Excavations on Reading Waterfront Sites, 1979–1988

by John W. Hawkes and P.J. Fasham

Wessex Archæology

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Front cover: Aerial view of Abbey Wharf (W61A) under excavation in the winter of 1983

Back cover: Abbey Wharf (W61A), Phase 9 revetment.

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Abstract

The town of Reading, Berkshire, grew up around the River Kennet close to its confluence with the Thames. During the medieval period its growth was due largely to the influence of the Abbey, founded in 1121. A new triangular market place outside the Abbey west gate formed a new economic centre which rivalled, and eventually superseded the original market. The two areas were linked by east–west streets. The town developed in an area crossed by a series of braided stream channels which formed a backdrop to the growth of the main urban centre and which not only provided both wharfage and water power for mills and other waterfront developments but also posed repeated problems of drainage and flooding. Reading's waterfront zone can be defined as the area between the Holy Brook and the Kennet, extended to include the banks within the geographical sweep of the medieval town. Its length is defined by the eastern limit of the Abbey precinct to the divergence of the Minster Mill stream from the Kennet.

During the period 1979–1986, substantial redevelopment in Reading town centre afforded the opportunity for a series of excavations and observations within the waterfront zone. Evidence for human activity was recorded from prehistoric times to the early 19th century AD.

Major excavations at Reading Abbey Wharf, on the west bank of the Kennet and on the southern boundary of the Abbey precinct, recorded evidence for a succession of waterfront structures spanning the period of the Abbey's existence with subsequent activities relating to the gradual canalisation of the river. The course of the river was moved gradually eastward by these operations. The excavated area also encountered a second stream, the Holy Brook, and what seems to have been an overflow channel bypassing the Abbey mill and the tailrace section of the Holy Brook. During the period of the Abbey a succession of timber revetments was built along the Kennet river frontage and the Holy Brook, where a hard or artificial beach was constructed of flint, sandstone and chalk blocks in the 12th–13th centuries. The early revetments were constructed of single or double rows of stakes with willow wattling, possibly in the form of prefabricated hurdles. By the mid 14th century more substantial revetments of adze-dressed oak posts had been built. Some sections were well-preserved offering detailed information on woodworking and construction and from which a detailed sequence of dendrochronological dates could be obtained.

In the later 14th–15th centuries further modifications to the waterfronts included the construction of substantial post-and-plank revetments and stone retaining walls. These more robust structures seem to have been necessitated by changes to the angle of flow of water caused by modifications to the banks at the confluence of the Kennet and Holy Brook. The remains of several wooden and stone buildings, presumably associated with wharfage, were also recorded.

From the later 16th century the Abbey Wharf was in decline. The revetments ceased to be maintained and a fall-off in the quantities of artefacts recovered and changes in the composition of the channel silts suggest a period of near abandonment following the Dissolution. Thereafter most refurbishment and replacement of revetment structures was associated with the canalisation of the Kennet.

Excavations at Crane Wharf, close to the northern bank of the Kennet to the south-west of Abbey Wharf, recorded prehistoric alluvial gravels overlain by a bank associated with a channel and sandy gravel horizons producing worked wood and radiocarbon dates in the 4th millennium BC. A silt horizon, overlying the bank and channel, contained groups of partly articulated and disarticulated human bone. On top of the silt was part of the skeleton of a young female adult with three iron objects, which was radiocarbon dated to the Roman period. Sherds of Saxon pottery occurred at the same level. Further alluvial deposits accumulated until at least c. 1400 AD. An alignment of a closely-spaced, right-angled post revetment of probable 14th century date was recorded, with a narrow construction trench behind it backfilled with sandy silts which were also spread across the bank for some distance, possibly in an attempt to consolidate it.

In the area of Bridge Street, where evidence for early wharfage and riverside activities was anticipated, a series of smaller scale excavations and evaluations was undertaken. At Bridge Street East a former channel of the Kennet provided evidence for another series of timber revetments, beginning in the 11th century. The main channel was deliberately realigned sometime in the 12th–13th centuries and thereafter seems gradually to have been made narrower. By the 18th century the former channel had been infilled and the area reclaimed for wharfage. Industrial activities included hide-processing.

A brick culvert was investigated over a 22 m length at Bridge Street West. Although probably mostly of 18th/19th century build, part of the culvert is thought to be of 16th century date, reusing 12th–13th century stonework. The culvert consisted of ribbed arch roofing using limestone blocks incorporating decorated fragments and masons' marks resting on limestone block walls. Excavations off Fobney Street, between the Kennet and Holy Brook recovered evidence for yet more waterside revetments. One of these, of 15th–early 17th century date, consisted of radially-split posts set into a wide construction trench backfilled with large quarried chalk blocks. A second was of a type unparalleled elsewhere in Reading, consisting of a large base plate and tenon-post supporting three planks laid edgeways and held by pegs. A dumped, chalk bank, probably a revetment, was itself later revetted by a series of closely-set, square-cut planks set on edge in a clay filled trench. Traces of other substantial waterfront structures were recorded and, away from the river frontage, raft piling indicating the position of workers' cottages associated with the former brewery.

In total, over 1000 individual timbers were recorded from the Reading waterfront sites, enabling the construction of a detailed dendrochronological sequence running from the mid 13th to the late 18th centuries. Detailed analysis was undertaken of the typology and construction of the various revetments and the two studies combined to provide a sequence of waterfront development. Pollen and plant remains and a large faunal assemblage, together with large assemblages of pottery, clay pipes, and especially leather representing shoe manufacture, chart the industrial and economic development of the riverfront areas throughout the medieval and post-medieval periods.

The archaeological evidence is complemented by a study of the history of the Reading waterfronts from documentary sources.

1. Introduction

1. General Topography

The original site of the town of Reading occupied part of an east–west gravel ridge between the Rivers Thames and Kennet almost 2 km upstream from the confluence, at the narrowest point of the Kennet valley (Fig. 1). Limitations to the area for settlement were imposed to the north by the seasonally-flooded meadow land adjacent to the Thames, and to the south by the Kennet, the Holy Brook, and the network of small streams which together are the focus of the investigations reported in this volume.

The physical development of the town has been reconstructed by Astill (1978), whose suggested evolutionary scheme is adopted here (Fig. 2). The town is mentioned in the Anglo-Saxon Chronicle for AD 870–871 as the site of a Danish winter camp, probably situated on or near the site of the later Abbey. A further visit by the Danes in the winter of 1006 is recorded. By the first half of the 11th century Reading included a market, a nunnery (possibly situated near the church of St Mary's), and a mint functioning between 1044 and 1046. The *Domesday* entry indicates it had achieved borough status by the Conquest. The likely centre of the late Saxon town is the area around St Mary's and the Old Market (now St Mary's Butts) at the crossing of major roads from Oxford to Winchester and London to Bath (Fig. 2a).

Expansion during the medieval period was due largely to the influence of the Abbey founded in 1121 (Figs 2b and 3). The new triangular market place outside the Abbey's west gate formed a new economic centre to rival and eventually supersede the Old Market, these two areas being linked by east–west streets. Linear expansion south of the Kennet along London Street and Wood (now Southampton) Street was under way by the later 12th century, and the new bridge giving access to London Street built across the Kennet by 1186 is likely to be the result of a deliberate policy to favour the development of the new market outside the Abbey gate. St Giles's Church, south of the river, was also in existence at this time.

The main town and the southern suburb are separated by the floor of the Kennet valley, some 250 m wide as measured along the axis of Bridge Street. Along the valley flows the main channel of the Kennet together with its canalised loops, and a series of other more minor streams of which the largest and most important, the Holy Brook, marks the northern limit of the valley bottom. The excavations reported in this volume have shown the valley floor to be covered in varying depths of alluvial silt (the formation of which is discussed further in Chapter 13), and the zone would have been largely marshland until post-medieval times.

The basic pattern of channels established by the 16th century can be recognised on successive maps as continuing into the modern period (Fig. 4), although inconsistencies would still allow for some alterations to the precise alignments. The maps each suggest the major east–west elements identifiable as the Holy Brook, Minster Mill stream, Back Brook, and usually two braids of the Kennet. Some of the variation is undoubtedly caused by differences of the approach of the individual map-makers; Man's map of 1813 takes an eccentric view by visualising islands separated by substantial bodies of water, and therefore presents a less linear scheme than other cartographers who have portrayed the area as essentially (dry) land with streams of

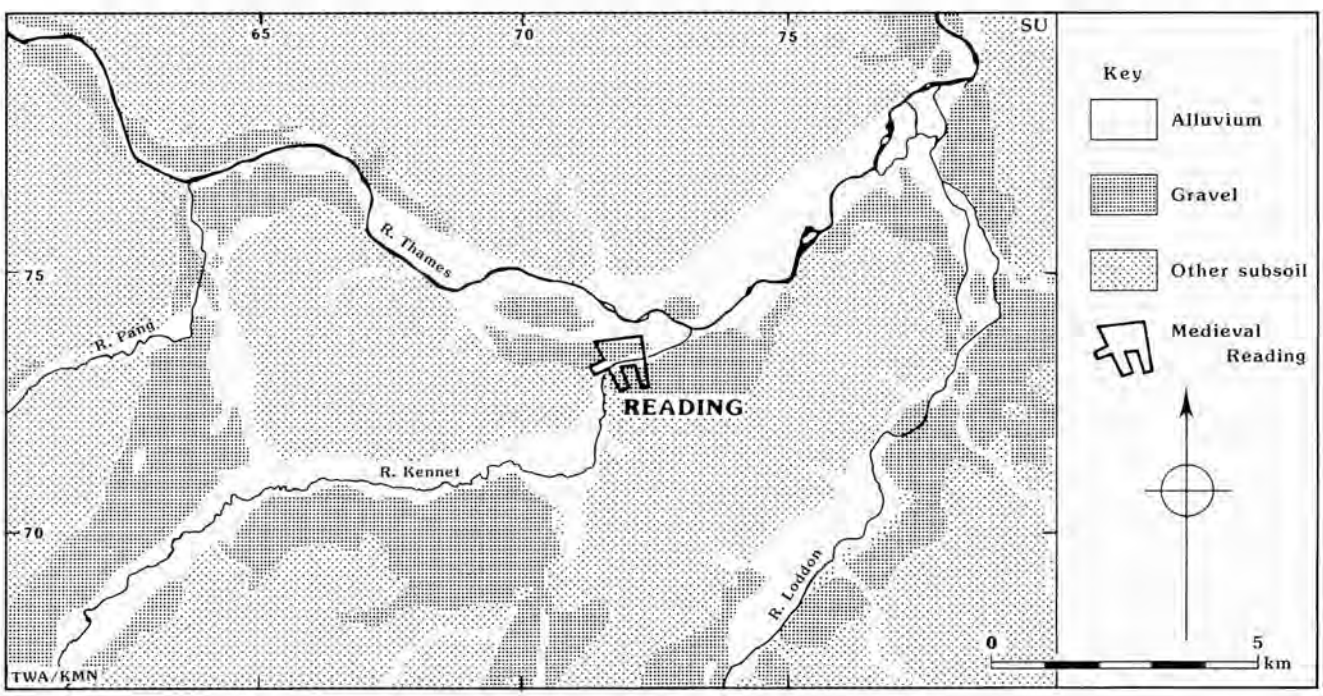


Figure 1 Reading: local drift geology

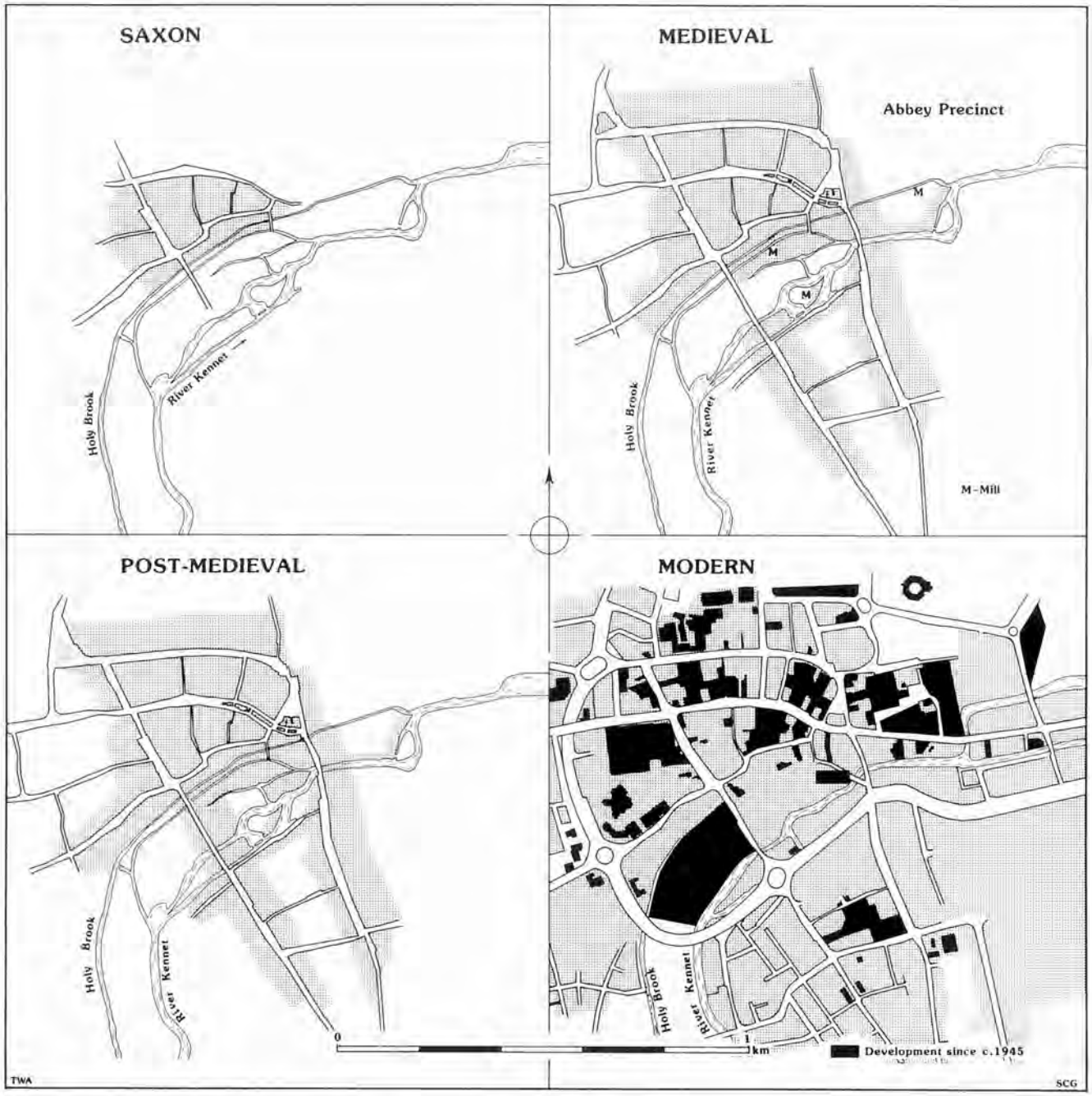


Figure 2 Reading: development of the town (after Astill 1978)

more modest size. Twentieth century development has greatly reduced the extent of open watercourses, although excavation has demonstrated that many survive in underground conduits where they still contribute to surface drainage.

2. Organisation and Project Development

Reading's waterfront zone can be defined as the area between the Holy Brook and the Kennet, extended to include the banks within the broad geographical sweep of the medieval town. Its length is defined by the eastern limit of the Abbey precinct to the divergence of the Minster Mill stream from the Kennet (Fig. 5). This comprises an area of some 1.75 km^2, of which approximately 50% has been redeveloped since 1979.

It would be satisfying to report that a programme devised in 1979 was carried out with unwavering purpose over a period of a decade until its preordained goals had been achieved. Such a claim could seldom, if ever, be justified, however, and would certainly be unwarranted in this particular case. The Reading Waterfronts project (a unified entity only in its later stages) discovered, evaluated, and exploited a hitherto unsuspected resource within a rapidly-changing framework of archaeological organisation and funding.

Archaeological interest in the redevelopment programme was originally focused on the Abbey, but the scope was expanded as the potential of the waterfront zone was realised following the excavations at the Abbey Wharf site

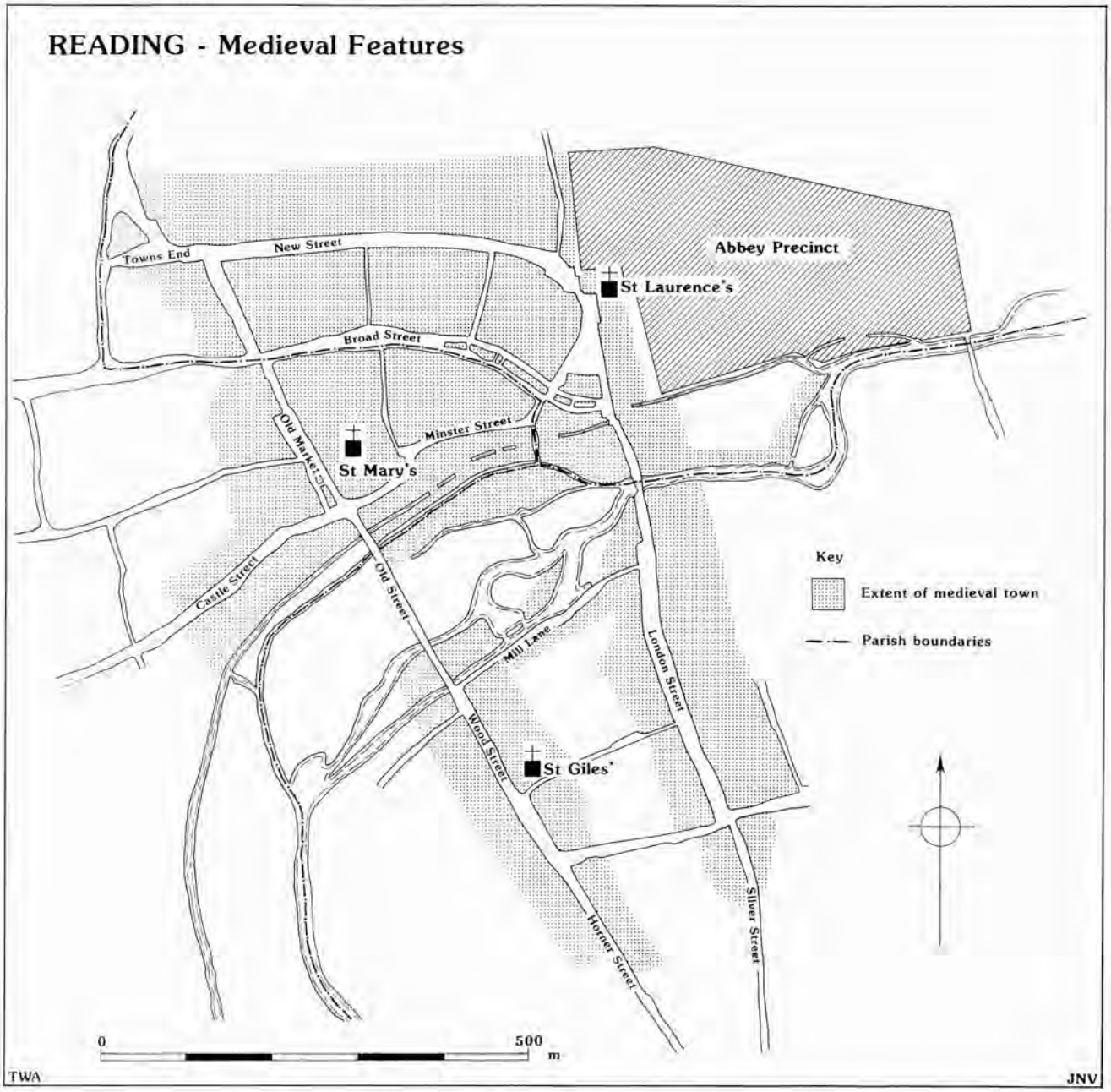


Figure 3 Reading: medieval features

in 1981 and the scale of the threat to similar deposits elsewhere in the town became apparent.

The 1981 Abbey Wharf Excavation

In 1978 the archaeological potential of Reading was seen as extremely limited. The historic core had been almost totally developed without any archaeological investigation and it was estimated that only 7% of the below-ground history of Reading remained intact (Astill 1978). Excavation had taken place only in the precinct of the Abbey, and the archaeology of Reading was perceived generally as consisting only of the upstanding remains of the Abbey buildings. Dr Slade had carried out some work in the Abbey precinct, including the discovery of timber pile foundations to the Abbey mill (Slade 1971/2; 1975/6). No examination of domestic occupation within the town had been undertaken. In 1979 trial excavations by Alan Vince for the Berkshire Archaeological Trust investigated part of the cloisters and an area south of the refectory (Vince *et al.* 1981/2). Additional small trenches excavated near the River Kennet revealed two timber piles, suggesting the possibility that well-preserved deposits survived. These could be related to the presumed site of the Abbey wharves in an area where, previously, survival had been believed to be unlikely.

By the early 1980s the archaeological significance of waterfronts had been demonstrated elsewhere in Britain and Europe (Milne and Hobley 1981), and this new academic framework coupled with the now demonstrable potential of the Abbey site prompted a review of archaeological priorities when fresh proposals were being discussed to develop the area between the Abbey and the River Kennet in 1981. The initial project design

for the 1981 excavation included work within and adjacent to the Abbey refectory and in the area between the refectory and the River Kennet. Further exploration of the riverfront to exploit the potential suggested by the trial trenches of 1979 was also proposed, where it was hoped that larger-scale investigation would establish the presence of riverside structures, determine the course and banks of the Kennet in the Middle Ages, and establish the physical relationship of the river to the Abbey precinct. Estimates for the work were put forward and a funding package was agreed with the developers, MEPC plc, the Royal County of Berkshire, the previous owners of the site, and the Department of the Environment, now English Heritage.

The excavations were phased, with the dry parts of the site being excavated first during September and October, and the waterfront in October and November 1981. The riverfront excavation, kept dry by a dewatering system (Plate 1; for a description of the technique see Fasham 1984), aroused considerable public interest. Despite extensive disturbance from piling for an aborted earlier development scheme the preserved timber medieval and later structures were visually impressive and readily comprehensible as an important part of the town's history.

It was possible in 1981 to examine only a small part of the whole potential area of the Abbey waterfront, and it was not certain how well-preserved were the deposits elsewhere on the site. The completion of the excavation at the end of November 1981 and the post-excavation work which followed was seen as the end of the archaeological response. It had been assumed at the start of excavation that planning permission would be granted quickly and that development would start immediately after the excavation.

However, planning permission was granted only following a protracted delay involving substantial modifications to the original scheme. The resulting re-design involved the construction of a very much larger building on the Abbey Wharf site, requiring more extensive foundations than had been originally intended. Set against the level of disturbance caused by the new scheme, the 1981 excavations appeared to be an inadequate response, and the desirability of carrying out further work was apparent.

The Appeal for the 1983/4 Abbey Wharf Excavation

The amendments to the planning application and the delay in granting planning consent provided the justification and the time for a reconsideration of the archaeological potential and importance of the site. This review covered not only the possible approaches to

Plate 1 The well-point dewatering system in operation at Bridge Street East (site W158). Individual small wells secured to the end of riser pipes are inserted at approximately 1 m intervals into the relevant permeable stratum under high water pressure. The riser pipes are connected by a swing connection to a header pipe, in turn connected to a well-point vacuum pump. The effect is to produce a dry core around each well-point thus preventing groundwater from entering the excavation.

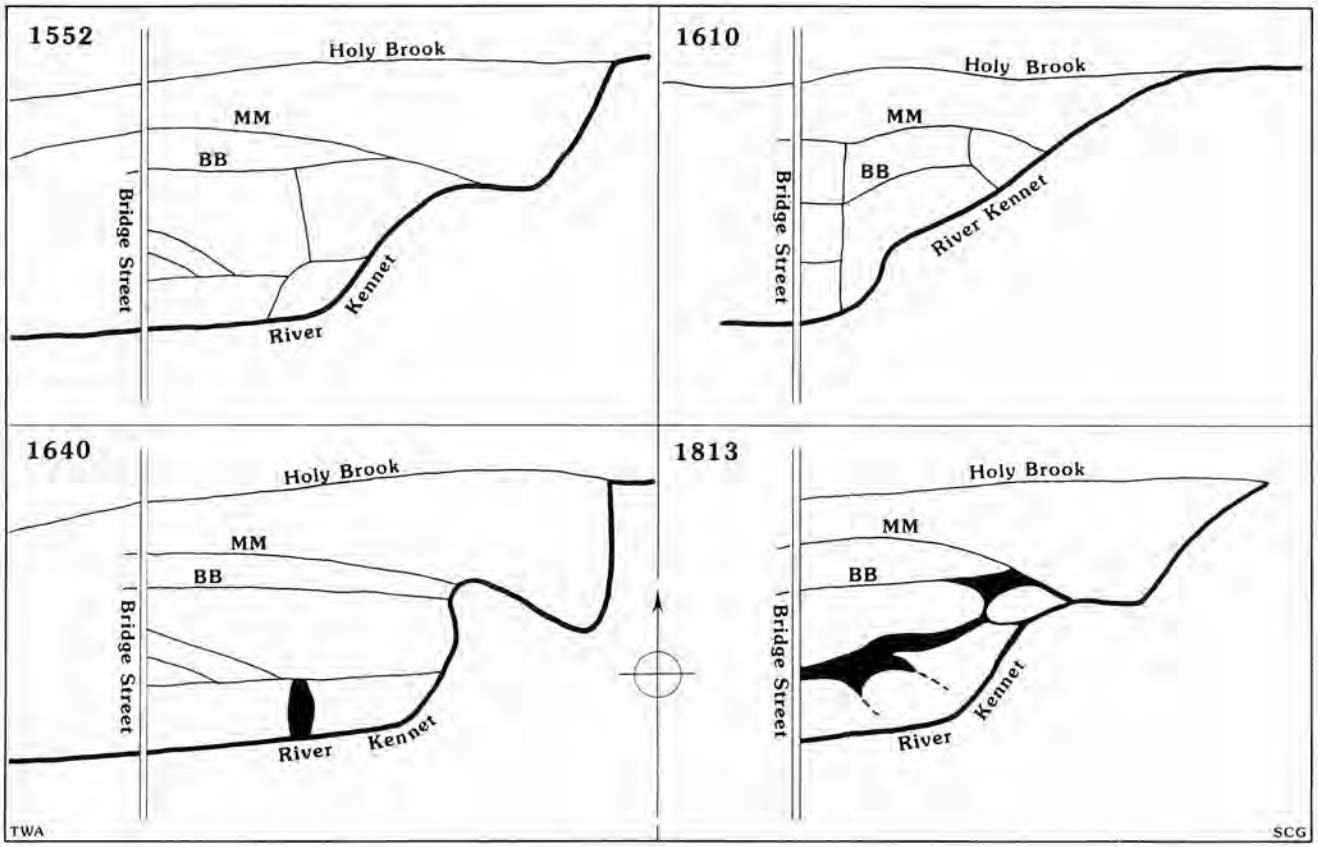


Figure 4 Topology of the rivers and streams in the Reading waterfronts area: 1552 survey by Roger Amyce; 1610 map by John Speed; 1640 survey; 1813 map as reproduced in Man (1816). MM = Minster Mill Stream; BB = Back Brook

excavation and post-excavation for a second programme of work, but also reassessed publicity, public relations, and potential sources of funding.

The unexpectedly good state of preservation of the waterfront area and the need to resolve some of the complex questions about the confluence of the Holy Brook and the River Kennet meant that two large areas immediately to the north and south of the 1981 excavation required investigation. The reconsideration of the archaeological approach was relatively easy compared to the problem of raising the necessary funding for the project at a time when money from central government was limited and the developer was not in a position to finance the whole project. It was decided to build on the existing favourable public perception of archaeology in Reading and to fund the excavation by a public appeal. The early stages of the excavation were nervous times; actual and projected expenditure initially rose at a far higher rate than income, and it was not until three-quarters of the way through the excavation period that income reached the minimum level necessary to complete the implementation of the project design.

The mechanics of the appeal are worth recording. MEPC took a very positive attitude and substantially underwrote the project's costs, contributing £29,000 towards the total. This offer provided an encouraging framework for raising the remaining money. An informal group comprising Councillor Janet Bond, then Chairman of the Berkshire Archaeological Trust and subsequently Mayor of Reading, Brian Portway, Public Relations Officer of Reading Borough Council (with the blessing of the Borough Council), Leslie Cram, Senior Keeper of Archaeology of Reading Borough Museum, and Peter Fasham with John Hawkes of the (then) Wessex Archaeological Committee met in June 1982 to plan the appeal. It had to be in two stages; the first before the planning decision was taken and the second after a positive decision on the application.

It was agreed that the appeal would be a joint venture between the then Wessex Archaeological Committee and the Berkshire Archaeological Trust. Special notepaper, donated by a local company, and a logo were acquired, and all correspondence was directed through Reading Museum so that the appeal could be seen to be a local venture. Stage One involved the establishment of patrons, and His Grace the Duke of Wellington, Lord Palmer, the Mayor of Reading, the Vice-Chancellor of Reading University and Magnus Magnusson all agreed to lend their names. Archaeology was kept in the local media by production of stories from the post-excavation work of the 1981 excavation and a series of 'off the record' briefings about the appeal proposals. In the summer of 1983 Leslie Cram wrote a series of ten weekly episodes for the local paper on the story of Reading Abbey. Letters were sent to 300 local firms seeking cash or resources in kind. The excavation of the Library site, funded by Berkshire County Council, provided a good opportunity to maintain a high profile in the media.

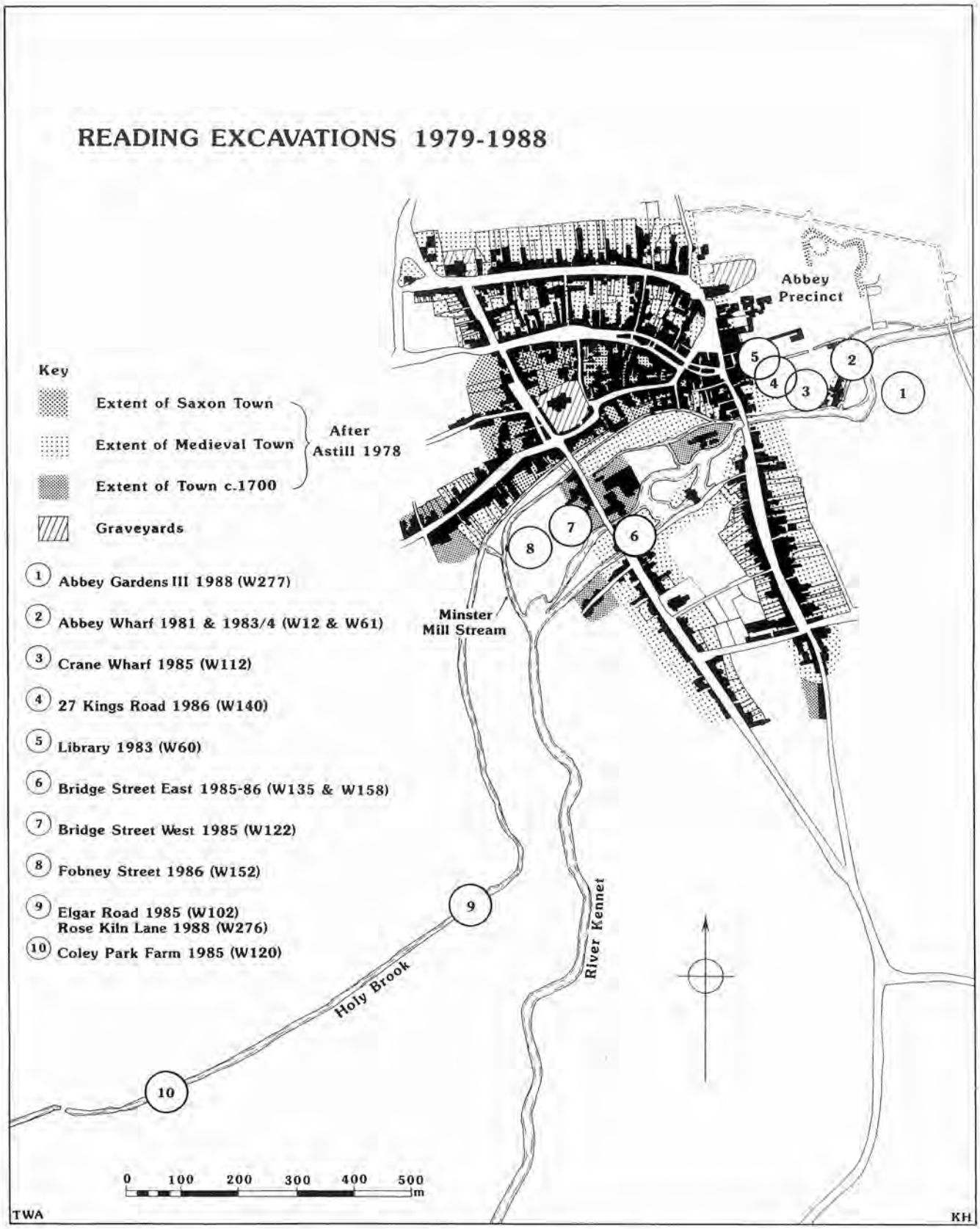


Figure 5 Reading waterfronts: location of the sites discussed in this volume

The appeal was launched at a press conference on 18th October 1983 at which a 'fact-pack' was available with suitable line drawings, photographs, letters from patrons, and other useful copy. Meanwhile, Legal and General Insurance, co-funders of the development with MEPC, had agreed to contribute £5000 to the appeal

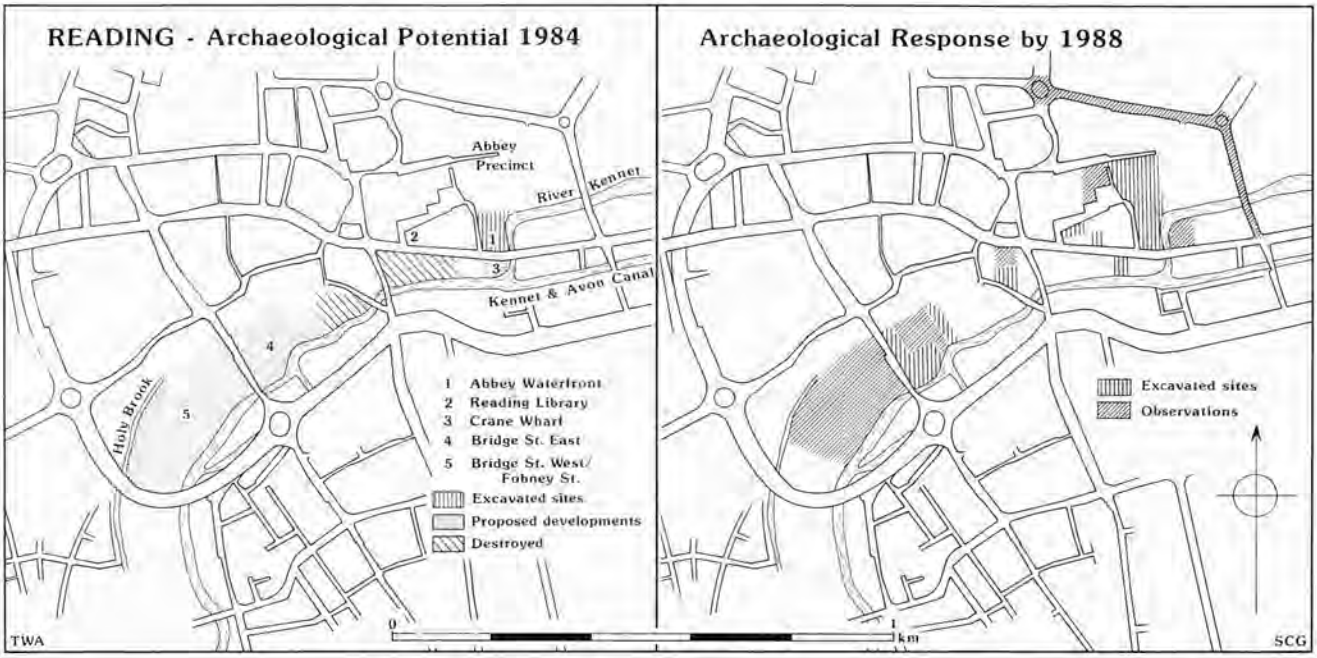


Figure 6 Reading waterfronts: archaeological potential and response

and the Department of the Environment had indicated its preparedness to fund at least the post-excavation aspect of the project.

The letter to local businesses produced boxes, free scaffolding and reduced van rental, and cash donations from seven companies of between £10 and £1000. Further direct approaches to the Borough and County and to Tilburys, a local firm, provided a free supply of most of the site accommodation. There were considerable savings made by the generous terms offered for the dewatering equipment by Sykes Construction Services. The scaffolding, supplied by SGB, was used for a public walkway with information and display huts at the beginning and end. The walkway was officially opened by the Mayor of Reading with attendant publicity. All sponsors received newsletters at the start, middle, and end of the excavation, and a special sponsors evening was held soon after the finish of the excavation. Local societies were specifically invited to view the excavations and all Berkshire schools, as well as some in north Hampshire and south Oxfordshire, received information about the project. Reading Museum with a local teacher produced a Children's Worksheet, which was enjoyed by the 1400+ schoolchildren who visited the site.

The excavation started on 22nd November and the site was opened to the public on 14th December, the delay being necessary to ensure that there were presentable remains to be seen. Allowing for the Christmas closedown, the site was open to the public for almost eight weeks, finally closing on 11th February 1984, when people were queuing at 8.30 in the morning to come into the site. About 2700 people, in addition to the 1400 school-children, visited in the short space of time that the site was open. Considering it was winter (and quite a cold winter at that) and that the site was not in a prime position in the town, the response was very encouraging. In one way or another the appeal had worked. It was a satisfactory and fortunate coincidence of the right developers, the right local politicians, and ultimately some very presentable archaeology all in the right place at the right time.

The success of the appeal and the excavation in general generated a mood of confidence about securing the means of recording the archaeology of Reading. The Trust for Wessex Archaeology (as the Wessex Archaeological Committee had now become) believed in its ability to raise funds from sources other than central government and especially from the developer. Reading Borough Council saw the value of archaeology and was prepared to insist in planning negotiations on the provision of archaeological conditions or agreements under Section 52 of the *Town and Country Planning Act* 1971, and the County Council, encouraged by English Heritage, saw the need for the provision of sensible and informed archaeological information becoming part of the process of determining a planning application.

It was essential to consider the events of the 1981 and 1983/4 campaigns in some detail as they created the base for all that followed. It is not intended to consider the arrangements for the subsequent work in such detail. The importance of the appeal lay not only in the funds it raised but in the way it influenced public opinion and created a climate in which the other work subsequently was possible. This is best demonstrated by the positive attitudes subsequently shown towards archaeology by the County and District Councils and fostered by the County Archaeological Officer. Apart from the waterfront excavations included here, six other Reading sites, which previously would probably have been ignored, were investigated by the Trust for Wessex Archaeology in the period 1984–8.

Other Sites

In 1984 the wider potential of the riverside sites was outlined in a short unpublished paper (Wessex Archaeology 1974) which stressed the importance of the Reading waterfront as the only example in Britain, at

that time, of an inland (non-tidal) waterfront with the potential for detailed examination. From the inner relief road to the Abbey Wharf there was a stretch of 900 m of the River Kennet where evidence for mills, wharves and other waterside structures could be anticipated (Fig. 6). Less than half of that length had been destroyed, although development proposals were imminent for much of the rest. The extent of those proposals is shown by the number of excavations completed subsequently. With the exception of three street frontage sites not immediately threatened it was felt that the waterfronts alone were able to provide evidence for the medieval commercial life of Reading. The Trust for Wessex Archaeology decided to attempt to excavate as much of the area as possible, seeing it as a means of understanding aspects of the development of the town via a linear landscape (waterscape) project which would complement the then current survey of the Kennet Valley (Lobb and Rose 1996).

The construction of a new public library on the site of the Abbey stables in 1983 required evaluation as a condition of Scheduled Monument Consent. The site lies adjacent to the Holy Brook, and the project design was drawn to include investigation of the stream bank. Without the previous excavations of the Abbey Wharf it is unlikely that excavation of this area outside the medieval structure would have been contemplated.

The excavation at Crane Wharf was the first in the wider programme of excavations on sites where the archaeological importance was defined explicitly in terms of the waterfront zone. Access was secured by writing to the Inspector of the Public Inquiry into the planning application and making a belated archaeological case. The developers, Commercial Union Properties, decided it was in their interests to remove any archaeological problems and agreed in a separate arrangement to fund the archaeological work. Similarly, the application relating to 27 King's Road went to appeal on grounds other than archaeology, but the Secretary of State advised in his appeal decision that archaeological excavations should take place. All the other projects were occasioned by various requests from, and arrangements within, the planning process by Reading Borough Council Planning Department, usually acting on advice from Berkshire County Council. One involved the recording of reused medieval columns in a culvert (a listed building) the result of conditions attached to the planning permission. Elgar Road and Fobney Street were separate agreements, and Coley Park was on an exchange of letters relating to a condition. In separate agreements The London and Edinburgh Trust provided over £30,000 for the evaluation and subsequent excavation of the Bridge Street East site in advance of construction of the first phase of their intended development of the site.

3. Report and Archive Organisation

The post-excavation designs and the proposals for publication have been amended and revised over the years as sources of funding, the climate of development, and perceived priorities have changed. Certain aspects have been or will be published separately elsewhere: the work on the 'dry' sites in 1979 and 1981 (Vince *et al.* 1981/2); the Abbey stable block aspect of the Library site (Hawkes 1986–90); excavations and observations in the cloister area in 1985 and 1986 (Fasham and Stewart 1986–90).

Table 1: correlation by period of principal phased sites

Period 1	Early prehistoric	Crane Wharf 1a
	Later prehistoric	Crane Wharf 1a–1b Abbey Wharf 1a
	Romano-British to Saxon	Crane Wharf 2 Abbey Wharf 1b
	Early medieval (11th–early 12th century	Abbey Wharf 1c Bridge St. East 2a–2c
Period 2	Medieval (12th–early 13th century)	Abbey Wharf 2a–2b Bridge St. East 2d
Period 3	Medieval (mid 13th–early 14th century)	Abbey Wharf 3a–3e Bridge St. East 2e
Period 4	Late medieval (14th century)	Abbey Wharf 4 Bridge St. East 2f Crane Wharf 3
Period 5	Late medieval (late 14th–early 16th century)	Abbey Wharf 5
Period 6	Post-medieval (mid 16th–early 18th century)	Abbey Wharf 6 Bridge St. East 3a–3g
Period 7	Early modern (mid 18th–early 19th century)	Abbey Wharf 7–9 Bridge St. East 4a–4f Crane Wharf 4

Table 2: radiocarbon determinations from all sites

Site	*Phase*	*Sample*	*Material*	*Lab. Ref.*	*Determination BP*	*Range (2 sigma)*
Crane Wharf	1a	188	Charcoal	Har–7027	4990±60	3970–3640 BC
Crane Wharf	1a	195	Timber	Har–7028	4950±80	3820–3670 BC
Crane Wharf	1a	188	Timber	Har–7020	4740±70	3640–3550 BC
Crane Wharf	1a	187	Timber	Har–7026	1970±70	80 BC–AD 90
Crane Wharf	2	SF22	Human bone	Har–9212	1860±70	AD 1–340
Bridge St. East	2a	3050	Timber	Har–8556	1000±70	AD 980–1120
Fobney St.	–	3006	Timber	Har–8555	400±70	AD 1430–1630
Fobney St.	–	3015	Timber	Har–8557	400±70	AD 1430–1630
Coley Park Farm	–	14	Timber	Har–8559	1320±50	AD 650–760

Calibrated ranges are taken from Pearson and Stuiver (1986) or Pearson *et al.* (1986) and rounded out to 10 years as recommended by Mook (1986)

All sites excavated prior to the end of 1988 which relate to the waterfront zone are included here. Further excavations subsequent to that date have been carried out, although these have been small-scale and have not altered the overall picture to any significant degree. Future opportunities for extensive investigation in advance of redevelopment of the Bridge Street area may allow for some reappraisal of the results presented in this volume.

Incorporating a disparate series of excavations into one whole has involved a considerable complexity of concepts, numbering and terminology; each individual context is at the same time a component of the site on which it was recorded and also part of the waterfront area and town as a whole. The authors have been aware of the traps awaiting either side of the ideal compromise in presentation: too little integration between the sites will fail adequately to explain synchronous events over large areas of the urban landscape, whilst an overly synthetic approach will obliterate detail and variety between and within the sites, and would fail to provide an accessible archive capable of reinterpretation. In an attempt to steer a middle course, this printed report seeks to describe individual excavated sequences, but in summary form only; the framework for discussion is usually wider than the single site. The excavated environmental and artefactual material is also considered in a highly synthesised format. Detailed information on individual contexts, finds and groups of finds is held in the archives held by Reading Museum and Art Gallery.

The principal excavations are those from the Abbey Wharf site (Chapter 2), with other sites described roughly in order east to west, divided into other sites in the area of the Abbey Wharf (Chapter 3), sites in the Bridge Street area (Chapter 4), and sites beyond the western limits of the medieval town (Chapter 5). As an aid to establishing an overview, a broad phasing scheme has been adopted to place the excavated sites within a general framework. Coarsely constructed, these episodes are adapted from the phasing defined for the Abbey Wharf sites, which is the most complete sequence available. Throughout this volume the term *Period* is invariably used to denote this inter-site chronological relationship.

Phase is a term reserved for intra-site chronological divisions, and is specific to the site to which it refers; Phase 2 at Crane Wharf is not the same as Phase 2 at Abbey Wharf. Consequently, phases should always be prefaced by their Wessex Archaeology site code (prefixed W). The relationship of individual site phases to periods is shown in Table 1. Phase divisions have been determined from the excavated stratigraphy with only a limited amount of independent dating evidence in the form of radiocarbon assays (Table 2) and dendrochronology (Table 3, *and see Chapter 6*). Dating is otherwise largely reliant on a consideration of the pottery and its similarities to the published sequences from Oxford (Chapter 10), and cannot be used to provide a closely-defined framework.

The fullest reference for an individual context is given by Period, Site, Phase, and Context (eg 2/W12C/2a/1088), but for the sake of clarity this reference is abbreviated wherever period, site, and phase are apparent from usage in the text. Elsewhere fuller identifiers are given, with additional special find (SF) numbers for individually recorded objects. General criteria used in the consideration of the excavated finds are to be found in the introductory sections of Chapters 8–11.

A survey of documentary and cartographic evidence was undertaken in 1995 with a view to providing

Table 3: dendrochronology dates from Abbey Wharf timber revetments

Site	*Phase*	*Revetment*	*Felling date range*[1]
W61B	3	II	AD 1238–1282
W12C	4	III	After AD 1309
W61A	4	III	After AD 1304–after AD 1316
W61B	4	–	After AD 1276–1373
W12C	5	IV	After AD 1386
W61A	5	IV	After AD 1383–1430
W61A	9	VIII	1765–1809

[1] (*see Chapter 6*)

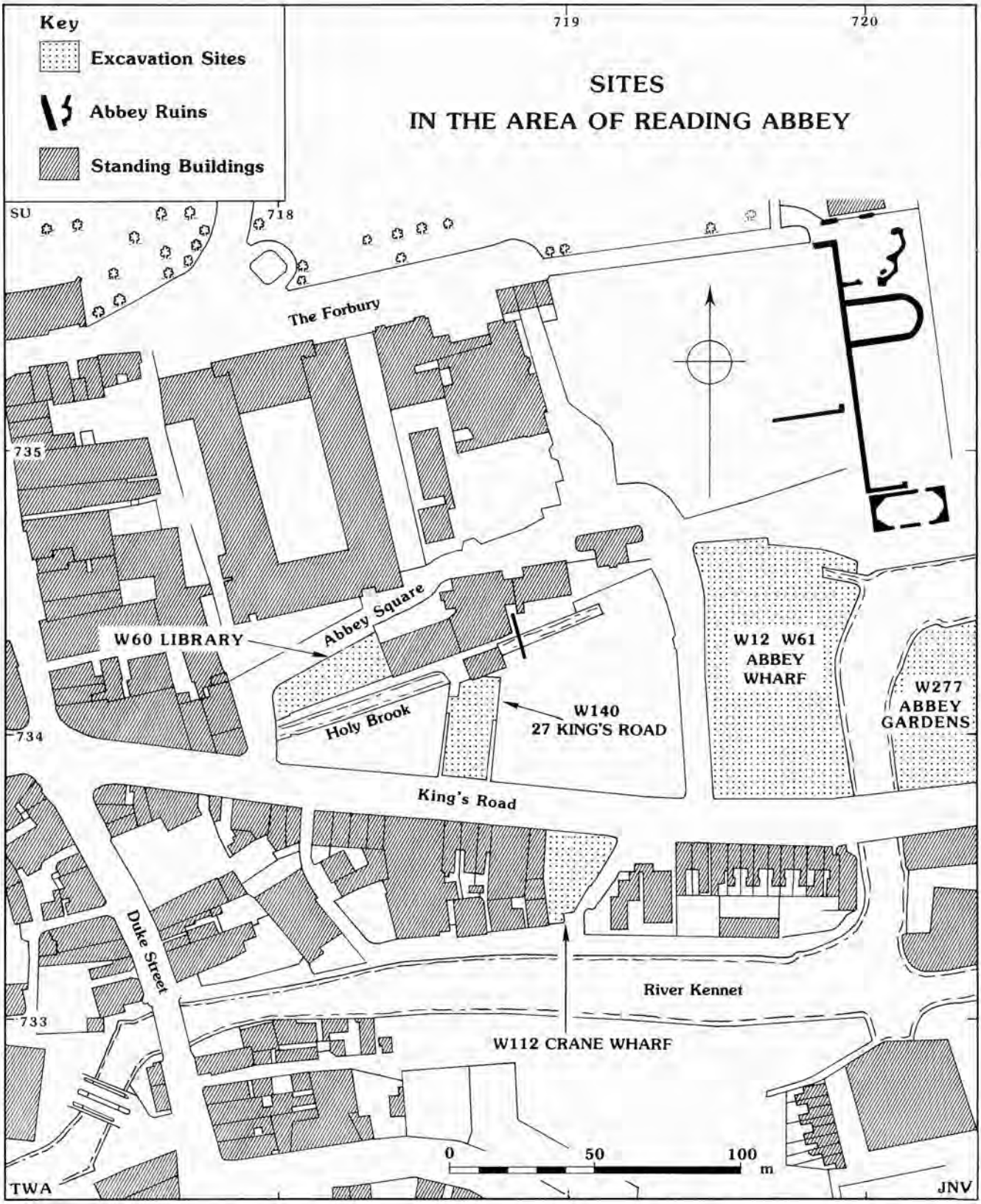


Figure 7 Reading waterfronts: excavations in the area of Reading Abbey

background information for specific aspects of the history of the town and the Abbey directly relevant to the understanding and interpretation of the excavated sites. The work concentrated on a wide-ranging survey of secondary reference material, although some primary references were also pursued. This evidence is presented in Chapter 12 and a survey of the documentary history of leatherworking is appended to the leather report in Chapter 9. Extensive use has been made of this information in the discussion in Chapter 13.

2. Reading Abbey Wharf

As a response to imminent and proposed developments within the Abbey precinct, excavations by the then Berkshire Archaeological Committee were carried out in 1979 under the direction of Alan Vince. The majority of this work was carried out in and around the claustral area and the results are published elsewhere (Vince *et al.* 1981/2). Evaluation work was also carried out on the Abbey Wharf site, and those results are included here.

The Trust for Wessex Archaeology excavation of the Abbey Wharf site comprised three separate trenches. The site of W12C, excavated in 1981, was initially intended as the sole response to imminent redevelopment, but delays in the development programme and modifications to the original scheme provided an opportunity to carry out further excavation to the south (W61A) and north (W61B) of the original investigations during the winter of 1983/4. The area had previously been disturbed by concrete piling for an earlier, aborted scheme, and it was apparent that the foundations necessary for the new development would totally destroy any surviving archaeology. Other observations and excavations in the area of the Abbey Wharf (Fig. 7) are considered in Chapter 3 below. The positions of the 1979, 1981, and 1983/4 trenches are shown on Figure 8.

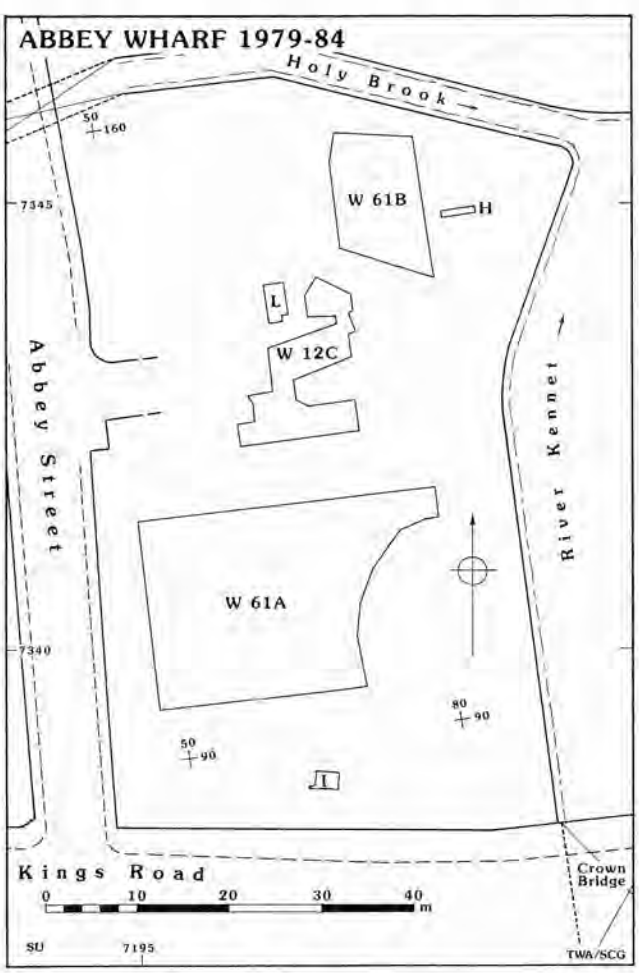


Figure 8 Abbey Wharf: excavation trenches 1979 (H, I, L), 1981 (W12C), 1983/4 (W61A and B)

1. 1979 Abbey Wharf Excavations, by A.G. Vince

Three trenches (H, I, and L) were rapidly excavated to evaluate the potential of the presumed site of the Abbey Wharf, their positions and size constrained by the use of the site for car parking. The 1979 ground surface was up to 2 m below the level of Abbey Street and King's Road, and less than 1 m above the water level in the River Kennet and it was anticipated, therefore, that all horizontal stratigraphy of medieval date would have been scarped away. It was hoped that information on the earlier topography and the possibility of a preserved medieval riverfront stratified at greater depths would survive.

Trench H

Trench H was hand-dug, 1.50 m wide, and intended to run at right-angles to the presumed line of any earlier channel alignments. Below *c.* 1 m of Victorian and later make-up was a layer of organic black silt also containing Victorian pottery and building materials. The interpretation in 1979 that this was the 19th-century infilling of a former course of the River Kennet shown on maps up to *c.* 1840 but shown as realigned on Simmons' map of 1861 was substantiated by the subsequent excavations.

Trench I (Fig. 9)

Trench I was located at the southern edge of the car park, an area occupied in recent times by a row of brick-built houses with concrete and brick floors. A portion of these floors (*c.* 9 m^2) was removed to examine the earlier stratigraphy. Immediately below the floor, 806, a layer of clayey gravel, 803, containing fragments of mortar and peg tile was traced eastwards for a distance of some 20 m, where it was cut away by a feature containing loose rubble and Victorian pottery (808, 811). Elsewhere in the trench 803 was seen to be overlain by a grey silty soil, 802, which contained late 17th- or 18th-century finds, and may have been the level from which the feature was originally cut. This feature was interpreted as the edge and latest filling of a former channel of the Kennet related to the layout shown on maps of 1802 and 1840, which show an island separated from the Abbey Street backlands by an apparently canalised channel. The subsequent excavation of trench, W61A revealed the timber revetment near the northern

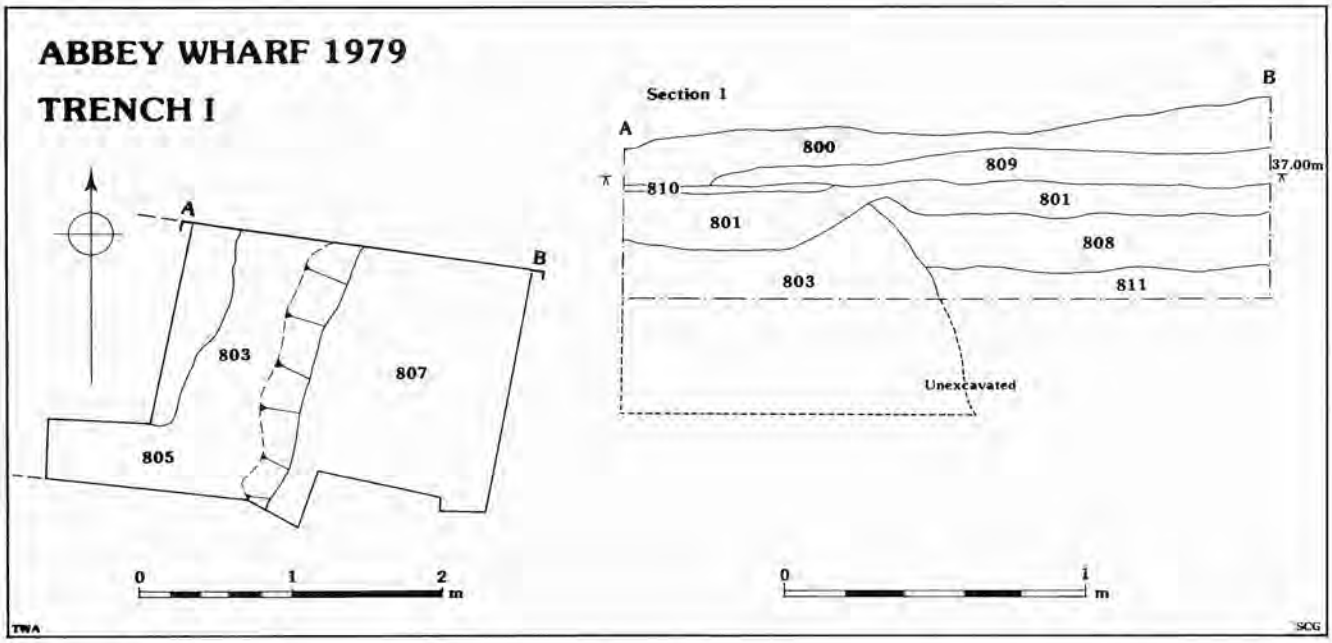


Figure 9 Abbey Wharf 1979: Trench I

apex of this island, which was in place by Period 7, probably during second half of the 18th century but certainly by 1802, based on cartographic evidence.

Trench L (Fig. 10)

Trench L (*c.* 11.4 m²) was located after some difficulty in an area of heavy modern disturbance, only an area 2 m x 5 m appearing to be stratigraphically intact. The top 1 m was excavated by hand and a further 2 m by machine. The earliest strata were a dump of rubble and Roman tile, 350, under a grey clay layer, 349, now equated with a Phase 1b clay bank from W12C and W61A. This clay had been cut away on a line running north–south, and two timber piles, 351 and 352, had been driven into the sloping edge of the cut. On the basis of alignment these timbers fit best with the Phase 4 revetment from the later excavations for which a construction date of between AD 1315 and 1395 is suggested by dendrochronology. Black organic silt, 348, with much preserved wood but no datable artefacts, was noted around the base of the timbers, overlain by but merging with grey silt, 347.

Cut through the grey silt was a small pit containing the remains of a wooden barrel, 343. The outside of the barrel was covered in a sticky clay and the inside filled with a substance believed to be lime. This feature may relate to the bases of two lime barrels recovered from W61A Phase 5 contexts, but considered to belong to the post-monastic Phase 6. Overlying the barrel further deposits of grey silt, 318, visually similar and possibly the same as Trench I (802), contained a clay pipe bowl of Atkinson and Oswald (1969) type 15, dated to *c.* 1660–1680, and a Frechen stoneware jug base. Stratigraphically later deposits above 36.65 m OD relate to later 18th- and 19th-century activity; further details are in archive.

2. W12C, W61A, and W61B, Abbey Wharf

In each trench modern rubble was removed by machine to a level just above the prevailing water table at approximately 36.40 m OD, and a well-point dewatering system installed. Restrictions within the stripped area were imposed by existing concrete pile caps and the need to step and batter trench sides to ensure safe working conditions.

The phasing of the three trenches has been integrated, although details of the development sequence are often confined to one trench. Nine broad phases of activity have been identified; these general divisions have been used as the basis for uniting the various excavated sequences from other sites in the town into an overall scheme (outlined in Table 1 above). The evolution of this phasing scheme throughout the process of post-excavation has led to the modification or abandonment of many of the on-site interpretations.

Overview (Figs 11 and 12; Plate 2)

The site was situated on the west bank of the Kennet, on the southern boundary of the precinct of Reading Abbey. Although earlier deposits were excavated, the sequence of river channel movement, reclamation, and riverside activity dates broadly to the period of the Abbey's existence and subsequent post-Dissolution activities principally related to the canalisation of the river in the 18th and 19th centuries. These alterations have combined to move the present course of the river progressively eastwards. Two other watercourses were present within the excavated area. The Holy Brook (which constitutes the mill stream and tail-race from the Abbey mill) presently joins the Kennet in the northern part of the site, earlier courses being excavated within

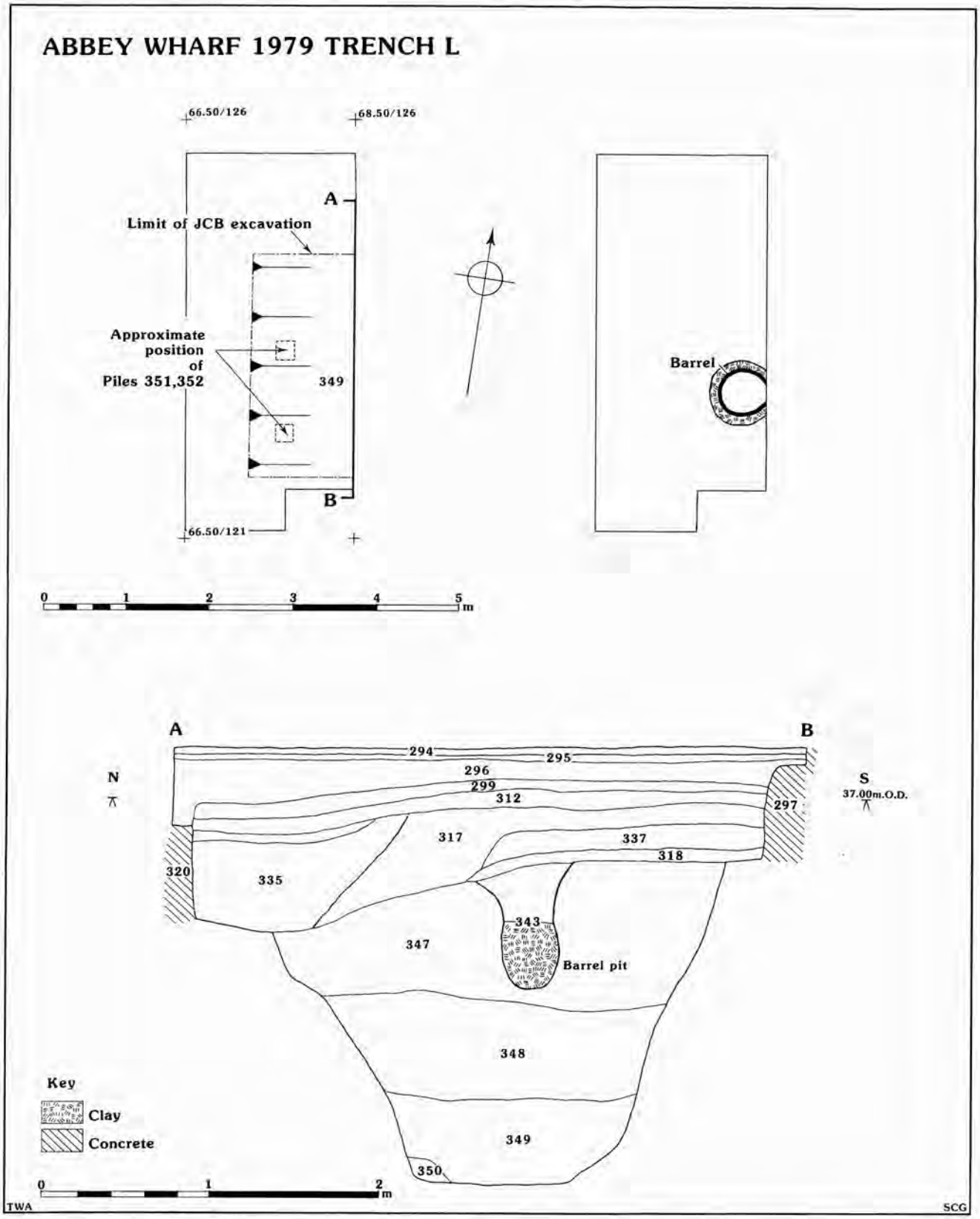


Figure 10 Abbey Wharf 1979: Trench L

Plate 2 Abbey Wharf W61: general view

trenches W12C and W61B. A second watercourse, interpreted as a by-pass or overflow channel for the Abbey mill, joined the Kennet within trench W12C during phases prior to the early modern canalisation. Evidence for the other end of this channel was recovered from the 27 King's Road site near its divergence from the Holy Brook (Chapter 3 below).

Summary descriptions of the excavated sequence are presented below; consideration of the revetment typologies and origins of the reclamation material are considered further in Chapter 6.

Phase 1 (Fig. 13)

Phase 1a

The earliest deposits examined comprised a river channel meander, best defined in trench W61B where it was observed to run approximately north-east–south-west at a level of 34.33 m OD. Varying in depth between 0.74 m and 0.80 m, the infill of the channel included silty clays and sandy silts. These contained large quantities of roots and branches (including identifiable elder and oak, together with large unworked trunk fragments of alder, and an unidentifiable species. A middle Iron Age burnished angular bowl (Fig. 84, No. 1) and a decorated sherd (Fig. 84, No. 2) were the only finds and provide the only dating evidence. The levels are closely comparable with the immediately pre-Roman deposits at Crane Wharf Phase 1a (Chapter 3).

Deep excavations in the western end of W61A also revealed evidence of a channel approximately 0.70 m deep stratified below monastic levels at *c.* 34.85 m OD and below, although the top had been truncated and may originally have been as high as 35.46 m OD. Neither edge of the channel was identified, and it must therefore have been in excess of 8 m wide at this point. Thin bands of sand and coarse gravels contained no artefacts or any other material, although the isolated dump of rubble and probable Roman tile at a depth of *c.* 34.85 m OD from Vince's trench L (*above*) are almost certainly from the same deposit.

Excavations of both sections of channel were limited by depth, which was beyond the effective limits of the dewatering systems. No potentially contemporaneous deposits in W12C could be examined for this reason.

