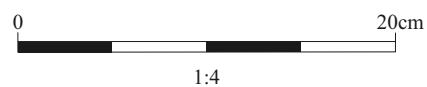
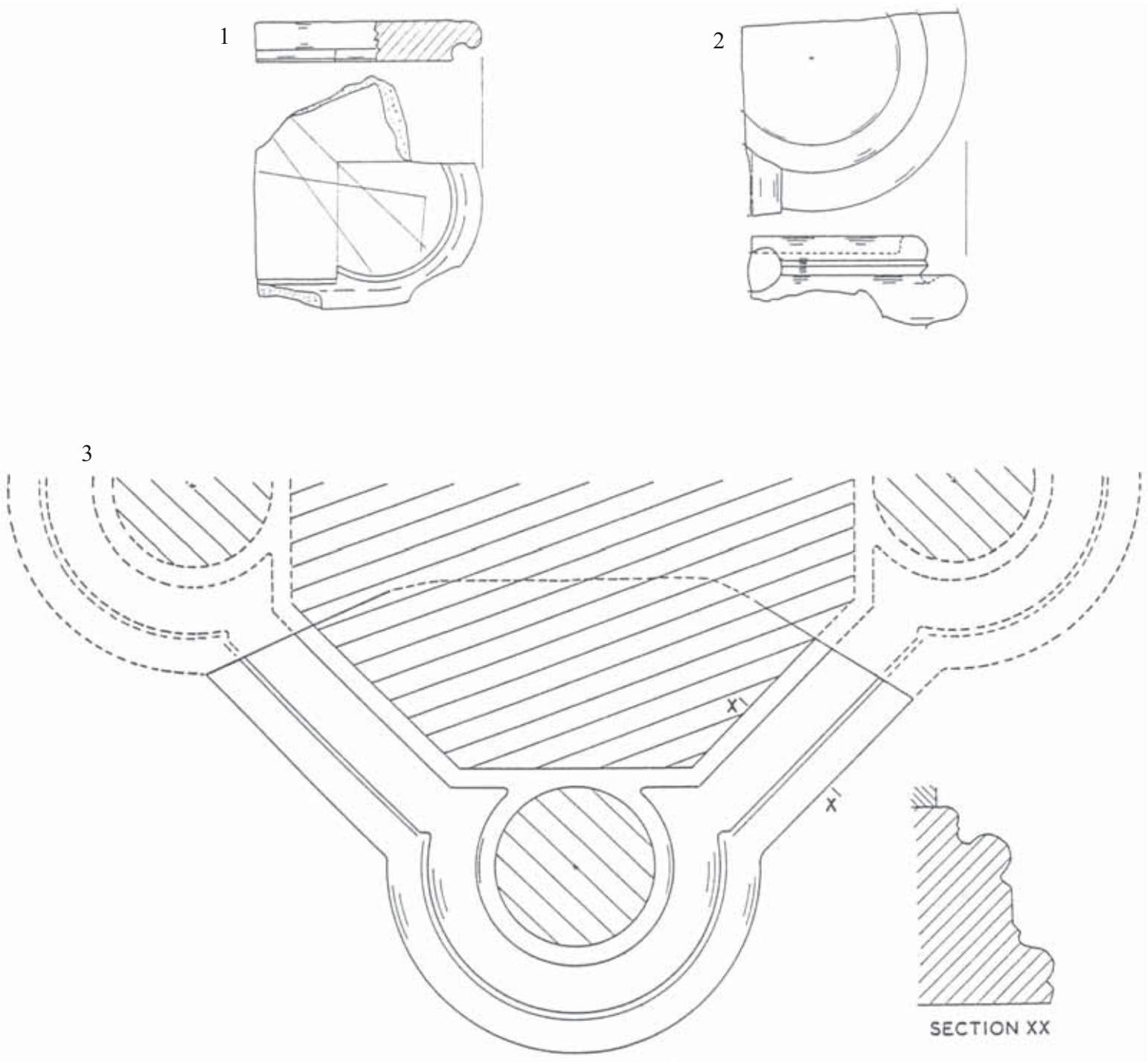


Figure 17: Masonry



No.1 : Typical Waltham abacus, from context 8003

No.2 : Piece of massive shaft base, from context 8003

No.3 : Base of unprovenanced major pier for comparison with No. 2

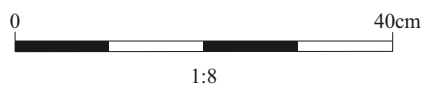
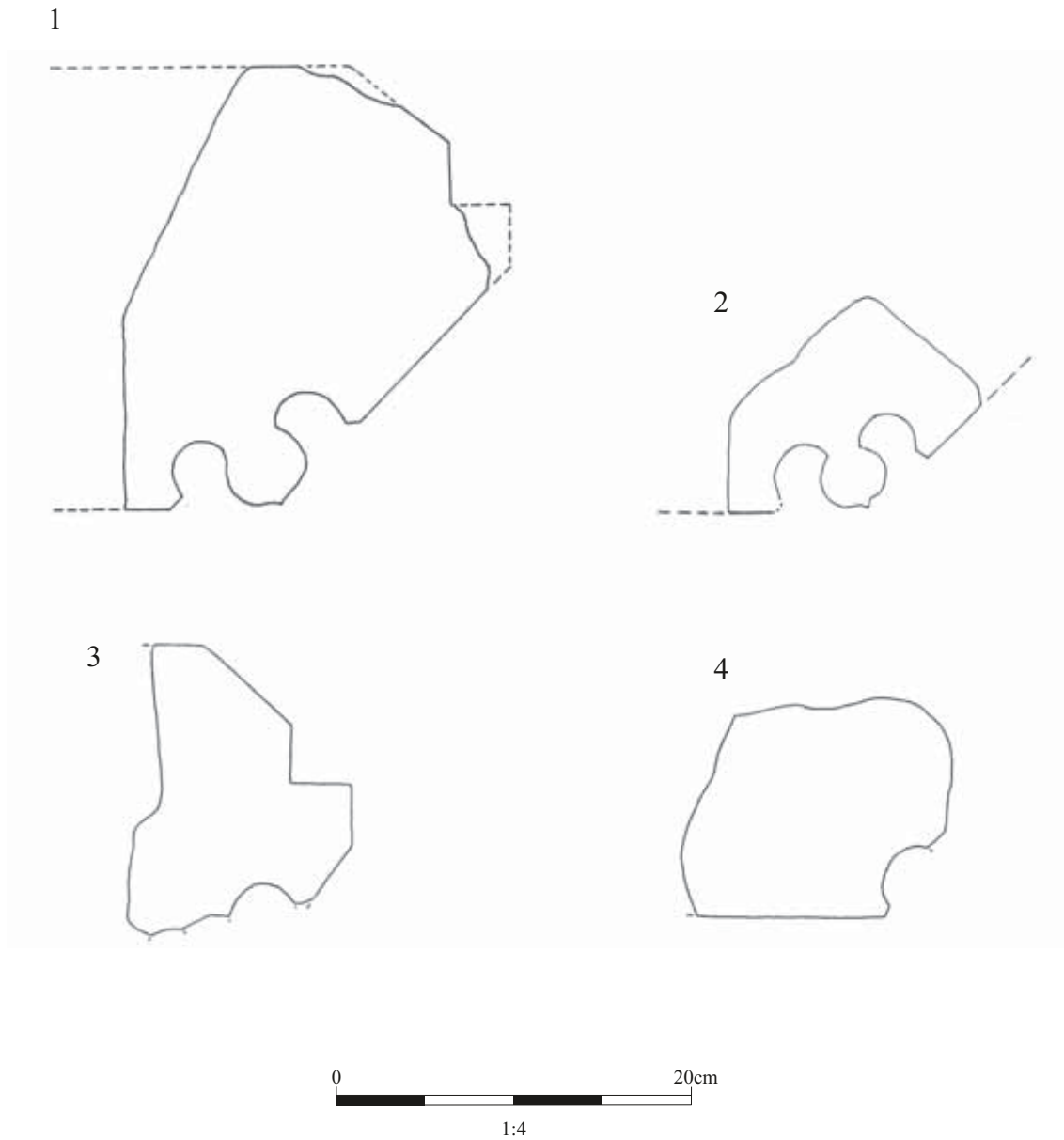


Figure 18: Masonry

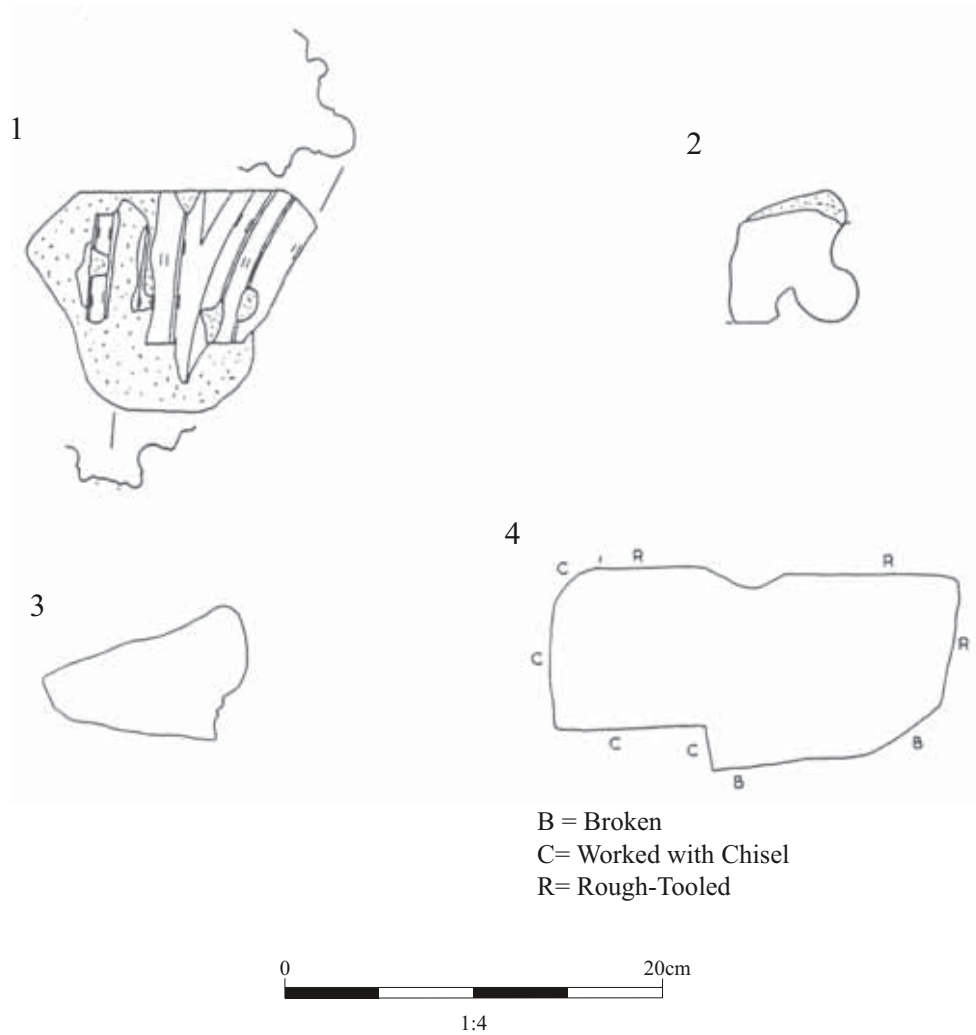


No.1 & 2 : Unprovenanced pieces of window/door jambs

No.3 : Piece like No. 1, from context 7112

No.4 : Piece probably like No. 2, from context 7112

Figure 19: Masonry



No.1 : Arch springer stone, Reigate stone, from context 7104

No.2 : Arch stone, Reigate stone, from context 7003

No.3 : Moulded Kentish ragstone, from context 7112

Figure 20: Masonry

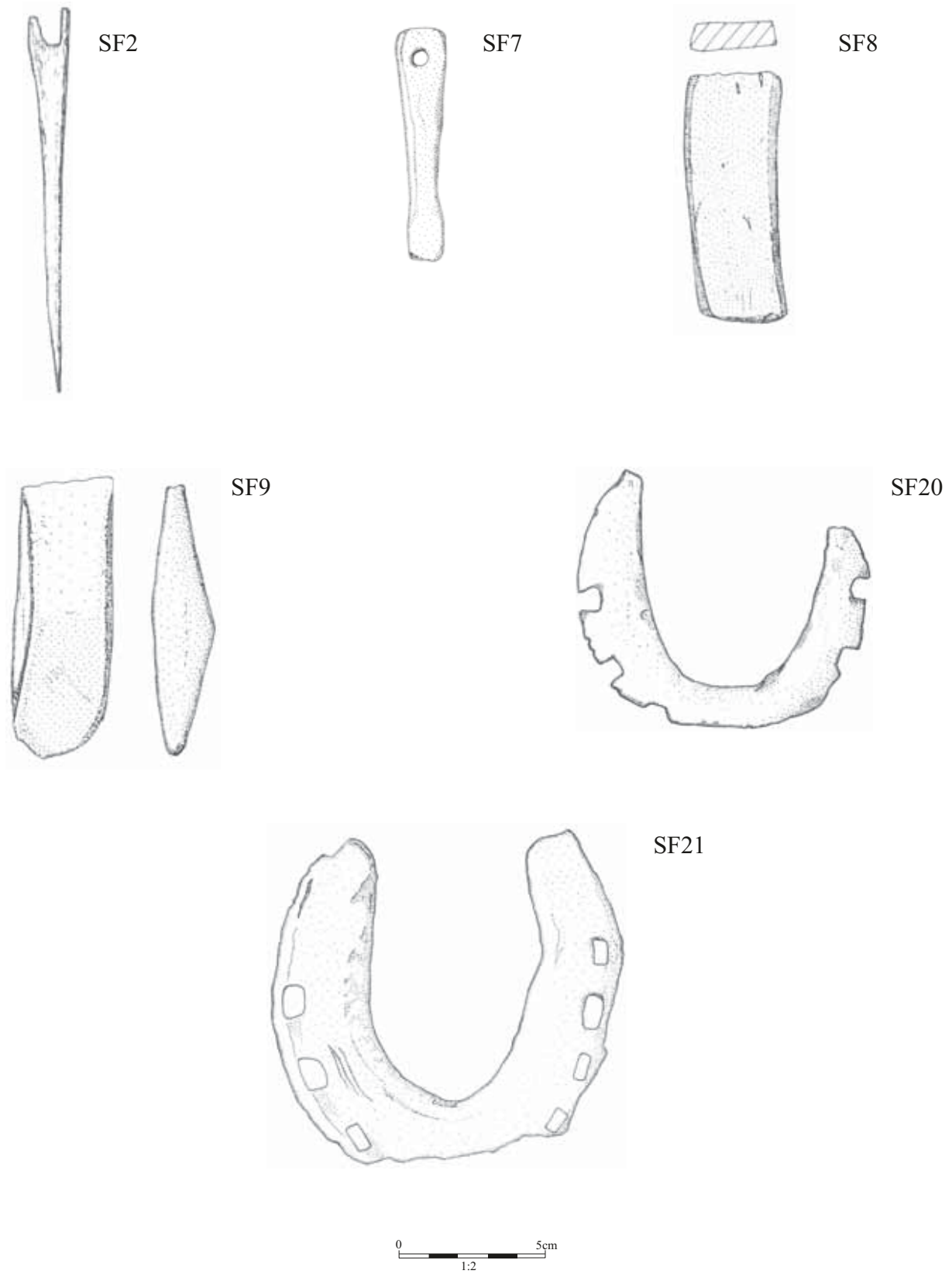


Figure 21: Registered Finds

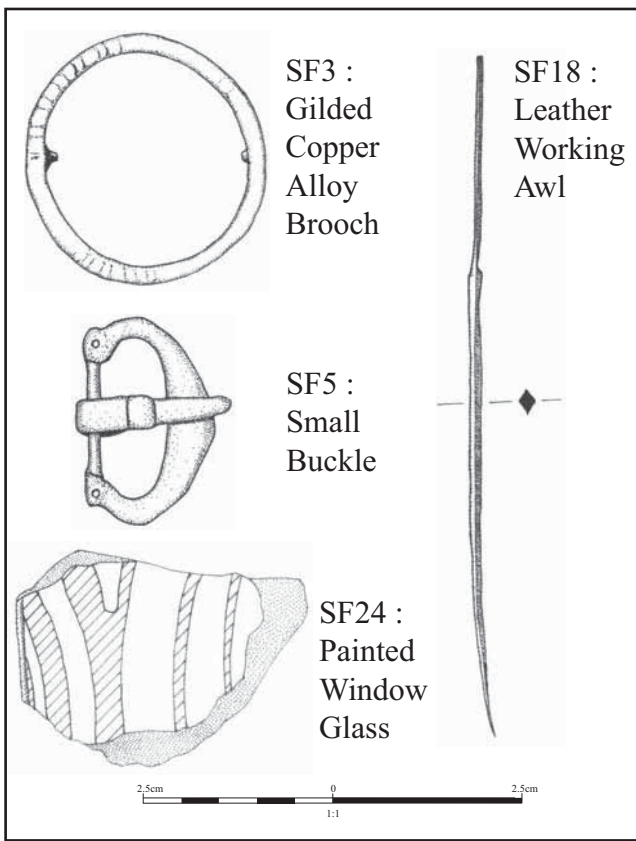


Figure 22: Registered Finds

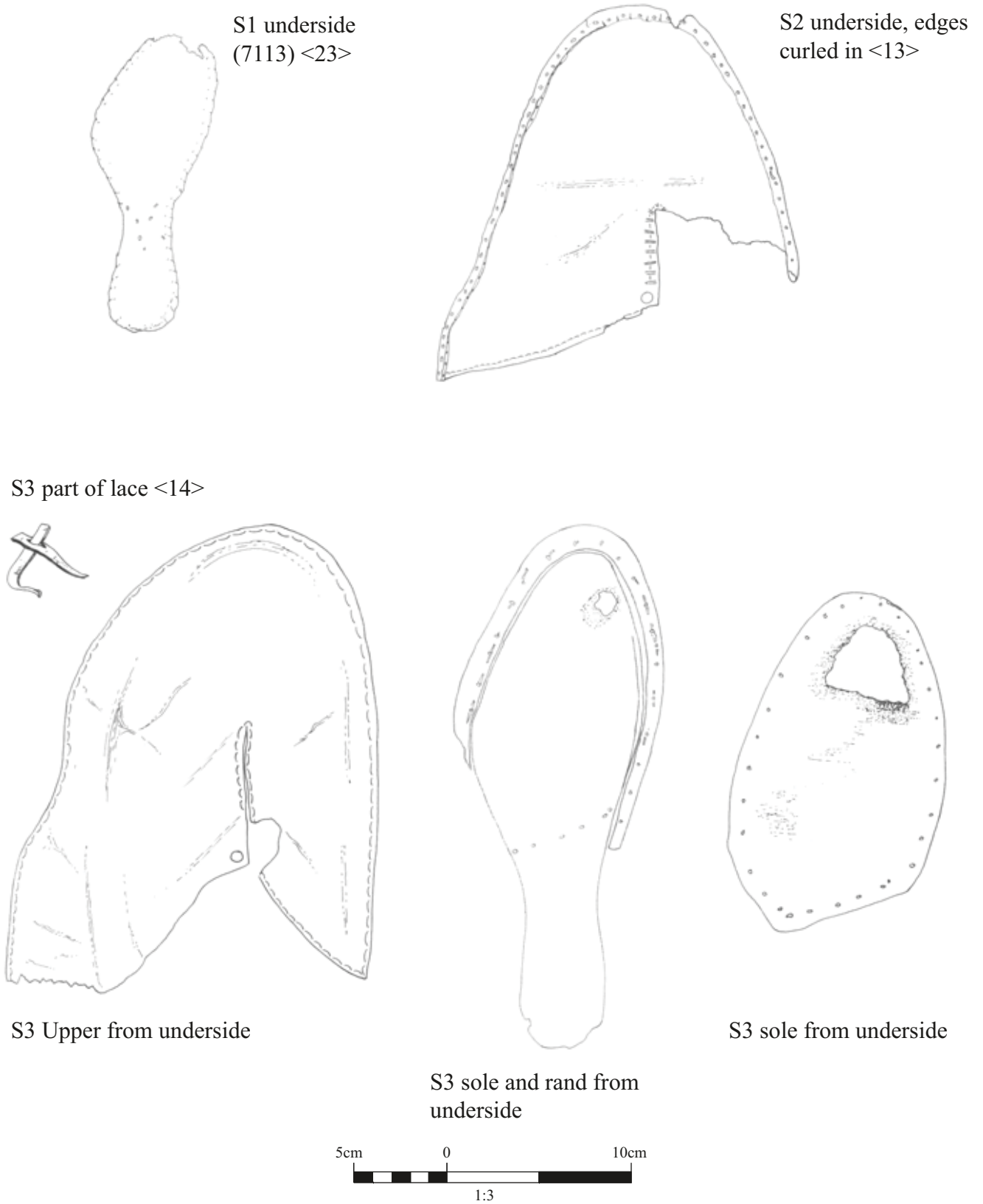


Figure 23: Leather

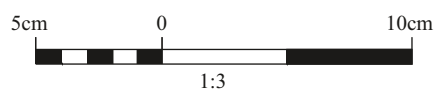
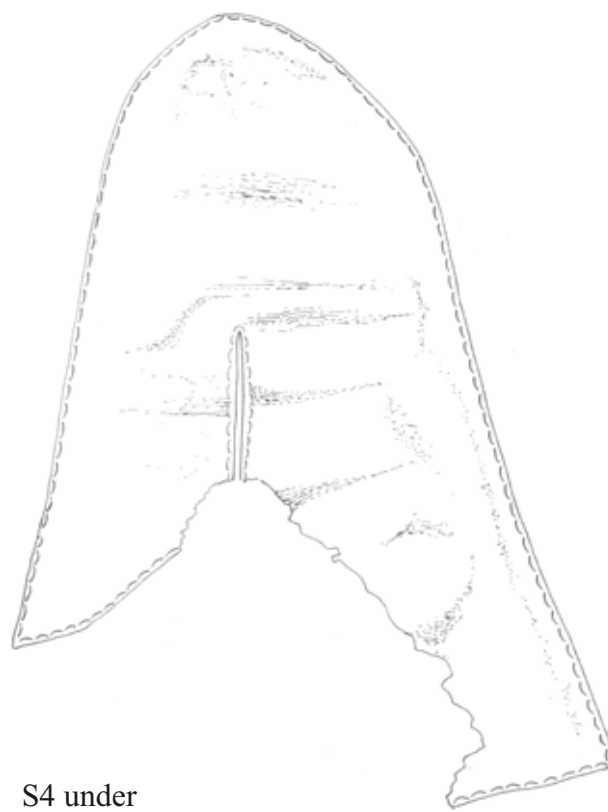
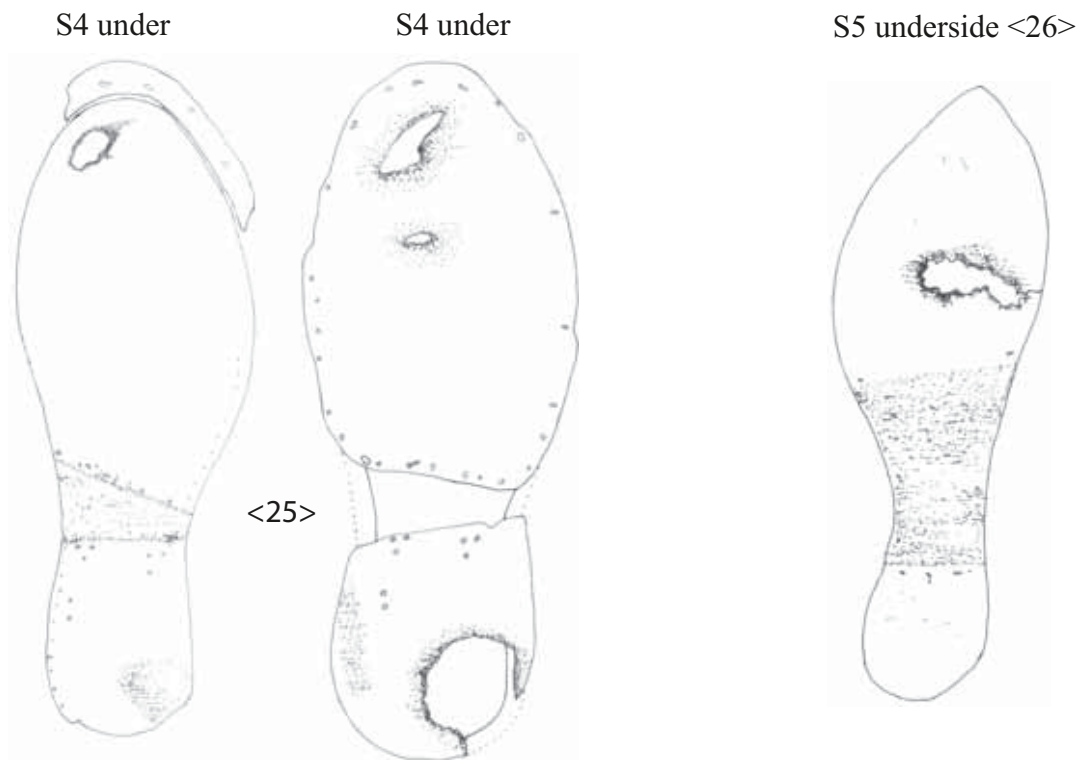
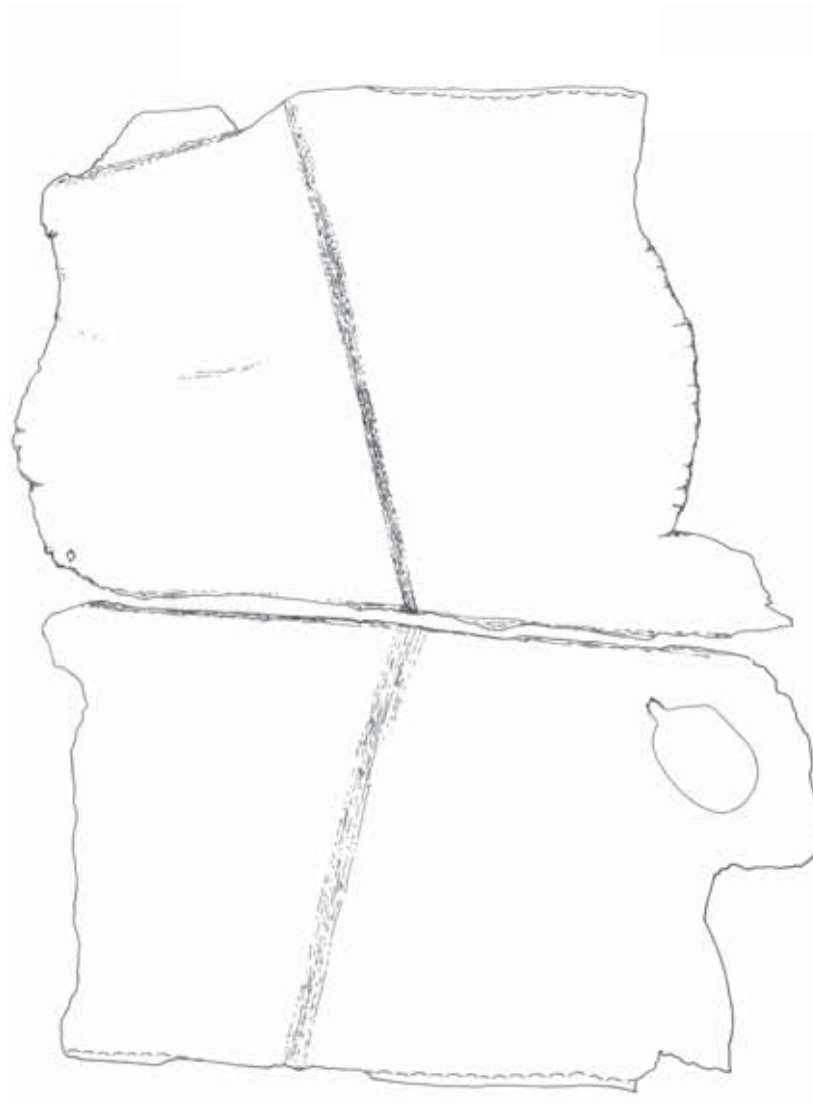