Phase 1b

A naturally-formed bank comprising a deposit of grey-green silty clay was evident in W12C and W61A, where it overlay the Phase 1a channel, but was not present in W61B. The deposit was at least 1.20 m thick, with a mean base level at *c.* 35.00 m OD (although variation was evident) and a truncated top level at 36.30 m OD. A small trench immediately north-west of W12C and the more extensive excavation on W61A demonstrated a largely homogeneous section, and such distinctions as could be made were based on colour changes through the profile, varying from brownish yellow to olive brown. An interface between two otherwise identical deposits

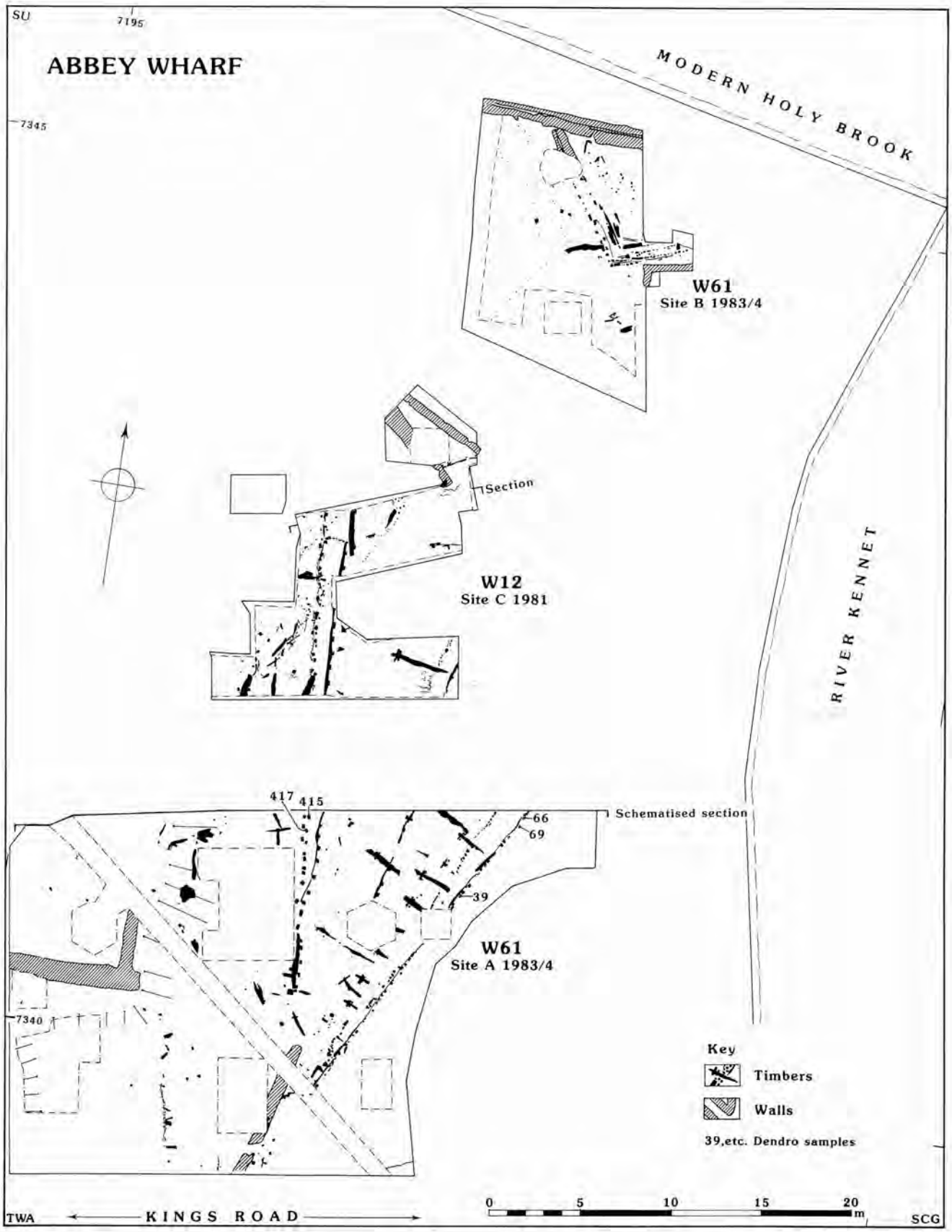


Figure 11 Abbey Wharf Sites W12C, W61A and W61B: all excavated timbers

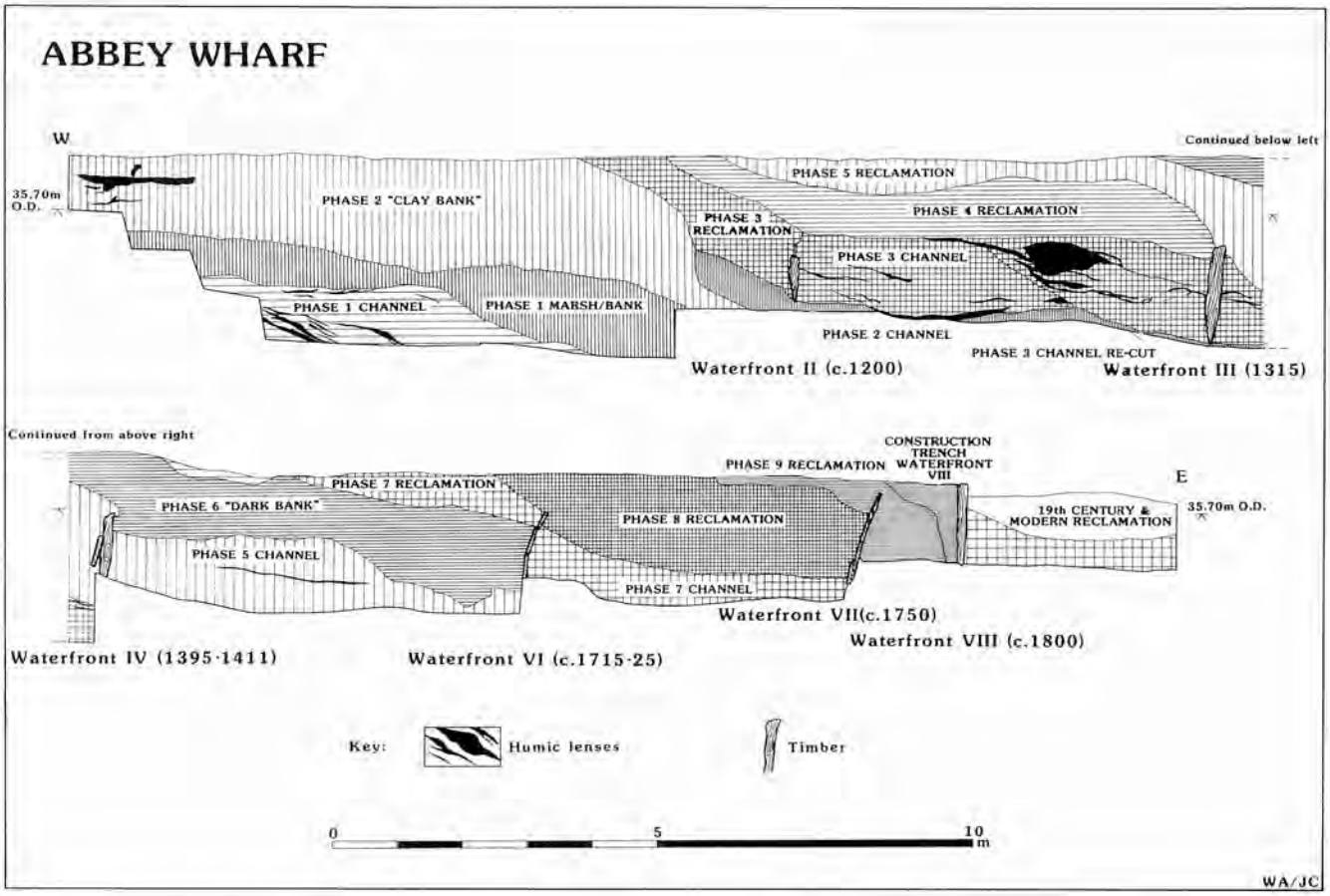


Figure 12 Abbey Wharf Site W61A: schematised section of north face

was defined by a horizon of unidentified tree root material implying a stabilised surface and, consequently, an extended time-scale over which the silts must have accumulated. These silts were similar in composition to, and, on the basis of comparative levels, potentially contemporary with, Crane Wharf Phase 2 silts accumulating from the Roman to the early medieval period, Crane Wharf exhibiting better definition of the stratigraphic components. Although no securely-stratified finds were recovered from the Abbey Wharf deposits, installation of well-point dewatering equipment on W12C brought to the surface vegetable-tempered sherds of mid-Saxon pottery only from an area immediately above the clay bank. Context 349 from Vince's trench L, immediately overlying the Roman tile and rubble, is also considered to be the same deposit. Comparative silting rates for the Abbey Wharf and Crane Wharf sites are discussed in Chapter 12.

Phase 1c

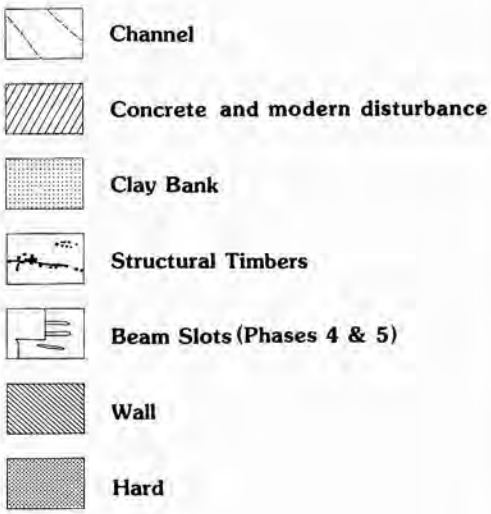
In this phase an insubstantial revetment was inserted at the foot of the Phase 1b clay deposit to consolidate the riverfront. The evidence on W12C is from two stratigraphically unrelated areas (north and south). These areas are divided by a later stream channel forming a confluence with the main river, described in Phase 2b below. Although there is no direct evidence for its existence at levels related to Phases 1c and 2a, an earlier version of this watercourse, possibly a meander from the Holy Brook, would provide an explanation for the presence of a revetment and for differences in revetment detail and levels between the northern and southern parts of the trench. Its presence has been assumed on the phase drawings and in the descriptive texts below.

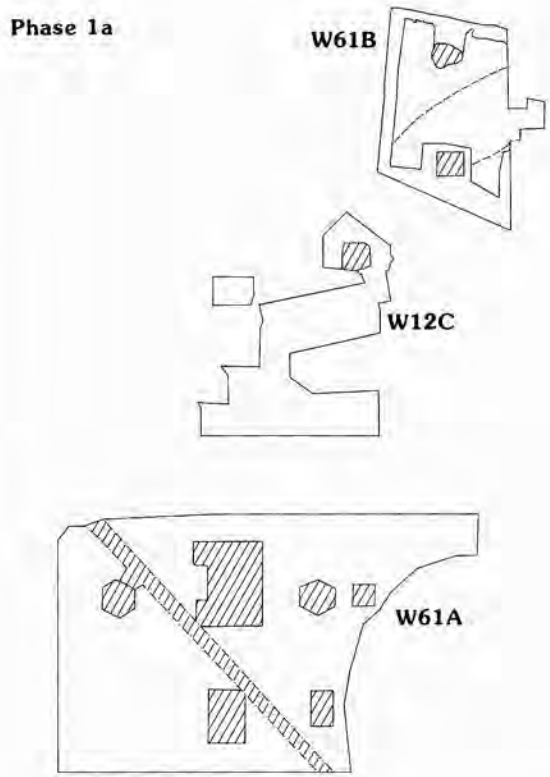
The only structural elements to the northern part of this phase were three beech posts in the north-west corner of W12C. No reclamation was present behind them, the alignment being recessed directly into the foot of the clay bank near its lowest point. There was no evidence that any lateral planks or wattles had ever existed. Some 3 m length of the Kennet frontage immediately north of the confluence was represented.

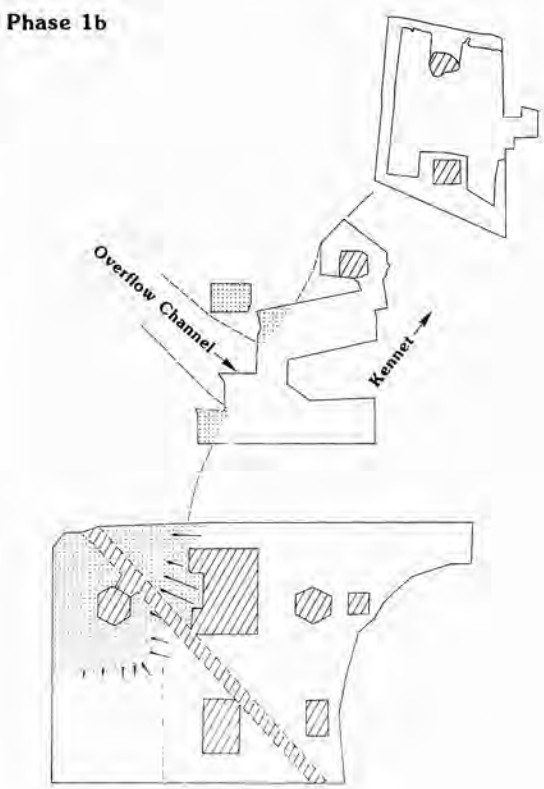
The alignment immediately to the south of the confluence was below the effective operating depth of the dewatering system, but was probably represented by pieces of unidentified driftwood timber in both W12C and W61A at 34.80 m OD, comparable to the levels for the bank to the north of the confluence. These pieces may have come to rest against the bank, although any contemporary deposits behind this alignment, whether the original extent of the clay bank or subsequent artificial reclamations, had been truncated or masked

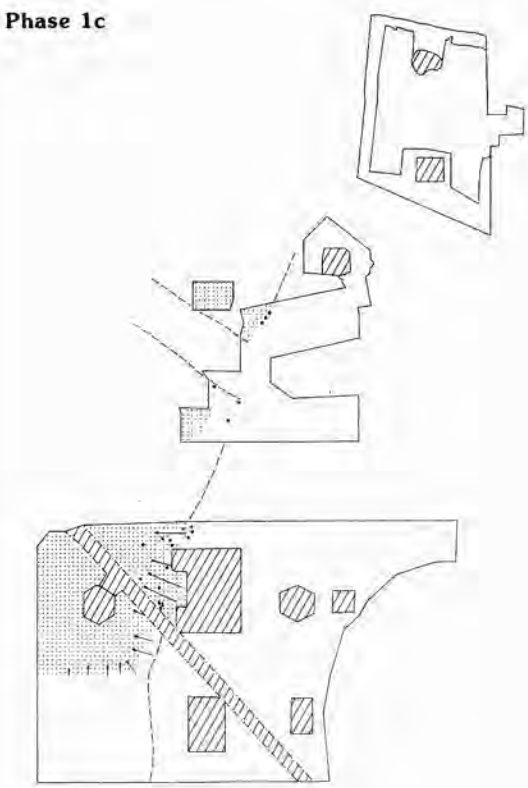
Figure 13 (opposite) Abbey Wharf: Phases 1a–1c

ABBEY WHARF


Channel
Concrete and modern disturbance
Clay Bank
Structural Timbers
Beam Slots (Phases 4 & 5)
Wall
Hard


Phase 1a
W61B
W12C
W61A


Phase 1b
Overflow Channel
Kennet


Phase 1c


0
30
m

by subsequent channels. In W61A there was no evidence for activities on or adjacent to the clay bank in this phase.

Although no extensive, systematic excavation of channel silts was possible, the driftwood at 34.80 m OD represents a minimum if not necessarily realistic height for the water level. There is no direct or indirect dating evidence, and this phase may equally well belong to the earliest monastic period.

Phase 2 (Fig. 14)

Activity likely to date to the earliest years of Reading Abbey was best represented in trench W12C by the sculpting of the front of the clay bank to accommodate a sequence of timber revetments. Contained within the site is the confluence between the Kennet and a sluggish, rapidly-silting stream, identified also on W140 27 King's Road, which is interpreted as a flood relief channel by-passing the Abbey mill and the tail-race section of the Holy Brook. The continuous deposition of backwash silts and a rising river level throughout this period are the apparent motives for the replacement of the timbers at the point of confluence of the overflow and main river channel.

Definition of phase groups within this period can only be partly based on demonstrable stratigraphic relationships, and comparative levels have been used to suggest links between different parts of the trench to provide an overall interpretation. Such links have been sparingly used, however, as modifications have involved the truncation of levels of silts and the possible reduction in height of revetment timbers.

Phase 2a

The alignment north of the Kennet/overflow channel confluence was replaced by two posts, one possibly but not certainly oak, and the other beech. The posts were set into the slope of the clay bank behind the Phase 1c alignment but at a higher level, with contemporaneous channel silts covering the earlier timbers at levels up to 35.00 m OD. No evidence for any lateral timbers was recovered. Reclamations of clean, coarse sands devoid of any building rubble infilled the gap between the posts and the top level of the clay bank.

The alignment south of the confluence was represented by two oak posts and two others of unidentified wood. Collapsed and fragmented planking almost certainly derived from this structure. Again the alignment was behind that of Phase 1c but at a higher level. Reclamations here were similar in texture and composition to those immediately north of the confluence. There is no evidence for any formal timber alignments on W61A, and it therefore seems likely that any revetment was confined to the immediate area of the Kennet/overflow channel confluence.

Dating evidence is restricted to associated pottery from reclamations and channel silt context suggesting a late 12th or early 13th-century date for this episode.

Phase 2b

This phase saw a considerable extension to the formal revetment, which for the first time extended a significant distance beyond the confluence of Kennet and overflow channel, firm evidence for the latter becoming available at this time. Other additions and alterations included the earliest evidence for the Holy Brook mill stream tail-race and the construction of a 'hard' or artificial beach.

The Abbey Mill, overflow channel and tail-race

The conjectured presence of an early course of the Holy Brook in previous phases has been suggested above. Modifications to the clay bank now included the recutting of this channel from a level of approximately 35.69 m OD within the clay bank. The recut was noted in the west section of W12C but not excavated in plan as it did not extend into the trench, the mouth of the channel only being exposed in the section. As observed, it was approximately 4 m wide and a maximum of 0.80 m deep, and had a regular (almost certainly artificial), rounded profile. It was not possible to phase its infilling on the basis of stratigraphy alone and there was no direct dating evidence; potential water level defined by the primary silting must have been at least at 35.20 m OD, and Phase 2b is the earliest period at which this level could be high enough to correspond to the suggested level of the main channel. The primary silting comprised fine-grained, organic silts indicative of a slow-flowing, perhaps sporadic, stream.

In trench W61B the course of another channel, *c.* 3 m wide, was marked by timber alignments comparable in level and type to those defining the newly-recut channel on W12C. The area was heavily disturbed and no contemporary channel fills could be isolated.

These two channels are respectively interpreted as an overflow or flood relief channel and the tail-race connected with the Abbey mill, some 100 m upstream on the Holy Brook. Excavations on the site of the Abbey mill (Slade 1971/2) led the excavator to propose a late 12th-century origin for the structure, although the possibility of a date as late as the earlier part of the 13th century cannot be ruled out on the basis of present limitations to the understanding of the local pottery sequence.

The 'hard'

Channel silts belonging to Phase 2a are overlain by a hard standing or artificial beach composed of large (*c.* 0.30 m flint, occasional siltstone and chalk blocks. It ran north from the presumed overflow channel on W12C and was also identified on W61B.

Where the hard overlay the Phase 1a channel it was up to 0.80 m thick, elsewhere it was between 0.20 and 0.30 m. A slight slope from west to east (ie dipping towards the main river channel) was evident on W12C, presumably due to the contours of the underlying channel silts; no significant variations in level were noted on W61B, although subsequent activity may have truncated some of the deposits.

The highest point of the hard was at 35.15 m OD based on the levels from W61B. On W12C the upper level of the hard was not measurably higher than the stratigraphically earlier Phase 2a channel silts, and, as water level must in any case have been high enough to

Figure 14 (opposite) Abbey Wharf: Phases 2a–3b

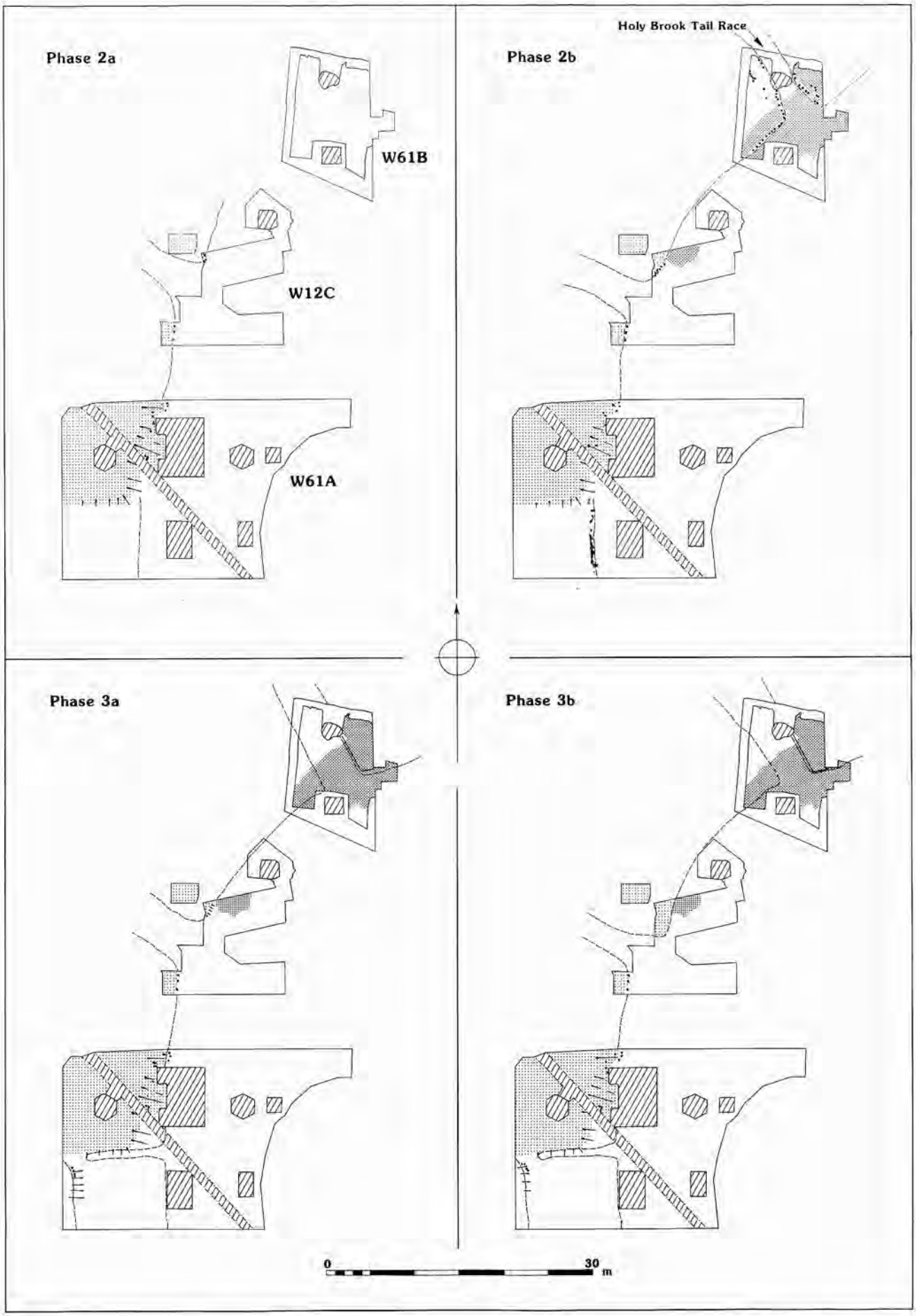

Phase 2a
W61B
W12C
W61A
Holy Brook Tail Race
Phase 2b
Phase 3a
Phase 3b
0
30
m

Plate 3 Abbey Wharf W61B: Phase 2b timber alignment

clear the surviving top of a Phase 1c timber at 35.17 m OD, it is assumed therefore that it must have been entirely submerged at this point.

Were the structure to have functioned as a landing beach (the original interpretation formulated during excavation) it would be expected that a significant proportion would have been above the waterline. An alternative explanation is that the hard was laid to prevent erosion of the silts into which the stake alignments (below) were driven. Erosion could have been a significant factor on the outside of a bend on the main river channel, and the laying of a paving would have prevented the removal of silts beneath and between the stake alignment and on the floor of the tail-race, whilst inhibiting the deposition of additional backwash silts at the confluence of the two fast-flowing channels. This latter point would have been of particular importance, as any accumulation of silts at the mouth of the tail-race would have hindered the flow of water through the mill immediately upstream.

The timber alignment, by John Pidgeon

The Phase 2b alignments comprised two conjoined structures. A single stake row ran south–north-east through W61A into W12C to the confluence of the Kennet and overflow channel, resuming north of the confluence and continuing on W61B south of the confluence of the Kennet and Holy Brook tail-race (Plate 3). Double stake rows marked both sides of the tail-race channel. The single-row and double-row structures between them comprised almost 100 untrimmed stakes with axe-cut points. The stakes varied in diameter between 0.04 and 0.12 m, and the dominant species were birch, beech, hazel, and willow. On the landward side of the stake rows in the north-west corner of W12C were a series of sand and gravel reclamation layers.

In the southern area of W61A stakes were preserved to a height of *c.* 0.50 m above contemporaneous deposits and, to the rear of these sections, lengths of willow wattling were poorly preserved. It is not known whether the wattles were in the form of prefabricated hurdles. Elsewhere along the single row the stakes did not survive to a comparable height, almost certainly because of truncation due to later overlying channels, but traces of decayed vegetational matter behind some stakes suggest wattling or other infilling may have existed along the entire length of the alignment.

The double-row stake alignments were driven through the hard; presumably the fast-flowing tail-race would have presented a greater potential for erosion than elsewhere on the riverfront, and a stronger structure coupled with increased protection at its base would have been well advised. A parallel for double-row alignments comes from the banks of a former course of the Trent near Castle Donnington, where oak posts of 0.10 m diameter supported mixed wood wattling enclosing large sandstone blocks between the rows (C.R. Salisbury pers comm). Dated by dendrochronology to AD 1270, the Castle Donnington revetment is altogether more robust than the example from Reading, which retains little evidence for any substantial infilling between the rows. Later channel movements have evidently truncated the stakes to a near uniform level of 35.20 m OD, however, and any flint, chalk or siltstone components dispersed across the hard would not have been recognised.

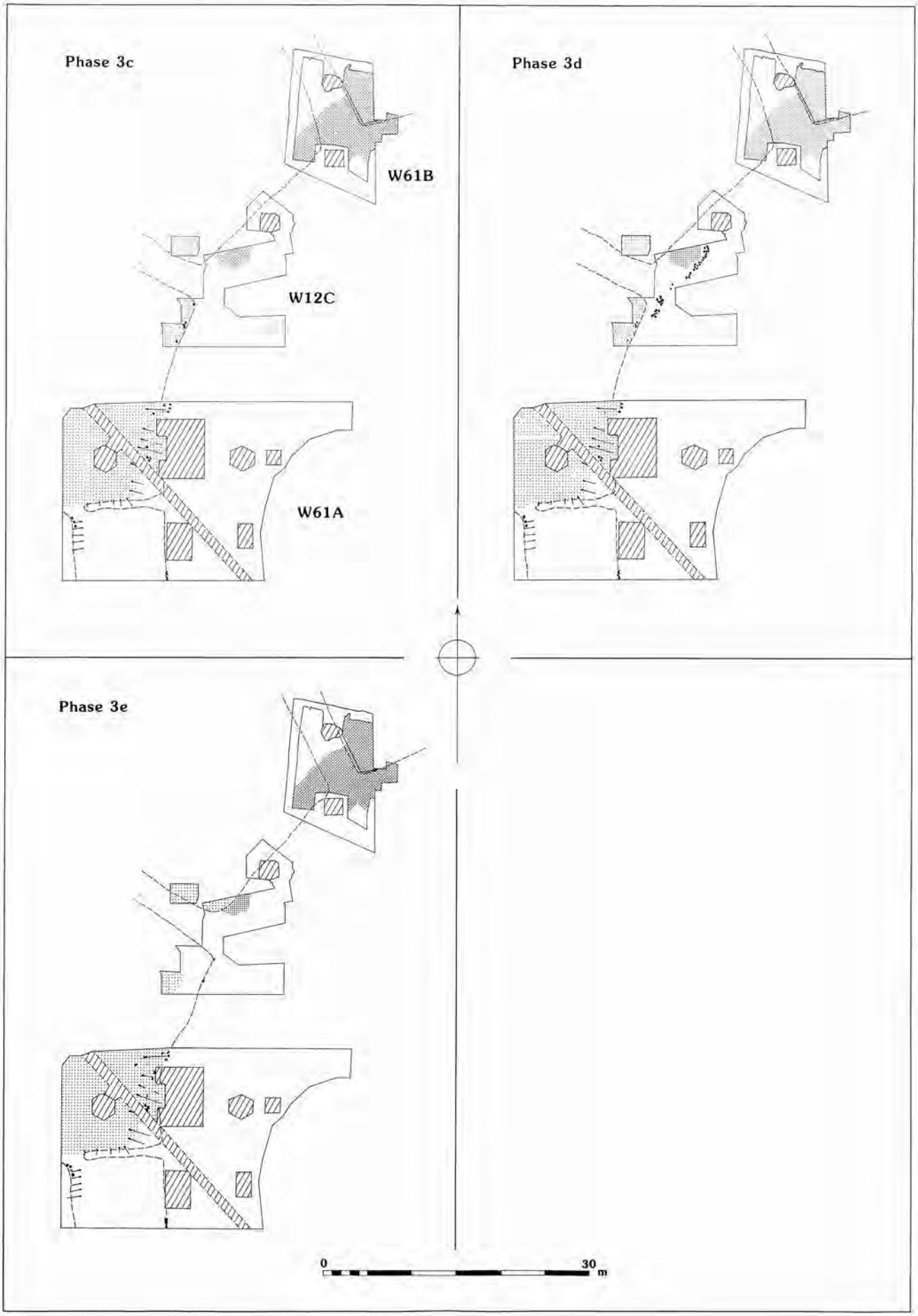
Phase 3 (Figs 14–16)

Modifications to the basic layout established during Phase 2b have been assigned to Phase 3. These modifications comprised alterations to the clay bank at the extreme south of the site and to the mouth of the overflow channel, the revetments and bank for which were gradually pushed outwards into the main channel narrowing the overflow.

There was little evidence relating to the riverfront on W61A at this time, although a post fronting Phase 3 reclamations visible in the northern section of the trench (Fig. 12) represented the southernmost extent of any modifications to the revetment established in Phase 2. A channel recut associated with this reclamation was also clearly visible, but cannot be more precisely attributed to phase.

Elsewhere on the clay bank additions were made to the southernmost end, where a drop in level of *c.* 0.40 m was evident. It is not known during which phase this reduction in the level was achieved, but it was during Phase 3 that the first use of the lower surface was made. A gully, up to 1 m wide and a maximum of 0.75 m deep

Figure 15 (opposite) Abbey Wharf: Phases 3c–3e


Phase 3c
W61B
W12C
W61A
Phase 3d
Phase 3e
0
30
m

with a U–shaped profile, was cut partly across the clay bank at the foot of the break in slope and led to the main Kennet channel. A second gully, 1.50 m wide and a maximum of 0.30 m deep with a U–shaped profile, ran parallel to the river from the break in slope southwards beyond the limit of excavation. The gullies are presumed to be for drainage purposes, and together with a substantially later (14th-/15th-century) gully from Crane Wharf Phase 3 may have been part of a scheme to drain and manage areas south of the Holy Brook subject to seasonal inundation. The break in slope from the clay bank may have marked the limit to the Abbey holding; it was a boundary maintained throughout later periods and still evident in differences in the Period 7 revetments.

Phase 3a

North of the overflow confluence a new alignment represented by a single oak post and gravelly soil reclamation contexts defined a new course for the river bank. Associated channel silts suggest a minimum water level above 34.84 m OD, although it is unlikely that the water level would have dropped from the minimum level of 35.20 m OD in Phase 2b, and it would appear that an incomplete sequence of channel deposits was preserved.

Phase 3b

The deposition of unidentified driftwood on the north bank of the confluence at a level of 35.36 m OD marked an intermediate stage in the continued silting of the mouth of the overflow channel. No formal revetment was associated with this phase on the north bank.

On the southern side of the confluence a realignment was achieved by the insertion of oak posts; the remains of an oak plank were probably also associated with this structure. It is possible that an oak post in the northern section of W61A fronting deposits post-dating the Phase 2 revetment was the tail end of this structure; no Phase 3 modifications were apparent further south, and it is assumed that realignment was confined to the area immediately adjacent to the confluence. The combined effect of the movements either side of the confluence was to narrow the mouth of the overflow channel to *c.* 2 m.

Stratigraphically unassociated but with a dendrochronology date of AD 1253–1257 was an oak post revetment on the northern bank of the Holy Brook tail-race. It has been included in this phase as it was morphologically similar to the new alignment south of the overflow, which was otherwise the earliest known occurrence of a post-and-plank revetment on the site. There is no evidence for a comparable structure on the south side of the tail-race, and it is assumed that the double-row stake alignment continues in use. Associated reclamations contained medieval pottery not closely datable.

Phase 3c

Substantially the same alignment was maintained to the south of the confluence, but the revetment now incorporated replacement oak posts (Fig. 16, W12C/1059, 1060, 1061, 1066]; planking was also present. There was no stratigraphic evidence for a comparable realignment on the northern bank of the confluence of W61B, although the dendrochronology date of post-AD 1276 for timber W61B/212 suggests it may have been of this phase.

Phase 3d

This phase saw the insertion of a series of birch stakes across the mouth of the overflow channel resulting in its effective closure. The alignment was carried north-eastwards immediately beyond the area occupied by the

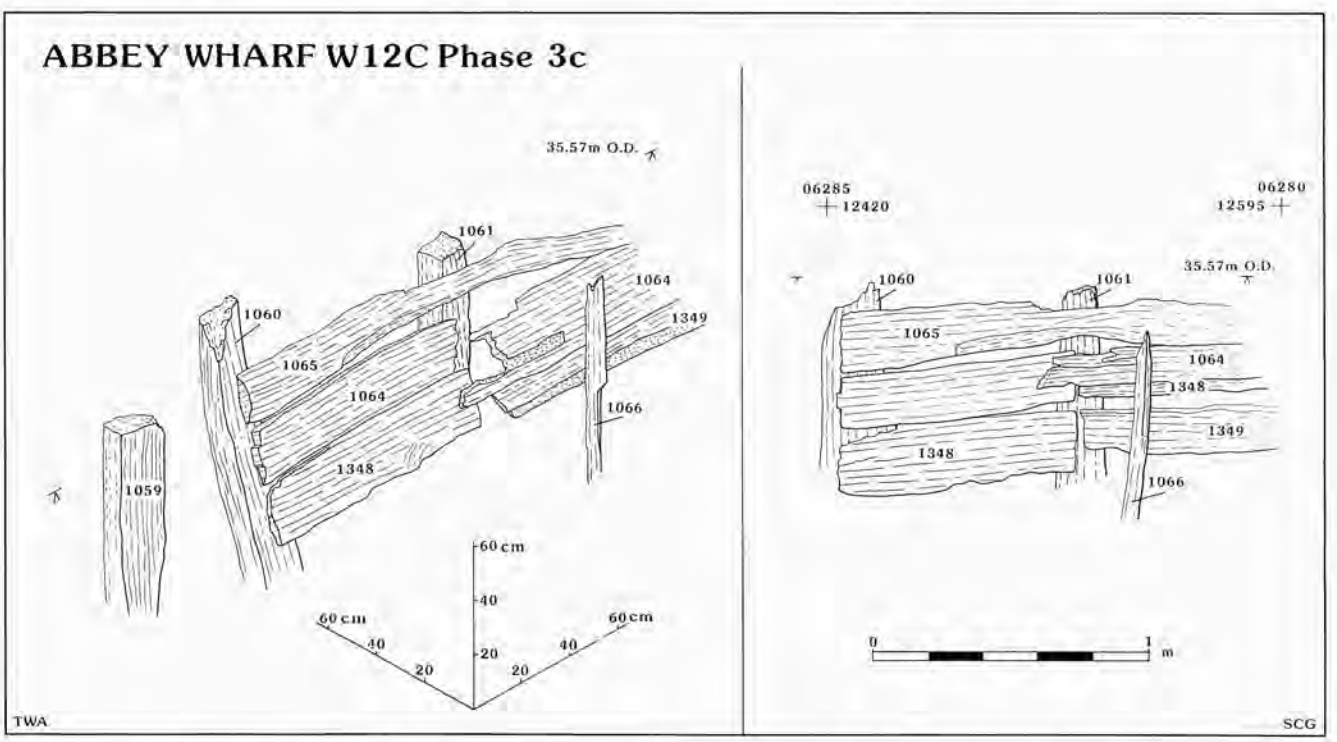


Figure 16 Abbey Wharf W12C: Phase 3c revetment, isometric and elevation viewed from land

Plate 4 Abbey Wharf W61A: Phase 4 wattles on revetment

hard laid down in Phase 2b. Small quantities of unidentified driftwood were incorporated amongst the stakes, the tops of which were truncated at a uniform level of *c.* 35.20 m OD to accommodate later channels and revetment works, and no associated channels apparently survived. No continuation was evident on W61B, and it is assumed that the double-row stake alignment remained in use.

Phase 3e

A substantial reclamation dump of sand containing some tile fragments pushed the course of the main channel south of the overflow confluence some 2 m further east. The new alignment comprised two oak posts and could be followed as a break in slope in the reclamation deposits between the posts. No channel could be discerned.

Phase 4 (Figs 17 and 18)

Phase 4 saw a major alteration in the alignment of the river, evidence for which was recovered both from trenches W12C and W61A, and almost certainly by two timbers recovered from the 1979 excavations (Vince above, contexts 351 and 352). The Kennet was pushed still further eastwards and aligned more directly north–south, whilst the outflow of the Holy Brook overflow channel was closed. Although there was no direct evidence for the existence of the overflow channel in this phase, its reappearance in Phase 5 suggests that it was situated outside the excavated area, at least some 10 m north of the previous confluence.

The extension to the east of the earlier bank was achieved by the dumping of a series of silts, sands, and gravelly sands, consistent in texture with the coarser end of the spectrum of channel silts from which it may have been derived (R. Macphail, pers comm). Only small quantities of finds were encountered, and the dumps were clearly not redeposited middens.

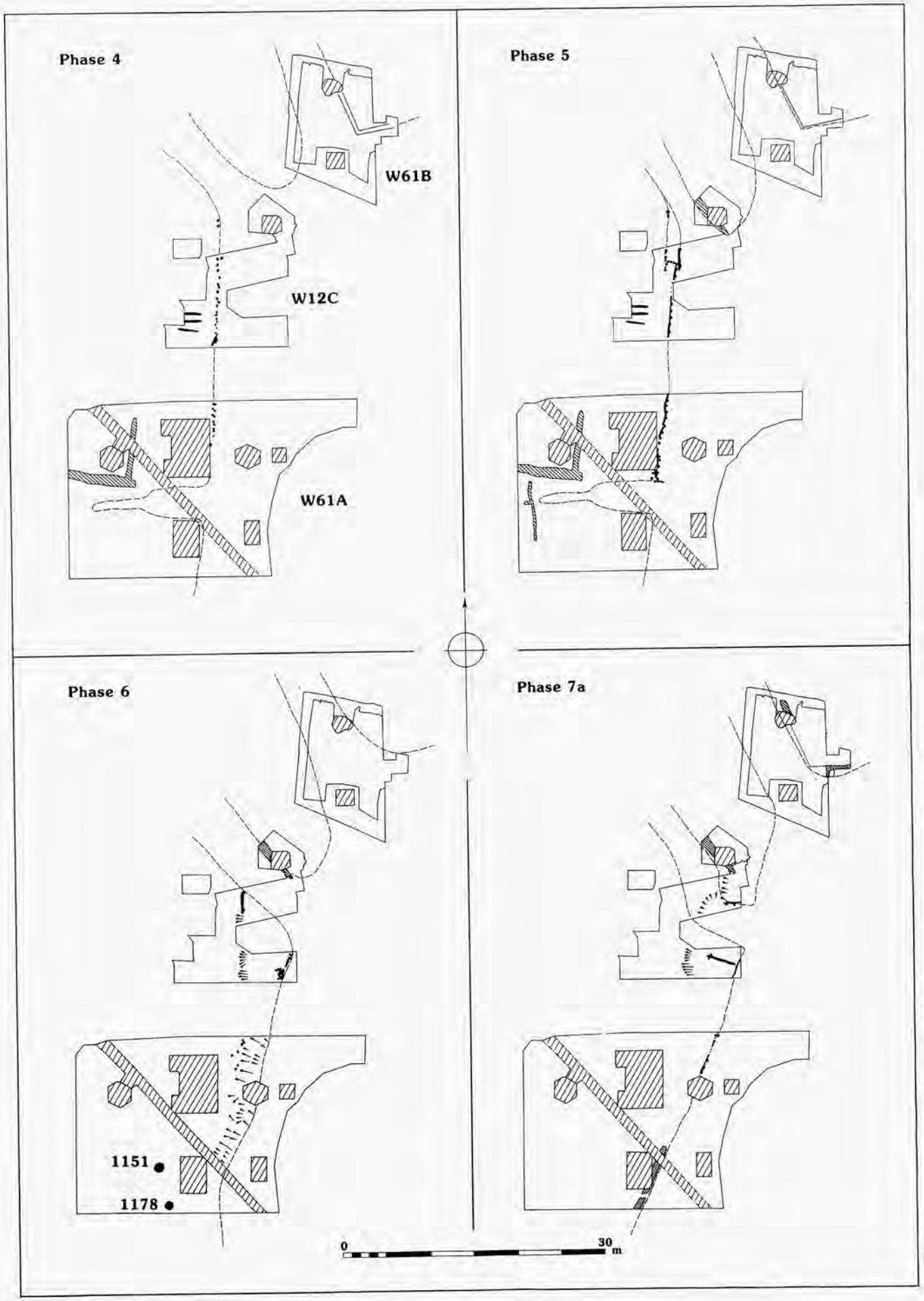
The major reclamation was fronted by a post-and-wattle structure from a point adjacent to what would have been the northern bank of the former overflow/Kennet confluence (Plate 4). This was traced for a distance of at least 27 m southwards, blocking the mouth of the overflow channel and extending as far as the southern limit of the clay bank. A construction date after AD 1315 is suggested by dendrochronology.

At the southern end of the clay bank the drainage channel was extended and widened. The outflow of this channel was thus widened to a maximum of 3 m, flat-bottomed in profile with a variable depth approximating 0.60 m. The base sloped gently towards the main Kennet channel and was 35.16 m OD at the point of issue; the minimum channel height must have been at least equivalent to the Phase 3b height of 35.36 m OD.

Evidence for structures built on the Phase 4 reclamation deposits may date to either Phase 4 or 5; two structures are included within this phase, an additional structure stratigraphically later than at least one of these is considered under Phase 5.

Timber alignments, by John Pidgeon

The major north–south alignment was composed of paired oak posts (Fig. 18) at approximately 1 m intervals


Phase 4
W61B
W12C
W61A
Phase 5
Phase 6
1151
1178
Phase 7a
0
30
m

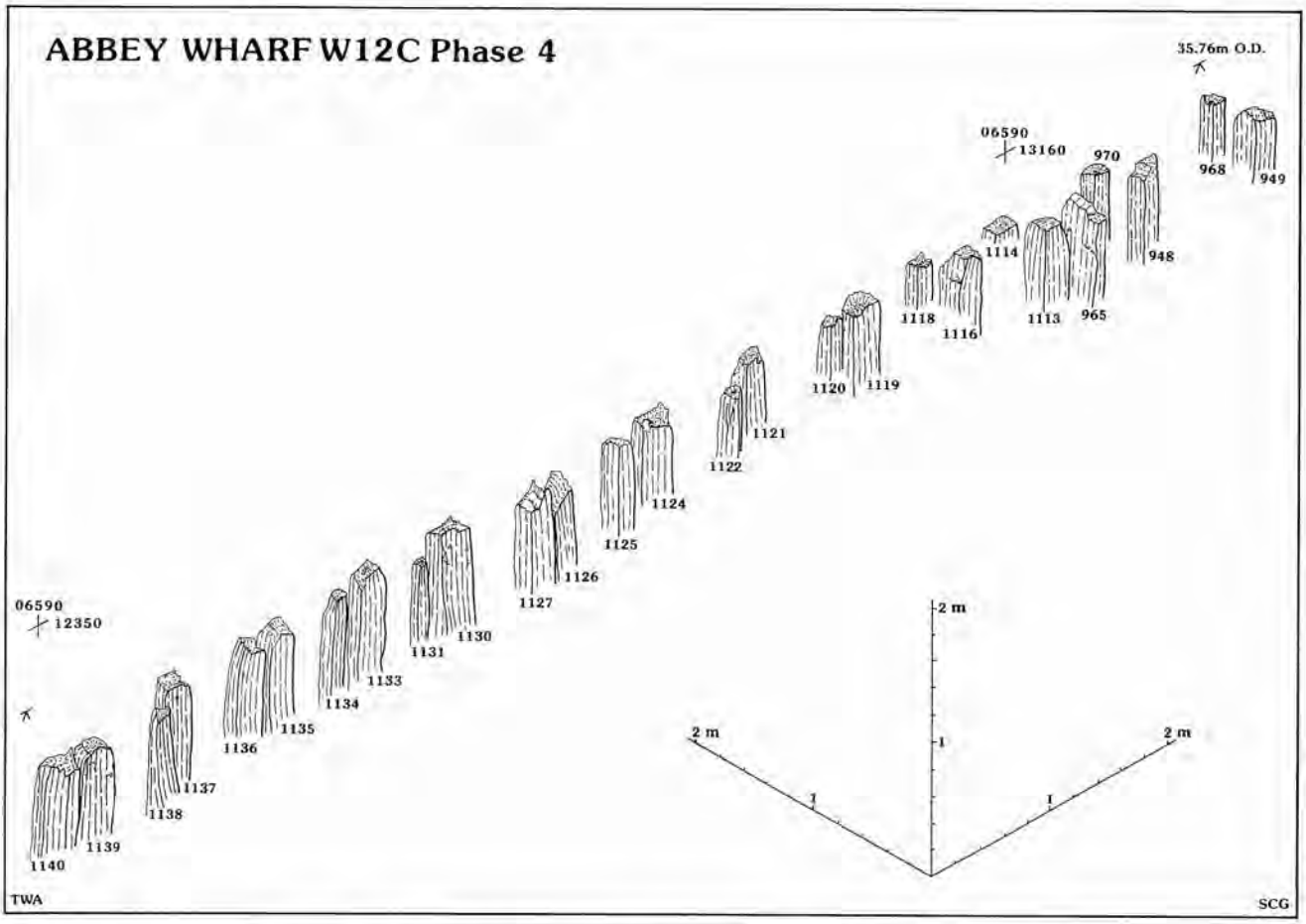


Figure 18 Abbey Wharf W12C: Phase 4 revetment, isometric, viewed from the river

with a wattle cladding still attached in W12C. The posts were roughly trimmed and adze-dressed, with approximately equal numbers of squared, halved, and quartered timbers. The posts were large, the faces between 0.12 and 0.26 m across, the edges between 0.09 and 0.15 m. Where investigated, points were also axe or adze-trimmed. Dendrochronology suggests a felling date of *c.* AD 1314–1315 for two of the timbers contained in this alignment.

Other alignments
North of the Holy Brook tail-race it proved impossible to separate stratigraphically separate alignments from the series of closely-spaced oak posts (details in archive). The form of revetment is not clear; although lateral timbers of elm were recovered from between the timber alignments on W61B there was no evidence that they had ever been secured to the posts. Dendrochronology suggests at least two distinct episodes or a rebuild of the same alignment:

Phase 4a: On the basis of dendrochronology at least two timbers can be assigned to an early stage of Phase 4 — one felled after AD 1276, and the other between AD 1283 and 1323.

Phase 4b: Three timbers were felled AD 1343–1344, and a fourth between AD 1341 and 1373. These felling dates are all prior to the date for the construction of the major Phase 5 revetment and it is assumed that this phase represents a rebuild or reinforcement of the confluence during the lifetime of the Phase 4 structure on the Kennet. The late dendrochronology date of post-AD 1366 for the felling of a W61A timber suggests that repairs to the Phase 4 structure may have been carried out over the full length of the wharf frontage.

Other structures

Building 1 (Fig. 19)
Within trench W12C four features interpreted as beam slots (227, 264, 265, and 232) were aligned approximately east–west (ie at right-angles to the river channel) on level ground formed by the surface of the uppermost Phase 4 reclamation layer. Only slots 264 and 265 were excavated, both being 0.25 m wide and varying in depth between 0.10 and 0.13 m, infilled with grey, sandy clay with chalk flecks. The spacing between the features varied between 0.70 and 0.85 m, the maximum length of the slots was at least 2.80 m. The group is interpreted as the (incomplete) foundations for a building of unknown form and function.

Figure 17 (opposite) Abbey Wharf: Phases 4–7a

Plate 5 Abbey Wharf W61A: Phase 4 building 2

Building 2 (Fig. 19, Plate 5)
The eastern (1095) and southern (1093) walls of a rectangular building at least 8.50 x 7.20 m were recorded in W61A. Wall 1093, 1.30 m wide, was constructed of large, irregular flints and reused roof tile randomly set within a yellow, sandy mortar. The faces were at least in part fronted by coursed, untrimmed flints. The construction of wall 1095 was identical apart from its overall thickness (0.80 m), and the absence of facing flints. The two walls were bonded in a continuous build, and enclosed the remnants of a chalk floor (1029), surviving in an area 6.20 x 1.50 m to a thickness of 0.02 m. This floor in turn overlay a thin deposit of compacted clay, interpreted as an impermeable foundation layer. The thickness and construction of the walls is consistent with other examples of excavated and standing buildings elsewhere in the Abbey precinct, and would have been capable of supporting a building of more than one storey.

Phase 5 (Figs 17, 19–21)

The Phase 4 post-and-wattle revetment south of the Holy Brook overflow channel was remodelled as post-and-plank. The alignment only moved 1.20 m to the east, and it is assumed that the principal motivation for the refurbishment was to provide a more robust structure, perhaps to accommodate wharfage activities indicated by the presence of riverside buildings described both here and in Phase 4. Consequently, only a comparatively small volume of reclamation material was required, its composition closely comparable to that of Phase 4.

Timber and stone alignments

Two sub-phases are apparent in the construction of part of the revetment; a large oak beam extended the northern end of the alignment and was presumed to be a late insertion. Elsewhere along the revetment, dendrochronology also implies a two-stage build, with the original construction after AD 1395–1396 and repairs after 1407–11.

A major post-and-plank element was traced for some 25 m from north of the leat marking the southernmost extent of the Phase 1b clay bank and later modifications, to a point marking the southern point of confluence of the Kennet and the Holy Brook overflow channel (Plate 6). Here the new alignment stopped and rejoined the Period 4 construction by means of a row of five close-spaced oak posts with no lateral planks (Chapter 6). Elsewhere, the construction comprised sawn planks, up to 3 m in length, 0.40 m wide and 0.05 m thick, nailed from the landward side to regularly-spaced oak posts (Fig. 20).

The northern bank of the overflow channel/Kennet confluence was retained by a stone wall (Plate 7), faced with coursed, mortared flint, with the exposed (riverside) end encased in limestone blocks. The wall, angled so that the top sloped towards the landward side, was traced for a distance of 6 m from the confluence to the edge of the excavated area, its length interrupted by a concrete pile-cap. Limited excavation below the wall

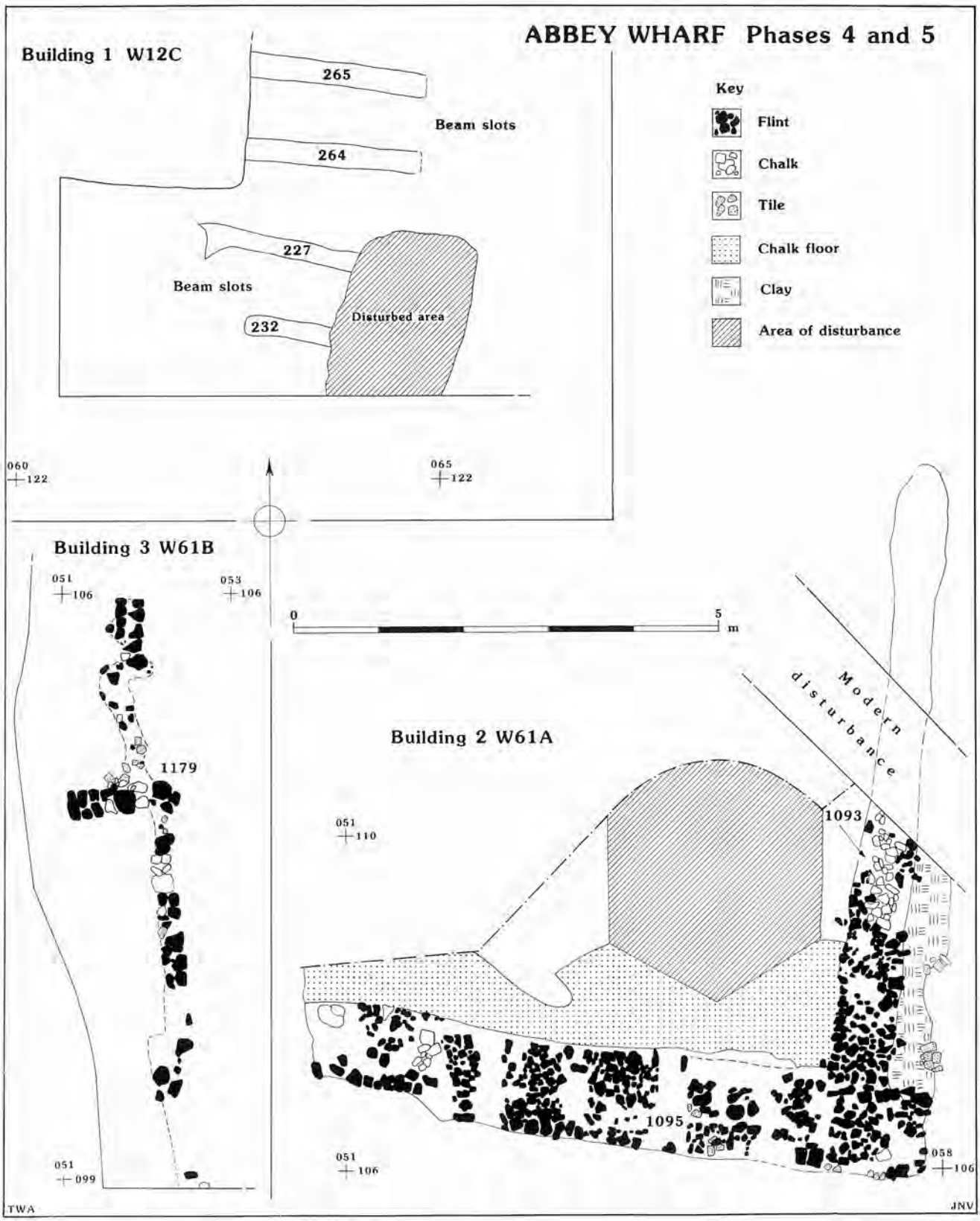


Figure 19 Abbey Wharf: Phase 5 riverside structures

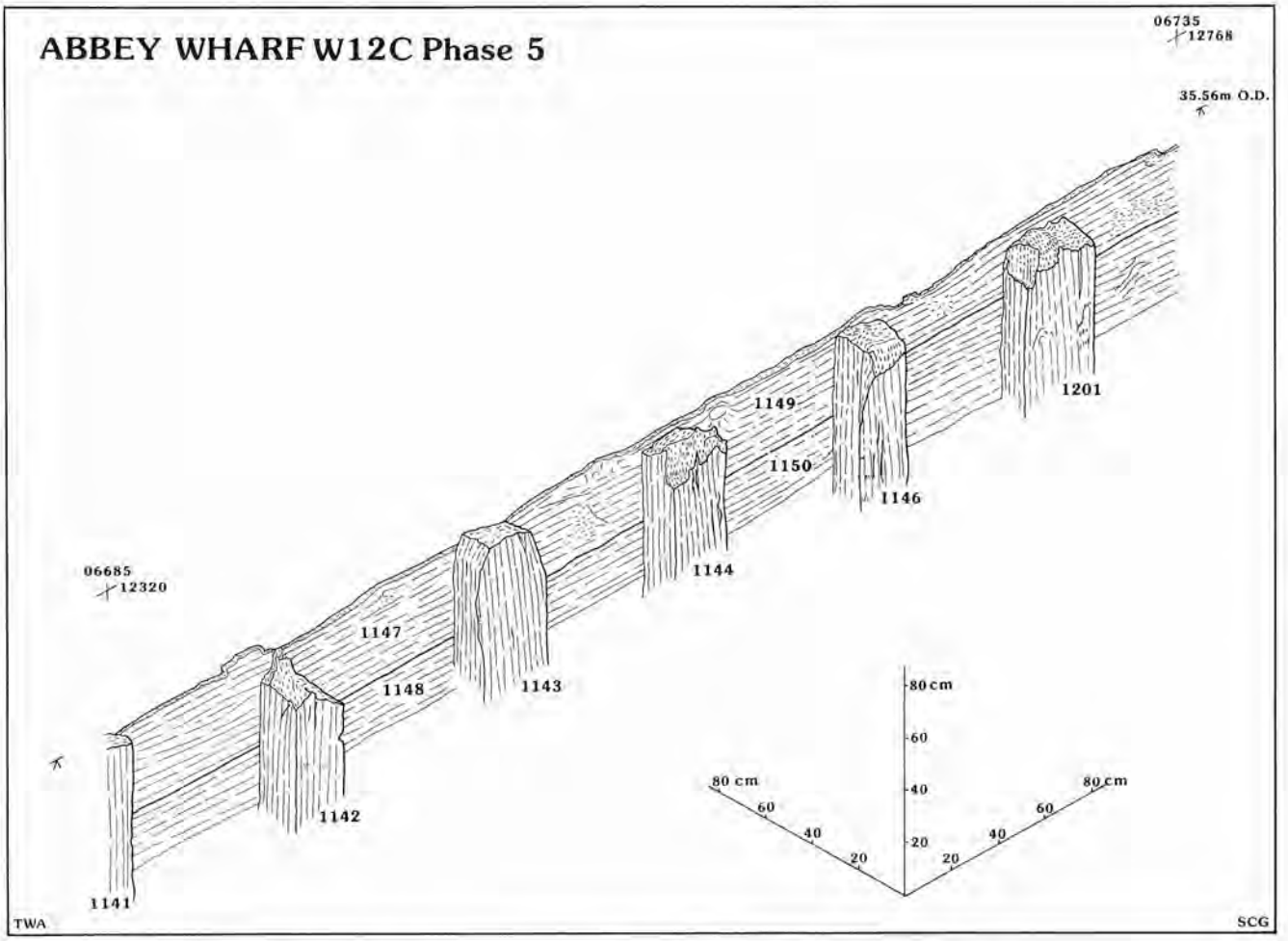


Figure 20 Abbey Wharf W12C: Phase 5 revetment, isometric, viewed from the river

demonstrated that it rested on at least one untrimmed tree trunk, tentatively identified as elm.

The wall, the associated Phase 5 overflow channel silts and the underlying, earlier channel silts and reclamations visible in the northern section of W12C are shown on Figure 21.

Partly underlain by some of the Phase 5 channel silts, it is considered that the construction of the wall is likely to have been associated with the second stage (AD 1407–1411) repair work. A more robust form of revetment may have been necessary to cope with the pressures caused by the change in angle of the confluence between the overflow and the main channel as compared with Phase 3, and/or because the overflow channel was much more confined than in Phase 4. The peninsula between the overflow channel and the Holy Brook tail race would have received the full force of the current of the main Kennet channel with a consequent threat of erosion to the bank. Similar considerations would have applied to the northern bank of the Kennet/Holy Brook confluence, repairs and modifications to which had been carried out (see Chapter 6 for details of this sequence), but not apparently carried in conjunction with the construction and refurbishment of the Phase 4 and 5 revetments on the main channel.

Other structures

Building 3 (Fig. 19)
Part of a flint and tile wall including a corner (1179) was recovered overlying trample layers butting the north site W61A Phase 4 Building 2, and is consequently assigned to Phase 5. The wall was less substantial than that of Building 2, 0.30 m wide with no evidence that it had ever had additional facing. The plan and function of the structure it represented are unknown.

Phase 6 (Figs 17, 22 and 23)

Phase 6 saw a physical decline in the Abbey Wharf as revetments were left unmaintained and riverside structures fell into disuse. Evidence to support this episode as a period of abandonment comes from reductions in the rate of deposition of artefacts (in particular the leather, Chapter 9), from the limited weed regeneration (Chapter 7), and from changes in the composition of the channel silts (below). All of this leads to the supposition that this phase was associated with the Dissolution of the Abbey in 1539, encompassing the period between then and the Phase 7 canalisations in the early 18th century.

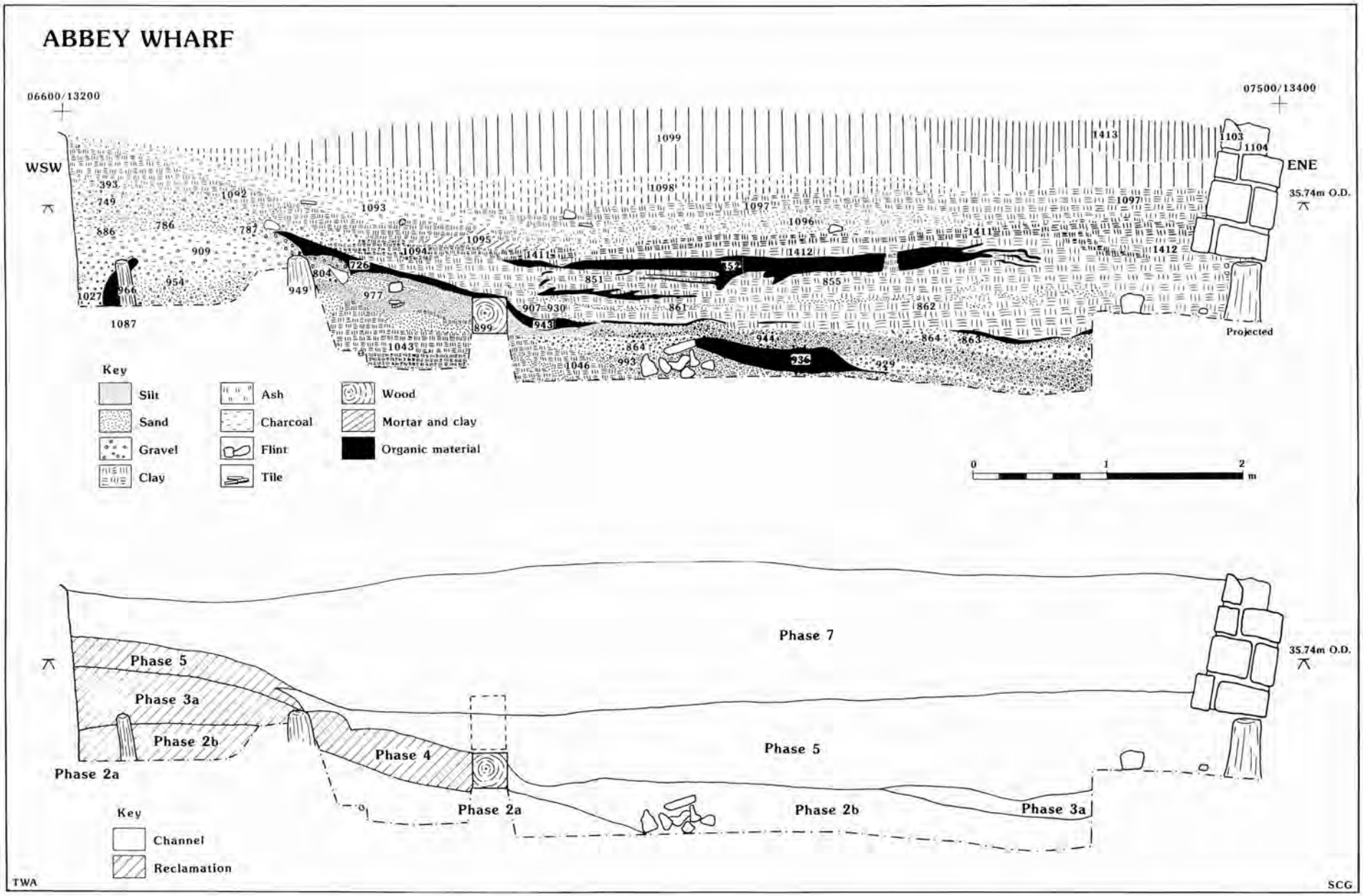


Figure 21 Abbey Wharf W12C: north section of Phase 5 wall (211) and associated Overflow Channel silts, overlying earlier Kennet silts and reclamations

Plate 6 Abbey Wharf W61A: Phase 5 timber revetment

Overlying the Phase 5 revetments south of the overflow channel and the ditch inferred as marking the southernmost extent of the Abbey Wharf was a series of black soils. Observation of the relevant parts of the southern section of trench W12C suggested that these deposits overlying the Phase 5 channels were best considered as dumped deposits of terrestrial origin (R. MacPhail, pers comm), although lenses of more peaty, organic matter suggested occasional inundation and deposition of alluvial silts. These reclamation levels contained very little archaeological material. On the break in slope of the bank in the southern part of W12C were the remains of the roots of three trees, one beech and two unidentified pomoideae.

Some activity on the surface of the Phase 6 reclamation was represented by a series of shallow pits containing small quantities of late 17th- or 18th-century pottery and animal bone. Their function is unknown, but was not necessarily connected with activities on the riverfront.

The bases of two oak barrels (Fig. 22; Plate 8) were sunk into the Phase 4 and 5 reclamations at the southern end of W61A; 1151 was 1.20 m and 1178 1.10 m in diameter. A barrel from Vince's trench L (see Fig. 10 above), 0.55 m in diameter, is potentially of the same phase. An off-white sticky residue apparent in all the barrels was probably lime.

On site W12C the black bank was fronted by a series of stakes, species not identified but possibly oak. Other scattered brushwood material to the rear (landward) side may have been deliberately placed as bank consolidation. No revetment or consolidation was apparent on W61A, and the course of the stream channels in north of W12C could not be determined.

Plate 7 Abbey Wharf W12C: Stone retaining wall on the northern bank of the overflow / Kennet confluence

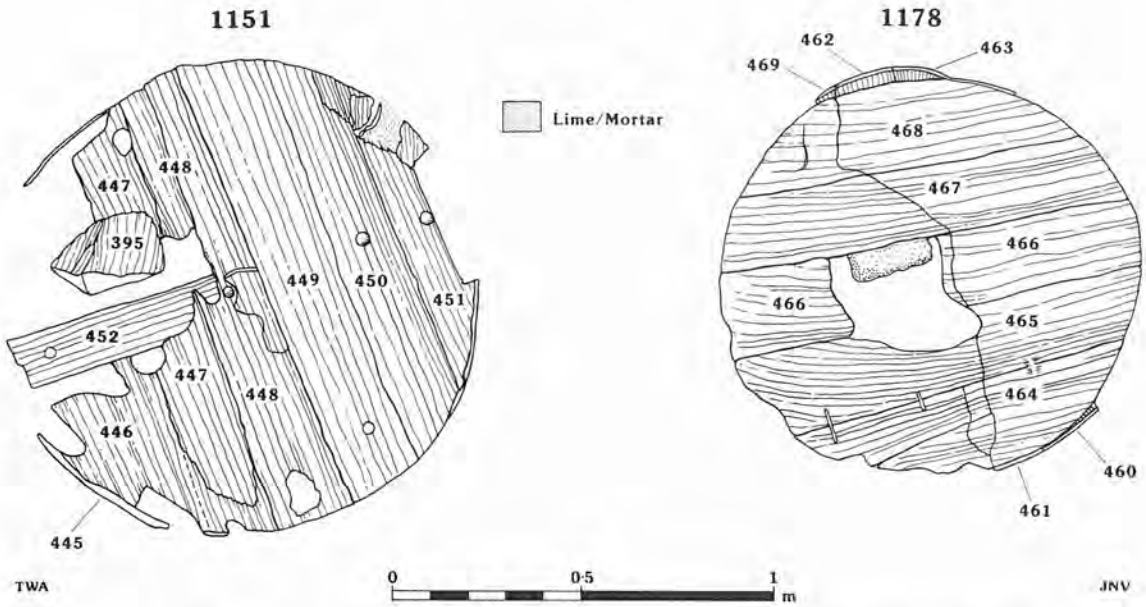


Figure 22 Abbey Wharf W61A: Phase 6 barrel bases 1151 and 1178

Plate 8 Base of oak barrel 1151 in situ

Phase 7 (Figs 17, 23–25)

A post-and-plank revetment used somewhat smaller oak posts than in the medieval phases to support oak planks with occasional elm flitches (Plate 9). Remnants of oak tie-beams at 3 m spacings were recovered, although only one example from W12C survived in its original position or retained evidence of its jointing: a transverse tenoned plate (Fig. 23, 384) retained by angled posts 368 and 369 (Plate 10). In no instance did the upper joint between the revetment face (Fig. 24) and the tie beam survive. At the southernmost end (beyond the inferred boundary of the former Abbey Wharf) the alignment was continued in stone and the northern bank of the Holy Brook/Kennet confluence was constructed in brick. Associated layers contain clay pipe with only one identifiable fragment dating to after 1740 (Chapter 11), and tin-glaze pottery with a likely date range 1680–1746 (Chapter 10). Two sub-phases are identified:

Phase 7a

A silted but still extant version of the overflow channel was revetted on its northern side by a short length of post-and-plank revetment. The mouth of the overflow

Plate 9 Abbey Wharf W61A: Phase 7 alignments

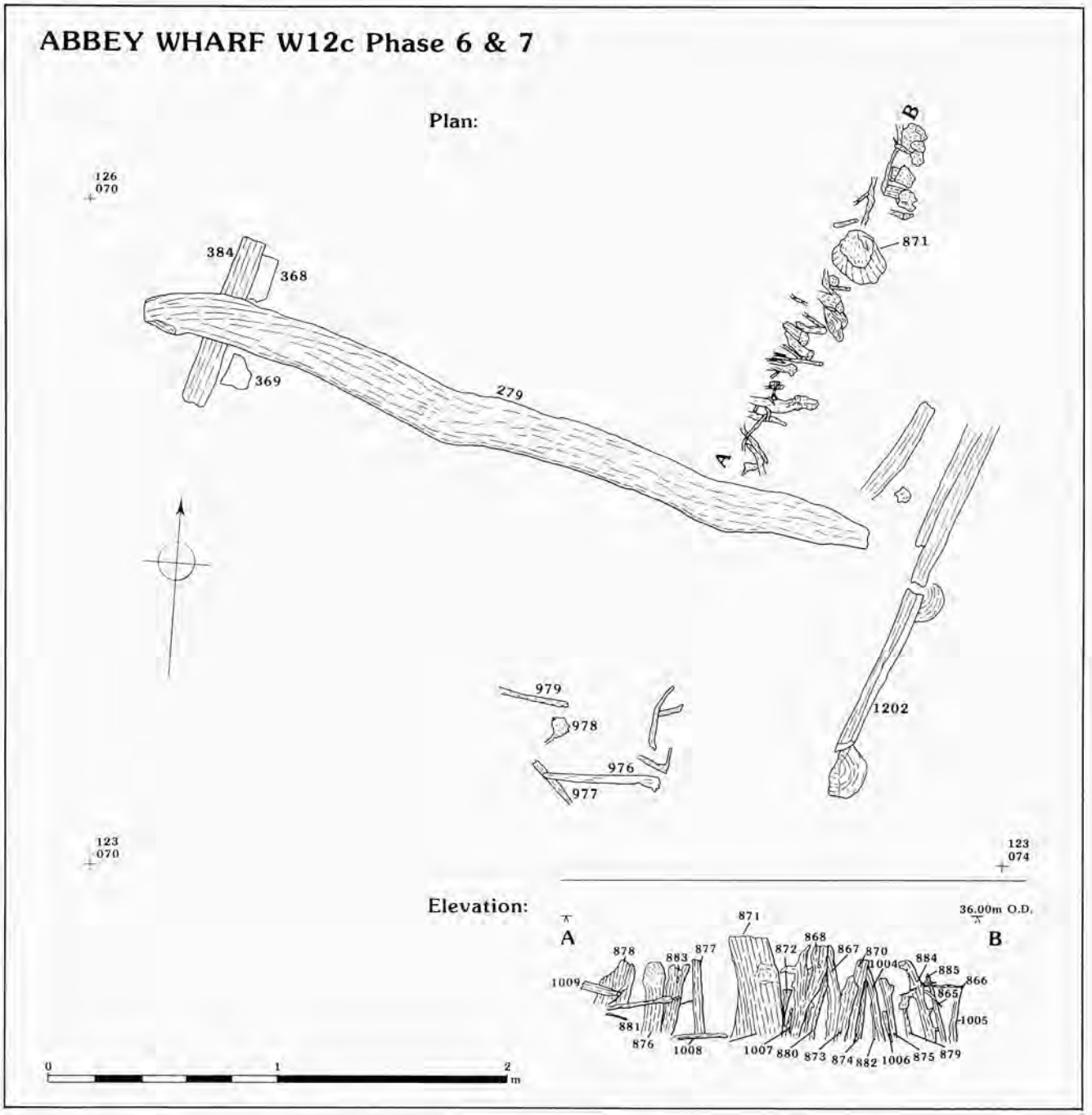


Figure 23 Abbey Wharf W12C: Phase 6 revetment, plan and elevation, viewed from land. Overlain by Phase 7 back-brace and revetment (plan)

was subsequently closed by dumps of soil and rubble including quantities of roof tile and (?Abbey-period) stone and flint.

Phase 7b

With the mouth of the overflow channel closed, the point of the confluence between the Holy Brook and the Kennet was pushed beyond the excavation area. A short length of post-and-plank revetment in the north of W12C suggests that, at approximately 15 m, the new, single Holy Brook channel was considerably wider than its predecessor.

Phase 8 (Fig. 25)

The Phase 7 alignment was replaced by a new structure composed of plank-sawn timbers butted edge-to-edge with squared posts set on the riverside at 2 m intervals (Plate 11). It is assumed that originally a top rail retained the staves (Chapter 6). The four tie-beams recorded were spaced at 4.50 m intervals. Brick walls revetted both north and south banks of the Holy Brook outflow. Clay pipes from associated levels contain nothing which need later than 1740 (Chapter 11).

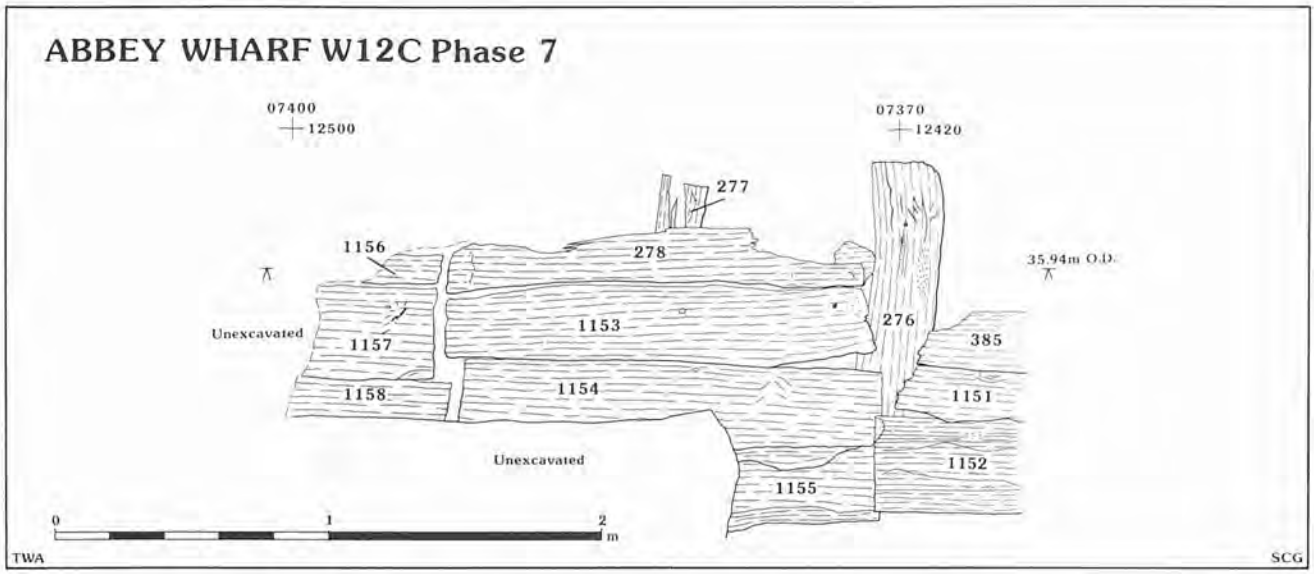


Figure 24 Abbey Wharf W12C: Phase 7 revetment, elevation, viewed from the river

Phase 9 (Fig. 25)

A back-braced post-and-plank revetment of similar form to that of Phase 7 but utilising iron-shod posts was excavated on W61A and also noted beyond the excavated area during observation of groundworks for the redevelopment (Plates 12 and 13). Observations also revealed part of the contemporary alignment of the east bank of the Kennet. Estimates derived from dendrochronology (Chapter 6) suggest a construction date for this phase at 1765–1809; coins from the channels associated with these phases suggest a late 18th–early 19th-century range for the accumulation of associated silts. Channel silts between the two alignments indicate that this phase corresponds with a post-and-plank revetment to an island in the middle of the main Kennet. This island is shown on Charles Tompkins' map of 1802, and it is possible, but not demonstrable, that its appearance is related to an earlier Period 7 alignment. The Holy Brook was at this time pushed immediately to the north of a brick wall excavated on the northern edge of W61B.

Modern (Fig. 25)

On the basis of cartographic evidence the river and Holy Brook arrangement reached its present form sometime after 1840, Edward Weller's map of that year showing

Plate 10 Abbey Wharf W12C: Phase 7 revetment

Plate 11 Abbey Wharf W61A: Phase 8 revetment

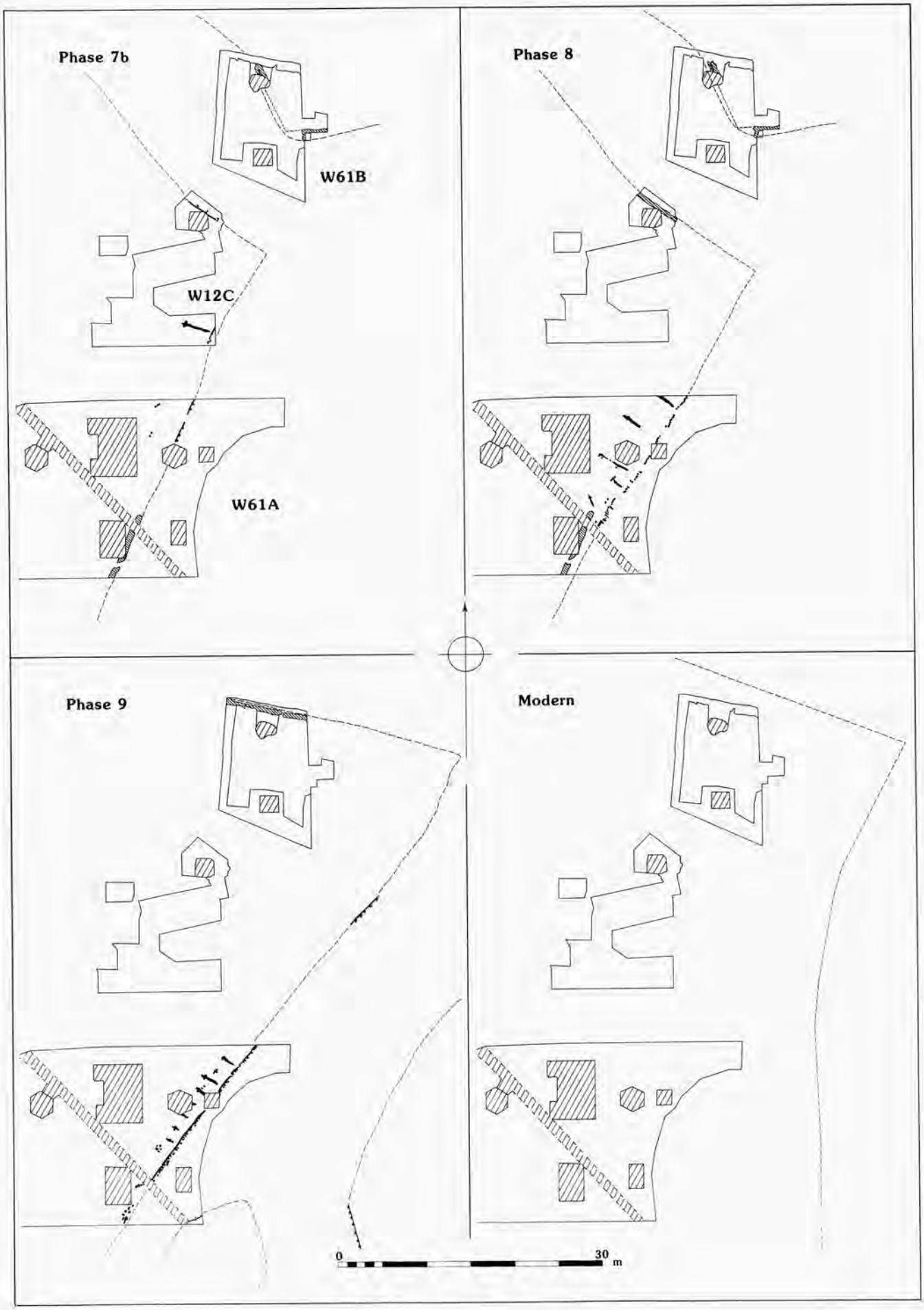

Phase 7b
W61B
W12C
W61A
Phase 8
Phase 9
Modern
0
30 m

Plate 12 Abbey Wharf W61A: Phase 9 revetment

King's Road built, but the mid-channel island still present. Simmons' town plan of 1861 shows the island gone and the Kennet on what is assumed to be its modern (present) alignment.

Plate 13 Abbey Wharf W61A: Phase 9 revetment; detail of back-brace

Fig. 25 (opposite) Abbey Wharf: Phases 7b–modern

3. Other Sites in the Abbey Area

1. Introduction

In addition to the Abbey Wharf sites described above, four other excavations or observations were also carried out adjacent to the Kennet or Holy Brook in the King's Road area: Abbey Gardens III, to examine the site on the opposite bank of the Kennet to the Abbey Wharf; Crane Wharf, specifically to examine a further length of the Kennet frontage; the Library site, where the primary objective was the examination of the site of the Abbey stables, but where there was also opportunity to investigate the north bank of the Holy Brook; and 27 King's Road, a site adjacent to the south bank of the Holy Brook close to the Abbey mill. For the position of these sites see Figure 7

2. Abbey Gardens III (W277), by A.V. Jenkins

The site of the Abbey Gardens III development was formerly known as Tanners Mead, and excavations previously undertaken on the site on the opposite bank of the Kennet (the Abbey Wharf sites) had produced quantities of off-cut leather from shoe manufacture, deposited in the silts of former courses of the river between the 12th and 18th centuries. This evidence suggested that the tannery which produced the leather for the medieval cobblers of Reading could be situated on this bend of the river. Since the level of the river is known to have risen substantially since medieval times it was further expected that any archaeological remains of this industry would be found in a waterlogged and consequently well-preserved condition.

The original project design called for the rapid excavation by machine of a trench 30 m long and 3 m deep running from west to east across the northern side of the site. In the event problems of vehicular access obliged the developers to clear the site from west to east instead of from north to south and this made the excavation of the proposed trench impossible. It was therefore necessary to revise the project design into a watching brief for the period of earthmoving.

Piling for the building to occupy the site was nearing completion when the observations began. Meanwhile the ground level was being reduced to 36.70 m OD over the entire site and further lowered to 35.85 m OD in squares of 3.50–4 m around the heads of the piles (Fig. 26). This revealed a stratigraphic sequence consistent over the whole of the western side of the site. All layers above 36.50 m OD proved to be modern, and overlay a series of sterile alluvial deposits which varied in texture between silty clays and clayey silts, ranging in colour between greyish green and greenish grey respectively.

At only one point on the site did excavation continue below 35.85 m OD (Area A on Fig. 26). Silts here were removed down to a height of 34.66 m OD, or more than 2 m below the current ground surface. These silts were also archaeologically sterile, but included the edge of a peaty deposit, at least 0.6 m thick, containing abundant fragments of decayed wood but with a comparatively low silt content. This layer is interpreted as the northern edge of a palaeo-channel aligned south-west to north-east, evidence for which was also present in boreholes 7 and 8. The recorded level for the upper boundary of this deposit (35.00 m OD) suggests a pre-Monastic date for the channel, perhaps comparable to the Phase 1a channel(s) recorded at Abbey Wharf on the opposite bank of the river (above).

No evidence for Abbey-period activity was noted on the Abbey Gardens III site. It is possible that industrial (tanning) activity could have been present in the unobserved areas of the site, particularly the immediate edge of the present river channel or in upper levels truncated by later development. However, the absence of any residual material suggests that any industry was small-scale and/or situated further downstream.

3. Crane Wharf (W112)

It was anticipated that excavations in advance of redevelopment on the site of Crane Wharf would clarify the course of the medieval and post-medieval river channels as a projection of the line of the early modern canalised channel from Abbey Wharf ran along the line of the road leading to Crane Wharf. Indications of riverside activity extending south from the Abbey Wharf area were also considered likely to be encountered.

Foundations and cellars belonging to the modern brick structures fronting King's Road were removed by machine over the whole excavation area (Fig. 27) to the top of the silt deposits at *c.* 36.50 m OD, and a well-point dewatering system installed (Plate 14). Medieval deposits were investigated at the northern end of the excavation area; Saxon, and late prehistoric deposits were examined in a small, stepped, central trench (Fig. 28), whilst early prehistoric deposits (Phase 1a) were excavated in two similarly stepped trenches to north and south of the central trench.

Phase 1

Phase 1a

The earliest deposits encountered were gravels at 34.41 m OD in the northern and southern stepped trenches. Deposition of alluvial gravels elsewhere in the Kennet floodplain can be shown to have ceased by the end of the late Devensian pollen zone III (Holyoak nd), datable to between 12,000 and 10,000 bp, although radiocarbon dates obtained from the immediately overlying lenses suggests that the material observed at Crane Wharf were not deposited until the 4th millenium BC. Differences in detail of silt deposition were recorded in the two areas where these levels were reached, although it was not possible to identify discrete channels.

Within one of these sandy gravel horizons a number of fragments of wood were recovered, including

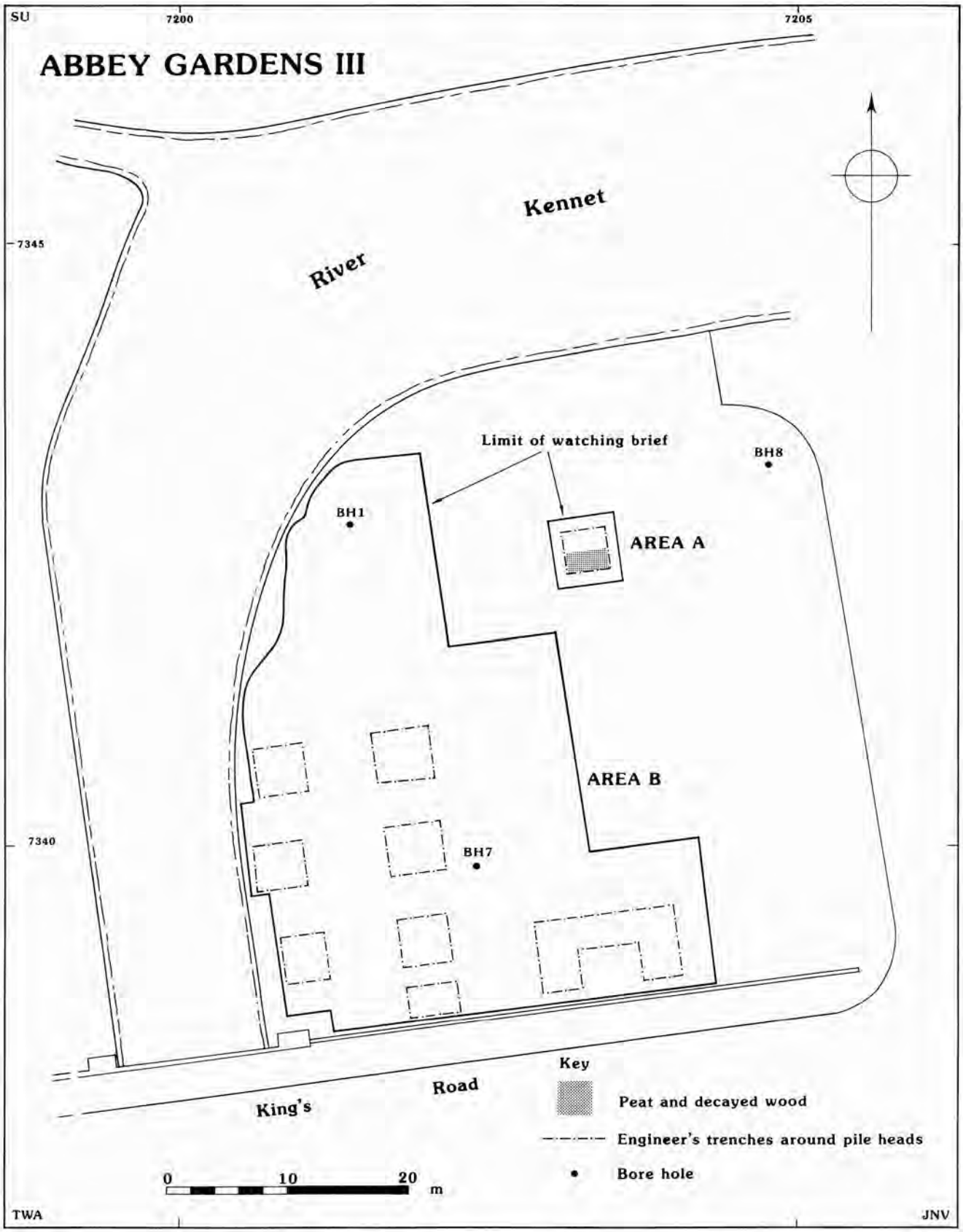


Figure 26 Abbey Gardens III: locations of observations

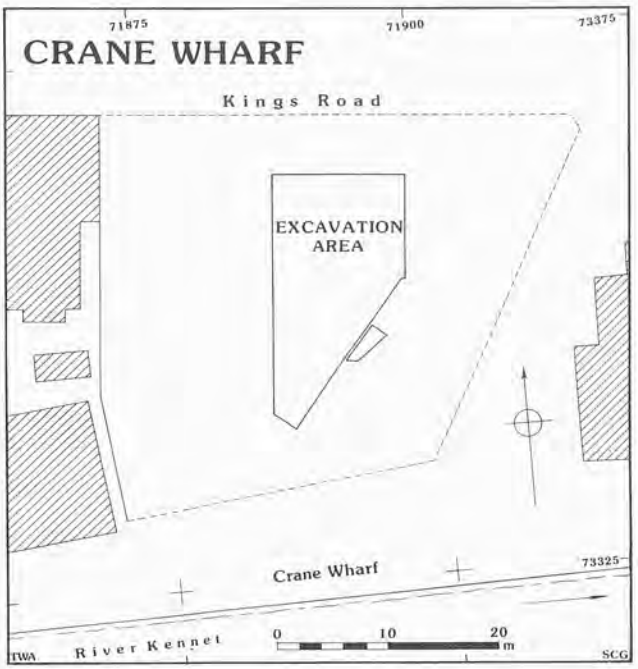


Figure 27 Crane Wharf: position of excavation trenches

examples with some evidence of working. Two were (non-conjoining) alder stakes split lengthwise from 60 mm diameter poles, and two were ash stakes roughly squared of nearly equal cross-sectional dimension. There is no indication that these stakes were *in situ*, although within the area excavated further investigation at this depth was not possible.

Overlying these deposits of sand, silt and gravel was a rich organic layer similar to peat in texture, indicative of slower and perhaps more sporadic deposition. Two worked flints (one blade and one core) and a pig jaw were recovered.

Three radiocarbon dates were obtained:

Har–7028 Alder stake (195) from gravel silts (188) at 34.41 m OD; 4950±80 BP, 3820–3570 cal BC

Har–7020 Unworked wood from context 188; 4740±70 BP, 3640– 3550 cal BC

Har–7026 Unworked wood from compacted organic layer (187) at 34.91 m OD; 1970±70 BP, 80 cal BC–cal AD 90.

Phase 1b (Fig. 28)

The main feature of this phase was a shallow clay bank, 110, defining the southern and western edge of a small tributary watercourse 0.50 m deep, also marked by two hazel stakes 0.60 m apart each with a surviving length of 0.15 m, 0.10 m projecting above the bank. Neither exhibited any evidence of working. Along the length of the bank nine further fragments of hazel poles were recovered and are interpreted as driftwood marking the edge of the contemporary channel. Much of the length of the bank was disturbed, particularly at the channel edge where trampling and churning, presumably by

Plate 14 Crane Wharf: general view of excavations

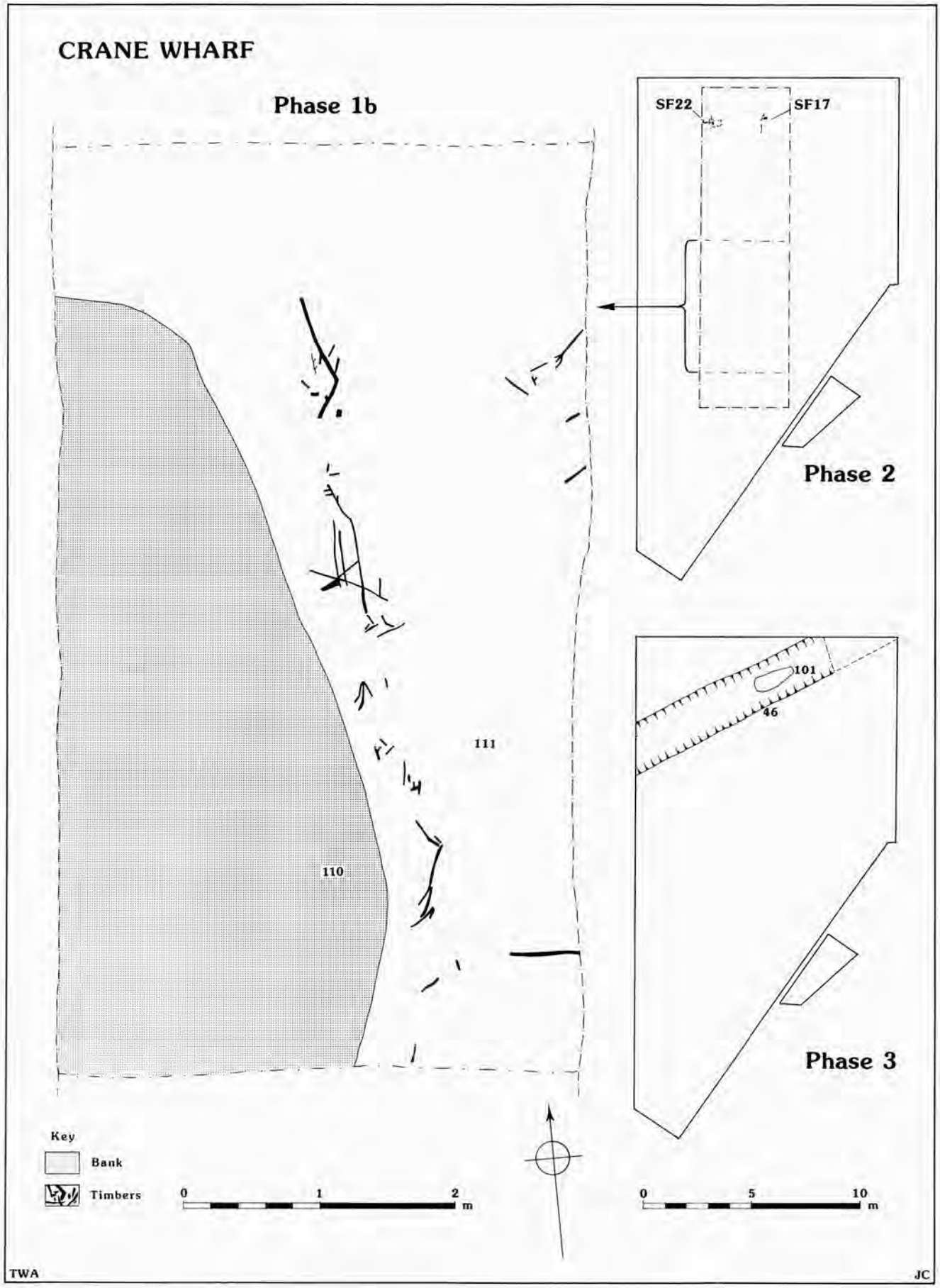


Figure 28 Crane Wharf: Phases 1b, 2, and 3

Plate 15 Crane Wharf: Phase 1b channel bank

animals, was evident (Plate 15). The limited scale of excavation made it impossible to establish the eastern bank of the channel. The channel silts, 111, were composed of deposits with a high clay and organic content indicative of a slow-flowing stream. A single sherd from a layer of trample on the surface of bank 110 and an identical sherd from 111 could be late Iron Age or Saxon.

Phase 2 (Fig. 28)

Overlying the bank and channel were a series of alluvial deposits, 0.30 m deep. Within the upper levels of these silts in the northern end of the trench were twenty small clusters of partly articulated and disarticulated bones, with one of these groups containing the remains of a young female adult (SF17).

On the top of this silt horizon near the north-western corner of the trench was the prone upper torso of a young female adult (SF22) associated with three iron objects (pins SF45 and SF46, and a fragment of a knife SF41). Samples of human bone yielded a radiocarbon date of cal AD70–340 (Har–9212; 1860±70 BP). The deposition could not be defined as formal burial, and a mandible originally believed to belong to this body has subsequently proved to be of another individual (SF22A). A more detailed illustration and description of the 'burials' is included in Chapter 8.

Subsequent truncation of the land surface may account for the absence of the lower part of the body (Plate16), and provide an explanation for the occurrence of fifteen sherds of Saxon vegetable-tempered pottery

Plate 16 Crane Wharf: Phase 2 skeleton SF22

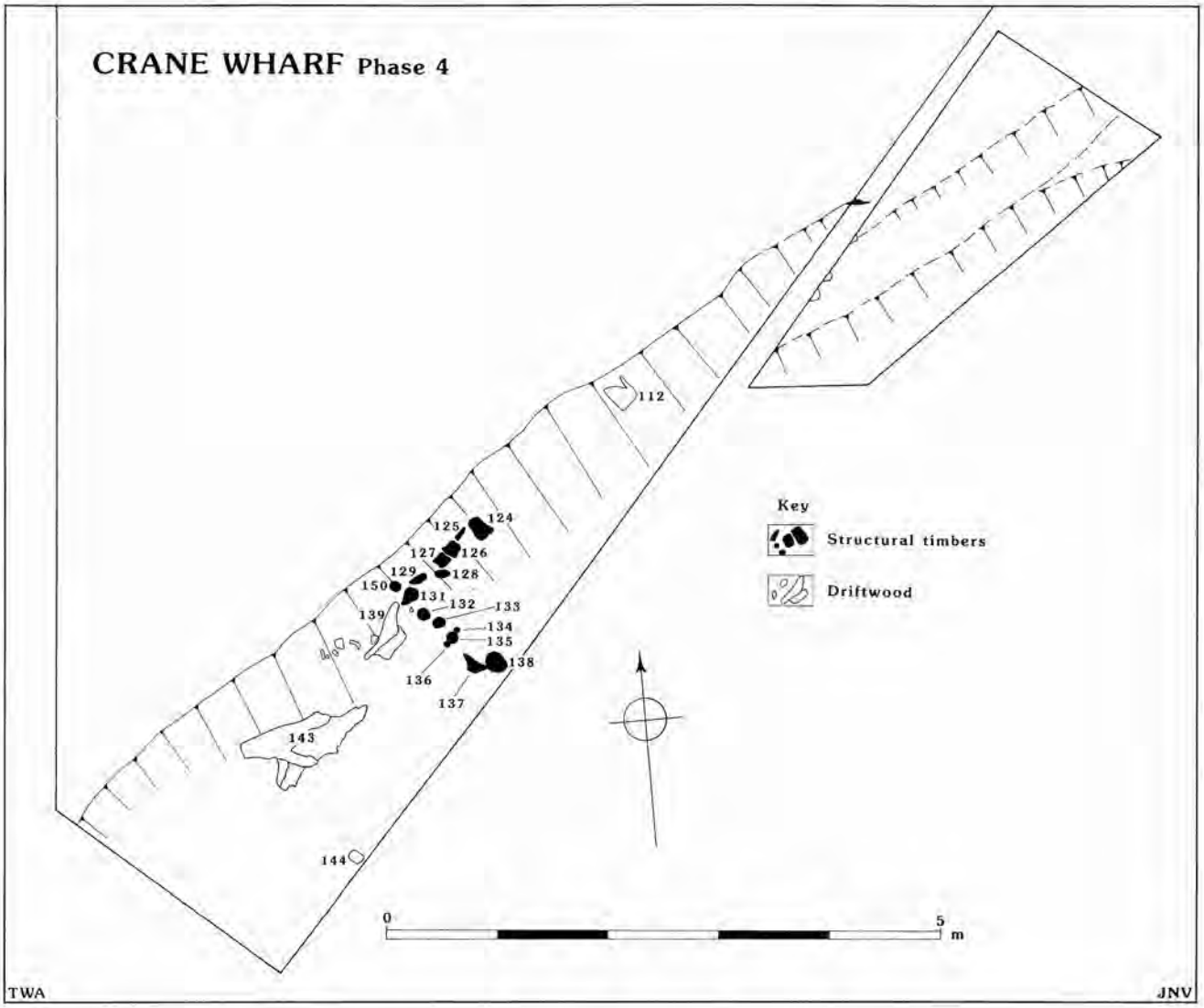


Figure 29 Crane Wharf: Phase 4

layers at the same level as the skeleton. Disturbed, disarticulated human remains some 75 m to the north-west from site W140 27 King's Road, and from the Abbey Wharf site (Chapter 8) are undated but may derive from a contemporaneous 'cemetery' phase in the waterfront zone either side of King's Road.

Phase 3 (Fig. 28)

Alluvial deposits continued to form for an additional depth of 1 m, most of the accumulation dating to the period *c.* 1200–*c.* 1400 on the basis of associated pottery. There was no evidence for further deposition after this time, stabilisation occurring at a levels between 36.45 and 36.65 m OD, varying across the site. These deposits covered the entire stripped area, but were only sampled within the central trench.

The alluvial deposits were cut by an ovoid pit (101) which in turn was cut by a gully (046). The ovoid pit, 1.50 x 0.75 m, 0.40 m deep had near-vertical sides, a flat bottom and was aligned central to the gully cut, its longest axis running on the same south-west–north-east alignment. Within the fill a lens of matted, decomposed vegetation, probably reeds, was recovered.

Sampled over a length of 9 m, the gully was flat bottomed and of uniform depth (0.20 m) and width (2 m). Running south-west–north-east, this feature may be equated with Period 4 and 5 drainage gullies recorded during the excavation of the Abbey Wharf site W61A. On the basis of pottery from its homogeneous, dark silt fill, a date in the late 14th or early 15th century is likely.

No evidence was noted of any channel of the River Kennet, and it must be assumed, therefore, that this lay to the south and east of the site, or had been destroyed by the construction of the Phase 4 alignment of the Kennet and Avon Navigation (*below*).

Phase 4 (Fig. 29)

The latest deposits examined were those relating to a phase of the Kennet canalisation, an alignment of a closely-spaced right-angled post revetment being re-covered in the extreme south-east corner of the trench. On the basis of the limited accompanying evidence it is

not possible to date the alignment with sufficient precision to assign it to one particular episode of canalisation within the sequence identified on Abbey Wharf W61A, nor do the revetment type or the dimensions of the five oak posts closely match the range of the W61A revetments.

Behind the alignment, a narrow construction trench had been excavated through the earlier alluvial silts, and backfilled with layers of a sandy silt which were also spread across the bank for a distance some 15 m north of the channel to a depth of 0.05 m, possibly as an attempt to consolidate the bank.

Only a small portion of the channel was contained within the excavation trench. A sequence of channel silts in front of the revetment was excavated to a depth of 1 m, further excavation being impractical. A row of eight alder posts (131–8) extending from the top of the bank towards the middle of the channel and positioned within the channel silts were recorded. The stratigraphic relationship between these posts and the oak revetment could not be determined.

4. The Library Site (W60)

Excavation of two trenches (B and C) on the north bank of the Holy Brook external to the southern wall of the Abbey stables block was carried out as part of an assessment of the effects of redevelopment on the Scheduled Monument (Fig. 30). The riverfront trenches were limited in size, and excavation without pumping was rapid and not exhaustive. The aims of the investigation were restricted to determining the presence of any evidence relating to the nature and development of any riverside management without any expectation that the observations made would necessarily be fully interpretable. An account of the excavations of the interior of the stables appears elsewhere (Hawkes 1986–90) and only a summary is presented here:

1. The pre-Abbey land surface comprised a poor quality agricultural soil with evidence of at least occasional arable cultivation in the 11th and 12th centuries.
2. Construction of the first Abbey building in the late 12th/early 13th century.
3. Partial destruction of the building followed by reconstruction using the existing structural walls and substantially raising the floor level in the 15th/early 16th century.

Subsequent activities, noted on earlier excavations (C.F. Slade, pers. comm.), had been removed by Victorian cellaring.

None of the riverside reclamation layers or revetments examined pre-dated the construction of the first phase Abbey building; more precise correlation of internal and external phases was not possible from the evidence recovered, and there was insufficient material to enable a correlation of the excavated phases with sequences elsewhere in the town.

The deposits observed in trench B, a machine-excavated hole 0.80 x 1.20 m adjacent to the south wall of the Abbey building, were not interpretable except by reference to comparable deposits from the hand-excavated trench C, 1 x 1.20 m, (Fig. 30). In neither trench was the full sequence of deposits and revetments recovered; access was limited by bracing for the existing Holy Brook retaining wall. The sequence of revetments and reclamations observed and inferred is as follows.

Phase 1 (Fig. 30)

A dump of consolidated chalk assumed to be a constructional feature of the first phase Abbey building was noted in both trench B and trench C (816) at present water table levels (*c.* 36.70 m OD) up to *c.* 37.00 m OD, overlain by a deposit of grey/brown sandy silt in trench B (509, 811). In trench C only this was seen to be fronted by a row of birch stakes/posts (818, 822, 823). The deposition of 509 and 811 is possibly alluvial, timber incorporated in these layers having the appearance of driftwood rather than collapsed structure. Excavations reached an insufficient depth to identify any related channel deposits and no estimate of contemporary water levels can be made. No conclusive dating evidence was found, although it is inferred that construction took place shortly after the erection of the Abbey stables in the late 12th/early 13th century.

Phase 2 (Fig. 30)

An oak post-and-plank revetment comprising post 820 and plank 821 fronted a reclamation deposit of blue and red clay 814 placed between Revetments 1 and 2, its likely equivalent in trench B being 508. Upper levels of planking and the top of post 820 did not survive, and it was not possible to determine contemporary revetment height or water level.

Phase 3 (Fig. 30)

An oak post-and-plank revetment comprised posts 827, 828 and plank 809, fronting a series of chalk, clay or silt dumps 801, 805, 806, 813, with likely equivalents in trench B being 504 and 507. The grey/brown silt deposit, 824, may derive from a channel associated with the Phase 3 revetment, giving a minimum water level of 37.10 m OD, but is more likely to be a reclamation for a later revetment not examined. Pottery from associated levels suggests a later medieval (possibly 14th-century) date, with small fragments of clay pipe and brick intrusive from overlying layers,

Later Phases

Layers post-dating the construction of the Phase 3 revetment had been totally removed in trench B, and no subdivision of the layers post-dating this phase and pre-dating modern debris has been attempted for trench C. Pottery evidence from these levels suggests a substantial reclamation and raising of levels.

Following the excavation and during the construction of the development a flint-and-mortar wall sup-

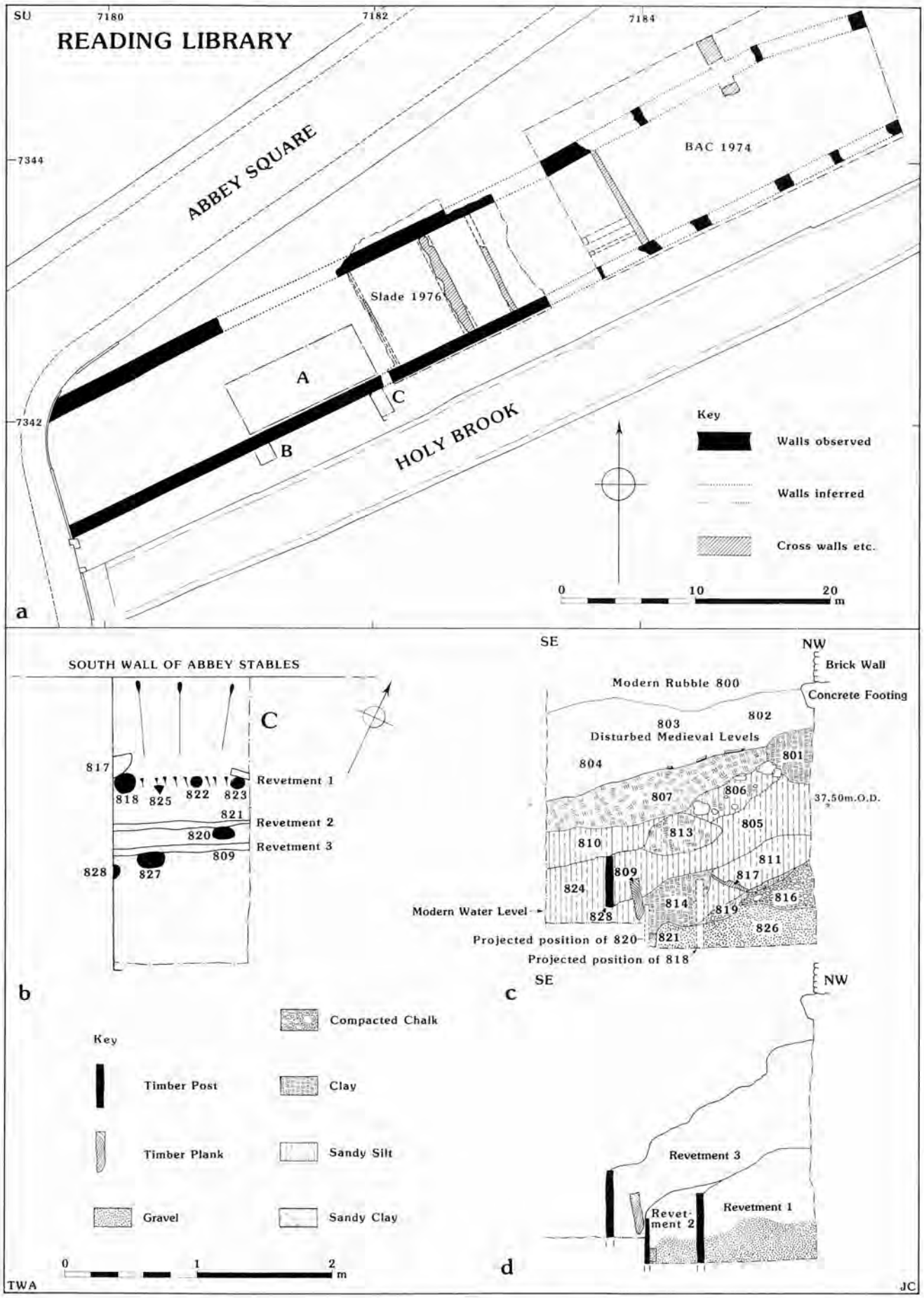


Figure 30 Reading Library: A) location; B) trench C, revetments plan; C) west section, trench C; D) schematised west section, Trench C

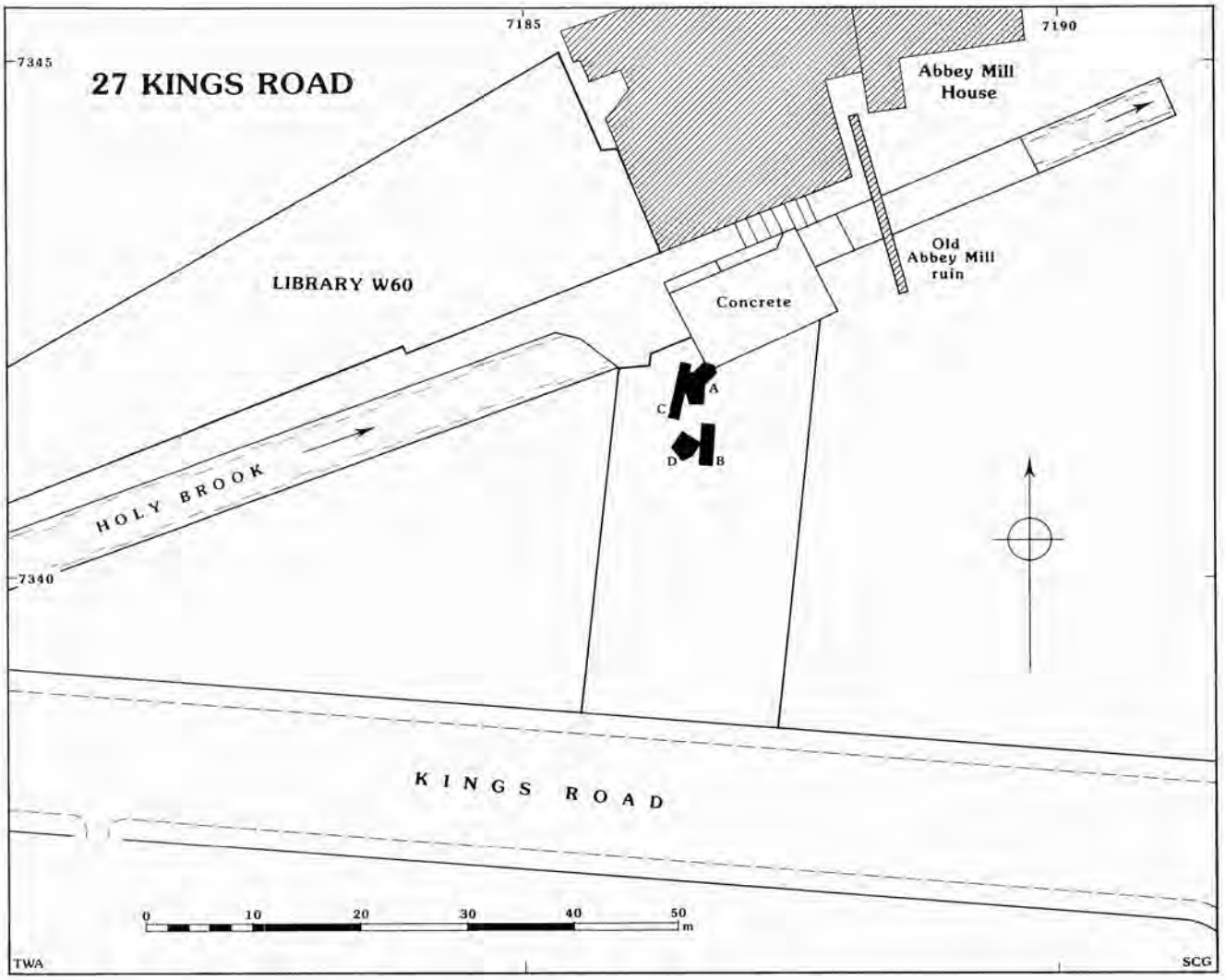


Figure 31 27 King's Road: location of trenches

ported on timber posts was observed (but not investigated) beneath the line of the modern Holy Brook wall; this is likely to have provided the revetment for the post-Phase 3 reclamation layers.

5. 27 King's Road (W140)

Excavations in advance of redevelopment on the south bank of the Holy Brook adjacent to the Abbey mill were designed to examine the composition of silts observed but not recorded during other redevelopments immediately south of the Holy Brook in this area, in particular the southern part of the Library site outside the area of excavation and the redevelopment of the corner west of Abbey Street and north of King's Road.

Intended as a single trench 12 x 6 m running from the edge of the Holy Brook, the excavated area was necessarily modified in view of the extent and position of massive disturbance caused by underpinnings to the Baptist church hall which formerly occupied the site. Four small trenches (Fig. 31) were excavated by machine with limited supplementary hand-digging.

Trench A

Trench A was located immediately south of the construction debris of the present Holy Brook retaining wall. Various levels of modern rubble and gravel consolidation overlay a brown redeposited silt clay which in turn sealed a blue-grey silt clay. No finds were recovered, and the brown silt clay is interpreted as a reclamation or consolidation of a stream-side bank.

Trench B

Located south of Trench A, the trench contained a series of lensed deposits sloping steeply to the south underlying modern levels. The uppermost were silt clays, overlying a layer containing driftwood and other organic

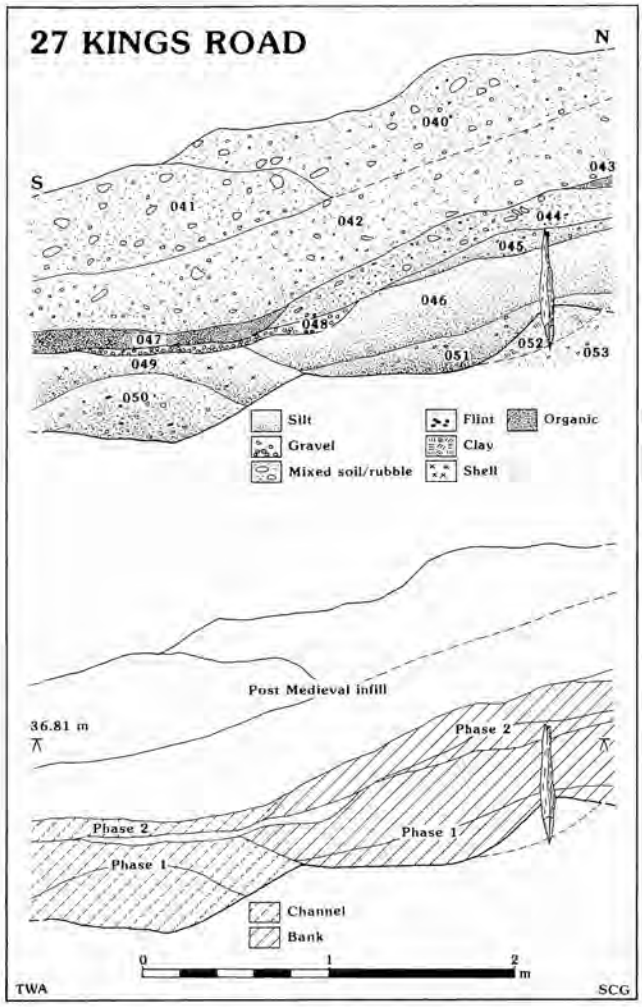


Figure 32 27 King's Road: west section, Trench C

debris, the lowest level was composed of lenses of sand and gravel. These deposits are interpreted as relict water course channels, and are undated.

Trench C (Fig. 32)

Immediately to the west of Trench A, this trench enabled further examination of the brown clay deposit, here labelled 046, which contained undiagnostic medieval pottery. The highest point of the bank within any of the trenches was 36.91 m OD. A series of three closely-spaced *in situ* stakes cut from a single timber post ran parallel to and 1.5 m to the north of the edge of the clay, the holes for two others were also recognised, and two stakes which may originally have filled them were recovered from disturbed levels during machining. Within 046 quantities of disturbed and disarticulated human and animal bone were recovered, and these may derive from burial contexts comparable to Romano-British remains recovered from the Crane Wharf site, some 75 m to the south-east.

Trench D

Immediately to the west of Trench C, further lenses of channel silt material were noted. The surviving topmost level of the medieval channel silt deposits were at 36.60 m OD. Small quantities of medieval pottery, not closely dated, were recovered.

Interpretation

The bank and its stake revetment are interpreted as forming the northern edge of a channel just beyond its divergence from the Holy Brook. This is likely to be the same channel recorded at its confluence with the Kennet on the Abbey Wharf trench W12C, where it is present from the earliest monastic phases through to the construction of the canalised 18th-century courses of the Kennet; the presence of medieval and post-medieval pottery within channel silts suggests a similar date range represented on the present site. The channel is interpreted as an overflow channel for controlling the flow of the Abbey mill race.

4. Sites in the Bridge Street Area

1. Site Potential

The proposed development of an area of about 1 ha east of Bridge Street was considered likely to contain significant deposits relating to medieval and pre-medieval activities associated with the Kennet riverfront. This, together with extensive commercial and residential development west of Bridge Street, prompted a series of excavations and observations in the area (Fig. 33).

The late Saxon town is believed to have centred on St Mary's Church, and extended as far south as Gun Street/Minster Street (Astill 1978). The Bridge Street East development site therefore provided an obvious situation for early wharfage and activities utilising the Kennet, Holy Brook, and the network of other, lesser streams which flowed across the site until recent times. The foundation of the church and suburb of St Giles immediately south of the river in the 12th century would have been likely to have intensified the use of the waterfront zone between the river and the town; the establishment of Bridge Street as a causeway linking the two areas would almost certainly date back to this time.

In addition to the generalised topographic considerations, documentary and cartographic evidence (detailed in Kerrane archive) suggested specific activities on and around the site in the later medieval and post-medieval periods:

1. *Mills*: First recorded during the reign of Henry III (1216–1272). Two corn mills and a fulling mill, in existence by 1543, were probably situated on the Minster Mill stream and the main river channel west of Duke Street.

2. *Locks*: Tan lock was situated on the main river channel immediately east of Bridge Street before 1552.

3. *Dyehouses*: A dyehouse is shown immediately to the south of the Minster Mill stream adjacent to Bridge Street on a survey map of 1552. Other dyehouses are shown on Minster Street backing onto the waterfront area, and also west of Bridge Street.

4. *Wharves*: Immediately to the north of the main channel and east of Bridge Street was situated Dodd's Wharf. Although first shown in 1816, excavation on the Abbey Wharf site had already suggested that such sites might have earlier (medieval) origins.

5. *Manufacturies:* The Oracle workshop over the Holy Brook adjacent to the northern boundary of the site was an important small manufactory for craftsmen from the early 17th century.

Even though direct evidence for such structures was likely to prove elusive, it was considered that the products and by-products of the industrial processes, successive modifications to the stream courses, and deposits related to the management and control of the area would be present.

Investigations east of Bridge Street were conceived as a two-stage approach. A first phase of evaluation (site W135) was to provide evidence to determine the desirability of further excavation and help formulate an appropriate project design (subsequently implemented as site W158, Bridge Street East). West of Bridge Street ground conditions and the nature of the development allowed a less intensive response (Bridge Street West site W122 and Fobney Street site W152); a survey of an adjacent part of the Holy Brook culvert was carried out as part of the Bridge Street West investigations.

Development west of Bridge Street proceeded either during or shortly after the period of archaeological investigations. However, east of the Bridge Street building work was deferred and a new, more expansive development is currently (1991) being planned. These modified proposals will affect not only the Bridge Street East site but the whole of the area bounded by Bridge Street, Duke Street to the east, the Holy Brook, and Mill Lane south of the Kennet. An archaeological response integrated with the development programme will present an opportunity to examine areas of high potential in some detail, and allow less intensive observations over a wider area. It is certain that work on this scale will substantially alter the provisional interpretation of this part of the town based on the investigations reported in this chapter.

2. Bridge Street East Evaluation (W135)

Sampling Strategy

Excavations at Crane Wharf had suggested that although all deposits above river gravels could be considered to have archaeological potential (and this amounted to an estimated 300,000m^3 at Bridge Street East), definable archaeology was likely to be sparsely represented between the Kennet and the Holy Brook in a zone which has proved largely unsuitable for permanent settlement until modern times. It was believed that significant deposits would cluster in the areas immediately adjacent to watercourses and commercial or industrial structures, the location of which could not be accurately predicted. In an attempt to identify the courses of channels and meanders running west–east along the valley floor it was decided to examine two north–south transects which would jointly cover the entire width of the development area. Additional evaluation trenches could not be contemplated with the funds available. Changes in level across the site eventually dictated that both evaluation trenches were dug in two parts, the one near the western boundary of the site as trenches A and B, the one near the eastern boundary as C and D (Fig. 34).

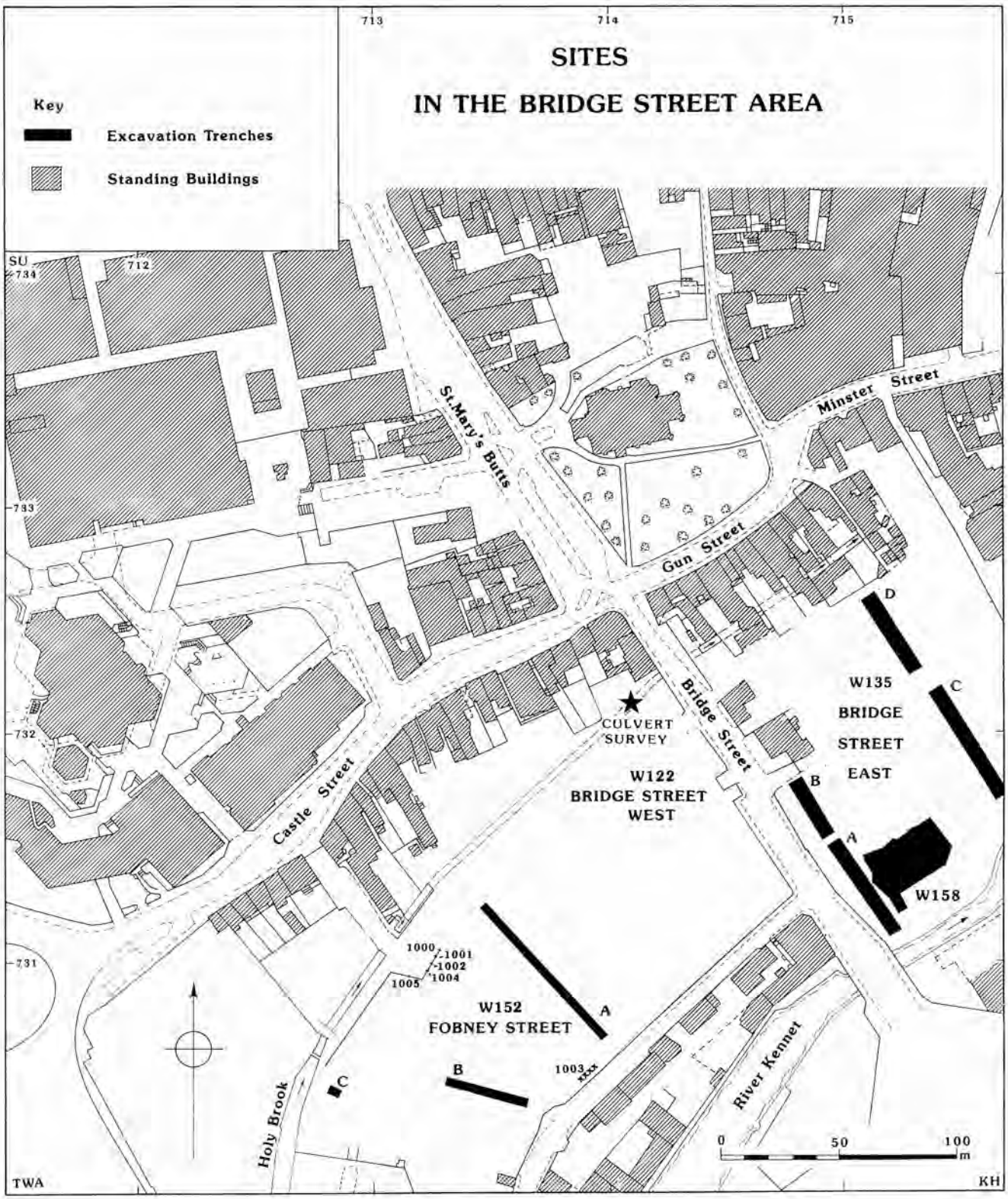


Figure 33 Excavations in the Bridge Street area

Both sets of trenches were excavated by developer's contractors to a depth of *c.* 3 m, 1 m wide at the bottom and with the sides raked back at an angle of 45° to allow safe access. No attempt was made to record deposits during machine excavation, the evaluation comprising the cleaning and detailed recording of trench sections supplemented by limited hand excavation into deposits of potential interest wherever it was safe to do so. Sump-pumping enabled deposits below the level of the water table to be examined, although it was not always adequate to reach the base of deposits.

The Observed Sequence, by D.E. Farwell and John W. Hawkes

A uniform sequence was apparent over most of the area examined. Natural gravels varied in depth but were generally at or below *c.* 35.65 m OD, and were overlain by a series of clean, largely undifferentiated riverine silts. These silts should equate with Crane Wharf deposits Phases 1a–3 and the Phase 1 deposits at the Abbey Wharf site despite the differences in absolute levels (the gravel at Crane Wharf was encountered at 34.41 m OD). By comparison with those sites, the deposits in the Bridge Street area are likely to have accumulated throughout the period from the Neolithic to the Middle Ages, with the greater part of the sediments deposited in the Roman period or later. The true depth of the silt deposits at Bridge Street East was nowhere represented, as 18th- or 19th-century foundations or rubble deposits overlay what was almost certainly a truncated profile at *c.* 37.25 m OD. A depth of at least 1.50 m of pre-modern deposits was visible over almost the whole site. Four zones of archaeological interest were identified:

Zone 1
At the extreme southern end of trench C deeper deposits of 18th- and 19th-century disturbance were encountered. These were associated with substantial oak posts aligned east–west some 7 m north of the present course of the Kennet at this point, and were inferred to form part of the 18th-century canalisation of the river. Subsequent excavations (W158) suggest that the northern bank of the Kennet in the medieval period may have closely followed this alignment. No evidence for this was found, although the trial excavations in this part of the trench did not reach depths at which revetments, reclamations or river bank of this date would be anticipated.

Zone 2
At the extreme northern end of trench D an undated oak post in poor condition was found within silts near the base of the trench. A medieval date was postulated in the evaluation report, although this is impossible to demonstrate from the stratigraphy or associated finds. The presence of extensive disturbance and the proximity of the relevant deposits to the northern boundary of the site suggested that further excavation might not prove conclusive. Given areas of greater potential on the site it was decided not to press for additional work.

Zone 3
Trench A incorporated a sequence of potentially early deposits preserved between two later brick-lined culverts. Each culvert and its supporting brickwork had destroyed a band of the archaeological levels *c.* 7 m wide. The lowest levels of alluvium between the culverts could not be adequately exposed or drawn, but small quantities of 12th/13th-century pottery together with tile and charcoal were recovered from the primary silting above river gravels at *c.* 36.50 m OD. In contrast to other parts of the trench, variations in colour and texture of the alluvial deposits were encountered which were considered to represent discrete periods of river transgression. A compacted chalk hard standing observed in the east face of the trench between the culverts was also considered potentially medieval, although subsequent further excavation (W158) demonstrated it to be post-medieval.

Zone 4
At the southern end of trench B an organic layer comprised the primary alluvial deposit at a depth of *c.* 35.80 m OD. Late 12th/13th-century pottery was comparable to material recovered from the lowest levels of trench A. Oak posts, some with fragments of plank still attached, formed a revetment of at least two phases to a channel immediately south of the southern extent of trench B, but the relationship of the organic silts to the timbers and, therefore, the dating of this episode was unclear. Difficulties of pumping the site to this depth made it impossible to examine the alignment in any detail; the overlying alluvial silts were completely undated.

3. Bridge Street East Excavation (W158)

Strategy

Following the evaluation excavation of W135, proposals were drawn up for fuller investigation of the two areas:

1. An area adjacent to the southern end of the evaluation trench B to investigate the course, nature, date and immediate context of the revetted channel.
2. An area adjacent to evaluation trench A to investigate the potentially medieval structure represented by chalk floor and the underlying riverine deposits.

It proved impossible to attract sufficient funding to carry out both parts of the proposed excavation, and it became necessary to reduce the programme. The lack of information on riverside buildings from previous excavations and the possibility of a lengthy sequence involving channels, reclamations and structures led to the decision to regard trench A as the priority, and plans to excavate adjacent to trench B were reluctantly abandoned.

The excavation area of the Bridge Street East site W158 was constrained by the presence of a number of thick concrete foundations which proved impossible to remove, and by the need to maintain a wide access strip

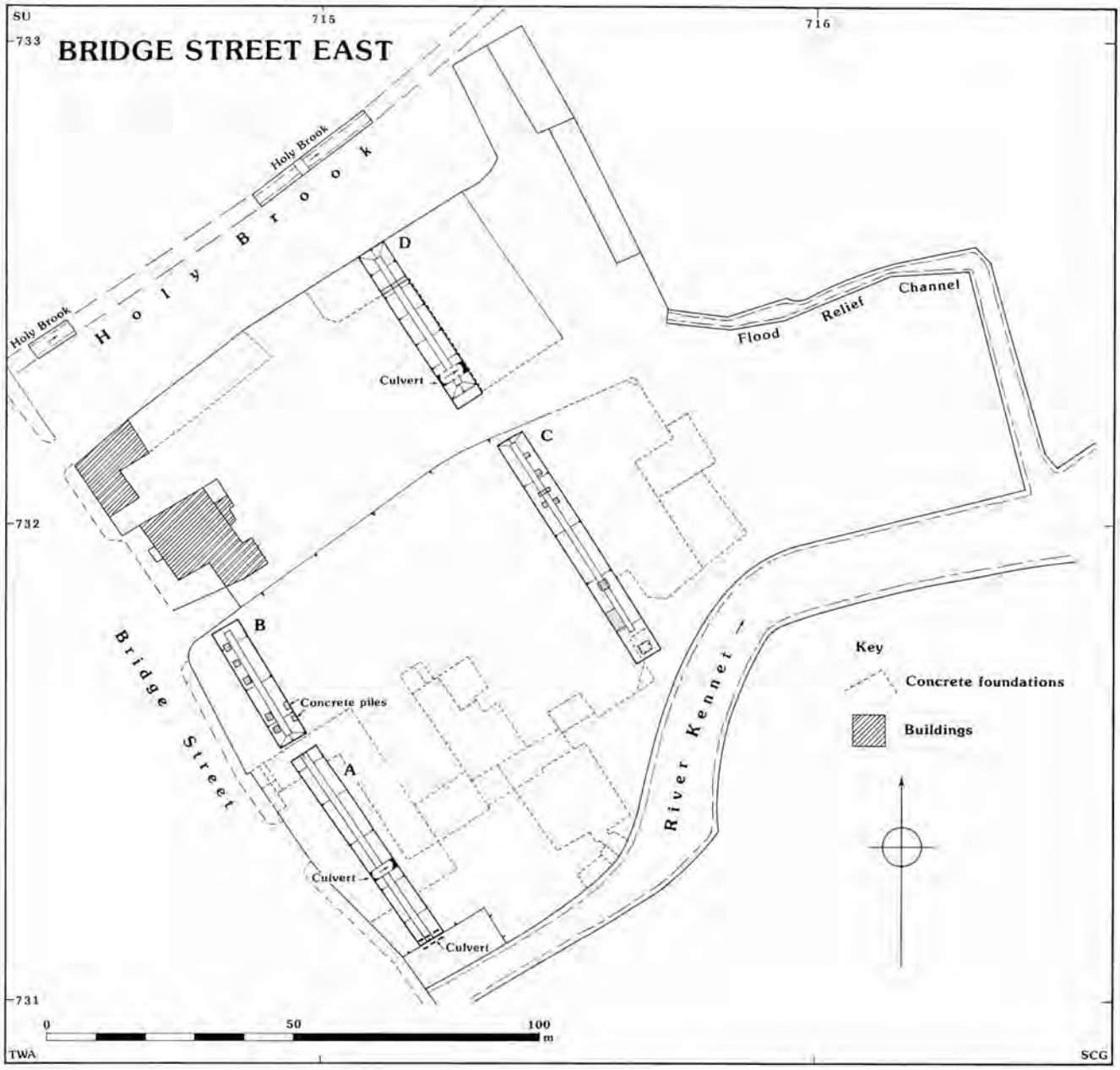


Figure 34 Bridge Street East evaluation W135: location of trenches

for contractors' plant engaged in river widening work immediately to the south of the area. The area, broadly 35 x 20 m, was machine stripped to remove brick demolition rubble down to clean silts at a level of approximately 37.50 m OD, and the top of the chalk floor indicated by the evaluation. A well-point dewatering system was installed at this level to enable the excavation of the lowest levels of archaeological deposits.

Within the excavation area a considerable degree of disturbance was evident in the form of concrete foundations, brick culverts and wells. It was possible, however, to excavate a series of trenches in areas between the disturbance (Fig. 35), and these provided sufficient information to reconstruct the basic outline of the site. Information from the excavation was supplemented by a watching brief maintained during river widening operations immediately to the south of the trench.

The Excavation, by Michael J. Heaton

Three processes were responsible for the deposition of almost 4 m of stratigraphy on the site:

1. Alluvium in the form of fine silts deposited during river transgressions between the 11th and 16th centuries.
2. Later medieval and post-medieval reclamation dumps in the south of the site overlying earlier channels.
3. Industrial structures and deposits of the 17th–20th centuries.

The earliest deposits were alluvial gravels at 34.50 m OD, overlain by deposits of fine organic silts up to 3 m thick in places. Although the silts were largely homo-

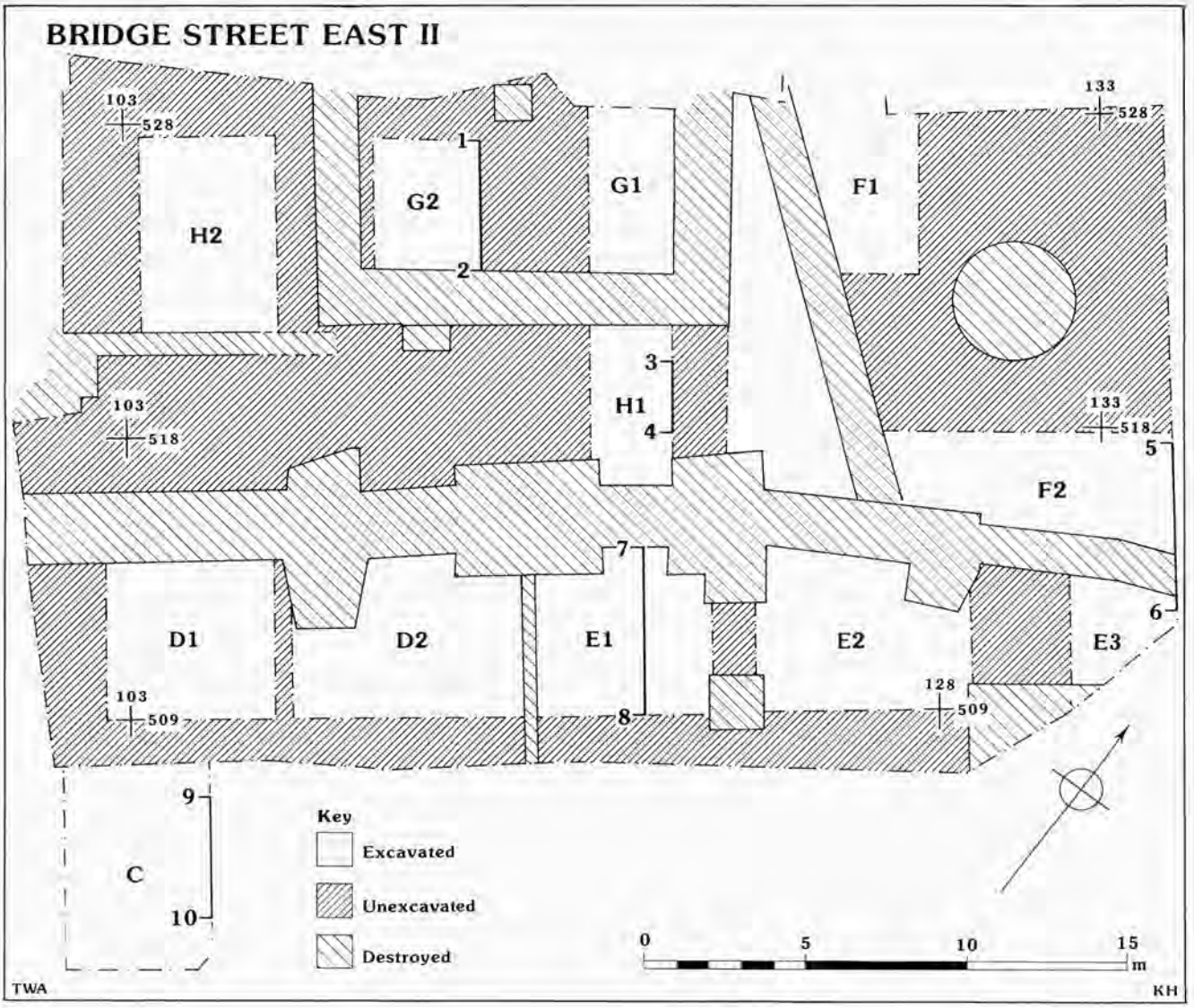


Figure 35 Bridge Street East W158: trench numbering and excavation areas

geneous, individual channels and horizons were discerned in plan and section but the relatively small size of the box trenches in which the excavation was conducted at these depths precluded any accurate assessment of the full dimensions of these features.

The channels investigated formed a confluence within the excavated area with a narrow stream from the north-west joining a larger channel, the full width of which was never established. An overview of the Bridge Street East area excavations (Fig. 36) suggests the latter watercourse was likely to have been a braid of the Kennet. The smaller stream may have been the same as the channel represented by the timber revetment discovered at the southern end of W135 trench B; if so, the arrangement would be consistent with the cartographic evidence for the early post-medieval period (cf Fig. 4).

Phase 1

The earliest levels comprised the confluence between the main east–west channel, represented only by its north bank, and the smaller watercourse joining from the north-west. This latter channel was approximately 3 m wide and 1 m deep, but the position of the south bank (probably beyond the excavated area) and the full depth of the main channel could not be established. The sides of both channels sloped at some 40°, and were not apparently revetted or otherwise consolidated. Fine organic and peaty channel silts were contained within the smaller channel and lay against the edge of the larger, but no dating evidence or any finds were recovered.