Figure 24: Leather

SF11



SF12



SF15

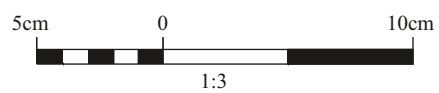


Figure 25: Leather

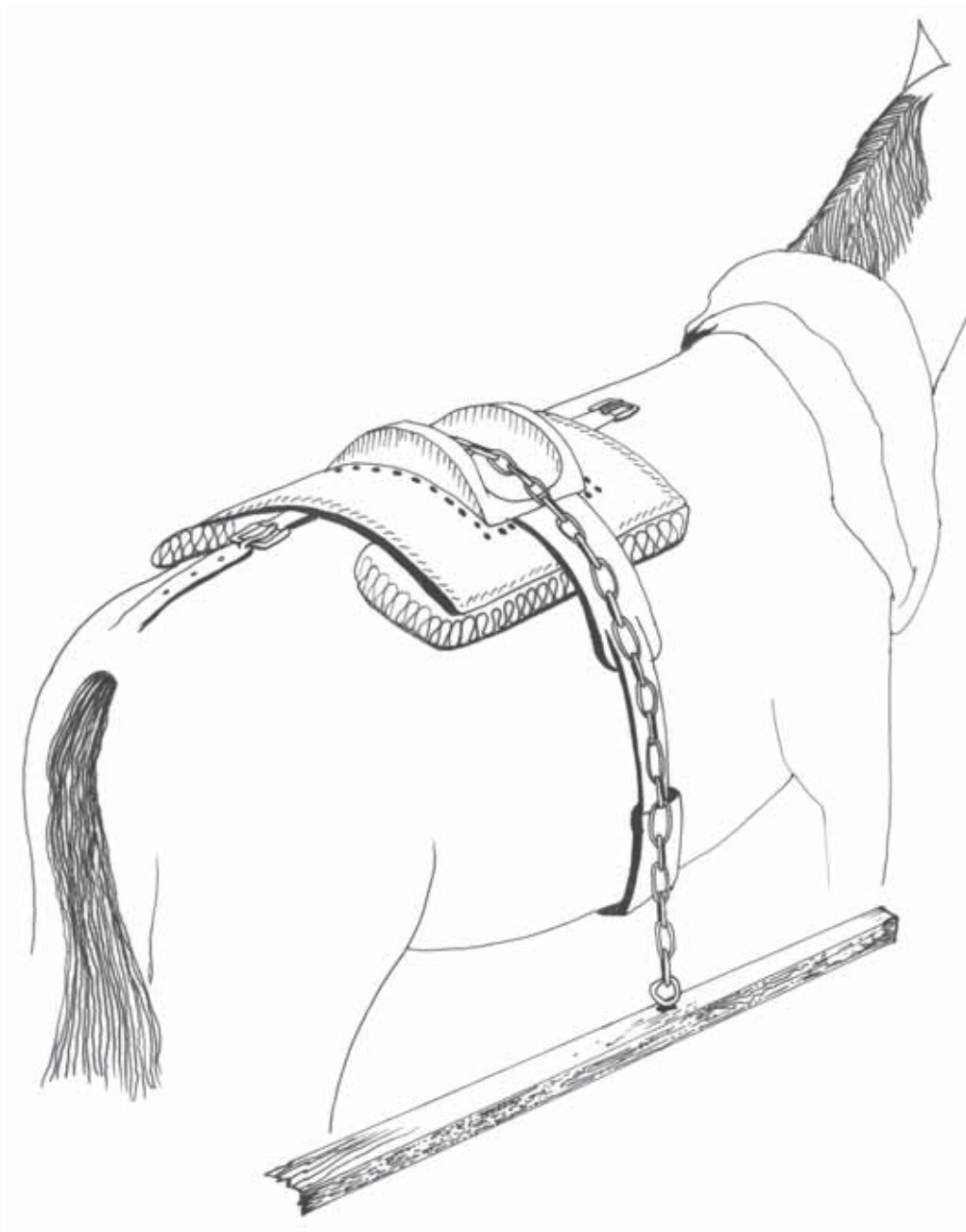


Figure 36: Reconstruction of the Cart Saddle

APPENDIX A

Trench 1

Context	Description	Length	Width	Depth	Finds	Equated in excavation
1001	Overburden	Trench	Trench	0.50m		8001
1002	Wall rebuild	5.30	0.50	>0.12		No. retained
1003	Wall	1.40	0.45	>0.12	CBM	No. retained
1004	Cobble floor	2.70	2.00	Unex		No. retained
1005	Partition wall	2.00	0.24	1.40		No. retained
1006	Partition wall	0.56	0.22	0.15	CBM	No. retained
1007	Wall	3.00	0.35	>0.60	CBM	No. retained
1008	Wall poss. rebuild	2.00	0.25	0.14		No. retained
1009	Demo. deposit	3.40	1.70	Unex		No. retained
1010	Make up layer	3.40	1.90	0.40		No. retained
1011	Concrete floor	1.40	0.40	Unex		No. retained
1012	Partition wall	1.30	0.20	>0.12	CBM	No. retained
1013	Wall	2.20	0.25	>0.40		No. retained
1014	Wall	2.60	0.35	>0.60		No. retained
1015	Wall or buttress	1.20	0.35	>0.12		No. retained
1016	Concrete pad	0.70	0.60	Unex		No. retained
1017	Poss. threshold	1.20	0.40	Unex		No. retained
1018	Make up layer	0.30	0.15	Unex		No. retained
1019	Mortar floor	0.90	0.50	0.50		No. retained
1020	Make up layer	Sondage	>0.50	0.22		No. retained
1021	Gravel and clay dump	Sondage	Sondage	0.38		No. retained
1022	Silty clay deposit	Sondage	>0.65	0.15		No. retained
1023	Wall	Sondage	u/k	0.25		No. retained
1024	Construction cut	>0.50	u/k	0.22		No. retained
1025	Wall	Sondage	0.35	>0.20		No. retained

THE FORMER DRILL HALL SITE, HIGHBRIDGE STREET, WALTHAM ABBEY, ESSEX
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Trench 2

Context	Description	Length	Width	Depth	Finds	Equated in excavation
2001	Tarmac surface	Trench	Trench	0.35		8001
2002	Overburden/ make up	Trench	Trench	0.20		8002
2003	Brick path	>6.00	0.80m	0.15		No. retained
2004	Construction cut	>6.00	0.80m	0.15		No. retained
2005	Pit fill	0.90	>0.60m	>0.20	Pot, CBM, Bone	No. retained
2006	Cut	0.90	>0.60m	>0.20		No. retained
2007	Garden soil	0.90	0.90	0.60	Pot, CBM, Bone	No. retained
2008	Silty clay deposit	>5.00	Trench	0.65	Pot, Bone	8105
2009	Surface/ path	>1.70	Sondage 1	0.15	Pot	No. retained
2010	Alluvial layer	1.30	Sondage 1	0.10	Bone	8106
2011	Wall	Trench	0.25	unex		No. retained
2012	Wall	Trench	0.40	0.15		No. retained
2013	Path	2.00	0.45	unex		No. retained
2014	Well	0.85	0.85	>0.60		No. retained
2015	Wall	Trench	0.45	0.15		No. retained
2016	Floor	Trench	0.25	0.05		No. retained
2017	Construction cut	0.95	0.95	unex		No. retained
2018	Alluvial layer	Sondage 2	Sondage 2	0.15		8106
2019	Alluvial layer	Sondage 2	Sondage 2	0.10		8106
2020	Alluvial layer	Sondage 2	Sondage 2	>0.15		8106
2021	Greenhouse wall	Trench	0.23	unex		No. retained

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Trench 3

Context	Description	Length	Width	Depth	Finds	Equated in excavation
3001	Concrete slab	Trench	Trench	0.10		8001
3002	Wall	>3.00	0.45	>0.12		No. retained
3003	Wall	>3.00	0.25	>0.06		No. retained
3004	Wall	>5.50	0.25	>0.06		No. retained
3005	Wall	>2.50	0.25	>0.20	CBM	No. retained
3006	Wall	>3.00	0.50	>0.12		No. retained
3007	Wall	>2.00	>0.35	>0.22	CBM	No. retained
3008	Wall	>0.80	0.25	>0.06		No. retained
3009	Topsoil	Trench	Trench	0.32		8003
3010	Modern layer	Trench	Trench	0.10		8002
3011	?Surface	>1.40	>1.00	0.03		No. retained
3012	Levelling layer	>1.40	>1.00	0.12		8002
3013	Levelling layer	>1.40	>1.00	<0.16		8002
3014	?Surface	>1.40	>1.00	0.08		No. retained
3015	Make-up layer	>1.40	>1.00	0.05		8002
3016	Make-up layer	>1.40	>1.00	0.14	CBM, Bone	8003
3017	Make-up layer	>1.40	>1.00	<0.06	Pot	8003
3018	?Post hole	0.50	0.40	0.03	Pot	-
3019	Layer, pre-building	>1.40	>1.00	0.10	Pot, CBM, Bone	8086
3020	Post hole cut	0.50	0.40	0.03		-
3021	Wall backfill	>2.00	>0.16	0.10		Not real
3022	Wall 007 cut	>2.00	>0.16	0.10		Not real
3023	Layer, below 019	>1.40	>1.00	<0.26	Pot, Bone	8105
3024	Layer, below 023	>1.40	>1.00	<0.14		8105
3025	Layer, below 024	>1.40	>1.00	<0.12		8105
3026	Layer, below 025	>1.40	>1.00	>0.50	Pot, CBM, Bone	8106
3027	Modern layer	Trench	Trench	<0.05		8002
3028	?Surface	>2.50	>1.80	<0.40		8086
3029	Fill	>2.50	>1.8	<0.30		No. retained
3030	Pit	>2.50	>1.80	0.30		No. retained
3031	Make-up layer	>1.60	>1.00	>0.10		No. retained

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Context	Description	Length/m	Width/m	Depth/m	Finds	Equated in excavation
3032	Layer, below 031	>1.60	>1.00	>0.10		8105
3033	Layer, below 3032	>1.60	>1.00	0.20		8105
3034	Layer, below 3033	>1.60	>1.00	>0.25	Pot, Bone	8105
3035	Layer, below 3034	>1.60	>1.00	>0.20	Pot, CBM, Bone	8105
3036	Layer, below 3035	>1.60	>1.00	>0.20	Pot	8106

Trench 4

Context	Description	Length/m	Width/m	Depth/m	Finds	Equated in excavation
4001	Tarmac	Trench	Trench	0.10		8001
4002	Concrete	>7.00	Trench	0.20		8001
4003	Levelling layer	>7.00	Trench	0.10		8002
4004	Overburden	>2.00	Trench	0.10		8003
4005	Layer	>4.70	Trench	<0.22		8003
4006	Demo. Deposit	>7.00	Trench	0.25	Pot	8012
4007	Layer	>7.00	Trench	0.04		8012
4008	Mortar fill	<1.30	<0.25	0.04		8012
4009	Cut	<1.30	<0.25	0.04		Not real
4010	Former topsoil	<4.50	Trench	0.03		-
4011	Layer	<2.30	Trench	0.03	Pot, CBM, Bone	8004
4012	Mortar fill	<0.42	>0.32	0.01		Not seen
4013	Cut	<0.42	>0.32	0.01		Not seen
4014	Layer, below 007	<4.20	Trench	0.18		8012
4015	Wall	1.40	>0.20	>0.24		8012
4016	Tile frag. Path	0.40	0.24	0.05		8071
4017	Brick drain	<1.74	<0.18	0.20		-
4018	Layer, below 006	<1.60	<1.20	0.10		8012
4019	Tile demo. Deposit	<2.00	1.50	<0.04	Pot, CBM	8012
4020	Cobble floor	<4.30	<1.40	>0.25		8021
4021	Tile foundation beam	Trench	0.30	Unex	CBM	8011
4022	Levelling layer	<1.40	<1.15	Unex		8030
4023	Brick foundations	<1.10	<0.30	Unex	CBM	8047

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Context	Description	Length	Width	Depth	Finds	Equated in excavation
4024	Tile foundation beam	<1.90	0.40	Unex		8063
4025	Tile foundation beam	<3.30	0.36	Unex	CBM	8063
4026	Services intrusion	Trench	<2.40	Unex		8057
4027	Demo. deposit	<3.20	Trench	Unex		8059
4028	Tile floor	1.90	<1.00	0.08		Not real
4029	?Floor/levelling layer	1.90	<1.00	0.08	Pot, CBM	8030
4030	Repair of tile floor	1.80	1.30	>0.11	Pot,	8072
4031	Make up layer	<1.31	<1.00	0.10	Pot, CBM	-
4032	Make up layer	<1.30	<1.00	0.11	Pot	-
4033	Make up layer	<2.00	<1.00	>0.36	Pot, CBM, Bone	8183
4034	Ground beam	<0.70	0.36	Unex	CBM	8012
4035	Ground beam	3.36	0.38	Unex	CBM	8070
4036	Mortar + tile surface	<3.20	Trench	Unex		8012
4037	Tile + gravel surface	2.00	1.30	Unex		8072
4038	Gravel dump	<2.00	<1.00	0.70	Pot, Bone	8086
4039	Burnt deposit	<0.40	0.35	0.04		-
4040	Silt dump	<1.28	<1.00	0.30		8180
4041	Layer, below 038	<2.00	<1.00	<0.38	Pot	8106
4042	Foundation cut	3.36	0.38	0.06		Not real
4043	Levelling layer	3.36	0.38	0.06		8035
4044	Mortar demo. deposit	<4.56	Trench	0.28		8032

Trench 5

Context	Description	Length/m	Width/m	Depth/m	Finds	Equated in excavation
5001	Modern surface	Trench	Trench	0.38		7001
5002	Modern masonry	5.00	Trench	1.00		7010
5003	Modern layer	5.00	Trench	0.98		7002
5004	Horn core fill	<1.40	>1.02	Unex	Pot, Bone	7116
5005	Cut	<1.40	>1.02	Unex		-
5006	Fill	0.66	0.56	0.28	Pot, Bone, glass	-
5007	Wooden feature	0.74	0.63	<0.28		-

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Context	Description	Length/m	Width/m	Depth/m	Finds	Equated in excavation
5008	Back fill	0.75	0.65	<0.28		Not real
5009	Cut for 007	0.75	0.65	<0.28		-
5010	Fill	>0.37	0.65	Unex	CBM, Bone	-
5011	Fill	0.45	0.38	0.17		-
5012	Post hole cut	0.45	0.38	0.17		-
5013	Fill	0.19	0.19	0.18		-
5014	Post hole cut	0.19	0.19	0.18		-
5015	Cleaning layer	Trench	Trench	0.05	Pot, Bone, glass	Not real
5016	Wooden post	0.16	0.14	Unex		-
5017	Sub-soil layer	<2.70	Trench	0.24		7104
5018	Sub-soil layer	<5.20	Trench	0.34		7097
5019	Flower bed cut	Trench	<1.15	0.24		Not real
5020	Layer	<2.24	<1.00	<0.60		7113

Trench 6

Context	Description	Length/m	Width/m	Depth/m	Finds	Equated in excavation
6001	Tarmac	Trench	Trench	0.25		-
6002	Brick rubble	Trench	Trench	>0.30		-
6003	Fill of drain	<6.2	0.16	0.16		-
6004	Brick drain	<6.2	<0.36	0.26		-
6005	Pit fill	0.40	0.40	0.16		-
6006	Pit cut	0.75	<0.36	0.16	CBM	-
6007	Pit fill	0.37	0.24	0.10		-
6008	Pit cut	0.37	0.24	0.10	CBM	-
6009	Sub-soil layer	Trench	Trench	0.35		-
6010	Layer	Trench	Trench	0.20		-
6011	Pit fill	0.30	0.15	0.10		-
6012	Pit cut	0.3.00	0.15	0.10		-
6013	3 stake holes	0.06	0.06	0.07		-
6014	Pit fill	<3.00	<2.60	0.28	Pot, CBM, Bone	-
6015	Pit (poss. tree bulb)	<3.00	<2.60	0.28		-

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Context	Description	Length/m	Width/m	Depth/m	Finds	Equated in excavation
6016	Pit fill	0.30	0.25	0.07		-
6017	Pit cut	0.30	0.25	0.07		-
6018	Horn core fill	<1.00	<2.50	>0.15	CBM, Bone	-
6019	Tree/ plant bulb	<1.00	<2.50	>0.15		-
6020	Clay layer	<6.00	<1.50	0.15		-
6021	Alluvial layer	<4.00	<1.00	>0.20	Pot, Bone	
6022	Alluvial layer	<4.00	<1.00	>0.18		
6023	Alluvial layer	<4.00	<1.00	>0.48	Pot, Bone	
6024	Buried soil layer	<4.00	<1.00	0.12		
6025	Fill of 6026	<1.00	0.40	0.07	Pot, Bone	
6026	Shallow gully	<1.00	0.40	0.07		
6027	Fill of 6028	0.62	0.44	0.06		
6028	Shallow pit	0.62	0.44	0.06		

Trench 7

Context	Description	Length/m	Width/m	Depth/m	Finds
7001	Concrete	22.10	16.00	0.40	
7002	Cinder-rich deposit	5.00	3.10	0.31	
7003	Clay-rich demolition horizon	22.10	16.00	0.20	Pot, CBM, OBM
7004	Demolition horizon	22.10	16.00	0.25	Pot, bone, CBM, Glass, CTP
7005	Modern dump	2.00	1.80	0.12	Pot, Metal
7006	Modern dump	0.73	0.21	0.14	Pot
7007	Modern dump	1.21	0.74	0.14	Pot, bone, CBM, glass, CTP, Metal
7008	Modern dump	2.18	0.65	0.08	Pot
7009	Fill of 7010	≥Trench	varies	varies	
7010	Modern services	≤Trench	varies	varies	
7011	Bedding, Building 5	2.64	2.60	0.05	
7012	Brick floor, Building 5	1.12	0.84	0.06	
7013	Sub floor, Building 1	2.70	1.68	0.22	
7014	Tree disturbed deposit	4.80	3.20	0.35	
7015	Fill of 7016, Building 4	2.73	0.46	0.14	
7016	Robber cut, Building 4	2.73	0.46	0.14	

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Context	Description	Length/m	Width/m	Depth/m	Finds
7017	Demolition of Buildings 4-5	4.80	0.54	0.15	
7018	Wall foundation, Building 4	0.75	0.30	0.22	CBM
7019	External wall foundation, Building 4	4.70	0.22	0.39	CBM
7020	Demolition of Buildings 4-5	4.06	0.25	0.15	
7021	Sub-floor, Building 1	2.30	1.80	0.11	
7022	Fill of 7023, Building 4	3.40	1.20	0.19	Pot, bone
7023	Construction cut, Building 4	3.40	1.20	0.19	
7024	Fill of 7025, Building 4	1.94	1.34	0.25	Pot, CBM, glass
7025	Cut, filled with rubble, Building 4	1.95	1.34	0.25	
7026	Foundation, Building 4	2.50	0.25	0.26	
7027	Chalk Building 4-5 yard	3.70	3.30	0.06	
7028	Metalled surface Building 4-5 yard	3.30	1.10	0.02	
7029	Chalk surface, Building 4-5 yard	4.60	2.20	0.17	
7030	Foundation, Building 4	3.80	0.60	0.21	CBM
7031	Foundation, Building 4	3.70	0.20	0.21	CBM
7032	Sub-floor, Building 4?	2.74	0.74	0.12	
7033	Sub-floor, Building 4	3.90	1.54	0.14	
7034	Foundation, Building 4	1.52	0.35	0.13	
7035	Foundation, Building 4	0.80	0.38	0.21	CBM
7036	Foundation, Building 4-5 yard	1.35	0.22	0.18	
7037	Foundation, Building 4-5 yard	0.32	0.22	0.18	
7038	Fill of 7039, Building 10	0.34	0.32	0.62	Pot, CBM
7039	Post-hole, Building 10	0.34	0.32	0.62	
7040	Yard surface, Building 10	2.05	1.50	0.08	Bone, CBM
7041	Foundation, Building 10	0.54	0.32	0.32	
7042	Same as 7041, Building 10	0.99	0.35	0.07	
7043	Brick floor, Building 4	0.40	0.32	0.06	
7044	Root disturbed deposit	3.05	2.55	0.34	
7045	External wall foundation, Building 9	4.60	2.20	0.18	CBM
7046	Post-pad, Building 9	0.42	0.22	0.18	
7047	Demolition deposit, Building 9	3.90	1.80	0.21	
7048	Foundation Building 9	0.58	0.23	0.18	
7049	Foundation, Building 4-5yard	0.30	0.22	0.18	

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Context	Description	Length/m	Width/m	Depth/m	Finds
7050	Dump	1.56	0.64	0.14	
7051	Fill of 7052, Building 9	4.20	0.35	0.20	
7052	Cut for foundation, Building 9	4.20	0.35	0.20	
7053	Foundation, Building 10	2.50	0.21	0.24	
7054	Brick course, Building 10	4.06	0.38	0.32	CBM
7055	Foundation, Building 10	1.55	0.30	0.17	
7056	Stone slabs, demolition , Building 10	0.60	0.52	0.23	
7057	Internal wall, Building 10	2.38	0.23	0.15	
7058	Stub wall, Building 10	0.32	0.22	0.16	
7059	Collapse or stacking, Building 10	0.85	0.21	0.10	
7060	Internal wall, Building 10	1.58	0.22	0.17	
7061	Foundation, Building 10	0.45	0.25	0.19	
7062	Late levelling dump	4.50	2.20	0.21	
7063	Fill of 7064, Building 10	1.48	0.43	0.10	CBM, glass, metal
7064	Wall cut, Building 10	1.48	0.43	0.10	
7065	Foundation, Building 12	0.68	0.22	0.09	
7066	Fill of 7067	0.92	0.54	0.14	
7067	Tree pit	0.92	0.54	0.14	
7068	Flag stones, Building 12	2.13	1.23	0.08	
7069	Brick foundation, Building 12	0.65	0.22	0.09	
7070	Brick foundation, Building 12	1.62	0.38	0.09	
7071	Mortar bedding, Building 12	1.45	0.36	0.05	
7072	Wall foundation, Building 12	0.50	0.36	0.09	
7073	Gravel surface	4.70	2.40	0.16	
7074	Stub wall, Building 4	0.60	0.32	0.27	CBM
7075	Foundation, Building 4	0.32	0.28	0.33	
7076	External wall foundation, Building 5	2.26	0.38	0.14	
7077	VOID				
7078	Fill of 7079	0.64	0.60	0.15	
7079	Garden feature	0.64	0.60	0.15	
7080	Same as 7024, Building 4	-	-	-	
7081	Same as 7025, Building 4	0.34	0.32	0.25	
7082	Foundation, Building 5	0.84	0.24	0.07	

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Context	Description	Length/m	Width/m	Depth/m	Finds
7083	Foundation, Building 4	0.70	0.30	0.21	CBM
7084	Fill of 7085	0.40	0.30	0.17	
7085	Garden feature	0.40	0.30	0.17	
7086	Gravel dump	-	-	-	
7087	Fill of 7090, Building 4	4.24	0.26	0.17	Pot, bone, CBM
7088	Fill of 7089, Building 10	1.70	0.26	0.20	Bone, CBM, CTP
7089	Cut for 7041, Building 10	1.70	0.26	0.20	
7090	Cut for 7026, Building 4	4.24	0.65	0.17	
7091	Dump of building material	1.00	0.40	0.30	Pot, bone, glass, metal, CTP
7092	Made ground over pond feature	-	-	-	CBM, glass, leather
7093	Fill of 7023, Building 4	3.40	1.20	0.19	Pot, bone, glass, CTP
7094	Brick foundation, part of Building 1	0.46	0.24	0.06	
7095	Compact dark brown soil	17.00	3.00	0.12	
7096	Dump of CBM-rich clay	16.10	3.00	0.11	
7097	Made ground	16.00	3.60	0.11	
7098	Loose dumped deposit	3.00	2.00	0.12	Pot, glass
7099	Levelling deposit	4.24	2.65	0.11	Pot, CBM
7100	Cobbled surface with 7112, Building 1	4.24	2.65	0.10	
7101	Stony dump below 7027	8.6	5.00	0.14	Pot
7102	Made ground: clean sand	8.60	5.00	0.20	
7103	Dump over 7107	1.80	0.82	0.14	Pot, bone, CBM, glass, OBM, CTP
7104	Root disturbed deposit	16.00	2.45	0.30	Pot, OBM, Metal
7105	Fill of 7106	0.54	0.54	0.38	Pot, bone, CBM, glass, metal
7106	Small pit	0.54	0.54	0.38	
7107	Upper fill 7109	22.10	7.50	0.29	Pot, bone, CBM, glass, leather
7108	Clay fill of 7109	22.10	7.50	0.21	
7109	Pond	22.10	7.50	0.51	
7110	Greenish sandy deposit	1.80	1.40	0.08	
7111	Silty layer...dumped? or river silt	22.10	9.75	0.16	Pot, bone, CBM
7112	E. Foundation, associated with 7100, Building 1	5.92	0.40	0.12	
7113	Dark brown marshy deposit, could also equal 8106	22.10	16.00	0.29	Pot, bone, CBM, leather
7114	Fill of 7115	3.10	2.30	0.29	
7115	Shallow Pit	3.10	2.30	0.29	

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Context	Description	Length/m	Width/m	Depth/m	Findings
7116	Same as 5/004, horn-core pit				Pot, bone, CBM
7117	Fill of 7118	2.66	2.52	0.30	Pot, bone, CBM, leather
7118	Tanning Pit?	2.66	2.52	0.30	
7119	Horn-core rich fill of 7120	1.23	0.84	0.32	Pot, bone, CBM, glass
7120	Pit	1.23	0.84	0.32	
7121	Stake in 7117, could be later	0.10	0.08	0.55	
7122	Post in 7117, could be later	0.06	0.06	0.28	
7123	Fill of 7133	4.80	1.85	0.30	Pot, bone, CBM, metal, leather
7124	Post m 7125	0.28	0.26	0.51	
7125	Post-hole	0.28	0.26	0.20	
7126	Post in 7127	0.28	0.26	0.50	
7127	Post hole	0.28	0.26	0.22	
7128	Post in 7129	0.30	0.28	0.50	
7129	Post hole	0.30	0.28	0.31	
7130	Fill of voided post-hole 7131	0.50	0.28	0.15	
7131	Voided post-hole	0.50	0.28	0.15	
7132	Greyish black marshy deposit equated with 8106	22.10	16.00	0.26	Pot, bone, CBM, metal
7133	Pit, potentially for tanning	4.80	1.85	0.30	
7134	Dark brown sandy clay, possibly made ground	16.00	12.00	0.51	
7135	W. foundation, associated with 7100, Building 1	2.21	0.42	0.21	
7136	S. foundation, associated with 7100 Building 1	4.30	0.42	0.21	