Phase 2

Phases 2a–2d

The earliest timber revetment and bank consolidation (Phase 2a) was observed in trench G2 sealing the fills of the Phase 1 channels. It comprised a 0.35 m thick deposit of blue/grey clay at about 35.00 m OD forming a triangle at the junction of two channels. Two stakes of either birch or beech were driven through it at its southern edge. A depression was observed in the surface of the clay in line with these two timbers at the same 0.20–0.30 m spacing, and was assumed to mark the position of a third, missing, timber. These timbers survived to a height of 0.20 m above the surface of the clay

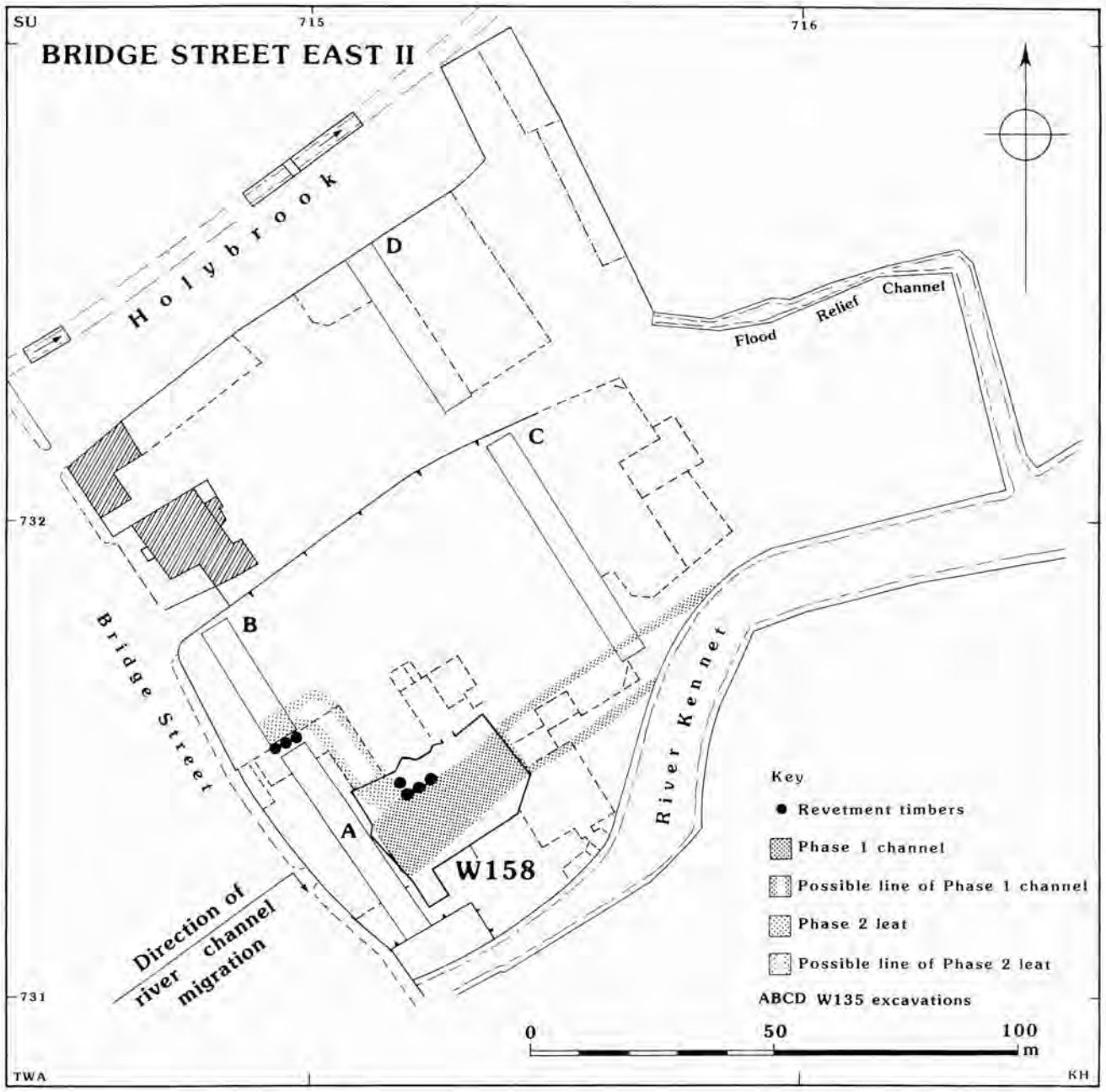


Figure 36 Bridge Street East W158: Overview of excavation results

and a date of cal AD 980–1120 (HAR–8556; 1000±70 BP) was obtained from stake 3050. The full extent of this structure fell outside the narrow confines of the 1 x 2 m box trench in which it was observed.

Channel silts deposited subsequent to the insertion of the confluence revetment were of a coarser, more gravelly texture indicating faster-flowing water, perhaps as a result of improvements to the channel carried out upstream. A sequence of deposits raised the bed of the main channel by at least 0.40 m to a level of 35.60 m OD. Some stabilisation at this level is suggested by the appearance of narrow 'gullies' in the bed of the Phase 2d channel, almost certainly the result of natural scouring rather than deliberate dredging. Contained within one of these scours were large sherds of a late 12th–early 13th-century tripod pitcher.

Phases 2e and 2f

Two apparently consecutive episodes moved the north bank of the main channel some 5 m to the south (Phase 2e) and subsequently realigned and probably narrowed the smaller stream (Phase 2f). The extent of these movements is shown on Figure 37.

The new river bank was faced with a 0.30 m wide band of degraded chalk which may in turn have been fronted by a row of stakes, although these survived only as loose fragments of wood. Sherds of 13th-century cooking pots were present in the reclamation material. Later disturbance made it impossible to identify and investigate any potentially contemporaneous silts from the main channel, although examination near the confluence with the smaller stream suggested that the latter had encroached slightly eastwards. A more signi-

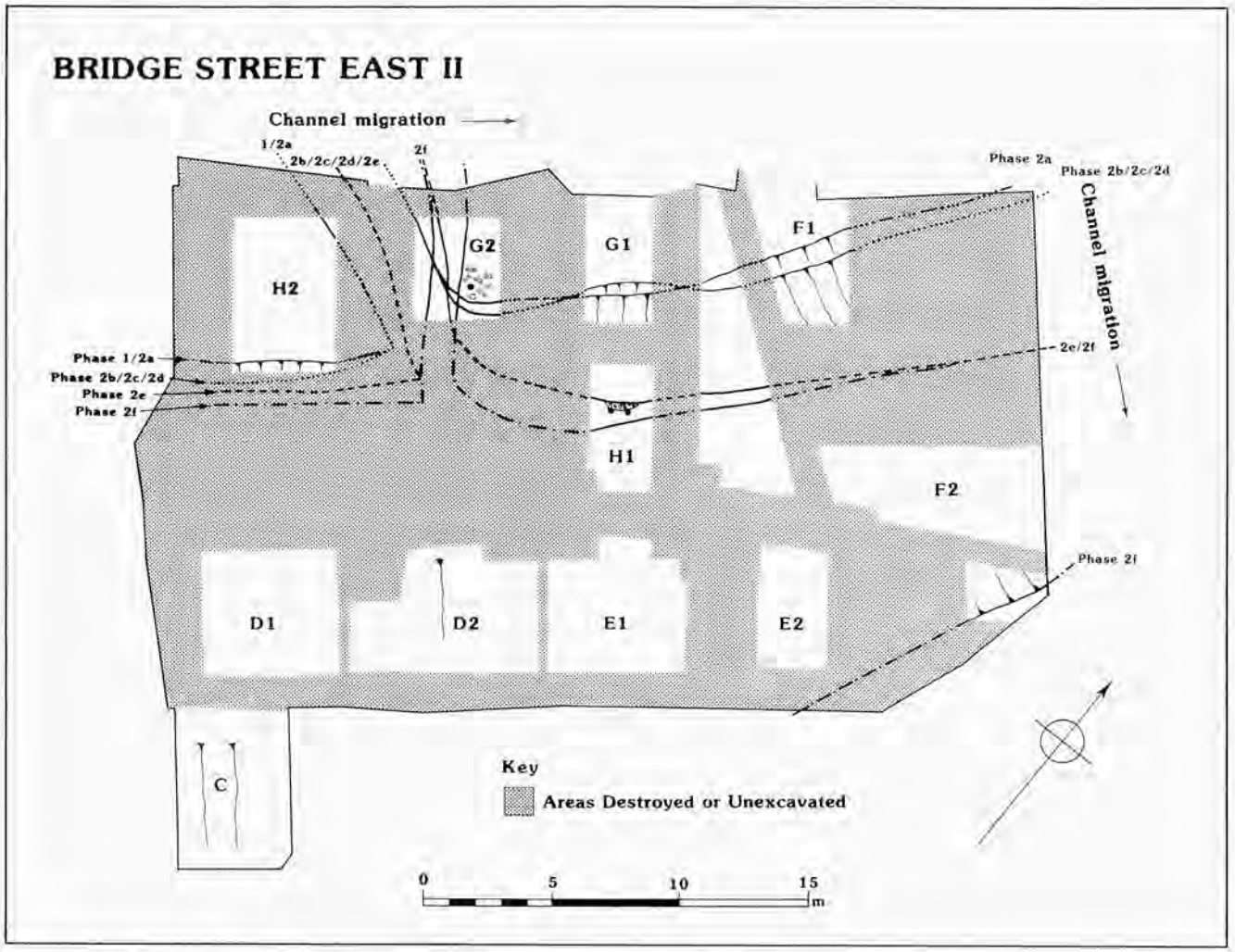


Figure 37 Bridge Street East W158: channel migration

ficant, deliberate, realignment (Phase 2f) subsequently moved the small stream further east so that its whole width (no more than 1.50 m) was contained in trench G2. There may also have been a narrowing of the main channel at the same time: excavations in trench E2 revealed a south bank associated with the latest channel silts which, if contemporary with the Phase 2e/2f alignments to the north, would have defined a channel some 12 m wide. Spouted pitcher sherds of likely 13th-century date from these deposits were accompanied by jugs and other forms suggesting a continuation of this phase at least into the 15th century.

Phases 3 and 4

Later developments are considered more fully in the archive. It is apparent that the process of channel narrowing continued. The main channel was effectively abandoned, with a pair of timber post-and-plank revetments inserted in the Phase 2 silts in trench E3 (Fig. 35). Pottery from their construction levels suggests a 16th- or 17th-century date.

Cartographic evidence (Fig. 4) implies that the east–west channel remained an open watercourse until at least 1640, even if in a reduced form. Both the Kennet channels shown on Man's map of 1813 are well to the south of W158 and their precise course can be traced through early series Ordnance Survey maps to the present day. Excavation (Phase 4) suggests that the former channels were enclosed or backfilled and the area reclaimed for wharfage from the early 18th century onwards.

Industrial activity on the site during this period included hide-processing pits containing discarded horn cores and animal hair (*below, Chapter 9*). By 1816 the canalside zone was occupied by Dodd's Wharf, replaced by a brewery towards the end of the century.

4. Bridge Street West (W122), by D.E. Farwell

Redevelopment of an area 70 x 90 m immediately to the west of Bridge Street presented an opportunity to observe groundwork cuttings adjacent to the Holy Brook, and to undertake a detailed survey of the alignment and internal detail of a length of the Holy Brook enclosed within a culvert (Fig. 38).

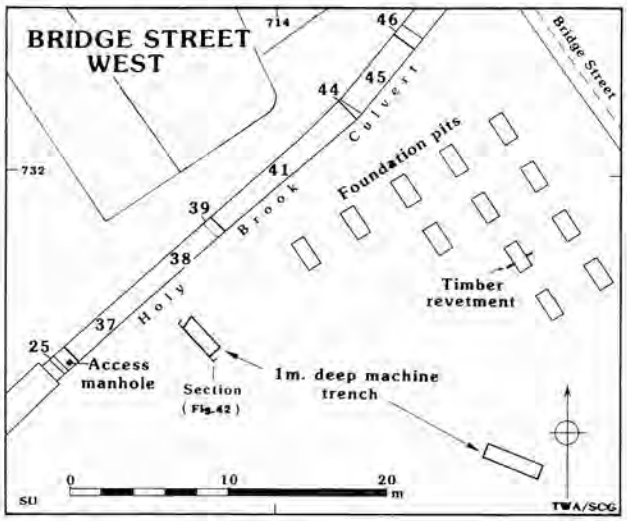


Figure 38 Bridge Street West: locations of observations

The Culvert Survey

In the course of groundworks contractors exposed a 22 m length of culvert in the north-west of the site, including an access manhole via which it was possible to examine a greater length of the interior. The culvert is substantially brick-built and is probably of 18th- or 19th-century date, although a 35 m section immediately east of the exposed brickwork is made of reused 12th- and 13th-century stonework, perhaps derived from Reading Abbey following the Dissolution in 1539. This length is likely to be of 16th-century date and has been a designated Grade II* listed structure since 1984.

Of the 35 m section, the westernmost 22 m was roofed with reused limestone blocks (context 41, Fig. 40). Incorporated within the structure were decorated fragments and masons' marks (Fig. 39). For 11 m west of this area the culvert consisted of ribbed arch roofing (context 45, Fig. 40). Up to 40 ribs running north–south spanned 3 m with a maximum rise of 0.50 m from the springers. Each rib was made from an average of 14 blocks. Four cross-sectional types of block were noted (based on a typology produced in the course of an earlier inspection by L. Cram) and it was apparent that attempts had been made to form individual ribs from a single type. Blocks averaged 0.27 m in width and varied between 0.10 and 0.35 m in length.

Both the limestone block arch and the ribbed sections rested on limestone block walling of apparently continuous construction, albeit with brick rebuilding in places. Sufficient of the original walling in contact with the ribbing and blockwork roof sections survived to suggest all three elements were of contemporary build.

It was not possible to investigate the floor of the Holy Brook within the culvert.

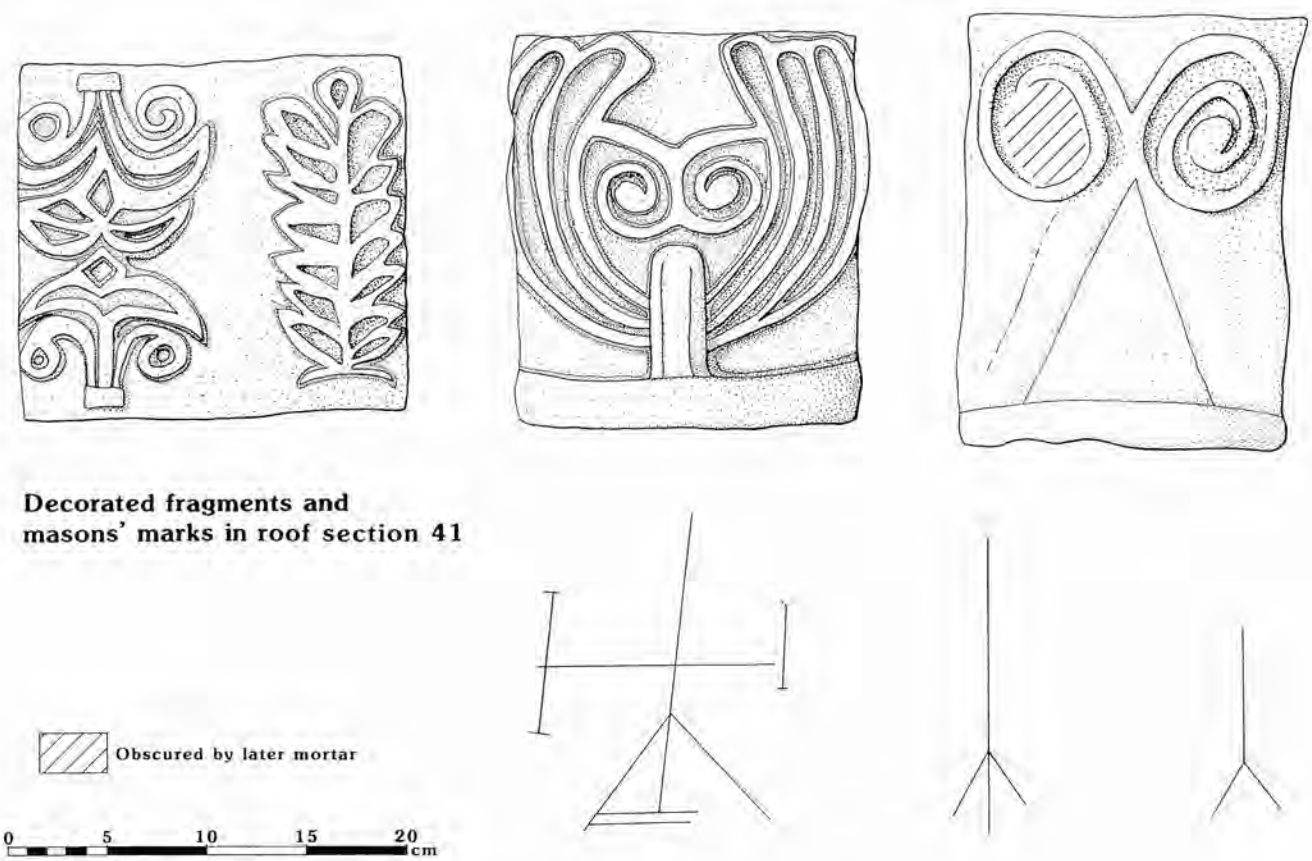


Figure 39 Bridge Street West: Ornamental stonework from the culvert

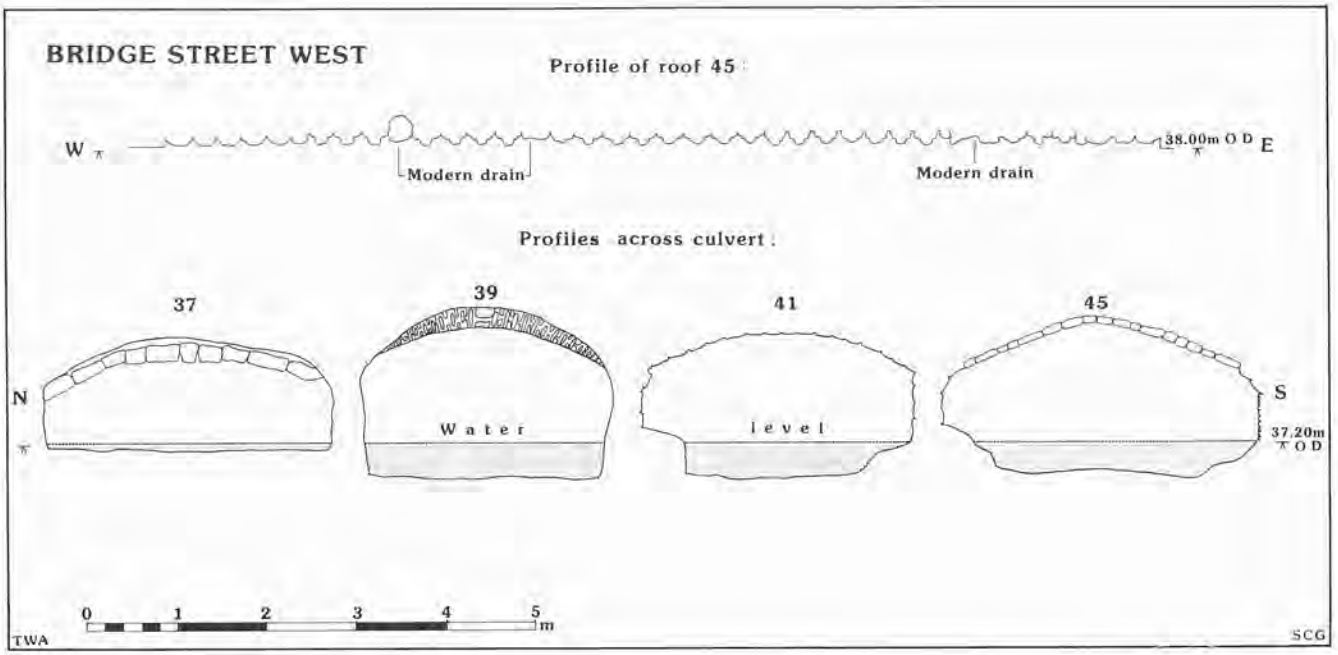


Figure 40 Bridge Street West: culvert profiles

Interpretation

Astill's (1978) map reconstructing medieval Reading shows the Old Market widening as it runs south before its intersection with Castle Street (Fig. 41, left). A continuation of this more westerly alignment of the edge of Bridge Street would cross the Holy Brook above the ribbed arch culvert. The stone block section of the culvert occupies the area of a building shown on Weller's map of 1840 (Fig. 41, right). The ribbed section may mark the alignment of the carriageway of Bridge Street and the block section the line of buildings fronting its western side at the crossing of the Holy Brook in earlier periods. There is no evidence to suggest that the Holy Brook was enclosed or culverted beyond the area of the stonework until very recent times.

Observation of Groundworks

A series of foundation pits and a 1 m deep machine trench (Fig. 38, section of machine trench on Fig. 42) revealed a sequence of silt clays, gravels, and organic deposits. The angle of these deposits in the machine cut suggested periods of reclamation and consolidation punctuated by occasional inundation resulting in the deposition of riverine silts, although it was not possible to carry out any formal excavation to examine the sequence in detail.

A lime barrel (Fig. 42, F8), 0.75 m in diameter survived to a height of 0.45 m. It contained a primary deposit of lime (6), but could not be dated. Underlying layers (9) and (10) contained roof tile, medieval pottery

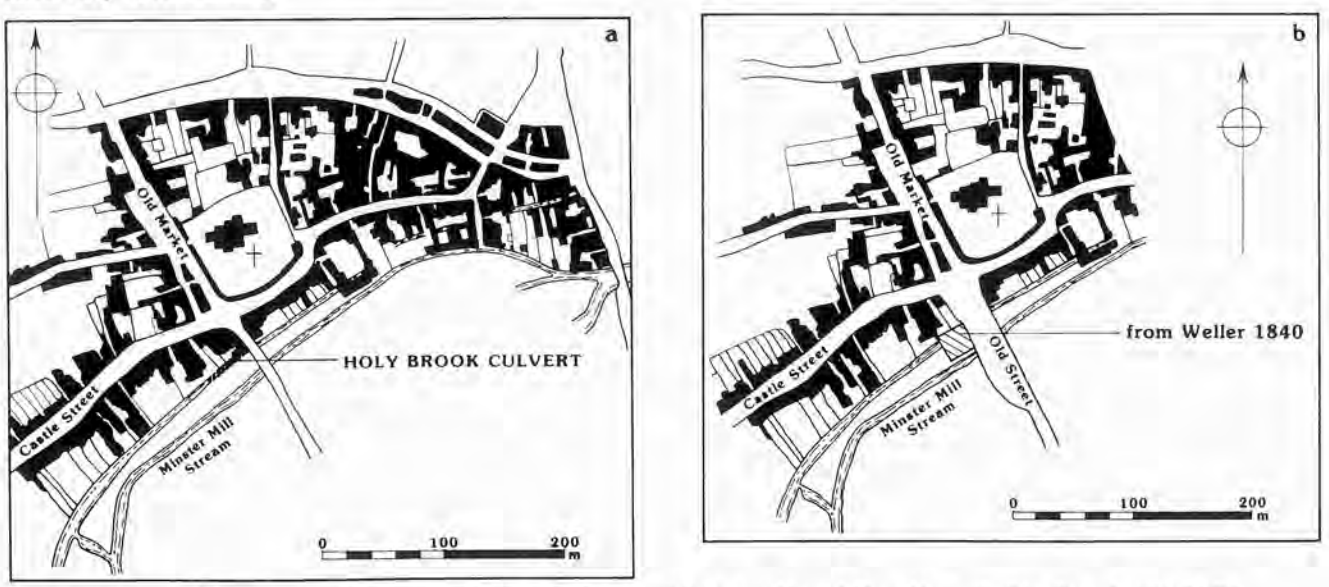


Figure 41 Bridge Street West: position of culvert within medieval Reading; (left) after Astill 1978; (right) adapted to show Old Market extensions and possible structure over Holy Brook

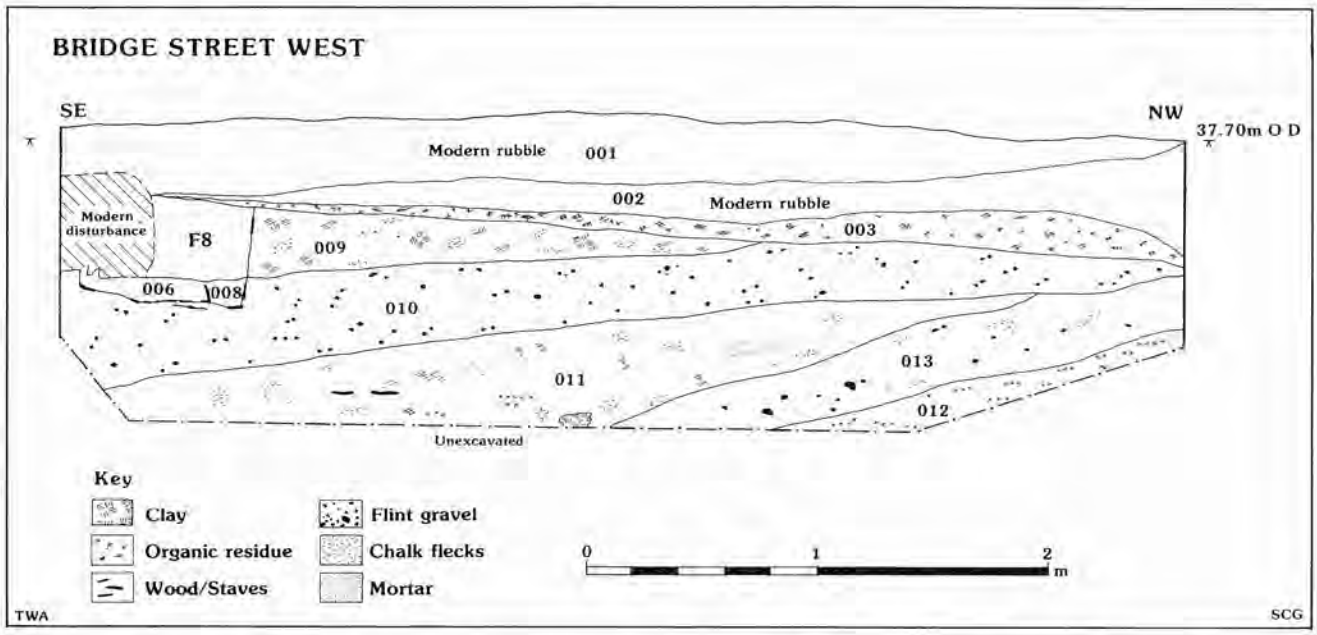


Figure 42 Bridge Street West: west face of '1 metre deep machine trench'. Position marked on Figure 38

of late 12th- or 13th-century date being retrieved from contexts 11 and 12.

Elsewhere an undated post-and-plank revetment with consolidated chalk reclamation to the north was noted in one of the foundation pits (Fig. 38). The revetment was some 20 m to the south of the Holy Brook, and is likely to relate to management of the Minster Mill stream also recorded in observations at Fobney Street. This episode is undated. Other isolated posts were noted during groundworks, but formed no coherent pattern.

5. Fobney Street (W152), by Michael J. Heaton

Limited excavation in advance of construction work was carried out, and a watching brief maintained during the preliminary groundworks for an extensive residential development (Fig. 43). The considerable depths of alluvium and restrictions on depth of excavation imposed by the development structural engineers hampered work, and it has not been possible to arrive at a full interpretation of the structures and other evidence revealed.

The scope of works included the following:

1. The observation of engineers' test pits.
2. The observation of, and limited excavation within three test trenches, A, B, and C.
3. The observation of works involved in the diversion of the main sewer running through the site.
4. Observations of sundry workings about the site.

The engineers' test pits produced largely negative results, being too shallow and too small. The other work did produce evidence for a series of linear timber revetments supporting the banks of various stream channels shown on early maps to have crossed this area. The silt deposits associated with these revetments produced dating evidence to place the structures in the late medieval to post-medieval period. Few finds were recovered, and the scale of investigation was not adequate to allow for detailed interpretations.

Trenches A, B and C

The trenches were machine-excavated with battered sides, the general methods of working and objectives being identical to the W135 Bridge Street East evaluation site previously described. The following observations were made only in the area intensively excavated near the north-western end of Trench A (Figs 43 and 44). The observed sequence was as follows:

Pre-structural deposits

Clean blue/grey alluvial clay sealed by a slight organic turf line was similar in composition to the earliest reclamation material (Phase 2a) from W158 Bridge Street East, although at the higher level of 36.15 m OD. No finds were present, but comparison with Bridge Street East might suggest an 11th–12th-century date.

Chalk bank

A 1.50–2 m deep deposit of compacted chalk lay directly over the earliest clays. It had been formed by a series of discrete dumps and its apparent alignment suggests a revetment or bank consolidation structure for the Minster Mill stream, shown on 19th-century and earlier maps but no longer extant as a surface watercourse. Other than the similarity of the materials, there is no direct link between this reclamation and the 13th-century (Phase 2e) bank from W158 Bridge Street East. The Fobney Street example contained no finds.

The east side of the chalk dump had been subsequently cut for or eroded by a minor channel aligned

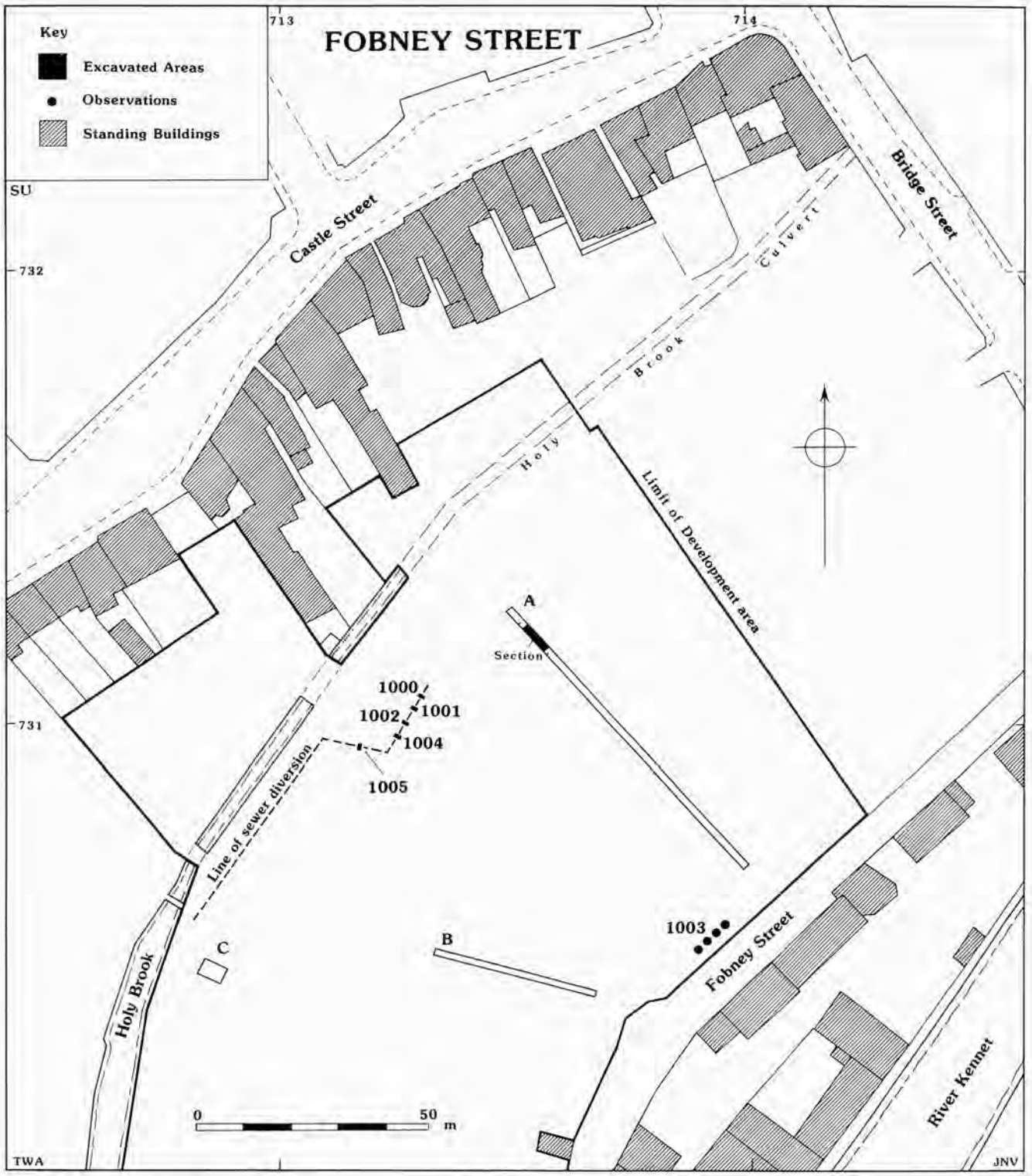


Figure 43 Fobney Street: locations of trenches and observations

approximately north–south, presumably linking the Holy Brook to the Minster Mill stream. This channel was too deep to be investigated, but it pre-dated two successive revetments associated with the southern face of the chalk bank (Fig. 44).

Revetment 1

Structure 56 (represented in section by post 49; Fig. 44) consisted of seven radially-split posts, faces averaging 0.08–0.10 m, lengths between 1.50–2 m, set into a wide construction trench backfilled with large quarried chalk blocks (48) (Plate 17). No horizontal members were observed. Identical radiocarbon dates of AD 1430–1630 were obtained from oak post 3006 (Har–8555; 400±70 BP) and beech post 3015 (Har–8557; 400±70 BP).

Revetment 2

A massive timber structure, 82 (Fig. 44), of a form unparalleled at other sites. A large base plate and tenon-post supported three planks laid edgeways, all

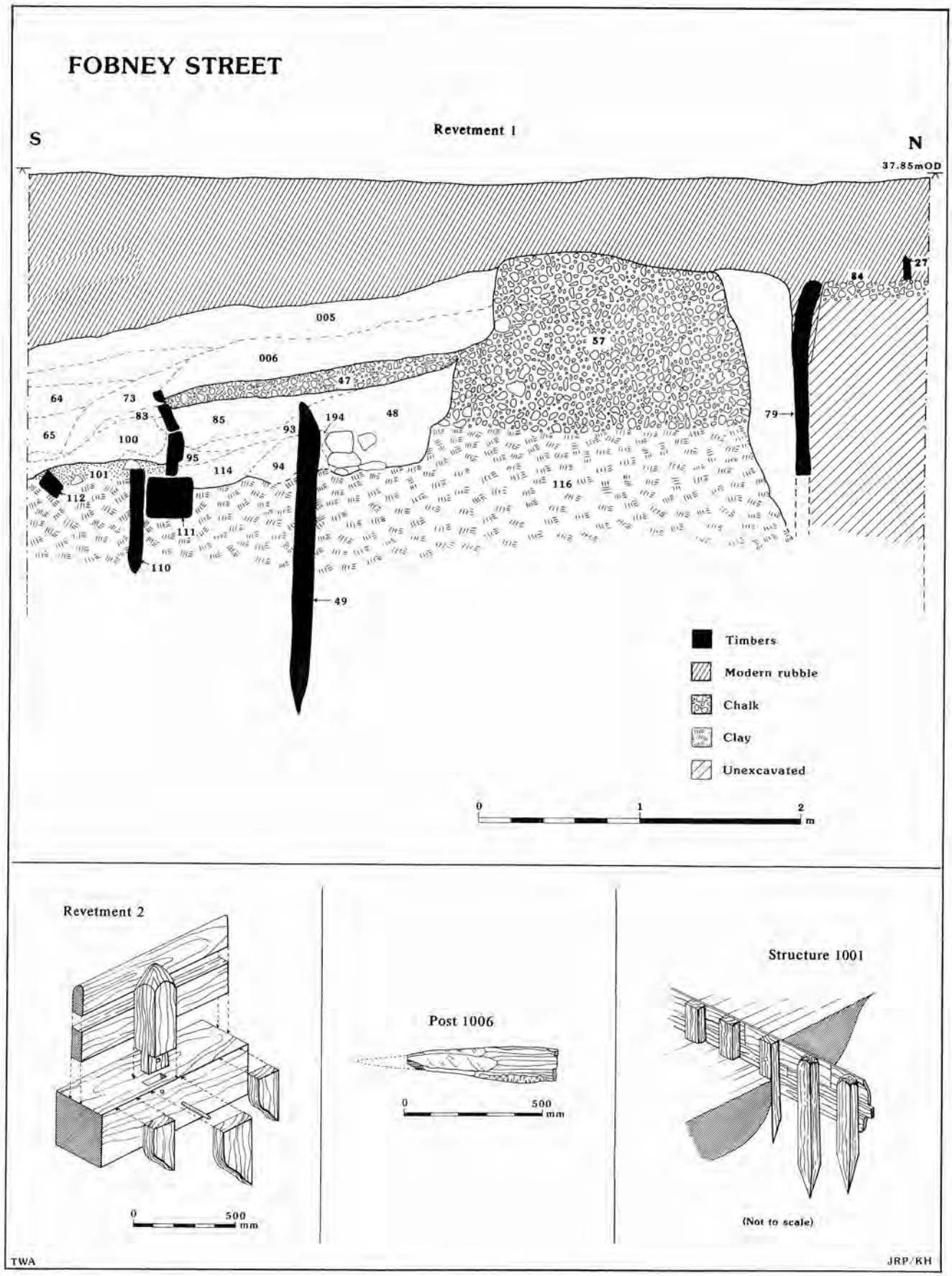


Figure 44 Fobney Street: west face of excavated area of Trench A. Reconstructions of timber structures

Plate 17 Fobney Street: excavation area

held in position by a set of smaller pegs (reconstruction Fig. 44). The base plate, 111, did not extend across the full width of the trench. Its insertion was associated with 17th-century pottery.

The northern face of the chalk bank was revetted by structure 61(Fig. 44), comprising seven closely-set square-cut planks set on edge (represented in section by timber 79). The planks were set in a clay-filled trench which cut the chalk bank. No horizontal members were observed, although the full extent of the structure lay beneath the base of excavations, and no timbers were lifted. The revetment is not dated, and it is not known whether it relates to unobserved watercourses to the north (possibly an alignment of the Holy Brook), or some other drainage feature.

Other Observations

Other observations made during groundworks are shown on Figure 43. The structures were sighted during mechanical excavation and backfilling, and it has not been possible to suggest any sequence based on relative depths.

Structure 1000
Considerable depths of grey silt containing huge timbers, post-medieval ceramics, and occasional scraps of leather. The form of revetment and the alignment could not be determined, although it is likely that the timbers defined a parallel course to the Holy Brook.

Structure 1001 (Fig. 44)
An axe-cut post-and-plank revetment, orientation uncertain. The form (reconstructed on Fig. 44) is typical of later medieval revetments from the Abbey Wharf Phase 5, or probable early post-medieval revetments from Bridge Street East Phase 3.

Structure 1002
A massive structure of timber-revetted chalk blocks at a depth of 3 m, located in a wide trench, 4.50 m deep. Ran parallel to the line of the Holy Brook, undated.

Structure1003
Series of pit-sawn timbers adjacent to Fobney Street, forming the raft pile to workers cottages for the brewery. Uncovered during demolition of the street frontage wall, not observed in either Trench A or B.

Structure 1004
At a depth of 2 m, at least three quartered, radially-split posts in grey silt beneath 1.50 m of rubble infill. The posts were at least 0.50 m long, some evidence of horizontal members (type unknown) was detected. The only timber recovered, 1006, is shown on Figure 44.

Structure 1005
Concentration of occupation debris of post-medieval date at a depth of 2–3 m.

6. Other Investigations on the Holy Brook

Within the framework provided by the larger excavations it became possible to contemplate smaller exercises designed to provide specific information on aspects of the waterfront. Various redevelopment proposals

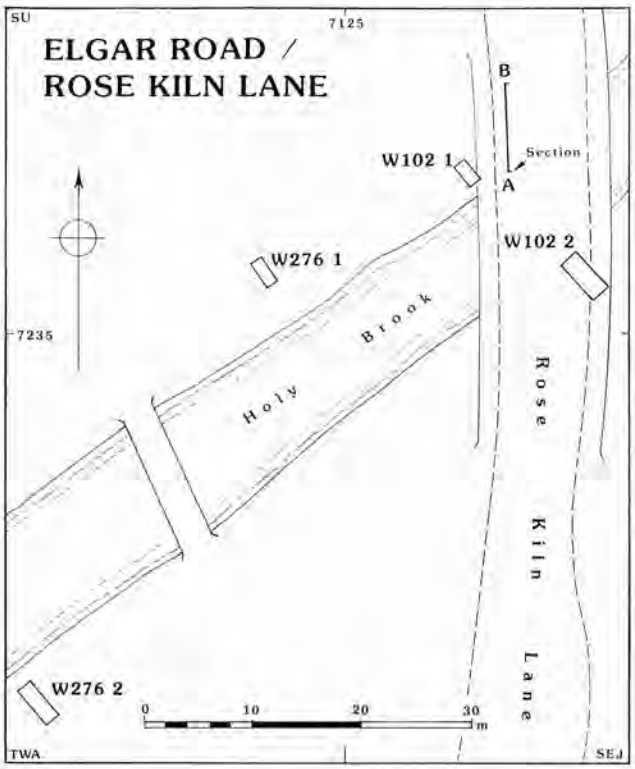


Figure 45 Elgar Road and Rose Kiln Lane: site locations

gave opportunities to examine the origins, management and development of the Holy Brook within and beyond the medieval urban area.

Elgar Road Relief road (W102) and Rose Kiln Lane (W276)

During 1985 the construction of the Elgar Road relief road provided an opportunity to examine the Holy Brook channel outside the area of the medieval town at SU 7129 7235 (Fig. 5). Excavation was limited to two small machine-dug trenches (W102, 1 and 2; Fig. 45), one on either side of the stream, and observations of the section of a construction trench on the northern side (A, B; Figs 45 and 46). Later trenching either side of the Holy Brook in advance of light industrial development immediately upstream at Rose Kiln Lane (W276, Fig. 48) produced no pre-modern stratigraphy, and that site is not considered further.

Only modern deposits were recorded south-east of the stream overlying alluvial clay (not investigated), principally a substantial embankment presumably raised as a flood protection measure. Excavations and observations north of the Holy Brook revealed a channel backfilled in the 19th century (Fig. 46, 001). The earliest feature, an artificial bank formed by alternate lenses of pale brown clay and consolidated chalk (004), was interpreted as a post-medieval towpath. A small number of abraded and presumably residual medieval sherds of pottery were noted, although no contemporary features were reached.

Coley Park Farm (W120), by J. Terry

In advance of housing development, a machine trench was excavated at SU 7066 7199 (Fig. 47) immediately to the north of the present course of the Holy Brook. At this point, the Holy Brook flowed some 0.50 m above the level of the standing water table, and still seasonally flooded the water meadows adjacent to its southern bank. Sump-pumping allowed some investigation of deposits below the water table.

Observation of the excavated section (Fig. 48) suggested the present channel was open by the Victorian period on the basis of associated material incorporated in bank consolidation deposits (Fig. 48, 004 and 005). Pre-dating these levels an undated horizon of bands of chalk rubble in silty clay (002/003/006) may equate with context (004) from W102 Elgar Road (above).

These deposits in turn sealed a uniform riverine silt, 007, approximately 1 m thick, which contained waterlogged organic material, including fragments of unidentified wood which may have formed part of a lathe-turned bowl (insufficient survives for further description). Six sherds of vegetable-tempered pottery of probable mid-Saxon date were also recovered from the lower levels of this horizon.

Below 007 a rich, organic layer, 008, contained a worked birch stake, 014. This appeared to have been split from a larger timber and had been subsequently

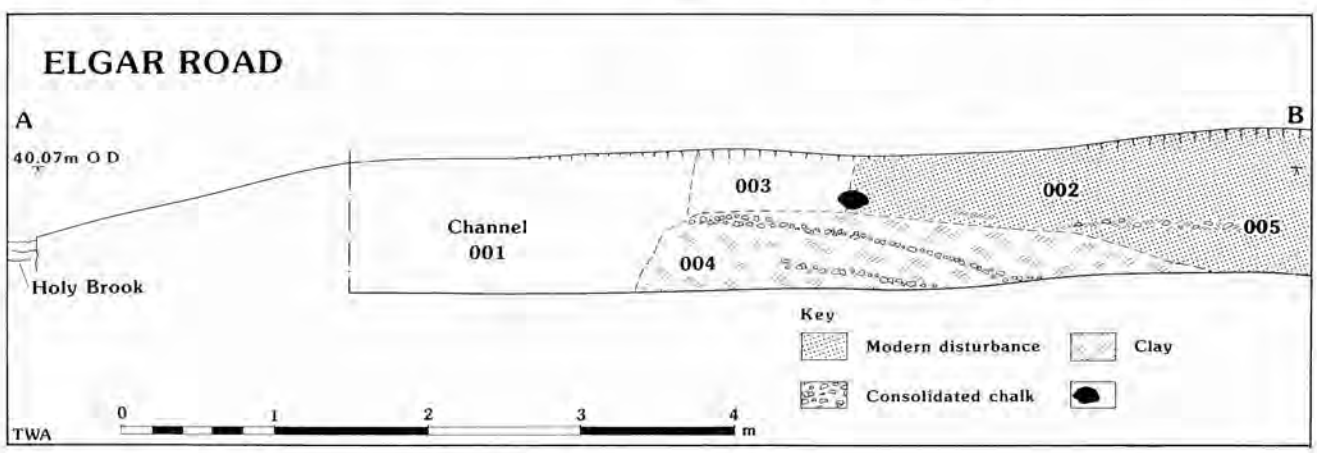


Figure 46 Elgar Road: section A–B, position marked on Figure 45

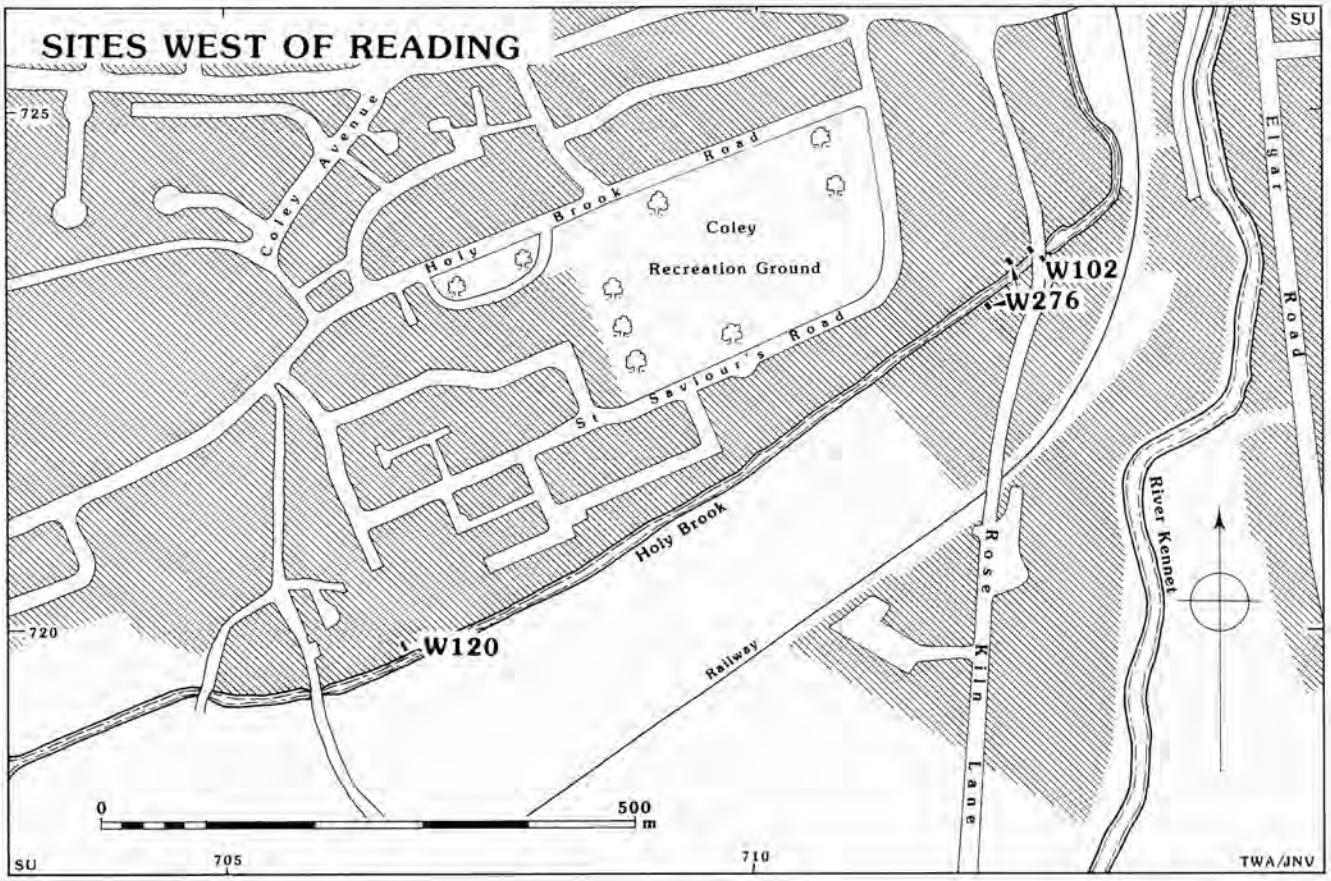


Figure 47 Coley Park Farm: site location

shaped to a point at one end. It was driven into the layer below to almost two-thirds its depth and was leaning slightly to the south. The stake is interpreted as a channel marker (it was too insubstantial to have been a load-bearing revetment timber). A single sherd of vegetable-tempered pottery from context 008 suggests a mid-Saxon date, and a radiocarbon determination from the stake produced a date of AD 655–760 (Har–8559).

The lowest silting levels of the early course of the Holy Brook (011) contained no archaeological finds. The section provided by the machine cut clipped the chalk bedrock to the north and clearly shows the maximum northerly extent of the stream, some 9.50 m north of the present channel. The position of the stream at the junction of the valley floor and the chalk scarp is consistent with observations made elsewhere along the course of the Holy Brook.

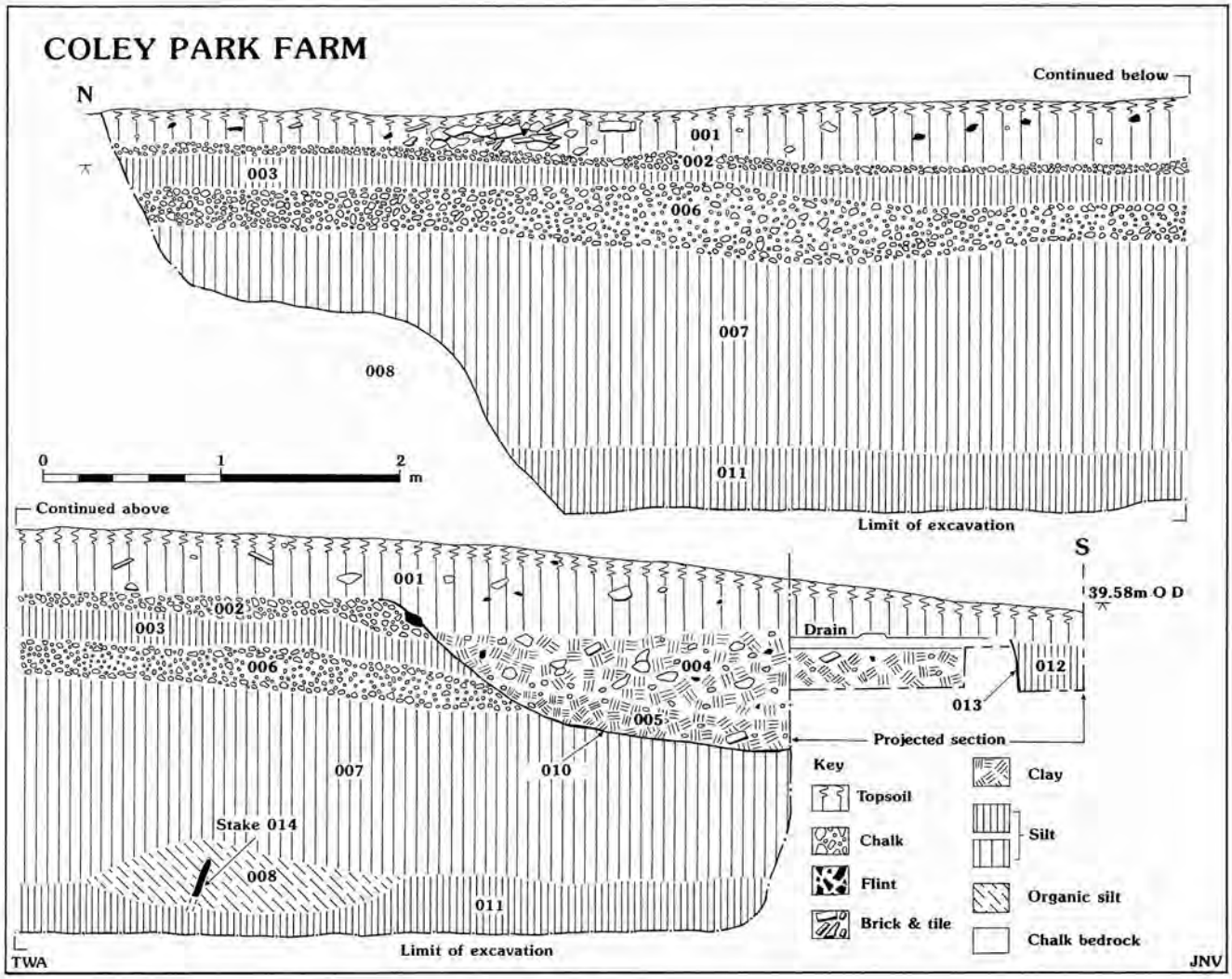


Figure 48 Coley Park Farm: section, east face

5. Structural Timbers, Revetments, and Dendrochronology

1. Introduction

All *in-situ* structural timbers were individually numbered, planned, measured on exposure, and identified to species. General condition, surviving height (m OD) and details of preparation, trimming, jointing, and evidence for previous usage were also described. The records of over 1000 individual timbers from all excavations were subsequently summarised and computerised and this record has formed the basis for the descriptions of timbers and revetments both in the sections dealing with the excavated sequences and within this chapter.

Posts driven into underlying silts proved to be surprisingly well-secured, and many of them resisted even machine-assisted attempts to remove them. Consequently, details of point preparation and overall lengths were recorded for only a small proportion. Lengths of the late medieval (Period 4) post-and-plank revetment from Abbey Wharf W12C were recovered and conserved using the Mary Rose facilities in Portsmouth for eventual display in Reading Museum and Art Gallery. Sections of the Period 7 back-braced revetment from the same trench were also conserved. One part is now displayed within the building subsequently constructed on the Abbey Wharf site, and other sections have been retained by Reading Museum and Art Gallery and the British Waterways Museum at Gloucester.

2. Wood Identification, by W.J. Carruthers

Samples of approximately 20 mm^2 were taken from structural timbers, small finds, and other worked wood for identification purposes. All timbers and worked wood from the Abbey Wharf trenches were sampled, but other sites were only selectively examined. A proportion of the unworked wood from the Abbey Wharf site was also identified, amounting to around 350 fragments.

The wood samples were double bagged with a small amount of water and were stored in cool, dark conditions in order to inhibit the growth of algae. Most of the wood had the consistency of cheese but was otherwise generally well-preserved. In order to obtain thin sections in the three planes necessary for the identification of each sample, the fragments were first frozen. This made them firm enough to section easily by hand with a sharp razor blade. The three sections were hardened in alcohol and mounted in glycerine prior to examination under dissecting and high-powered microscopes.

Results

A summary of the taxa recovered from each phase of the Abbey Wharf site is given in Table 4. Identifications for the small numbers of timbers recovered from the Crane Wharf and Bridge Street sites are provided in archive. Identification of the wood is according to Schweingruber (1978). The following information concerning habitat and timber properties is taken from Clapham *et al.* (1962), Polunin (1977), Taylor (1981), and Boulton *et al.* (1947).

Acer campestre L. (field maple). A small tree of woodlands, scrub and hedgerows, found primarily on calcareous soils, it is often coppiced. The wood is light, tough and smooth and turns well.

Alnus glutinosa (L.) Gaertn. (alder). Alder is characteristic of streamsides and other periodically flooded land where the soil water is moving. It is also found in drier, woodland habitats and is often coppiced. The wood is light and straight grained but soft and weak when dry. It rots readily in air but is very durable under water. It can be used for turning and carving, but burns poorly unless well seasoned.

Betula sp. (birch). These are light-demanding trees of heaths and open woodland and may be coppiced. The wood rots rapidly in water. It is a useful fuel wood and the bark can be sewn to make containers or used in roofing. If seasoned the wood is hard, strong and easily worked. It can be turned and is used for arrowshafts and furniture.

Corylus avellana L. (hazel). This shrub grows on a wide variety of soils but requires light to flower. It grows rapidly when coppiced and is a good hedge species. The nuts are a useful food and oil source. The wood burns fairly well and is soft, tough and flexible, and easily split. It is used for wattling, fencing, thatching spars, basketry.

Fagus sylvatica L. (beech). This tree grows most successfully on calcareous and other well-drained soils. It can stand shade and may be coppiced. The wood is a good fuel, producing heat but little smoke. As a timber it is heavy, strong, easily split and durable under water. It may be turned and carved and is used for laths, tool handles, furniture, ships.

Fraxinus excelsior L. (ash). This light-demanding species grows well on chalk and limestones and drier stream-banks. It may be coppiced and is fast growing. The wood is a good fuel even when green. As a timber it is hard, strong and easily split but rots rapidly when wet. It is useful generally for carpentry, spear shafts, agricultural implements, poles, barrel hoops.

Guaiacum sp. (lignum vitae), identified by Rowena Gale. The wood from this genus was first introduced into Europe c. 1515 to be used for timber and for its medicinal properties (Pinto 1969). The trees grow in tropical America and the West Indies and produce a dark, heavy and durable timber which resists splitting and turns well. The timber also possesses a self-lubricating property which makes it useful for cogs, pulleys, and clock mechanisms. It was used medicinally in the 18th century for the treatment of venereal disease by mixing the sawdust with water to make a porridge. It was used extensively for turned drinking vessels from the 17th century onwards.

Juglans regia L. (walnut). Although walnuts are commonly found on Roman sites there is no conclusive proof that it was grown in this country at that time. Documentary evidence

Table 4: Abbey Wharf, types of wood and their uses

Taxa *Phase*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Acer campestre	–	T	–	–	U	–	T	–	fork handle
Alnus glutinosa	–	U, bowl	T, 2 bowls	–	B, U, 3 bowls	–	B, W, tool & corkscrew handles	–	–
Betula sp.	–	T	S, T	–	–	–	–	–	knife handle
Corylus avellana	–	T	–	–	B, U	S, U	B, S, U, W	–	–
Fagus sylvatica	–	S, T	T	B, T, U	S, U, W	B, T, tree stump	B, S, T, U, W	–	–
Fraxinus excelsior	bowl	T	–	–	U	–	B, U, W	–	–
Guaiacum sp	–	–	–	–	–	–	–	–	turned lid
Juglans regia	–	–	–	–	–	–	W	–	–
Larix decidua / Picea abies	–	–	–	–	W	–	U, W	–	–
Pinus sylvestris	–	–	–	–	–	?furniture	U, W	–	–
Pomoideae spp.	–	T	T	–	W	R	B	–	tool handle
Prunus sp.	–	T	U	–	B, U	W	B, W	–	–
Quercus sp.	2 mallets	S, T, W	S, T, U, W, lid	T, U, W, peg	B, T, U, W	S, U, W	B, S, T, U, W	T	T
Salix sp./*Populus* sp.	–	B, T, U	S, T, U	B, T, U, wattling	B, U	B, T	B, R, T, U, W	–	peg
Sambucus nigra	–	–	–	–	–	T	–	–	–
Taxus baccata	–	–	W	–	–	–	–	–	–
Ulmus sp.	–	–	–	–	B, T	W	B, T, U, W	–	–
Vitis vinifera	–	–	–	–	U	–	–	–	–

B = branch wood; R = root; S = stake; T = structural timber; U = unworked fragment; W = worked fragment

suggests that it may have been grown on some estates by the 13th century (Roach 1985). It is a slow-growing tree from south-east Europe and the Middle East, the nuts of which are exploited both as a luxury food and for oil. The attractive wood is valued by cabinet makers and can be turned and carved.

Larix decidua Mill./*Picea abies* (L.) Karst. (European larch /Norway spruce). These trees were first introduced from Scandinavia and grown on estates in the 17th century. The timber became more widely available when plantations became established in the 18th century. Larch is durable in the ground and is used for posts. Spruce is light, strong, and splits well and is used in roofing, barrels, poles, and musical instruments.

Pinus sylvestris L. (Scots pine). Although native to northern Britain the timber only became more widely available in the south when plantations were established in the 18th century. The wood burns well. As a timber it is not strong but is very durable. It is used structurally for poles and planking and in carpentry.

Sub-family *Pomoideae* (hawthorn, apple, pear, rowan, whitebeam). These taxa grow in woods, scrub, and hedgerows, hawthorn being by far the most common in a natural habitat. However, apple, pear, and possibly rowan are likely to have been grown in the Abbey orchards. All of the woods burn well, are hard and easily turned and carved. They have been used to make wagon parts, mallet heads, printing blocks, tool handles, and spinning wheels.

Prunus sp. (sloe, cherry, bullace, plum). This genus grows naturally in open woodland and scrub as sloe and wild cherry, and would have been cultivated as an orchard crop as sweet cherry, bullace, damson, and plum in the Abbey grounds. Cherry wood is prized for cabinet making and is particularly useful for pierced work such as pipes and musical instruments. Sloe wood is hard and tough and has been used for marquetry and tool handles.

Quercus sp. (oak). This widely-occurring woodland taxon has always provided the most frequently-used wood for fuel and structural timbers. It burns well, is strong, durable, heavy, and hard. It also splits well and is resistant to rot in wet and dry situations. It is widely used for waterfronts, boat building, structural timbers, furniture, and other carpentry.

Salix sp./*Populus* sp. (willow/poplar). These trees of scrub, open woodland, and riverside are particularly characteristic of wet soils and are generally fast growing. Willows can be coppiced or pollarded and produce rapid growth suitable for making baskets and hurdles. The wood is firm, light and splits easily and is a reasonable fuel. Poplars occur less frequently in most

natural habitats. The wood is a poor fuel and, being soft and coarse, is of little use as a timber.

Sambucus nigra L. (elder). This shrub of woods and scrub is a frequent coloniser of land where human disturbance has increased the nitrogen content of the soil. It may be coppiced. As well as producing useful berries it has a hard, strong wood which can be used for small articles such as cogs in mills, pegs, combs, and toys.

Taxus baccata L. (yew). This is a slow-growing tree of well drained, often calcareous soils. The wood is very close-grained, tough, dense, flexible, and durable outside. It can be turned and carved and has been used to make spear shafts, bows, furniture, barrel hoops, mallets, and tool handles.

Ulmus sp. (elm). Elms prefer deep, rich soils and are susceptible to rot and disease. The wood is tough and easy to split and is resistant to decay in wet or dry conditions. It has been used for coffins, water pipes, bridge piles, wheels, furniture, ships, and longbows.

Vitis vinifera L. (grape vine). Vines require deep, well drained soils and a sheltered situation. The single, unworked fragment of wood recovered from the Abbey Wharf site probably represents the cultivation of vines in the Abbey grounds. It is unlikely that sufficient wood would be produced by this species to be used as a timber.

Many of the above taxa can also be used to produce dyes, the leaves, catkins, roots, and bark often giving different colours. Some may be used for medicinal purposes, for example willow bark which contains salicin. The bark of several species, such as alder and oak, contains high tannin concentrations and can be used in the tanning process.

Discussion

Structural timbers

The large structural timbers on all of the waterfront sites examined were primarily oak, as may be expected considering its size, strength and durability under water. However, Table 4 shows that a variety of other woods were used in the construction of the early revetments for the smaller timbers and stakes. Of these, birch and ash would appear to have been unsuitable for long-term use due to their liability to rot under water. These taxa were not used in the later revetment structures.

The use of the various taxa obviously reflects their different properties, such as the use of willow in Abbey Wharf Phase 4 for the wattling. It also, to some extent, is likely to reflect the availability of the taxa in the local woodlands, although wood for use by the Abbey could have been brought in from any of its many estates if required.

Small finds and other worked fragments

The woods used for the small finds reflect the working properties of the different timbers, such as the use of alder for bowls due to its straight grain and ability to be turned. The other fragments which had been worked to some extent may have been used structurally or as furniture and objects. Oak was again prominent in this category due to its qualities of strength and durability. The taxa not native to the area, such as walnut, lignum vitae, larch/spruce, and pine probably represent imported items or timbers. However, they were generally only recovered from the later phases and some of the trees may have been grown on local estates and plantations. Fragments of walnut shell were recovered from both monastic and post-medieval phases.

Unworked fragments, branch wood, and roots

Some of the unworked wood may have been used but may have lost the worked portion, such as where stakes have broken leaving the worked tip in the ground. However, much of it is likely to be from trees and shrubs growing locally and upstream, as are the branch fragments and roots.

Willow/poplar appears to have grown along the river Kennet throughout the periods examined, judging from the recovery of branch wood (twigs and branched fragments from larger boughs). The small seeds of the willow are usually widely dispersed by the wind and are rarely recovered from archaeological deposits in any quantity but catkin fragments and bud scales were common in many of the samples.

The plant macrofossil analysis for the Crane Wharf site indicated that alder was particularly prevalent in the prehistoric period, probably growing as a floodplain alderwood along much of the Kennet valley. Alder fruits and female catkins were also recovered in large quantities from most of the pre-monastic Phase 1 samples at the Abbey Wharf, but only in small numbers from later samples. This suggests that there was substantial clearance or thinning of the alder around the time of the foundation of the Abbey. Small amounts of branch wood were recovered from some Abbey and post-Dissolution phases and it is likely that some alder continued to grow along the Kennet, as it does to the present day. The remains from other taxa probably represent occasional trees growing along the banks, and material thrown into and washed into the Kennet from further afield. The beech tree stump is more secure evidence of what actually grew on the site after the Dissolution of the Abbey.

3. **Dendrochronology**, by C. Groves, J. Hillam, and F. Pelling-Fulford

Samples were examined from 49 oak timbers excavated from the Abbey Wharf site in 1983/4. Other timbers found during that and other excavations were unsuitable for dating purposes. For example, most of the planks were tangentially split and had only 10–30 rings. The ring width data of the ten timbers examined by Martin Bridge from the 1981 excavations of the same site were also made available for study. Twenty-six timbers were submitted from W61A, twenty-three from W61B, and ten from W12C. The timbers were assigned to preliminary groupings based on the excavated revetment structures. The terminology for these groups has been revised to conform with the usage elsewhere in this volume.

The aims of this study were: firstly, to date the timbers, estimate the felling dates and thereby clarify

the chronology of the waterfront's development; secondly, to produce a tree-ring chronology for the Reading area; and thirdly, to obtain any information of note about the timbers. The tree-ring analyses were carried out in 1985, and full details of the study can be found in Groves *et al.* (1985).

Method

The samples were deep frozen for a minimum of 48 hours to provide a firmer cross-sectional surface. The cross-sections were cleaned with a surform plane whilst still frozen to produce a surface on which each annual growth ring is clearly defined. At this stage any timbers with insufficient rings (for this study, those with less than 30) or unclear ring sequences were rejected. The wood was allowed to thaw slightly before it was measured.

The ring widths were measured on a travelling stage connected to an Apple II microcomputer. The sample to be measured is observed through a low power (x10) binocular microscope. As each ring is traversed a signal is sent to the microcomputer, and the width of each ring in units of 0.02 mm is automatically recorded in the microcomputer's memory and displayed on the VDU. When the ring sequence of a sample has been measured it can be printed out and also stored on floppy disk. The sequence of ring widths of each sample is represented as graphs (width against time) on transparent semi-logarithmic paper.

The tree-ring curves were visually compared with each other by superimposing two curves, sliding one curve past the other and searching for similarities in the patterns of wide and narrow rings, which indicate that the timbers had some period of growth in common. This process, known as cross-matching, is also carried out on the Apple microcomputer. The CROS computer program (Baillie and Pilcher 1973) measures the amount of similarity between two ring sequences by calculating the product-moment correlation coefficient, r, and a corresponding value of Student's t for each position of overlap. Generally a t–value of 3.5 or over is significant if it is accompanied by an acceptable visual match (Baillie 1982). Computer matching must always be checked visually before it can be accepted, since spurious results occasionally occur.

A site master curve is produced from any matching curves by adding them together and producing an average curve. A master curve is more likely to produce a date than the ring sequence of a single sample when compared with a dated reference chronology. This is because the master curve enhances the common climatic signal but reduces the 'background noise' resulting from the local growth conditions of individual trees. The ring sequences from each group of samples were compared for similarities and were finally tested against reference chronologies from Britain and Europe (Table 5).

Following the completion of cross-matching and dating, it is possible to calculate the felling dates of the timbers. Sapwood, the outer part of the oak tree, is very important in the determination of felling dates. It is easily differentiated from the heartwood, usually by its colour, but also because the large springwood vessels of the sapwood are hollow, whilst those of heartwood are filled with tyloses (Jane 1970, 38). Sapwood, however, was often removed from the timber due to its susceptibility to fungal and insect attacks.

If the sapwood on a sample is complete the exact felling year can be given. However, because the amount of sapwood in an oak tree is relatively constant, it is possible to estimate the felling year even if only a small amount of sapwood is preserved. A recent study of oak trees shows that the amount of sapwood remains constant between 10–55 rings (Hillam and Tyres 1987). If there is no sapwood present, the addition of the minimum sapwood allowance (10 rings) to the date of the last measured heartwood ring produces a *terminus post quem* for felling. As the number of missing heartwood rings is unknown, the actual felling date could be much later.

Construction usually followed soon after felling since it is much easier to work when 'green'. In medieval times timber was rarely seasoned unless it was to be used for panelling or furniture (*see*, for example, Hollstein 1980 or Rackham 1990). It would be unnecessary in any case to season timber which was intended for use in a waterfront structure. At this stage of the tree-ring analysis, however, factors such as stock-piling or timber reuse must also be considered, since they might affect the interpretation of the tree-ring dates. Thus whilst the production of dates is a completely independent process, their interpretation (ie calculation of felling and construction dates) can be refined by studying other archaeological evidence.

Results

Of the 49 samples received from the 1983/4 excavation, only seven were unsuitable for measurement. Samples with more than 50 rings are preferred as these can be dated more readily, although timbers with 30–50 rings can sometimes be dated but a great deal of care must be taken during cross-matching. Nine out of the ten 1981 samples, measured by Bridge, were usable. Details of orientation and number of rings of all samples are in archive. The ring width data from the 1983/4 excavation are stored at the Sheffield Dendrochronology Laboratory. The timbers providing key sequences are labelled on Figure 11.

Dating the timbers

On the basis of other archaeological dating evidence available when this analysis was carried out, the tree-ring samples were divided into three groups. The first was the group from W61A (Phase 9), tentatively dated by the excavators to *c.* 1800. All nine of these timbers were measured, although their ring sequences were generally short. Only three of the ring sequences (39, 66, and 69) cross-matched conclusively (Fig. 49). A master curve of 59 years, READING1, was constructed using the data from the three matching curves. This master was tested against various reference chronologies, or absolutely dated ring sequences. High t–values were obtained when the master covered the period AD 1708–1766 (details in archive).

Table 5: reference chronologies used in the dating of the Reading tree-ring sequences

Chronology	*Reference*	*Date span*
Abbey Barn, Glastonbury	Bridge 1983	1095–1334
Bradwell Abbey, Milton Keynes	Bridge 1983	1083–1279
Calverley Hall, Leeds	Hillam 1982	1261–1480
Carlisle	Baillie/Pilcher pers. comm.	893–1600
Commandery, Worcester	Pilcher pers. comm.	1273–1465
Droitwich	Hillam 1985	1178–1415
Dublin	Baillie 1977	855–1306
Dunstable	Bridge 1983	1172–1302
E. Midlands	Laxton *et. al.* unpubl.	882–1976
England (various)	Baillie/ Pilcher pers. comm.	404–1981
Germany, Munich area	Becker 1981	370 BC– AD 1969
Germany, Trier area	Hollstein 1980	400 BC– AD 1965
Hampshire	Barefoot 1985	1635–1972
Maentwrog	Leggett *et al.* unpubl.	1710–1974
Nantwich	Leggett 1980	930–1330
Trig Lane, London	Tyer pers. comm.	1207–1382
Wick, St Cuthbert's	Bridge 1983	1255–1496

The second group consisted of seventeen samples from W61A and five from W61B (Phase 4) which had been suggested on archaeological grounds to date to the late 13th and early 14th centuries. Five of the samples proved unsuitable for measurement. The ring sequences of ten of the timbers from W61A cross-matched each other (Fig. 49). The level of agreement between samples 415 and 417 was very high (t=11.0) indicating that these two samples probably came from the same tree. A master curve of 187 years, READING2, was compiled from these matching curves. This was compared with various dated chronologies which gave high t–values when READING2 spanned the period AD 1221–1407 (details in archive).