Trench 8

Context	Description	Length/m	Width/m	Depth/m	Findings
8001	Concrete	45.00	27.00	0.25	
8002	Rubble overburden and foundation for concrete	45.00	27.00	0.50	
8003	Dark brown mixed layer, including direct demolition material	45.00	27.00	0.30	Pot, bone, CBM glass, CTP
8004	Garden soil at south east. Variation in 8003	10.00	3.00	0.30	
8005	Fill of 8006	1.22	1.20	>0.50	Pot, glass, CTP
8006	Brick toilet chamber	1.73	1.57	>0.50	
8007	Egress channel from 8006	1.17	0.35	0.19	
8008	Brick drain/ culvert	>20.00	0.40	0.40	
8009	Dark brown sandy clay, includes some demolition material	8.28	6.98	0.10	bone

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Context	Description	Length/m	Width/m	Depth/m	Finds
8010	VOID				Pot, CBM, bone
8011	Wall core, Building 2	2.00	0.60	0.20	OBM, stone
8012	Demo deposit of Building 2, tile	2.40	1.10	0.08	
8013	VOID				
8014	Spread of tile, demolition deposit	2.04	0.98	0.08	
8015	Spread of pebbles, demolition deposit	4.18	1.80	0.10	
8016	VOID				
8017	VOID				
8018	VOID				
8019	VOID				
8020	VOID				
8021	Fill of soakaway	1.42	1.36	>0.70	
8022	Soakaway	1.56	1.54	>0.70	Pot, CBM
8023	VOID				
8024	Garden path	Les			
8025	Mortar bed, Building 2	1.58	0.34	0.08	
8026	VOID				
8027	Wall bed, Building 2	4.50	1.30	0.50	
8028	VOID				
8029	Tile surface, Building 2	0.96	0.66	0.04	
8030	Brickearth (surface?) , Building 2	3.36	2.50	0.08	
8031	Brickearth (surface) , Building 2	2.80	0.88	0.06	
8032	Made ground, post-found.	7.80	1.40	0.34	
8033	Ashy deposit	0.50	0.48	0.02	
8034	Wall bedding, Building 2	3.00	0.60	0.03	
8035	Brickearth (surface?)same as 8030, Building 2	-	-	-	Pot
8036	Demolition of Building 2 into 8038	1.30	0.36	0.05	
8037	Fill of 8038	1.00	0.90	0.21	
8038	Garden feature	1.00	0.90	0.21	
8039	VOID				
8040	VOID				
8041	Spread of oyster shell, part of demolition event	3.30	1.48	0.12	Pot, bone, CBM
8042	Brick core, Building 8	2.55	0.26	0.07	

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Context	Description	Length/m	Width/m	Depth/m	Finds
8043	Foundation	6.76	0.40	0.07	
8044	Brick facing, Building 8	0.98	0.24	0.07	
8045	Wall facing, Building 8	1.37	0.13	0.07	
8046	Mortar bed, Building 8	1.38	0.52	0.04	
8047	Brick foundation of chimney, Building 2	1.40	0.56	0.73	
8048	Chimney breast/ oven, Building 2	2.20	1.10	0.10	
8049	Wall? floor? , Building 2	0.90	0.40	0.07	
8050	Chimney breast/ oven, Building 2	1.60	1.36	0.10	
8051	Brick foundation of chimney, Building 2	1.40	1.20	0.73	
8052	Hearth area, Building 2	0.88	0.78	0.07	
8053	Brick floor, Building 2	1.00	0.80	0.07	
8054	Sub-floor, Building 2	1.50	1.20	0.11	
8055	Demo of Building 2 over 8073	1.30	0.90	0.11	
8056	Fill of service trench	10.00	0.44	0.35	
8057	Service trench	10.00	0.44	0.35	
8058	Brick and stone wall, Building 2	0.85	0.60	0.14	
8059	Demo dump, of Building 2?	1.30	1.10	0.11	
8060	Rubble and stone yard surface, Building 2	1.90	1.20	0.06	
8061	Demolition deposit of Building 2	2.90	1.20	0.02	
8062	Demolition deposit, Building 8	2.60	0.64	0.20	
8063	Foundation, Building 3	6.90	3.10	0.07	
8064	Brickearth (surface?), Building 3	2.45	1.00	0.10	
8065	Fill of 8081	4.40	4.20	0.20	Stone
8066	Wall fragment, Building 2	0.70	0.30	0.07	
8067	Made ground, post-foundational, Building 3	6.40	4.96	0.34	
8068	Clay below foundations: waterproof?, Building 3	2.00	2.00	0.15	
8069	VOID				
8070	Tile course (foundation) , Building 2	1.80	1.30	0.02	
8071	Tile course, Building 2	0.90	0.25	0.04	
8072	Demolition dump of Building 2	4.70	1.50	0.12	Pot
8073	Made ground, post-foundation, Building 3?	4.40	3.20	0.34	
8074	Same as 8011	-	-	-	
8075	Brick well/ soakaway	1.10	0.70	>0.70	

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8076	Fill of 8077	0.86	0.60	>0.70	
8077	Cut for 8075	1.68	1.30	>0.70	
8078	Internal wall foundation, Building 2	1.05	0.20	0.03	
8079	Tiled floor, Building 2	0.35	0.30	0.03	
8080	Brickearth (surface) , Building 2	1.28	0.50	0.05	
8081	Irregular cut	4.40	4.20	0.20	
8082	Fragmentary foundation, Building 3	0.30	0.30	0.10	
8083	Wall foundation, Building 3	0.44	0.24	0.07	
8084	Corner of structure, Building 3	1.04	0.71	0.04	CBM
8085	Bedding for floor, Building 3	2.05	2.00	0.05	
8086	Made ground,-post-structural, ass w' Building 2	6.80	3.15	0.34max	
8087	Fill of 8088	1.60	1.04	0.30	
8088	Eval sondage	1.60	1.04	0.30	
8089	Demo or bed, Building 8	0.85	0.50	0.06	
8090	2 stones	0.44	0.28	0.31	
8091	Demolition spread, Building 8	1.38	1.06	0.12	
8092	Demolition spread, Building 8	0.40	0.25	0.05	
8093	Made ground,-post-structural, ass w' Building 2	1.96	0.68	0.34max	
8094	Chimney stack foundation, Building 8	1.62	1.04	0.07	
8095	W wall of toilet	1.16	0.66	>0.60	
8096	Buttress of toilet	0.30	0.22	>0.60	
8097	Buttress of toilet	0.26	0.25	>0.60	
8098	Fill of toilet	1.90	0.99	>0.60	
8099	Fill of toilet	1.08	1.02	>0.60	
8100	N wall of toilet	2.44	0.12	>0.60	
8101	S wall of toilet	2.24	0.28	>0.60	PM
8102	Arch within toilet	1.00	0.25	1.10	
8103	E wall of toilet	1.01	0.23	>0.60	
8104	Drain remnant	0.32	0.18	0.12	
8105	Made ground, brown clay	45.00	15.00	0.29	Pot, bone, CBM, metal
8106	Dark brown silty clay, upper marsh deposit	45.00	27.00	0.20	Pot, CBM
8107	Household dump	1.24	0.23	0.04	Bone, CBM
8108	Hollow formed by 8107	1.24	0.23	0.04	

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8109	Fill of 8111	0.74	0.46	0.10	
8110	Fill of 8111	0.73	0.43	0.12	
8111	Garden feature?	0.74	0.46	0.25	
8112	Fill of 8111	0.22	0.18	0.15	
8113	Dump of gravelly clay	1.00	0.85	0.10	Bone, CBM
8114	Clay capping of 8117	0.85	0.80	0.07	
8115	Charcoal within 8117	0.85	0.80	0.05	
8116	Bone-rich fill of 8117	1.30	1.10	0.22	Pot, bone, CBM, metal
8117	Oval pit	1.34	1.26	0.54	
8118	Fill of 8119	1.45	0.60	0.20	Pot, bone, CBM
8119	Tree pit	1.45	0.60	0.20	
8120	Fill of 8121	1.04	0.90	0.23	Pot, bone, CBM
8121	Shallow pit	1.04	0.90	0.23	
8122	Driven stake	0.12	0.11	0.17	Bone
8123	Hollow caused by 8122	0.12	0.11	0.17	
8124	Fill of 8125	1.64	1.44	0.13	Pot, bone
8125	Shallow pit	1.64	1.44	0.13	-
8126	Fill of stake hole	0.10	0.10	0.20	
8127	Stake hole	0.10	0.10	0.20	
8128	Fill of 8129	1.06	0.60	0.10	
8129	Shallow pit	1.06	0.60	0.10	Pot, CBM
8130	Spread of gravelly clay	2.30	1.32	0.08	Pot, bone, CBM
8131	Fill of 8132	1.45	0.89	0.23	Pot, bone, metal, CBM, stone
8132	Shallow pit	1.45	0.89	0.23	
8133	Fill of 8134	1.08	0.90	0.20	Pot, bone, CBM
8134	Shallow pit	1.08	0.90	0.20	
8135	Layer of clay (7108)?	42.00	14.00	>0.30	
8136	Fill of ditch	2.12	0.56	0.37	Pot, CBM
8137	Ditch	2.12	0.56	0.37	
8138	Spread of gravelly clay	18.00	14.00	0.15	
8139	Dump, some coal	2.40	1.95	0.18	Pot, bone, CBM, metal
8140	Large square post-hole	0.76	0.72	0.60	
8141	Packing material in 8140	0.76	0.72	0.53	

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8142	VOID				
8143	Post in 8140	0.38	0.34	0.68	
8144	Fragment of 8140	0.33	0.32	0.07	
8145	Post hole part of 8140 event	0.98	0.82	0.26	
8146	Fill of 8145	1.38	0.98	0.26	Pot, CBM
8147	? Stake hole	0.35	0.35	0.10	
8148	Fill of 8147	0.35	0.35	0.10	
8149	Driven stake	0.16	0.16	0.34	
8150	Gravelly clay dump	8.00	5.00	0.13	Pot, bone, CBM
8151	Driven stake	0.09	0.08	0.43	
8152	Driven stake	0.05	0.05	0.15	
8153	Fill of 8154	0.45	0.45	0.16	
8154	Possible post-hole	0.45	0.45	0.16	
8155	Dumped deposit=8106	1.00	1.00	0.38	Pot
8156	Clay interface	1.00	1.00	0.18	
8157	Peat	1.00	1.00	>0.07	
8158	Driven stake	0.14	0.14	0.57	
8159	Dump of cow horn	1.20	0.60	0.10	Pot
8160	Dump of cow horn	0.80	0.60	0.10	
8161	VOID				
8162	Cut for post (8140)	0.76	0.72	0.60	
8163	Fill of 8164	0.42	0.40	0.38	Pot, bone
8164	Post-hole	0.42	0.40	0.38	
8165	Fill of 8166	0.97	0.68	0.16	
8166	Shallow pit	0.97	0.68	0.16	
8167	Post	0.36	0.34	0.24	
8168	Dump...could be developed marshland (SAME AS 8106)	1.00	1.00	0.15	Pot
8169	Organic, woody layer	1.00	1.00	0.10	
8170	Clay interface	1.00	1.00	0.17	Bone
8171	Peat	1.00	1.00	>0.12	
8172	Fill of 8173	1.41	0.98	0.37	Pot, bone
8173	Pit	1.41	0.98	0.37	
8174	Fill of 8175	0.28	0.28	0.40	Pot and bone

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Context	Description	Length/m	Width/m	Depth/m	Finds
8175	Post hole	0.28	0.28	0.40	
8176	Fill of 8177	0.30	0.30	0.33	Pot, bone, CBM, CTP, Do not trust
8177	Post hole	0.30	0.30	0.33	
8178	Fill of 8179	0.56	0.51	0.34	Pot
8179	Post-hole	0.56	0.51	0.34	
8180	Made ground, brown sandy silt	Ext	Ext	0.67	
8181	Greenish gravelly deposit	2.50	2.10	0.15	
8182	Lens of mortar	0.77	0.72	0.07	
8183	Layer of clay	4.35	1.40	0.17	
8184	Disturbed tarmac mix	5.00	3.08	0.05	
8185	Dump of gravelly silt	5.00	6.00	0.30	
8186	Fill of 8188	0.30	0.27	0.14	
8187	Fill of 8188	0.30	0.27	0.06	
8188	Post hole	0.30	0.28	0.20	
8189	Peat	1.00	1.00	0.13	
8190	Gravel lens	2.30	0.80	0.08	Pot, bone, stone
8191	Dumped wood	0.42	0.12	0.06	
8192	Grey clay	2.00	2.00	0.06	
8193	Superintendent's house east cellar wall, Building 6	3.70	0.34	0.92	
8194	Cut for 8193, Building 6	5.21	4.40	0.70	
8195	Fill of 8196	1.44	0.56	0.44	CBM
8196	Rectangular pit	1.44	0.56	0.44	
8197	Superintendent's house south cellar wall, Building 6	5.20	0.44	0.92	
8198	Superintendent's house west cellar wall, Building 6	3.60	0.34	0.33	
8199	Superintendent's house flagged cellar floor, Building 6	4.40	3.50	0.05	
8200	Bricks beneath 8199, Building 6	4.40	3.50	0.06	
8201	East plank, Building 6	3.95	0.38	0.05	
8202	South plank, Building 6	4.41	0.38	0.05	
8203	West plank, Building 6	3.96	0.38	0.05	
8204	Wooden brace, Building 6	0.75	0.75	0.10	
8205	Fill of 8194, Building 6	5.21: 4.40	0.20	0.70	
8206	Cut for drain culvert	>20	6.00	0.50	
8207	Wall foundation, Building 7	7.95	0.42	0.10	

THE FORMER DRILL HALL SITE, HIGHBRIDGE STREET, WALTHAM ABBEY, ESSEX
 RESULTS OF AN ARCHAEOLOGICAL EXCAVATION: ARCHIVE REPORT

Context	Description	Length/m	Width/m	Depth/m	Finds
8208	Wall foundation, Building 7	3.50	0.36	0.03	
8209	Mortar sub-floor, Building 7	2.10	1.18	0.05	
8210	Brick floor, Building 7	0.85	0.60	0.06	
8211	Chimney? Stack, Building 7	3.20: 1.28	0.45	0.25	
8212	Mortar sub-floor, Building 7	2.60	1.10	0.05	
8213	Wall foundation, Building 7	2.26	0.35	0.08	
8214	Brick floor, Building 7	1.20	0.54	0.06	
8215	Wall foundation, Building 7	3.65	0.24	0.10	
8216	Cut for service	>4.80	0.70	0.60	
8217	Bricks, Building 7	1.54	0.12	0.07	
8218	Internal drain, Building 7	3.80	0.18	0.12	
8219	Brickearth sub-floor, Building 7	3.74	2.90	0.05	
8220	Garden wall	4.31	0.17	0.06	
8221	Wall of Building 7 and 8	4.31	0.20	0.12	

APPENDIX B: SPECIALIST FINDS REPORTS

THE POTTERY (Figure 16)

Lucy Whittingham

METHODOLOGY

An assemblage of 1185 sherds, (854 ENV) weighing 35.5 kg includes one roman, 669 medieval and 515 post-medieval pottery sherds. The medieval pottery is more abraded than the post-medieval assemblage which is in larger assemblages of well-preserved sherds, some of which cross-join between contexts. All of the pottery has been identified and quantified using the standard four-letter fabric codes established by the Museum of London Specialist Services (Orton 1988) and the fabric reference systems established for Waltham Abbey (Huggins 1973 and 1976) and in Essex (Cunningham 1982, 1985 and Walker 1995). All of the sherds have been quantified recording sherd count, weight, estimated vessel number (ENV), form and decorative attributes. These details are recorded on an Excel database spreadsheet and can be consulted with the site archive.

FABRIC TYPE SERIES:

Roman

A flagon rim in a fine sand-tempered reduced greyware is residual in pre-occupation marshland (Context 8155).

Medieval

The medieval assemblage of 633 sherds (12.2 kg) is comprised of a variety of wares. Two sherds of Thetford type ware (THET) are from two different vessels. One of these is an everted jar rim of 200mm diameter (Figure 16/1 (8106)), a typical Thetford ware form. Both sherds associated with earliest pre-occupation marshland, Context (8106) which must provide evidence of Saxo-Norman settlement in the nearby vicinity of this site.

Blue-grey ware (BLGR) imports from Germany are represented by one handle from a ladle. These middle Rhineland imports are known in London from c. 1039 up to the mid 12th century. This example is found in the earliest pre-occupation marshland, Context (8106) but provides evidence of Saxo-Norman settlement in the nearby vicinity of this site.

Early medieval, possibly Saxo-Norman, hand-built sand tempered ware is represented by two rims from a jar and possible bowl of 280mm diameter. Both rims are clubbed and have inturned inner edges where the rim has been constructed by the clay being folded inwards. Both are residual in a late 15th to early 16th-century tanning pit (7123).

Early medieval, possibly Saxo-Norman coarse shell tempered ware represented by 39 hand-built cooking pots/jars. These vessels have everted rims (Figure 16/2 (8174) and Figure 16/3 (8106)) of between 200 and 280 mm diameter. Similar coarsely-tempered shell fabrics (Fabric D2) are dated 850-1300 (Huggins *ibid*)

and extend from the Saxo-Norman into the early medieval period. These sherds are primarily associated with 12th-century ditches and pits (8136, 8172, and 8174), surface 8150 and the pre-occupation marshland (8106). Examples found in contexts after the 14th century (8120, 8116) are residual.

Early medieval, possible Saxo-Norman quartz and flint tempered fabric in which classic Saxo-Norman forms, such as a spouted bowl (Figure 16/4 (8106)) and cooking pot jar with thickened rim occur. These are associated with the pre-occupation marshland Context (8106) which also suggests this fabric is of an early medieval/Saxo-Norman date.

Early Surrey ware is represented by five cooking pot/jars, two of which have the classic everted rim form so often associated with this fabric type (see Vince 1991 fig 2.58 no 140). This is an early medieval, Saxo-Norman ware type and is associated with the pre-occupation marshland (7132, 8106) and 12th to 13th-century tanning pit (8124) and posthole (8174).

A wheel-thrown coarse quartz-gritted fabric, occasionally with calcareous or flint inclusions is found in cooking pots of an early medieval type. These are equated to Fabric group G as defined by Huggins (*ibid*) and are similar to early South Hertfordshire greyware (ESHER) as defined in London and dated 1150-1300. Twenty one vessels, all cooking pots or jars have everted or thickened rims ranging from 120 to 240mm in diameter. One vessel is roughly combed on the exterior in a crude attempt at decoration. This ware is primarily associated with 12th to 13th-century pits and postholes.

A fine shell tempered fabric is associated with a small number of cooking pots. One of these five hand-built vessels has an everted rim with thumbled edge of 240mm diameter. All of these sherds are associated with pre-occupation marshland (8106) and a 12th/13th century ditch (8136) indicating that they are of early medieval date.

A coarse quartz-tempered fabric with occasional calcareous inclusions is found in cooking pots, tripod pipkins and jugs. The only diagnostic cooking pot rim is an inturned form of 200mm diameter. The jug is represented by three lead glazed sherds from a rod handle with stabbed decoration (Figure 16/5 (8107)). These sherds are found in a 12th century pit (8165) and a 12th to 13th-century dump (8107) where they are likely to be contemporary as an early medieval fabric.

A small assemblage of coarse quartz-tempered wares, with calcareous or shell inclusions, is similar to coarse London type ware with calcareous inclusions (LCOAR CALC) or with shell inclusions (LCOAR SHEL). Sixteen cooking pots in the calcareous temper and two with shell are represented by bodysherds, one of which has notched decoration around the shoulder. Only one rim with an everted thumbled rim survives. These sherds are associated with the pre-occupation

marshland and the 12th to 13th century tanning pits, but must be residual in the 14th to 15th century cess-pits and dumps.

A finer, wheel-thrown, shell-tempered fabric has affinities with Shelly sandy ware (SSW) as defined in London. The cooking pot forms are characteristic of Shelly Sandy Ware whose distribution does extend into Essex (Blackmore forthcoming). This fabric equates to fabric group D2 at Waltham Abbey (Huggins *ibid*). Forty five sherds from thirty vessels are all cooking pot/jar forms in which the everted rim form (Figure 16/6 (8124)) ranging from 180 to 240 mm in diameter is more common. Other rim types are also found but represented by a single example of a rolled/rounded rim and square cooking pot rim. Shelly-sandy ware is defined as a medieval ware dated 1140-1220 and occurs later at Waltham Abbey in pits, cess-pits, tanning pits and ditches of 12th to 15th-century date where it may be residual in the later features.

A coarsely quartz-gritted oxidised ware, possibly (Fabric 13, Walker 1985) is found in 18 cooking pots, some of which are definitely hand-built vessels with a wheel-turned rim. One coarsely tempered vessel has a thumbled rim of 200mm diameter whilst other examples have a simpler everted rim (Figure 16/7 (8150)). All of these sherds are associated with pre-occupation marshland, a 13th century surface (8150) and a 13th-century pit (8133). This ware may be paralleled to sandy redware Fabric H, dated 1200-1500, at Waltham Abbey (Huggins 1973).

A coarsely gritted quartz-tempered lead glazed fabric found in two cooking pots and one jug is reminiscent of Grimston type ware. The cooking pot/jar has an everted rim which has been decorated with a 5-pronged tool. The small number of vessels present in this fabric is also an indicator that this may be a regional import. The vessels are associated with 14th to 15th-century cesspit (8118 and 8120), 14th/15th-century dump (7113) and 12th-century pit (8172). Grimston-type ware is dated 1300-1500 which would suggest that these sherds could be contemporary in the later cesspits (8118, 8120) and dump (7113).

A substantial part of the medieval assemblage is supplied by London type wares. A variety of cooking pots, jugs and dripping dishes (Figure 16/8 (8106)) are represented in 107 vessels in coarse London-type ware (LCOAR). Cooking pots have everted rims ranging from 200 to 240mm in diameter and some small diameter vessels of 100mm diameter which may be pipkins (Figure 16/9 (8136)). Jugs are found in early rounded style and with early style slip painted decoration.

A large assemblage of 127 sherds from 108 vessels are classic examples of cooking pots and pitchers in late 12th to 14th-century South Hertfordshire greyware (SHER). Cooking pots are large vessels with everted rims between 160mm and 240mm diameter, several of which are decorated with applied thumbled strips or incised lines. Jugs and pitchers are less common represented by stabbed strap handle and squared rims. One large open bowl is also represented by an everted rim of 340mm diameter. These sherds are primarily associated with

pits, cesspits, tanning pits and ditches of 12th to 14th-century date where they are contemporary. The occasional sherd with additional flint temper is associated with the pre-occupation marshland and may be an earlier variant of SHER.

London type ware (LOND) is represented by 82 vessels in both cooking pots and jugs. The jugs occur in several styles; early rounded with early slip-painted decoration, baluster jugs with applied pellet and slip decoration in Rouen style, large rounded jugs with white slip and splashed copper glaze on the exterior surface and North French style decoration. Twenty two cooking pots have everted rims ranging from 160mm to 280 mm diameter. These vessels are primarily associated with a variety of features of 12th to 14th-century date but the occasional sherds in the tanning pits of 1485+ are residual.

Two jug sherds with external white slip are classic examples of Mill Green ware (MG) jugs and a further three sherds are from Mill Green coarseware (MG COAR) baluster jugs. These are all associated with cesspits and postholes of 14th to 15th-century date (7113, 8116, 8140 and 8146).

A fine oxidised sandy ware with mottled copper glaze is a jug sherd of Headingham fine ware (Fabric 22, Walker 1985) jug. As this ware has a date range of late 12th to 13th century it must be residual in a 15th century dump (7113).

Occasional examples of a coarse reduced greyware fabric are found in ten vessels, a bowl with pinched spout (Figure 16/10 (8106)), cooking pots and a jug sherd with white slip. These vessels may equate to the coarse medieval greyware Fabric 20 (Cunningham 1985) spanning the 12th to 14th centuries. They occur in pre-occupation marshland and in 12th to 13th-century ditch (8136).

One imported sherd of mottled green glaze Saintonge ware (SAIG), usually dated 1280 to 1350, might be intrusive in a 12th-century dump (8130).

Two sherds of Surrey whiteware: Kingston-type ware (KING) produced between 1240 and 1400 are body sherds, one from a highly decorated jug. One sherd is intrusive in pre-occupation marshland (8106), but the highly decorated jug sherd is contemporary in a 13th-century surface (8150).

Six vessels, two of which are rounded jug forms, occur in mid 14th to 15th-century Late Medieval Hertfordshire glazed ware (LMHG/ Fabric K; Huggins *ibid*). These sherds are closely associated and probably contemporary in two contexts, a dump (8113) which lies below a 15th century tanning pit (7123).

Five examples red earthenware pitchers with white painted slip decoration are likely to be Red sandy ware jugs of Essex type (Fabric J2) with white slip painted decoration dating from 1250 -1500. These occur in a 12th century dump (8130)

and in a 15th-century tanning pit (7123) but are residual in 18th-century made up ground.

Forty sherds from 26 vessels in an unglazed red ware can be equated to Fabric 21 (Cunningham 1985), a transitional late medieval ware of 15th-century date. A wider range of forms, such as skillets, cooking pots/jars, large rounded jugs, handled bowls, a possible cistern and flanged bowl reflect the later medieval diversification in vessel forms. All of these wares are associated with post 1300 tanning pits, cess-pits, dumps and earlier 16th-century made up ground, but the few sherds which occur in 18th-century features must be residual.

Post-medieval

The majority of the redware sherds from this site are found in late medieval/transitional unglazed red earthenware Fabric 21 as defined by Cunningham (1985). This fabric is one of the most common of Essex fabric types occurring in the late 15th century and continuing throughout the post-medieval period. A distinction has been attempted in this report to identify the earlier late 15th- to 16th-century wares, classified here as PMRE, which sometimes has reduced surfaces. Thirty three vessels include bunghole cisterns, jars with everted and lid seated rims of 200 to 260mm diameter, large flanged dishes of 320 to 380 mm diameter, a goblet, jugs with large strap handles, rounded chamber pots of 140mm diameter and a chafing dish. This fabric type first occurs in the dumps which post date 1485 and continues to occur through to 18th century garden features. There are some examples in post 1770 redeposited middens and made up ground but the nature of these features confirms that these are residual sherds.

London-area post-medieval slipped redware with green glaze (PMSRG) is represented by three vessels; a jug, a drainer and dish. These are dated as 1480 to 1600 in London and occur at this site in early 16th century made ground (context 8105) but must be residual in post 1950+ hardcore (context 8003).

Fabric 40/smooth, dating from 1580-1650, are characterised by a very smooth red earthenware fabric with glossy continuous lead glaze on both interior and exterior surfaces. Of the 96 vessels represented, the majority are deep bowls, handled bowls and rounded bowls with a variety of everted, hooked, lid seated, square and rounded rims between 200 and 380 mm diameter. The most common form is the deep bowl with rounded (Figure 16/11 (7119) or squared (Figure 16/12 (7024) rim and cordons on the body. Large storage jars and pancheons with squared or rolled rims of between 240 and 360 mm diameter. Other forms include jars, rounded mugs, flower pots, chamber pots, flanged dishes, a drainer and a chafing dish. These vessels begin in the ceramic sequence in association with Building 1, dating from 1540, and continue to be associated with features dated 1770-1850. Their complete absence from 1850+ features means that their occurrence thereafter is also residual.

Post-medieval black-glazed redware (PMBL) is poorly represented by 13 vessels which include tygs, a globular jug and chamber pots. These vessels are usually dated between 1580 and 1700 and occur at this site from 1540 through to 1770.

Metropolitan slipware dishes (METS) from Essex, also form a small part of the red earthenware assemblage at this site. These are primarily examples of large 17th-century flanged dishes ranging from 240 to 360 mm diameter with white slip trail link, dash or wavy line decoration on the rim. A very large flanged dish of 400mm rim diameter is possibly an 18th-century example. One particular example of a bowl/chamber pot is a near complete example decorated with slip trail tree like motifs (Figure 16/13 (7119)). These vessels occur from a phase dated 1540-1650 and continue through to features dated 1770-1850.

A coarse post-medieval redware (Essex Fabric 40) is a long ubiquitous tradition which starts in the 17th century and continues into the early 20th century. Twenty seven vessels can be attributed to this fabric type within which it is possible to distinguish some earlier vessel forms. Late 16th to early 17th-century forms include a flanged bowl and dripping dish. Other vessel forms which continue into the early 19th century are more common in this assemblage, for example handled bowls, flower pots, deep bowls, handled bowls, jars, large storage jars with thumbled cordons and combed line decoration on the exterior, a mug and one skillet/ladle represented by the handle. This ware first occurs in the pond (7107), dated 1540-1650, where it might be contemporary at the later date and is commonly associated with 1700-1850 features.

Imported early post-medieval Rhenish wares include one Raeren stoneware (RAER) drinking jug which may be contemporary in made up ground (8105) dated 1540. Three Frechen stoneware (FREC) bartmanner jugs date from c. 1550 and so maybe intrusive in tanning pit (7123) dated 1485-1540 and are residual in modern hardcore (7005, 8003).

One undiagnostic fragment of Chinese blue and white porcelain (CHPO BW) may be residual in made up ground (7091) dated 1770-1850.

Late 17th to early 18th-century press-moulded flatwares (STSL) include six flatware dishes, 2 flanged dishes and two cups with slip trail decoration. These Staffordshire type slipwares first occur in features dated 1540-1650 where they could be contemporary and continue through to features dated 1700-70.

Tin-glazed earthenwares are present in very small numbers. Earlier 17th-century vessels include a single charger with polychrome decoration in TGW A and an albarello with cartouche in TGW D, both of which are residual in modern hardcore. Later decorative vessels are two dark blue painted dishes and a bowl in TGW BLUE /H. These may be contemporary in made up ground (7101) dated 1700-70 and building 4 foundation (7087) dated 1770-1850 but are residual in

modern hardcore (7003). One imported polychrome fragment of south Netherlands tin-glazed ware (SNTG) is residual in a pit (7103) dated 1700-70.

Eighteenth century English stonewares are represented by a variety of manufacturers. The earliest is a white salt-glazed stoneware (SWSG) dipped tankard which is contemporary in association with the horn workings dated 1700-70. Other wares are three examples of London stoneware (LONS) globular jugs with rilled necks, one of which is stamped with a monogram 'ER'. All of these are contemporary with a horncore-rich pit (7119) and a large dump (7103) dated 1700-70. Five vessels in English stoneware include two bottles, a conical ink well and a storage jar. These are intrusive in the top of the filled pond (7101) but are contemporary with Building 4 (7038) and a cesspit (8005).

A substantial number of later 18th and 19th-century English wares are well preserved and form 30% of the post-medieval pottery assemblage. These include 28 vessels in Creamware which include chamber pots, plates with blue and green feather edges or scalloped edges, rounded bowls, cups and teapots. All of the Creamware occurs in features dated from 1700-70. A majolica teapot in the form of a cauliflower is preserved as a near complete vessel and is contemporary with horn working (7119) dated 1700-70.

The earliest examples of transfer-printed wares are found on six Pearlware plates and two bowls with blue and white (TPW2) willow pattern, floral and landscape patterns. A willow pattern cake stand is preserved as a near complete Pearlware vessel. These Pearlware vessels are probably contemporary in cesspit (8005) dated 1850+ but are predominantly associated with poorly stratified features such as made up ground and hardcore dating from 1850+. Twenty nine transfer-printed vessels occur in blue and white (TPW2) patterns, coloured transfer wares (TPW3/4) and flow blue (TPW FLOW) patterns in a range of utilitarian plates, cups and bowls. The earliest examples on this site in one pit (7103), the result of intrusive garden features. The vessels in well (8022) and cesspit (8005) may be contemporary but the majority of these wares are poorly stratified in root disturbance, made up ground and hardcore dating from 1850+.

Eleven vessels in Refined white earthenware (REFW) are intrusive in dump (7103), probably through gardening, maybe contemporary in cesspit (8005) but are primarily associated with post 1950 hardcore.

One Lustware (LUST) plate maybe contemporary in the fill of a cesspit (8005).

Four English Porcelain (ENPO) vessels: one cup, two saucers and a vase are all poorly stratified in made up ground (7098) dated 1850+.

A black basalt stoneware (BBAS) teapot is associated with post 1950 hardcore.

Five Yellow ware (YELL) chamber pots and bowls with dendritic mocha style decoration are all associated with post 1950 hardcore and root disturbance.

Nine coarse redware dishes of Sunderland style with slip trail decoration on the interior first occur in 1700-70 made up ground (7101) but are otherwise associated with post 1950 hardcore.

One Agate ware (AGAT) bowl is associated with post 1950 hardcore.

DISCUSSION

This is a varied medieval assemblage, with a diverse range of vessel forms, which are well defined within the chronological stratigraphic sequence.

Pre-occupation marshland

A large assemblage of 104 sherds occurs in these pre-occupation layers. The large number and variety of early medieval/Saxo-Norman coarsewares (ESUR, LCOAR, SHELLY WARES, THET) including continental imports such as blue-grey ware indicate that a significant Saxo-Norman settlement may have been present in the nearby vicinity and suggested as across the river from the site. The presence of medieval wares such as SHER, SSW, LOND, KING and MG indicate that dumping was continuing into the 13th century.

12th to 13th century layers (8130 and 8150)

A small assemblage of 75 sherds is primarily contemporary with this phase of activity on the site. Wares such as SSW and local coarse red sandy ware (Fabric 13), LCOAR, LOND EAS and LOND NFR which can be dated closely as from 1140 and 1180, are good indicators of a mid 12th century date associated with these features. The presence of SHER and LOND NFR jugs in this phase could be contemporary if the features date from the latter part of the 12th century.

12th to 13th century postholes, pits, tanning pit, ditch

A large assemblage of 225 sherds is primarily contemporary with these features. Wares such as LCOAR CALC, SHER and SSW are all contemporary in the 12th century> London Baluster jugs can be dated closely as from 1180+. Some disturbance in the stratigraphy is represented by residual sherds of early medieval/Saxo-Norman wares such as ESUR, and the coarse shelly wares and Fabric 21 which must be intrusive.

12th to 13th century dumps

A very small assemblage of 12 sherds is associated with these two dumps (8139 and 8107). Dump 8107 contains residual early medieval material whereas dump 8139 contains a cohesive group of London type ware jugs in early rounded style LOND ERND), north French (LOND NFR) and Rouen (LOND ROU) styles all closely dated as 1150/80-1200/70 with a South Hertfordshire greyware (SHER) pitcher well.

14th to 15th century cesspits, posthole, stake-hole, tree-pit.

A large assemblage of 219 sherds primarily composed of contemporary medieval wares such as Mill Green coarseware (MG COAR), London type ware (LOND), South Hertfordshire greyware (SHER) and late medieval Hertfordshire glazed ware (LMHG). A high proportion of early medieval wares (LOND EAS, SSW, LCALC) are residual in this phase.

1485-1540 tanning pits

A small assemblage of 45 sherds contain contemporary wares which include Rhenish imported Frechen stoneware (FREC), local wares such as Fabric 21 and local early post-medieval redwares (PMRE). Some early medieval wares such as LOND, LMHG and SSW must be residual in these features.

1540 made ground

A small assemblage of 23 sherds contains a high degree of residual wares due to the nature of the redeposited material used to make up this ground surface. Residual wares include early medieval LCOAR CALC and medieval SHER and SSW. Wares such as the early post-medieval redwares (Fabric21/PMRE, PMSRG) and the imported Raeren stoneware drinking jug, which account for half of the assemblage in this features, are contemporary.

1540-1650 pond, Building 1 floor repair, Building 2 floor

A small assemblage of 46 sherds contains primarily early post-medieval redware fabrics (PMBL, Fabric 40/smooth and coarse, METS, STSL). Three sherds of medieval wares (SHER LOND ROU) are residual.

1650-1700 horn-working

Fourteen sherds, all of early post-medieval redware fabric types (PMBL, Fabric 40/smooth METS, STSL) are contemporary with this feature.

1700-70 horn-working, Building 2 demolition, made ground

A large assemblage of 112 sherds is well preserved in these features. The introduction of early industrial finewares such as creamware and early regional post-medieval traditions such as Surrey/Hampshire Borderware occur for the first time in this period alongside the continuation of early post-medieval redware fabrics (PMBL, Fabric 40/smooth METS, STSL) into the 18th century.

1770-1850 Building 4 foundations and posthole, made ground and dump

Ninety one sherds in this phase of activity are dominated by local post-medieval coarseware (Fabric 40) and the use of early industrial finewares such as Creamware (CREA). The earlier post-medieval redwares such as METS must be residual by this date.

1850+, midden, well, made ground, Building 10 foundation, cesspit

A small assemblage of 32 sherds demonstrates the establishment of industrial finewares in the ceramic sequence. Nearly all of the manufactured wares, such as Pearlware (PEAR), Transfer printed wares (TPW2 and 4), Refined whiteware (REFW), English Porcelain (ENPO), English stoneware (ENGS) and Lustreware (LUST) are contemporary with these features and well preserved in deposits such as the well (8022). A small percentage of early post-medieval redware fabrics such as PMRE are residual in these features.

1950+ hardcore and root disturbance

A large assemblage of 159 sherds contain a mixed assemblage of residual early post-medieval redwares and contemporary industrial finewares such as Agate ware (AGAT), black basalt stoneware (BBAS), refined whiteware (REFW), majolica (MAJO), yellow ware (YELL) and Sunderland type coarsewares (SUND).

SIGNIFICANCE

This assemblage is significant for Waltham Abbey as it contains a range of local and imported wares which extend from the Saxo-Norman to post-medieval period. Unfortunately there is little evidence of medieval building on this site to accompany the assemblage which is primarily associated with pits, cess-pits and industrial activity such as leather working or horn-working. The assemblage appears to relate to wasteland and not to building plots which might indicate patterns of street development within the area but the variety and range of wares, extending over such a long period, indicates that this is the waste of nearby domestic occupation. The composition of this assemblage compares well with other excavated sites within Waltham Abbey (Huggins *ibid*) and it would appear to be as large and diverse a range of medieval material as have previously been published from medieval sites within the town.

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SCALE 1:4

Figure 16: Medieval Pottery

1: Jar. 2, 3: Cooking pot/ jar. 4: Spouted bowl. 5: Cooking pot. 6: Cooking pot/ jar. 7: Cooking pot. 8:
Dripping dish. 9: Pipkin. 10: Bowl with pinched spout

Post-Medieval pottery: 11, 12: Bowl. 13: Bowl/ chamber pot

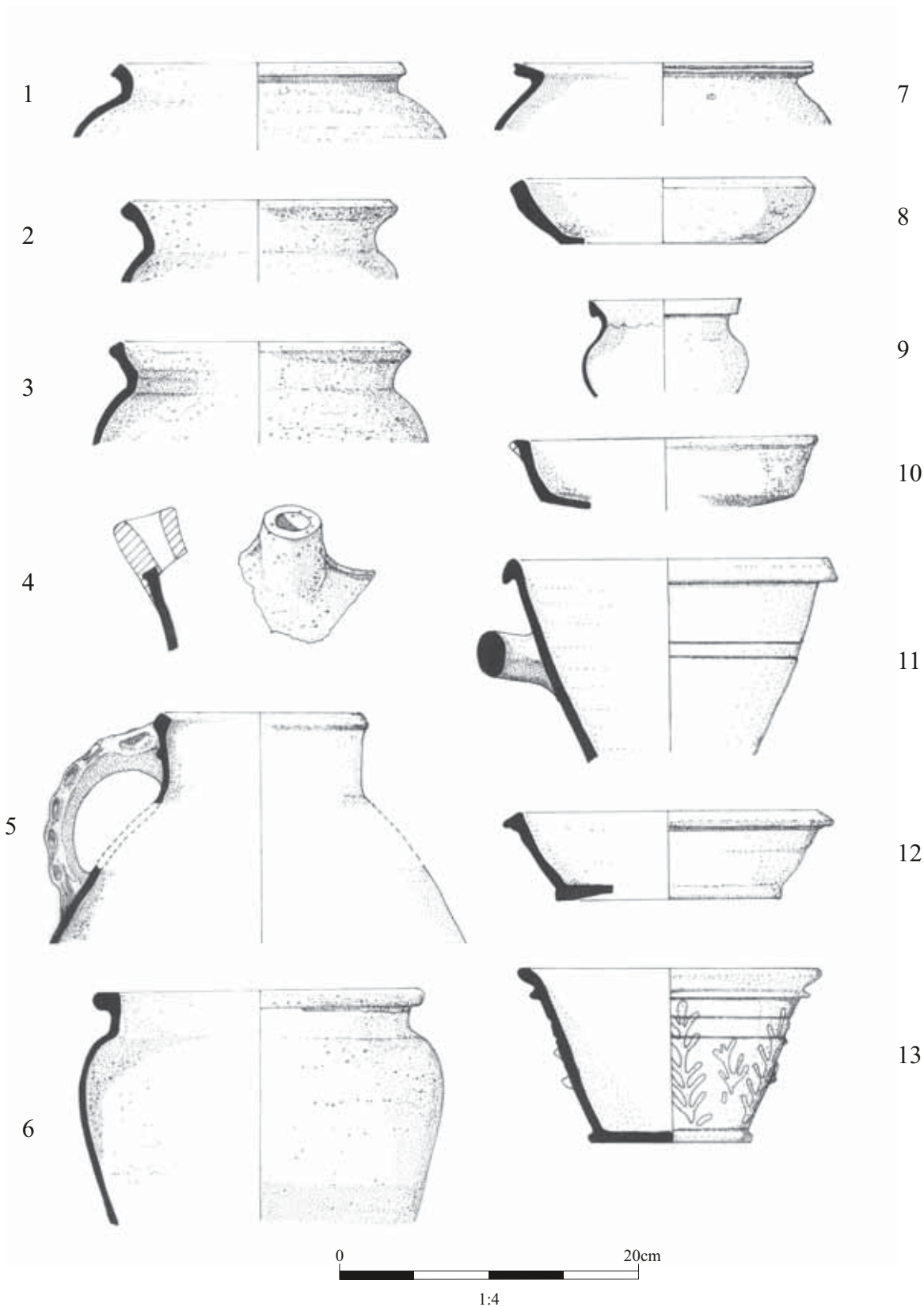


Figure 16: The Pottery Finds

CERAMIC BUILDING MATERIAL

Ian M. Betts

METHODOLOGY

The most important ceramic building material groups are discussed in the main text so only a very brief overall summary of the complete assemblage is given here. A total of 275 pieces of ceramic building material were found on the site weighing 69.24kgs (this figure excludes 15 brick and two tile samples which were not weighed).

All the building material has been recorded using the standard recording forms used by the Museum of London. This has involved fabric analysis undertaken with a x10 binocular microscope. The fabric numbers used are those in the Museum of London fabric reference collection which is available for consultation on request.

FABRIC TYPE SERIES

Roman building material

Tegula and brick: Fabric group 2815

These Roman tiles may represent the remains of a Roman building or buildings in the Waltham Abbey area. Alternatively, they may have been salvaged from elsewhere for reuse, possibly in one of more of the early Abbey buildings.

Medieval and Post-medieval building material

Floor tile: Fabric: 3092

The only definite floor tile is a plain unglazed example with a distorted round nail hole in one corner. The nail hole indicates a Low Countries origin, but the fabric suggests it may be the product of an English tileworks.

Floor tile/brick: Fabric: 2273

Part of what is either a floor tile or brick, which is also certainly from the Abbey. The tile is at least 33 mm in thickness and has two vertical cut edges. Floor tile and brick in the same distinctive sandy fabric have been found on other monastic sites in the Greater London/Essex area where they are dated to the mid twelfth-early thirteenth century AD.

Roofing tile

Peg tile: Fabrics: 2271, 2273, 2276, 2586, 3216, 3265

The peg tiles are all of standard two-hole type with glaze present on certain of the medieval examples. A number of peg tiles, which probably covered buildings at the Abbey, have knife trimming on their sides and base but are not glazed. Most

of the nail holes are round in shape, but there are square and diamond holes (where the square hole-punch has been put in at a 45 degree angle to the tile sides) in a number of post-medieval examples. Many of the post-medieval buildings probably had peg tiled roofs whilst others had a covering of pantiles (see below).

Nib tile: Fabric: 2586

The only nib tile (Context 7007) from WA8 was found over the remains of Buildings 9 and 10 demolished in the mid-twentieth century AD. It was found associated with pottery and clay pipes of a nineteenth or twentieth century AD date. The nib tile was probably made in the nineteenth century AD as it has a larger nib area (54 mm long x 45 mm wide x 16mm thick) than nib tiles of medieval date found in Essex and London.

Pantile: Fabrics: 2275, 2587, 3202

These are probably of mid seventeenth-nineteenth century AD date and would have roofed some of the post-medieval buildings in the area.

Ridge tile: Fabrics: 2271, 2276, 2586

The roof crest of buildings covered with peg tiles, pantiles and possibly nib tiles, would have been covered by a line of ridge tiles. Such tiles were used in both medieval and post-medieval periods.

Brick: Fabrics: 2586, 3032, 3033, 3034, 3035, 3046, 3065, 3221, 3224, 3250

Most of the bricks are from the post-medieval brick structures found on the site, including a number with shallow and deep frogs (fabrics 3032, 3035, 3046, 3215) of eighteenth and nineteenth century AD date.

There are, however, a number of reused medieval and so-called 'Tudor' bricks most, if not all of which, represent material salvaged from the Abbey. These include a perforated Waltham Abbey 'great brick' (fabric 2586) (Context 8084), a type dated by Ryan to *circa* 1177 to 1370. Similar bricks are illustrated by Huggins (1972, 113, Fig 25), including one example with a definite curved edge which may have been use around a doorway or window opening. There are also a small number of slightly smaller bricks (fabrics 3033, 3046, 3065) of probable late fifteenth century AD date (Contexts 8043, 8048, 8051).

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THE MASONRY (Figures 17-20)

Peter Huggins

INTRODUCTION

Stonework from the Augustinian monastery is commonly found in town excavations at Waltham Abbey. The stone collected from the present excavations amounted to 33 pieces from 8 contexts. There was: Reigate stone, 17 pieces; polished Purbeck Marble, 10 pieces; Kentish Ragstone, 4 pieces; and Caen stone, 2 pieces. In terms of archaeological contexts the pieces were found as follows: 7003, 2 pieces; 7104, 1 piece; 7112, 11 pieces; 8003, 6 pieces; 8011, 7 pieces; 8060, 1 piece; 8065, 1 piece; and 8105, four pieces. An attempt is made here to describe the significant pieces and apportion them to particular building phases. For the Augustinian works, Phase 1 is presently seen as from 1177 to 1184, and Phase 2 from c.1220 to 1242.

There were four pieces with one or more Ashlar faces, and 2 with no such working, there was a large Reigate stone with just a hollow roll, and there was a Reigate piece with very battered moulding; nothing useful can be said about these. This leaves 25 for further consideration. There were 12 pieces of shafting, 6 each of Purbeck Marble and Reigate stone, all were of detached shafts unless otherwise stated. They were made in inch sizes so are thus listed (1 inch = 25.5mm). The diameters of the Purbeck Marble shafts were: 5¼ in (Figure 17/3); 5⁵/₈ in; 7 in, 2 pieces; 7½ in; and one fragment of medium size. The Reigate stone diameters measured: 5 in; 5¼ in, 2 pieces; 6 in, engaged; 8½ in, a half drum; and 8⁵/₈ in; a complete drum of length 10¾ in. This leaves 13 stones for more detailed consideration.

FORMS

Capitals and Shaft

A Purbeck Marble clerestory lintel, found in 1989 church excavations, is relevant here (see Figure 17/1). It would have accommodated a 5¼ in diameter shaft; it incorporated a slot for an iron bar which would have helped to locate the supporting masonry with the lintel. The fragment of Purbeck marble bell capital (Figure 17/2, 8011) also shows evidence of a locating slot and has remains of a lead 'plug' into which an iron bar appears to have been hammered. Besides the plain bell capital, a moulded Purbeck Marble example (Figure 17/4), of a four-fold repeated semi-naturalistic design, was also present (7112). The design implies a square abacus above and points to a transitional Norman to Gothic period or Phase 1 for the capital, whereas the circular form of the plain capital points to a Phase 2 date for it and the lintel. Besides these illustrated stones, a piece of Reigate stone (8003) appears to be a rough-out for a similar small capital.

Abacus

Sitting on top of a capital was the abacus. One such Purbeck Marble piece (Figure 18/1, 8003) is shown in combined elevation and section, with a view from below indicating scribed lines, four of which seem not relevant. The moulding, of an upper sagging roll above a hollow and chamfer, is typical of other Waltham

examples which suit the lintel described above. So this appears to be a Phase 2 piece, having been set above an engaged capital and shaft, at the corner of an opening. The moulding here appears to have continued, for some distance at least, along the wall.

Base

Part of a heavy Purbeck Marble base (Figure 18/2, 8060) is fractured, but it could have supported a detached shaft of about 9 in diameter. No parallels for the projection, which must have turned along a wall, are known at present. But the incipient upcurve from the projection is just sufficient to suggest that the roll which remains is the lower of two such rolls separated by a hollow. The curve of the outer roll fits a template of diameter 16½ to 17 inches. Thus the piece is a size to suggest it may have derived from the aisle respond to one of the detached shafts of a major pier of the Augustinian church, included here as Figure 18/3. If this comparison is valid, then the same profile of the base is to be expected. In suggesting this comparison it should be pointed out that for the major pier the elements sat directly on the base and were not recessed into it as in the case of the excavated item.

Window Jambs

Two pieces of unprovenanced Reigate stone have recently been suggested, by Glyn Coppack, to be jamb stones of a window or door (Figure 19/1 & 2). The larger one would suit a wall of thickness of 19¾ in, and so is probably from a minor Augustinian application. From the present excavations two other Reigate stones were found (7112); the more certain piece (Figure 19/3) compares with the larger example, the less certain piece (Figure 19/4) compares with the smaller. The keeled roll suggests a Phase 2 date.

Arch Stones

Two stones are so-called, both in Reigate stone. The largest piece (Figure 20/1) is drawn with the top face horizontal, rather than at the angle of a voussoir, as seems to be indicated by the presence of two 'stops' to the moulding. There are two parts to this moulding, the left hand part must continue upwards on the face of a wall, the right hand part defines the shape of an opening through which one could see if not pass, for the moulding is symmetrical on both sides and was obviously thus visible from below. The piece may fit a multi-element design, with the left-hand moulding rising over the whole so as to unite the various elements together. The use of the pointed roll possibly indicates a 13th century date for this piece. The second arch stone (Figure 20/2, 7112), is 9½ in high, with slight curvature. It may be a fragment of a simple opening like the window jambs discussed above.

Other Stones

There are two pieces of Caen stone. A piece, 4¼ in thick, (7003), with remaining evidence of weak vertical moulding on the right-hand side (Figure 20/3) has no present parallel. Another piece, up to 3¼ in thick, from context 8065, had a face

finely polished as if part of a tomb or altar. Caen stone is more likely of Norman rather than of Augustinian date at Waltham.

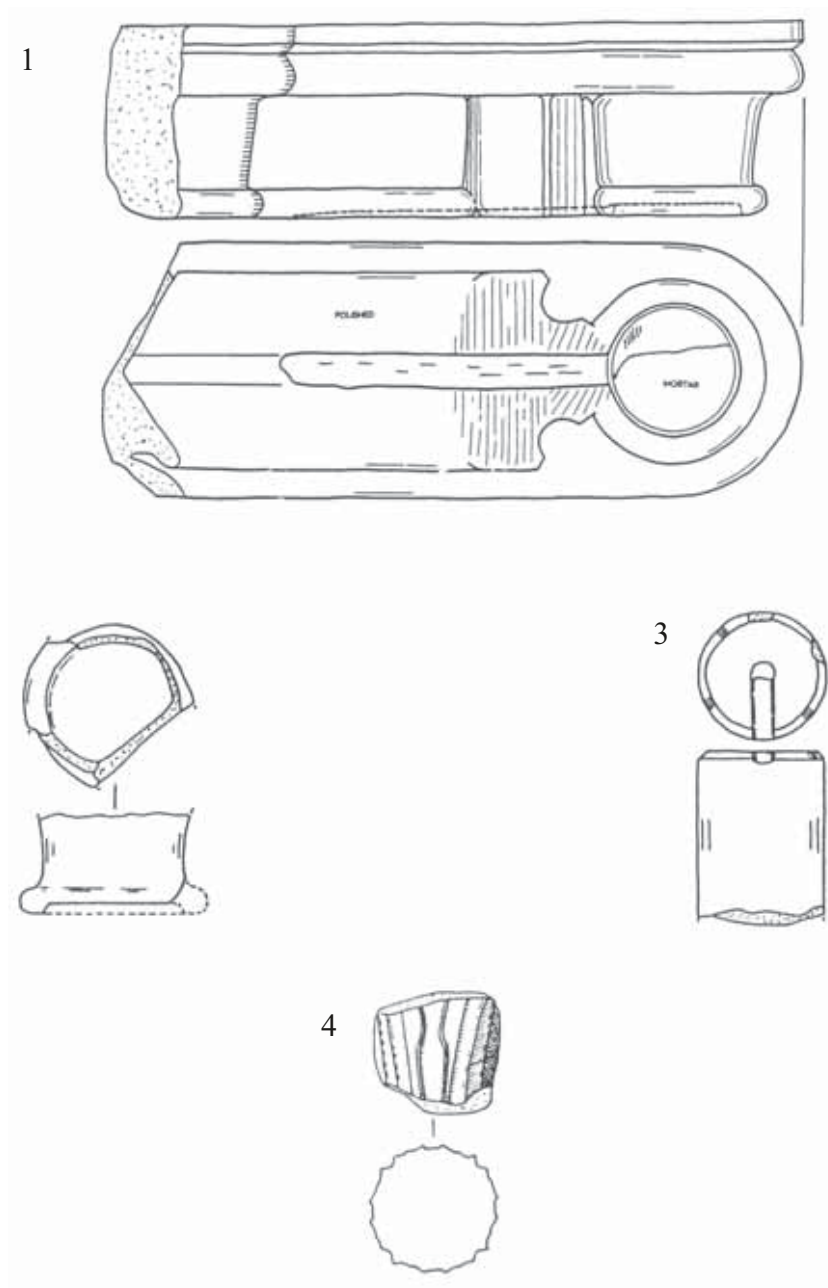
There are two pieces of worked Kentish Ragstone. This material is difficult to work; but rough-tooled Ashlar pieces have been found used in the abutments of a 14th century bridge. One such piece had a face measuring about 6 in by 16³/₄ in (8003). The other piece (Figure 20/4), about 6¹/₄ in thick (7112), has been more carefully tooled by means of a chisel held near-vertically to the face being worked, along the edges marked 'C', the other edges are rough tooled 'R' or broken 'B'. Pieces like this were probably laid in courses, possibly in a wet environment, such as for a sluice, in a sewer, or as part of the water system of a mill, but no certain use can be suggested.