The third group consisted of thirteen samples, all from W61B, which had been tentatively dated to the early 16th–18th centuries. Only one of the samples was unmeasurable. Nine of the ring sequences cross-matched each other (Fig. 49). The ring widths of these matching curves were averaged to produce a master curve of 163 years, READING3. This was compared with reference chronologies spanning the 16th–18th centuries. No conclusive results were obtained within the expected period but the England and East Midlands chronologies had given t–values of 4.4 and 6.9 respectively when READING3 covered the period AD 1181–1343. A comparison between READING3 and READING2 at this date produced a very good match both visually and on the computer (t=6.7). READING2 was compared with several other reference chronologies which confirmed this date (details in archive). READING2 and READING3 were combined to produce a new master, READING4, dating from AD 1181 to 1407.

Of the five remaining samples, all from W61B, one mid 12th-century sample was unmeasurable. Two samples had been tentatively dated to the 17th/18th centuries, whilst two others had been placed between the 14th and 16th centuries. Neither of these two pairs cross-matched each other. The ring sequences from these four timbers, along with all unmatched samples from the second and third groups were compared with READING4 and various reference chronologies. A further four samples from W61B were dated (Fig. 49). These were added into READING4 resulting in a revised master, READING5, extending from AD 1160 to 1407.

As over 50% of the measured samples from the 1983/4 excavations had been successfuly dated, the ring sequences of the 1981 samples (Bridge in archive) from W12C were re-examined. Some of these were known to be on the same alignment as dated samples from W61A. The ring sequences of all of these samples, with one unusable exception, were compared with the master READING5 and dated reference chronologies, many of which were not available when the data were first analysed. Two samples were dated and were subsequently added into READING5. This new master, known as READING, dates from AD 1160 to 1407 (details in archive) and includes 25 samples (Fig. 49). The ring width data for READING and READING2-5 are listed in archive.

The timbers

The numbers of rings present on the medieval samples ranged from 18 to 153: however, the bulk of the timbers appear to have originated from trees approximately 50–100 years old. In general, during the medieval period, trees seem to have been felled under 100 years old, and often at about 70 years (Rackham 1990). The dimensions of the majority of the medieval timbers found at Abbey Wharf lie between 125 x 125 mm and 175 x 175 mm. The trunks had been worked accordingly, either halved, quartered, or left virtually whole, which could explain the presence of sapwood on so many of the samples. In some cases the whole timbers appear to have been unworked. The occurrence of the halved, quartered, and whole timbers from the sampled component is approximately 1:1:1; methods of timber conversion are considered further in the following section.

All the 18th-century timbers had retained sapwood and six out of the nine were whole trunks. The dimensions do not vary greatly from those of the medieval timbers. However, with one exception, the parent trees of all appear to be under approximately 60 years old.

Interpretation

Table 6 shows the felling dates, exact or estimated, of all the dated samples. Six samples had retained a full complement of sapwood. The bark or waney edge, indicating the last growth of the tree prior to felling, was

Table 6: felling dates for all dated samples

Site	*Phase*	*Context*	*Date span (AD)*	*Felling date*
W61B	3	256	1160–1253 (1242)	1253–1257*
	3	261	1173–1231 (1228)	1238–1282
W12C	4	1119	1168–1299	After 1309
W61A	4	415	1221–1294	After 1304
	4	416	1231–1315 (1301)	1315*
	4	417	1229–1307 (1291)	1314
	4	426	1317–1356	After 1366
W61B	4	118	1206–1343 (1316)	1343–1344*
	4	123	1210–1283 (1269)	1283–1323
	4	124	1188–1277	After 1287
	4	127	1165–1271	After 1281
	4	211	1191–1343 (1308)	1343–1344*
	4	212	1191–1266	After 1276
	4	213	1211–1341 (1319)	1341–1373
	4	215	1202–1343 (1320)	1343–1344*
	4	235	1181–1286	After 1286
	4	263	1185–1247	After 1257
	4	264	1193–1304	After 1314
W12C	5	965	1265–1376	After 1396
W61A	5	350	1310–1387 (1386)	1395/1396*
	5	351	1313–1407 (1390)	1407–1411*
	5	352	1330–1407 (1385)	1407–1411*
	5	253	1225–1373	After 1383
	5	356	1328–1382 (1376)	1386–1430
	5	357	1335–1388 (1372)	1388–1426
W61A	9	39	1729–1766 (1756)	1766/1767*
	9	66	1731–1765 (1755)	1765–1809
	9	69	1708–1765 (1750)	1765–1804

Dates of heartwood-sapwood transitions, if present, in brackets. * = bark edge

present on all six, although the outer eight rings of one sample were not measured due to distortion. Consequently their date of felling is precise. Several other samples also retained a full complement of sapwood, but the edges of these were badly preserved. However, only 3–4 rings at most could have been missed, giving felling dates of 1407–1411 for two samples and 1253–1257 for one other. The felling dates of the remaining dated timbers have been estimated.

Trench W61A (Figs 11 and 49)

Thirteen timbers from W61A associated with Phases 4, 5, and 9 were dated. Three felling dates were identified for the medieval timbers from Phase 4 and 5. The waney edge was present on Phase 4 sample (416), indicating that it was felled in AD 1315. As only part of the earlywood is represented in the last season of growth, the tree would probably have been felled during late spring or summer. Samples 415 and 417, adjacent to 416 (Fig. 11), appear to be contemporary with it and are also likely to have been felled in 1315.

The bark edge is present on Phase 5 sample 350 and, as latewood growth was present, felling probably occurred between late summer AD 1395 and early spring (pre-growing season) 1396. The last ring of sample 357, thought to be very close to the bark edge, dated to AD 1388 which suggests that this sample was contemporary with 350.

Twelve to fifteen years later in the period 1407–1411 two timbers (351 and 352), also from Phase 5, were

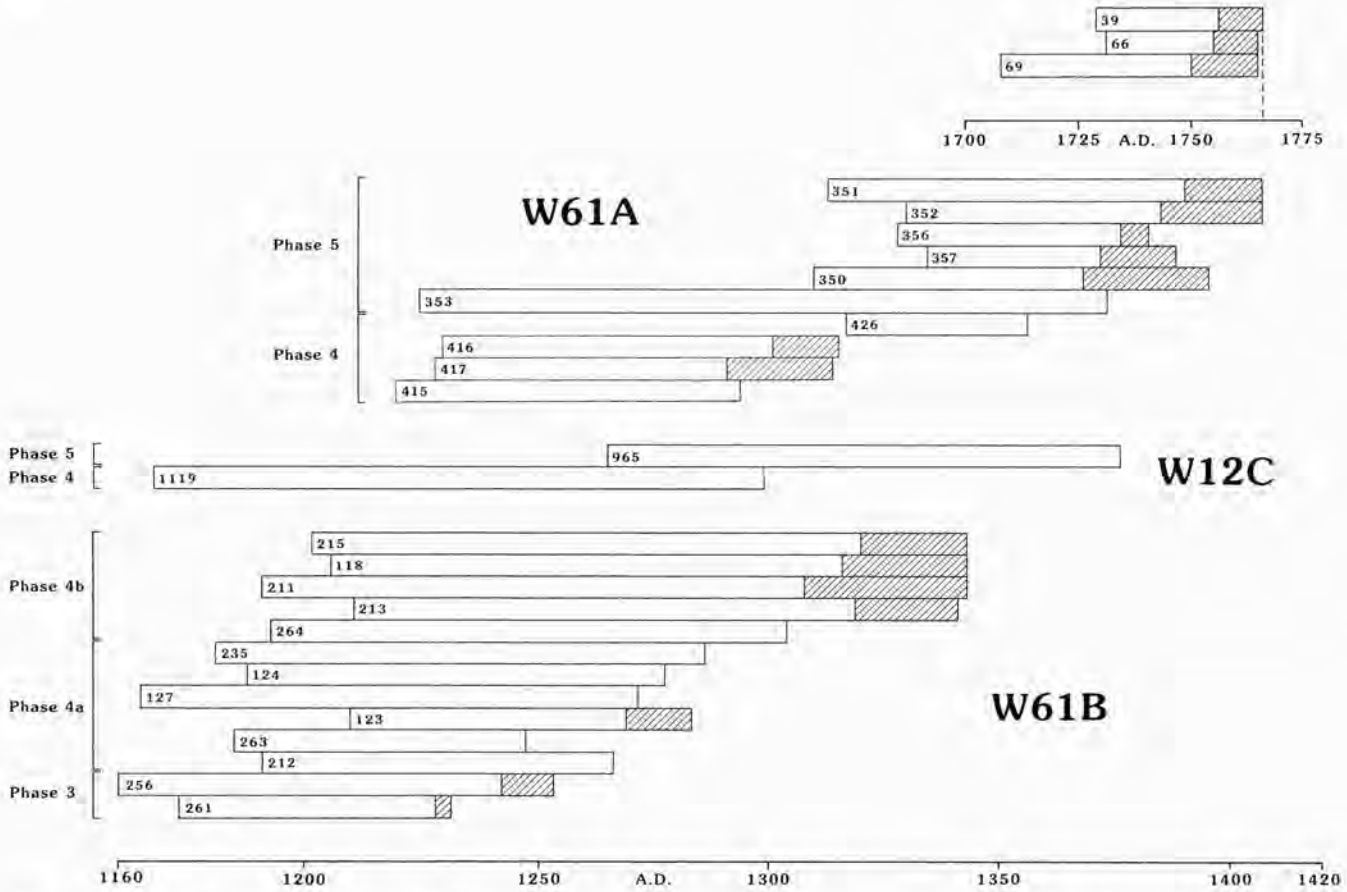


Figure 49 Abbey Wharf Phase 3–5: relative positions of dated ring sequences (hatched area indicates sapwood). The outermost rings of sample 417 were counted rather than measured

felled. Samples 356, 353, and 426 are probably contemporary with one or other of these two felling periods represented within the Phase 5 timbers (ie AD 1395/6 or AD 1407–1411) but it is not possible to determine which, even though sample 356 retained some sapwood.

The felling dates for the Phase 9 samples can be assessed from Figure 49. The presence of the waney edge and latewood growth indicates that felling occurred between late summer AD 1766 and early spring 1767. The last ring of the sequences from samples 66 and 69 both dated to AD 1765, but the waney edge did not appear to be present. The heartwood/sapwood transitions for samples 39, 66 and 69 date to AD 1750, 1755, and 1756. This indicates that the timbers were all probably felled at the same time.

Trench W61B (Figs 11 and 49)
Thirteen samples from W61B, associated with Phase 3, 4a, and 4b, were dated. Samples 256 and 261 are probably contemporaneous, since both retain sapwood, giving a felling date range of AD 1253–1257 for the timbers from Phase 3.

In the absence of sapwood a *terminus post quem* for felling of AD 1296 is obtained for the Phase 4a timbers (124, 127, 212, and 235), assuming they are contemporaneous. The presence of fifteen sapwood rings on 123 gives a felling date range of AD 1283–1323. Other archaeological evidence suggests that 123 may be associated with Phase 4a. This would imply that the timbers from Phase 4a were felled after AD 1296 but probably before 1323.

Three samples from Phase 4b (118, 211, and 215) had retained their full complement of sapwood and were felled in late AD 1343 or early AD 1344. Samples 213 and 264 from Phase 4b were also probably felled in AD 1343/4. Timber 263 has a *terminus post quem* for felling of AD 1257 and could therefore be contemporary with either Phase 4a or 4b.

Trench W12C (Figs 11 and 49)
Only two samples were dated from W12C. The final measured ring of sample 1119 was thought to mark the boundary between the heartwood/sapwood transition (Bridge in archive). This would give an estimated felling date of AD 1309–1354. Sample 965 retained no sapwood so a felling date after AD 1386 is assumed.

Discussion

The samples from W61A indicate that there were at least three periods of construction or repair to the waterfront structures during the 14th and early 15th centuries and one during the 18th century (Fig. 50; *see also* Table 6). The felling dates of the trees used to provide the timber for these episodes are AD 1315, 1395/6, 1407–1411 and 1766/7. As wood for use on a waterfront would not need to be seasoned, it is probable

that the timber was used quite shortly after it had been felled.

Phase 4 Samples (415–417) were used in a revetment constructed AD 1315 or just after. This was replaced approximately 80 years later by the structure which included Phase 5 samples, 350 and 357, felled in AD 1395/6. However, samples 351 and 352, on the same alignment and from the same structure as 350 and 357, were felled in the period AD 1407–1411. Stockpiling could account for trees of slightly different felling years being used in a single building phase, but it is doubtful that this would occur over such a long period of time. Due to the relative positions of the timbers it appears more likely that the Phase 5 revetment was constructed AD 1395/6 or just after, and that repairs may have been necessary AD 1407–1411.

The felling date of Phase 4 sample 1119 from W12C, which is on the same alignment and is possibly the same structure as W61A samples, indicates that it may be contemporary and thus also used in the AD 1315 construction phase. Sample 965, also from W12C, is terminal to the structure which includes 350 and 351. Although felled after AD 1386, it is impossible to determine whether or not it is contemporary with either of the two later construction phases.

The three dated samples (39, 66, and 69) from the 18th-century, Phase 9, structure indicate a construction date of AD 1766/7 or just after.

The dated samples from W61B indicate three periods of construction between the mid 13th and mid 14th centuries (Fig. 50; Table 6). This has resulted in modifications to the model of waterfront development based on the preliminary archaeological evidence, which had suggested that a more prolonged sequence of constructional phases might have been represented. The felling dates of the trees used to provide the timbers for these phases are AD 1253–1257, 1296–1323 and 1343/4 implying that the life span of each revetment may have only been approximately 50 years.

Phase 3 samples 256 and 261 were used in a revetment probably constructed in the period AD 1253–1257. This was replaced during Phase 4a by the structure which included samples 124, 127, 212, 235, and possibly 123, felled after AD 1296 and probably before 1324. The Phase 4b samples, 118, 211, 213, 215, and 264 are on the same alignment as the Phase 4a samples but were felled AD 1343/4. This implies that the Phase 4 waterfront structure was constructed in the period 1296–1323 and repaired or rebuilt in 1343/4. Tree-ring analysis demonstrates that its initial construction could be contemporary with the erection of the revetment in W61A in AD 1315.

The close correlation between many of the medieval samples implies that they grew under similar environmental conditions and probably came from the same source. It is quite probable that the Abbey owned sufficient forest to provide all of its own timber. Some samples, all from young trees, have much wider average ring widths indicating that they grew under more favourable conditions, perhaps in less dense woodland or on the fringe of forests. Generally trees with very narrow rings are from woodland where competition was severe, whereas trees with wide complacent rings usually originate from open contexts where little competition was experienced (Bartholin 1978; Hillam and Morgan 1981).

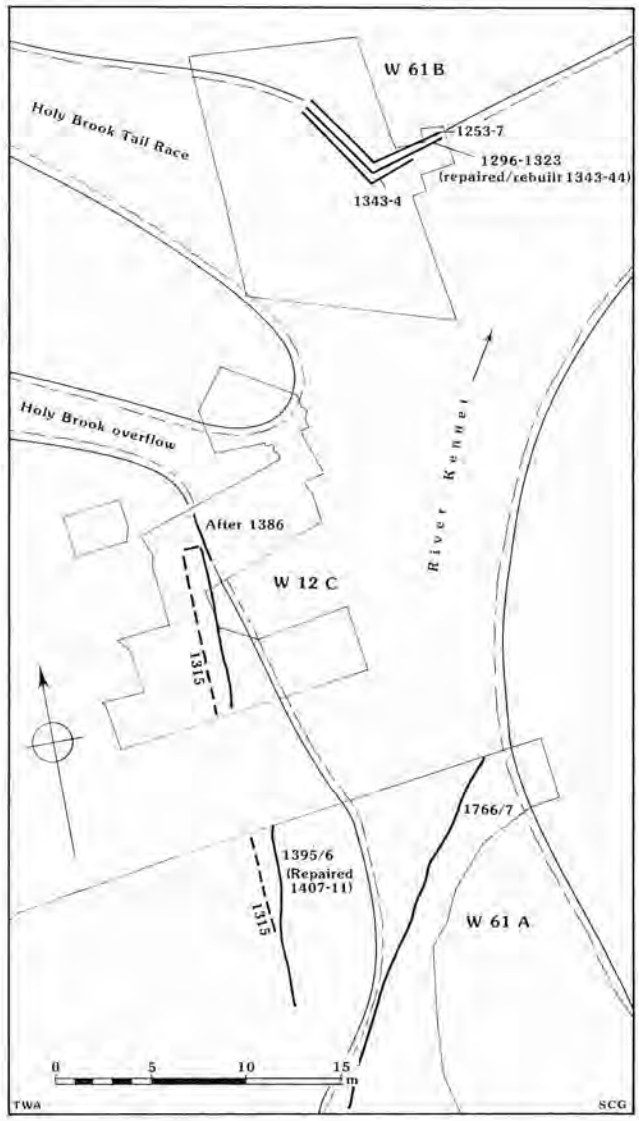


Figure 50 Abbey Wharf: summary of the chronological development derived from tree-ring dates

The timbers used in the 18th century all tend to be from trees under approximately 60 years old. They appear to have wider average ring widths than the majority of the medieval timbers, which came from parent trees of between 50 and 100 years old, implying that they experienced less competition. These two points may both be related to the 17th-century depletion/regeneration phase discussed in Baillie (1982, 211–13). During the 17th century forests are thought to have been heavily and systematically exploited resulting in a depleted stock of oak trees of a suitable size for building. The regeneration was aided by landowners planting oaks specifically to replenish the depleted stocks which would have probably resulted in young oak trees of very similar ages being available for building by the middle of the 18th century.

The timbers from the medieval period span what is considered to be another depletion/regeneration phase

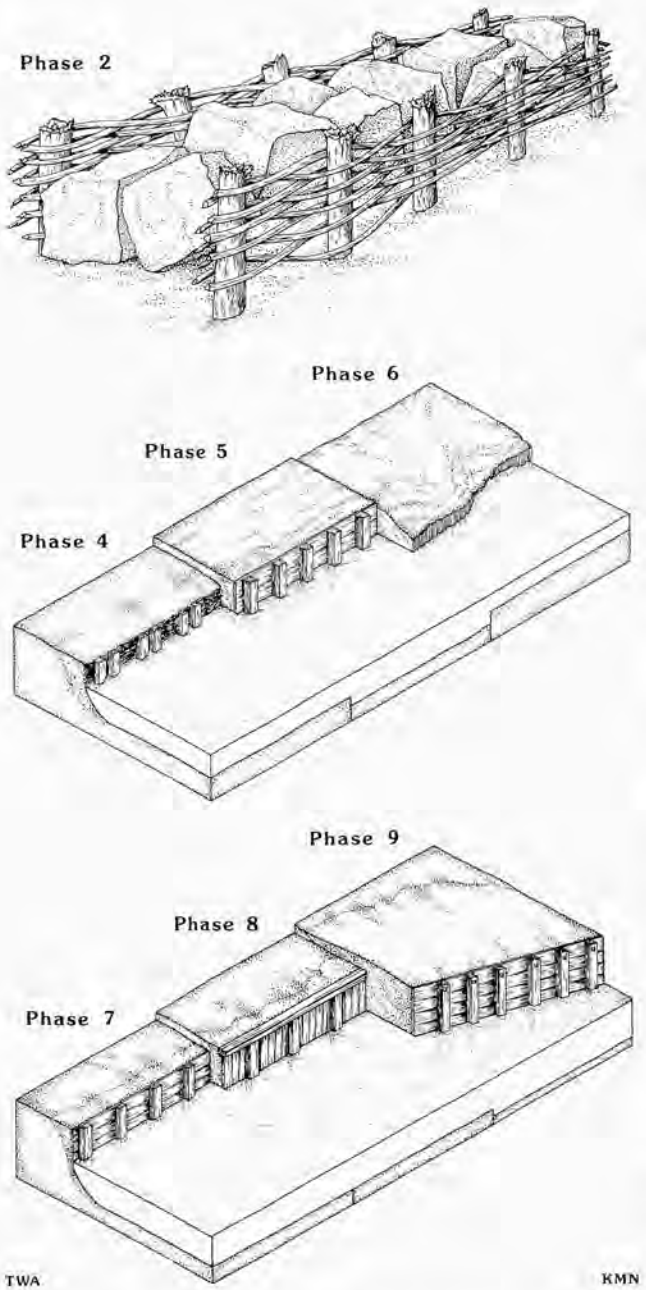


Figure 51 Abbey Wharf: reconstructions of elevations by phase (Phase 2 adapted from Castle Donnington reconstruction, after C. R. Salisbury)

in the 14th century (Baillie 1982, 213–15), trees having been felled throughout the 14th and early 15th centuries. If the Abbey did supply its own timber then it is quite probable that they would have avoided the depletion and subsequent regeneration.

4. Revetment Typology and Construction, by J. Pidgeon and John W. Hawkes

The variety of materials, preparation, and constructional techniques employed on channel revetments is best illustrated by the sequence recovered from the Abbey Wharf site (Fig. 51), elements of which have been closely dated by dendrochronology. Where other sites have produced morphologically comparable structures, radiocarbon determinations or artefactual associations have not generally contradicted a supposition that a broadly chronological progression of revetment type is valid for the whole town (Fig. 52).

Revetment Types

Miscellaneous stakes
Stakes marking channel alignments of Neolithic (Crane Wharf 1a) and Saxon (Coley Park Farm, Crane Wharf 1b) date are described in Chapter 3. Too few individual timbers were recovered to enable any structural analysis to be undertaken.

Post-and-wattle
Single rows of usually birch or beech posts were recovered from a variety of sites, and are the simplest type of revetment technique and apparently the earliest medieval revetment tradition within the town. Examples from Abbey Wharf Phases 1c and 2a are early within that stratigraphic sequence, early or possibly pre-monastic *c.* 12th century, and a radiocarbon date of cal AD 980–1120 (Har–8556; 1000±70 BP) has been obtained from timber 3050 from the W158 Bridge Street East Phase 2a alignment which is also likely to have been a wattled construction, although no lateral elements survived. Some continuity into later periods is indicated by the late date for timber 3015 from Fobney Street (cal AD 1430–1630; Har–8557; 400±70 BP) and the Phase 3d alignment closing the mouth of the Holy Brook overflow channel at the Abbey Wharf. Other examples from observations from the Library site Phase 1 and 27 King's Road are not closely dated.

The example from Abbey Wharf Phase 2a included fragmentary remains of willow wattling, and it is likely that hurdles or brushwood lacing would have infilled the areas between the posts. The variant from Abbey Wharf Phase 2b, a double stake row, bore no traces of any infilling material. The intact length of wattle revetment from Abbey Wharf Phase 4 may be seen as a transitional form. Wattle hurdles are in this case retained by squared oak timbers of a size consistent with the post-and-plank revetments of later phases, the additional supporting strength perhaps required because of the pressure of a greater quantity of reclamation fill placed behind it.

Post-and-plank
The basic form of later medieval revetment was oak posts (on the river side) with nailed oak planks behind. On the Abbey Wharf site such structures all date to Phase 2a or later, although planking was only apparently used on a very limited scale prior to Phase 5. Examples dated by dendrochronology suggesting construction dates after AD 1238 (Phase 3b), AD 1383, and AD 1407–1411 (Phase 5).

The earliest examples (all pre-Phase 5 Abbey Wharf) are apparently confined to the immediate area of a confluence, whilst later 14th- or early 15th-century exam-

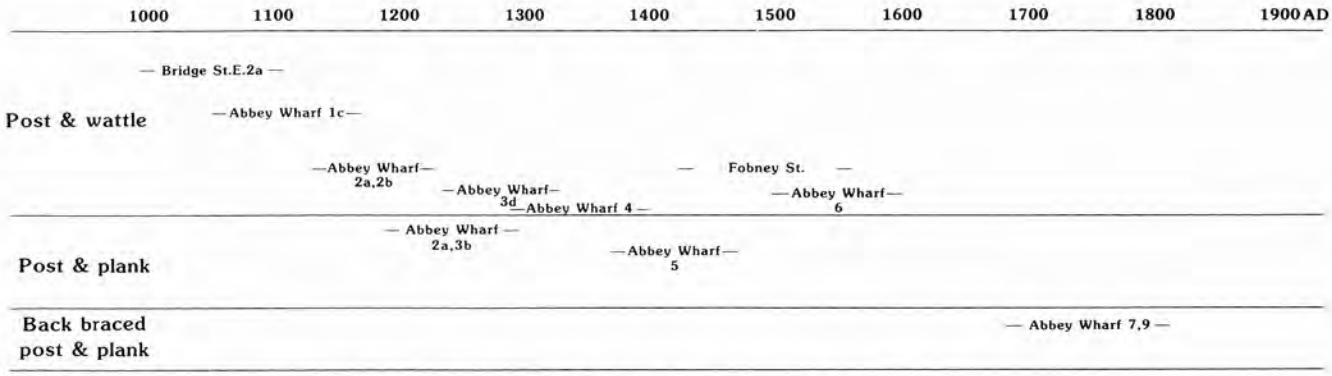


Figure 52 Principal instances of revetment types on the Reading waterfronts

ples from Abbey Wharf Phase 5 extend more generally along the river bank. This may be specific to the Abbey Wharf for the purposes of wharfage, or may represent a general expansion of the network of revetments at this time.

Back-braced post-and-plank

Examples of post-and-plank revetments with back-bracing are confined to phases of construction of the Kennet canalisation, the only one dated by dendrochronology from Abbey Wharf Phase 9, AD 1766/7. The added rigidity offered by bracing may have been in response to the pressures exerted by the large quantities of reclamation material employed in the construction.

Stave construction

The only example of a stave-built revetment is the apparently short-lived Abbey Wharf Phase 8. Even the presumed addition of a top rail and supporting verticals (as shown on Fig. 51) produces a structure significantly weaker than the contemporary back-braced post-and-plank structures which preceded and followed it.

Timber Preparation

The terminology used in archive to describe the methods of preparing timber posts by shaping and pointing is illustrated in Figure 53 and Plate 18. Too few posts were examined to establish a pattern in the methods of point

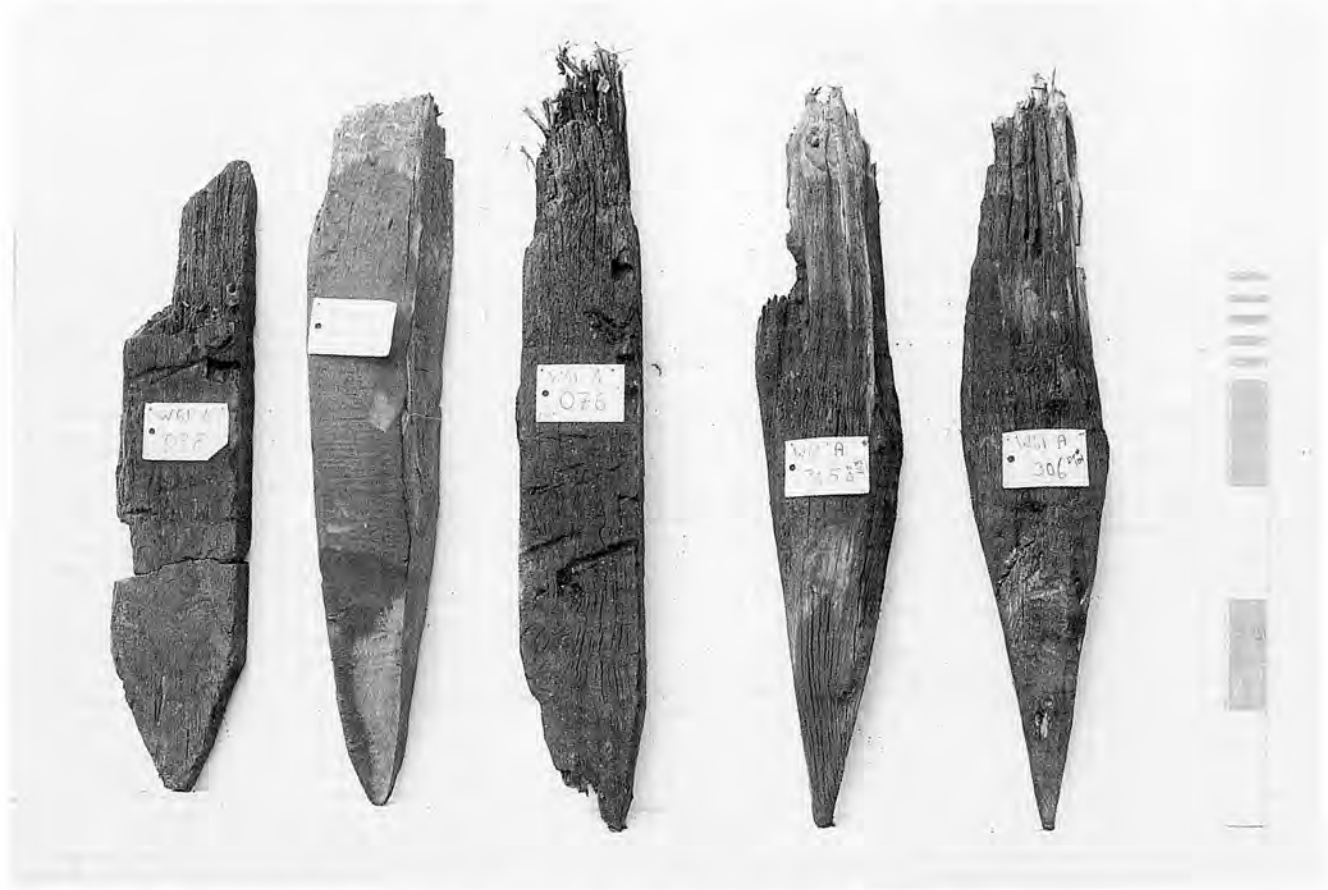


Plate 18 A selection of worked timber posts from the Abbey Wharf site (W61A)

Table 7: Abbey Wharf, timber conversions by phase (for key see Fig. 53)

		Stakes		*Trunk untrimmed*				*Trunk trimmed*				*Total*
Site	*Phase*	*I*	*J*	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	
W12C	1c	3	–	–	–	–	–	–	–	–	–	3
W12C	2a	1	–	–	–	–	1	–	–	1	–	3
W12C	2b	5	1	–	–	–	1	3	–	–	–	10
W61B	2b	3	–	–	–	–	–	–	–	–	–	3
W61A	2	20	1	–	–	–	5	2	–	–	–	28
W61B	2	33	1	–	–	–	–	3	–	2	1	40
W12C	3a	–	–	–	–	–	1	–	–	–	–	1
W12C	3b	1	–	–	–	–	–	1	1	–	–	2
W12C	3c	–	–	–	–	–	–	1	–	1	–	2
W12C	3d	22	8	–	–	2	3	1	–	2	–	38
W12C	3e	–	–	–	–	–	–	1	–	1	–	2
W61A	3	5	2	–	–	–	1	1	–	–	–	9
W61B	3	1	–	–	–	–	–	3	3	–	–	7
W12C	4	2	–	–	–	2	–	6	4	13	–	27
W61A	4	–	–	–	–	–	–	10	2	3	–	15
W61B	4	1	–	2	5	1	1	28	15	19	1	73
W12C	5	–	–	–	3	–	–	3	6	4	–	16
W61A	5	–	–	–	–	–	–	11	3	–	–	14
W12C	6	3	–	–	–	–	–	–	–	–	–	3
W12C	7	10	–	–	–	1	–	1	2	1	–	15
W61A	7	–	–	–	–	–	–	4	2	–	–	6
W61A	9	–	–	–	1	–	–	38	14	2	1	56
W61B	9	1	1	–	–	–	–	1	1	–	–	4

preparation through time or between sites, but Table 7 outlines the chronological occurrences of the various methods manufacture of posts for the Abbey Wharf site. The methods employed involve a considerable variation in economy; boxed heart conversion produces only one (admittedly robust) timber from a substantial trunk which could have been rendered more productive if half- or quarter-sawn. Radial splitting is undoubtedly the most efficient usage of a trunk, although there are penalties to be paid in terms of size and strength, and the inevitability of producing posts with large areas of curvature and awkward angles between the faces. Variations in the type of timber employed have been considered above.

There is a marked tendency in the earlier periods to use entire trunks, unconverted, as stakes or small posts. The availability of over-sized timbers is implicit in the adoption of any method of timber conversion. The method of conversion and the type of revetment need to be closely matched to ensure that strength and stability are achieved as economically as possible; the considerable weight of the Abbey Wharf Phase 7 reclamations is supported by smaller posts than used for the medieval revetments, but at the expense of having to construct a more elaborately-carpentered structure involving back-bracing. The principal medieval wharf revetments (Abbey Wharf Phase 4 and 5) are, however, arguably over-specified in terms of the size, number, and spacing of the uprights involved and in the wastefulness of the conversion methods. The comparative scarcity and increased prices of hardwoods from the 16th century onwards may have altered the economic equation (Braudel 1981, 362–7; Baillie 1982), with a return to the use of smaller stakes and timbers in the later phases.

Reclamations

Little evidence is available for the origin of the reclamation layers which the revetments fronted. The similarity of the matrix of the channel and reclamation deposits on the Abbey Wharf has suggests that the reclamations are in fact redeposited channel silts dredged from the river. The small quantities of building material, particularly tile, are incorporated on an apparently casual basis in small, bucket-sized consignments,

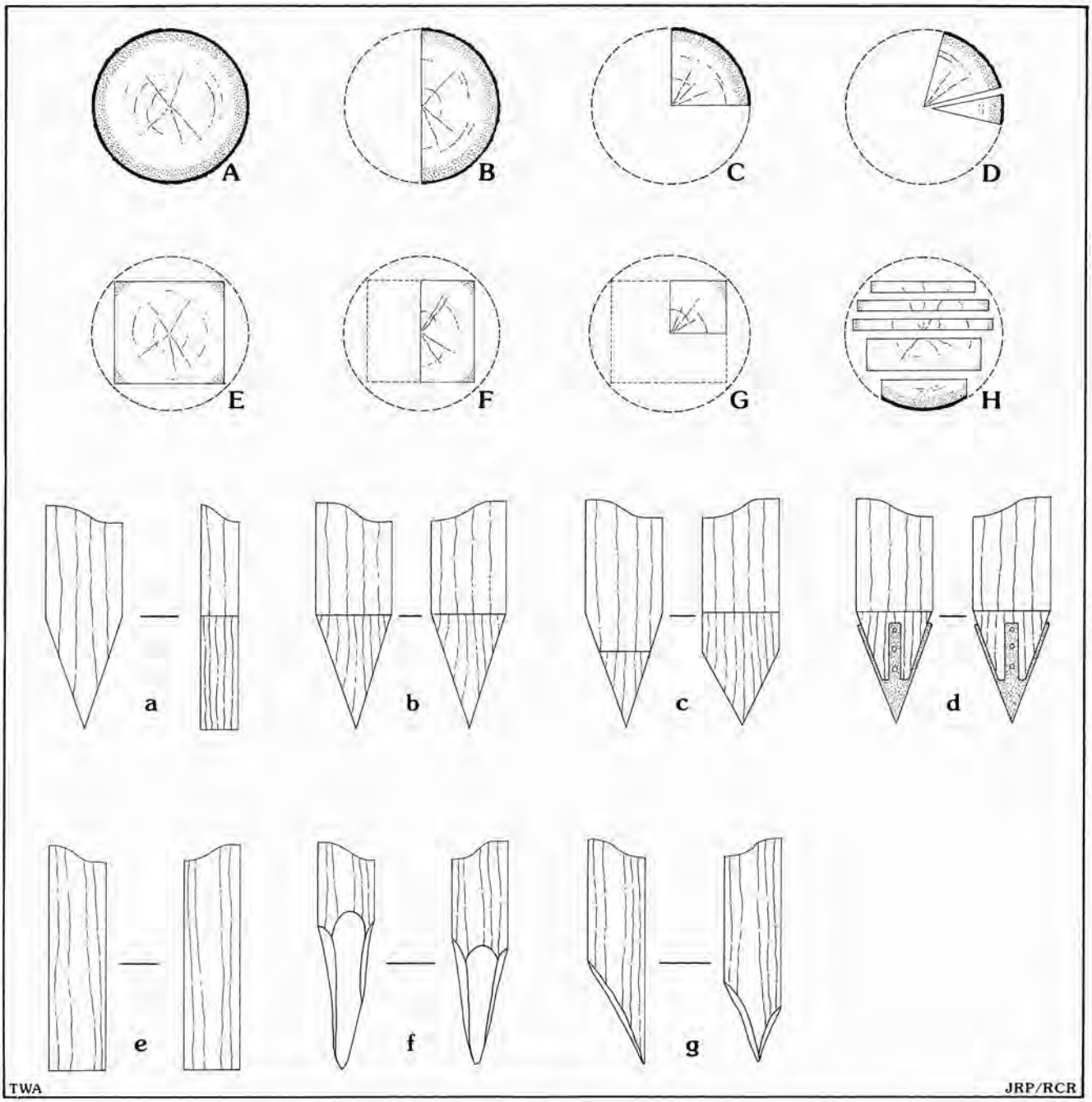


Figure 53 Terminology for post conversions (top): A = untrimmed whole trunk; B = untrimmed half trunk; C = quartered trunk; D = radially split trunk; E = squared — boxed heart; F = halved trunk; G = quartered trunk; H = slabbed or planked; (not illustrated: I = whole stake; J = halved stake)

Methods of pointing (bottom): a = bilateral edge cut; b = four-face; c = edge and face; d = iron-tipped; e = butt-ended; f = axe-cut multi-facet; g = axe-cut one / two facet

although specific deposits (eg the Phase 7 closing of the overflow channel) are dumps on a larger scale.

Later and post-medieval deposits suggest a wider range of sources for reclamation material; chalk from 14th- or 15th-century Phase 2e Bridge Street East, chalk associated with an undated revetment at Fobney Street, and the unspecified terrestrial soils comprising the Abbey Wharf Phase 6, and later reclamations from the late 16th century onwards. None of these levels utilises redeposited midden material, nor is any use made of the readily-available sources of gravel. Gravel pits of 18th-century and later date have been encountered in a number of excavations and observations in the Abbey precinct, particularly some 50 m north of the Holy Brook, north of Abbey Square, west of the cloister area. It is perhaps somewhat surprising that no use was made of a locally-obtainable resource in many respects superior to the materials actually employed.

6. Environmental Analyses

1. Environmental Sampling

Despite the wide variety of waterlogged deposits encountered on various sites, the survival of environmental materials proved to be largely restricted to those deposits identified as channel silts; transgressional silts, reclamation, and dumped deposits yielded few well-preserved samples, even where they were situated in conditions of permanent or semi-permanent waterlogging.

In addition to the pollen and plant macrofossils reported on below, samples were taken with a view to recovering insects and diatoms. The untimely death of Dr Maureen Girling halted analysis of these remains at an early stage; it proved impossible to retrieve all the samples (many of which were partly-processed) or to make alternative arrangements for the continuation of the work, and these investigations were reluctantly abandoned. It had been the intention to link the results of insect and diatom analysis with further work on the pollen, but these additional pollen samples, which would have covered a wider chronological range, were amongst those lost.

Proposals for extensive redevelopment of the area east of Bridge Street may reveal deposits more suited to the preservation of environmental data than have been encountered to date. Provision will be made for analysis to complement the work carried out on the Abbey Wharf site, with sedimentological investigations to examine the history and chronology of silt accumulations as a priority.

2. Pollen Analysis from Abbey Wharf Site W61B, by Robert G. Scaife

Introduction and Aims

The waterlogged character and resultant anaerobic preservation of organic materials in certain well-dated contexts provided conditions well-suited to pollen preservation. Thus pollen analysis was undertaken in conjunction with sampling for insect assemblages (M. Girling) and plant macrofossils (Carruthers, below). The circumstances which subsequently restricted the scope of the pollen work and prevented an integrated environmental study have been touched on above. The only series of pollen samples finally analysed and reported on here were obtained from a Phase 3 reclamation context in the north section of Abbey Wharf W61B.

Although pollen analyses of such sediments have a large element of 'look and see', the medieval date and urban origin of these sediments provided the likelihood of obtaining evidence for the urban environment of the 13th century. It was expected that pollen analysis might shed light on the range of plants and plant materials which were growing and/or being used in the local area of Reading at this time.

Serial pollen samples were taken directly from the open archaeological section at an interval of 40 mm through Phase 3 context 2058. This context lay at a depth of between 34.68 and 35.33 m OD and was directly associated with the construction of the Phase 3 revetment, timbers for which were felled in the period AD 1253–1282 (*Chapter 6*). The excavators have suggested that such reclamation deposits may have derived from sediments dredged from the river channel, and could therefore be expected to also contain inclusions of an earlier date. Although including shell, the sandy deposits did contain a higher proportion of organic detritus and wood fragments. Standard pollen preparation techniques were used in the extraction of the sub-fossil pollen and spores (Moore and Webb 1978). Pollen, although not abundant, was well-preserved. The results of this analysis are presented in pollen diagram form (Fig. 54) and discussed below. Pollen percentages are given as a percentage of total pollen (TP) and spores as a percentage of total pollen plus spores.

Pollen Data

Inspection of the pollen diagram (Fig. 54) clearly shows that there is a diverse range of pollen taxa present in the fourteen levels (spectra) analysed. It is also apparent that with a few minor exceptions (*see below*), there is little vertical (ie temporal) variation in the taxa present. Thus, no attempt at zonation of this pollen sequence has been made. The lack of temporal variation is undoubtedly caused by the disturbed origins of these sediments. It is possible to distinguish a number of categories of pollen taxa which can be interpreted in terms of urban environments and human activities. These categories may be broadly described as follows:

a) Arboreal component: *Quercus* (oak) and *Alnus* (alder) are the most consistent tree pollen taxa. The former attains a maximum of 10% TP at 30.58 m OD, the latter of 11% at 34.98 m OD. Other taxa include *Betula* (birch), (especially between 35.03 and 35.13 m OD), and sporadic occurrences of *Pinus* (pine), *Ulmus* (elm), *Tilia* (lindens), *Fraxinus* (ash) and *Carpinus* (hornbeam).

b) Shrubs: these are dominated by *Corylus* type to 12% T. P. This type may include *Myrica* (sweet gale) and *Corylus* (hazel) with similar pollen morphology. Close inspection of those well-preserved pollen grains indicates that here hazel is the principal taxon concerned. *Salix* (willow) is also of note between 34.93 and 35.08 m OD.

c) Aquatic and marsh plants: although the sediments observed here are directly related to the River Kennet and its tributaries, surprisingly few aquatic taxa were recorded. Those which were plantains include *Alisma* type (water plantain), *Hottonia* (water violet) and *Sparganium* type. The latter includes Sparganium (bur reeds) and *Typha angustifolia* (lesser reedmace). Cyperaceae (sedges) predominate in this category although, as discussed below, the derivation of this pollen may be from

other sources. It is possible that other taxa recorded in the general herbaceous category may also have been demonstrated as belonging to this ecological group were identification to species level possible. Such taxa may be *Ranunculus* type (buttercups), for which Carruthers has recorded seeds of *Ranunculus* subgroup *Batrachyium*, *Lythrum salicaria* (purple loosestrife), and *Scrophularia* type (water betony). Spores of the fern, *Osmunda regalis* (royal fern) and *Sphagnum* (bog moss) are also present.

d) Cultigens and associated taxa: pollen of cereals (along with Gramineae) are the dominant taxa throughout this pollen sequence. Percentages are in general greater in the lower stratigraphical levels. *Fagopyrum esculentum* (buckwheat) and Cannabis type (*Cannabis sativa*; hemp and *Humulus*; hop) are the only other possibly cultivated taxa and only occur sporadically. There is, however, a diverse herb assemblage recorded with many taxa which may be of segetal type. Pollen morphology does not allow separation to species or in some case genus and it is thus not possible to identify absolutely those taxa which are referable to this category. These may include *Centaurea cyanus* (blue cornflower), Cruciferae (charlocks), *Spergula* (spurrey), *Chenopodium* type (goosefoots), *Polygonum aviculare* (knotgrass), and *P. convolvulus* (black bindweed). The presence of these very notable quantities of cereals and associated weeds does not necessarily indicate the presence of nearby arable agriculture; it is more likely that these pollen result from typical urban taphonomic processes (*see below*).

e) Ruderals: weeds of waste ground form a large part of the pollen spectra present. These include typically *Plantago* spp. (*P. lanceolata*, *P. coronopus* and *P. major* type; plantains). The high percentage values of Gramineae may also in part be from grasses growing in waste ground areas. It must again be considered that these taxa may have been derived indirectly via secondary anthropogenic pathways.

f) Spores: the monolete fern spores of *Dryopteris* type are dominant (to 12% TP + S). *Equisetum* (horsetail ferns), *Pteridium aquilinum* (bracken), *Polypodium* (polypody) and *Osmunda regalis* (royal fern) are also recorded.

g) Miscellaneous microfossils: of particular note and highly diagnostic in urban archaeological contexts is the presence of the ova of intestinal parasites. Small numbers of both *Ascaris* (maws worm) and *Trichuris* (whip worm) were found. Because these sediments were given a full palynological extraction treatment, it is likely that destruction of a larger number of these egg cases may have occurred.

Discussion

The interpretation of pollen spectra obtained from urban archaeological contexts poses a number of problems which relate to the potential sources of the pollen and the taphonomic processes which they undergo. Such problems have been discussed in studies from other urban areas of Britain and Europe (Greig 1982; Krzywinski and Faegri 1979; Krzywinski *et al.* 1982; Scaife 1982). In general, it can be stated that the diverse range of pollen taxa frequently encountered in urban environmental contexts accrue directly from plant communities present in and around the urban centres and from plant materials used by the inhabitants of the town or city. Thus, detailed studies of urban pollen assemblages may produce evidence for differing sources and ways in which pollen may become preserved. Suggested models of pollen sources, transport and deposition have been produced notably by Greig (1982) and Krzywinski *et al.* (1982). It is, however, apparent that such studies can provide valuable data on the environment of urban areas and the economic utilisation of plant resources by their inhabitants. Thus, the pollen spectra present may be representative of a diverse range of habitats and land use and of a multitudinous variety of uses of plant resources.

Unravelling these potential sources of pollen and providing a realistic interpretation is difficult. A background component comprising pollen evidence for the local and regional vegetation characteristics may be present but often masked by the substantial quantities of pollen from purely anthropogenic inputs as discussed below. At the Abbey Wharf site, the presence of tree and shrub pollen may be representative of local woodland growth. It would appear from the pollen data that oak and hazel woodland was certainly present. The problem here arises as to whether the pollen transport is by direct airborne means or via fluvial transportation. If the former is so, oak and hazel woodland with other woodland elements was present in the pollen catchment and local area of Reading. If riverine transport is involved, the pollen may derive from woodland at a distance up the river's catchment.

Similar arguments apply to the presence of the aquatic taxa. As noted above, few of these are present and this in part may relate to the continual clearance of the river channel in Reading town preventing stable growth of rooting and marginal aquatic plants. Pollen of willow is largely under-represented in pollen spectra because of its entomophilous character. The values of willow recorded here may therefore indicate that, whilst aquatic herbs were not prevalent, the banks of the river were likely to have had willow trees growing along them. However, the possibility of extra-regional, riverine transport of the pollen must again be considered. Quantities of *Alnus* (alder) pollen are seen and the same interpretation also applies. Where alder is dominant as in alder carr woodland, extremely high absolute pollen frequencies are often recorded. This is due to its anemophilous (wind-pollinated) character and the fact that it produces very large numbers of pollen grains. The percentages recorded here indicate, therefore, that it was probably not a locally-dominant tree but may have been growing in wetter habitats along the river and its tributaries.

The presence of many herb taxa provide different problems in interpretation, since although they undoubtedly derive from the urban habitat, they may result directly from urban weed assemblages or indirectly through a number of dispersal pathways of purely anthropogenic causation. During the medieval period extensive use was made of plant resources. Such utilisation might be expected to contribute pollen into the local environment. This has been described by Greig (1982) as the human pollen component. Studies of urban pollen assemblages continue to increase our knowledge of such sources of pollen and plant macrofossils. It can be envisaged that building materials (wood, coppice, and thatch) and floor covering materials (for human and animal quarters) were of special importance. Human

ABBEY WHARF

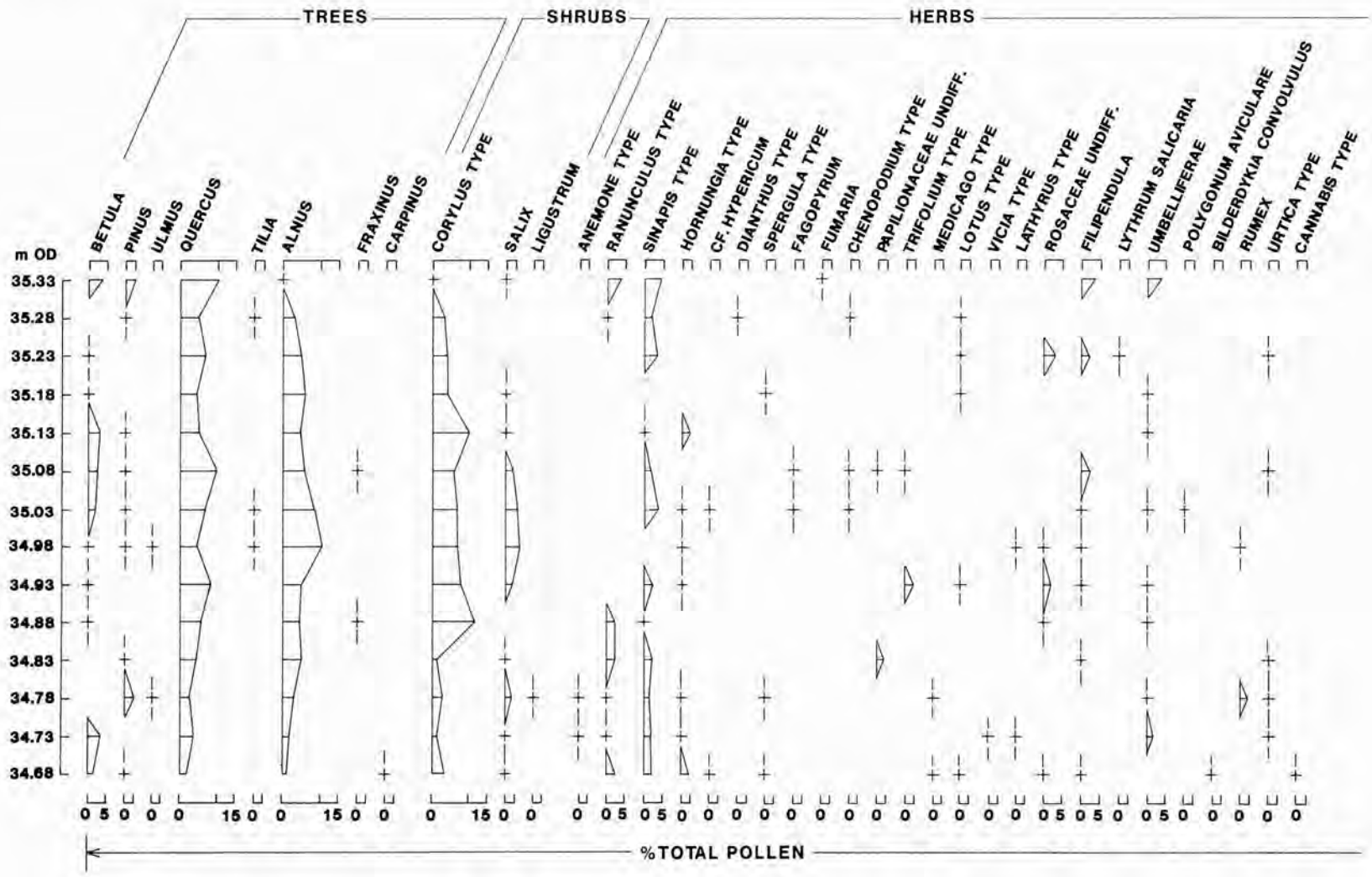


Figure 54a Abbey Wharf pollen diagram

ABBEY WHARF

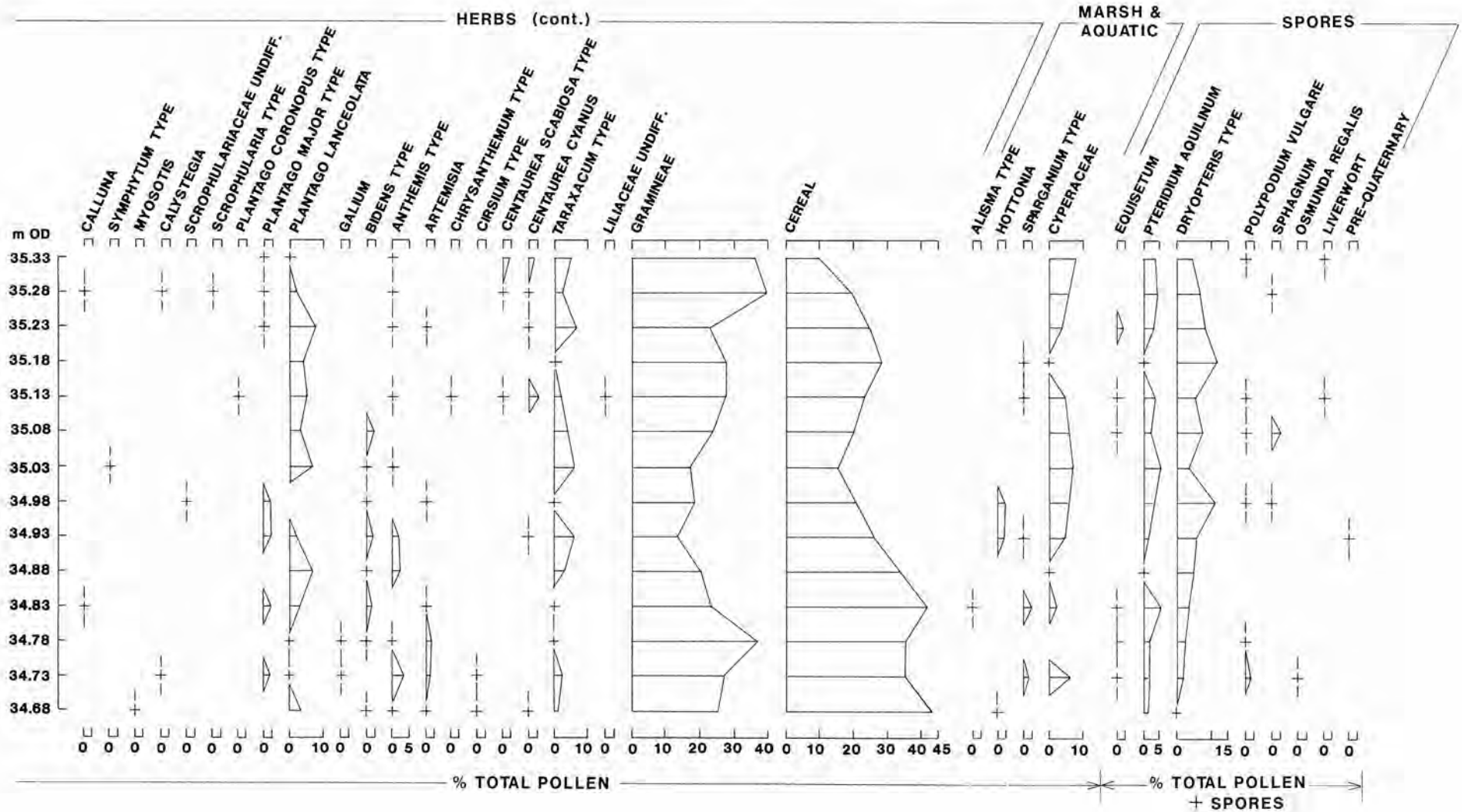


Figure 54b Abbey Wharf pollen diagram (cont.)

and animal foodstuffs have frequently been recorded either from food processing activities in urban areas, domestic waste food deposits and from faecal debris contained in latrine/cess-pits (Greig 1981). Ultimately much of this debris may have been disposed of on waste ground or in river channels (Keene 1982).

At the Abbey Wharf, very high values of cereal pollen are recorded along with the pollen of a number of segetal weeds. In 'normal' pollen spectra, such pollen frequencies are not usually encountered and an anthropogenic causation must be invoked. It is now widely understood that cereal pollen is a frequent component of such urban contexts and derives from one or more sources. It has been shown (Robinson and Hubbard 1978) that pollen may become trapped in the heads of cereals during its growth. This pollen remains throughout crop-processing and bread-making and is subsequently consumed. Pollen remains in the body without apparent deterioration during digestive processes (Krzywinski 1979; Scaife 1986). Ultimately this and other pollen is voided into cess-pits.

Here, diverse assemblages of pollen and seeds of food plants may be found (for example, Greig 1981). Material cleaned from cess-pits and latrines was frequently dumped into the nearest river (Keene 1982) where stratigraphical accumulations of this and other debris has been found (eg Broad Sanctuary, Westminster; Scaife 1982). Another possibility is that cereal pollen (and other pastoral taxa) are derived from animal dung (perhaps in this case from the Abbey stables) and/or offal products from butchery which were similarly disposed of in the river. A further possibility is that the cereal pollen and associated segetal taxa accrue from crop processing waste. Carruthers (*below*) has noted waterlogged cereal chaff and charred grain of wheat, barley, oats, and rye which may come from a mill at Holy Brook a short distance away. These possibilities are the most likely reasons for such high cereal pollen percentages recorded. It is not, unfortunately, possible to state specifically if human or animal food or crop processing activities are pertinent here. The presence of ova of intestinal parasites lends weight to the likelihood of faecal debris in this context.

As noted above, there is a range of other weeds typical of waste ground and these undoubtedly accrue from the local environment. Carruthers has noted that samples from the Abbey site which post-date its foundation in 1121 contain fewer numbers of weeds typical of waste ground. In general, seeds tend to provide evidence of vegetation in the local vicinity unless secondary transport has taken place. Pollen dispersion may, however, be greater and it is postulated here that these weed pollen assemblages may be inputs from waste ground areas slightly further afield. Taxa recorded are commensurate with the plant macrofossil evidence which also attests to the fact that these reclamation deposits contain, where preservation is good, plant remains indicating material from a variety of sources including waste ground taxa.

Summary and Conclusions

The pollen assemblages obtained from the Abbey Wharf are typical of those which have been obtained from medieval urban contexts in other areas of Britain and Europe. A diverse herb assemblage predominates and results from the innumerable sources of plant materials which were used and have become preserved in anaerobic conditions. It is extremely difficult to elucidate the possible sources of these plant remains. Even when compared with the plant macrofossil evidence, the specific origins cannot be substantiated. At the Abbey Wharf site, the pollen spectra are dominated by cereal pollen and segetals and weeds of waste ground. The former is of special interest because of the extremely high values of cereal pollen present. The source remains enigmatic, but is likely to have been from crop processing at a nearby mill, offal products and human or animal feed, all of which may have been disposed of in the river. In contrast to the seed data (*below*) few exotic crop plants and herbs were evidenced in the pollen record.

There is some evidence that nearby woodland existed. This may have comprised oak and hazel but with other elements present. The local environment of the river may have been sparse in aquatic plants, but appears to have been fringed by willows with occasional alders. A ubiquitous range of ruderal typical of urban contexts attests to the presence of waste ground areas in the urban environment.

3. **Plant Remains**, by W.J. Carruthers

Methods

The sampling and extraction methods used for the recovery of plant macrofossils were based on Kenward *et al.* (1980). Two types of samples were taken from selected deposits:

i) Small samples of 500 ml (equivalent to 'biological samples' of Kenward *et al.* 1980) were taken in order to provide quantitative records of the entire range of plant macrofossils present. These samples were sieved through a stack of sieves (ranging from 5 mm down to 250 µm mesh size) in the laboratory and the residues were sorted in water under a dissecting microscope.

ii) In addition to the small samples, bulk samples were taken in order to recover the less frequently-occurring plant remains, such as fruit stones and carbonised grain. The size of the bulk samples was set at 30 litres (*c.* three buckets) soil for both the Abbey Wharf and Crane Wharf sites, which was the maximum volume of soil that could be processed with the available resources. Bulk samples from Bridge Street East were often less than 30 litres because of the small areas excavated.

The bulk samples were processed on site in a large rectangular wet-sieving tank in which a large sieve of 1 mm mesh size was supported on rollers. The residues were sorted in water by eye for large seeds, bone, and artefacts. In some cases it was necessary to soak soil samples of a cohesive nature prior to processing in warm water containing a little hydrogen peroxide. Waterlogged and carbonised plant remains recovered from the samples were stored in 75% alcohol prior to identification, and AGF (alcohol-glycerine–formalin) solution for long-term storage.

Results

The initial analyses of trial samples from waterlogged deposits at Abbey Wharf demonstrated that the anaerobic preservation of plant remains was good. This proved to be the case generally for this site but not for Crane Wharf and Bridge Street East, where the very variable preservation indicated that some drying out of deposits had taken place after deposition.

In most cases only fruits and seeds were identified for this report, as time did not allow for the identification of vegetative remains such as leaf fragments and buds. Mosses were retained but have not been examined for this analysis.

Samples from waterfront contexts in Reading examined for this report are detailed in archive. The list of species recovered is presented in Table 8 as a summary of the overall abundance of taxa for each of the four sites examined. The full lists of data collected are given in archive.

Abbey Wharf W61A and W61B

Forty-five bulk samples and 54 small samples were examined for this report. As the state of preservation of the plant remains was generally good and a large number of samples was taken, it was possible to present some of the data for this site in diagrammatic form. The occurrences of taxa of probable economic importance, such as fibre plants, orchard and imported fruits, herbs and spices, are shown in Table 9.

Presence and dominance analyses for the carbonised cereal remains are shown in Figure 55. These methods of analysis were used because, as Figure 55a shows, the recovery of the remains was very variable between phases, thus making direct comparison difficult.

Other plant taxa (primarily waterlogged remains) have been grouped according to their habitat preferences and presented in Figures 56 and 57 as percentages of the total seeds recovered for each phase. For this analysis only data from the small samples (500 ml) taken from river silts was used in the hope that changes in local activities would be detected. The bulk samples were not used as they do not provide quantitative data for taxa whose seeds are less than 1 mm in size. Samples from reclamation deposits were not included, as the material used for these contexts may contain redeposited plant remains,imported from some distance and of uncertain date.

Aquatic and waterside plants

The aquatic and semi-aquatic plants of rivers, ditches and banks such as water-plantain (*Alisma* sp.), hornwort (*Ceratophyllum demersum* L.), and clubrush (*Schoenoplectus* sp.) which are represented in the seed assemblages may have grown in and along the Kennet, or in tributaries and ditches flowing into it. Most of these taxa are typical of slow-flowing or stagnant water such as might be found in ditches, or along the banks of a slow-flowing river. Some of the water-buttercups (*Ranunculus* subg. *Batrachium*) and pondweeds (*Potamogeton* sp.) may have been able to grow in faster-flowing water towards the centre of the river. Figure 56a shows that the percentage of seeds from this habitat group remained at a low and relatively constant level (*c.* 2–8%) throughout the six phases examined in detail.

Plants of disturbed land

As with all of the categories, seeds from plants of this group may have come from a variety of sources and been deposited in the Kennet amongst domestic waste. However, changes in the percentages of this group over the six phases followed the pattern of use of the area, suggesting that many of the seeds may have come from plants growing in the immediate vicinity.

In the pre-Abbey phase (Phase 1) the local vegetation showed signs of disturbance, as indicated by the presence of large numbers of stinging nettle (*Urtica dioica* L.) and dock (*Rumex* sp.) seeds. Some activity was evidently occurring in the area, but perhaps not enough to prevent the growth of wasteground vegetation. During the period when this part of the Kennet waterfront functioned as the Abbey Wharf (Phases 2–5), the increased activity appears to have limited the growth of vegetation, since the percentages of seeds from plants of this group decreased considerably. Reduced production of seeds would also have this effect and weeds may have been deliberately removed or cut back as part of the upkeep of the wharf. When the Abbey fell into disuse at the Dissolution (Phase 6) the weeds would have once again been able to become established. An increase in the occurrence of weeds such as stinging nettles was recorded for this phase.

A number of plants of this group, eg nettles and fat-hen (*Chenopodium album* L.), are characteristic of soils containing high phosphate and nitrogen levels, such as occur in areas of human disturbance. The recovery of several grass snake eggs (Pl. 19, *below*) from a 14th century (Phase 4) sample (*see Coy, below*) suggests that organic debris had accumulated at some point along the river bank, since grass snakes often lay their eggs amongst warm, composting rubbish.

Grassland taxa

An opposite trend to that of the plants of disturbed ground was revealed in the occurrence of seeds from grassland taxa, such as buttercups (*Ranunculus acris / bulbosus / repens*), daisy (*Bellis perennis* L.), plantains (*Plantago* spp.), and grasses (indet. Gramineae). Seeds from these taxa were found to be more numerous during the period of occupation of the Abbey. This could be due to areas of grass replacing the disturbed, weedy areas

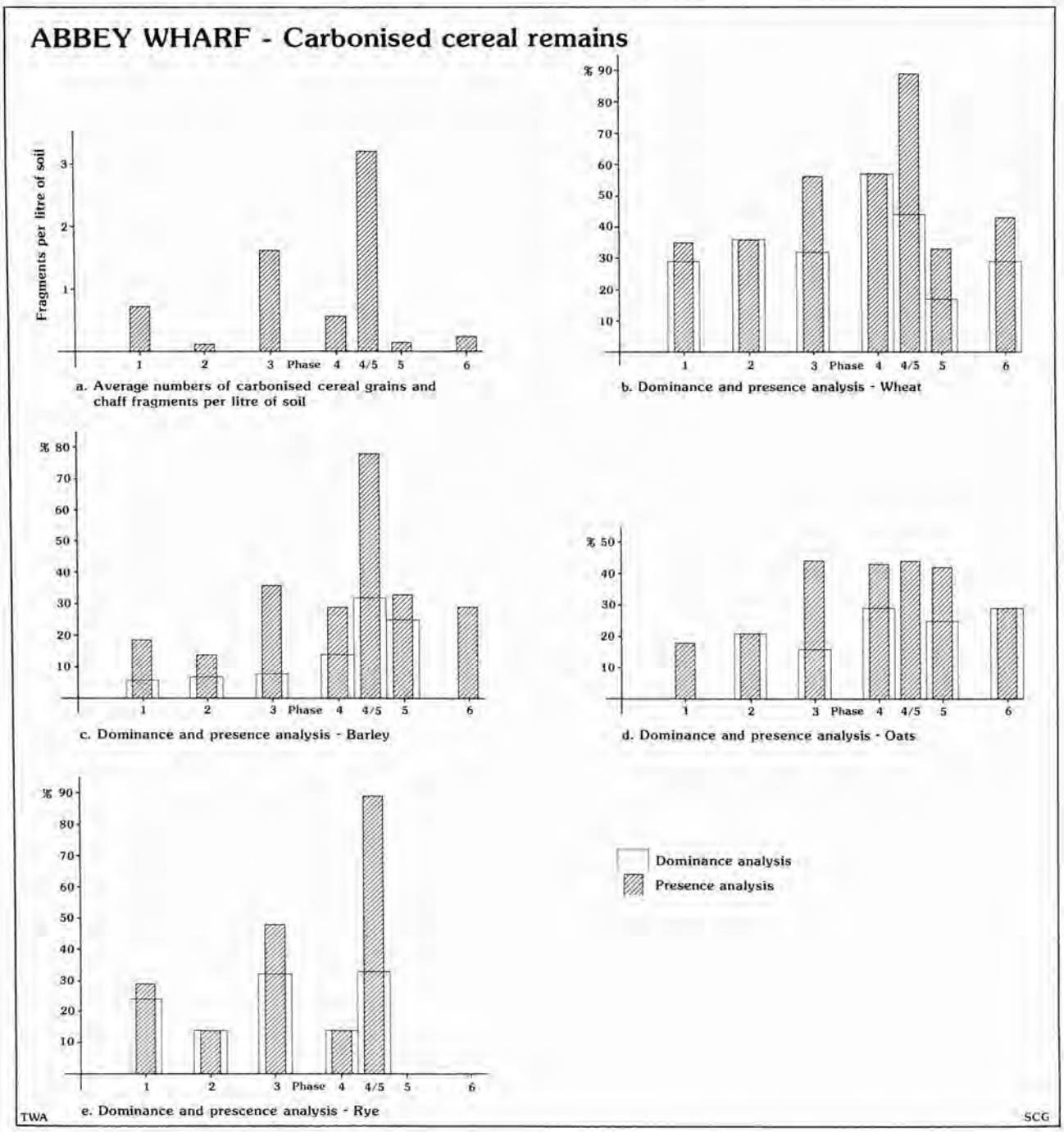


Figure 55 Abbey Wharf: presence and dominance analysis, carbonised cereal remains

as the banks became more intensely managed, particularly in the case of daisy and plantains which require an open, cut, or grazed grassland habitat. It may also, to some extent, show an increase in the deposition of waste hay during the this time, since a number of the taxa represented in this group are generally held to be more typical of hay meadows than pasture, eg purging flax (*Linum catharticum* L.), ox-eye daisy (*Chrysanthemum leucanthemum* L.), meadow rue (*Thalictrum flavum* L.), and sorrel (*Rumex acetosa* L.) (Baker 1937).