CONCLUSIONS

The stonework discussed here has added significantly to the corpus of such material which derived from the Augustinian Priory later Abbey. Some items can be attributed to one or the other phases of construction. Some pieces yield new information, others can be paralleled with earlier discoveries. It is fortunate that moulded pieces and shafts, which had less value as building material, after the Dissolution of 1540, found their way into the urban environment in the following decades; on the monastic site some such pieces seem to have been burnt possibly to make lime.

Context	Stone	Description	Period	Figure
7003	PM	5 ⁵ / ₈ inch shaft	Augustinian	
	C	Weak moulding	Norman	20/3
7104	R	Arch stone	Augustinian	20/1
7112	R	Window/ door jamb	Augustinian	19/3
	R	Window/ door jamb	Augustinian	19/4
	R	Arch stone	Augustinian	20/2
	K	Wet environment	Augustinian	20/4
	Rx2	Ashlar faces	Uncertain	
	R	5 inch shaft	Augustinian	
	R	6 inch shaft	Augustinian	
	R	Battered moulded piece	Augustinian	
	R	Large piece with hollow	Augustinian	
	PM	Moulded capital	Augustinian 1	19/4
8003	PM	Fragment bell capital	Augustinian 2	19/2
	PM	Abacus	Augustinian 2	18/1
	R	Capital rough-out	Augustinian	
	K	Rough ashlar face	Augustinian	
	Kx2	No working	Uncertain	
8011	PM	5 ¹ / ₄ inch shaft	Augustinian	17/3
	PMx4	7, 7 ¹ / ₂ , and 2x 7 ³ / ₄ inch shafts	Augustinian	
	Rx2	Ashlar faces	Uncertain	
8060	PM	Base	Augustinian	18/2
8065	C	Polished faces	Uncertain	
8105	Rx4	5 ¹ / ₄ , 5 ¹ / ₄ , 8 ¹ / ₂ , 8 ⁵ / ₈ inch shafts	Augustinian	

Figure 17



- No.1 : Clerestorey lintel from 1989 excavations
No.2 : Fragment of similar bell capital, from context 8003
No.3 : Piece of shaft to suit 1 and 2, from context 8011
No.4 : Piece of moulded capital, context 7112

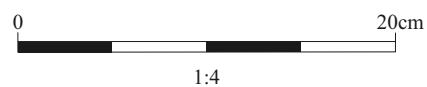
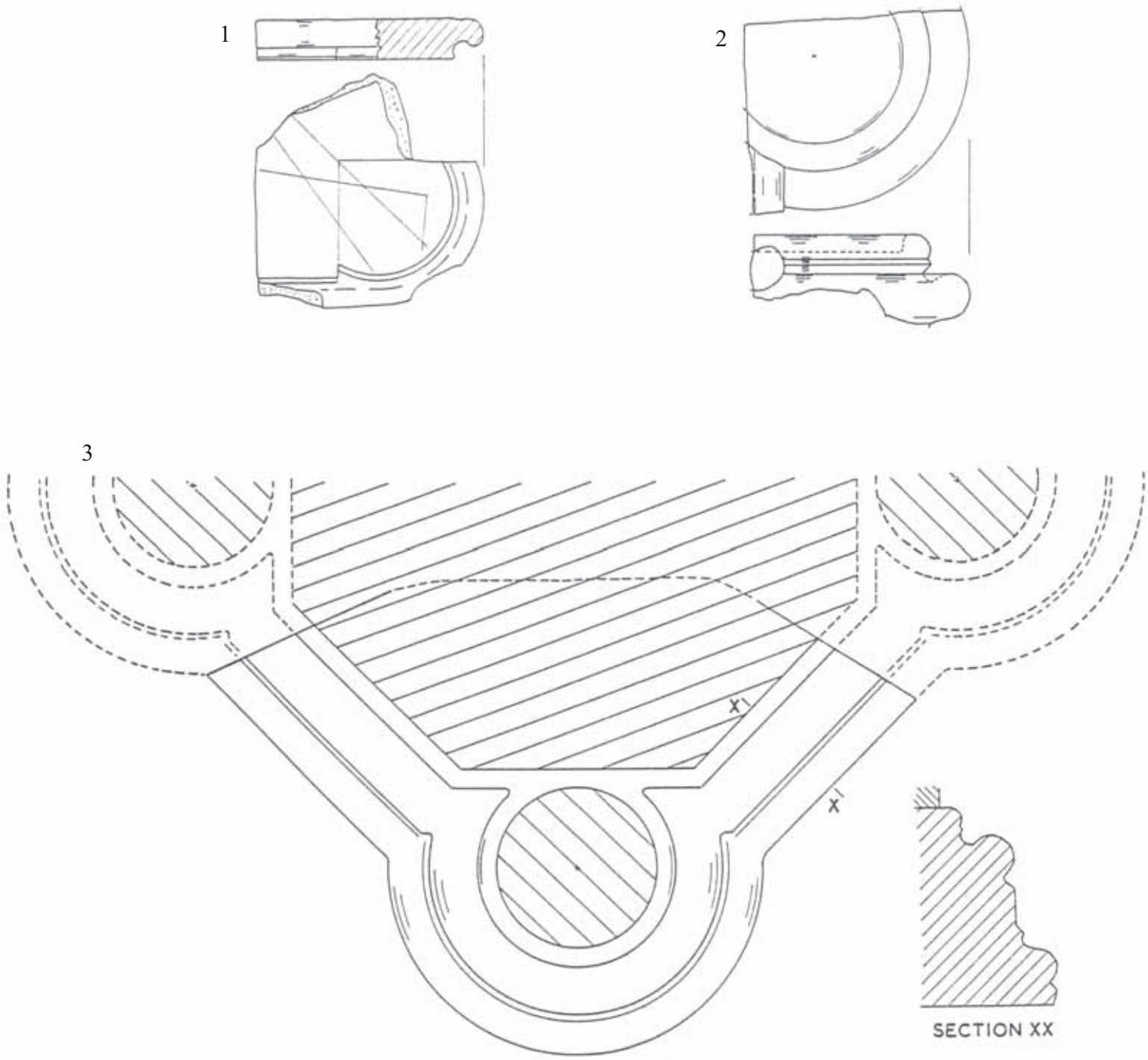


Figure 17: Masonry

Figure 18



No.1 : Typical Waltham abacus, from context 8003

No.2 : Piece of massive shaft base, from context 8003

No.3 : Base of unprovenanced major pier for comparison with No. 2

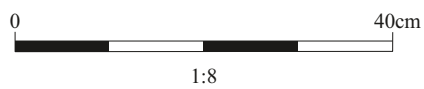
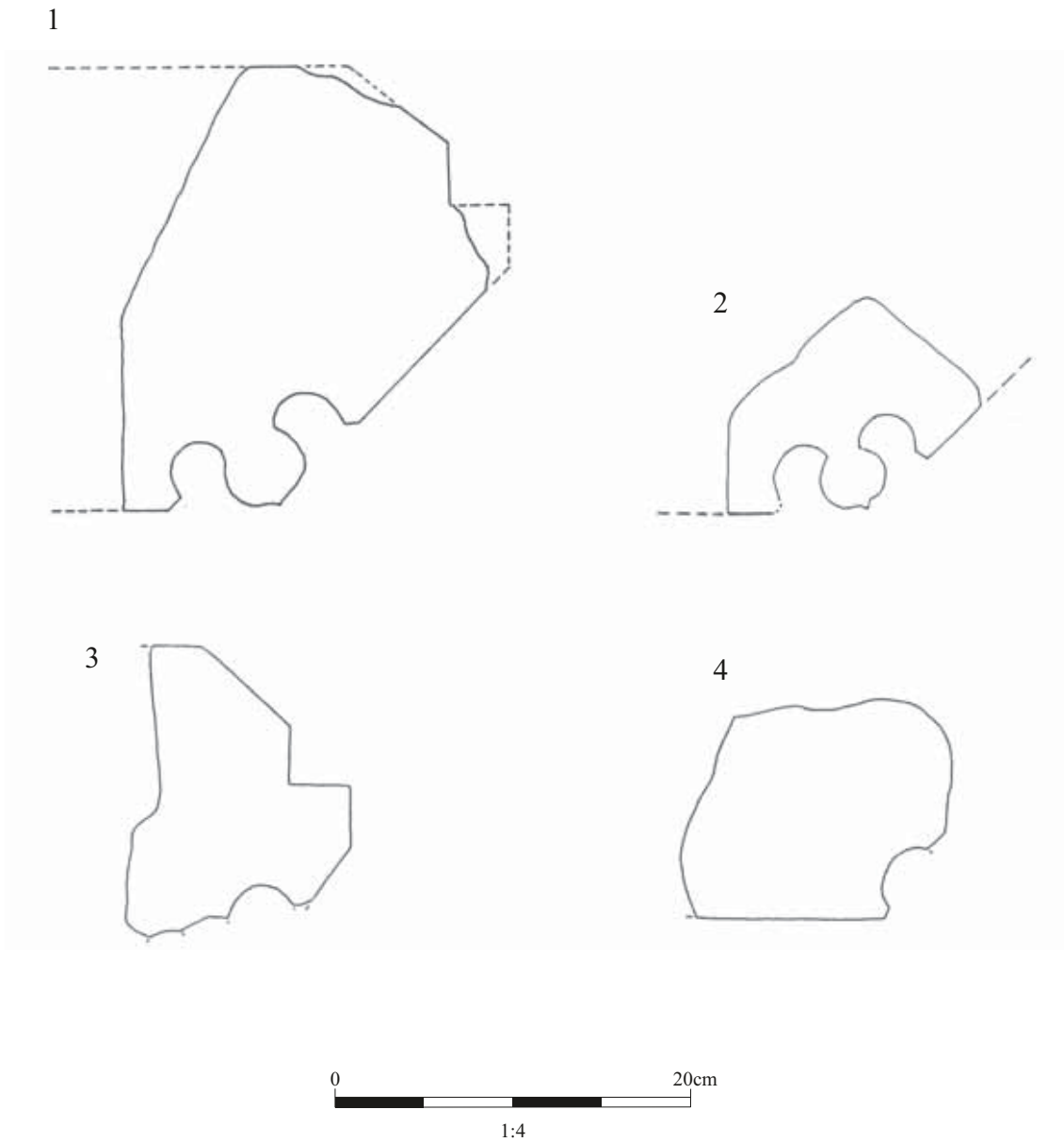


Figure 18: Masonry

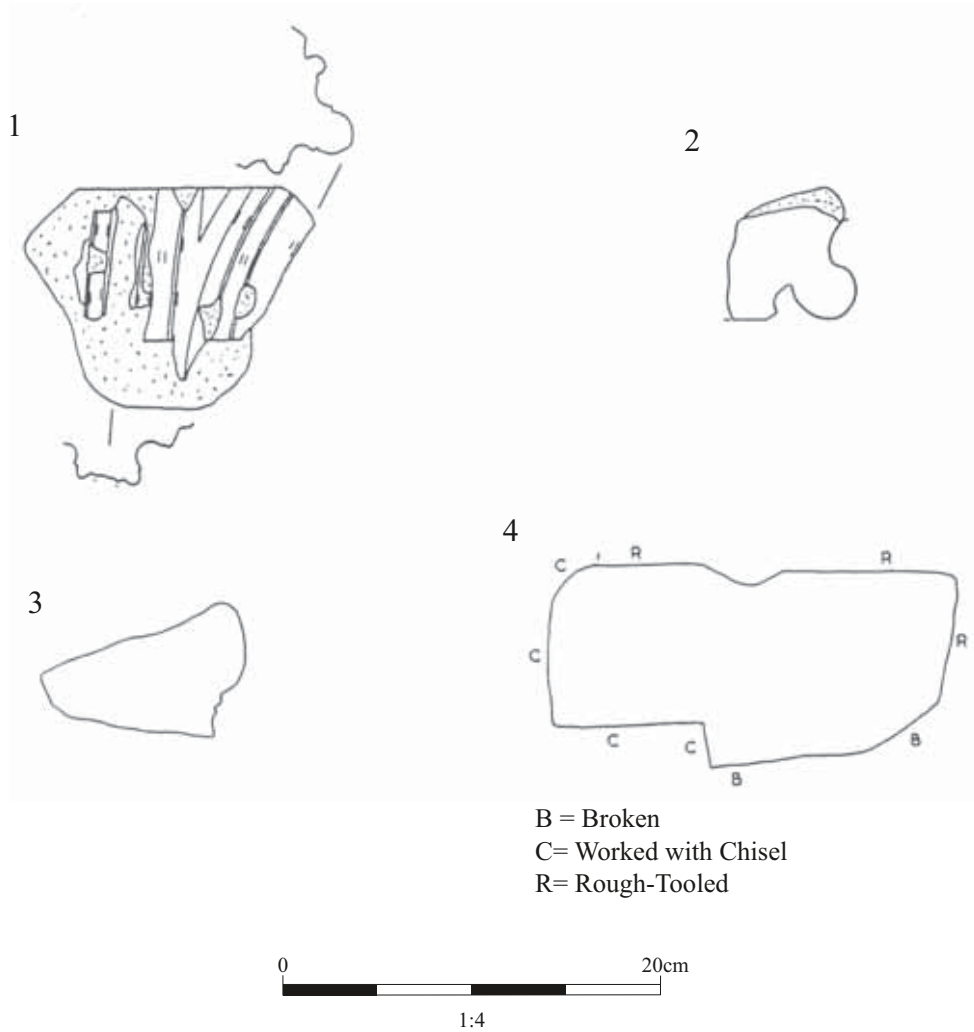


No.1 & 2 : Unprovenanced pieces of window/door jambs

No.3 : Piece like No. 1, from context 7112

No.4 : Piece probably like No. 2, from context 7112

Figure 19: Masonry



No.1 : Arch springer stone, Reigate stone, from context 7104

No.2 : Arch stone, Reigate stone, from context 7003

No.3 : Moulded Kentish ragstone, from context 7112

Figure 20: Masonry

THE SMALL FINDS (Figures 21 and 22)

Beth Richardson

THE FINDS

There are 26 accessioned finds, a box of bulk leather and a bag of bulk iron nails from the site. Most of the finds are leather or, in the case of an 18th century saddle, composite leather, wood and iron. The leather finds form the bulk of the report. The majority of the metal finds are late post-medieval; four are medieval (two copper alloy and two iron). There are also three medieval hone stones, a fragment of medieval window glass and a bone tool which is probably also medieval and comes from a context which produced most of the leather. The medieval objects and more significant post-medieval objects are described below, while the complete archive is available for study at Epping Forest District Museum

Small Find Number	Context	Material	Object	Period
1	7005	Cu alloy	Coin/ token	Post medieval
2	7117	Bone	Needle	Medieval
3	8116	Cu ally, Au	Ring	Medieval
4	8105	Cu alloy	Button	C20th
5	8139	Cu alloy	Buckle	Medieval
6	7119	Pottery	Teapot	Post medieval
7	8124	Stone	Hone	Medieval
8	8131	Stone	Hone	Medieval
9	8190	Stone	Hone	Medieval
10	7107	Leather	Strap	Post medieval
11	7117	Leather	Strap	Medieval
12	7117	Leather	Strap	Medieval
13	7117	Leather	Shoe	Medieval
14	7117	Leather	Shoe	Medieval
15	7117	Leather	Sheet	Medieval
16	7107	Leather	Collar	Post medieval
17	7092	Composite	Saddle	Post-medieval
18	7123	Cu alloy	Piercing tool	Medieval
19	7063	Cu alloy	Object	Post medieval
20	7123	Iron	Horseshoe	Medieval
21	7104	Iron	Horseshoe	Post medieval
22	7132	Metal	Object	Medieval
23	7113	Leather	Shoe	Medieval
24	8116	Glass	Window	Medieval
25	7117	Leather	Shoe	Medieval
26	7117	Leather	Shoe	Medieval

COPPER ALLOY OBJECTS

Catalogue

- <3> [8116]: Large ring (very slightly ovoid). Remains of internal projections. Gilded copper alloy. Ext. D 30-32mm. Figure 22
- <5> [8139]: Undecorated copper alloy buckle with oval frame and narrowed bar; the pin has a transverse ridge. 12 x 27mm. Figure 22

Discussion

The buckle comes from the 12th-13th century dumps. It is comparable to a number of examples from London, dated from the 13th-15th century (Egan, in Egan and Pritchard, 1990, 50-124).

The ring is gilded and has traces of decoration on its outer surface. There are fragmentary internal projections indicating that this is an odd form of brooch or a fitting. It comes from the primary fill of a late medieval cesspit, and may, like a piece of painted window glass from the same fill, have derived from or be connected in some way with the Abbey.

IRON OBJECTS

Catalogue

- <18> [7123]: Complete (slightly damaged at point) slightly curved tool, tapering to a point at one end and to a tang at the other for insertion into a handle; probably an awl. Diamond-shaped section: L 92mm, W 2mm, T 2mm. Figure 22
- <20> [7123]: Horseshoe. Near-complete, with the worn remains of five square or rectangular nail holes. D 95mm. Figure 21
- <21> [7104]: Horseshoe. Near-complete, with seven rectangular nail holes, three in one branch and four in the other. D 128mm. Figure 21

Discussion

The presence of a probable awl in the upper fill of a medieval tanning pit is interesting. Awls are usually thought to be leatherworking tools, although they did have other craft uses. A large group of mainly early medieval awls from York have both diamond-shaped and rectangular sections; it is noted that the diamond-shaped sections were (and are) better suited to leather working as they make a cleaner cut (Ottaway and Rogers 2002, 2728-30).'

Because the horseshoe from [7123] is small and has an angular inner profile it is probably late medieval (Clark 1995, 88-91). The pottery from this context is late 15th-16th century.

The horseshoe from [7104] does not have fullering (a groove close to the outer margin in which the nails are sunk), and the absence of this feature with the

arrangement of nail holes (three in one branch and four in the other) suggests a probable 17th century date (Noël-Hume 1969, 237-9).

BONE OBJECTS

Catalogue

<2> [7117]: Pin or needle, made from a naturally pointed pig fibula, with a large perforation (broken) at the proximal end. It has been worked (or trimmed) on the shaft and point. Probably medieval. L 128mm, max W 12mm. Figure 21

Discussion

Pins or needles made from pig fibulae are common Saxon and early medieval finds. Because the heads are wide and the perforations usually large, these objects are generally thought to be pins used to secure an article of dress ((MacGregor 1985, 120-1). If used for textile work it would be for activities like netting and mesh knitting (MacGregor *ibid*, Crummy 1988, 6-7). This needle or pin was found with discarded shoe parts and a fragment of hide waste, but it would have been too coarse to have been used for sewing in leather working.

STONE OBJECTS

Catalogue

- <7> [8124]: A complete schist hone of rectangular form with a suspension hole at the upper end. Worn on all faces. L 79mm, W 15mm, T 10mm. Figure 21
- <8> [8131]: Incomplete schist hone, rectangular and slightly curved. No obvious signs of wear. L 86mm, W 28mm, T 15mm. Figure 21
- <9> [8190]: Incomplete finely-grained schist hone, rectangular in section, and tapered at its rounded end. L 95mm, W 30mm, T 18mm. Figure 21

Discussion

Two of the hones (from [8124] and [8131]) are Norwegian Ragstone, a fine-grained schist from the Eidsborg quarry near Telemark, Norway (Moore & Oakley 1979, 280-3). Norwegian Ragstone hones are common finds on English sites in the late Saxon and medieval periods. The other hone is a very fine-grained blue-grey micaceous siltstone of unidentified source.

GLASS

Catalogue

<24> [8116]: Fragment of window glass with grozed edge and traces of painted decoration. Surfaces are pitted and distorted. It is not possible to identify the colour of the glass or the paint; the painted lines are curved and may be from a foliate scroll design. Figure 22

The painted glass is likely to have come from one of the Abbey buildings, and indicates a phase of change or repair during the medieval period prior to the dissolution.

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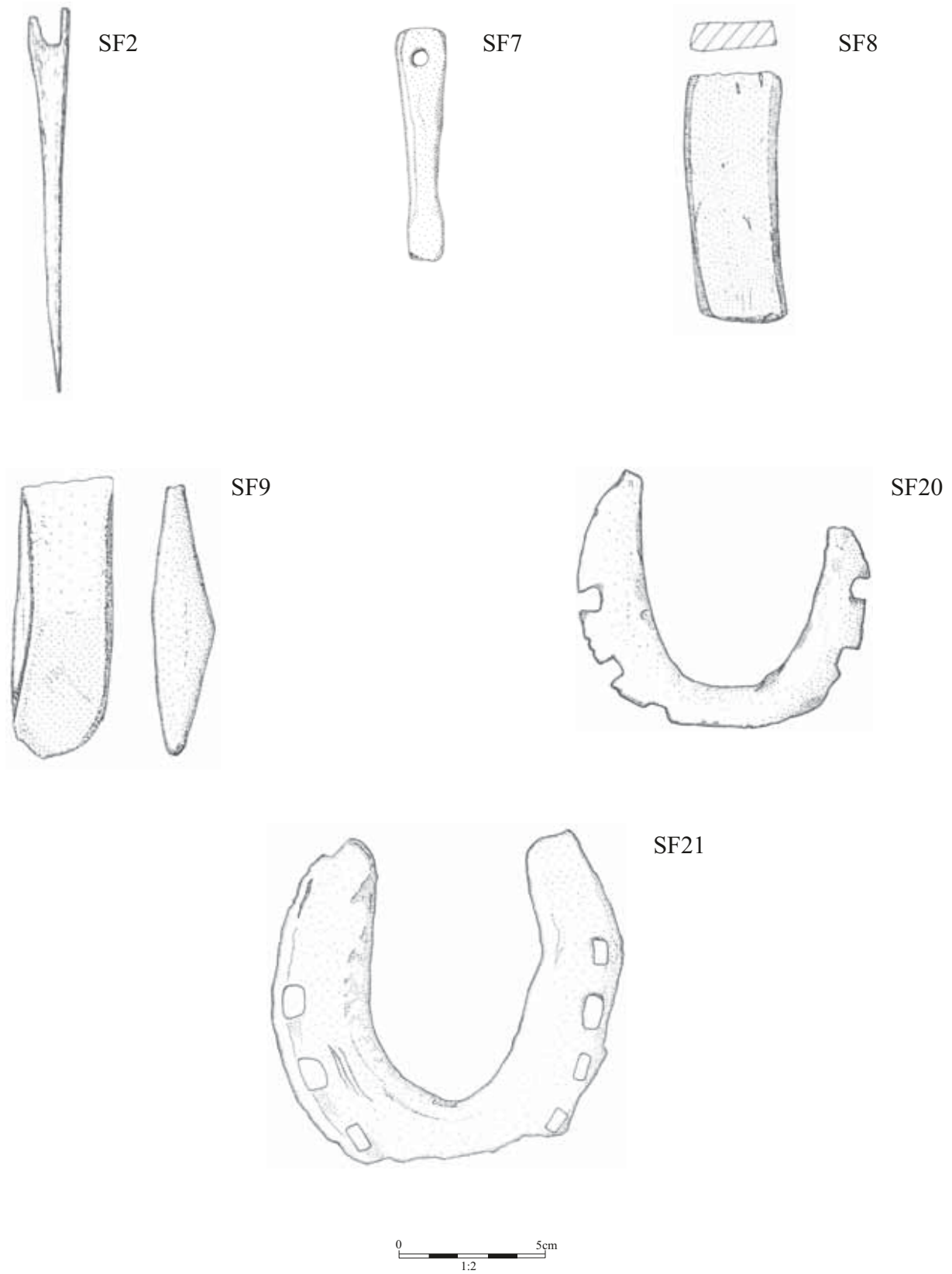


Figure 21: Registered Finds

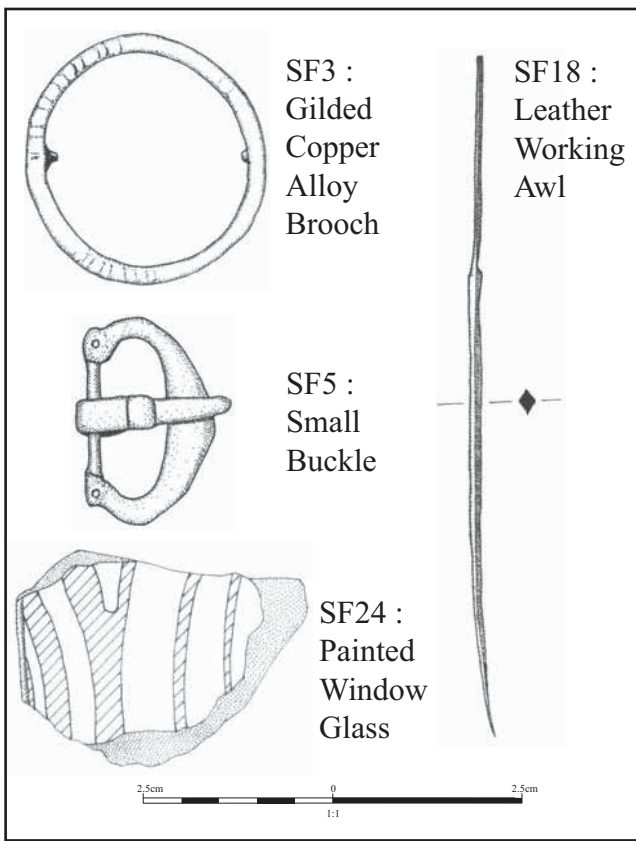


Figure 22: Registered Finds

LEATHER OBJECTS (Figures 23-25)

INTRODUCTION

There are 75 leather items from the site from five contexts ([7113], [7117], [7123], [7107] and [7092]). The majority are shoe parts from late medieval shoes, but there are also pieces of medieval and early post-medieval strap and waste leather. A late medieval yoke or collar and the wooden frame and leather trappings from a late 17th or early 18th century saddle was found in association with the carcass of a horse in the infill of a horn-core-lined pit. All the leather was found in pit and pond fills and is well-preserved.

The leather was examined and recorded before and after conservation, and assessed for publication by Jackie Keily (Museum of London Specialist Services). The leather was conserved and identified by Elizabeth Goodman (Museum of London).

THE SHOES

Catalogue

- <23> [7113]: Child's sole, oval toe, stitch marks at waist (underside) for attachment of clump sole. L. approx. 155, W. 52mm. Leather: cattle. Figure 23-S1
- <13> [7117]: Adult ankle shoe, oval toe. Incomplete front upper. Upper has high cut slit throat with internal whip stitching for tongue. Butt seam with edge-flesh stitch marks. Central lace or buckle fastening. Leather: cattle. Figure 23-S2
- <14> [7117]: Adult one-piece ankle shoe, right foot, oval toe. Front upper, rand, worn one-piece sole, worn front clump sole. Upper has high cut slit throat with edge-flesh stitch marks for tongue or reinforcement cord. Butt seam with edge-flesh stitch marks on inner side, other side torn but no evidence for corresponding seam on outer side. Fragments of two straps, tapered at their ends; one slotted through the other and both slotted through two holes at top of throat, almost certainly for attachment to (missing) buckle. Central ?buckle fastening. L.250, W.82, clump sole W. 103mm. Leather: cattle. Figure 23-S3
- <25> [7117]: Adult one-piece ankle shoe, left foot, oval toe. Upper, rand, worn one-piece sole (unworn under back clump sole), worn front and back clump soles. Upper has high cut slit throat with edge-flesh stitch marks (on one side, other side worn) for tongue or reinforcement cord. Butt seam with edge-flesh stitch marks on inner side. No fastening details. L. approx. 240, W. 82, front clump sole W. 100mm. Leather: cattle. Figure 24-S4

<26> [7117]: Adult right sole, slightly pointed toe. L 230, W. 76mm. Leather: no identification possible. Figure 24/-S5

Description

All the shoes and shoe parts come from turn-shoes made with a single sole which was sewn directly to the upper, usually incorporating a rand, a narrow strip of leather which made the shoe more watertight. The shoe was reversed or 'turned' so that the stitching was on the inside. The turn-shoe method was the standard method of shoe-construction in the medieval period, developing into the modern double-soled or 'welted' method in the late 15th and early 16th centuries. Sheep, goat and cattle leathers were all used for shoe-manufacture, but after the 13th century cattle leather became predominant (Mould, Carlisle and Cameron 2003, 3265-66; Grew and de Neergaard 1988, 44-6). Where identifiable all the shoes from this site are cattle leather (Elizabeth Goodman, Museum of London Archive Report, 2004).