The presence of the stable block a short distance upstream on the banks of the Holy Brook suggests that fodder hay could have been delivered to the wharf and stable waste deposited in the stream. There are documentary records of hay being received by the Abbey as tithes from a number of its churches (Kemp 1987) and some of this may have been transported via the wharf for the upkeep of Abbey livestock. In addition, the keeping of livestock in gardens and back yards in towns appears to have been common practice in the medieval period (Keene 1982), so that dung and waste bedding would have been a component of the domestic waste produced by the town. Some of the seeds recovered may have entered the river in dung, since they can survive the passage through the gut of horses, cattle, pigs, and goats, eg plantains, sheep's sorrel (*Rumex acetosella*

Table 8: waterlogged and carbonised plant remains

Taxa	*Habitat*	*Abbey Wharf*	*Abbey Stables*	*Crane Wharf*	*Bridge Street E.*
	No. contexts examined	*45*	*1*	*10*	*22*
CEREALS					
Triticum cf. *dicoccum* (cf. emmer wheat caryopses)		-	-	[+]	-
T. spelta L. (spelt wheat glume bases)		-	-	[+]	-
T. dicoccum / spelta (emmer/spelt caryopses)		-	-	[+]	-
T. aestivo-compactum Schiem. (bread/club wheat caryopses)		[++]	[+]	[+]	[+]
T. aestivo-compactum (rachis fragments)		[+]	-	-	-
Triticum sp. (wheat caryopses)		[+]	-	[+]	-
Hordeum vulgare L. emend. (6-row hulled barley caryopses)		[+]	-	[+]	-
Hordeum sp. (barley caryopses)		[+]	-	[+]	[+]
Hordeum sp. (rachis fragments)		[+]	[+]	[+]	[+]
Avena sativa L. (common oat caryopses)		[+]	-	-	-
Avena sp. (oat caryopses)		[++]	[+]	[+]	[++]
Secale cereale L. (rye caryopses)		[++]	-	-	[+]
S. cereale (rachis fragments)		[+]	-	-	-
Indeterminate cereals		[++]+	[+]	[+]	[++]
Indeterminate rachis fragments		[+]	-	-	-
ALISMATACEAE					
Alisma sp. (water plantain)	PR	+	-	+	+
ARACEAE					
Arum maculatum L (cuckoo-pint)	HS	+	-	-	-
BETULACEAE					
Alnus glutinosa (L.) Gaertn (alder fruits)	BwS	+++	-	+++	+
A. glutinosa (catkin fragments)	BwS	+++	-	+++	+
Betula pendula Roth. (silver birch)		-	-	+	+
cf. *Betula* sp. (birch catkin fragments)	S	+	-	-	-
BORAGINACEAE					
Lithospermum arvense L. (corn gromwell)	AD	+	-	-	-
Myosotis sp. (forget-me-not)	CGMS	+	-	+	+
BUXACEAE					
Buxus sempervirens L. (box leaves)	Sc*	+	-	-	-
CANNABIACEAE					
Cannabis sativa L. (hemp)	*D	+	-	-	-
Humulus lupulus L. (hop)	H*	+	-	+	+
CAPRIFOLICEAE					
Sambucus nigra L. (elder)	DHSn	+++	+	+	+
CARYOPHYLLACEAE					
Agrostemma githago L. (corn cockle)	A	[+]++	-	+	+
Arenaria serpyllifolia L. (thyme-leaved sandwort)	oA	+	-	-	-
Cerastium sp. (chickweed)	ABOG	+	-	-	-
Dianthus sp. (pink)		+	-	-	-
Lychnis flos-cuculi L. (ragged robin)	wGMS	+	-	-	-
Myosoton aquaticum (L.) Moench (water chickweed)	BMPwS	+	-	+	+
Scleranthus anuus L. (annual knawel)	CDds	+	-	+	-
Spergula arvensis L. (corn spurrey)	Aa	+	-	-	-
Stellaria graminea L. (lesser stitchwort)	EGSI	+	-	+	+
S. holostea L. (greater stitchewort)	HS	+	-	-	-
S. media (L.) Vill. (chickweed)	AD	+	-	+	+
Stellaria sp.		+	-	+	+

Taxa	*Habitat*	*Abbey Wharf*	*Abbey Stables*	*Crane Wharf*	*Bridge Street E.*
Silene alba (Mill.) Kreuse (white campion)	CDH	+	-	-	-
S. Vulgaris (Moench) Garcke (bladder campion)	AGW	+	-	+	+
Silene sp (campion)		+	+	+	-
CERATOPHYLLACEAE					
Ceratophyllum demersum L. (horn-wort)	P	+	-	-	-
CHENOPODIACEAE					
Atriplex hastata/patula L. (orache)	CD	+	+	+	+
Chenopodium album L. (fat hen)	CDn	+	+	+	+
C. cf. *aurale* L. (nettle-leaved goosefoot)	DI	+	-	+	-
C. polyspermum L. (all-seed)	CD	+	-	-	-
C. Rubrum L. (red goosefoot)	CDn	+	-	+	-
Chenopodium sp.		+	+	-	-
COMPOSITAE					
Anthemis cotula L. (stinking mayweed)	ADh	+	-	+	+
Arctium lappa L. (great burdock)	DW	+	-	-	-
cf. *Artemesia* sp.		+	-	+	-
Bellis perennis L. (daisy)	G	+	-	-	-
Bidens tripartita L. (tripartite bur-marigold)	BP	+	-	-	+
Bidens sp. (bur-marigold)	BP	+	-	-	-
Calendula officinalis L. (pot marigold)	*	+	-	-	-
Centurea cyanus L. (cornflower)	AD	+	-	-	-
C. nigra L. (lesser knapweed seed head)	DG	+	+	-	-
Chrysanthemum leucanthemum L. (ox-eye daisy)	G	+	-	-	-
C. segatum L. (corn marigold)	Aa	+	-	-	-
Cirsium sp./*Carduum* sp. (thistle)	ABDGMW	+	+	+	+
Eupatorium cannabium L. (hemp agrimony)	BMwS	+	-	+	-
Hypochoeris radicata L. (cat's ear)	GW	+	-	-	-
Lapsana communis L. (nipplewort)	DHR	+	-	+	-
Leontodon sp. (hawkbit)	G	+	-	-	-
Onopordum acanthium L. (cotton thistle)	DW	+	-	+	-
Picris echioides L. (bristly ox-tongue)	DHWc	+	-	-	-
Senecio sp. (ragwort)	BCDW	+	-	+	-
Sonchus arvensis L. (field sow-thistle)	AB	+	-	-	-
S. asper (L.) Hill (spiny sow-thistle)	CD	+	-	+	-
S. oleraceus L. (sow-thistle)	CDW	+	-	+	-
Taraxacum sp. (dandelion)	BDGW	+	-	-	-
Tripleurospermum maritimum (L.) Kock. (scentless mayweed)	AD	[+]+	-	-	-
Indeterminate		-	-	+	-
CORYLACEAE					
Corylus avellana L. (hazelnut shell fragments)	HS	+	+	[+]+	[+]+
CRUCIFERAE					
Barbarea vulgaris R. Br. (yellow rocket)	BwHW	+	-	-	-
Brassica nigra (L.) Koch. (black mustard)	BDW	+	-	-	-
Brassica sp./*Sinapis* sp.	ACD	+	+	+	+
Coronopus squamatus (Forsk.) Aschers (swine-cress)	D	-	+	+	-
Thlaspi arvense L. (field pennycress)	AD	+	-	-	-
Rorippa nasturtium-aquaticum (L.) Hayek (watercress)	P	+	-	-	-
Raphanus raphanistrum L. (wild radish)	AW	+	-	-	-
Indeterminate		+	-	-	-
CUCURBITACEAE					
Bryonia dioica Jacq. (bryony)	HS	+	-	-	-
Cucumis sativus L. (cucumber)	*	+	-	-	-

Taxa	*Habitat*	*Abbey Wharf*	*Abbey Stables*	*Crane Wharf*	*Bridge Street E.*
CUPRESSACEAE					
Juniperus communis L. (juniper)	ESc	+	-	-	-
CYPERACEAE					
Carex sp. (sedge)	GM	+	+	+	+
Eleocharis subg. *Palustres* (spike-rush)	MPw	[+]++	-	+	-
Schoenoplectus sp. (bulrush)	BPR	+	+	+	+
Indeterminate		+	-	-	-
DIPSACACEAE					
Knautia arvensis (L.) Coult. (field scabious)	dG	+	-	-	-
Dipsacus fullonum L. (teasel)	BGW	+	-	-	-
EUPHORBIACEAE					
Euphorbia helioscopia L. (sun spurge)	C	+	-	+	+
E. lathyrus L. (caper spurge)	*D	+	-	-	-
E. peplus L. (petty spurge)	CD	+	-	-	-
FAGACEAE					
Fagus sylvatica L. (beech)	HS	+	-	-	-
Quercus robur L. (pedunculate oak, acorn cups)	HS	+	-	+	-
FUMARIACEAE					
Fumaria sp. (fumitory)	CD	+	+	+	+
GRAMINEAE					
Bromus sect. *Bromus* (chess)	ADG	[+]	-	[+]	-
Gen et. sp. indet. (grasses)	CG	[+]++	-	+	-
GROSSULARIACEAE					
Ribes uva-crispa L. (gooseberry)	HS*	+	-	-	-
HYDROCOTYLACEAE					
Hydrocotyle vulgaris L. (pennywort)	Ma	+	-	-	-
HYPERIACEAE					
Hyperium sp. (St John's wort)	GHS	+	-	-	-
IRIDACEAE					
Iris pseudacorus L. (yellow flag)	BMP	+	+	+	-
JUGLANDACEAE					
Juglans regia L. (walnut shell fragments)	*	+	-	-	-
JUNACEAE					
Juncus sp. (rush)	wGMR	+	+	+	-
LABIATAE					
Ajuga reptans L. (bugle)	GS	+	+	+	-
Ballota nigra L. (black horehound)	HW	+	+	+	-
Galeopsis tetrahit agg. (hemp-nettle)	AW	+	+	+	-
Glechoma hederacea L. (ground ivy)	DGSh	+	-	-	-
Lamium sp. (dead-nettle)	CDHW	+	+	+	+
Lycopus europaeus L. (gipsey-wort)	BM	+	+	+	-
Marrubium vulgare L. (white horehound)	DW	+	-	-	-
Mentha sp. (mint)	ADPW	+	+	+	-
Prunella vulgaris L. (self-heal)	DG	+	-	-	-
Stachys cf *palustris* L. (marsh woundwort)	BM	+	-	-	-
Stachys sp. (woundwort)	ABH	+	-	-	-
Indeterminate		+	-	-	-
LEGUMINOSAE					
Trifolium sp. (clover calices)	DG	+	-	-	-
Vicia sativa L. (common vetch)	GH*	[+]	-	-	-
Vicia sp. (pod fragments)		[+]	-	-	-
Vicia sp./*Lathyrus* sp. (vetch, tare)		[++]	-	[+]	[+]

Taxa	*Habitat*	*Abbey Wharf*	*Abbey Stables*	*Crane Wharf*	*Bridge Street E.*
Vicia sp./*Lathyrus* sp./*Pisum sativum* (vetch/tare/pea)		[+]	-	-	-
Indeterminate hilums		+	-	-	-
LIMNACEAE					
Lemna sp. (duckweed)	P	+	-	-	-
LINACEAE					
Linum catharticum L. (purging flax)	EcG	+	-	-	-
L. usitatissimum L. (cultivated flax seed)	*	+	-	+	-
L. usitatissimum (cultivated flax capsule fragments)	*	[+]+	-	+	-
MALVACEAE					
Malva sylvestris L. (common mallow)	DW	+	-	-	-
MENYANTHACEAE					
Menyanthes trifoliata L. (bogbean)	BP	+	-	+	-
MORACEAE					
Ficus carica L. (fig)	*	+	-	-	-
MYMPHAEACEAE					
Nuphar lutea (L.) Sm. (yellow water-lily)	PR	+	-	+	-
ONAGRACEAE					
Epilobium sp. (willow-herb)	BDMW	+	-	+	-
PAPAVERACEAE					
Chelidonium majus L. (greater celandine)	DH	+	-	-	-
Papaver dubium/hybridum L. (long-headed poppy)	AD	+	-	-	-
P. rhoeas/hybridum L. (field poppy)	AD	+	-	-	-
P. somniferum L. (opium poppy)	*	+	-	-	-
Papaver sp.		+	-	-	-
PLANTAGINACEAE					
Plantago lanceolata L. (ribwort plantain)	Gb	[+]+	-	-	-
P. major L. (great plantain)	CDGfo	+	-	+	-
POLYGONACEAE					
Fallopia convolvulus (l.) Dumort. (black bindweed)	AD	+	-	-	-
Polygonum aviculare agg. (knotgrass)	AD	[+]++	-	+	-
P. hydropiper L. (water-pepper)	P	+	-	-	-
P. lapathifolium/nodosum (pale persicaria)	BD	+	-	+	-
P. persicaria L. (red shank)	BCD	[+]+	-	+	+
Polygonum sp.		+	-	-	-
Rumex acetosa L. (sorrel)	G	+	-	-	-
R. acetosella agg. (sheep's sorrel)	CEGa	[+]+	+	+	-
R. crispus L. (curled dock)	CDG	+	-	-	-
R. conglomeratus Murr. (sharp dock)	wG	[+]+	-	+	-
R. hydrolapathum Huds. (great water dock)	BMPw	+	-	-	-
R. maritimus L. (golden dock)	oBwG	+	-	-	+
R. obtusifolius L. (broad-leaved dock)	DH	+	-	+	-
R. palustris Sm. (marsh dock)	BGow	+	-	-	-
R. sanguineus L. (red-veined dock)	DG	+	-	-	-
Rumex sp.		[+]++	+	+	+
PORTULACACEAE					
Montia fontana sobsp. *chondrosperma* (blinks)	BwGas	+	-	-	-
PRIMULACEAE					
Anagallis arvensis L. (scarlet pimpernel)	CW	+	-	-	-
Primula sp.		+	-	-	-
POTAMOGETONACEAE					
Potamogeton sp. (pondweed)	PR	+	-	+	-

Taxa	*Habitat*	*Abbey Wharf*	*Abbey Stables*	*Crane Wharf*	*Bridge Street E.*
RANUNCULACEAE					
Clatha palustris L. (marsh marigold)	MP	+	-	+	-
Myosurus minimus L. (mouse-tail)	wA	+	-	-	-
Ranunculus acris L. (meadow buttercup)	Gw	+	-	-	-
R. bulbosus L. (bulbous buttercup)	Dg	+	-	-	-
R. flammula L. (lesser spearwort)	w	+	-	-	-
R. lingua L. (great spearwort)	M	+	-	-	-
R. repens L. (creeping buttercup)	Gw	+	-	-	-
R. sardous Crantz (hairy buttercup)	wAD	+	+	+	-
R. sceleratus L. (celery-leaved crowfoot)	BPR	+	-	-	-
Ranunculus acris/bulbosus/repens (buttercup)	GD	+++	+	+	+
Ranunculus subg. *Batrachium*	PR	+	-	+	+
Thalictrum flavum L. (meadow rue)	GwG	+	-	+	+
ROSACEAE					
Aphanes arvensis (L.) Scop. (parsley piert)	CGd	+	-	-	-
Crataegus monogyna Jacq. (hawthorn)	HSW	+	+	+	-
Filipendula ulmaria (L.) Maxim. (meadow-sweet)	wGMS	+	-	-	-
Fragaria vesca L. (strawberry)	GS*	+	-	-	-
Malus sylvestris L. (apple)	HS*	+	-	-	-
Potentilla anserina L. (silverweed)	DG	+	-	+	-
Potentilla sp. (cinquefoil)	DG	+	-	+	-
Prunus avium (L.) L. (cherry)	*HS	+	-	-	-
P. domestica cf subsp. *insititia* (bullace)	*HS	+	-	-	-
P. domestica cf subdp. *domestica* (plum)	*HS	+	-	-	-
P. domestica subsp. *insititia/domestica* (bullace/plum)		+	-	-	-
P. spinosa L. (sloe)	HS	+	-	+	-
Prunus sp. (stone fragments)		+	-	+	-
Rosa sp. (rose)	HS	[+]+	-	-	-
Rubus fruticosus agg. (blackberry)	DHS	+	+	+	+
R. idaeus L. (raspberry)	ES*	+	-	-	-
Rubus sp. (fragments)		+	-	-	-
RUBIACEAE					
Galium aparine L. (cleavers)	DH	[+]	-	[+]+	-
G. palustre L. (marsh bedstraw)	BMw	+	-	+	-
SALIACEAE					
Salix sp. (willow catkins and bud scales)	BSW	+	-	+	-
SCROPHULARIACEAE					
Euphrasia sp./*Odontites verna* (eyebright/red bartsia)	CD	+	-	+	-
Scrophularia sp./*Verbascum* sp. (figwort/mullein)		+	-	+	-
Veronica hederifolia L. (ivy speedwell)	C	+	-	-	-
SOLONACEAE					
Hyoscyamus niger L. (henbane)	Dn	+	-	+	-
Lycopersicon esculentum (tomato)	*	+	-	-	-
Solanum dulcamara L. (woody nightshade)	DHS	+	-	+	-
S. nigrum L. (black nightshade)	D	+	+	+	+
SPARGANIACEAE					
Sparganium sp. (bur-reed)	MP	+	-	+	+
TILIACEAE					
Tilia sp. (lime)	HS	+	-	-	-
UMBELLIFERAE					
Aethusa cynapium L. (fool's parsley)	C	+	-	+	+

Taxa	*Habitat*	*Abbey Wharf*	*Abbey Stables*	*Crane Wharf*	*Bridge Street E.*
Anethum graveolens L. (dill)	*	+	-	-	-
Angelica sylvestris L. (wild angelica)	Wgs	+	-	-	-
Anthriscus sylvestris (L.) Hoffm (cow parsley)	DH	+	-	-	-
Apium graveolens L. (celery)	B*	+	-	-	-
A. nodiflorum (L.) Lag. (fool's watercress)	P	+	+	+	+
Berula erecta (Huds.) Coville (narrow-leaved water parsnip)	MP	+	-	-	-
Bupleurum rotundifolium L. (thorow-wax)	A	[+]+	-	+	-
Chaerophyllum temulentua L. (rough chervil)	GH	+	-	+	+
Conium maculatum L. (hemlock)	Bw	+	-	+	+
Coriandrum sativum L. (coriander)	*D	+	-	-	-
Daucus carota L. (carrot)	Gc	+	-	+	+
Heracleum sphondylium L. (hogweed)	GHW	+	-	-	-
Oenanthe sp. (dropwort)	BGMP	+	-	+	-
Pastinaca sativa L. (parsnip)	DGW*	+	-	-	+
Pimpinella saxifraga L. (burnet saxifrage)	Gc	+	-	-	-
Torilis japonica (Houtt.) DC (upright hedge parsley)	GHW	+	-	-	-
T. nodosa (L.) Gaertn (knotted hedge parsley)	A	+	-	-	-
Torilis sp. (hedge parsley)	AGH	+	-	-	-
Scandix pectan-veneris L. (shepherd's needle)	A	+	-	-	-
Indeterminate		+	-	+	-
URTICACEAE					
Urtica dioica L. (stinging nettle)	DGHWp	+++	+	+	-
U. urens L. (small nettle)	CDl	+	+	+	-
VALERIANACEAE					
Valeriana officinalis L. (valerian)	G	+	-	-	-
Valerianella carinata Lois. (lamb's lettuce)	A	+	-	-	-
v. dentata (L.) Poll. (lamb's lettuce)	AD	+	-	-	-
VERBENACEAE					
Verbena officinalis L. (vervain)	DW	+	-	+	-
VIOLACEAE					
Viola sp. (violet)		+	-	+	-
VITACEAE					
Vitis vinifera L. (grape)	*	+	+	-	[+]
ZANNICHELLIACEAE					
Zannichellia palustris L. (horned pondweed)	PR	+	-	+	-
Pteridium aquilinum (L.) Kühn (bracken frond frgaments)	ESal	[+]+	-	-	-
Equisetum sp. (horsetail stem fragments)	BHMP	+	-	-	-
Indeterminate *Characeae* (stonewort algae)	P	+	-	+	-

+ waterlogged [+] carbonised; + occasional ++ several +++ frequent

Habitat preferences:

A = arable
B = riverbanks
C = cultivated land
D = disturbed/wasteland
E = heath
G = grassland
H = hedgerows
M = marsh
P = ponds, ditches, slow flowing/stagnant water
R = rivers, streams
S = woodlands, scrub
W = waysides

a = acid soils/calcifuge
c = calcareous/basic soils
d = dry soils
h = heavy soils
l = light soils
n = nitrogen-rich soils
o = open habitats
p = phosphate-rich soils
s = sandy soils
w = wet/damp soils
* = plants of possible economic importance

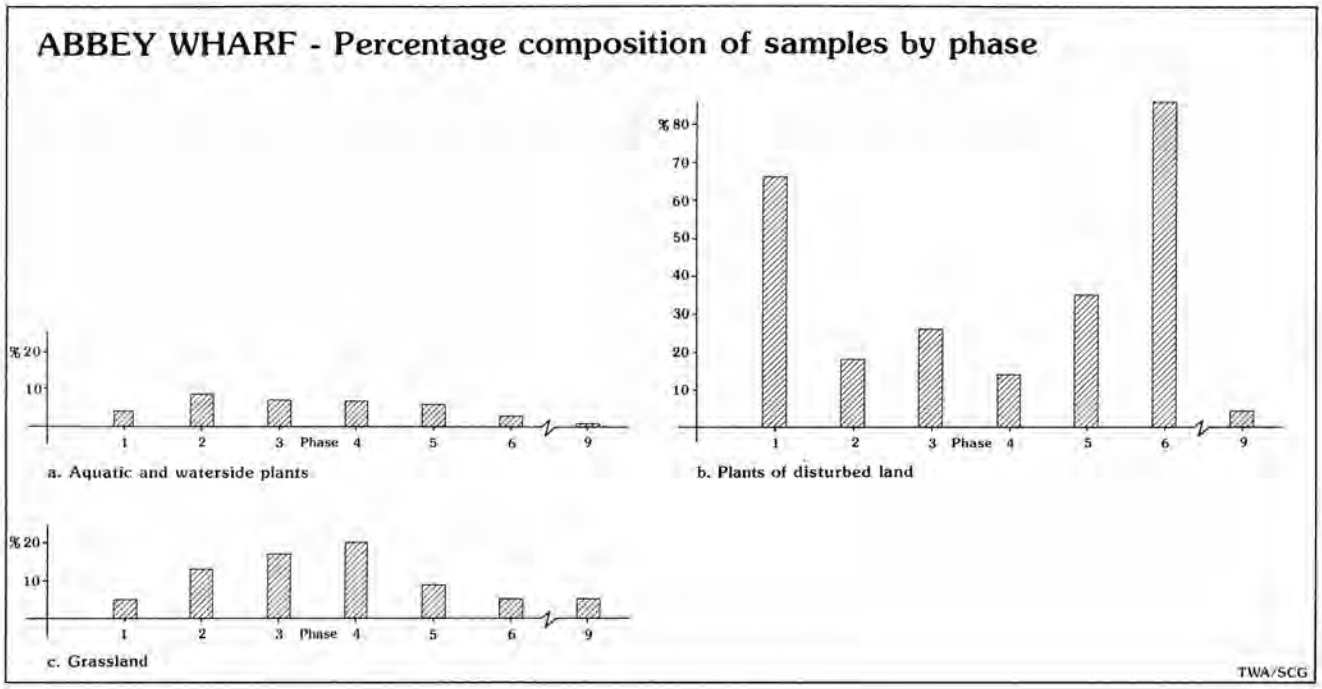


Figure 56 Abbey Wharf: habitat – composition of samples by phase

agg.) (Salisbury 1961). The likely presence of dung within the water has also been suggested on the basis of the pollen evidence (*above*). Both damp and dry grasslands were represented in the assemblages.

Arable weeds and waterlogged cereal remains

The weeds of arable crops selected for this group were confined to the more habitat-specific taxa, such as cornflower (*Centaurea cyanus* L.), corn cockle (*Agrostemma githago* L.), and corn marigold (*Chrysanthemum segetum* L.). Even so, some of the selected taxa, such as stinking mayweed (*Anthemis cotula* L.), can be found in other cultivated or disturbed habitats.

Arable weeds may have been deposited in the Kennet as crop-processing waste and amongst animal fodder, or may have been present in incompletely processed crops being transported to the Abbey mill. Crop-processing waste typically contains both weed seeds and chaff, but only a small number of anaerobically preserved rachis fragments were recovered from the samples. It is likely that the early stages of the processing which remove the bulk of the larger chaff fragments (Hillman 1981) had been carried out closer to the site of cultivation and the cereals were transported as at least partially processed grain. In addition, some differential preservation may have occurred resulting in a disproportionate loss of chaff fragments. This latter point may also be true for cereal caryopses since they are not often recovered in any quantity from waterlogged sediments, although on this site samples from Phase 3 and 4 deposits contained several waterlogged caryopses.

Some arable weeds may have been deposited amongst sewage, as crop cleaning methods would not have been completely successful in removing contaminants from the grain, and some seeds may survive the passage through the human gut. Most of the corn cockle recordings were of small fragments of seed, demonstrating that this large seed had probably been ground with the corn at the mill, and perhaps also chewed after being made into bread.

Carbonised cereals and chaff fragments

The carbonised cereals, chaff fragments, and arable weed seeds recovered from the samples may represent material accidentally burnt in the process of grain drying, or deliberately burnt waste. According to Hurry (1901) the remains of a bakehouse containing a 4–foot square oven were excavated in 1860 adjacent to the mill. Burnt grain from the ovens may well have been washed the short distance along the Holy Brook into the Kennet. Bread/club wheat (*Triticum aestivocompactum* s.l.), barley (probably all 6-row hulled, *Hordeum* sp.), rye (*Secale cereale* L.), and oats (*Avena* sp.) were represented by caryopses and rachis fragments. No evidence for the use of tetraploid wheats was recovered.

The use of tail grain and chaff to bulk up animal fodder has long been practised, and carbonised remains of this nature were recovered from floor levels of the stables site (Carruthers in Hawkes 1986–90). Some of the carbonised cereal remains from the Abbey Wharf site may also have been derived from burnt stable waste.

Changes in cereal usage

Figure 57 shows the occurrence of arable weeds during the occupation of the Abbey to be higher than in either the preceding or following periods. This corresponds with an increase in waterlogged cereal caryopses and an increase in the number of carbonised caryopses and chaff fragments recovered. It is clear that more cereals passed through the area during the lifetime of the Abbey, as would be expected in the vicinity of the mill and with the needs of the Abbey to be met.

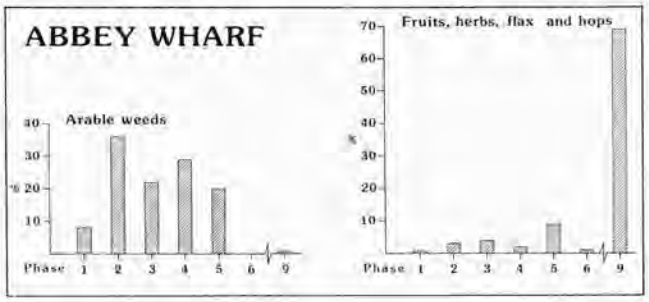


Figure 57 Abbey Wharf: arable weeds and fruit / herb taxa by Phase

There is no direct documentary evidence for the diet of the monks at Reading Abbey, but Hurry (1901) quotes records for the Manor of Leominster, a dependent priory, indicating that the monks each received '2 white or monk's loaves, 1 wheaten or prykked loaf, 1½ flaggons of best ale and 1½ mess flesh or fish a day'. Although Kemp (1968) warns of the inaccuracies in Hurry's account of the Abbey, bread was undoubtedly an important component of the diet for much of the population of England at this time. It is unfortunately not possible to be certain of which cereals were used to make the many types of bread mentioned in the records. Presumably 'esquires bread' and 'white' or 'monk's loaves' were of good quality, and so are likely to have been made primarily of bread wheat with the bran sieved out to give a white flour. 'Wheaten or prykked loaves' were probably the next grade down. Wheaten bread, where only the large bran fragments were sieved out, was a statute bread in the 16th century (Percival 1934). Bread of black wheat (*blackwyth*), which is also mentioned in the records, may have been a coarser bread made of a combination of cereals, with the bran left in. Rye was probably the major component and this 'low quality' bread might have been fed to the poor. Hurry (1901, 14) also mentions a barley loaf which was given in part payment to the Abbey laundress.

The cereals may have been grown on any of the many estates owned by the Abbey, or received as tithes from its churches as documented in the cartularies (Kemp 1987). The arable weed seeds recovered from the samples are indicative of a variety of soils including acidic soils (corn spurrey (*Spergula arvensis* L.), corn marigold (*Chrysanthemum segetum* L.)), dry and sandy soils (annual knawel (*Scleranthus anuus* L.)), heavy soils (stinking mayweed (*Anthemis cotula* L.)), and basic soils (thorow-wax (*Bupleurum rotundifolium* L.)).

The number of carbonised cereal remains recovered from each sample and phase varied greatly, as can be seen in Figure 55a. This graph shows the data as the number of fragments per litre of soil, in order to overcome differences in the number of samples taken from each phase. In an attempt to determine whether proportions of the different cereals utilised changed through time, presence and dominance analyses were carried out. The generally low occurrence of carbonised remains produced widely fluctuating levels (Fig. 55b–e) the absolute values of which are of little significance. However, the general trends revealed may be of more validity, although it should be remembered that these only represent occurrences in the silts which need not necessarily reflect changes in usage by the Abbey.

Bread/club wheat and rye appear to have been the major cereals in pre-Abbey levels. During later phases the importance of barley appears to have increased, reaching a peak immediately prior to the Dissolution (Phase 5). Oats also became more numerous, although it was not possible to determine whether these were cultivated oats or weed infestations of wild oats. Rye was not present in samples later than Phase 5. For Wessex in general, rye appears not to have been grown on a large scale (Green 1981), although it can be a useful crop on marginal soils. Its relatively frequent occurrence on this site and disappearance after the Dissolution could be related to specific uses by the Abbey. Cereals from the town may also have been sent to the Abbey mill for grinding and so may be represented in these samples.

Other food plants

A number of seeds from other edible plants were recovered from the samples. Details of the occurrence of these taxa over the phases examined are in archive. These remains would have been deposited in the Kennet in domestic waste and sewage. It is thought that the Abbey latrines were flushed by a stream flowing into the Holy Brook (Hurry 1901), although this would have been immediately downstream of the excavations and are unlikely to account for the present results. The large quantities of fruit remains recovered, in particular the small seeds of fig (*Ficus carica* L.) and strawberry (*Fragaria vesca* L.), indicate that sewage deposition occurred in the area, however.

With the foundation of the Abbey more exotic foods such as grapes (*Vitis vinifera* L.), walnuts (*Juglans regia* L.), and figs were introduced. The figs would probably have been imported as dried fruits, since fruits formed parthenogenetically on plants grown in this country often only have vestigial seeds, and there is no evidence of their cultivation in Britain until the 16th century (Roach 1985). The cultivation of grapes at the Abbey, however, is confirmed in the cartularies (Kemp 1987, 312) by a 12th-century reference to a property 'next to the Abbey's vineyard', and also by the recovery of a fragment of unworked vine wood from a Phase 5 context (*see Chapter 6*).

The milder weather which occurred in the early medieval period and the establishment of monastery gardens brought about the spread of viticulture in southern England. One of the first guilds to be established in Reading was the vintners guild in 1242 (Astill 1978). Wine making is likely to have decreased with the deterioration of the climate from the 14th century onwards, and with increased importations of wine from France. The unripe grapes may still have been used to make verjuice and vinegar for a while, but it is likely that later occurrences of grape pips represent imported dried fruit. The recovery of the vine wood might indicate the destruction of the vineyards in the later medieval period.

Walnuts may have been grown in the Abbey gardens or been imported. They were first introduced into Britain as a luxury food by the Romans, but there is no clear evidence that they were grown here until the 13th century (Roach 1985). Pollen evidence has been re-

Table 9: plants of economic importance

	Pre-Abbey		*Abbey*			*post-1539*	*18th century*
Phase	*1*	*2*	*3*	*4*	*5*	*6*	*9*
Linum usitatissimum (flax)	***	***	***	**	**	–	*
Prunus spinosa (sloe)	**	**	**	**	**	**	–
P. domestica ssp. *insititia* (bullace)	*	**	**	*	*	–	*
P. domestica ssp. *domestica* (plum)	–	*	***	*	*	***	**
P. avium (cherry)	*	–	*	*	*	*	***
Cannabis sativa (hemp)	*	–	**	*	**	*	***
Humulus lupulus (hop)	*	*	**	–	***	*	****
Coriandrum sativum (coriander)	*	*	–	–	–	–	****
Juglans regia (walnut)	–	*	**	**	**	–	**
Malus sylvestris (apple)	–	*	*	–	***	*	**
Vitis vinifera (grape)	–	*	**	*	***	**	***
Ficus carica (fig)	–	–	***	***	***	*	***
Fragaria vesca (strawberry)	–	–	**	**	***	–	***
Rubus idaeus (raspberry)	–	–	*	–	*	–	***
Euphorbia lathyrus (caper spurge)	–	–	**	–	–	–	–
Calendula officinalis (pot marigold)	–	–	–	–	**	–	*
Juniperus communis (juniper)	–	–	–	–	–	–	**
Lycopersicon esculentum (tomato)	–	–	–	–	–	–	***
Ribes uva-crispa (gooseberry)	–	–	–	–	–	–	**
Anethum graveolens (dill)	–	–	–	–	–	–	*
Cucumis sativus (cucumber)	–	–	–	–	–	–	*

* = occasional; ** = several; *** = frequent; **** = numerous

covered from some 14th- or 15th-century sites (Greig 1988, 118).

According to the 9th-century plan of an ideal monastery drawn up at St Gall, Switzerland (Bonar 1979) the Abbey gardens would have contained a wide variety of orchard fruits, of which evidence was recovered for apple (*Malus sylvestris* Mill.), cherry (*Prunus avium* (L.), bullace (*P. domestica* ssp. *insititia* (L.) C.K.Schneid.), and plum (*P. domestica* ssp. *domestica*) at Reading. Unworked wood and branch fragments of sloe/cherry/bullace/plum (*Prunus* sp.) were recovered from Abbey and post-Dissolution phases. Apple wood may have been present in post-Dissolution phases but identification of the wood more closely than to the sub-family Pomoideae (which includes hawthorn) was not possible.

Fruits that would earlier have been gathered from hedgerows and woodland, such as blackberry (*Rubus fruticosus* agg.), raspberry (*Rubus idaeus* L.), strawberry, and hazelnuts (*Corylus avellana* L.), may have been cultivated in the Abbey grounds, but this is impossible to confirm. In most cases the seeds of wild and early cultivated fruits are indistinguishable. However, the 18th-century (Phase 9) strawberry seeds recovered were observed to be markedly larger than seeds of this species found in the medieval contexts. Roach (1985) quotes the earliest reference to the cultivation of strawberries in Europe as being 14th century but at this time the runners used would have been from the native *Fragaria vesca* collected from the wild. The large seeded 18th-century remains may have been from an introduced New World species which was much closer to the modern hybrid still grown today, *F. xananassa*.

The Abbey grounds are also likely to have contained a herb or physic garden in which a wide variety of culinary and medicinal herbs would have been grown. Several caper spurge (*Euphorbia lathyrus* L.) seeds were recovered from Phase 3 deposits. Its use as a strong purgative is recorded in many herbals. An early archaeological record for this species was the find of three seeds inside a thread box in a Saxon grave (Meaney 1981) which demonstrates the extent to which it was valued at this time.

Other pot herbs and vegetables represented in the assemblages include pot marigold (*Calendula officinalis* L.), an introduced species first appearing in Phase 5 deposits, and celery (*Apium graveolens* L.) which is present in low numbers from Phase 2. Since celery grows wild by rivers, although mostly in maritime counties, it is not possible to be certain that this species was cultivated. Similarly, the parsnip (*Pastinaca sativa* L.) and carrot (*Daucus carota* L.) seeds could have come from wild plants growing on calcareous grass verges and waste ground. They were present in low numbers from Phase 1 onwards.

Coriander (*Coriandrum sativum* L.) seeds were recovered from Phase 1, 2, and 9 samples. Although found on Roman sites, such as those in London reported by Willcox (1977), and in the 15th-century barrel latrine at Worcester (Greig 1981), coriander is not usually recovered from early medieval deposits in Britain. The few

pre-Abbey and early Abbey seeds from this site could represent relicts from earlier occupation. The 18th-century deposits contained numerous coriander seeds which may be spillage of cargo from boats, or colonisation of waste areas by this introduced plant. Contamination of the early levels by this deposit was not suspected, as the samples were taken from different areas of the site. Coriander can be used to flavour food and drink and has some medicinal properties, such as being an antispasmodic.

Evidence for the cultivation of vegetable crops not left to grow on to seed is more difficult to obtain. It is likely that some of the *Brassica* sp./*Sinapis* sp. seeds were from cultivated species, such as cabbages, turnips, and mustard. Documentary records from monasteries such as Ely and Norwich show that a wide variety of vegetables were grown in the gardens including onions, garlic, peas, leeks, and beans (Larkcom 1979).

With the wide range of fruit, vegetables, and herbs grown in the Abbey gardens and additional foods that were imported from the numerous estates and from abroad, the monks could have enjoyed a varied diet. A plentiful supply of home-grown and luxury foods would also have been necessary for the entertainment of royal visitors who periodically visited the Abbey (Kemp 1968). Fig, walnut, grape, and other fruit remains have been recovered from a 13th-century well in Cross St, Reading, (Holyoak and Robinson forthcoming) showing that high-status foodstuffs were not only grown and imported for use by the Abbey but were also being consumed by other inhabitants of the town.

The few 18th-century samples examined contained a wider variety of seeds of edible plants. As well as large numbers of coriander and hop seeds, the samples produced the following species not present in earlier deposits; tomato (*Lycopersicon esculentum* Mill.), gooseberry (*Ribes uva-crispa* L.), juniper (*Juniperus communis* L.), dill (*Anethum graveolens* L.), and cucumber (*Cucumis sativus* L.). The first three of these are particularly rare finds archaeobotanically, probably because so few post-medieval deposits have been examined. Tomato was first introduced into Europe from the New World after the conquest of Mexico in the 16th century. Although widely used in Spain and Italy, it was thought to have been regarded as a curiosity in Britain until the end of the 19th, being called the 'Love Apple' (Roach 1985). The finding of relatively large quantities of seeds in this deposit could indicate otherwise.

Gooseberry, although probably native to Britain, has not previously been widely recovered from archaeological deposits and was only subjected to intensive selection in the 18th century. Juniper berries were quite widely used in Europe for flavouring beverages and food, partiuclaly meat dishes.

Fodder crops

Two samples from W61B (details in archive) contained large assemblages of carbonised remains. As well as the four cereal types, large numbers of carbonised vetch/tare seeds were present, some of which could be identified as being common or cultivated vetch (*Vicia sativa* L.). The percentages suggest that vetch was present as more than just a severe weed infestation. Very few chaff fragments were recovered (a couple of rachis fragments from the 'small samples') and only 2–3% arable weeds, showing that the deposits represented a mixture of processed crops. The presence of low percentages of the more valuable and generally dominant crop bread/club wheat, but relatively large amounts of rye and in one case, chess (*Bromus* subg. *Bromus*) suggest that these are deposits of burnt animal fodder.

Medieval estate records, such as the early 14th-century documents from Glastonbury Abbey (Keil 1965), show that vetches were grown as a minor crop. They may have been used as part of the workers' payment in kind, or as a winter fodder crop, but no doubt they would have also been useful as part of the crop rotation programme in restoring nitrogen to impoverished soils. The Reading Abbey cartularies (Kemp 1987) mention 'other legumes' amongst the tithes collected, and these are likely to have been vetches. They may well have been destined for use as fodder for the Abbey's livestock along with the tithes of hay.

As mentioned in relation to the grassland taxa, fodder hay may also have been present amongst the waterlogged remains, although this is difficult to demonstrate in such a mixed assemblage without recovering deposits containing large quantities of the grass culms themselves.

Plants with industrial uses

Other plants of economic importance represented include flax (*Linum usitatissimum* L.), which appears to have been cultivated in the area from pre-Abbey times onwards. Both seeds and capsule fragments were recovered from the samples and their occurrence decreased over the period studied. This material probably represents waste from the processing of flax to extract bast fibres. The requirement of large quantities of water for part of the processing, retting, meant that this industry was often sited near rivers. Cloth working was an important industry in Reading, as the founding of drapers, weavers and fullers guilds in the 13th century demonstrates (Astill 1978). The apparent decline in the occurrence of flax remains may indicate a change to the use of other textiles, such as woollen fabrics. No doubt cloth would also have been dyed in the town, but dying waste such as the madder, woad, and dyer's greenweed found in Anglo-Scandinavian deposits in York (Hall and Tomlinson 1984) and the madder, dyer's greenweed, and weld in early medieval waterfront deposits at Bristol (Jones and Watson 1987) has not yet been found in Reading. Flax seeds also contain valuable linseed oil for which they may have been cultivated.

Hemp (*Cannabis sativa* L.) seeds were present in small numbers in pre-Abbey, Abbey, and post-Dissolution samples. They probably represent cultivation for fibres which were often used to make rope, although it may also have been grown for its medicinal properties. There is some documentary evidence that both flax and hemp were grown in gardens for household use in the medieval period (Tusser 1580). Hemp seed was relatively common in the 18th-century deposit examined, even though by this time its cultivation in this country had decreased with the increased use of imported fibres (Bradshaw *et al.* 1981).

The hop (*Humulus lupulus* L.) may be grown for the fibres from its stem, for its medicinal properties, or for

brewing. Seeds were recovered in low numbers from Phase 1 onwards, but were numerous in the 18th-century samples. It is not possible to determine at what point these remains were from cultivated plants as opposed to gathered from woodlands, or when they were used in brewing. However, the recovery of a cargo of hops from the 10th-century boat at Graveney has provided early evidence for their use in brewing and there is evidence that French monasteries were using hops in their beer from the 9th century (Wilson 1975).

According to Hurry (1901) at least two kinds of beer were brewed, 'knight's beer (*cervisia militum*)' and 'small beer', which he suggests may have been a weaker version. Whether either or both of these beers contained hops is uncertain, since a variety of other herbs were used to flavour beer in earlier periods, for example sweet gale (*Myrica gale* L.) and yarrow (*Achillea millefolium* L.). It has been suggested that there may have been a brewery by the stables (Hurry 1901), but there is as yet no evidence to support this. Only small numbers of irregularly sprouted carbonised grain have been recovered from the Reading waterfronts as a whole, so that there is so far no clear evidence for malting taking place in the area. However, ale was clearly an important component of the diet at the Abbey, since even the lepers had an allowance of half a gallon daily (*ibid*, 13).

The large number of hop seeds in the 18th-century deposits undoubtedly represents cultivated hops used for brewing. The Simmonds brewery was established in Reading in 1760, and the hops recovered may well have been part of a cargo destined for the brewery. Brewing increased in Reading during the post-medieval period, particularly with the improved communications brought by the completion of the Kennet and Avon Canal in 1810 (Astill 1978).

Comparison with other sites

The range of plant remains is comparable to medieval waterlogged assemblages from the larger towns and cities, such as Winchester and Southampton (Green 1979), Norwich (Murphy 1983), and Bristol (Jones and Watson 1987), where there was sufficient wealth and demand for the importation of exotic foodstuffs. This contrasts with evidence from smaller market towns like Newbury (Green 1997; Carruthers 1997) where very few exotic taxa were recovered from the faecal deposits examined.

The only other monastic site where waterlogged plant macrofossils have been sampled and analysed is Shrewsbury Abbey, Shropshire. Samples from this site contained many of the food plant remains found at Reading with some notable additions. Stone pine and almond were present in the 12th cenury and a 15th/16th century drain produced melon, hyssop, gooseberry and morello cherry. Apples and pears appear to have been the most popular fruits but grape pips were notably sparse and there was no evidence of vines having been grown by the monks (Greig, pers. comm.).

Some evidence of food plants was recovered from deposits in the mill races of Bordesley Abbey (Carruthers unpubl.). Grape and fig seeds were the only evidence of food that was probably imported, and strawberry, cherry, bullace/plum, raspberries, and carrot may have been cultivated.

Intra-site variation

In order to examine the degree of variation in plant remains within the deposits, some contexts were sampled at several points, both laterally and vertically. In all cases the overall range of taxa present in the samples was very similar, but large differences were found in the total numbers of seeds recovered. In the cases of the river silts, this may be due to the direction of the currents carrying plant material, as well as factors such as the position of the sewage outlet from the Abbey. In some cases differences were due to the swamping of samples with seeds from one species, in particular stinging nettle which produces large numbers of seeds.

The reclamation deposits produced widely differing numbers of plant remains. This appeared in most cases to be due to some levels having dried out, causing the decay of organic remains. It could also be due to the use of clean materials for the reclamation. However, the truly anaerobic reclamation deposits contained a range of plant remains indicating that waste material from a variety of sources had been used. A well-preserved reclamation layer (1181) from a pre-Abbey level contained primarily weeds of disturbed ground and a few carbonised cereals, but no exotic fruits or arable weed seeds. All of the well preserved samples from later reclamation deposits contained the whole range of exotic fruit remains, weeds of arable and other groups. Some other samples contained virtually no remains except carbonised cereals or woody seeds such as sloe (*Prunus spinosa* L.) stones, indicating that they had dried out at some point in their history. It is not possible to determine exactly where the plant remains included in these deposits have come from, but as they do not differ greatly from the river silts they could well have been of local origin.

Library Site (W60)

A single sample of late 12th- or early 13th-century silt from the Holy Brook was examined from this site. It contained relatively few remains indicating that some drying out of the deposit may have occurred. Details of the carbonised plant remains recovered from other (aerobic) deposits on this site appears elsewhere (Carruthers 1986–90).

Numerically the most dominant habitat group was the weeds of disturbed ground, such as stinging nettle and swine-cress (*Coronopus squamatus* (Forsk.) Aschers.), the latter of which is typical of trampled places. No clear evidence of waste straw or fodder was recovered. In addition to a number of hedgerow fruits, some grape pips were present. The sample, therefore, contained little evidence of stable waste, sewage, cereals, or crop processing waste.

Crane Wharf (W112)

Samples from this site have primarily provided evidence for the nature of the vegetation and levels of activity pre-dating the establishment of the nearby Abbey. Unfortunately, few deposits were suitable for sampling and in most cases the preservation of plant remains was not

as good as in samples from the Abbey Wharf. The results from ten bulk samples and 11 small samples are included in this report. It is likely that a number of the deposits sampled had partially dried out at some stage in their history, as indicated by the small number of seeds present, the poor state of preservation of these remains and the predominance of seeds possessing thickened seeds coats, such as elder (*Sambucus nigra* L.) and sloe.

As a result of the problems in sampling and preservation, insufficient data was retrieved to demonstrate clear changes over the different phases. Neither was it possible to compare the Crane Wharf samples directly with those from the Abbey Wharf due to lack of samples from equivalent phases. In most cases it has only been possible to discuss Period 1, Phases 1a and 1b in any detail and even in these samples differential preservation may have affected the results where drying of the sediments took place. Ten samples from Phase 1 contained enough plant material for some sort of analysis to be carried out, whereas no samples from the later phases were sufficiently well-preserved. In using so few samples it is also possible that the results are not typical of the site as a whole.

Aquatic and waterside plants
Samples from Phases 1a and 1b contained higher percentages of seeds of this group than the Abbey Wharf samples, averaging c. 32%. This is due to the much lower input of seeds from other sources, such as domestic waste and sewage, so that in actual numbers per volume of soil there was little difference between the two sites. A similar range of taxa was found on both sites with perhaps more gipsy-wort, aquatic buttercups, club-rush, and bur-reed in the prehistoric samples from Crane Wharf. The latter two species are often present in reedswamp communities and were found in large numbers almost exclusively in the Phase 1b samples.

Scrub and woodland taxa
This group was not used for the Abbey site, although small numbers of alder fruits and cones, hazelnuts, hawthorn seeds, and a number of different buds were present in the Abbey Wharf samples. Some samples from the pre-Abbey phase in particular contained large numbers of alder catkins and fruits and a couple contained yew (*Taxus baccata* L.) seeds.

Samples from the prehistoric deposits at Crane Wharf were dominated by alder fruits and catkins so that this group formed a major component of the assemblages. Phase 1a samples contained 26% tree and shrub remains, which were primarily alder, but also hawthorn, elder, hazel, and yew. This had fallen to an average of 13% in Phase 1b samples, again mainly alder. Since alder is frequently a dominant species of wet river valley soils it seems likely that these remains represent a local vegetation type.

Hawthorn berries, elderberries, and hazelnuts may have been collected for food and probably grew in nearby scrub and hedgerows. No alder remains were recovered from the poorly preserved later phased samples, even though the woody female catkins are comparatively resistant to decay.

Plants of disturbed land
Early use of the area in prehistoric times is suggested by the presence of large numbers of weeds of disturbed ground, such as stinging nettles, orache, fat hen, and docks. However, since the natural habitats of stinging nettle are fen carr and woodland, the large numbers of seeds of this species in a Phase 1a sample does not necessarily indicate disturbance. It is said to grow 'luxuriantly in woods of *Alnus glutinosa* (alder) on alluvial soils' (Pigott and Taylor 1964).

Phase 1b samples showed much greater signs of disturbance by containing a wider variety of weeds of disturbed ground, in particular docks and Chenopodiaceae. Species such as great plantain (*Plantago major* L.) and silverweed (*Potentilla anserina* L.) are characteristic of open, often trampled ground. Stinging nettles, Chenopodiaceae, and docks were common amongst the few seeds recovered from later phases.

Grasslands
Only 4% grassland taxa were recovered from the Phase 1a samples but by Phase 1b this had risen to 13%. This is mainly due to the increase in buttercup seeds in Phase 1b and may indicate some clearance and the growth of damp meadows and pastures in the area bordered, by a reedswamp vegetation along the River Kennet. Few seeds of grassland taxa were present in later samples.

Arable weeds and carbonised cereals
No weeds exclusive to arable fields were represented in samples prior to Phase 3 (c. AD 1200–1400). It would appear that very little activity associated with crop processing took place in this area, as even in medieval and post-medieval samples only a couple of arable weed seeds were recorded.

The presence of a few carbonised cereal caryopses and chaff fragments, however, indicated some degree of human activity in the area from the early prehistoric period onwards. Only one grain of possible emmer wheat (*Triticum* cf. *dicoccum* Schübl.) was recovered from Phase 1a, but Phase 1b produced several cereal caryopses and chaff fragments. Both spelt (*T. spelta* L.) (confirmed by the presence of glume bases) and bread/club wheat were present, as well as 6–row hulled barley and wild/cultivated oats. The Romano-British and early medieval Phase 2 samples contained only two barley caryopses and the medieval and post-medieval Phases 3 and 4 deposits a little bread/club wheat.

Other food plants
The few hedgerow fruits recovered, such as elder, sloe, hawthorn, blackberry, and hazelnuts may have been gathered and consumed. They were present in samples from Phase 1a onwards. None of the more exotic food plants were present, suggesting that sewage had not been deposited in any quantity in the Crane Wharf area in the medieval and post-medieval periods.

Industrial plants
Cultivated flax seed and capsule fragments were recovered primarily from Phase 1b samples but also from a Phase 3 sample. Its use either for fibre, oil or as a food clearly began at an early point in the occupation of the area. A few hop seeds were recovered from Phase 1b

samples. Since hops grow naturally in damp alder fen-woods (Tansley 1939) it is not possible to determine whether they were used in any way.

Bridge Street East (W158)

Samples from 22 contexts were examined from this site. As at Crane Wharf, the state of preservation of the plant remains was poor in the majority of samples. Only in a few 11th-century samples was the preservation good enough to indicate that the deposit had remained permanently waterlogged since the time of deposition. The number of carbonised remains recovered from this site, however, was comparatively high.

The following descriptions refer only to ten Phase 1b samples likely to date to the later Saxon or early post-Conquest period, since the other phases sampled produced few plant remains.

Aquatic and waterside plants

The relatively high occurrence of seeds belonging to this group (21%) when compared to Abbey Wharf was probably due to the low input of domestic and industrial waste at this point. Club-rush, spike-rush, and sedges were particularly numerous indicating marshy areas along the river bank. The high occurrences of the bank-side species red shank (*Polygonum persicaria* L.) and golden dock (*Rumex maritimus* L.) were probably due to the plants having grown close to the point of sampling. Golden dock is a relatively rare plant in Berkshire today (Bowen 1968).

Scrub and woodland taxa

Very few remains from this habitat group were recovered (2%), as in deposits of this phase from the other sites studied.

Plants of disturbed land

A number of weeds of disturbed, organic-rich soils were represented in the assemblages, including stinging nettles, henbane (*Hyoscyamus niger* L.), and members of the family Chenopodiaceae. However, the total number of seeds (16%) suggested areas of disturbance rather than an extensive wasteland vegetation.

Grassland taxa

Some 11% of the seeds recovered from this phase are typical of grassland habitats. In some samples buttercups were quite numerous, suggesting the presence of areas of grass.

Arable weeds and carbonised cereals

Fewer arable weed seeds were recovered from this site (5%) than from deposits of similar date at Abbey Wharf, but more carbonised cereals were found. Most of the carbonised cereals came from one channel deposit and were oat caryopses. This appears to represent a single deposition of grain burned either accidentally or deliberately.

Other food plants

No fruit remains other than a few seeds from hedgerow plants such as sloe and blackberry were recovered from this site, indicating that there was little in the way of sewage or domestic waste deposited at this point.

Industrial plants

Of the taxa represented at the Abbey Wharf, only a few hop seeds were found in samples from this site. It is not possible to know whether these were used in any way or grew wild.

Other phases

Samples from early channel silts (Phase 1a) produced just a few seeds of waterside plants. Phase 2 channel silts produced a few carbonised bread wheat caryopses, waterside plants and weeds of disturbed ground. The post-medieval hide-processing pits contained very few seeds. A carbonised grape pip and grain of bread wheat were present amongst the waterside taxa and weeds of disturbed ground.

Discussion

Waterlogged deposits, in particular within medieval urban contexts, can be of great value in providing environmental and economic information due to the anaerobic preservation of a wide range of organic remains. However, assemblages recovered from riverine silts are often difficult to interpret, since they may comprise a mixture of remains from a wide variety of sources and include material washed into the site from further upstream.

The local aquatic and marginal plant communities are often well-represented in these types of deposits. Seeds from plants growing in the river and along its banks would have been shed into the water and precipitated out into the silts, the quantities depending on the buoyancy of the seeds, the speed of flow of the river, and whether the seeds are consumed by predators or germinate. In addition, Keene (1982) has discussed the problems of waste disposal in medieval towns and described how useful a town river would have been for disposing of household waste, stable dung, straw, and sewage from public latrines. Tanneries, cloth workers, dyers, and breweries were often sited near running water into which their waste would have been deposited. A wharf site is also likely to produce evidence of cargoes being loaded onto and off boats. The assemblages examined from the Reading waterfront sites appear to have produced material representing most of these sources, the proportions from each habitat group varying with the position of the individual site and date of the deposit.

In addition to river silts, some reclamation deposits were sampled for plant remains. These contexts are likely to have been composed of materials from several sources, some of which may have been clean, dry sands and gravels containing no plant remains and others, rubbish deposits containing redeposited plant material. As with the silts, the plant remains recovered are difficult to interpret due to the uncertain derivation of the material.

The earliest deposits examined were early prehistoric sediments from Crane Wharf (Phase 1a) and these produced evidence of an alder carr vegetation type with only a single carbonised grain (cf. emmer) as posi-

tive evidence of human intervention. Late prehistoric (Phase 1b) samples from this site showed an increased level of disturbance in the range of weed seeds present, and a reduced percentage of scrub/woodland taxa. Some taxa typical of reedswamp communities were abundant. Carbonised cereals (spelt, bread-wheat, barley, oat) and cultivated flax were recovered from these deposits.

Pre-Abbey samples from the Abbey Wharf site contained fairly high percentages of weeds of disturbed ground indicating a degree of human activity in the area. Carbonised cereals (primarily bread/club wheat and rye) and cultivated flax were present

After the foundation of the Abbey the percentage of wasteground weeds dropped in samples from the Abbey Wharf site. Channel silts from the four phases of occupation of the Abbey (Phases 2–5) produced a variety of cultivated and imported fruits and herbs, reflecting a varied diet. From the large number of fruit remains recovered from these silts, in particular fig and strawberry seeds, it is likely that the sewage was emptied out into the Kennet in this area. There is evidence for the presence of a vineyard at the Abbey, and there are also likely to have been orchards, vegetable gardens, and a herb or physic garden. Arable weed seeds, waterlogged chaff, and carbonised cereal (bread wheat, barley, oats, and rye) remains showed an increase during the Abbey period. This was probably largely due to the presence of the mill a short distance upstream from the Wharf site along the Holy Brook. Carbonised and possibly waterlogged evidence of animal fodder was also recovered from the Kennet silts.

Of the plants with industrial uses, the occurrence of cultivated flax decreased over the period of occupation of the Abbey, and hop and hemp seeds were recovered from some of the samples examined in moderate numbers. A sample from late 12th–early 13th-century silts of the Holy Brook next to the Abbey stables produced little evidence of animal fodder, fruit or cereal remains but consisted primarily of weeds of disturbed ground.

Eleventh-century samples from Bridge Street also contained few remains of fruits or industrial plants, although some hop seeds were present. Several carbonised cereal caryopses were recovered, possibly resulting from a single deposition of burnt oats. The vegetation in the area appears to have consisted of waterside plants along the Kennet with areas of disturbed ground and grass.

Post-medieval (Phase 9) samples from Abbey Wharf contained large quantities of coriander and hops which were probably part of cargoes being transported along the River Kennet. The hops are likely to have been destined for the Simmonds brewery a short distance upstream. There were also large numbers of fruit remains indicative of the deposition of sewage and domestic waste, including more recently introduced plants such as tomato and cucumber.

7. Human and Animal Bone and Marine Molluscs

1. Human Skeletal Remains

Crane Wharf (W112), by J.D. Henderson

Human remains in the form of two partial burials were submitted from Period 1, Phase 2 (Romano-British to Saxon) contexts from Crane Wharf (details in archive). A radiocarbon date of cal AD 1–340 (Har–9212; 1860±70 BP) was obtained from one of the burials, SF22. Although surviving bone was fairly well-preserved only 10% and 25% of the skeletons respectively remained. An extra mandible in W112/SF22 was given the number W112/SF22A, thus there were parts of a minimum of three individuals. Observations were made for age (Schour and Massler 1941), sex (Henderson 1984), stature (Trotter 1970), metrical analyses, morphology, and any abnormalities. A summary of the information is presented in Table 10, details are in archive.

Apart from some wormian bones in the lambdoid sutures of both SF17 and SF22 no metrical or morphological anomalies of any particular note were found. Skeleton SF22 showed some degree of tooth wear and severe periodontal disease (Brothwell 1981). Changes seen in the bones of the right elbow of SF22 were probably the result of trauma, either of a fracture and/or dislocation of the elbow joint. Attempted re-approximation of the bones seemed to indicate that there had been cranialward movement of the radius and ulna on the humerus which had led to the joint becoming more or less fixed in a flexed position. Certainly, at the very least, movement would have been severely restricted. Whilst the injury seemed to have 'healed' with long-term damage to the elbow joint the appearance of both proximal humerus and distal radius and ulna suggest normality at both shoulder and wrist joints. One possible explanation of this is that there had been no rotational strain involved in the original injury. Whilst the precise cause of this trauma could not be determined it may be noted that injuries of this type are often the result of falls or compression injuries (Watson-Jones 1946; Adams 1978).

Table 10: human bone from Crane Wharf (W112)

	Sex	*Age*	*Height*	*Pathology*
SF17	F	25–40	1.59 m	None
SF22	F	25–30	1.60 m	Severe periodontal disease. Changes to bones of right elbow: distal humerus completely lost its shape with new bone formed, no evidence for actual fracture
SF22A	?	8–10	?	None

27 King's Road, by S. Browne

Human remains from context 046 include two right calcanea and are therefore from at least two individuals. A right ulna, a right femur, and a left tibia are probably from a young (15–20 years) male approximately 1.72 m tall (after Brothwell 1981, 101). Much fragmented pelvic bone and a few other bones from the spine, ribcage, and shoulder, indicate a second individual, probably an adult female. No pathology was seen and there is no indication as to the cause of death of either individual.

Additional Human Bone, by Jacqueline I. McKinley

A number of examples of human bone were not identified on site and were originally submitted for analysis with the animal bone. The material includes two individual bones from Abbey Wharf (W12C) Periods 1 and 7 and a number of fragments of older juvenile and adult bone from various Period 4 contexts at Crane Wharf (W112). Details are provided in archive.

2. Animal Bone, by J.P. Coy

The animal bone sample from Reading is not large and it is much divided through being from a number of individual sites and periods. Because of its careful collection, routine sieving, and uniform method of treatment, however, it is possible to draw some conclusions from even the small samples of bone within these subdivisions. Analysis for all sites was undertaken as part of a single programme except for the Library site, information on which has been abstracted from an earlier report (Coy 1985; Coy in Hawkes 1986–90).

The Abbey Wharf sites have provided the most extensive samples and therefore provide a basic framework. The data is sufficient, however, to allow some discussion for Reading as a whole and sections on the size of common domestic ungulates and changes in butchery style through time are included. A large and important sample of horn cores was studied on a period-by-period rather than site-by-site basis.

Materials and Methods

Table 11 shows the distribution of the 10,525 animal bone fragments from trench recovery by site and period. Over 1300 of these bones were cattle horn cores which are discussed separately (*below;* further details in

Table 11: animal bone fragments, including horn cors, from normal trench recovery

Period		*Abbey Wharf* *W12C*	*W61A*	*W61B*	*Crane Wharf* *W112*	*Library* *W60*	*Bridge St E* *W158*	*Total*
1	Early prehistoric	–	–	–	1	–	–	1
	Late prehistoric	–	53	–	20	–	–	73
	Saxon	80	9	–	–	–	–	89
	Early medieval	–	–	–	–	64	–	64
2	12th–13th century	320	84	13	–	56	13	486
3	13th–14th century	539	114	233	284	68	9	1247
4–5	14th–16th century	1865	1023	86	–	–	114	3088
6	16th–18th century	584	570	–	–	1375	202	2731
7	18th–19th century	711	949	343	182	–	561	2746
Total		4099	2802	675	487	1563	899	10,525

archive). The majority of bone was recovered from Abbey Wharf, in particular trench W12C. Some other sites produced small quantities of unphased material which are not included in the Table 11 totals but are discussed below. Animal bones were initially analysed by site and, wherever possible, in phase order; results from the three Abbey Wharf trenches have been pooled by period to provide a larger sample for interpretation.

Results were entered on a database derived from the Faunal Remains Unit METHOD6 used for the medieval and post-medieval research programme. In addition to the bone from trench recovery, several thousand bones were examined from the programme of soil and bulk sampling. These were recorded in the same way as trench-recovered bone but have been tabulated separately.

Taphonomic Considerations

The basic formation processes of the river front can be inferred from other archaeological data: channel silts containing both deliberate rubbish deposits and material casually lost seem likely to have been dredged and redeposited to form reclamation contexts on the river bank, with the possibility of further refuse then becoming incorporated within them. It is to be expected that intermixing of assemblages may have taken place on a considerable scale, although obviously intrusive material (eg post-medieval pottery in medieval contexts) has been found to be largely limited to certain, specific contexts which can be ignored when formulating general conclusions. Residual material reworked into later phases is perhaps more common but it is impossible to estimate the extent to which mixing within the medieval period has occurred, as too few closely-dated finds were recovered to allow this to be routinely recognised. Analysis has proceeded on the assumption that the basic division between medieval and post-medieval is intact, but that some anachronisms exist within individual phases and periods which may have diluted evidence for change.

Attempts were made to establish the degree of mixing from the bone evidence itself. Trench recovery was checked against the results from sieving in order to deduce what may have been missed during excavation and to provide an assessment of how much may have been lost through redepositional processes; results from

Table 12: Abbey Wharf, species groups from trench recovery

Phase		*MAJ*	*MAM (dom)*	*MAM (wild)*	*Bird (dom)*	*Bird (wild)*	*Fish*	*Total*
1a	L. prehistoric	40	13	–	–	–	–	53
1b	Saxon	86	–	2	1	–	–	89
2a–2b	12th–13th century	400	6	6	5	–	–	417
3a–3e	13th–14th century	853	9	9	10	1	4	886
4	14th century	1115	10	6	42	–	8	1181
5	14th–16th century	1655	52	11	47	2	26	1793
6	16th–18th century	1107	8	7	11	5	16	1154
7	early 18th century	882	–	–	–	–	–	882
8	mid 18th century	257	111	18	32	3	–	421
9	late 18th century	700	–	–	–	–	–	700
Total		7095	209	59	148	11	54	7576

MAJ = major ungulate species; MAM (dom) = other domestic mammals; MAM (wild) = wild mammals

channel silts and reclamation deposits were compared to establish whether the two context types differed in any significant ways which might be attributed to reworking of deposits.

In general the animal bones retrieved represent both occupational and industrial waste. Certain indicators have been used throughout the site-by-site section to distinguish the two, and this is discussed further in the concluding section of the report. Where specific percentages of major domestic ungulates are discussed these are relevant only to the processes specific to the waterfront zone and do not necessarily represent the economy of the whole area.

Fine-sieving of soil samples also provided a great deal of very small fish bone which is of environmental rather than economic interest. These bones were probably naturally derived and provide some evidence for the state of the waterways.

Abbey Wharf (W12C, W61A, W61B)

This site produced the largest sample of bones, 7576 from trench recovery, of which over 1000 were measurable horn cores. The bones were distributed between the three trenches and various Reading Periods as shown in Table 11; the major concentration of material being from Periods 4 and 5 on W12C and W61A. The major cattle horn core deposits were both earlier and later than this and are discussed below. The range of species identified for Reading as a whole are in archive.

Table 12 shows which species groups were identified for the Abbey Wharf site from trench recovery for the different periods. As can be seen most were from the major ungulates with just a few from other mammals, birds, and fish. The results obtained from the examination of sieved samples is somewhat different in bias.

Major ungulates

Most of the remains from trench recovery at Abbey Wharf are from the major domestic ungulates, cattle, sheep, and pig (Table 13). There are very few finds of goat (under 1% of ungulate fragments). Within this report all such bones are categorised as sheep/goat, although it should be understood that the vast majority of such bones are likely to have come from sheep.

Percentages for Abbey Wharf show that cattle is the most important species in all periods, comprising 64–84% of all ungulate bones. If this were occupation debris this would be a very high value indeed for cattle in any of these periods. Being the largest food ungulate might suggest that it would have been the majority of meat eaten and that a very high class of diet was being consumed at Reading, but this was not necessarily so. The majority of trench-recovered bones in all periods of Abbey Wharf could be identified to species: 70–92% of common ungulate fragments could be identified to cattle, sheep or goat, or pig. A more normal figure for urban material would be 50–60% (eg Bourdillon and Coy 1980). The suggestion here is that only the more recognisable fragments are present and that the normal occupation debris of small splinters and trampled bone fragments have not been deposited in these features or were not retrieved on excavation. Secondly, there is a very high proportion of extremities (heads, feet, and distal lower limbs including distal radius and tibia) than is usual in occupation debris (normal range 51–75%), also suggesting a biased deposition or retrieval. It is most likely that industrial processes connected with cattle horn and skins produced a bias towards deposits of cattle horn cores, head bones, and metapodials.

A large number of horn cores, some skulls, and many metapodials were found whole. Such specialised deposition might be expected to lose the small bones, even those of the extremities, unless they were joined. If the deposits came into contact with flowing water and were redeposited at some time, or both, this might be even more marked. That toe bones have been lost is confirmed by their notable lack in sieving. Confirmation of the bias of these results comes when the phalanx index is calculated. In an analysis of differential recovery rates Maltby (1985) uses a cattle and sheep phalanx index in which he calculates, for these two species, the number of 2nd (smaller) phalanges as a percentage of the number of 1st phalanges. Not only does Reading Abbey Wharf show values lower than for most British sites in his list (23% for cattle, 0% for sheep) but no sheep 2nd phalanges at all were found at Reading. The reasons for low indices discussed by Maltby include retrieval bias (including poor retrieval conditions); separation on processing; carnivore scavenging; and secondary deposition.

In addition to a low 1st:2nd phalanx index there is, as discussed above, a notable absence of toes. Only 0.6% of the ungulate bones at Abbey Wharf are toes. Retrieval bias can be ruled out as the sieving results do not improve on this value for toes. The evidence of carnivore gnawing from the animal bone records does not bear out scavenging as a reason. The remaining possibilities are that the toes, perhaps with the skins, went elsewhere; or that secondary deposition led to the toes being left behind when the larger bones were dumped; or both.

Some spatial variability was evident for Period 2, where results for trench W12C show a marked concentration on cattle head and foot bones compared with results for W61A (93% and 91% respectively of the total head and foot bones from Abbey Wharf). This industrial bias continues in the Period 3 deposits, dropping slightly in Periods 4 and 5 (when there appears to be a slightly higher value for sheep at the expense of cattle). Separating the known Period 4 deposits from the combined Period 4 and 5 deposits reinforces this trend; Period 5 contexts show a high proportion of sheep bones from extremities (details in archive).

In the post-medieval period, material from both W12C and W61A shows bias towards extremities, rising to 75% for the large samples of cattle horn cores. The small sample of sheep bones in this period is also biased towards horn cores and metapodials (details in archive).

In the Period 7 samples, however, there is a much lower proportion of extremities but otherwise the above criteria still hold. Cattle representation shows a gradual decrease if the 18th–early 19th-century material is split into early, middle, and late (Phases 7, 8, and 9; from 72% of ungulate bones down to 64%) and the percentage of bones identified to species goes as high as 90%. This may in part be due to differential recovery for the later phases, with only the larger bones being collected and retained. The Period 7 samples show a much lower bias

Table 13: major ungulate representation

Period / phase		*Cattle*		*Sheep / goat*		*Pig*		*Total identified*		*Extremities*	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%
Abbey Wharf											
1/1a	L. prehistoric	24	73	4	12	5	15	33	82	11	33
1/1b	Saxon	60	76	8	10	11	14	79	92	45	57
2/2	12th–13th century	265	78	32	9	44	13	341	85	230	67
3/3	13th–14th century	562	78	72	10	89	12	723	85	462	64
4/4	14th century	606	78	85	11	88	11	779	70	471	60
5/5	14th–16th century	860	68	253	20	158	12	1271	77	648	51
6/6	16th–18th century	829	84	113	11	44	4	986	89	741	75
7/7	Early 18th century	461	72	144	23	33	5	638	72	218	34
7/8	Mid 18th century	155	67	47	20	30	13	232	90	98	42
7/9	Late 18th century	358	64	135	24	67	12	560	80	262	47
Crane Wharf											
3/3	13th–14th century	117	69	37	22	15	9	169	62	21	12
7/4	18th–19th century	59	52	34	30	20	18	113	64	34	30
Library											
–	Building 2, ?16th century	225	59	99	26	57	15	381	34	138	36
–	Revetment 4, ?16th century	52	46	41	36	20	18	113	53	44	39
Bridge St East											
4–5/2	14th–16th century	33	46	35	49	4	6	72	65	44	61
6/3	16th–18th century	68	49	63	45	9	6	140	71	93	66
7/4	18th–19th century	375	79	88	19	10	2	473	90	391	83
Total		5109		1290		704		7103		3951	

towards extremities, possibly associated with a drop in industrial activity utilising cattle carcases. The Bridge Street results show this was not true for other areas of Reading at this period.