The stratigraphically earliest shoe parts from the site are two soles and a forepart clump (or repair) sole from the upper levels of the marshy deposits on the western half of the site ([7113]). The most complete sole (not illustrated) from a child's turn-shoe, has a broad forepart, a fairly narrow waist and tread, and probably an oval toe although the end is worn away. It cannot be closely dated, especially as children's shoes throughout the medieval period were generally broader and more natural in shape than their adult counterparts, but the deposit also contained 15th century pottery and it could well be this date.

The other shoe parts were found in the upper fills of two large tanning pits ([7117] and [7123]), also on the western half of the site. The fills are thought to have been deposited in the early to mid 16th century but the shoes are late medieval, probably 15th century. The four shoe parts from [7123] consist of a worn adult sole with a short point and petal-shaped tread (very similar to <26>), a back clump sole and clump sole fragment, both with tunnel stitching around their edges, and a heavily repaired heel section from a pieced sole.

The much larger group, from [7117], contains two near-complete adult turn-shoes (<14 and 25>), and about 40 shoe parts consisting of soles, front and rear clump soles, heel stiffeners, pieces of rand, and mainly fragmentary pieces of upper.

The most complete item in the group is a one-piece or 'wrap around' ankle shoe (<25>) with the joining butt seam positioned towards the heel on the inner side of the foot. The shoe has a high front and a central slit, the left (outer) side of which has edge-flesh stitch marks for a reinforcement cord or tongue. The other side of the slit is very worn, and no reinforcement or fastening details survive here or elsewhere on the upper. The sole has a wide natural shape with an oval toe, and (detached) front and rear clump soles. All three soles are worn at the toe and heel. Part of the wide triangular-sectioned rand survives, with edge-flesh stitch marks

on its inner edge for attachment to the upper and sole, and widely-spaced flesh-grain tunnel stitch marks around its edge for attachment of the clump soles.

A less complete but very similar shoe (<14>) is almost certainly also one-piece, with a butt seam in the same position but with no back. It also has a high front opening with a central slit, and edge-flesh stitch marks on both sides of the slit (very worn on the outer side). Part of the fastening survives at the top of the outer side of the slit with the tapered ends of two internally joined thongs (one is slotted through the other) which could be the ends of laces or thongs for the attachment of a buckle. The sole, front clump sole and wide rand are again very similar to those of <24>, but the two shoes have slightly different shaped soles and are not thought to be a pair.

The other shoe parts from [7117] are less complete. The outer side of an adult shoe (<13>) is similar in shape to <14> and <24>, above, but there are internal whip stitch marks rather than edge-flesh stitches along the one surviving side of the central slit (again these are probably for a reinforcement cord or tongue) and the inner butt seam is nearer the instep. A broken thong or lace is threaded through a hole at the top of the butt seam. Other pieces of upper are more fragmentary, but include the back (quarters) of a two-piece shoe. Most of the soles have a fairly natural shape with medium or narrow waists and seats and oval toes; one has a short pointed toe with a petal-shaped tread and a medium waist and seat (<26>). The interesting feature of the group is the large number of clump and repair soles: nearly every shoe has been repaired, and surviving pieces of rand are wide, with enough room for attachment of the clump sole to the existing sole and upper.

Discussion

All the shoes from the tanning pits are very similar and probably near-contemporary, but they are re-deposited and have to be dated by their shape, constructional and fastening details, and by parallels from other sites. They are difficult to date with precision, partly because it is a small group with few complete or near-complete shoes and partly because this is a rural site, and they are not necessarily directly comparable with (for example) the shoes from the well-dated waterfront groups in nearby London.

The shoes have either a natural foot shape with a tread, waist and seat of medium width and an oval-shaped toe (e.g. <25>) or a short pointed toe with a petal-shaped tread (<26>). These correspond to Quita Mould's later medieval sole shapes types 1 and 2a from a large assemblage of working shoes from Reading Abbey Wharf dated c. 1395-1539 (Mould 1997, 109-10). They are single-soled turn-shoes, but they nearly all have (or had) additional clump soles and wide rands for clump sole attachment. The attachment of clump soles during manufacture is called turn-welt construction, and is a late medieval development (see for example Grew and de Neergaard 1988, 47; Mould *ibid*, 110-11). There is evidence for turn-welt construction in this group with at least one example of a shoe unworn under its back clump sole (<25>) and generally wide rands which

were essential if a further sole was to be added. However most of the clump soles do seem to be repairs; again there are parallels with the 15th century assemblage from Reading Abbey where more than half the shoes had repair clumps. The uppers are fragmentary, and it is only possible in three cases to say whether they have been constructed in one or two pieces: two are one-piece with an inner seam positioned towards the heel (<14>, <25>), and one (<23>) is two-piece with instep seams.

One-piece uppers are generally earlier than two-piece uppers, but the more basic wrap-around or one-piece construction method continued to be used well into the 15th century, especially for children's shoes and in rural or poor areas (see for example Mould *ibid*, 111; Grew and de Neergaard *ibid*, 71). All vamps are high with a central slit which has stitching for a reinforcement cord or tongue. Only one shoe <14> has (incomplete) fastening details: fragments of what may have been a lace. Both the vamps and the fastenings are consistent with a 15th century date, and again paralleled by 15th century shoes in London and Reading (Grew and de Neergaard *ibid* 71-2 for example) although they are fragmentary and not in themselves completely diagnostic.

On balance the shoes are almost certainly 15th century, and perhaps late 15th century as they were deposited in the early to mid 16th century. They are worn and presumably just dumped as rubbish with the straps, possible collar and other leather pieces (below). There are two pieces of re-used leather or waste in the group, but both are sheep/goat hide (the shoes are cattle) and there is no real evidence that this is cobbling waste.

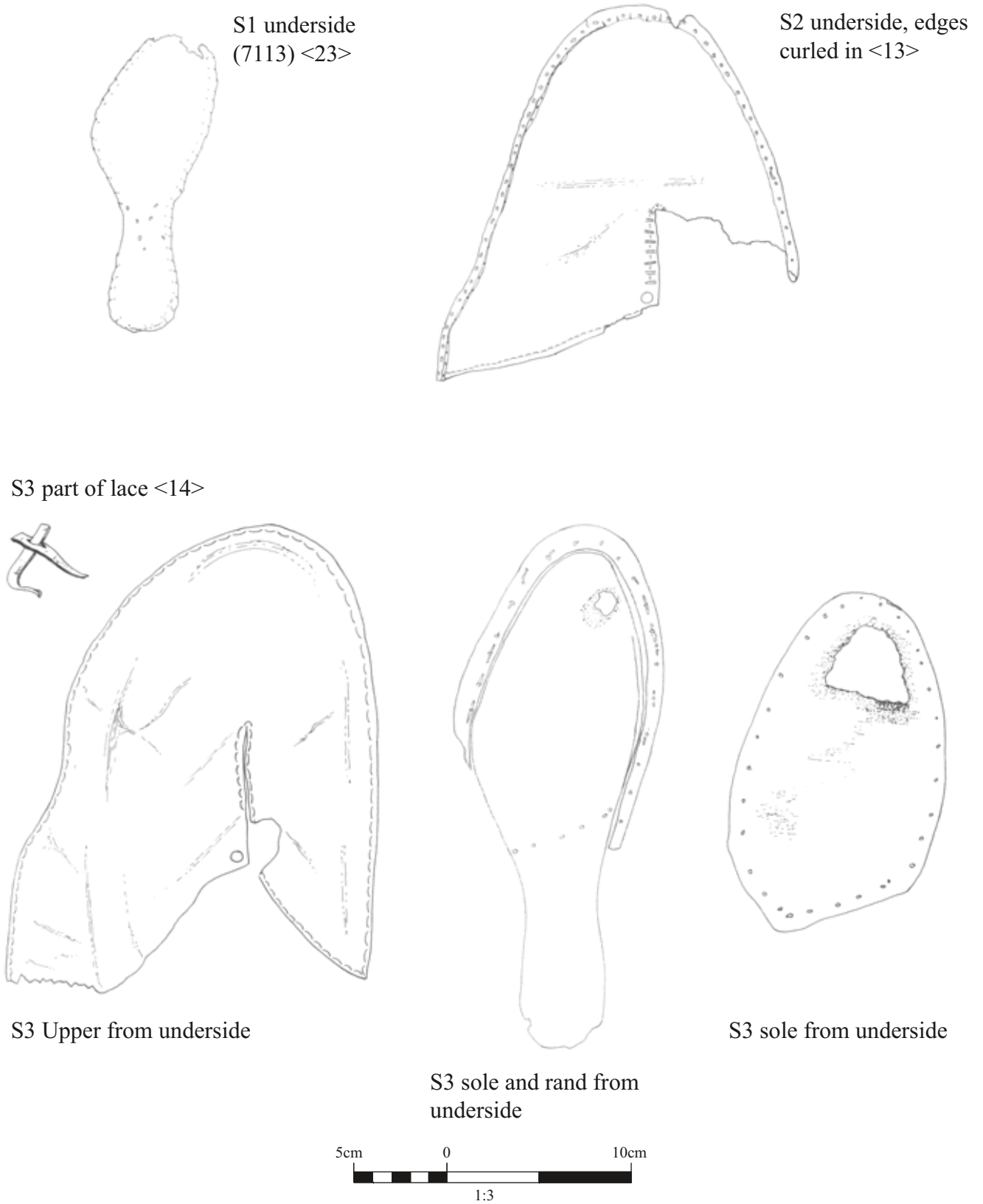


Figure 23: Leather

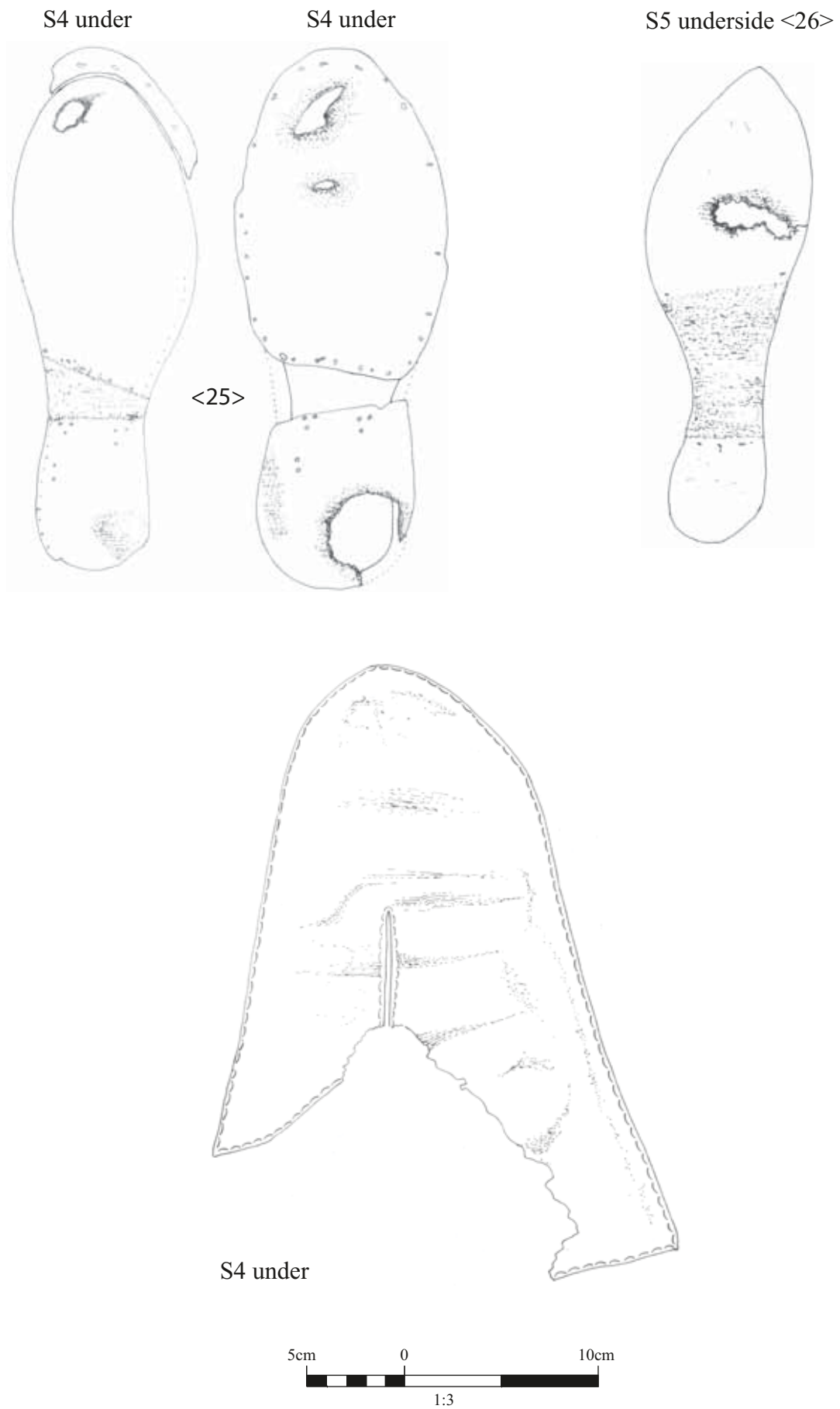


Figure 24: Leather

THE STRAPS AND OTHER LEATHER ITEMS

Catalogue

<11> [7117]: Strap end, one end torn, the other cut to a blunt point. Parallel knife cut edges, tapering slightly to the pointed end. Remains of two central slits and a possible rough hole. L.110, W.22-25, T.3mm. Leather: cattle. Figure 25

<12> [7117]: Strap end, one end torn, the other cut square. Knife cut edges. Central hole with slit extending from it, and another torn hole at cut end; four small holes (two near cut end) appear more randomly placed and may be secondary. L.218, max.W.33, T.1mm. Leather: no identification possible. Leather: unidentified. Figure 25

The other leather

<15> [7117]: Two pieces of roughly rectangular sheet, each with a flesh/edge seam along one long side, other long side torn, one short side torn and the other short side whip-stitched. Possibly part of the same object that has split at a fold. One has a roughly circular fragment cut from it, and remains of an angled corner. C. 310x18-19mm. Leather: sheep/goat. Figure 25

[7117]: Fragment of thick hide off-cut (waste). Leather: ?sheep/goat.

<16> [7107]: Long curved strip; both ends torn. One long side has a line of fine probably decorative stitch holes along its edge, and a line of larger more widely-spaced diagonal stitch holes (c. 8-10mm apart) just below it. The larger stitch holes correspond to a line of identical large diagonal stitch holes approx. 40mm from the edge of other long side, and they meet where the object is curved (although this may be a result of burial conditions). The other long side has a knife cut edge, and has a line of very widely-spaced vertical stitch holes (c. 30-40mm apart) about 10mm from the edge, with a few apparently randomly spaced stitch holes below that. There are a large number of apparently randomly spaced reinforcement stitch holes in one area (on a torn edge) between the two lines of large diagonal stitch holes. A large irregular curved section has been cut out of the side with the fine stitch holes, presumably for re-use. If the curved section is original, and not caused by burial conditions, this object may be part of a collar or yoke. It was found in a 17th century context. L.765mm, W.c.165mm. Leather: probably cattle.

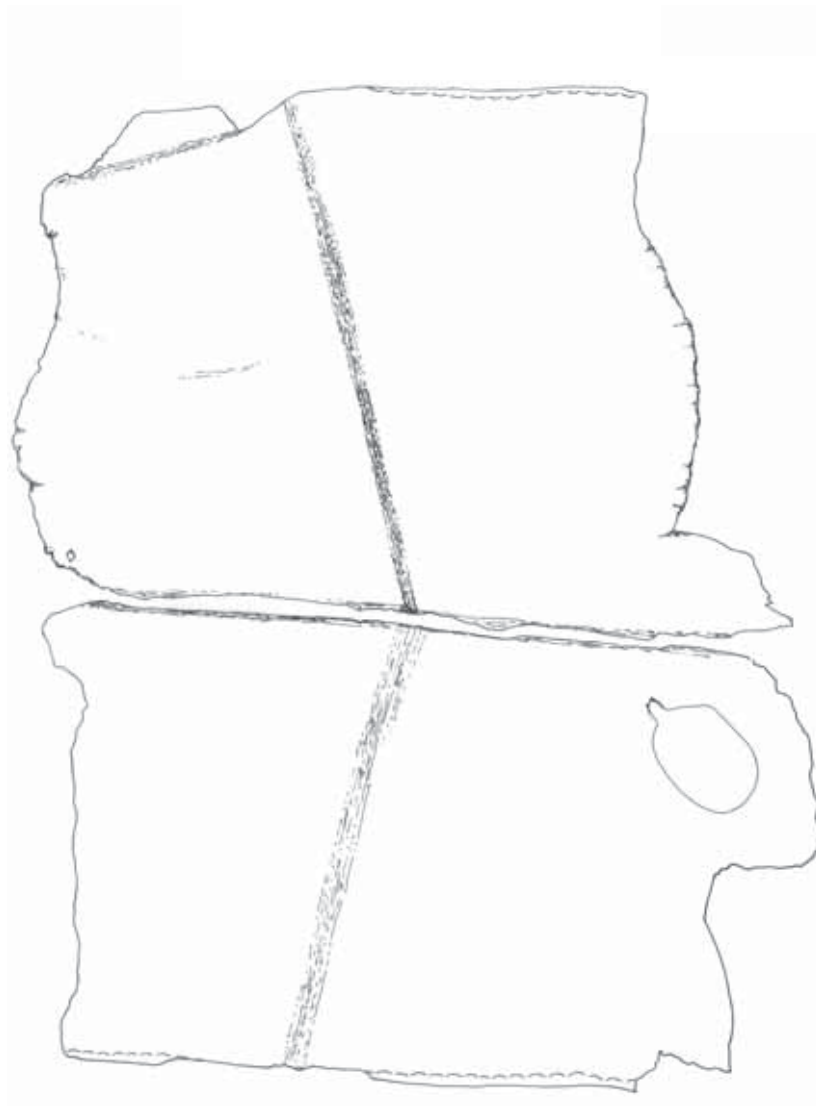
Discussion

All these pieces were discarded in a disused tanning pit dating from the early 16th century. Some are worn or reused, suggesting they were of some age when deposited. They are not thought to be part of the fittings of the cart saddle.

SF11



SF12



SF15

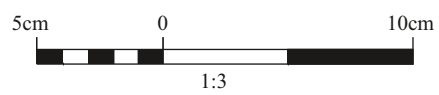


Figure 25: Leather

THE CART-SADDLE <17>.

Chris Green

A number of associated fragments of wood and leather survived in the fill of the pond (7087/ 7107) dating to c 1680-1700. On examination they proved to be elements of a *cart-saddle* – an essential item of the harness of a draught horse since medieval times, but an unfamiliar archaeological find. The saddle had disintegrated owing to the decay of its stitching [linen] and the corrosion of many of its iron nails. The upper left-hand side has been lost in a way suggesting incomplete burial/submersion while the remainder was safely waterlogged. As with all such ‘vernacular’ finds, the caveat must be made that the saddle may have been ‘old’ and worn out when thrown away; nonetheless it might not be expected to have had a very long life.

Some of the fragments were examined after conservation by freeze drying, but the wooden parts and leathers attached thereto were seen when saturated in PEG solution; differential conditions which occasionally made it difficult to align fragments, and the nail holes, very exactly.

The cart-saddle is only one element in the harness of a draught horse, and is shown as *n/o/p* with its attached girth strap (*q*) in Figure 26. In this instance, the only further possible harness fragments to survive are thin leathers which *may* have formed part of the draught collar (*k*); but the collar is not permanently attached.

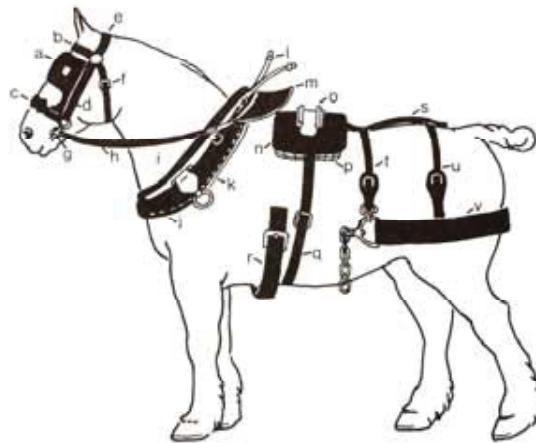


Figure 26 London-pattern harness of a shaft horse, ‘as finally developed’ in the twentieth century. From Keegan, *The Heavy Horse*, fig 4.

© T Keegan 1973

Saddles are designed to transfer loads on a horse’s back away from its spine through upholstered pads known as *panels* on either side (these may have been of textile and do not survive here). Cart-saddles are worn only by the shaft horse(s) in a team, and bear the weight of the shafts, *and*, in carts (i.e. two-wheeled vehicles) a proportion of the payload - Keegan cites 8-10% - as this assists traction. The essential parts of the cart-saddle are the rigid wooden saddle-tree

(Fig 26, *o*) which acts as a bridge across the horse's spine, and as a point of attachment for *boards* and *panels* (*p*), and for straps (*q*). The cart shafts are supported by a *back-chain* passed over a 'trough' (normally lined with an iron channel) formed across the saddle-tree. The general arrangement is seen in Figure 27, which also illustrates the importance of balance in the whole equipage.

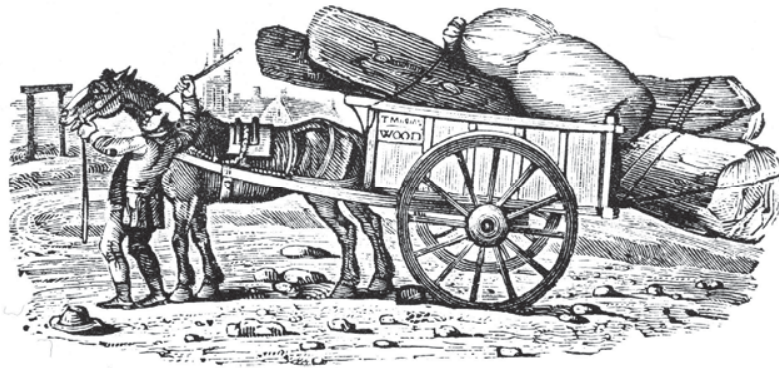


Figure 27: An overloaded cart. Tail-piece by Thomas Bewick or an assistant for his *History of British Birds*, i (1826). A closely observed study: the overhanging load at the back has lifted the shafts and made the back-chain go slack – hard work for the horse. The saddle-tree is shown set forward in the saddle.

©Dover Publications Inc 1962

The general construction and terminology of cart-saddles in relatively recent use is described shown by Keegan and reproduced at Figure 28. It forms the basis for assessment of the Waltham Abbey saddle since there is no sufficiently detailed historical account or pictorial record.

In the Waltham Abbey saddle the tree (*t*) is from a single block of elm near the heart of the timber, and with the grain as indicated. Between the front and back upstands is the characteristic iron channel to take wear from the chain, and to allow it to move across the horse's back if the cart was not level. The channel was too corroded for useful illustration when examined, but may be revealed by cleaning. One feature of the tree was hard to understand: the longitudinal 'step' cut along the centre line beneath, so that one side was effectively 12 mm or so above the other.

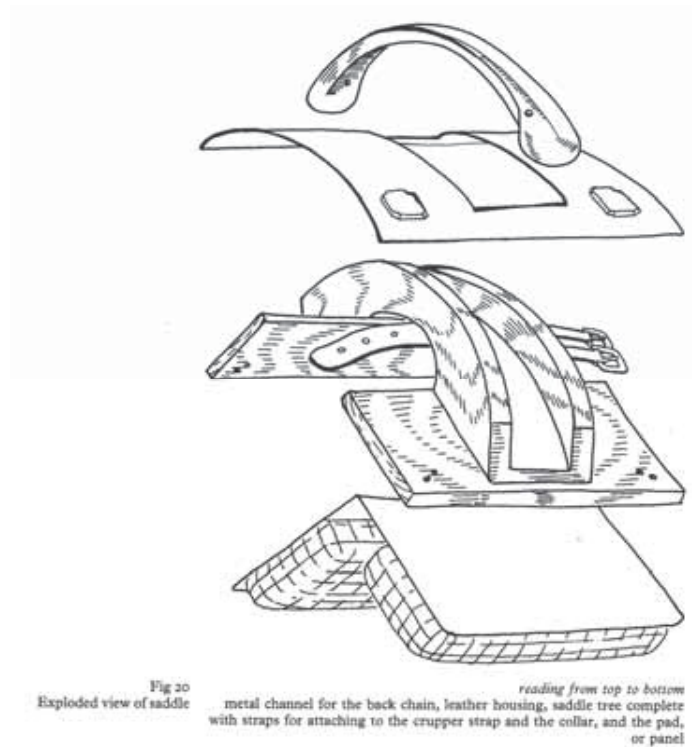
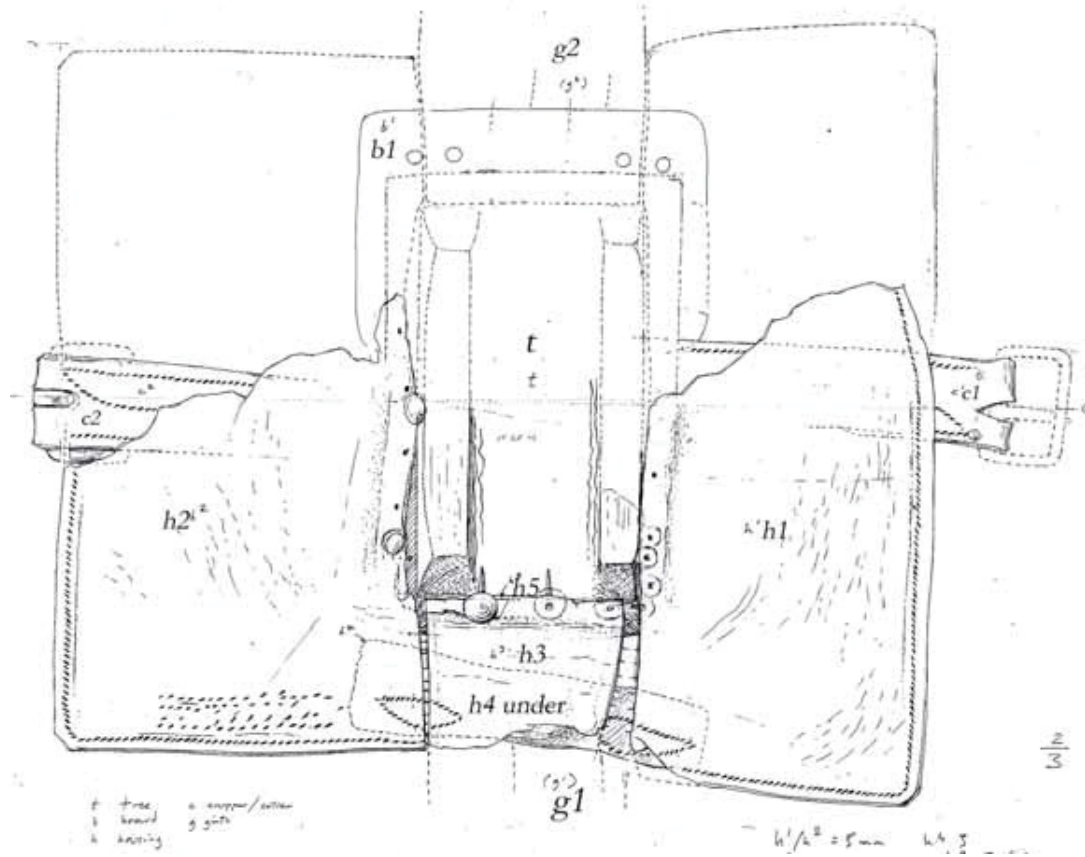


Figure 28: The construction of a ‘traditional’ cart saddle in twentieth-century use is shown by Keegan (fig 20): iron channel, tree, boards, panels, housing, and straps.