Minor species: mammals

Both domestic mammals with minor representation (horse, dog, and cat) and wild mammals (red, fallow, and roe deer, hare, and rabbit) are included under this heading. Species and anatomical elements found in the different periods are in archive.

Horse

Horse bones are poorly represented pre-Period 5, but this may mean only that their remains were disposed of elsewhere. There is no evidence for the use of horse bones in any industrial processes. That horses were used for work at least during Period 7 is clear from a notable pathological specimen where the hoof bone was joined to extensive ossified tissue.

Dog and cat

The only significant dog remains were also from the later periods. Individuals vary from small puppy bones to those of old senile dogs with very worn teeth. Shoulder heights could be calculated for a few of the dog remains according to the methods of Harcourt (1974). There was Phase 1 (later prehistoric) evidence for dogs with shoulder heights of 0.48 m and 0.61 m. Medieval and post-medieval dogs provided very little size evidence but suggested animals around 0.40–0.50 m. Dogs from 18th- or 19th-century contexts varied widely in size. Two were small: one with a shoulder height of 0.31 m; the whole skeleton of a senile dog with a shoulder height of 0.55–0.58 m was well within the medieval range. There was also evidence for a very large dog, 0.78 m. Cat bones were few and mostly from 18th-century deposits.

Wild animals

Wild mammals exploited were few and their remains thinly spread, only 59 fragments being identified from trench recovery at Abbey Wharf (Table 12). Red, fallow, roe deer, and hare are all represented. Phase 3 context 1169, site W61A, suggests the presence of high-status remains with all three species of deer.

A single metapodial from Phase 4 is the first find of rabbit at Reading and is consistent with the post-Conquest introduction of the species seen in the rest of Wessex (Bourdillon and Coy 1980). Fallow and roe deer are also represented in this period. Rabbit and fallow deer, although they are categorised as 'wild' mammals would have been really 'captive' wild species as they were extensively managed after their Norman introduction, in warrens and deer parks respectively. In their

Table 14: Abbey Wharf, species groups recovered from sieving

Phase	*MAJ*	*MAM (dom)*	*MAM (wild)*	*UNM*	*SMM*	*Bird (dom)*	*Bird (wild)*	*UNB*	*AMP*	*Fish*	*UNF*	*Total*
1a	–	4	–	2	–	–	–	–	–	1	–	7
1b	6	–	–	13	–	–	–	–	–	–	–	19
2	35	–	–	69	4	2	–	11	–	20	24	165
3	83	2	–	88	1	–	–	29	5	57	78	343
4	65	52	1	–	1	3	1	10	14	29	9	185
5	216	8	2	273	10	8	3	51	6	296	223	1096
6	223	7	2	234	–	5	–	9	–	6	7	493
7–9	267	2	9	27	12	12	–	5	1	41	29	405
Total	895	75	14	706	28	30	4	115	26	450	370	2713

MAJ = Major ungulate species; MAM (dom) = other domestic mammals; MAM (wild) = wild mammals; UNM = unidentified mammal; UNB = unidentified bird; AMP = amphibians and reptiles; UNF = unidentified fish

subsequent spead, therefore, they might be regarded as 'feral' rather than true wild species. Red deer, fallow, hare, and rabbit are represented in the Phase 5 contexts, the last three again in the post-medieval layers. All four recur in the 18th-century contexts. Bias that may have occurred in retrieval of the smaller minor mammals and the evidence for rodents are discussed below.

Minor species: birds

Both domestic birds and wild species are represented in trench recovery at Abbey Wharf (Table 12). Species and anatomical elements represented in the different periods are given in detail in archive. Only three bones were recovered from Saxon deposits: the two fallow bones discussed above and a single tibiotarsus of goose.

Small numbers of fowl and goose bones were found in all subsequent periods, overall just under 2% of total fragments from trench recovery. Although low, this does correspond with some figures for domestic birds in occupational debris for other sites (eg Saxon Southampton; Bourdillon and Coy 1980). The presence of fowl and goose, like that of deer and rabbit, suggests that occupation debris, especially food waste, is represented in Periods 4 and 5. A carpo-metacarpus of the domestic turkey occurred in Period 7 Phase 9. Eighteenth-century records of this bird, presumably introduced from America, have been found from archaeological deposits in other Wessex towns.

Wild bird remains from trench recovery were extremely sparse and very little more evidence was obtained from sieving. There are several fragmentary bones, probably from waders or related groups (details in archive). There is also a very small amount of additional information for wild bird from the sieving results below. This paucity of wild bird remains may be misleading and more to do with the types of deposits being investigated here, rather than a lack of exploitation of wild species in Reading.

Minor species: fish

Occurrences of fish bones are recorded in Table 12 and archive; additional details of anatomical elements are in archive. Unsurprisingly, only large fragments of fish were retrieved without sieving, with just six species from normal trench recovery.

The earliest are the finds of sturgeon dermal head bones in the Phase 3 deposits. Sturgeon would have been found in rivers at this time and most major towns in Wessex have provided evidence. In the Phase 4 contexts, there is evidence of marine fish — conger eel and ling. The Phase 5 material produced a wider range (congor, cod, haddock, ling, and flatfish); and the post-medieval material some cod family remains. Otherwise all fish evidence came from sieving.

Evidence from sieving

The methods used are described in detail in archive. Although trench recovery techniques cover a very large volume of soil and form the main body of evidence for conclusions about the common domestic ungulates, sieving provides a check on the efficiency of retrieval and also much more detailed evidence for microfauna. The differences in the two types of evidence for Abbey Wharf for the species groups discussed above can be seen by comparing Tables 12 and 14. Table 14 details the 2713 bones recorded from sieving.

Most of the fragments from the sieves were probably small fragments of the major ungulates but, whereas nearly 900 of them could be reliably classified as such, an almost equal number were so fragmentary that it is only possible to say that they came from mammals (UNM). In some cases there were more fragments of the small ungulates (SAR) than those likely to have come from cattle (LAR).

It has often been assumed that smaller species produce smaller fragments and for some sites this is undoubtedly true. It has been shown for Saxon Southampton that if all soil is passed through a 4 mm mesh more SAR fragments will be found than would be expected from the species ratios (J. Bourdillon, pers comm). But at Reading the SAR:LAR ratios are very misleading as they do not appear to reflect the cattle:sheep+pig ratio consistently. One reason may be that LAR and SAR fragments represent a small sample anyway, both because cattle bones form such a high percentage of the total fragments and because a high proportion of the bones are identifiable to species (Table 14). The propor-

tion of large ungulate (LAR) unidentifiable fragments is sometimes unexpectedly low, both from trench recovery and from sieving.

This tends to confirm that the origins of the large ungulate and small ungulate material may sometimes be different – the former being of industrial origin and the latter domestic. A more detailed context by context analysis could use this factor to show up the quantitative balance of these two types of deposition.

There is a higher incidence from the sieving of immature domestic ungulates. Bones of cat, rabbit, and domestic fowl are also more common compared with the larger species in their categories, suggesting that trench recovery biases against them compared with bones of horse, dog, hare, and goose. Wild bird evidence is still very scarce from sieving at Abbey Wharf, although house sparrow, a possible hedge accentor, and pigeon come from the Period 5 samples. Trench and sieve recovered bird bones are compared in detail for Abbey Wharf in archive.

In addition there are two groups represented in the sieved results which do not appear at all from trench recovery — amphibian remains and rodents. There are a few frog and toad remains in most periods but in Period 4 context 1153 (W61A) an unusual find was a collection of some 12 snake eggs containing the small bones of the unhatched snakes. These were too numerous to count and are excluded from Table 14. Dr N. Arold of the British Museum (Natural History) has suggested that these are probably eggs of the grass snake (Plate 19).

Occasional small mammal bones indicate mouse, water vole, short-tailed vole, and both species of rat. The black rat remains were medieval and a distinctive bone of brown rat came from the late 18th-century deposits in trench W61A.

It is for fish that the evidence from sieving is absolutely essential to an understanding of exploitation. Two very high counts in Table 14 show that small fish vertebrae, many of common eel and herring, appear in the sieves. These mainly come from late medieval contexts when we know from other sites that these were a common part of the diet. Eels could well have been locally caught but herrings were generally imported in a preserved state. These vertebrae can pass through the human alimentary tract and it is not unlikely that concentrations of these in particular contexts might indicate the presence of cess.

Occasional fish remains of other exploitable species were found from the sieving at Abbey Wharf. For marine species there was evidence of shark, ray, horse mackerel, gurnard, and flatfish. A salmon bone came from the Phase 3 samples. There were occasional finds of genuine freshwater species — pike, perch, small cyprinids, stickleback, burbot (now probably extinct in England), and bullhead. In theory, the presence or absence of some of these species could be used to suggest the nature of the waterways in or near which they were found. A brief assessment proved inconclusive, however, and more detailed analysis was not attempted in view of the limited quantities of evidence and the likely degree of cross-context contamination.

Plate 19 Snake egg from a Period 4 context at Abbey Wharf

Conclusions

The emphasis on cattle in this assemblage is probably largely symptomatic of industrial processes and cannot be used to infer high status. That being said, the question of the disposal of so much meat does present an interesting problem. There are also small concentrations of sheep metapodials, especially in the Phase 5 contexts.

This bias caused by industrial usage occurs as early as the Phase 2 deposits at Abbey Wharf. The presence of a number of what might be called occupation indicator species — cat, dog, fowl, goose, rabbit — suggests that occupation debris is also represented in all periods. The relative paucity of small fragments of large ungulate in some periods reinforces the dual origin of the material. Quantifying the ratio of domestic to industrial material and defining any resultant spatial patterning could have helped determine the origin of the riverside deposits, but could not have been achieved easily from this assemblage.

Sieving shows that there is some bias in trench retrieval towards retrieval of the larger species, more fragments of sheep, cat, rabbit, and fowl are found from sieving than would be expected from their relative importance in the trench recovery record. There is not, however, the new evidence from sieving that would be expected if the trench recovery were poor. As is normal for all archaeological retrieval in clay and loam a range of microfauna appears only from sieving — amphibians, small birds, rodents, and fish — but at Abbey Wharf this material is fairly sparse: an enormous amount of soil was sieved to provide the results discussed in the sieving sections.

There are very few wild bird remains and the fish evidence from sieving, although it highlights the exploitation of eel and herring, does not add greatly to dietary evidence. Some of the small fish remains may well have come there by natural means and could provide evidence for surrounding ecosystems.

Crane Wharf (W112)

Crane Wharf provides a much smaller sample than Abbey Wharf and only Periods 4 and 7 are significantly represented (Table 11).

Major ungulates
The medieval (Period 4, Crane Wharf Phase 3) sample, small as it is, corresponds very well with the results for Abbey Wharf. The Period 7 (Phase 4) results show even fewer cattle. The proportion of ungulate material which is identifiable to species is similar in both periods and the representation of ungulate extremities is much lower than for Abbey Wharf. There are no specialised deposits of horn cores.

This suggests that there are no particular industrial processes represented at Crane Wharf in these two periods which involve the use of cattle carcases, although there is a slight concentration of cattle metapodials (mostly in the Phase 3 gully, context 5) and a lot more small ungulate fragments than would normally be expected, in the Phase 3 sample. The bones from Period 7 Phase 4, however, show a distribution more characteristic of occupation debris and small ungulate:large ungulate ratios are very much in line with specific percentages from identified bones, something which does not tend to be true for Abbey Wharf.

Minor species and sieving
In such a small sample there are, predictably, very few other species represented. From trench recovery in Period 4 horse, cat, domestic fowl, goose, and a possible wader, were identified. Sieving of Phase 4 pit context 102 produced a wider range of species: ray, eel, herring, whiting (a new species not found at Abbey Wharf), vole, and small passerine bird bones.

The Period 7 trench-recovered bones included two finds of goat and a little evidence of red deer, fowl, and goose. Sieving again produced evidence for small rodents, small passerines, and amphibians as well as one bone each of eel and herring, and two of the cod family.

Conclusions
This small sample provides two windows into the medieval and post-medieval periods. The animal bones suggest only slight evidence for selection of material in the medieval period and represent different types of deposition from those at Abbey Wharf. The most interesting medieval material came from pits and produced a new species of marine fish for Reading, the whiting, not found in the enormous sieved sample from Abbey Wharf. The Phase 4 material, although much of it came from silting, was of more typical occupation debris than that from Abbey Wharf and forms an interesting contrast.

Library Site (W60)

The animal bone sample from this site was mostly from post-medieval contexts which were from possible stable buildings (Hawkes 1986–90, building 2). The Library material (Coy in Hawkes op. cit.) was examined before the other material from Reading and some of the comments in the published report may stand in need of revision, particularly with respect to animal size (details in archive).

Major ungulates
The smaller medieval collections, each fewer than 100 bones, cannot give a clear idea of specific percentages. Many of them are from food remains but the origins of the various collections are probably diverse. Detailed results are given in archive for the two post-medieval samples and show remains of cattle, sheep, and pig, with one bone of goat in each sample. They demonstrate the much lower value for cattle than in the industrial deposits of Abbey Wharf. The percentage of identifiable bones and the percentage of bones from the extremities is also much more consistent with occupation debris. There was evidence for calf in a variety of deposits at the Library site.

Minor species and sieving
The small medieval samples also produced a little evidence for domestic horse, goose, fowl, and definite brown hare. There were no medieval dog bones despite evidence of dog gnawing. Sieving added evidence of a hedge accentor, and a cod several kilograms in weight.

The post-medieval sample, being larger, produced a wider range of species, details of which are given in archive. Building 2 produced evidence of domestic dog, fowl (including two bones from hens), and goose; and evidence of fallow deer, rabbit, common snipe, a medium-sized wild duck, and a tibia probably from black rat was also recovered. Frog bones were found from sieving. The Phase 4 reclamation material also produced domestic cat, domestic fowl, fallow deer, rabbit, and an ulna of cormorant. There was in addition a very large unfused distal femur of pig large enough to have come from the wild boar, *Sus scrofa*. The fallow deer bones at the Library were very low in the size range for archaeological fallow in Wessex and may have come from one unusually small individual.

Conclusions
This assemblage provides a useful sample of post-medieval occupation debris. Butchery, usage, and dietary range were consistent with a post-medieval date and the domestic animals were of a good size. There was evidence of the exploitation of two species thought to have been introduced into England after the Norman Conquest — the fallow deer and the rabbit. The example of the former was extremely small, although anatomically certainly fallow. There was also a little evidence of the exploitation of true wild species — snipe and duck, and even cormorant, which is well able to come this far inland, as it does along the Thames even today. From the medieval material, which provided only a small sample, there was evidence for exploitation of large marine fish.

Bridge Street East (W158)

This site produced a small but extremely interesting sample of bones, mostly derived from Period 4 onwards. The Period 7 material was notable for a concentration of cattle horn cores and there is no doubt that these deposits, at least, are biased by derivation from industrial processes. The industrial concentration at Bridge Street East complements to some extent that discussed

earlier at Abbey Wharf for the medieval and post-medieval periods. This is discussed in more detail in the horn core section below. In addition to this there is evidence for specialisation connected with the use of sheep carcases.

Major ungulates
Results in archive give the details for the only three period samples which exceed 100 fragments. The majority of bones in all three are from the domestic ungulates: cattle, sheep, and pig. A goat cranial fragment was found in Period 6 and two goat metapodials in Period 7.

A much lower concentration of cattle is obvious for the later medieval and post-medieval periods. As much sheep as cattle bone was identified in Periods 4 and 6, mostly represented by metapodial fragments. The incidence of sheep metapodial fragments is also high for Period 7 but the occurrence of sheep is swamped by the very large sample of cattle horn cores which raises the cattle percentage representation to the levels seen at Abbey Wharf in both the medieval and post-medieval periods. However, there is not a corresponding concentration of cattle metapodials, as there is sometimes at Abbey Wharf.

Although a smaller sample and spread over several periods, this concentration of sheep metapodials bears some similarities to the collection of sheep metapodials analysed for late 17th–early 18th-century groups from Walmgate, York (O'Connor 1984). There are virtually no sheep or goat cranial remains.

Minor species
Although most of the fragments dated to the medieval period at Bridge Street East are from the major ungulates there was also evidence of goat, domestic fowl, and goose. Period 4 produced evidence of domestic fowl and horse including a partial skeleton (ribs, cervical and thoracic vertebrae) of a horse and the post-medieval period also produced horse and goose.

In Period 7, 31 horse bones and a scattering of bones from domestic dog and cat, and evidence of fallow deer and bird were recovered (details in archive). A virtually whole elderly dog from culvert context 2243 was also recovered. The dog may represent a distinctive breed of the period having a relatively short and broad skull and an estimated shoulder height of 0.48–0.49 m (Harcourt 1974; details in archive). A gnawed and eroded calf astragalus may have come from inside the dog's body but the bones of the dog skeleton were somewhat disturbed before excavation so that it is not possible to confirm this. The dog had many signs of age: its teeth were well worn, some down to the roots; it also showed bony outgrowths (exostoses) on long bones and vertebrae; and a severely arthritic right elbow which might have given pain on movement.

Evidence from sieving
Altogether 665 fragments from sieving on Bridge Street East were studied. The Period 2 samples produced evidence of rabbit, domestic fowl, eel, herring, small cyprinid fish, small rodent, and frog. The Period 3 assemblage also contained a shark tooth and a ray tooth (both from channel deposit 2420). Period 4 samples contained evidence for domestic horse and fowl, some small bird evidence (partridge and sparrow family), and a few fragments from eel, herring, small cyprinid fish, frog or toad, and the short-tailed vole. The post-medieval Period 6 samples only produced fragments of ungulates. The Period 7 samples again contained shark tooth from culvert 2216 and evidence of the woodmouse.

Conclusions
This small sample is very interesting as to some extent it complements the results from Abbey Wharf for cattle, particularly when the evidence obtained from the cattle horn cores is included. Bridge Street also contained concentrations of sheep metapodials, like those at Abbey Wharf. There is just a trace of bird and fish evidence and it is not clear how much derived from occupational debris and how much could have come from the surrounding area through natural processes. With such single bones it is unwise to speculate but obviously the herring, shark, and ray remains must have arrived by human agency.

Other Sites

Very small numbers of bones were recovered from the other sites discussed in this volume. Details are in archive.

Discussion

Ungulate size
Changes in size are discussed through time for all the Reading sites for the major domestic ungulates, including horse. The measurements taken throughout the animal bone study were based on the work of von den Driesch (1976). Normally up to 12 measurements were recorded. Withers (shoulder) height measurements were calculated from whole bones according to the methods for the different species recommended by von den Driesch and Boessneck (1974). As so many periods are represented and such a high proportion of the bones were horn cores there are not many post-cranial measurements from which size may be judged. The concentration on extremities, however, does mean that there are quite a lot of metapodials: the bones of the fore and hind limb (metacarpus and metatarsus respectively).

Horse
Withers height estimates were made where possible for horse. There is no proof that donkey was present at any of the sites. Periods 2 and 3 produced animals as small as the Shetland Pony (10.3 hands, 1.08 m) and the majority seem to have been ponies (under 14.2 hands, <1.48 m). Only four horses were identified, the largest, in Period 7, measuring 16.1 hands (1.65 m).

Cattle
Withers heights estimates for cattle were made from whole bones. One value from the Library (Period 2) was rather high for this period (1.13 m) compared with values given by Bourdillon (1988) and may have been intrusive. Period 4 and 5 values are increased by three

relatively large examples from W12C Abbey Wharf. Otherwise the medieval and post-medieval results are not surprising (0.97–1.33 m) and well within the range of comparable animals found elsewhere in Southern Britain.

The Period 7 values for the Abbey Wharf were pooled as no differences were obvious between Phases 7, 8, and 9. Some of the Period 7 results were surprisingly low — less than 1 m at the shoulder. There were too few metapodial values to attempt graphical representations of the sex ratios.

An analysis was attempted on cattle bone widths, but there was insufficient evidence in the various periods to make this worthwhile. Similarly the distal metacarpals were examined for evidence of heavy use. An index of splaying (Maximum Distal Width (MDW) divided by Distal Diaphysis Width (DDW)) was plotted against MDW and results compared with those from other Wessex material. A few results were well splayed. These were animals of various sizes from W12C Abbey Wharf Phase 3 and Phase 4 contexts. The other notable results were a large bull from W12C Phase 5 with a distal width of 71.7 mm; and the tendency for the Period 7 results to fall into widely separated groups, presumably male and females.

Cattle extremities are under great pressure when the animals are used for traction and several cattle metapodials showed signs of pathological change.

Sheep and goat

Before estimating sizes it is essential to distinguish between the two species, as the goat has relatively shorter extremities. Sheep and goat bones were specified where possible using the anatomical criteria described by Boessneck *et al.* (1964) and accumulated data more relevant to Wessex. On anatomical criteria very few goats were recognised. In Period 6 some sheep metapodials appeared to have goatlike characteristics of slight inflation and posterior flattening of the distal shaft. Using Gromova's sheep:goat index on the distal condyles of the measurable metacarpals as a check, these specimens matched sheep except for an odd low value which coincided with a specimen which was goatlike in other ways. Distal condyle indices lower than 63% are usually considered more likely to be goats (Boessneck *et al.* 1964). Apart from a distinctive whole goat metacarpus in W61B Abbey Wharf Period 4/5, with a Gromova Index of 59.6%, the results for a sample of 60 metacarpals ranged from 64.8 to 77.3% with a mean of 70.4%.

More total separation of the two species was obtained by Klein and Reichstein (1977) for Haithabu by plotting width measurements against total lengths for the metacarpus. This decreases the sample as it can only be done on whole bones but, for Haithabu, provided complete separation. For Reading, total length was plotted against distal breadth (archive) rather than the minimum diaphysis breadth used for Haithabu because of the added complication of the post-medieval sheep. The bone which matched goat anatomically is well separated from the majority of the bone sample. Two large 18th-century sheep are considerably bigger than any other animal within the sheep/goat sample, almost certainly the result of the sheep improvements of the early modern period carried out most notably by Robert Bakewell (Pawson 1957).

If the three goatlike metacarpals are excluded, overall these are small animals averaging just over 0.5 m at the shoulder. Bourdillon (1988) has pointed to the decrease in size which occurs in both sheep and cattle after the Saxon period in Southampton. There is a very tall individual in Period 5 (0.66 m) but it is not as broad as the Period 7 large individuals mentioned above.

Withers heights were also calculated from metatarsals and a number of other whole long bones, and most observations fit the results for metacarpus. The three individuals which are suspected goats give withers heights of 0.59–0.61 m using the figures for goats (von den Driesch and Boessneck 1974).

Pig

The pig sample is very small and apart from one or two long bones which are large and well-sculptured enough to have come from wild boar, all that can be said is that the pigs are domestic and largely skeletally immature. Later contamination with, especially, 18th- or 19th-century pigs might also produce larger bones.

Age

One factor pursued was relative ageing by tooth wear. Eruption and wear was recorded for all mandibular teeth of cattle, sheep, and pig using the techniques of Grant (1975). The samples were quite inadequate for rigorous analysis but what evidence there was pointed to adult cattle and sheep with well worn teeth (sometimes very worn teeth). This would fit with a hypothesis of the use of older animals for industrial purposes. Pigs, as explained, are more often younger and there is no particular evidence that they were used here in any industrial process.

Butchery styles

Butchery methods certainly change through time and the database accumulated for Reading might pay further study. There is very little evidence from Reading of vertebral remains of the domestic ungulates but what there is shows midline splitting of the carcase, as expected from the medieval period. The actual techniques of splitting change through time, however. Some medieval material is extremely carefully split but in later phases, although cut surfaces are flatter (this is in line with the use of different implements), the actual cut is not necessarily midline.

There are some cattle skulls in Period 6 Abbey Wharf with distinctive chopping either side which may be associated with the removal of horns. Unfortunately this is from a period of W12C which is not notable for horn core working. The horn cores themselves were often attached to a chunk of skull and any knife cuts or blade marks from chopping were carefully noted both for horn core itself and for skull attachments.

The commonest type of butchery overall is an oblique chop right through the corner of the skull below the horn. In the Period 6 W12C Abbey Wharf deposits there seems to be a trend towards an oblique cut nearer to the base of the horn core. In Period 7 very fine sawing may replace chopping. That the two horns became separated at some stage in the process is obvious from the scarcity of pairs.

An exception is the very few crania bearing both horn cores which are of the 'small' category. These presumably would not have produced worthwhile amounts of horn, although the associated skins might have been used.

The timing of separation of the horn from the core is difficult to establish, as horn rarely survives. But in view of the almost total lack of evidence for knife marks on the cores themselves it can be assumed that the horn came off easily so it was probably separated after some time had elapsed, when the tissues joining the core and the sheath had rotted or dried out. If additional maceration was required for this process it would be a great advantage to have the horns separate as they could be packed better. This would justify the oblique cut to remove horns separately. The timing of the separation of the skin from the horns and their cores is also of interest. Horns might form a useful handle for some of the processes of leatherworking. A proportion of skull frontal fragments attached to cores do show knife cuts, presumably made during the skinning process, but whether this was before any part of the tanning process or after needs more investigation.

Conclusions

The animal bones provide a complex mixture of evidence which is the result of a large number of processes, some primary and some secondary. In addition there is a complex mixture of types of preservation at Reading. Some bones have come from waterlogged deposits, some from non-waterlogged deposits, yet others have had a history of intermittent waterlogging and drying. To sort out the fine details of these taphonomic processes and their effects on the resultant collections, ie to calculate detailed bias, would be a major undertaking beyond the scope of this report. It has been possible here only to deliver some broad comments and analyses across sites and across periods and to look at certain deposits in more depth.

The peaks of cattle representation and the peak of industrial utilisation (as represented by the percentage of ungulate bones which are from the extremities) occur at Abbey Wharf in the W12C Period 3 deposits; the W61A post-medieval deposits; and the Period 7 deposits at Bridge Street East. A variety of deposits at Abbey Wharf and Bridge Street East also show a concentration on bones of the extremities of sheep, especially those from Periods 4 and 5 at W12C and W61A.

Some attempt was made to estimate body size of cattle but available whole long bones for doing this were few. A better sample for withers height estimates was available for sheep.

A wide variety of other domestic species were present: some horse, very little goat and cat, but an interesting sample of dogs, and a little fowl and goose. Turkey was also found in Period 7. Traces of a number of wild mammals were also found including the two native species of deer (red and roe) and the fallow deer and rabbit, likely to have been introduced post-Conquest.

The fish evidence is sparse but wide ranging. Some of the bones, especially remains of eels, herring, and small freshwater cyprinid fish may have come from cess, especially where these were retrieved from the same context. Herring would have been imported from the coast, probably as preserved fish. Eel and cyprinids would have been common locally. Evidence of larger fish is not surprising as in medieval and post-medieval times large sea fish were taken to all parts of England from the coast. The remains of shark, ray, conger eel, cod, whiting, haddock, ling, gurnard, scad or horse mackerel, and flatfish would originally have come from the coast. The finds of shark teeth might be associated with the use of sharkskin in some industrial process although there is no evidence for this.

Salmon and sturgeon could have been brought from nearer the coast although both might have been caught as far up the Thames as Reading. The true freshwater fish — burbot, stickleback, and bullhead or miller's thumb — are probably evidence for diverse populations of fish in the surrounding waterways rather than evidence from diet. The burbot is probably now extinct in England and was identified from a Swedish specimen supplied to the writer by Leif Jonsson of Goteborg.

3. **Cattle Horn Cores**, by J.P. Coy and Michael J. Allen

Material and Methods

A total of 1344 measurable horn cores as recovered from the Reading waterfronts excavations, of which only 463 were measurable for total length, despite considerable mending and matching. Only measurable horn cores are discussed here. Details of all the horn cores are in archive.

The major horn core densities are in Abbey Wharf W12C Period 3 (44% of all fragments are measurable cores); Abbey Wharf W61A Period 6 (44 %); and Period 7 at Bridge Street East (43%) but in some small samples from earlier periods on W12C at least a quarter of the fragments are also cores (77 examples). Values in excess of 1% of total ungulate fragments are not typical of domestic deposits in any of these periods (*see below*).

Detailed measurement and recording of the horn cores was undertaken in an attempt to:

1. define specific size/shape collection
2. determine specific species present (ie longhorn or shorthorn)
3. determine specific age/sex classification

with a view to attempting to discern the use, function, or industrial process(es) leading to considerable horn core discard on the waterfront sites.

All measurable cores were recorded on database READHC which included: site; period; a number of measurements to mirror overall size; angle to skull; and torsion; and a number of other non-metrical criteria such as wall thickness, porosity, grooving, and subjective assessments of age and sex (*details tabulated in archive*). Whole cores were categorised and fragmentary cores were estimated according to Armitage's work on horn core size groups (Armitage and Clutton-Brock 1976, Armitage 1982).

Results

The results of the detailed analysis are given in archive and only summarised here as, despite detailed and targeted analysis, few major results could be obtained or conclusions drawn.

Horn core lengths were consistently 120–140 mm until Period 7 which gave a slightly larger mean for horn cores from the Abbey Wharf sites and a significantly larger mean for the very small sample of whole cores from Bridge Street East. Horn core length varies little throughout the medieval and post-medieval periods and corresponds with the 'short' category of Armitage's classification of prehistoric and medieval horn cores (Armitage and Clutton-Brock 1976).

Ageing, using the system devised by Armitage (1982), was assessed for measurable 'adult' cores. Most cores fall into the adult classes (3 = young adult, 4 = adult, 5 = old adult) and very few are recorded in the infant and juvenile classes (classes 0 and 1). No consistent relationship with deposit type or age of deposit was observed (detail in archive). The only discernible patterning is that the Period 7 deposits have a preponderance of older cores. The highest overall proportion of adult and old adult cores is from the late 18th-century Abbey Wharf sample which is virtually all from channel deposits as opposed to pits or culverts.

Analysis of basal widths of the adults (classes 3–5) revealed a modal size of 45–50 mm for maximum basal diameter, with slight skewing in favour of larger values due to the presence of a few very large cores. Basal sizes for Period 3 are slightly lower than earlier and later phases (detail in archive) but, in Period 6, although the modal group is smaller, there is a block of larger cores corresponding to those from Period 7. This positive bias in Periods 6 and 7 may indicate the presence of 'longhorns'.

Detailed analysis of length category estimates followed those of Armitage and Clutton-Brock (1976) and are detailed in archive.The basal diameter modal group is statistically most likely to represent short or medium horns. It was noticeable that the longhorns from Bridge Street East included some very slender horn cores (presumably cows). The bimodality emerging in the basal length distribution (detail in archive) may represent bulkier males and more slender female cores. The length category estimates show that most cores are within the 'short' (96–150 mm) category.

The question of cattle breeds and the identification of Shorthorns and Longhorns (employing capital letters to denote identifiable breeds following Armitage's usage) was addressed. Most Reading cores had a high double type of intercornual ridge with occasional specimens showing a very high ridge, characteristic of the modern Jersey breed. This does not mean that they were Jersey cattle, only that they may have had a genetic similarity.

Sexing of horn cores is a very difficult exercise; nevertheless, the supposed castrate horns are in the majority. But an analysis of the major collections showed very little pattern when percentages of supposed bulls, cows, and intermediates (ie castrates) were calculated for the various sites and periods. However, when supposed males were set against females there was a regular pattern of very high male values in all the samples (72–90%).

It has been suggested (eg, Armitage 1982) that in the post-medieval and early modern periods there was considerable selection of cattle for different industrial processes. Some of the horn cores may have been associated with the Period 7 cattle hide processing pits at Bridge Street East. At a 16th-century tannery excavated in Northampton (Shaw 1984) it was assumed that the skins came with the horns still attached. Excavations at Brook Street North, Lewes, East Sussex produced *c.* 1700 14th–15th-century cattle horn cores in an area with considerable evidence for tanning up to the last century (Freke 1975).

4. Oyster and Other Shells, by J. Winder

Oysters

The shells of oysters, other marine molluscs and some freshwater molluscs were recovered during the excavations of the Abbey Wharf trenches W12C, W61A, and W61B. The shells were examined to see if there was any significant variability on an intra-site level in their abundance, size, age, growth rate, infestation, fragmentation, and discolouration. Particular attention was paid to variations between periods from trenches W12C and W61A, and also to differences in the shells from the channel contexts compared with reclamation contexts. No analysis has been carried out on the smaller numbers of shells from other waterfront sites. On an inter-site level, the size distributions of the oyster shells were compared with samples from other archaeological sites and from modern oyster populations. The possible source of the oysters is discussed.

The majority of shells recovered from the Abbey Wharf site were those of the common oyster (*Ostrea edulis* L.). The minimum number of individual oysters represented by the shells was only 489 which is a small quantity considering that they were deposited over a period of about 600 years. However, oyster shells were mostly confined to Phase 4 onwards. The relative infrequency of oysters seems to indicate that they were not a common commodity, or were disposed of in areas other than those excavated. Since oysters have a limited lifespan out of water, and they are normally eaten alive, the cost of the necessarily rapid transport from the coast would have been high.

The distribution of oysters through time on this site encompasses the period from the development of riverside storage and wharf facilities (Phase 4) to the Phase 6 decline at the time of the Dissolution. It is interesting to note that oysters did not suddenly disappear at this stage but apparently continued to be consumed and the debris dumped for some time afterwards. The appearance and disappearance of oysters on the site might not only have been associated with the fortunes of the Abbey but also with the availability of oysters for despatch inland by the existence of a surplus at the coast. The British climate was mild during Phases 4 and 5, which may have promoted natural propagation on wild oyster

beds. By the beginning of Phase 6 the climate had begun to deteriorate.

The average size of the oysters was small (detail in archive). There appears to be a gradual reduction in size with time. However, the size frequency distributions in the samples were similar (with the majoity in all periods having maximum dimensions of 45–70 mm) and no significant difference in size could be demonstrated between them. The one or two very small oysters could have originally been attached to older specimens.

When the mean sizes of the oyster shells from the Abbey Wharf were compared with the means of other samples (Winder 1988; 1992), they could be placed in a group with those from Ludgershall Castle near Andover, Hampshire; Brown Street, Salisbury, Wiltshire; and Cross Street, Wokingham, Berkshire. The Reading shells bear no size relationship to either archaeological or modern oyster samples from the Solent and Poole areas.

The most common ages of oyster found on the Abbey Wharf site, as on other archaeological sites, were three and four years (detail in archive). Older specimens, in which the meat is tougher, may require cutting or cooking before eating. Since oysters are usually eaten alive and raw, younger oysters with tender meat are normally preferred.

The mean maximum width of the right valves of oyster shell belonging to each age group within a sample was used to calculate and plot the average size of shell in each year group. This could be compared visually with curves obtained for other samples on an intra-site and inter-site basis. The absolute growth rates determined for samples from Phases 4, 5, and Period 7 were virtually identical. They were also similar to the rates demonstrated for oyster shell samples from Brown Street, Salisbury. The growth rate in oysters from Phase 6 at Reading was much lower than the rate calculated for samples from the other periods. It matched, however, the rate for the oysters from context 131 at Cross Street, Wokingham which belongs to the same general period. The growth rate curves are detailed in archive. The reduced growth rate from Phase 6 coincides with a decrease in numbers. This tends to support the idea that colder weather may have contributed to a decline in their availability. This may be evidence of worsening climatic conditions.

Infestation of the oyster shells was slight. There was evidence of eight types of infesting or encrusting organism (details in archive). The most frequently occurring infestation evidence was the burrows of *Polydora ciliata*. These burrows were dominant in all samples (30–40% of infested oysters in each phase) although in Phase 7 there were fewer instances than elsewhere (29%). The predominance of *P. ciliata* is potentially significant in a consideration of the place of origin of the oysters.

Oyster shells in Phase 6 were characterised by an absence of encrusting organisms such as the calcareous tubes of *P. triqueter*, Sabellid worm sand tubes, sea mats, and barnacles. It is difficult to account for this noticeable difference in the pattern of infestation in this particular period but it may be connected with the slow growth rate already established for this sample in being a possible response to colder weather; or both features could be a result of growth in deeper water.

An examination of the degree of fragmentation in the oyster shell samples revealed that more than twice the number of shells from the reclamation contexts (47.1%) were damaged than from the channel contexts (21%). Since oyster shells are fairly brittle, some broken shells could logically be expected in most types of deposit. The higher proportion of broken shells in the reclamation contexts would be the result of dredging the river channel where it is supposed that rubbish was deposited in the first instance; and then dumping the river muds on the bank. Where primary deposition had taken place, in pits or post-holes for example, a higher percentage of shells would remain intact.

Deposition in fine organic silts on the river bed had caused staining of the shells. This varied from the presence of a few grey patches to complete blackening, presumably depending on the length of time spent in the silts.

Other Molluscan Species

Other marine molluscs and the larger freshwater molluscs were counted and their abundance in the different context types and in the different phases was tabulated. Valves of edible mussels (*Mytilus edulis* L.), that disintegrate very easily, seem to have survived better in the undisturbed channel contexts and may be under-represented in the other deposits. All the common whelk shells (*Buccinum undatum* L.) were found in the channel contexts. One specimen of the related, but more robust, buckie (*Neptunea antiqua* (L.)) was recovered from each of the context types. Most of the freshwater species were also found in the channel contexts. A table in archive shows the abundance of other molluscs according to type of context.

The various species were distributed unevenly through time on these Reading sites (details in archive). In deposits belonging to the pre- or early-monastic periods (Phases 1–3) only freshwater species were found with a few oysters. In contexts dated to Phases 4 and 5 the majority of the edible mussels (91.7%) and most of the common whelks were found. Phase 6 possessed the highest percentage of cockles (*Cerastoderma edule* (L.)) at 48% and two of the three buckies recovered from the site. Cockles were found in all Phases from 4 to 8.

The numbers of non-oyster molluscs were small; they may have been affected by differential survival or recovery. There is nothing to indicate that the large freshwater mussels, both *Unio pictorum* (L.) and *Anodonta* sp., had been used as food. They would have lived in the mud of the river bed and their inclusion with the other molluscan food refuse would have been incidental.

Most shellfish appears to have been consumed during Phase 5, a transition phase between a warmer and a cooler phase of the British climate. A relatively large quantity of mussels, with whelks, cockles, and most of the oysters were found in deposits from this phase. Although it is necessary to state again the need for caution in making assumptions based on such a small number of shells, the frequency of shellfish remains around this time might have resulted from a surplus catch being available to coastal communities

because of an extended phase of favourable conditions leading to increased stocks.

Source of the Marine Molluscs

Finally, it is possible to draw together several pieces of evidence to suggest the general locality from which the oysters came. The oysters in the samples from Reading Abbey Wharf share certain of their characteristics, such as size frequency, age distribution, and growth rate, with samples obtained from other archaeological excavations in the more northern part of the region of Wessex: at Salisbury, Ludgershall, and Wokingham. These features are very different from those demonstrated in oyster shells from either the Poole or Solent areas in the south (Winder 1989a and b; 1992; forthcoming).

Furthermore, the most frequently occurring type of infestation in the oyster shells was caused by *Polydora ciliata*. This worm has an ubiquitous distribution in oysters on hard, sandy or clay grounds, particularly in warm shallow water. The larger, related species, *Polydora hoplura*, is found mostly in the south-west of England where it thrives in oysters on soft ground in still, warm conditions. In the Solent and Poole regions both species are often found in oyster shells. However, on the east coast it is usually only the smaller *P. ciliata* that occurs. Therefore, any shells that are predominantly or solely affected by the latter species are more likely to have originated on the east coast in north Kent, Essex, or Suffolk.

The buckie, also called the 'red' or 'almond' whelk, which was found with the Reading oysters, is not to be found on the south coast at all. It only occurs on the east or west coasts and is often found in baited whelk pots off the Norfolk shore.

It seems likely, therefore, that the marine shells at the Abbey Wharf came from the East Anglian coast from which area they could have been rapidly shipped up the rivers Thames and Kennet to the Abbey.

8. Leather

by Quita Mould

1. Abbey Wharf

Introduction

Approximately 1450 items of leather were recovered from the excavation of the Abbey Wharf trenches W12C, W61A, and W61B. Table 15 shows the quantity of leather found within each phase. It was not possible to differentiate between Phases 4 and 5 or between Phases 7 and 8 within trench W61B of the 1983/4 excavations so that the finds from these contexts have been placed into the later phase in each case. As Phases 6 and later were found to contain shoe parts with a date range at variance with the dating proposed, the individual phases from the mid 16th century have been considered together as a single mixed assemblage. Because of the nature of the total assemblage no estimation of population as reflected by the shoe finds was attempted.

The illustrated items are arranged by site more-or-less in phase order irrespective of the suggested date for individual items (Figs 60–83, key to drawings on Fig. 58, sole shapes and construction types shown on Fig. 59). References in text are made to illustration number or, if the item is not illustrated, in the form of Period/Site/ Phase/ Context/SF No.

Nature of the Total Assemblage

The shoe components found indicate that the leather from the Abbey Wharf site falls into two wide but distinct groups:

1. Medieval: comprising shoes of turnshoe construction dating from the beginning of the site's occupation to *c.* 1490–1500.
2. Post-medieval: comprising shoes of welted construction dating from the early 17th to the late 19th century.

It was notable that no shoe parts of mid or late 16th-century date could be recognised within the assemblage, although occasional turnshoe vamps with broad, round toes belonging to the late 15th or early 16th century were found (Fig. 62, No. 16, Fig. 70, No. 43).

Medieval

Nature of the medieval assemblage

A total of 88% of the leather from medieval deposits came from contexts belonging to Phases 4 and 5 combined, spanning a period from the early 14th century to the Dissolution, the majority coming from Phase 5, more closely dated to *c.* 1395–1539. The quantity of leather found in contexts belonging to the pre-monastic and early monastic periods was too low for any comparison by phase to be significant.

Some 44% of the medieval leather was waste. Phases 4/5 contained 52% waste leather, amongst which both primary waste from the discarding of unusable parts of the hide and secondary waste from the cutting and trimming of shoe pattern pieces could be distinguished. The small amount of primary waste found, including five pieces of belly skin with udder, indicates that hides

Key to Leather Illustrations:

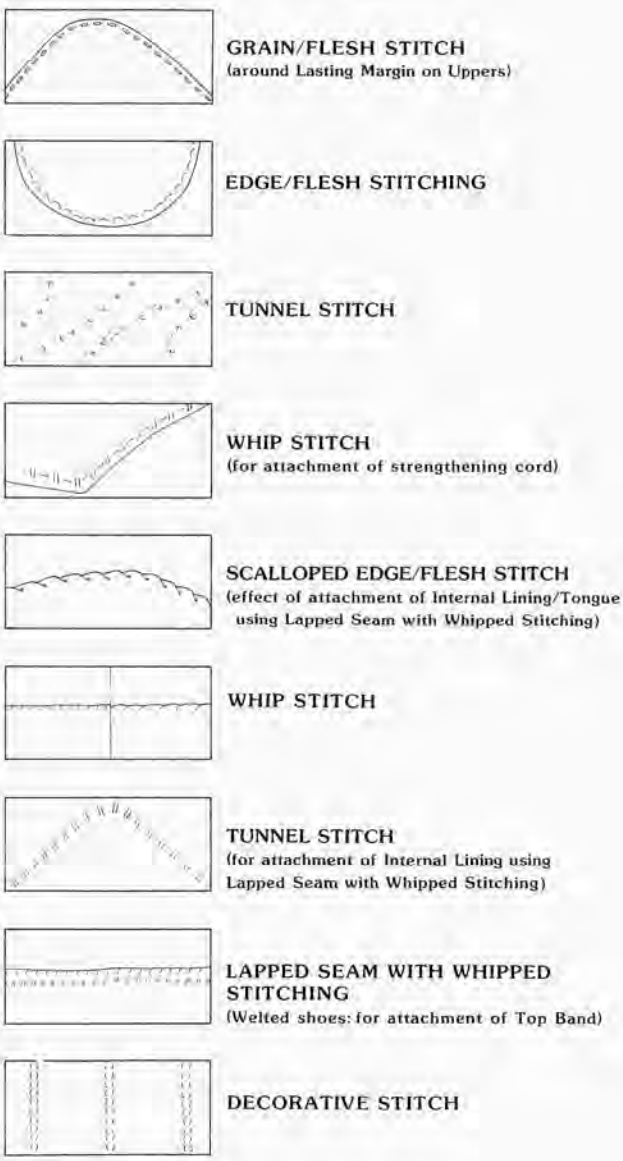


Figure 58 Conventions used in the leather illustrations

Table 15: Abbey Wharf, number of leather items by phase

	W12C				*W61*			
Phase	*Manufacture*	*Reuse*	*Waste*	*Scrap*	*Manufacture*	*Reuse*	*Waste*	*Scrap*
1b	5	1	11	–	–	–	–	–
1	–	–	–	–	3	1	4	4
2a	–	–	1	–	–	–	–	–
2b	8	3	6	2	–	–	–	–
2	–	–	–	–	7	–	12	2
3a	16	1	11	1	–	–	–	–
3b	1	1	1	–	–	–	–	–
3c	1	1	–	1	–	–	–	–
3e	1	–	–	–	–	–	–	–
3	–	–	–	–	10	3	1	–
4	56	8	11	–	7	–	1	1
4/5	–	–	–	–	13	–	32	31
5	194	34	231	54	61	6	72	29
6	62	6	18	–	14	1	9+	5
7	67	7	21	3	12	–	1	–
7/8	–	–	–	–	1	–	3	–
8	–	–	–	–	20	4	–	–
9	–	–	–	–	114	23	20	3+
U/S	64	6	30	2	57	10	7	20
Total	475	68	341	63	319	48	178+	95+

were being prepared in the vicinity at this time. The majority of the waste leather was secondary, from shoe making. It is of interest that three small waste pieces from the making of decorative cut-outs (Fig. 74, No. 66) such as that seen on a boot top (Fig. 73, No. 58) occurred in Phase 4/5. The proportion of waste leather was relatively low, however, compared with that found at other sites; the waste from Period II (mid–late 13th century) at Lucy Tower, Lincoln, represented 95% of the leather finds from that period, for example. Whilst the relative proportions of waste found on the two sites may to some extent be governed by the differing time scale over which the deposits accumulated, it does suggest that the leather from the Abbey Wharf site does not solely represent shoe making waste.

Six per cent of the manufactured items from Phase 5 had been cut to salvage reusable leather which, along with the quantity of worn shoe parts found, indicates that part of the assemblage is debris from cobbling. The occurrence of shoes with the majority of their component parts including internal linings remaining (Fig. 61, No. 10, Fig. 65, No. 29, Fig. 67, No. 35, Fig. 69, No. 40) may suggest that a small proportion of the finds are casual discards rather than any form of manufacturing waste or repairing debris. The rather mixed nature of the assemblage is likely to be the result of the comparatively long time span over which the later medieval deposits and, therefore, the greater part of the leather accumulated.

Turnshoes

The shoes of turnshoe construction are discussed as a single group. The majority of the shoe finds of this construction were found within contexts belonging to Phase 5. Those from earlier contexts occurred in too small a number for any comparison to be made by phase nor could they be seen to differ from the bulk of the assemblage as was the case with the turnshoe parts found residually in contexts of post-medieval date and unstratified.

Soles

One hundred and three turnshoe soles were found exhibiting a range of shapes commonly found during the later medieval period (Fig. 59). The sole shapes showed no extremes of fashion suggesting that they come from practical, working shoes.

Type 1 Of the soles sufficiently complete to classify, nearly half had oval toes and a 'natural' foot shape having a tread, waist, and seat of medium width (Fig. 61, No. 10, Fig. 62, No. 12, Fig. 63, No. 17, Fig. 67, No. 35 and Fig. 69, No. 40).

Type 2a: Roughly a quarter had short, pointed toes with a 'petal' shaped tread and medium waist and seat, (Fig. 62, No. 13, Fig.74, Nos 69 and 70).

Type 2b: Occasional soles had more distinctly pointed toes with narrower waists and longer seats, (Fig. 64, No. 25, Fig. 65, No. 26, Fig. 66, No. 30, Fig. 70. No. 42); no examples of the excessively long-toed pike or poulaine were found.

Type 2c: A single pointed-toe sole (Fig. 62, No. 11) was found in Phase 4, which was

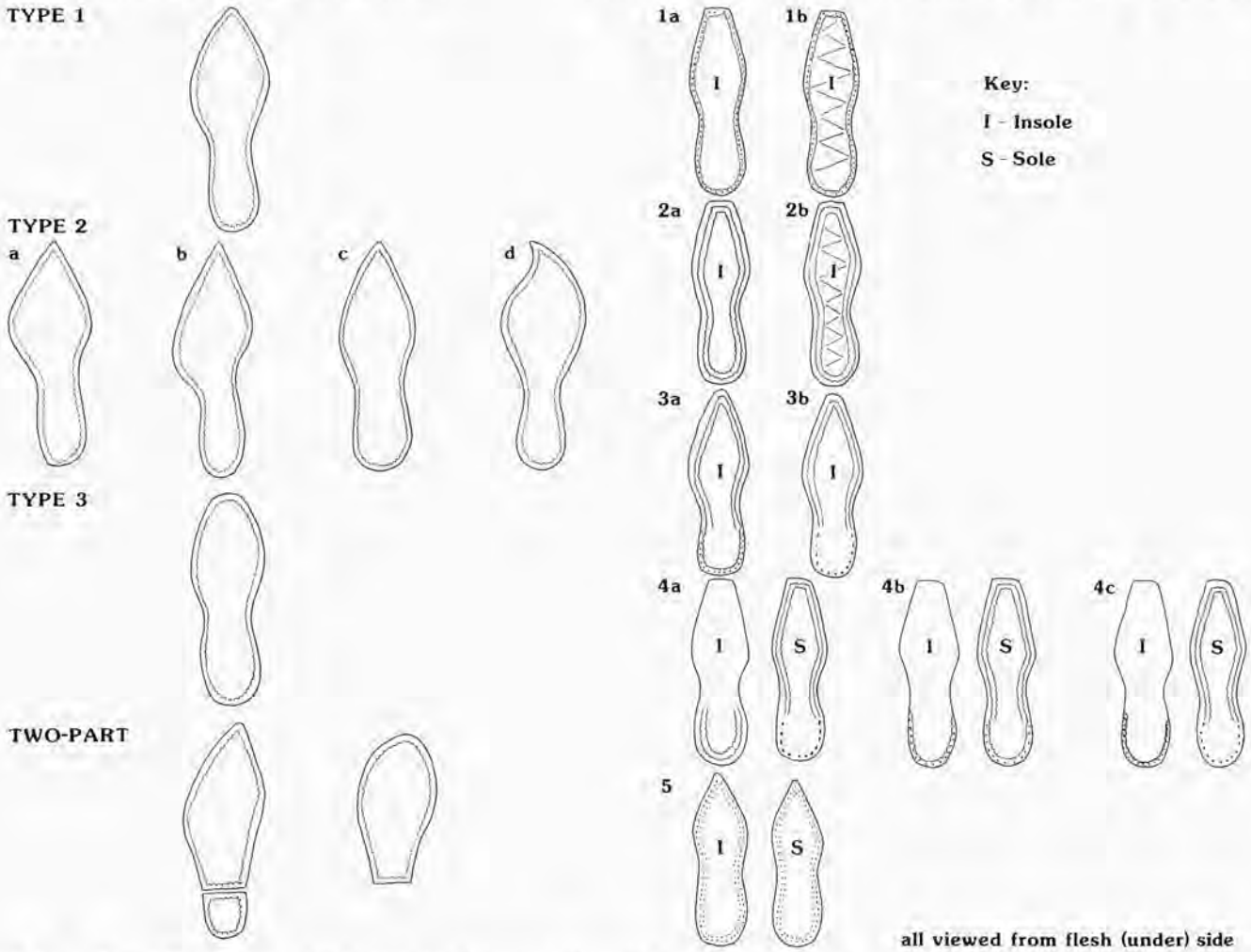


Figure 59 *Turnshoe sole shapes and post-medieval shoe construction*

wide at the tread, waist, and seat and virtually straight, only the wear indicating on which foot it had been worn.

Type 2d: Another pointed sole had a toe which appeared to be slightly outward-curving, (Fig. 67, No. 37); however, the toe was worn and incomplete. The sole was found in a context dating to *c.* 1395–1539 and, while it could be an example of the outward-curving toe popular from the mid 12th–mid 13th century and appearing occasionally later in the period (Swann 1973, 19), it is more likely that the curvature seen is the result of distortion during burial.

Type 3: Three soles had round toes and were relatively wide at the tread, waist and seat, (Fig. 66, No. 31, Fig. 75, No. 76A).

Six two-part soles were found, being joined with a butted edge/flesh seam across the waist. They occurred in early and later medieval contexts and both pointed- and round-toed types were represented (Fig. 60, No. 4, Fig. 71, No. 46). Two-part soles are commonly found in small numbers in medieval assemblages and represent an economy measure on behalf of the shoemaker.

A length of thread found in the seam of one sole (5/W61/5/1100/SF329) was of vegetable fibre, likely to be bast, suggesting it to be flax (G. Edwards, pers. comm.).

Repairs: The majority of the soles were well-worn at the toe, tread, and seat and more than half had tunnel stitching across the waist and around the perimeter on the grain side indicating the addition of repair clumps to forepart and seat. Seventy-eight clump repairs were found, their shape generally reflecting that of the soles to which they were attached (Fig. 66, No. 30). However, a large clump to cover an entire sole (Fig. 60, No. 9) and a small triangular clump (Fig. 75, No. 77C) were also found. Another small triangular piece (Fig. 75, No. 76B) came from a composite clump repair originally joined with butted edge/flesh seams to other pieces, showing that the cobbler had made use of the smallest fragments.

Several soles had their associated clump repairs remaining in place (Fig. 62, No. 13, Fig. 74, Nos 69 and 70). A 14th-century sole (Fig. 62, No. 13) is of interest having a repair clump at the forepart, and seat attached

to the sole across the waist and to the rand around the sole's perimeter. The sole shows no signs of heavy wear implying that the clumps were attached during the original manufacture and that the shoe was, therefore, of turn-welt construction, a transitional development of the turnshoe toward the later welted construction.

A single example of a clump attached to a turnshoe sole by thonging was found in Phase 1 dating before 1121 (Fig. 74, No. 61). Thonged clumps are known from excavations within the City of London (J. Cowgill, pers. comm.) and at Perth, where they were found in a 12th-century context (C. Thomas, pers. comm.).

Uppers

The turnshoe uppers occurred in a wide range of styles including one-piece ankle boots and shoes, low-cut shoes with and without fastenings, front lacing shoes and side lacing shoes and boots. A single back-seamed shoe was found and several undiagnostic boot fragments.

One-piece uppers: Fifteen uppers were found comprising a single piece of leather extending around the back of the foot to join to the vamp wing with a single butted seam. The side seam was either straight (Fig. 64, Nos 21 and 22), obliquely sloping (Fig. 61, No. 10, Fig. 63, No. 17, Fig. 73, No. 59, Fig. 75, No. 72), or angled (Fig. 64, No. 21, Fig. 65, No. 29, Fig. 67, No. 35).

The seam was usually placed at the inside instep, two examples being joined at the outside instep (Fig. 73, No. 59, Fig. 75, No. 72). Frequently, it could be seen that a small additional upper insert had been placed at the side seam but the majority were now missing. A fragmentary one-piece upper (Fig. 63, No. 17) had part of its upper insert present, and a separate insert piece was found (Fig. 69, No. 41) which had been cut away from the shoe along one seam.

Several one-piece uppers had their soles remaining; four examples had oval-toed soles of Type 1, three had pointed-toed soles of Type 2A, and one example was associated with a round-toed sole of Type 3 (Fig. 75, No. 76A).

One-piece ankle boots: The majority of the one-piece uppers were from ankle boots with an opening at centre front and remains of fastenings over the instep. One ankle boot (Fig. 63, No. 17) had a circular metal buckle to fasten with a strap over the instep, and two further uppers had slots and fragments from the attachment of similar fastenings (Fig. 64, No. 22, and an unlabelled, unstratified example with Reading Museum from W12C, not illustrated).

Other examples had a pair of fastening holes at the instep which may have had a buckle and strap or laces, one upper with a double set of holes (Fig. 73, No. 59) had been laced. Laces found *in situ* had a tab end to prevent them being pulled from the lace hole (Fig. 64, No. 22, Fig. 67, No. 35). One-piece ankle boots were a popular style of shoe during the later medieval period. Ankle boots with a strap and buckle fastening were the most frequently found shoe type in the Coventry Museums collection (Thomas 1980, type 1a, 12) and were found at Leicester, thought to be of 14th-century date (Allin 1981, fig. 2, no. 21, fig. 4, no. 25), Barbican Ditch, Oxford Castle, dated 13th–15th century (Jones 1976, fig. 20, no. 44) and Trichay Street, Exeter dated to the early 14th century or 1400–1480 (Friendship-Taylor in Allan 1984, fig. 185, no. L39).

An ankle boot lacing over the instep occurred at Trichay Street, Exeter, probably dating to *c.* 1450 (*ibid.*, fig. 186, no. L44). Other examples with no evidence of their method of fastening remaining were found in mid–late 14th-century deposits at Barnard Castle, County Durham (817762a; 817773a; 817748, Mould in prep.).

One-piece shoes: An example of the same one-piece construction with a central opening fastening with a buckle and strap (Fig. 75, No. 72) differs from the ankle boots by extending less high up the leg, being cut under the ankle like a shoe. This one-piece shoe probably dates to the mid or late 15th century (Swann 1973, 20); it was found in a Phase 5 context. A second one-piece upper differs from the remainder by having a latchet which fixed to a small, rolled leather button at the centre of the throat (Fig. 61, No. 10). The button has been torn away and a corresponding latchet and upper insert are now missing. Found in a 14th-century context, the one-piece shoe is comparable with an example from Broadgate, Coventry (Thomas 1980, fig. 4, 78/51/54).

Back-seamed shoe: A single turnshoe upper was found comprising a pointed-toe goatskin vamp cut away on the left side but extending on the right into quarters which terminate in a straight butted edge/flesh seam at centre back (Fig. 64, No. 20). A raised decorative rib runs down the centre of the vamp from throat to toe produced by alternating tunnel stitches on the flesh side. Similar tunnel stitching occurs on a fragment of boot upper from the same Phase 5 context (5/W12C/5/825/SF683). A somewhat wider pleat similar to this type of decoration has been noted on the vamps of 'kidney boots' in the Coventry Museums collection (Thomas 1980, 16, type 6). An oval-toed vamp decorated with a pair of ribs produced by tunnel stitching on the flesh side is known from London and dated *c.* 1440 (F. Grew, pers comm.). Work on the large collection of medieval shoes from the City of London indicates that the back-seamed shoe reappears *c.* 1400 and becomes increasingly popular after this time. The Abbey Wharf shoe is likely, therefore, to date to the middle of the 15th century.

Uppers with separate vamp and quarters: Forty-two vamps and 29 quarters of turnshoe construction were found. The majority were incomplete so that the style of shoe from which they came is unknown, however, a number of styles could be recognised:

Low cut shoes: Examples of shoes cut low on the foot occurred with both distinctly pointed toes (Fig. 64 No. 25, Fig. 65, No. 26, Fig. 66, No. 30, Fig. 69. No. 40) and round toes (Fig. 70, No. 42). The low cut vamp wings were strengthened on the flesh side by a cord held by whipped stitching to prevent stretching and tearing. None of the vamps showed any form of fastening and appear to be of slip-on style, however, it is possible that the fastening was held on the quarters. One shoe

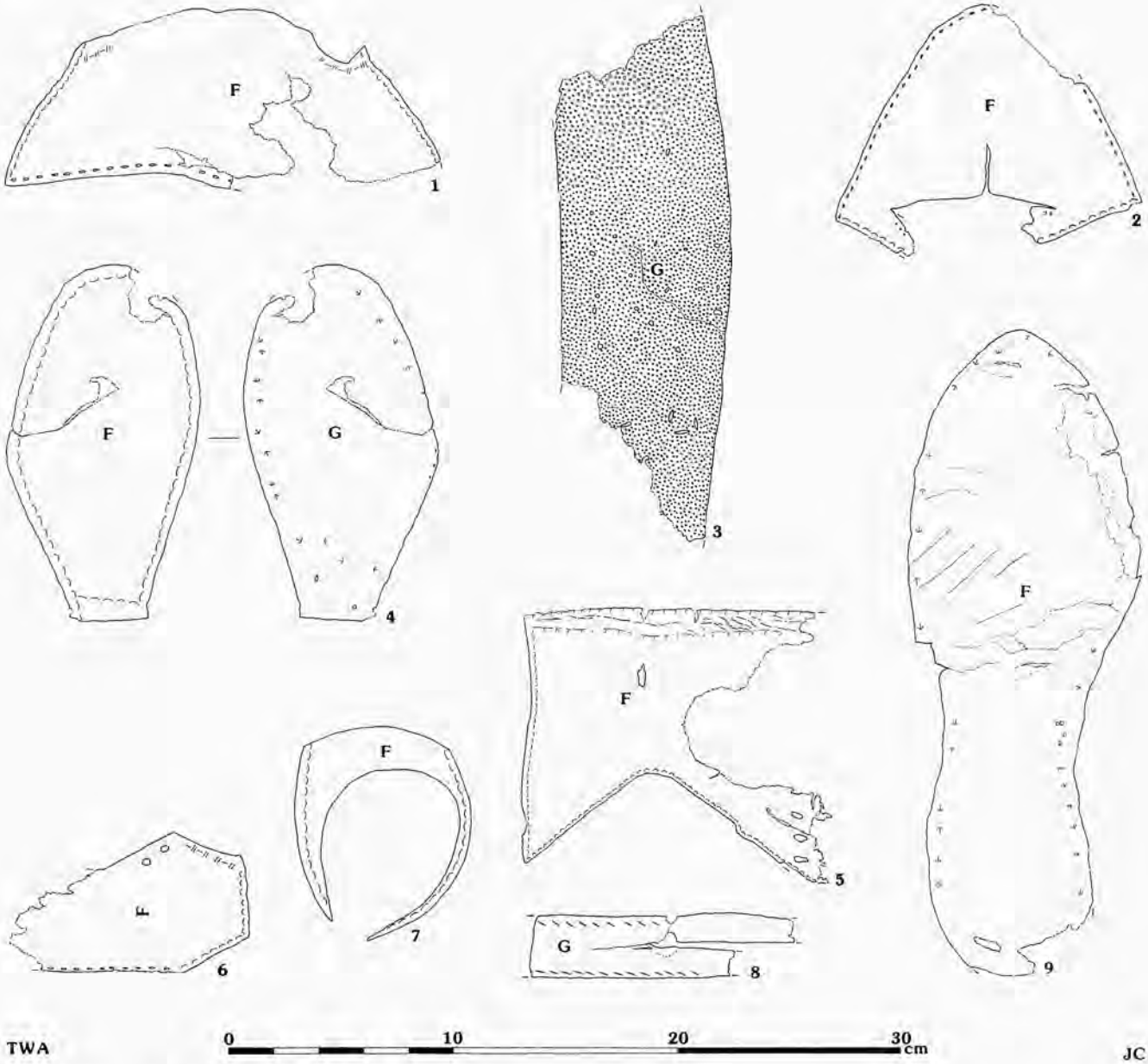


Figure 60 Leather items Nos 1–9. Scale 1:3

(Fig. 70, No. 42) was found associated with a fragment of strap and a small, circular buckle, so that it may belong to the next category of shoe style described below.

Two of the vamps had asymmetrical wings indicating that separate inserts had been added between the interior vamp and quarters seam (Fig. 65, No. 26, Fig. 66, No. 30). An oval-toed vamp (Fig. 71, No. 47) was found with an insert on the left wing, however, the throat had been roughly cut away so that the original style of the shoe is unknown. Three of the low cut shoes were found with their soles of type 2B (Fig. 64, No. 25, Fig. 65, No. 26, Fig. 70, No. 42). This style of shoe occurred frequently amongst the Coventry material (Thomas 1980, 15, type 3) and was also found at Perth High Street (Thomas 1986, 7, types E and F).

The six stratified examples from the Abbey Wharf site all belong to Phase 5 and are likely to date to the 1440s (Swann 1973, 20) with the exception of the round-toed example (Fig. 66, No. 43), which may date to the end of the 15th or beginning of the 16th century.

Shoes with strap fastening:

A pointed vamp (Fig. 62, No. 14) has remains of fastening straps over the instep and a second example (Fig. 74, No. 68) also appears to have extended into a fastening at the top of the right vamp wing. Similarly, two round/oval-toed vamps may have had fastenings of this sort but are in too poor a condition for positive identification (Fig. 60, No.

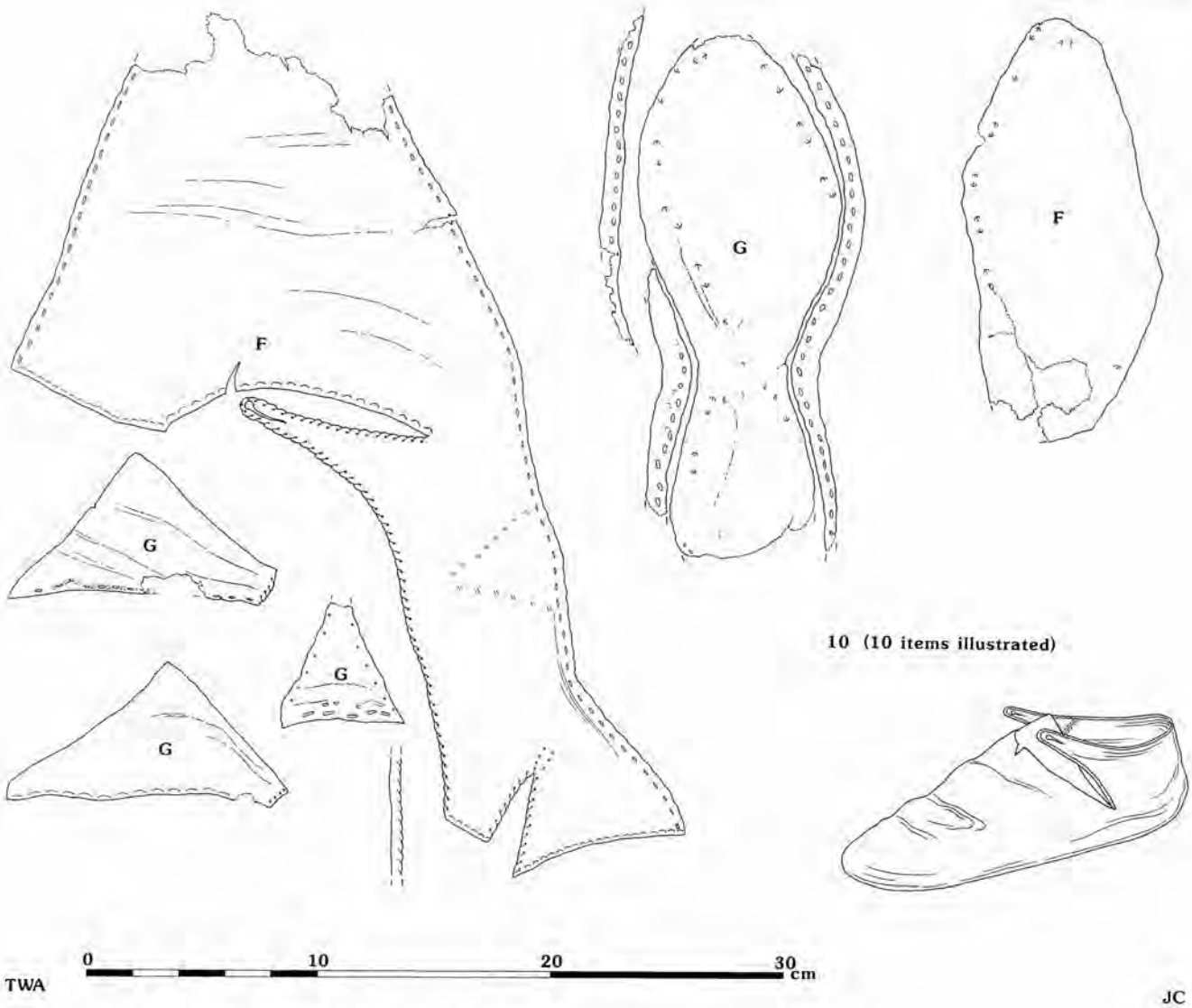


Figure 61 Leather shoe No. 10. Scale 1:3

2, Fig. 66, No. 31), the latter found with its sole of Type 3. Two small, circular iron buckles (4/W12C/4/860/SF788 and 5/W61/5/1100/SF330.2) come from shoes fastening over the instep, as indeed may the low-cut shoe (Fig. 70, No. 42) mentioned above. Three of the four examples found at the Abbey Wharf site occurred in contexts dating between *c.* 1395 and 1539; one vamp (Fig. 60, No. 2) was found in Phase 2. Again, this style of shoe was found at Coventry (Thomas 1980, 14–15, type 2) and amongst the 13th–15th-century assemblage from the Barbican Ditch at Oxford Castle (Jones 1976, fig. 19, no. 13; fig. 20, no. 42).

High-throated shoes: A number of vamps cut higher up the instep could be recognised with straight side seams joining vamps to quarters. Most had oval toes, one example was gently pointed (6/W12C/6/930/SF867), another had a broad, round toe (Fig. 62, No. 16, see below). The majority of the high-throated shoes were found in Phase 5 contexts, others occurred residually in post-medieval and unstratified deposits. Several had been torn or deliberately cut so that their style and type of fastening is uncertain (Fig. 62, No. 16, Fig. 64, No. 18), however, there appear to be two different styles represented: a) high, plain throat (Fig. 66, No. 34, Fig. 71, No. 48); b) high throat lacing at centre front with two pairs of lace holes (Fig. 60, No. 6, Fig. 62, No. 12). This latter, a child's shoe of 14th-century date, showed the method of lacing: a single split lace with a tab end passing out of the lace holes on one side would be threaded from the flesh to the grain side through the holes on the opposite side of the central opening and tied.

Front lacing uppers occurred with both oval and gently-pointed-toe soles (Types 1 and 2A). The front lacing shoe

is another common later medieval type, being found at Coventry (Thomas 1980, 15–16, type 4), Chapel Lane, Staith, Yorkshire, dating from the end of the first quarter of the 14th century to just after 1350 (Jackson in Ayers 1979, 51, fig. 23, no. 30; fig. 24, no. 42,47), Barnard Castle in mid–late 14th-century contexts (817745 a, b; 817797a; 817792; Mould in prep.) and Lucy Tower, Lincoln (of turn-welted construction). The broad, round toe shape of one high-throated vamp (Fig. 62, No. 16) suggests it dates to the end of the 15th or beginning of the 16th century.