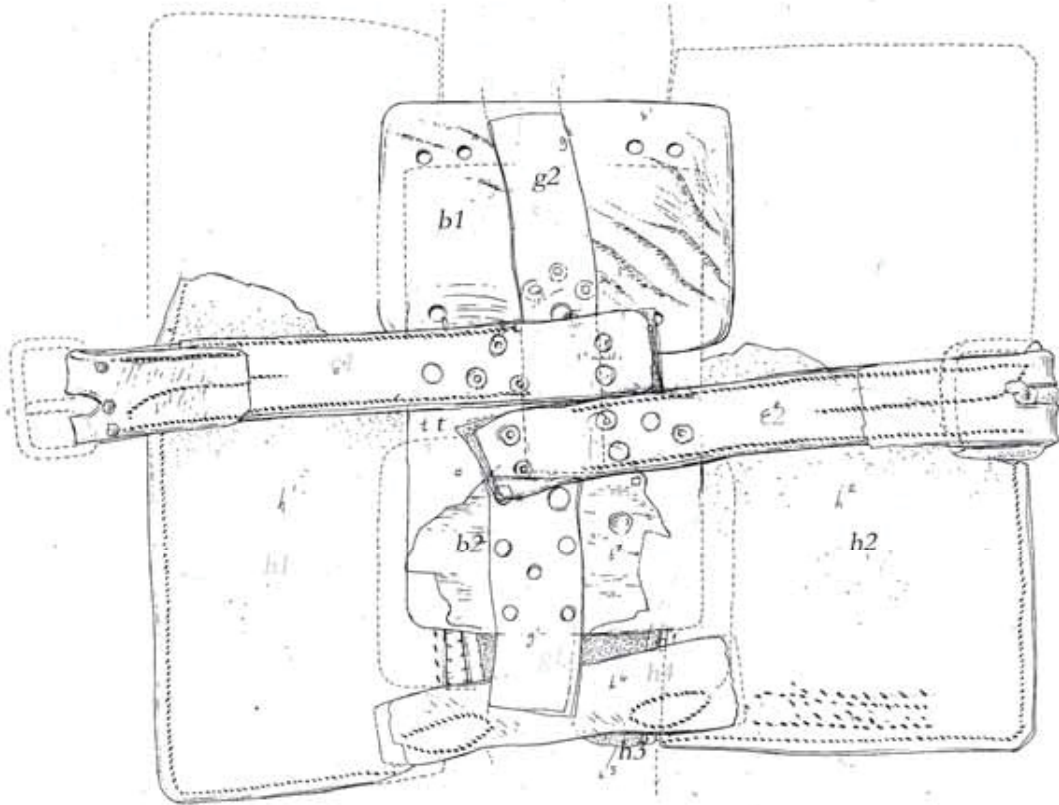
© T Keegan 1973

The left-hand board b^1 , also of elm, survived in fragmentary condition and detached from the tree, to which it had originally been nailed. In section it is exactly as a twentieth-century Kentish cart saddle illustrated by Keegan. The right-hand board b^2 survived only as fragments transfixed by the nails attaching girth strap g^1 . The precise placement of the boards beneath the tree is therefore uncertain. It has been assumed that the four holes in the outer edge of b^1 are placed outside the tree, so that the panel could be tied to the board through them, as in recent practice. That gives a width as reconstructed of just over 11 inches (281 mm) across the boards; Keegan says the measurement should be 12 inches.

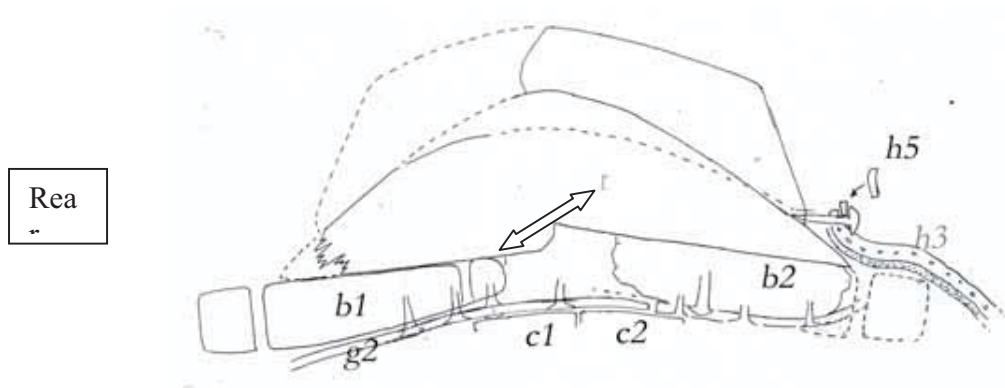
THE FORMER DRILL HALL SITE, HIGHBRIDGE STREET, WALTHAM ABBEY, ESSEX
 RESULTS OF AN ARCHAEOLOGICAL EXCAVATION: ARCHIVE REPORT



Top
front



Underside
front



Figures 29, 30, & 31: views of the Waltham Abbey saddle as re-assembled.

© C M Green 2005

In fact it is doubtful that there was a gap between the two boards, as the girth straps g^1 , g^2 , are nailed continuously across. The 'channel', relieving the horse's spine, must simply have comprised the gap between the two panels, of which no trace survives.

Four straps radiate from beneath the centre of the tree. Simple girth straps g^1 , g^2 , were fixed direct to the boards and through them into the tree, using round-headed square-sectioned nails. Both were broken off short, but a section of a decoratively stitched strap end also survives, and is probably from the girth adjustment (g^3). It is also possible that the thin leather 'tube' which survives in fragments originally fitted around the girth strap and padded it for the horse's comfort.

The longitudinal straps c^1 and c^2 are heavier in construction, being doubled and stitched over iron buckles. One would buckle to the draught collar, and the other to the crupper strap, but they are detached and indistinguishable. Both were nailed across the girth straps using similar small nails, 29-33 mm long.

The housing is surprisingly elaborate, consisting originally of four stout leathers stitched as one and nailed around the upstanding part of the tree using brassed round-headed studs of 'upholstery' type nailed through a narrow leather strip which survives as h^5 above h^3 . h^1 and h^2 are assumed to lie at the head and tail respectively, since h^1 is shorter front to back (and apparently broader) and might clear the withers. Both the 'Bewick' illustration of the *overloaded cart* and Stubbs' *Labourers* have the saddle thus (Figure 27). h^1 and h^2 have decoratively stitched borders, and h^2 (rear) has had a small strap sewn on the right hand side (now lost). These components are joined by a narrow leather, h^3 , at the side of the tree, with the seams nicely butted and edge-stitched, and there is a roughly cut reinforcement (h^4) of relatively thin leather beneath, stitched through the seams. h^3 extended down above the girth strap, but is broken off. Why take so much trouble with the housing when, apparently, a single piece of leather with a hole for the saddle-tree would have sufficed? The answer is found in the greater thickness of h^3 , which indeed has a separate inner layer of leather, held by the seam stitches.

The purpose will have been to distribute the pressure of the shaft chains; this degree of care in construction is not found in more modern practice as described by Keegan.

Where the leather is best preserved, it can be seen that the stitching has been prepared with a *saddlers' harness awl* of diamond section, as described by Salaman in use at the beginning of the twentieth century. Diamond-shaped holes produced a decorative stitch which lay neatly in the corner of the diamond, and zig-zagged between the closest corners of adjacent holes (Salaman, *Dictionary of Leather-Working Tools*, 232, 238, 273-4).

The literature of saddlery is very slight, and English pictures showing cart-saddles are rare before 1750. One is seen in the Luttrell Psalter (though it is not certainly an English source), and there are vague indications in sixteenth-century English pictures. However the first clearly recognizable examples are illustrated as late as 1690-1700, and one of the first really detailed looks is in Stubbs' *Labourers* of 1789. Pyne (1803) shows many examples, perhaps all drawn from one study. None of these historical examples is particularly close to the regional types shown by Keegan (Figure 11) which may possibly be later elaborations.

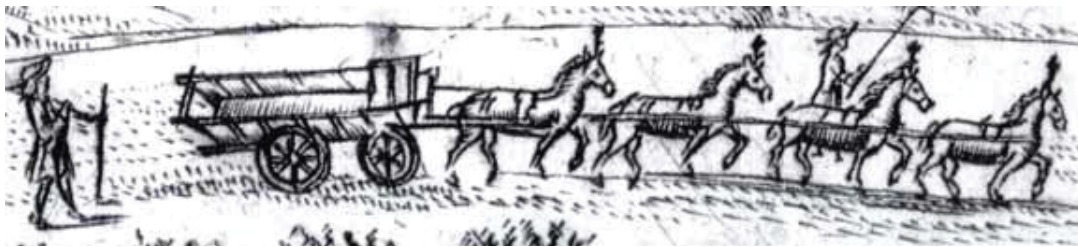


Figure 32 Detail from Drapentier's view of Little Offley, Herts, in Sir Henry Chauncy's *The Historical Antiquities of Hertfordshire*, 1700

© St Albans Museums

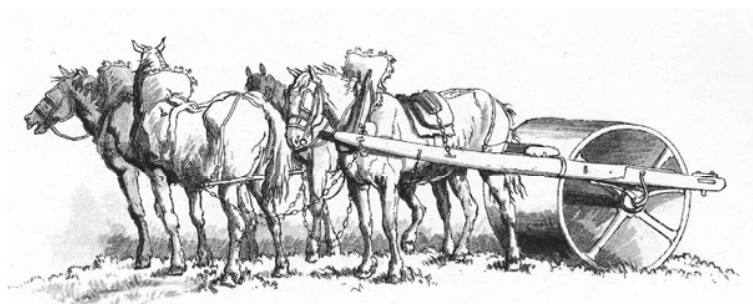


Figure 33 A typical draught harness from Pyne's *Microcosm* (1803)

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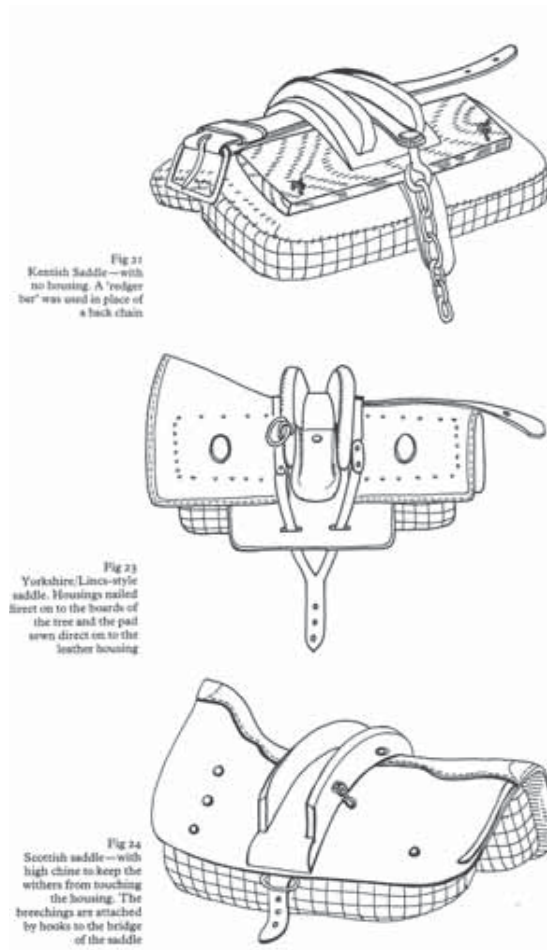


Figure 34: Three regional patterns of cart saddle, as finally developed in the nineteenth and twentieth centuries; after Keegan 75 ff

© T Keegan 1973

In general, the Waltham Abbey saddle is rather more complex in construction than the recent saddles described by Keegan. Its stitching would have been expensive, yet is largely decorative, as were the brassed nails/studs around the tree. The extension of the housing above the girth strap is hard to parallel, and the whole saddle is perhaps of an unrecorded pattern. From it we can deduce the fact that supposedly 'traditional' forms of harness actually underwent substantial change - perhaps simplification in this case - between the seventeenth and nineteenth/twentieth centuries. This saddle's careful finish, and the eye-catching brass studs nailed around the saddle-tree, confirms the considerable care and expense that might go into the appearance of draught horses in the later seventeenth century – as can be seen from the wagon team of 1700 in Figure 8, whose harness no doubt matched the horses' plumes in splendour.

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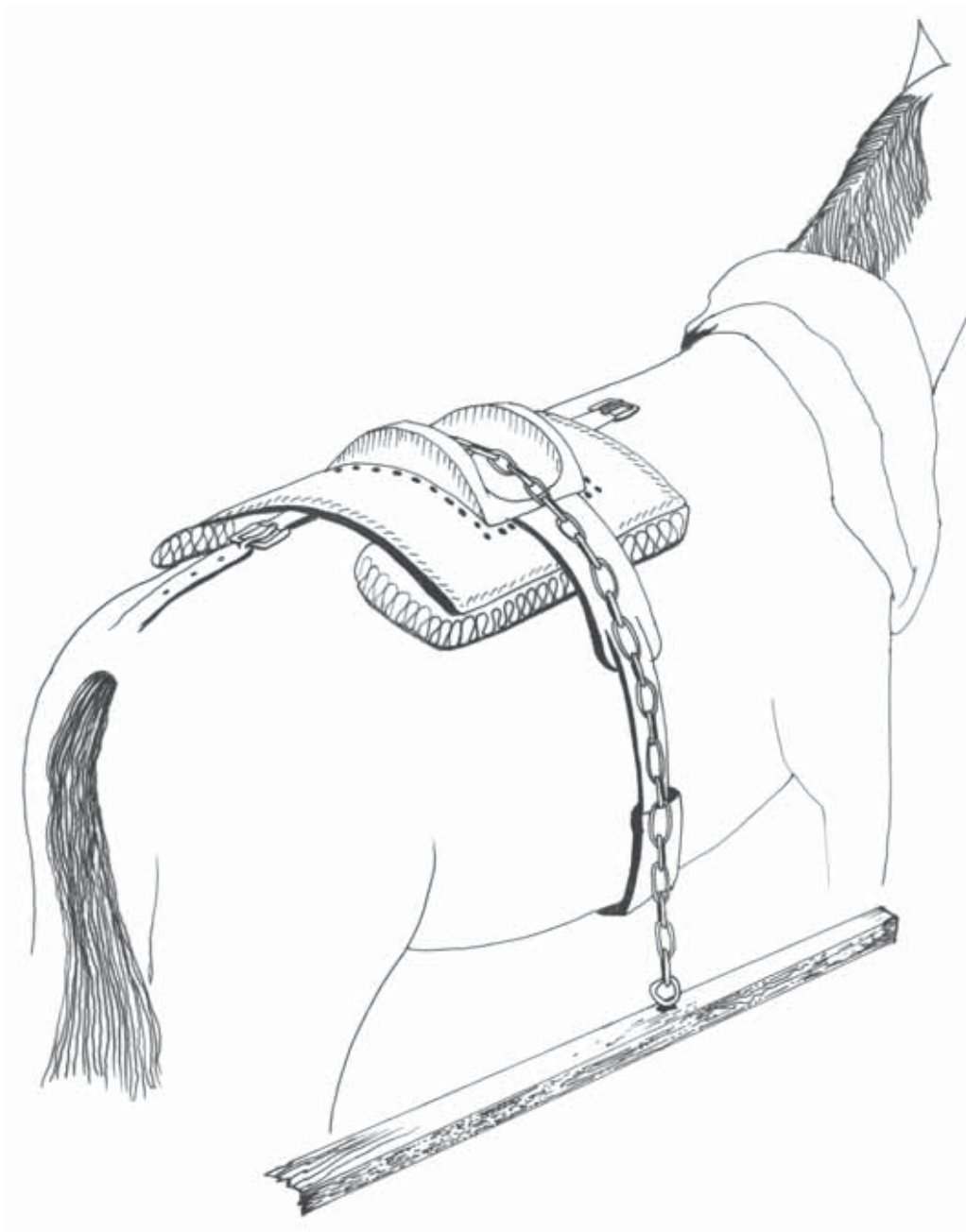


Figure 36: Reconstruction of the Cart Saddle

ANIMAL BONE

Dr Sylvia Warman

INTRODUCTION

The assemblage has been assessed (Warman 2004) for potential, and recommendations made for further study. In terms of sample size and potential for further study, the medieval and post-medieval contexts merited further investigation. The 16th century phase is interesting in terms of transition from the dissolution even though they are rather small. The modern and unstratified material did not require any further study.

Medieval

The material has been identified and recorded in a database. Particular objectives are the comparison of species present with later periods and the measurement of complete long bones for comparison with later phases.

Post-medieval

The material has been identified and recorded in a database. The main contexts that required further study are 7116 and 7119, the cattle horn cores, the horse skeleton and the butchered pig bones. Any complete cattle horn cores were analysed to establish age, sex and breed which may indicate what the cattle were used for during life. The horn core sample also provided information about hornworking and possibly tanning. Many examples of tanning pits and collections of horn cores have been seen on Post-Medieval sites in London, particularly Southwark and the city, for example Cutlers Gardens (Armitage 1989). The results of the horn core analysis are compared with those from other sites in both London and smaller urban centres more comparable with Waltham Abbey.

The horse is a single individual with many complete long bones enabling withers height estimation. The fact that the teeth are present means that the specimen can also be aged and sexed. Finally this specimen also shows pathologies.

The butchered pig bones (chopped scapulae) may indicate a particular butchery practice these have been examined for details of butchery marks.

Very small assemblages of incomplete or fragmented bone have been excluded particularly when material cannot be identified to species. Any context with measurable long bones whatever the species has been included for withers height calculations.

The animal bone along with the work done on it will be archived at the relevant museum (Epping). The more fragmented horn cores have been disposed of following discussions with Epping Forest Museum.

SUMMARY

The assemblage has been identified and quantified. Requirements for further study have been assessed. The Medieval assemblage shows quite a range of

species comprising domestic food waste. The post-medieval assemblage includes material that is waste from hornering and tanning. The main objectives for further work are to investigate craft activities, industrial processes and the use of animals as both raw materials and power.

Revised methodology

In order to prioritise those contexts of greatest archaeological interest there were certain limitations on material of less interpretative use. Thus ribs and vertebra (apart from atlas axis and sacrum) are excluded from the analysis as are fragments not identifiable to species. Any contexts which only have fragmentary or unidentified bone in are also not included in the analysis. Complete horncores and those with the base present have been retained in the archive but un- butchered tips and mid sections as well as small external and internal horn core fragments have been disposed of now they have been quantified. These specimens are identified in the database with a tick in the recommend discard field. The material recovered from the environmental samples has been assessed and is considered to have been adequately dealt with at that level and did not require further work.

Following the assessment of the ceramic assemblages a more detailed chronology has been established. The phases are;

Medieval marshland AD 1080-1250

Medieval AD 1250-1400

Medieval AD 1400-1540

Post-medieval AD 1540-1770

Post-medieval AD 1770+

MATERIAL

The material included in this analysis was derived from the excavation at the site as well as an earlier evaluation. Much of the more fragmentary material examined at the assessment stage has not been included. All material included in the analysis has been clearly labelled as such to differentiate if from that which was merely assessed.

Methodology

The material was examined and details of each specimen recorded in a database (supplied for archive), the details recorded were; element, taxa, part, weight in grams, number of fragments, number of bones, age, sex, side, fusion, and the number of individual animals. The database is accompanied by an appendix detailing the codes and abbreviations used. Selected measurements were taken from bones which were complete. These follow Von den Driesch unless otherwise specified. Further details of the methods used as well as database codes and abbreviations are given in the key which accompanies the database, both of which will be placed in the site archive.

RESULTS

The identified specimens are presented by phase. For each phase the results are summarised with numbers and weights for each species given in a short table. For those phases where a substantial amount of material was examined an additional table details the species present and the body parts present. Totals for the number of identified specimens (NISP) and also the minimum number of individuals required to produce the assemblage (MNI) have also been calculated.

Medieval Marshland 1080-1250

Table 1 Summary of species

Species	No fragments/ pieces	NISP	Weight/ g
Horse	8	6	1538
Cow	27	24	2363
Sheep/Goat	10	10	130
Pig	4	4	77
Chicken	1	1	1
Duck	1	1	1
Goose	3	3	15
Total	54	49	4125

Table 2 Species and elements

Element	Cattle	Sheep/ Goat	Pig	Horse	Goose	Chicken	Duck
Antler							
Skull		1					
Skull +horncore	2						
Horncore	1						
Maxilla							
Upper teeth							
Mandible	5	3		1			
Lower teeth	3						
Hyoid	1						
Atlas	1						
Axis							
Scapula	2						
Coracoid							
Humerus	1		1		1	1	
Radius	1	3		1			
Ulna							
Carpal							
Metacarpal				2	2		1
Innominate			2				
Sacrum							
Sternum							
Femur	2						
Patella							
Tibia	3	1		1			
Fibula			1				
Talus							
Calcaneus							

Element	Cattle	Sheep/ Goat	Pig	Horse	Goose	Chicken	Duck
Tarsal							
Metatarsal	1	2		1			
Metapodial							
Proximal phalanx	1						
Intermediate phalanx							
Terminal phalanx							
NISP totals	24	10	4	6	3	1	1
Total weight	2363	130	77	1538	15	1	1
MNI	5	2	2	1	2	1	1
% by NISP	49	20	8	12	6	2	2
% by weight	57	3	1.9	37	0.4	0.02	0.02

The earliest phase appears to be largely devoid of structures. The animal bone was recovered from the clay interface (8170) and the upper marsh deposit. Horse, cattle, sheep/ goat and pig are present as well as three domestic bird species; chicken, goose and duck.

Medieval AD 1250-1400

Table 3 Summary of species identified from 12th-13th Century phase

Species	No. fragments/ pieces	NISP	Weight/ g
Horse	2	2	134
Cow	32	27	1625
Sheep/goat	16	13	128
Goat	1	1	61
Pig	15	15	213
Chicken	4	4	16
Goose	4	4	15
Pigeon	1	1	0.5
Total	75	67	2192.5

Table 4 Species and elements identified from 12th-13th Century phase

Element	Cattle	Sheep/Goat	Goat	Pig	Horse	Goose	Chicken	Pigeon
Skull	1			1				
Skull + horncore	2							
Horncore			1					
Maxilla	1							
Upper teeth								
Mandible	8	3		2				
Lower teeth				1				
Hyoid								
Atlas								
Axis								
Scapula	2	2						
Coracoid								

Element	Cattle	Sheep/Goat	Goat	Pig	Horse	Goose	Chicken	Pigeon
Humerus				1		2		
Radius	1	2						1
Ulna		5		2				
Carpal								
Metacarpal	2			2	1	2	1	
Innominate	4			1				
Sacrum								
Sternum								
Femur	1							
Patella								
Tibia		1		1			3	
Fibula				1				
Talus								
Calcaneus	1			2				
Tarsal								
Metatarsal	1			1				
Metapodial	1							
Proximal phalanx								
Intermediate phalanx	2							
Terminal phalanx					1			
NISP totals	27	13	1	15	2	4	4	1
Total weight	1625	128	61	215	134	15	16	0.5
MNI	2	2	1	4	1	2	2	1
% by NISP	40	19	1.5	22	3	6	6	1.5
% by weight	74	6	28	9.8	6	0.7	0.7	0.02

Animal bone was recovered from pit fills, post-holes, and household dumps. The assemblage from this phase is more varied than the preceding ones and includes cattle, sheep/goat, goat, pig, horse as well as bird species chicken and goose and a pigeon.

Medieval AD 1400-1540

Table 5 Summary of species identified

Species	no fragments/ pieces	NISP	Weight/ g
Horse	3	3	531
Cow	27	26	2535
Sheep	2	2	43
Sheep/goat	23	18	312
Red deer	1	3	191
Pig	6	6	90
Chicken	2	2	5
Goose	4	4	21
Total	68	64	3728

Table 6 Species and elements identified

Element	Cattle	Sheep/ Goat	Sheep	Pig	Horse	Red Deer	Goose	Chicken
Skull +Antler						1		
Skull	2	1		1				
Skull + horncore	2							
Horncore	1							
Maxilla	1							
Upper teeth	2							
Mandible	4	3		2				
Lower teeth	2			1				
Hyoid								
Atlas		1						
Axis								
Scapula	2	1						
Coracoid								
Humerus	1	1		1			2	
Radius		2						
Ulna	1	1						
Carpal								
Metacarpal		3	1	1			1	1
Innominate								
Sacrum								
Sternum								
Femur		1						1
Patella								
Tibia	1				1			
Fibula								
Talus								
Calcaneus	2							
Tarsal								
Metatarsal		3					1	
Metapodial								
Proximal phalanx	2							
Intermediate phalanx								
Terminal phalanx	1							
NISP totals	24	17	1	6	1	1	4	2
Total weight	2445	250	17	90	308	191	21	5
MNI	2	2	1	3	1	1	2	1
% by NISP	43	30	1.8	10	1.8	1.8	7.1	3.6
% by weight	73	7.5	0.5	2.7	9	5.7	0.6	0.2

Contexts which produced animal bones from this phase were pit fills and a dump of gravelly clay. The assemblage for this phase comprises horse, cattle, sheep/goat, sheep and pig as well as chicken and goose. Red deer was also identified: a single skull fragment with part of the antler attached. The two tanning pits contained few animal bones: the cattle remains were all post cranial, one pelvis fragment from a juvenile individual and another from an adult.

Fragments of limb bones were identified as sheep/goat. The tanning pits also included small quantities of cattle, horse, sheep and sheep/goat.

Post-Medieval AD 1540-1770

Table 7 Summary of species identified from 1550-1770 phase

Taxon	no fragments/pieces	NISP	Weight/ g
Horse	47	33	32521
Cow	813	240	75848
Sheep	4	4	70
Sheep/goat	11	9	180
Pig	76	27	2250
Rabbit	1	1	0.5
Total	906	317	110,969.5

Most of the animal bone for this phase derived from a several individual features with high bone content. The fill of the pond (7107) contained mostly cattle skull and horncore fragments. This represents at least five individuals of adult and sub-adult age classes and includes two specimens identified as male and one identified as female. Sheep/goat was also identified; a humerus from a sub-adult and an ulna from an adult.

Later in the phase, cattle horncore and skull fragments dominate the assemblage, and one pit fill (7116) included a partially articulated horse skeleton. Three major dumps of horncores are also present (7116, 7103 and 7097). Other species identified included pig, sheep and there was evidence of a rabbit.

Further cattle horncores were deposited towards the end of this phase (7119), an assemblage of bone that also contained a concentration of pig scapulae.

Table 8 Species and elements identified from 1540-1770

Element	Cattle	Sheep/ Goat	Sheep	Pig	Horse	Rabbit
Antler						
Skull	12				1	
Skull + horncore	144					
Horncore	52		1			
Maxilla						
Upper teeth				1		
Mandible	1	1			1	
Lower teeth	1	1			1	
Hyoid						
Atlas						
Axis						
Thoracic Vertebra					2	
Lumbar					6	

Element	Cattle	Sheep/ Goat	Sheep	Pig	Horse	Rabbit
vertebra						
Rib					1	
Scapula	1			27		
Coracoid						
Humerus	1	1		1	1	
Radius					5	
Ulna						
Radius + ulna	2					
Carpal						
Metacarpal	6	2			3	
Innominate	1	3			2	1
Sacrum					1	
Sternum						
Femur	2				3	
Patella						
Tibia	2			1		
Fibula						
Talus						
Calcaneus						
Tarsal						
Metatarsal	7	1	1			
Metapodial	1				2	
Proximal phalanx	1				2	
Intermediate phalanx						
NISP totals	140	9	2	29	33	1
Total weight	72294	180	68.5	37	32621	0.5
MNI	73	5	2	15	4	
% by NISP	65.4	4.2	0.9	13.5	15.4	0.4
% by weight	68.7	0.17	0.08	0.03	31	0.04

Post-Medieval 1770+

Table 9 Species identified from 1770+

species	no fragments/ pieces	NISP	Weight/ g
Cow	2	2	828
Sheep/goat	2	2	57
Total	4	4	885

A very small assemblage (4011) from the evaluation which comprised two fragments of cattle skull both adult, one with a horncore attached that appeared to be female, a sheep/goat tibia from a sub-adult individual was the only other specimen.

AGEING DATA

Two means of establishing age at death are commonly used on archaeological animal bone. The first method studies the fusion of the long bones and the degree

to which the joining of the epiphyses (ends) have attached, following Silver (1969). The second method measures the eruption and wear of the mandibular (lower) cheek teeth using the system developed by Grant (1982). However in this assemblage a third means of estimating the age at death is also available: the porosity of the surface of the horncores, this has been recorded for all sufficiently well preserved specimens, following the method outlined by Armitage (1982).

The ageing data will be described by focusing on the phase that produced most material 1540-1700 as there appears to be some continuity, looking at three specific collections of material;

- 1 The pig scapulae from 7119
- 2 The partial horse skeleton from 7116
- 3 The cattle horn cores from 7119 and 7116

1 The pig scapulae from 7119

Phase 1700-1850 contains a concentration of pig scapula (shoulder blades) all from a single deposit (7119). Of the 23 specimens identified all but four are classified as sub-adult, that is they are of almost full size but the fusion process is incomplete. In some cases the area that forms the shoulder joint (the glenoid was unfused) in the pig this point fuses around one year old (Silver 1969). Many specimens lacks this area (due to butchery see section below) but the general porous condition of the bone surface is consistent with sub-adult age at death. In those specimens where the length of blade survived, fusion was mostly incomplete along the border of the blade: this fuses in most ungulates fairly late and is associated with the ossification of cartilage (few modern domestic pigs live long enough for this event to occur). Four pig scapulae from the previous phase (deposit 7116) were of similar appearance and also classified as sub-adult.

2 The partial horse skeleton from 7116

The horse bones and teeth from 7116 appear to derive from a single individual thus dental and fusion methods of ageing can be combined. The only unfused element was a thoracic vertebra with the caudal epiphysis missing. This fuses at 5 years according to Silver. All of the long bones identified are fully fused including the pelvis which confirms an age of at least 5 years (Silver 1969). With the individual appearing to be skeletally mature the best line of evidence for ageing remains the dentition. An examination of the incisors following Silver 1969 indicated a level of wear that is consistent with an age of 8-10 years, although how abrasive the diet is obviously influences this process.

3 The cattle horn cores from 7119 and 7116

A large number of cattle horncores were recovered from contexts in phase 1650-1700 and 1700-1850. Many were sufficiently complete to be aged using Armitage's system (1982). All of the specimens were only one side never both, thus totals have to be calculated separately for right and left sides to avoid

duplication. The table below indicated that the age groups 3 and 4 are the most common which include adult and sub-adult individuals.

Table 10 Age estimates for horncores from 1650-1700 and 1700-1850
(following Armitage 1982)

Horncore age class	Number of specimens Right side	Number of specimens Left side	Age class
1			Juvenile
2	2		Sub Adult
3	12	18	Young Adult
4	14	12	Adult
5	3	4	Old Adult

SEXING

The presence of a large number of horncores enables the identification of specimens as male female or oxen (castrated male). Wherever possible the sex of specimen was established using observations of morphological variation developed by Armitage (1982). These specimens are included in the plots of horncore dimensions given in the metrics section below.

MEASURABLE SPECIMENS

A number of measurable specimens were included. The measurements of the long bones from the limbs can be used to estimate the withers height in domestic species. The measurements taken from the horncores can be plotted to examine individual variation and also highlight sexual dimorphism. Measurement data has been used to investigate three aspects of the assemblage;

- 1 Withers height for the horse in 7116
- 2 Withers height for cattle in 7105
- 3 Horncore dimensions from material in 1650-1700 and 1700-1850.

1 Withers height for the horse in 7116

The factors for the calculation of withers height are taken from von den Driesch and Boessneck (1974).

Table 11 Measurements of horse bone from 7116

Element	Side	Dimension	Measurement	Factor	Withers height	Equivalent in hands
Femur	R	Greatest lateral length	397	3.51	1393.47	13h 3ins
Radius	L	Lateral length	333	4.34	1445.22	14h 1 in
Radius	R	Lateral length	334	4.34	1449.56	14h 1ins
Metacarpal	L	Lateral length	223	6.41	1429.43	14h
Metacarpal	R	Lateral length	222	6.41	1423.02	14h

These results give a withers height of approximately 14 hands, similar to a largish breed of modern pony, such as the Highland pony.

2 Withers height for cattle in 7105

The factors used for the calculation of the withers height are taken from von den Driesch and Boessneck (1974).

Table 12 Withers height estimations of cattle metapodials from 7105

Element	length	factor	Withers height
Metacarpal	196	6.13	1201
Metacarpal	197	6.13	1207
Metacarpal	204	6.13	1251
Metacarpal	213	6.13	1306
Metacarpal	215	6.13	1318
Metatarsal	228	5.45	1243
Metatarsal	228	5.45	1243
Metatarsal	239	5.45	1303
Metatarsal	246	5.45	1341
Metatarsal	246	5.45	1341

These results indicate that these cattle would have been 1.2 to 1.3 metres tall at the shoulder, which is within the size range expected for cattle from this period.

3 Horncore dimensions from material in 1650-1700 and 1700-1850.

Four dimensions were recorded whenever the horncores were complete enough. These are all taken from Von de Dreisch (1976);

- horncore basal circumference
- greatest (oro-aboral) diameter of horncore base
- least (dorso-basal) diameter of horncore base
- length of outer curvature of horncore.

The measurement taken on the horncores from the deposits dated to 1650-1700 and 1700-1850 have plotted using the relationship between three of these dimensions in Charts 1 and 2. The ratio used for the y axis of the minimum diameter/maximum diameter x 100 follows L. Yeomans (pers. comm.).

Chart 1

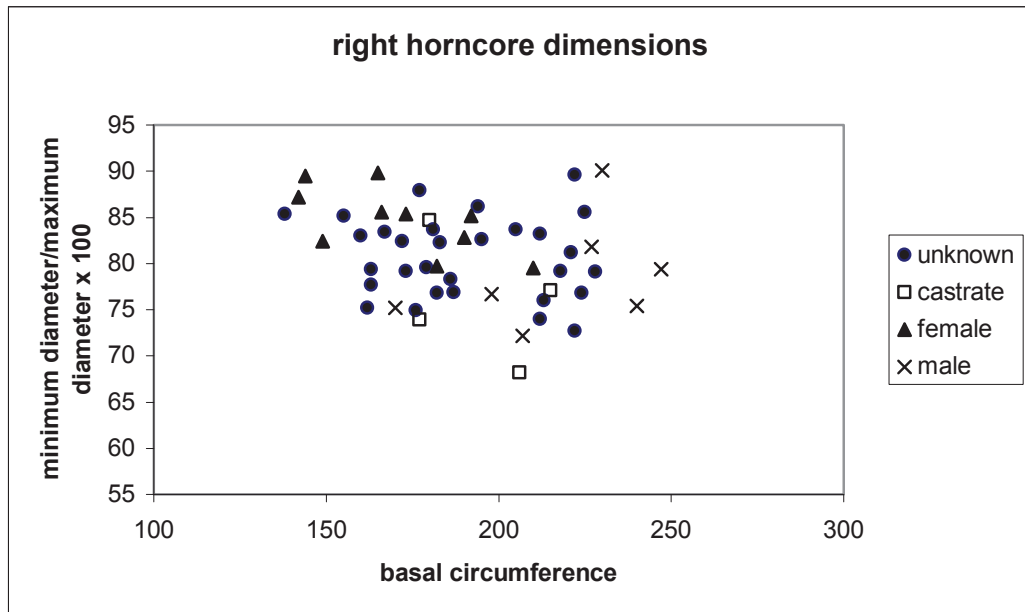
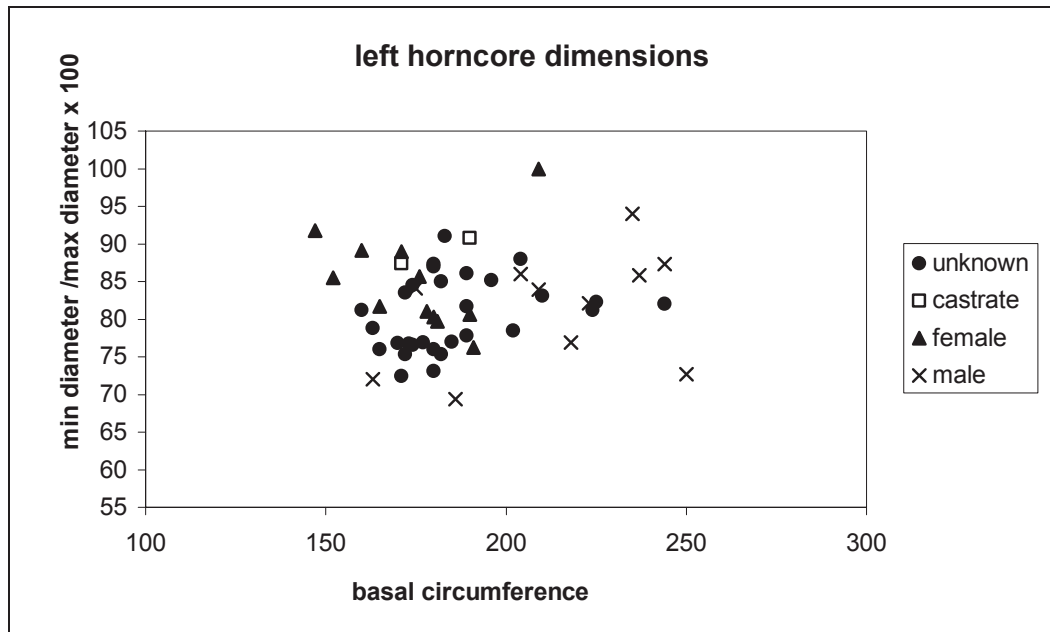


Chart 2



PATHOLOGY

Pathological changes were observed in a number of specimens, these are described below.

A cow maxilla from context 8130 has an abscess close to the foramen, and there are signs of alveolar recession bone.

The horse spine in context 7116 (1650-1700) shows some abnormal fusion. A single specimen was found, formed by what are usually five separate lumbar vertebrae which articulate with the cranial end of the sacrum. The vertebra have fused together particularly along the transverse processes. There are also slight bulges of extra bone on the ventral surface. This may be the condition referred to by many authors as Spondylosis Deformans or Bamboo spine (Bartosiewicz and Bartosiewicz 2002).

A cow metatarsal from context 7105 (1700-1850) which appears to have undergone a sequence of pathological and taphonomic changes: the proximal articular surface shows area of extra bone growth (extoses). The dorsal edge of the proximal articulation also shows signs of rodent gnawing and the bone also has a chop mark on the proximal shaft.

A cow mandible from the medieval marshland context 8155 which is from a very old individual with very worn teeth shows some lipping on the medial side of the articulation with the skull and looks quite polished, below the articulation on the medial side some destruction and increased porosity suggesting thinning of bone.

A number of the cattle skull fragments with horncores attached exhibit an interesting feature of a number of small holes at the back of the skull where the frontal and parietal bones meet. The holes vary in size and have smooth edges indicating they are not the results of post-mortem damage or damage at the time of death (Baker and Brothwell 1980).

BUTCHERY

Cut and chop marks were visible on a quarter of the specimens examined, most are chopped and a few cut. Some long bones had been split vertically others had their shafts smashed. Two collections of bones show particularly interesting butchery evidence; firstly the pig scapulae from context 7119 and also the cattle horn cores from deposits dated to 1700-1850.

The pig scapulae from 7119 include several specimens have been chopped though near the neck of the bone adjacent to the shoulder joint. This is presumably the result of a particular butchery practise.

The cattle horncores in 1700-1850 always comprise a half frontal either the right or left side with part or all of a single horncore attached. It is likely that the skulls were separated from the rest of the carcass elsewhere when the meat bearing

bones were butchered but the reason for the chopping of the skull in half is less clear and possible explanations will be discussed below.

Taphonomic factors

The majority of specimens showed either no weathering or the most minor score of 1 on Behrensmeyer's scale (O'Connor 2000). Dog gnawing was noted but at a low occurrence of less than ten percent, rodent gnawing was observed on a few specimens.

DISCUSSION

The earliest deposits, assigned to the medieval marshland phase show a wide range of species, all are domestic but three bird species are present (chicken duck and goose) albeit in small quantities. The small number of skull fragments and the lack of foot bones suggest that this material is likely to be domestic waste rather than waste from the early stages of butchery.

The subsequent phase 12th-13th centuries also shows a wide range of taxa including pigeon and a horncore positively identified as goat. The pigeon radius is from quite a small individual and is likely to be domestic rather than the larger wild wood pigeon. The pattern of a fairly wide range of species continues into the next phase of 1300-1485. Sheep is positively identified for the first time (following Boessneck 1969). Additionally, a skull fragment (with part of the antler attached) from a red deer was found, this is the only evidence for this species in the whole assemblage. The lack of any postcranial elements means that all that can be said that a single head of a male red deer was brought onto the site and subsequently deposited. This is the last phase with the domestic bird species present. The small assemblage from the phase dated to 1480-1550 encompasses the period of the dissolution. Horse, cow sheep/goat and sheep are identified; this smaller range of species may relate to the small size of the assemblage or may reflect change in the usage of the site.

The post-medieval activity shows a reduced number of mammal species and no birds. Finds from the pond (7107) include fragments of leather which may have once have been straps or belts. The fact that this deposit contained both cattle horncores and fragments of leather may indicate a link with either hornering or tanning processes being carried out at the site or close by. A variety of elements are seen for most species, there are 10 cattle horncores present in the early part of the period, a small number compared with the later deposits but this may indicate the beginning of a degree of specialisation away from the general domestic waste seen in the medieval features.

The animal bone from deposits dated to 1650-1770 forms a very interesting assemblage. Context 7116 from [5005] contains a large number of cattle horncores and a significant part of a horse skeleton which appears to have been at least partially articulated at the time of deposition. The horse is an adult individual as all of the bones are fully fused. The wear on the teeth suggests an age at death

of 8-10 years so of working age but certainly not old. The lengths of the long bone taken (see measurements section) indicate a withers height of approximately 145cm which equates to around 14 hands. A modern analogue for this size of animal would be one of the larger pony breeds such as the Highland pony or the Welsh Cob pony. These breeds are a suitable comparison in that this specimen was quite robust for its size and well muscled as indicated by the condition of the limb bone surfaces. The skull survives sufficiently well to get an idea of the facial profile which is convex rather than the concave shape seen in breeds with Arab and Thoroughbred blood. The pathology seen in the lumbar vertebra may be the results of the condition Sponylosis Deformans or Bamboo spine. This is often explained as either the result of overloading in draft and riding animals or a result of ageing (Baker and Brothwell 1980, Bartosiewicz and Bartosiewicz 2002). This condition is not uncommon in archaeological horses; a similar case was identified by the author from the Wandsworth Workshops site at Garrett Lane, in south London (Warman 2002). It has been suggested by horse breeders, as well as some zooarchaeologists, that certain breeds of horses may be predisposed to developing this condition and that it thus at least partly genetic and the result of either overloading or old age (Melanie Wilson pers. comm.). The finding of the remains of a cart saddle in context (7092) from feature [7109] is of interest as this supplies artefactual evidence (see figures 29-31) for the type of work which over time might produce the overloading that has been suggested as a possible causal factor in the development of this condition.

The other interesting aspect of the assemblage is the large number of cattle horncores; these will be considered along with those from the subsequent phase 1700-1850. In terms of the parts present almost all specimens are either single horncores or horncores attached to fragments of the frontal and parietal bones of the skull. These are always only the left or the right sides never both. The age at death of the cattle to which the horncores belonged has been estimated by an examination of the surface porosity following the scheme developed by Armitage (1982), as can be seen in Table 16 the majority of specimens are classified as sub-adult or adult. Thus it seems likely that these cattle were butchered elsewhere and just the skull fragments with horns attached brought onto site. The fact that they are all only right or left sides may reflect that they weren't brought in with the skins as in that case one might expect the both sides of the frontal bone with attached horncores to be included. This may be taken as evidence for a small scale hornering industry rather than the horn cores being a side line to a large scale tanning enterprise. In pit 5005 the positioning of the horn cores, laid in two parallel rows that ran the length of the feature seemed deliberate. Thus the subdivision into left and right halves may not have been connected with the processing of horn sheaths but may in fact relate to the need to make them a uniform size to fit into the pit. And at Cutler's Gardens in the City of London a pit was discovered with cattle horncores used to line the sides (Armitage 1989). Another possibility is that the porous horncores can act like a sponge to absorb liquid or very unpleasant pit fills acting much like a soak away. The fact that few of the horncores suggests rather than being cut off the horn sheaths may have

been removed by soaking, which could have been the original purpose of the pit, the horncores being disposed of in it at a later stage.

Measurement data plotted for the horncore dimensions shows some separation of the more robust male horncores from the more gracile female ones, with the castrates occupying an intermediate position. However the specimens which could not be sexed by examinations of their morphology alone (plotted as unknown) show a range of variation overlapping with male, female and castrates thus the dimensions seem useful for confirming the morphological categories but do not seem sufficient to identify specimens of unknown sex. Some doubt has been cast upon the use of horncore deposits as a meaning to examining variation in cattle populations particularly in London as material could be brought in not just from all over England but also from the continent (Robertson 1989). The extensive concentrations of tanning and horning industries in London and other urban areas are not suitable comparisons for this site which appears to represent smaller scale horning and possibly fellmongering activity (Serjeantson 1989). Many of the skull fragments show an interesting pathological variation, small smooth-edged roundish holes. Baker and Brothwell (1980) describe this condition, and suggest that it is congenital in origin. It was observed by the author in an assemblage of cattle horncores and skull fragments from Long Lane Studios in Southwark (Warman 2001).

The pig scapulae from 7119 and 7116 are all from individuals of a similar age range and many appear to have been butchered in a specific manner with the neck region of the bone chopped through. This action would separate the humerus and the rest of the limb from the body at just above the shoulder joint. This is the only evidence from the post-medieval deposits for butchery related to the removal of meat from the carcass, the horncores representing horning waste and the horse presumably deposited whilst still whole.

CONCLUSIONS

The animal bone assemblage shows some temporal changes with a broader range in terms of both species and elements identified in the earlier phases which appear to represent small quantities of domestic waste. A shift is seen after the dissolution phase with the number of species decreasing and more specialised deposits identified comprising large concentrations of cattle horn cores which may be waste from hornering or may have been used to line pits. The nature of the assemblage and the features identified are more consistent with horning and possibly some small scale tanning or fellmongering that with a large tanning operation (Shaw 1996). The find of a partially articulated horse skeleton with pathological changes in the lumbar region is of particular interest when the nearby find of a cart saddle of similar date is considered. However the possibility that this condition is genetic rather than a chronic reaction to overloading should also be considered.

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OTHER NON-REGISTERED FINDS

GLASS

Beyond the painted medieval window glass, the remainder of the glass finds offer little interpretive information regarding the site. The glass may be divided into three categories: 18th century wine bottles and, drinking vessels, 18th-19th century window glass and 19th-20th century drinks bottles.

The 18th century bottles are present in five contexts (7107, 7097, 7101, 7119, and 7015), of which four are contemporary. All the bottles are of the shaft and globe style, and date from between c. AD 1700 and 1730. They indicate wine consumption, possibly by the inhabitants of building 1, since it is thought that much post-medieval household waste was generated on site. Parts of two wine or sherry glasses within the assemblage (7098 and 7107) also date from the 18th century. They were incomplete, and cannot be proved to have originated in the households on site.

The smallest assemblage was window glass, only two pieces collected during the excavations. While indicating that the houses on site in the 19th century had windows, little information could be gathered.

The largest assemblage was 19th and 20th century glass from drinks bottles and containers, varying from 'cod' bottles to tonic bottles and beer or wine bottles.

CLAY PIPES

The clay pipe assemblage is rather small for a post-medieval site, and may be due to any of several reasons. Smoking may have been unpopular in this part of time, or the people carrying out the industrial activities on site tended not to smoke in the workplace. Of the six pipe bowls collected, all are considered residual in later features through redeposition.

Table 13, pipe bowls

Context	Element	Type	Comments	Date
7004	Bowl	31	Rusticated fragment. Initials F and C? on spur	1850-1910
7103	Bowl	18	Slight milling	1660-1680
8003	Bowl	20	No decoration	1680-1710
	Bowl	33	No decoration	1840+
8005	Bowl	27	Spur missing, 2/3 of bowl, corrupt Prince of Wales feathers on back of bowl, leaves on front	1780-1820
8159	Bowl	20	Slight milling	1680-1710

IRON

Apart from the registered iron finds, the only other iron collected during the excavations were fifteen nails. Six dated from medieval features, the other nine from the post-medieval period. Little can be deduced from the nails.

Table 14, Nails

Context	SF no.	X-ray no.	Material	Form	Comment
7005		X001	Iron	Nail	Modern
7007		X001	Iron	Nail	
7015		X001	Iron	Nail	X2
7091		X001	Iron	Nail	
7107		X001	Iron	Nail	Domed head
7123		X001	Iron	Nail	X2, 1 square-headed
8003		X001	Iron	Nail	Flat headed
8131		X001	Iron	Nail	
8136		X001	Iron	Nail	Flat headed
8165		X001	Iron	Nail	X2 flat headed
8172		X001	Iron	Nail	X2 one flat headed

1 OASIS DATA COLLECTION FORM

1.1.1 Printable version

1.2 OASIS ID: aocarcha1-10043

Project details

Project name Excavations at the Drill Hall Site, Waltham Abbey

Short description of the project The site was first occupied in the medieval period, when it was little more than a marshy extension of the pit-digging characterised the first anthropogenic activity in site during the medieval period. During the 14th century industrial use of the site was established; a shelter for tanning, a working surface and a tanning pit indicated by small cesspits. During the 16th century, the site was used for small industries; both tanning and leatherwork. After the Dissolution of Waltham Abbey after 1540, houses began to be constructed along the Highbridge Street from the Abbey, with a metre of made ground raising the site above the water table. There appear to have been two rows of houses to the east and one to the west. The occupants of at least one of these houses appear to have been horn-core workers filling several pits. A range of new houses was built in the 1780s to provide accommodation for workers, the largest being the Storekeeper's House that lay in the east of the site. These houses were demolished in the 19th century. The Drill Hall and Government House, which was founded on immense concrete foundations.

Project dates Start: 08-09-2003 End: 05-09-2005

Previous/future work Yes / No

Any associated project reference codes WA8 - Sitecode

Type of project Recording project

Site status None

Current Land use Residential 1 - General Residential

Monument type TANNING PIT Medieval

Monument type HORN CORE PIT Post Medieval

Monument type RUBBISH PIT Medieval

Monument type RUBBISH PIT Post Medieval

Monument type OFFICIAL HOUSE Post Medieval

*THE FORMER DRILL HALL SITE, HIGHBRIDGE STREET, WALTHAM ABBEY, ESSEX
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Monument type	WORKERS COTTAGE Post Medieval
Significant Finds	HORSESHOE Medieval
Significant Finds	HORSESHOE Post Medieval
Significant Finds	SADDLE Post Medieval
Significant Finds	BOWL Medieval
Significant Finds	JUG Medieval
Significant Finds	JAR Medieval
Significant Finds	DISH Medieval
Significant Finds	BOWL Post Medieval
Significant Finds	DISH Post Medieval
Significant Finds	BUCKLE Medieval
Significant Finds	STRAP END Medieval
Significant Finds	CLUMP SOLE Medieval
Significant Finds	CLAY PIPE Post Medieval
Significant Finds	AWL Medieval
Significant Finds	WHETSTONE Medieval
Significant Finds	SHOE Medieval

Project location

Country	England
Site location	ESSEX EPPING FOREST WALTHAM ABBEY The former Drill hall Site, Highbridge Street
Postcode	EN9
Study area	4120.00 Square metres

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National grid reference TL 3780 0051 Point

Height OD Min: 17.24m Max: 17.10m

Project creators

Name of Organisation AOC Archaeology

Project brief originator Local Authority Archaeologist and/or Planning Authority/advisory body

Project design originator AOC Archaeology

Project director/manager Ron Humphrey

Project supervisor Les Capon

Sponsor or funding body Developer

Project archives

Physical Archive recipient Epping Museum

Physical Archive ID WA8

Physical Contents 'Animal Bones','Ceramics','Environmental','Glass','Industrial','Leather','Metal','Wood','Worked bone','Worked stone/lithics'

Physical Archive notes Kept at AOC until transfer

Digital Archive recipient Epping Museum

Digital Archive ID WA8

Digital Contents 'Animal Bones','Ceramics','Environmental','Glass','Industrial','Leather','Metal','Stratigraphic','Survey','Wood','Worked bone','Worked stone/lithics'

Digital Media 'Database','Images raster','Images vector','Spreadsheets','Text'

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RESULTS OF AN ARCHAEOLOGICAL EXCAVATION: ARCHIVE REPORT*

available

Digital Archive notes Kept at AOC until transfer

Paper Archive recipient Epping Museum

Paper Archive ID WA8

Paper Contents 'Animal Bones','Ceramics','Environmental','Glass','Industrial','Leather','Metal','Stratigraphic','Survey','Textiles','Worked bone','Worked stone/lithics'

Paper Media available 'Context sheet','Correspondence','Diary','Drawing','Manuscript','Map','Matrices','Photograph','Plan','Report','Section','Survey','Unpublished Text'

Paper Archive notes Kept at AOC until transfer

Project bibliography 1

Publication type Grey literature (unpublished document/manuscript)

Title The former Drill hall Site, Waltham Abbey, Results of an Archaeological Excavation: Archive Report

Author(s)/Editor(s) Capon, L.

Other bibliographic details N/A

Date 2005

Issuer or publisher AOC Archaeology

Place of issue or publication AOC Archaeology

Description A4, 164 pages, 35 illustrations

Entered by Les Capon (lescaapon@aocarchaeology.co.uk)

Entered on 6 September 2005