Side-lacing shoes: Evidence of shoes with lacing at one side to join the vamp wing and quarters is given by a fragment of vamp with two lace holes down the left wing (Fig. 64, No. 19) and an example of one-piece quarters with a pair of lace holes, originally with an internal facing, close to the top of the left front seam (Fig. 62, No. 15), both dating to Phase 5. It is likely that side lacing shoes had high, plain-cut throats like those noted above. Side lacing shoes have been found at Coventry (Thomas 1980, 17, type 7), Chapel Lane, Staith dating between the end of the first quarter of the 14th century to post-1350 (Jackson in Ayers 1979, fig. 23, no. 34), Barbican Ditch, Oxford Castle with 13th–15th-century material (Jones 1976, fig. 19, no. 20), Barnard Castle in mid–late 14th-century deposits (817745a; 817796c; 817814) and at Perth High Street, where they were found to come predominantly from the second half of the 13th century (Thomas 1986, type Di and Dii, 6).

Side-lacing boots: A single example of a side-lacing ankle boot of goatskin (Fig. 65, No. 27) was found, comprising an oval-toed vamp and vamp extension up the instep with multiple lace holes along the right side and a butted seam to join to separate quarters at the left. Other side-lacing boots are indicated by fragments of upper with multiple lace holes along the vamp wing and front edge of the quarters (Fig. 60, No. 5, Fig. 64, No. 23 Fig. 65, No. 28) or quarters insert (5/W12C/5/938/SF1226), and the internal reinforcement facings for such lace holes (Fig. 70, No. 44).

The fragments with multiple lace holes may come from one-piece ankle boots like those from Coventry (Thomas 1980, 13, type 10) or boots with separate vamp and quarters (Fig. 60, No. 5, Fig. 64, No. 23) as found at Perth High Street in late 12th–14th-century contexts (Thomas 1986, 6, type C). The examples from the Abbey Wharf site were all found in Phase 5 deposits with the exception of the boot leg (Fig. 60, No. 5) which was unstratified.

Other boots: Vamps with a continuous butted edge/flesh seam running across the straight throat from one lasting margin to the other belong to boots (Fig. 75, No. 73), one (1/W12C/1/938/SF1226.2) being found with a quarters insert from a high side-lacing boot (*see above*). Other upper fragments with high side seams (Fig. 75, No. 74) or a butted edge/flesh seam along the top edge (Fig. 75, No. 75) are also likely to come from boots.

A vamp fragment (5/W12C/5/825/SF683) with a line of alternating stitching on the flesh side may come from a 'kidney boot' with a decorative central pleat (Thomas 1980, 16, type 6) like that on the back-seamed shoe, described above. It is unfortunate that the only example of an upper with cut-out decoration (Fig. 73, No. 58) was unstratified. The decoration occurs along the top edge of a boot leg and is comparable with that on a side-lacing ankle boot from the Bull Inn, Coventry (Thomas 1980, fig. 6, 49/185/15, 16). This decorative technique was first used on footwear around 1320 and is unlikely to have survived long after a sumptuary law prohibiting the cutting of garments with intricate decoration was enforced in 1407 (Swann 1973, 21).

Quarters

Nineteen quarters were found unassociated with any other upper components. The majority were one-piece quarters but four two-piece quarters were found with a straight-butted seam at centre back and tunnel stitching from the attachment of a heel stiffener on the interior (Fig. 64, No. 23, Fig. 65, No. 28). The latter comes from a side-lacing boot, the others are fragmentary.

The one-piece quarters had plain, cut top edges, raised at centre back and falling to the front seams (Fig. 64, No. 24, Fig. 67, No. 36, Fig. 69, No. 41). Four examples were asymmetrical, dropping more steeply to one side before rising to a small peak at the front seam (Fig. 60, No. 1). Comparison with those quarters which had their associated vamps suggests that the asymmetrical quarters with peaked front seam come from low cut slip-on or strap-fastening shoes, whilst the symmetrical quarters belong to shoes with a higher throat.

Construction

The turnshoes were generally well made. Where identifiable the soles were found to be of cattle hide and the uppers principally of calf skin or cattle hide, with a small number being of goat skin (Fig. 64, No. 20, Fig. 67, No. 36, Fig. 75, No. 75).

The uppers were joined to the soles with an edge/flesh seam frequently incorporating a rand (bead) to provide a more flexible, waterproof seam; the earliest rand being found in a context dated *c.* 1121–1315. Upper components were joined with butted edge/flesh seams. The top edges of the uppers were usually cut, only a small number were seamed to take a top band, one shoe (Fig. 61, No. 10) being found with a length of its top band present. A small number of folded top band fragments

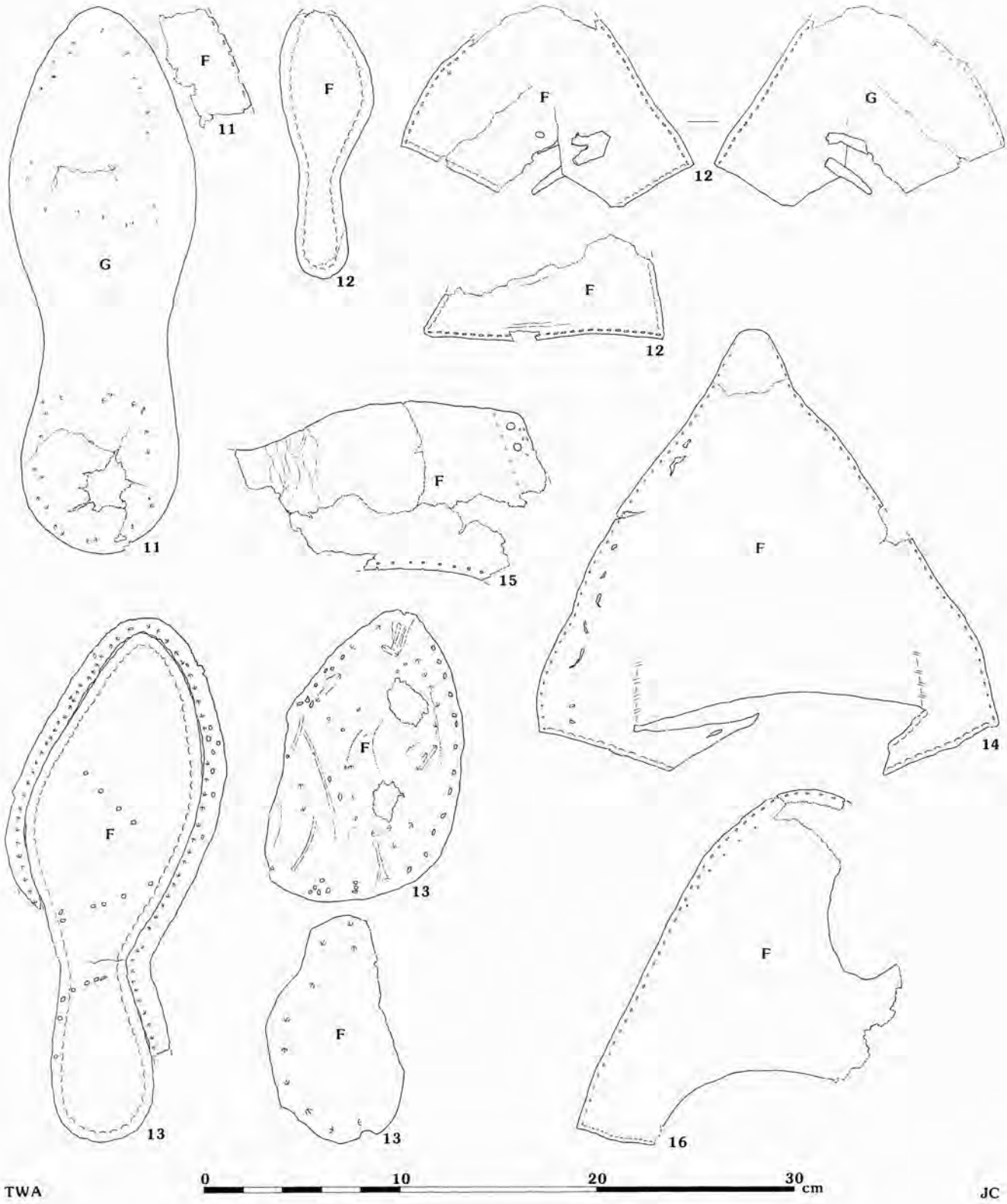


Figure 62 Leather items Nos 11–16. Scale 1:3

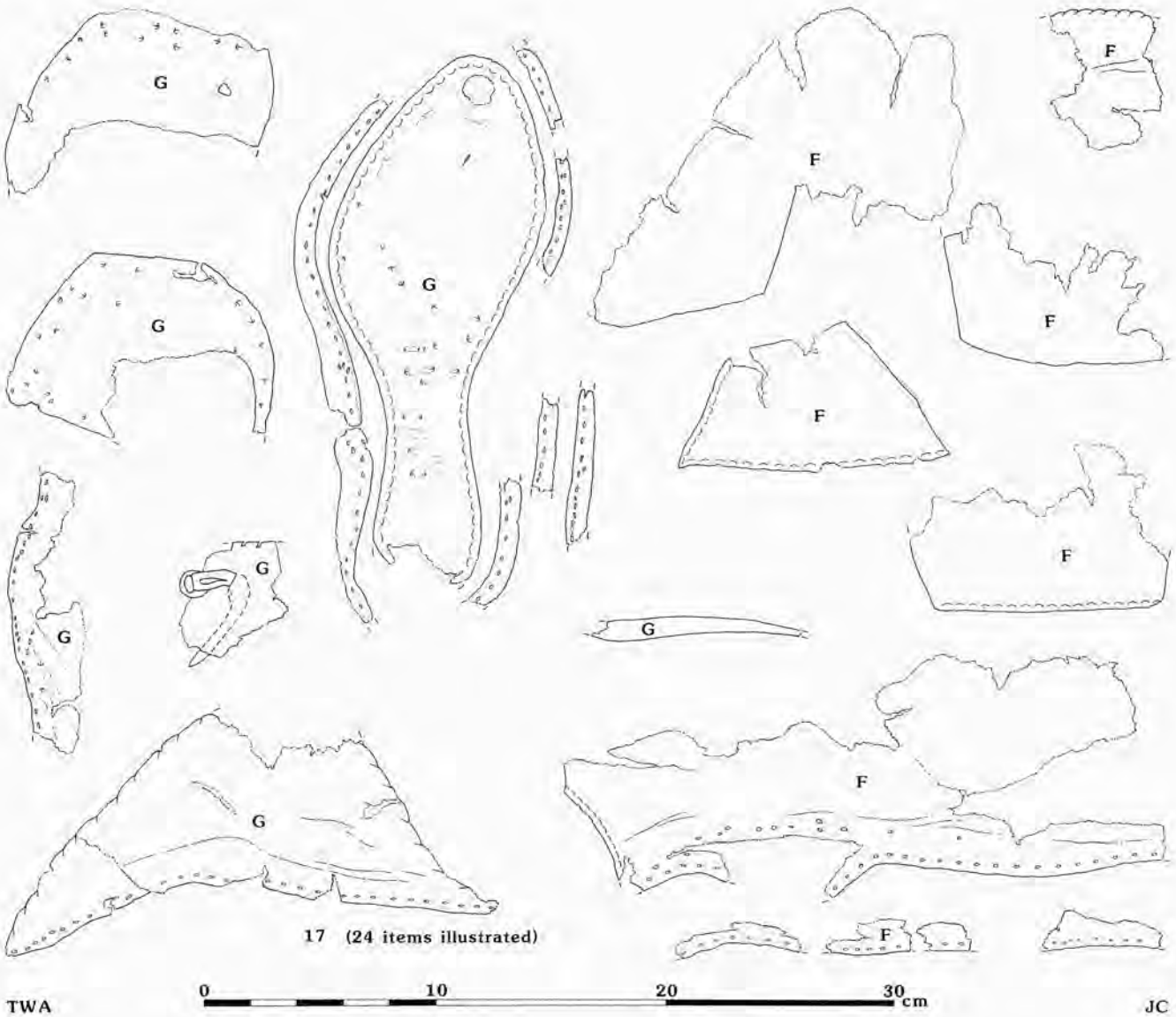


Figure 63 Leather shoe No. 17. Scale 1:3

were found, the earliest in a context dating to *c.* 1121–1315 being unusually bulky may be an edging to a garment rather than a shoe (Fig. 74, No. 63). A quarter extension from a side-lacing boot (Fig. 60, No. 5) of calf skin had the top edge folded over and secured by whipped stitching to the flesh side. This represents an unusual treatment of the top edge and, being found unstratified, it may not be of medieval date.

Internal features

Strengthening cord held by whipped stitching was commonly placed at the throat, along the vamp wings and at the junction of the top edge and front seam of the quarters on the flesh side to prevent stretching and tearing.

Heel stiffeners were used to support the centre back of the quarters of one-piece uppers and two-piece quarters but were not found on one-piece quarters. Examples of one-piece quarters with heel stiffeners or tunnel stitching were found to have at least one torn edge indicating that they had been torn from one-piece uppers originally (3/W12C/3a/863/SF676 and 5/W12C/5/933/SF859). Heel stiffeners varied in shape from triangular to trapezoidal, and also in size, that in shoe (Fig. 64, No. 22) being particularly small. They were sewn with a whipped stitch onto the interior of the shoe and were incorporated into the lasting margin usually, but not invariably, lying grain side outward to the foot; examples such as Figure 63, No. 17, Figure 67, No. 35, and Figure 69, No. 40 had been placed flesh outward to the foot.

Multiple lace holes were similarly reinforced with a lining on the interior (Fig. 70, No. 44) and one shoe (Fig. 69, No. 40) had a small triangular lining to reinforce the area at the lower side seam. Five shoes had a tongue lying across the throat, two were of bellows type (Fig. 65, No. 29, Fig. 69, No. 40) the others being triangular or trapezoidal (Fig. 61, No. 10, Fig. 63, No. 17, Fig. 64, No. 22).

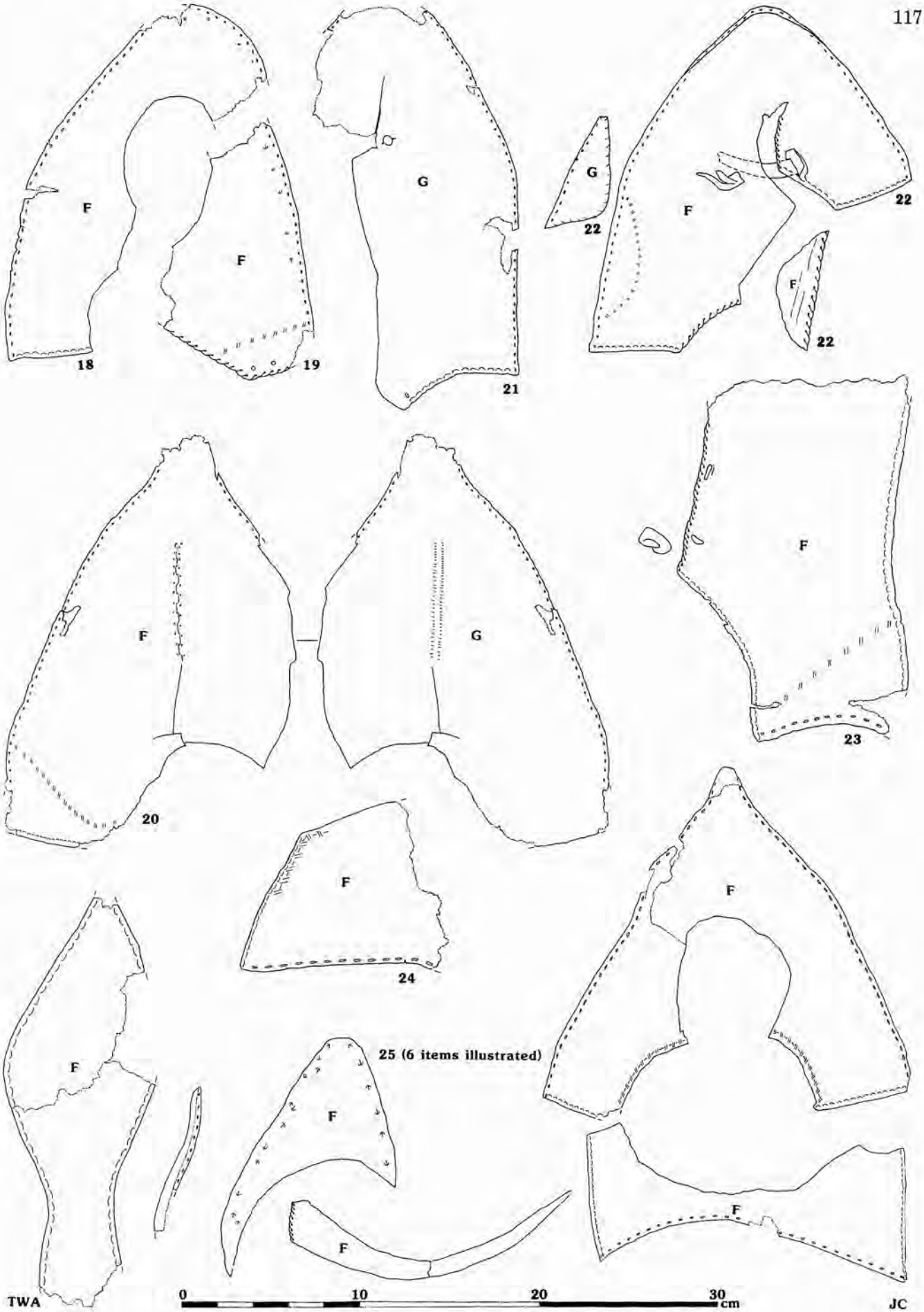


Figure 64 Leather items Nos 18–25. Scale 1:3

Upper repairs
Many of the uppers had a line of crude stitching running above the lasting margin from the attachment of large clump repairs which overlapped the sole and rand (Fig. 69, No. 40, Fig. 70, No. 42, Fig. 74, No. 68, Fig. 75, No. 72). This has also been noted on uppers from Coventry (Thomas 1980, 11), Barnard Castle (817748; 819273; Mould forthcoming) and Lucy Tower, Lincoln (L 27, Mould forthcoming). A line of stitching along the front seam of a side lacing boot (Fig. 75, No. 74A) suggests that the seam had been repaired, whilst the worn toe of a one-piece ankle boot (Fig. 74, No. 64) had been patched.

Non-shoe leather
A small number of non-shoe items were found in medieval contexts. The majority, seven, were fragments of strap of varying width (Fig. 74, No. 71) found in contexts dating between the 12th and the beginning of the 16th century. None were decorated and all are likely to come from a harness. An unillustrated example, 5/W61/5/1100/SF314, appears to have been part of a harness strap repair, probably laid at the back to strengthen a weak point (L. Stevens, pers. comm.).

A waisted rectangular piece of calf skin (Fig. 74, No. 62) with a pair of button holes at each end was found in a Phase 2 context. It is unseamed with a crease line running around the perimeter and shows signs of wear at the centre. The original use is uncertain, possibly a garment fastening.

A length of thick cattle hide (Fig. 60, No. 3) with the grain surface decorated with round, impressed tool marks is of similar date to the fastening above. It had been cut from a larger object and had a series of perforations probably to take studs and a group of three slits, possibly from the former attachment of a buckle. Other waste fragments were found with similar grain-side decoration (6/W12C/6/942/SF993.1 and 4-5/W61B/4-5/2100/SF1189).

The only knife sheath fragment to be found at Abbey Wharf was in a deposit of Phase 4 or 5 date and is likely to date to the beginning of the period (Fig. 74, No. 65). The sheath top which had been torn from the blade case, has a single butted side seam with two crude suspension holes close to it toward the top edge. It was decorated with a crudely executed geometric design using a blunt tool comprising a panel with oblique lines and two opposing chevrons with a double rectangular border.

A small scrap fragment from a Phase 5 context is perforated by a series of tiny, regular holes with iron corrosion products within (Fig. 66, No. 33). It appears to have been covered with rows of numerous thin metal teeth and as such, mounted on a wooden bat, it is likely to come from a carding comb used to prepare wool for spinning. A comparable fragment has been found in a medieval context at Swan Lane in the city of London (Dept of Urban Archaeology excavation, Museum of London Acc No. 4728), other examples have been found with 16th-century material in the Castle Ditch, Newcastle-upon-Tyne (Vaughan 1981, fig. 43, no. 526) and from an early 18th-century context at East Gate, Gloucester (Goudge 1983, fig. 106, no. 47).

Post-Medieval

The nature of the post-medieval assemblage
It proved impossible to consider the post-medieval leather by phase due to the inability to precisely correlate the two seasons' phasing and the divergence between the proposed dating of each phase and the datable shoe parts found within them. The post-medieval assemblage, therefore, has been considered as a whole.

Nineteen per cent of the leather from the post-medieval contexts was waste, both primary and secondary waste being present in small numbers indicating some small-scale shoemaking. Eighty-one percent of the leather was manufactured items (Table 15), 16% of which had been cut to salvage reusable leather. The majority of the objects were fragmentary shoe components which suggests that the assemblage comprises principally of cobbling waste. Two shoes (Fig. 77, No. 81, Fig. 79, No. 88) and several individual components (Fig. 77, No. 83A, Fig. 82, No. 100) had been deliberately cut away above the lasting margin by a shoe translator in order to construct a shoe of smaller size by adding a new sole to the cut down upper. The translator represents the lowest branch of the shoe trade being regarded as of more lowly status than the humble cobbler (J. Swann, pers. comm.). As with the medieval finds, occasional shoes were found to be virtually complete (Fig. 76, No. 79, Fig. 81, No. 99, Fig. 82, No. 103) and may have been casual discards rather than workshop debris. Plate 20 shows the welted shoe (Fig. 81, No. 99) as found during the excavation.

Welted shoes
The shoes of welted construction are discussed as a single group and dated by style wherever possible. They were found predominantly within contexts dating from *c.* 1539–1857, however, some occurred intrusively in Phase 5 contexts and others were unstratified. The welted shoe components date from the early 17th–late 19th century.

Plate 20 Welted early 19th-century shoe (Cat. No. 99) in situ

Construction

Five methods of construction were recognised in the post-medieval footwear with further subdivisions being noted within four of the five types. The first three had soles with grain/flesh stitching around the perimeter, often lying within a distinct stitching channel, Types 4 and 5 have their soles separately described and illustrated (*see* Figure 59).

Type 1A: Insole joined to upper with an edge/flesh seam (Fig. 71, No. 45A, Fig. 72, No. 51, Fig. 76, No. 79).

Type 1B: As 1A but with bracing (Fig. 68, No. 39, Fig. 77, No. 80).

Type 2A: Insole joined to upper with a raised rib seam formed by multiple horizontal tunnel stitching running round the perimeter on the flesh side (Fig. 71, No. 49, Fig. 82, No. 103).

Type 2B: As 2A but with bracing (Fig. 82, No. 104).

Type 3A: Insole joined to upper with a raised rib seam on flesh side changing to an edge/flesh seam around the seat (Fig. 80, No. 91, Fig. 83, 107).

Type 3B: As 3A but changing to a grain/flesh seam around the seat (no illustrated example).

Type 4A: Insole is unseamed around the forepart with a raised rib seam on the flesh side around the seat. The upper is joined to the sole with a raised rib seam around the forepart on the flesh side changing to a grain/flesh seam at the seat (Fig. 78, No. 85, Fig. 82, No. 105).

Type 4B: As 4A but with an edge/flesh seam around the seat of both the insole and sole (Fig. 81, No. 95).

Type 4C: As 4B but with a grain/flesh seam around the seat of the sole (Fig. 81, No. 99).

Type 5: Insole, sole, and upper held together with a double line of brass nails (Fig. 80, No. 92).

17th-century latchet-fastening shoes

Welted shoe components of 17th-century style were found in contexts dating from the mid 16th–mid 18th centuries and unstratified. Five shoes were found sufficiently complete for their style and construction to be known in some detail.

Bottom units

The thick soles were made straight, neither distinctly for the left or the right foot, and often worn flesh side to the ground. The foot lay on an insole, grain side upward to the foot with a tread, waist, and seat of relatively uniform width and usually a square-shaped toe (*see below*). The upper and bottom unit were joined by two separate seams to a welt around the perimeter using Type 1A or 1B construction. Occasionally a middle or middle strips were incorporated into the seam to lie between the sole and the insole as additional packing. A separate stacked leather heel (Fig. 72, No. 51) or a heel of alder wood with a leather cover (Fig. 68, No. 39, Fig. 76, No. 79) was present at the seat. When a wooden heel was used the sole extended down the heel breast and a separate top piece was added.

One shoe (Fig. 76, No. 79) was notable in having the leather cover of its alder wood heel (identified by J. Watson, Ancient Monuments Laboratory) and the sole edge painted with a pigment of iron oxide, probably haematite (identified by P. Walton, XRF analysis P. Wilthew, Ancient Monuments Laboratory).

The toe shape of the 17th-century bottom units was predominantly square, with the exception of the shoe with the red heel cover and sole edge (Fig. 76, No. 79) which had a gently-pointed toe (*see closed shoes below*). A single insole (Fig. 77, No. 80) of Type 1B construction represents the fashion for the exaggerated long, square toe made popular on Charles II's return from France in 1660, although examples were known slightly before this in the 1650s (Swann 1982, 15). An insole of Type 1A construction (Fig. 71, No. 45A) found with its vamp and toe puff (No. 45B and C) has a slightly forked, square toe, a shape popular throughout the 17th century.

Uppers

The 17th-century shoe uppers comprised a vamp and separate two-piece quarters with either the grain side outward (Fig. 68, No. 39, Fig. 72, No. 50) or flesh side outward, as buff or suede leather (Fig. 72, No. 51, Fig. 76, No. 79). The vamp was often supported internally by a toe puff incorporated into the lasting margin and held by whipped stitching. The vamp extended high up the instep into either a rounded (Fig. 74, No. 67) or, more usually, a straight-ended tongue (Fig. 68, No. 39; Fig. 72, No. 50). The tongue was pierced by a single or a double pair of lace holes, the extra set being used to hold a decorative rose.

The two-piece symmetrical quarters had a butted edge/flesh seam at centre back and extended into latchets at the top of the butted front seams to lie over the tongue and fasten with laces over the instep. The majority of the quarters were peaked at centre back, one example (7/W12C/7/365/SF156) was unusual in having a straight cut top edge. Two quarters were found to have a butted seam to take a separate latchet (6/W12C/6/942/SF994, Fig. 80, No. 93).

Two styles of shoe upper could be recognised: 1. open-sided shoe; 2. closed shoe. The open-sided or 'drawbridge' shoe had low side seams with a pronounced recess at the top of the seam below the high tongue and narrow latchets. The vamp had a square-shaped, pleated toe which slightly overhung the sole (Fig. 68, No. 39, Fig. 72, Nos 50 and 51), a style which was popular until the 1670s. The open-sided shoes from Abbey Wharf are from practical footwear dating between *c.* 1620s–1660s, the style being less exaggerated than the large open-sided shoes worn at the beginning of the century. Nevertheless, the side seams were structurally weakened and several shoes were strengthened by the addition of a cord held by whipped stitching on the interior (Fig. 68, No. 39, Fig. 72, No. 50). One vamp (Fig. 71, No. 45B) had both side seams cut away, probably by a shoe translator, but a series of stitches visible on the interior running obliquely are likely to come from internal facings used to strengthen the seams. A single vamp fragment and

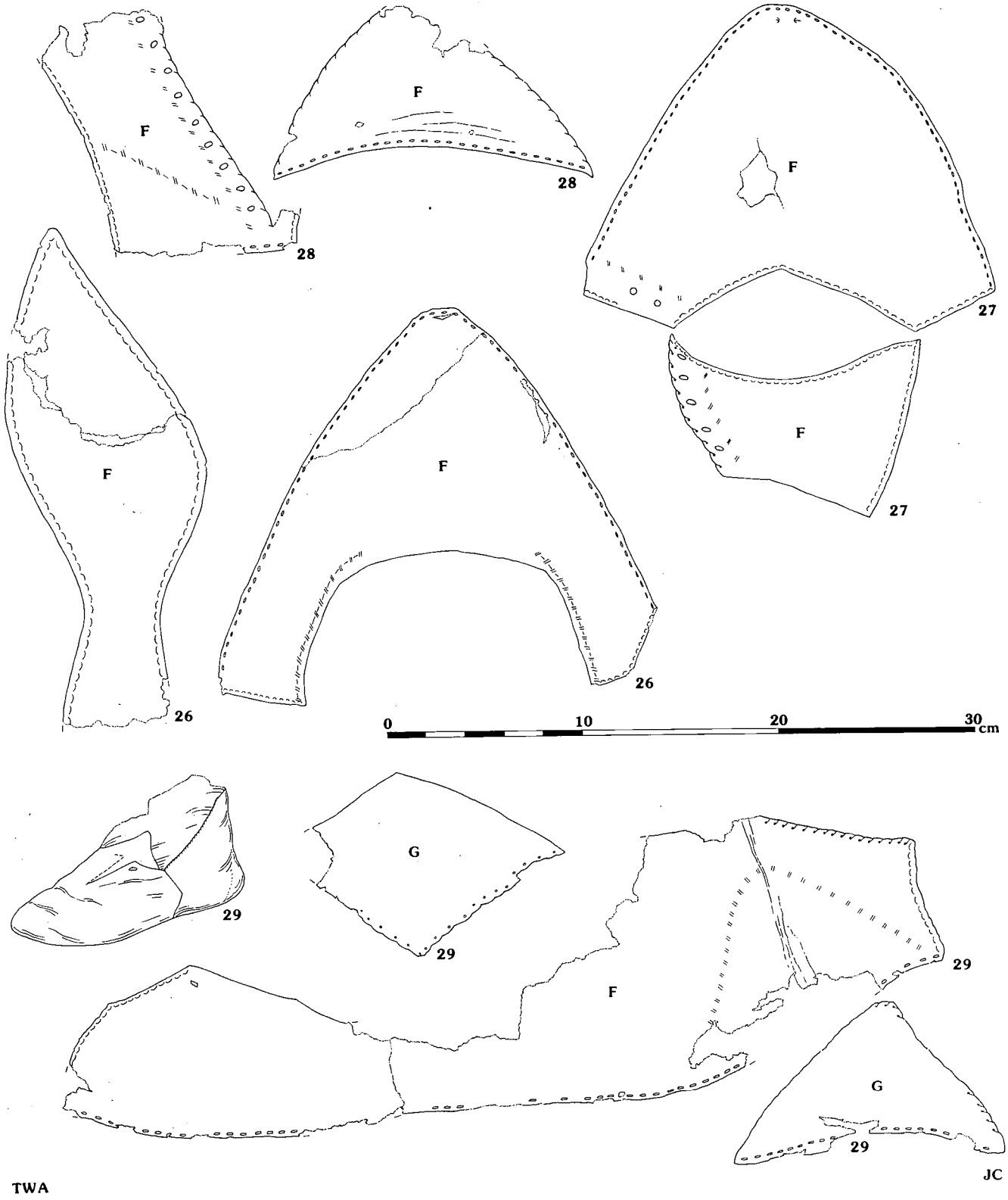
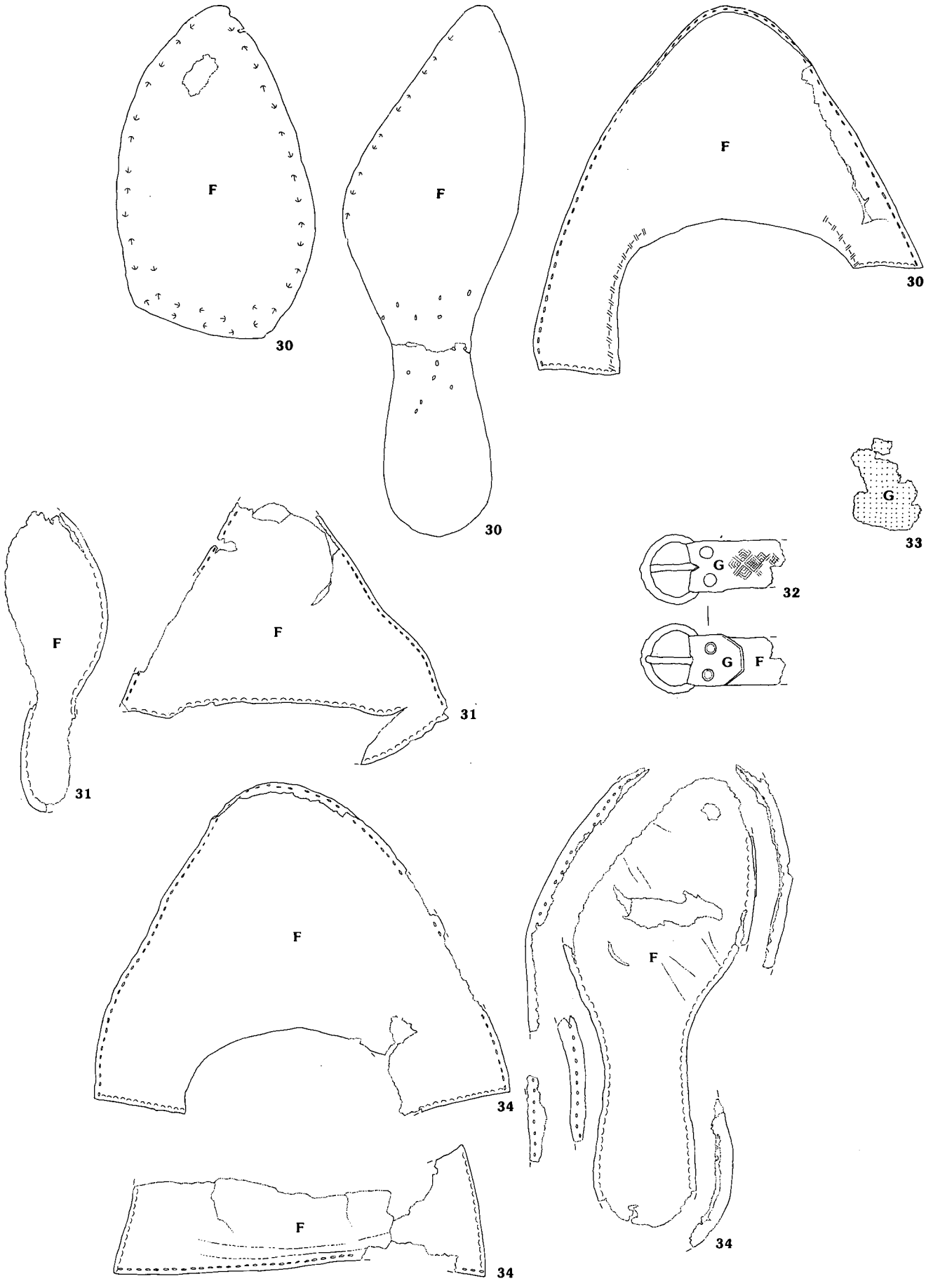


Figure 65 Leather items Nos 26–29. Scale 1:3

Figure 66 (opposite) Leather items Nos 30–34. Scale 1:3



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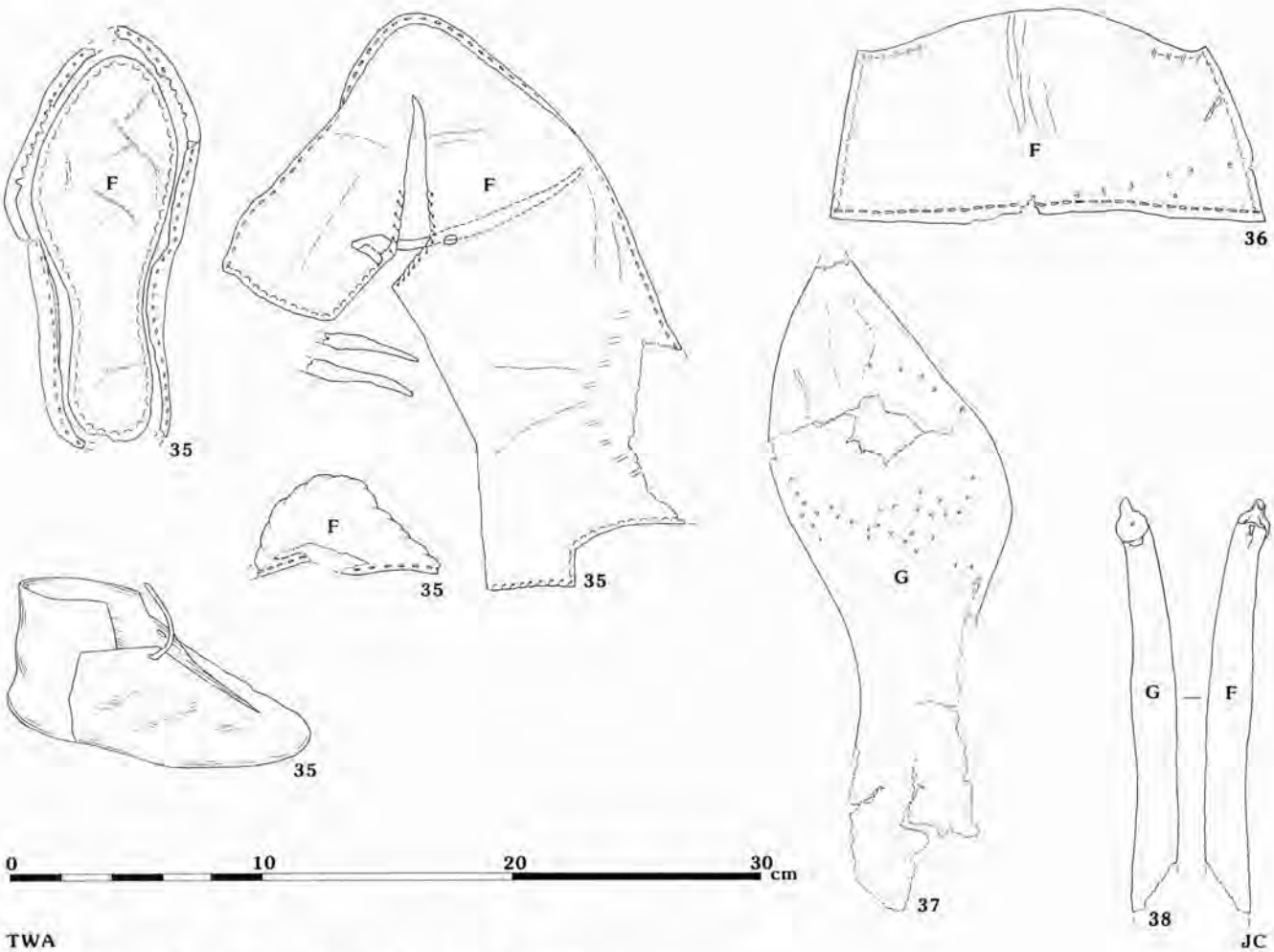


Figure 67 Leather items Nos 35–38. Scale 1:3

toe puff (7/W12C/7/365/SF209) had a rounded toe-shape suggesting a slightly earlier date of *c.* 1600–1620.

The open-sided shoes are comparable in both style and construction with the assemblage from the excavation of a 17th-century bastion in Newcastle-upon-Tyne (Vaughan 1983, 208–17). Similar shoe parts have also been found at East Gate, Gloucester, in late 17th- and early 18th-century fills (Goudge 1983, fig. 105, nos 23, 33, 34), Castle Moat, Oxford Castle (Jones 1976, fig. 22, nos 22, 26; fig. 23, no. 32; fig. 24, no. 48) and Trichay Street, Exeter, with 15th–17th-century material (Friendship-Taylor in Allan 1984, fig. 187, no. 59).

The closed shoe had shorter, thicker latchets above the closed side seams. The single complete example (Fig. 76, No. 79) had a gently-pointed toe, a style favoured by the Puritans. Having a red-painted heel cover and sole edge it represents a good quality shoe, the closed seams suggesting a date in the 1640s. Closed shoes were worn alongside open-sided shoes in the mid 17th century, replacing them altogether by the 1680s (Swann 1982, 20).

Two quarters from closed shoes (7/W12C/7/366/SF296 and SF310) have decorative stitching around the top edge and latchet which also served to prevent stretching of the cut edges. This feature can also be seen on a pair of men's buckle shoes of 1680's date (Swann 1982, 19, no. 15) and on similar shoe components found with 18th-century material in a well at Bishops Waltham, Hampshire (Barton 1969, fig. 72, no. 101).

Late 17th–18th-century buckled shoes

No complete buckled shoes were found but a number of shoe parts appear to come from shoes of this style. A vamp fragment with a long tongue (Fig. 77, No. 83B) is likely to come from an early buckled shoe; the buckle was first used in the 1660s eventually replacing the laced latchet fastening by the end of the 1680s (Swann 1982, 20). Other upper components have closed curving side seams of the earlier 18th century (Fig. 77, No. 83A) similar to a shoe from a mid 18th-century pit at East Gate, Gloucester (Goudge 1983, fig. 106a, no. 49). The curved seamed quarter on No. 83a has a button hole in the latchet to take a buckle with an anchor chape, a type in use from the 1660s until the 1730s (Swann 1982, 20). The wide strap (Fig. 78, No. 86) cut from a heavier shoe may have been used with a buckle with a double-pronged attachment.

Bottom units made straight with pointed toes, tread, waist and seat of relatively uniform width and thick stacked leather heels are of 18th-century date (Fig. 77, No. 81). Similar straight bottom unit components with pointed or oval toes occurred in Type 1A, 3A, and 3B

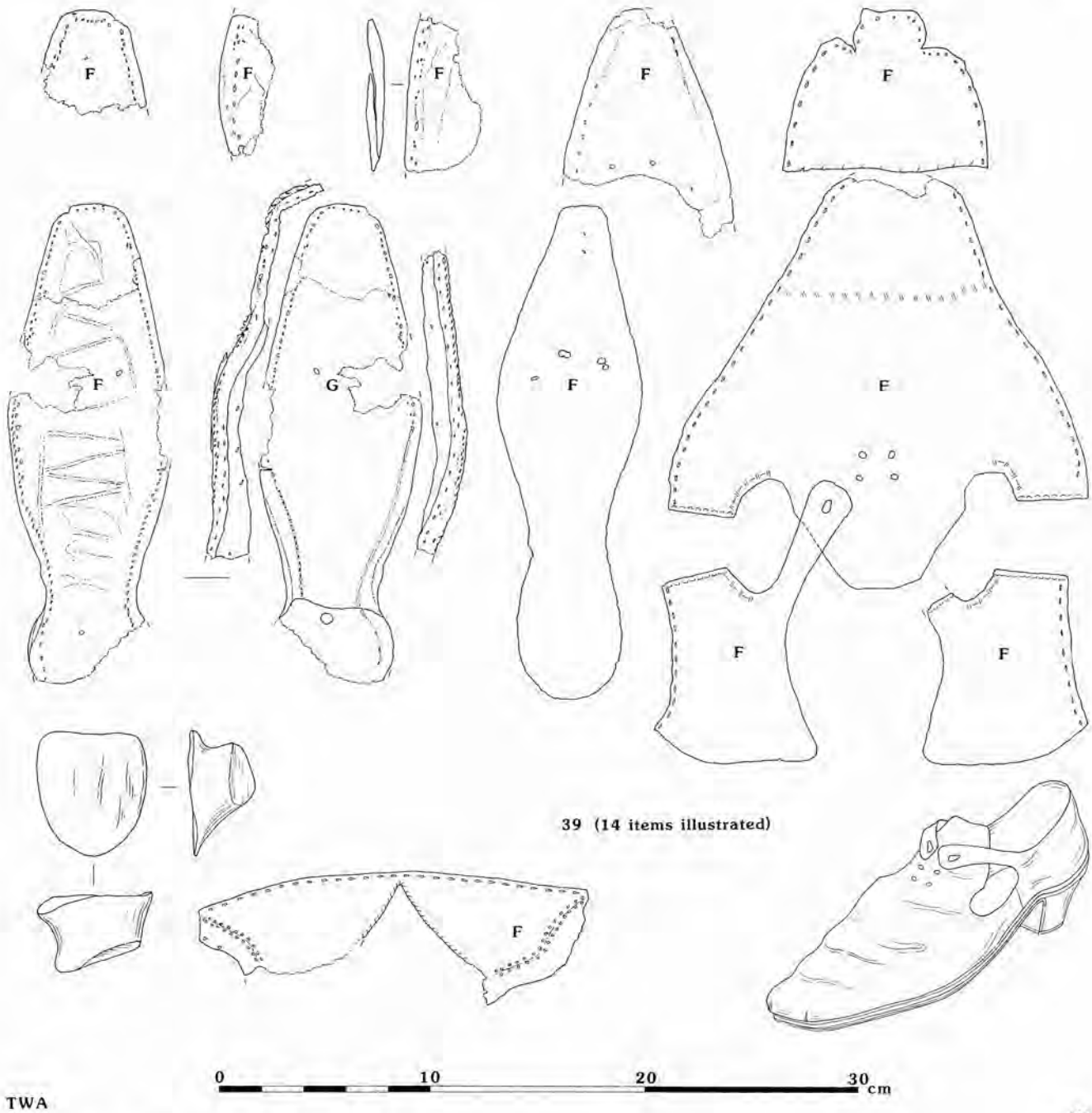


Figure 68 Leather shoe No. 39. Scale 1:3

construction; their toe shape suggests an 18th-century date, but without their uppers they are difficult to date with more certainty (Fig. 80, No. 91, Fig. 83, No. 107).

Late 18th-century shoes

The most interesting shoe found at the Abbey Wharf site (Fig. 80, No. 92) was found in Phase 7 dated *c.* 1780–1860 and appears to be of late 18th-century date. The closed shoe is of calf skin, flesh outward, and tied with latchets over a short tongue at the instep. The two-piece quarters have slightly sloping, lapped side seams and a straight top edge seamed for the attachment of a top band. The shoe had been deliberately cut up before being discarded; the vamp was slashed and much of its right side and all of the left quarter have been cut away. Despite this, internal linings of calf skin are present. The shoe which has a gently-pointed toe is made straight and has a riveted construction, Type 5, the upper being placed between the sole and the insole and the components held together by a double row of small copper alloy nails, probably of brass. A low stacked leather heel is held in place by a line of wooden pegs along the front edge and iron nails around the perimeter.

The riveted construction was a technique developed by Marc Isambard Brunel when producing military footwear during the Napoleonic War. The Abbey Wharf shoe, however, being made straight with a gently-

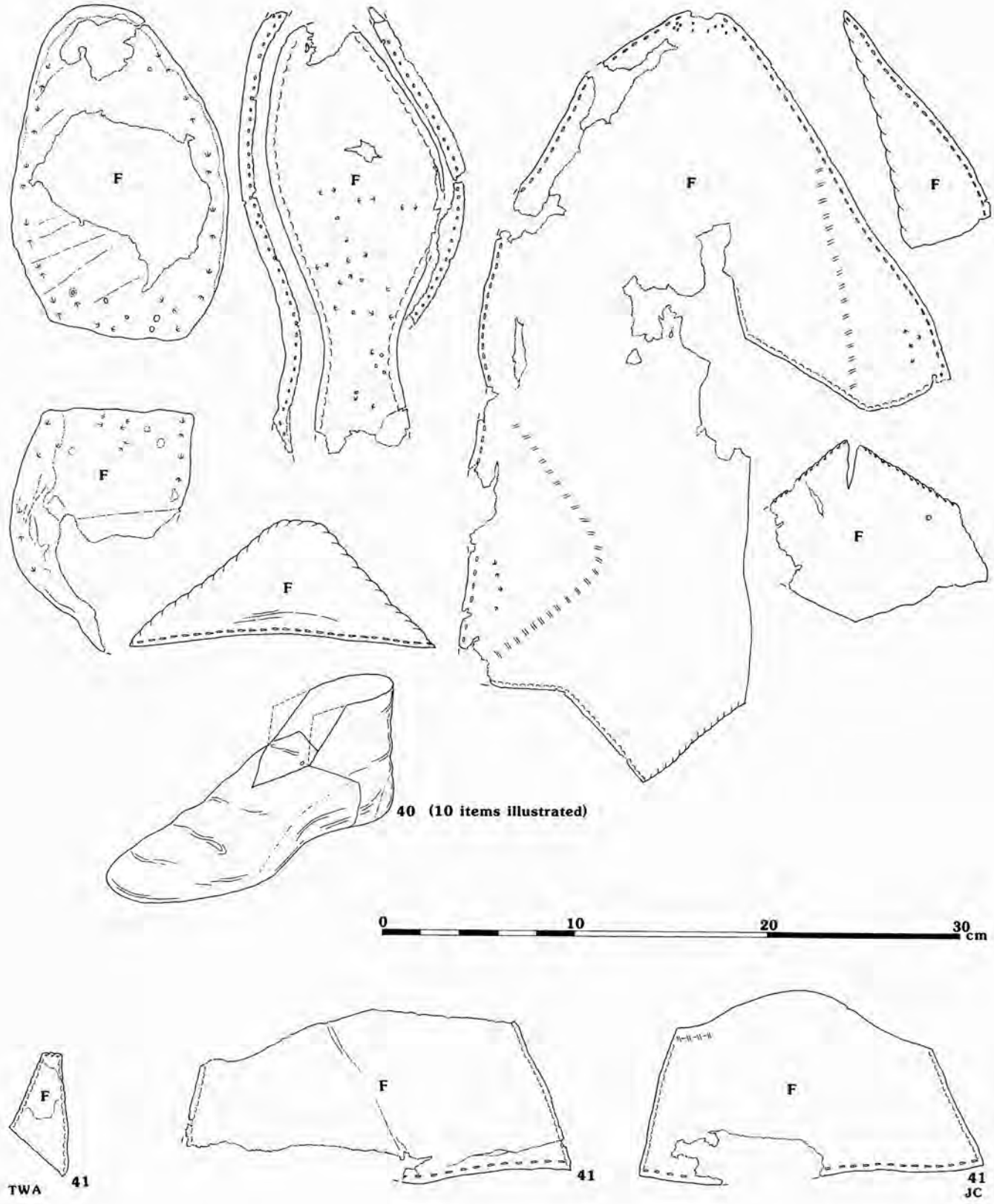


Figure 69 Leather items Nos 40, 41. Scale 1:3

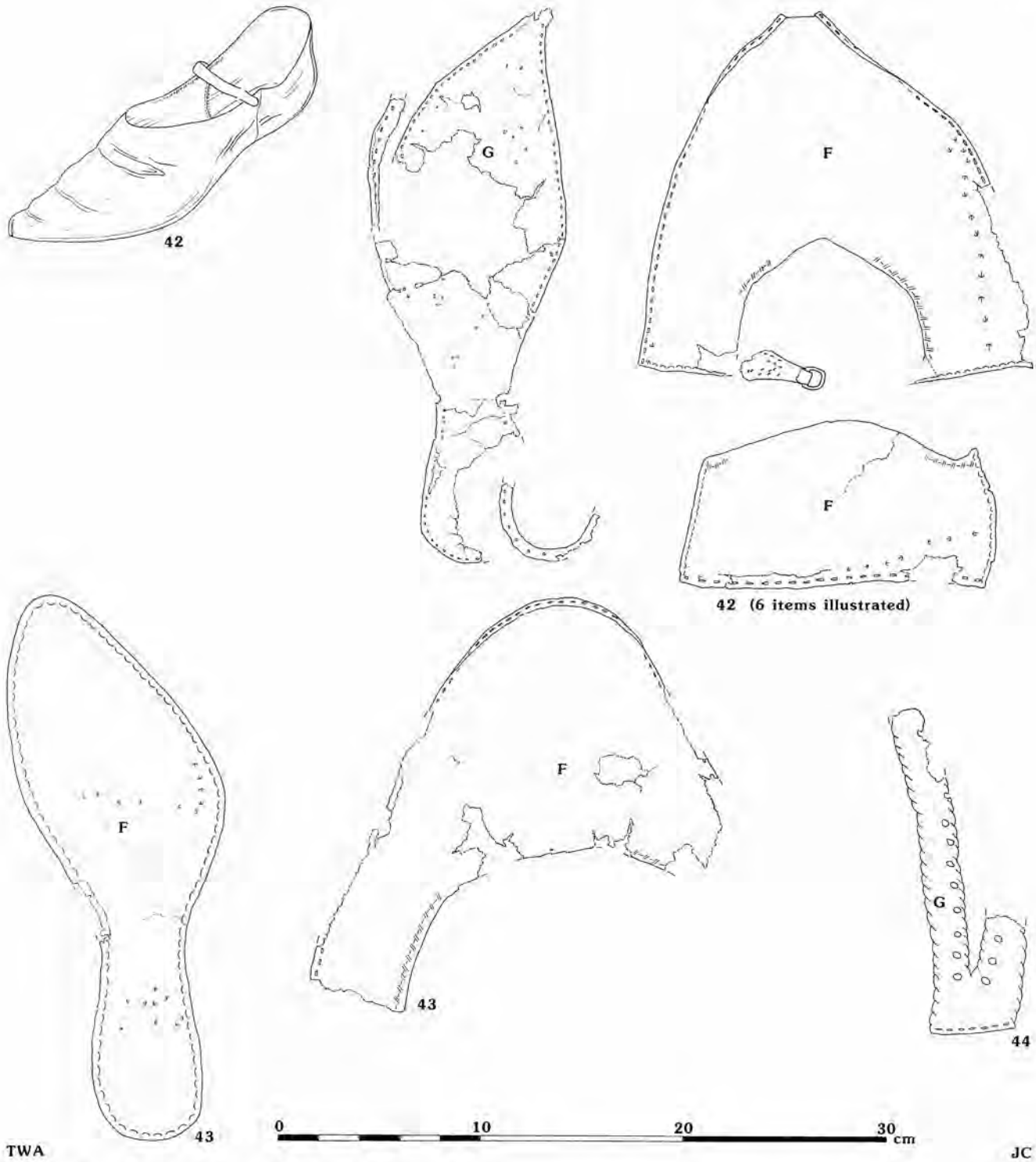


Figure 70 Leather items Nos 42–44. Scale 1:3

pointed toe shape and using brass rather than iron nails in the riveted construction, appears to be of earlier date probably belonging to the end of the 18th century. As such it is the earliest shoe of riveted construction to be recognised in Britain. It may be a French import, as the riveted technique is believed to have been developed in France some years prior to Brunel in this country (J. Swann, pers. comm.).

Another shoe part of late 18th-century date, a long quarter with a dog-leg front seam extending into a small latchet with a pair of lace holes to tie over the instep (Fig. 83, No. 111) was found unstratified.

Late 18th- or early 19th-century working boots

Three examples of open tab fronted lacing 'high-lows' of suede/buff leather were found representing practical

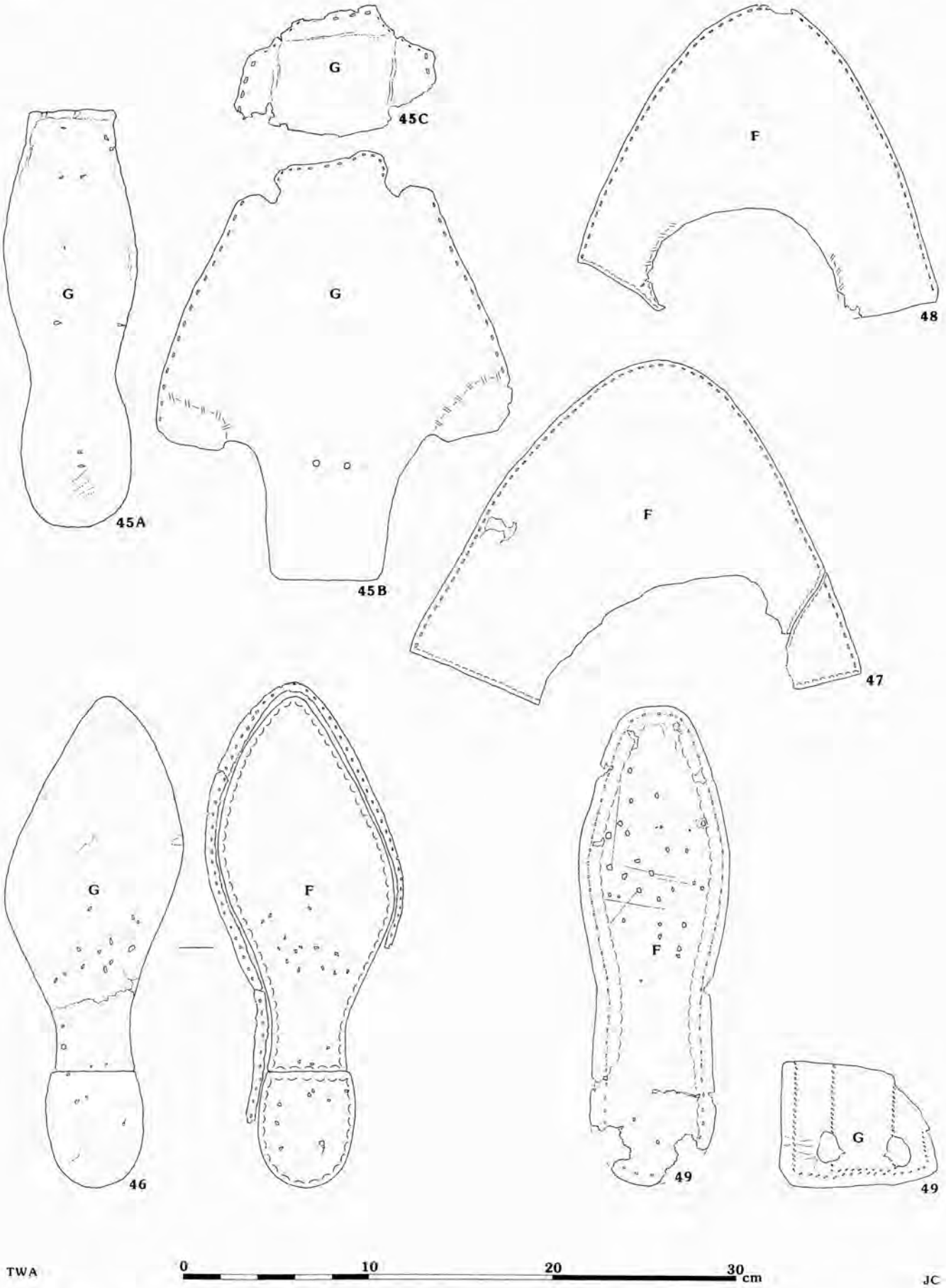


Figure 71 Leather items Nos 45–49. Scale 1:3

working footwear (Fig. 79, No. 88, Fig. 81, No. 97, Fig. 82, No. 100). The most complete example (Fig. 79, No. 88), of Type 2 or possibly Type 3 construction, had been cut away above the lasting margin by a shoe translator. This style of working boot was first worn in the 1760s and continued in use until replaced by the blucher boot, of similar style but with one-piece quarters, *c.* 1810–1820. The one-piece quarters from a blucher boot (Fig. 81, No. 98) found at the Abbey Wharf site is likely to date to the 1830s–1840s.

19th-century quality footwear

Two dress shoes for men, found within the same Phase 7 context (2088), are of similar type but differ in construction. They are of a style current in the 1830s–1840s, both shoes have square-toed vamps ending in a short, straight tongue and long, low quarters with sloping front seams. One (Fig. 82, No. 103), made with the grain side of the leather outward, has small latchets at the front of the quarters to tie across the tongue; the other (Fig. 81, No. 99) with the flesh side outward, has small tabs sewn to the vamp at the junction of the tongue and the side seams. The front-lacing shoe (Fig. 82, No. 103) had a square-toed bottom unit made straight of Type 2A construction; the shoe with the stitched down tabs (Fig. 81, No. 99) had a bottom unit of similar shape but made for a right foot with Type 4C construction.

The six other examples of bottom unit components of Type 4 construction all with unseamed insoles which lay like a sock within the shoe vamp, occurred within Phase 7contexts or were unstratified, indicating it to be a construction method used only during the 19th century at this site (Fig. 78, No. 85, Fig. 81, No. 95, Fig. 82, No. 105). The majority were made straight with a square toe and tread, waist, and seat of similar width, only two examples (Fig. 78, No. 85, Fig. 81, No. 99) with the suggestion that they were made for a right foot. The reintroduction of right- and left-footed shoes began in the 1790s, however they did not become generally adopted for at least 40 years (see Swann 1982, 32) so that the Abbey Wharf examples show the reluctance of the shoemaker to adopt this innovation. It must be pointed out, however, that square-toed, straight bottom unit components of varying constructions found amongst the 19th-century material have little to distinguish them from bottom units of 17th-century date (Fig. 82, No. 104).

The greater part of the leg of a good quality knee boot (Fig. 78, No. 84) of buff/suede calf skin, also of 1830s date, was found in a Phase 7 context. The finely-stitched boot leg was back-seamed with remains of a V-shaped vamp. The cuff was missing but the position of two sets of straps were visible, one pair to pull the boot on, the smaller pair to go over the knee or attach to the breeches.

Late 19th-century shoes

Two sole fragments (Fig. 81, No. 96, Fig. 82, No. 102) with horizontal or obliquely-sloping grain/flesh stitching around the perimeter are of 1860s–1870s date and are the latest recognisable shoe parts.

18th- and 19th-century shoes: general construction

The 18th- and 19th-century shoe uppers showed a number of constructional details. The uppers were of calf skin or cattle hide, the use of buff/suede leather, flesh outward being as popular as the use of the leather grain outward. The majority of the seams were butted with fine edge/flesh stitching, however several shoes had lapped seams joining the vamp to the quarters (Fig. 80, No. 92, Fig. 81, No. 98), one 'high-low' having a lapped back seam (Fig. 82, No. 100) originally covered by a back strap. Internal stitching showed that several of the vamps had been reinforced at the junction of the side seams and tongue (Fig. 79, No. 89, Fig. 83, No. 108). Internal linings and straight-topped heel stiffeners were common, joining to each other with butted edge/flesh seams, incorporated into the lasting margin and secured with whipped stitching to the interior of the upper. The more complete shoes were recovered with their linings *in situ* (Fig. 79, No. 88, Fig 80. No. 92, Fig. 81, No. 99, Fig. 82, No. 103). The multiple lace holes of the tab opening 'high-low' boots had internal facings (Fig. 79, No. 88, Fig. 81, No. 97, Fig. 82, No. 100).

One of the 19th-century dress shoes (Fig. 82, No. 103) had a length of top band present at the tongue. Fine lapped seams with whipped stitching which had held top bands were present on a number of other shoes and shoe components (Fig. 79, Nos 88, 89, Fig. 80, No. 92, Fig. 81, No. 97, Fig. 83, No. 108). The other 19th-century dress shoe (Fig. 81, No. 99) had a line of decorative stitching across the tongue edge.

Welted shoe repairs

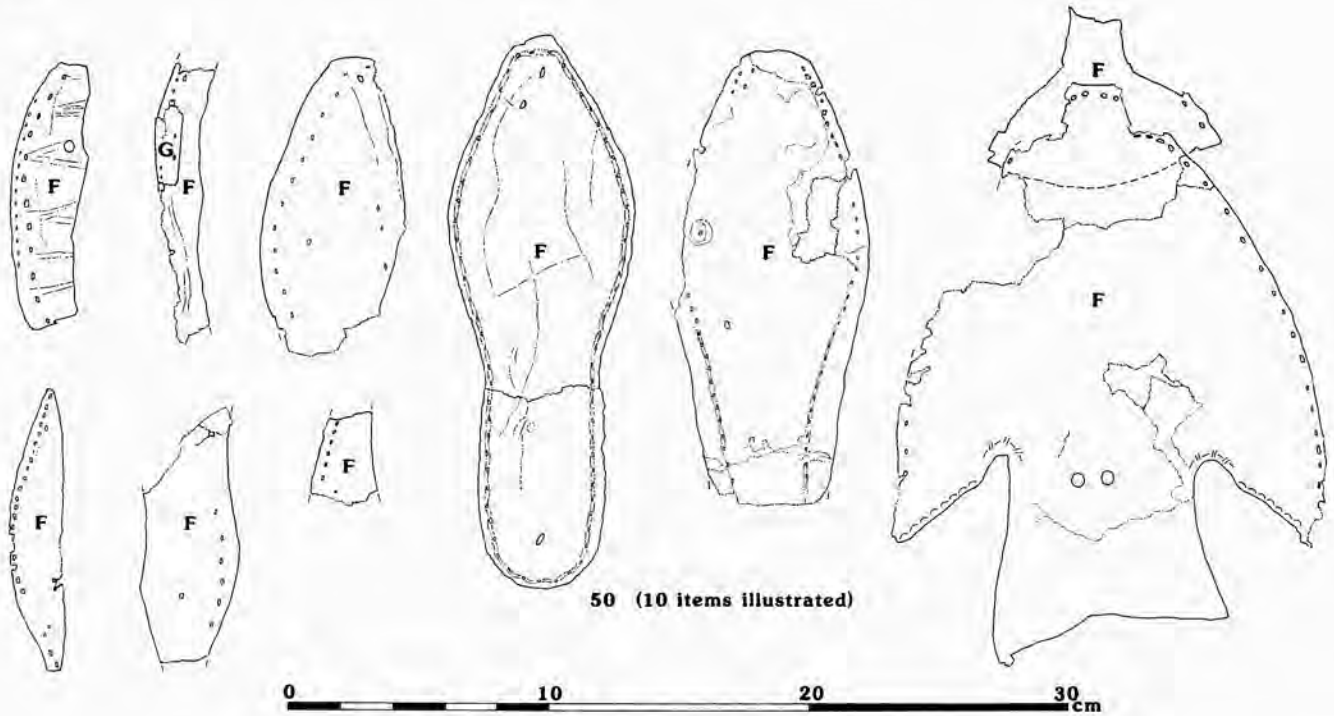
Like the medieval footwear, the majority of the welted shoe parts were heavily worn. Bottom units were frequently worn at the tread and seat and repaired with clumps nailed in place (Fig. 68, No. 39, Fig. 74, No. 67, Fig. 81, No. 98). Occasionally the repair clumps were secured by wooden pegs, the holes from which appear on soles and insoles (Fig. 71, No. 49). One sole forepart from a Phase 7 context had a double clump repair, one overlapping the other, heavily nailed and made from reused pieces of sole (Fig. 80, No. 90).

Eight two-part shoe soles were found with a seam across the waist. This may have been an economy measure in manufacture, although in two unstratified examples (Fig. 83, Nos 107 and 110) seams had resulted from the replacement of the original forepart of the sole as a repair. Similarly the fragment of two-piece insole found (7/W61A/8/1113/SF356b) may be either an economy measure or a repair.

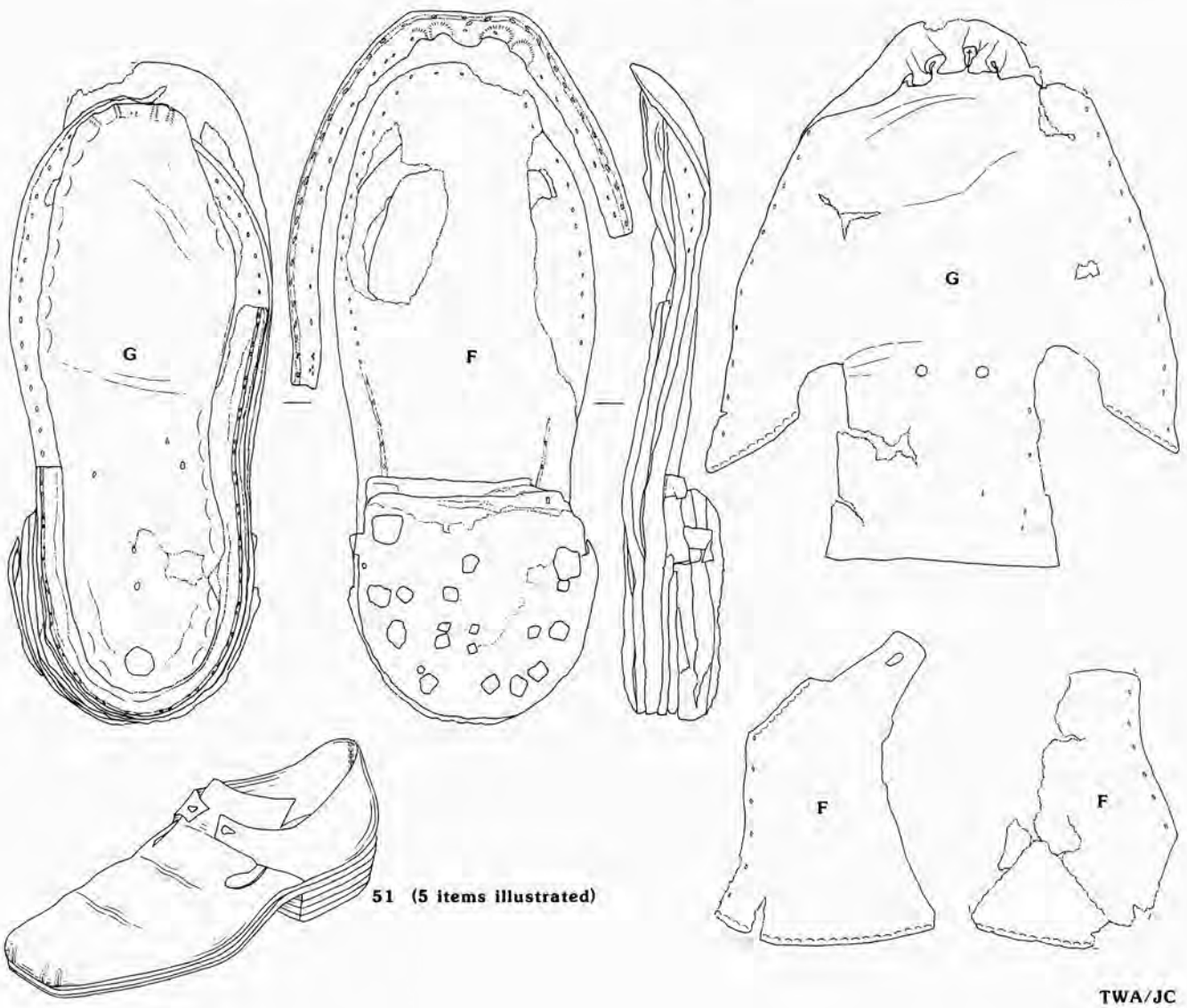
Several uppers had stitching from repair patches visible (Fig. 77, No. 82, Fig. 79, No. 89, Fig. 81, No. 98). One unstratified vamp of 19th-century date (Fig. 83, No. 108) had stitching from a repair patch covering a long tear which had first been joined with a butted edge/flesh seam.

Pattens

Two separate layers from multi-layered patten soles (us/W12C/us/borehole 4/SF30, Fig. 73, No. 60) or possibly middle soles from welted shoes, from which



50 (10 items illustrated)



51 (5 items illustrated)

TWA/JC

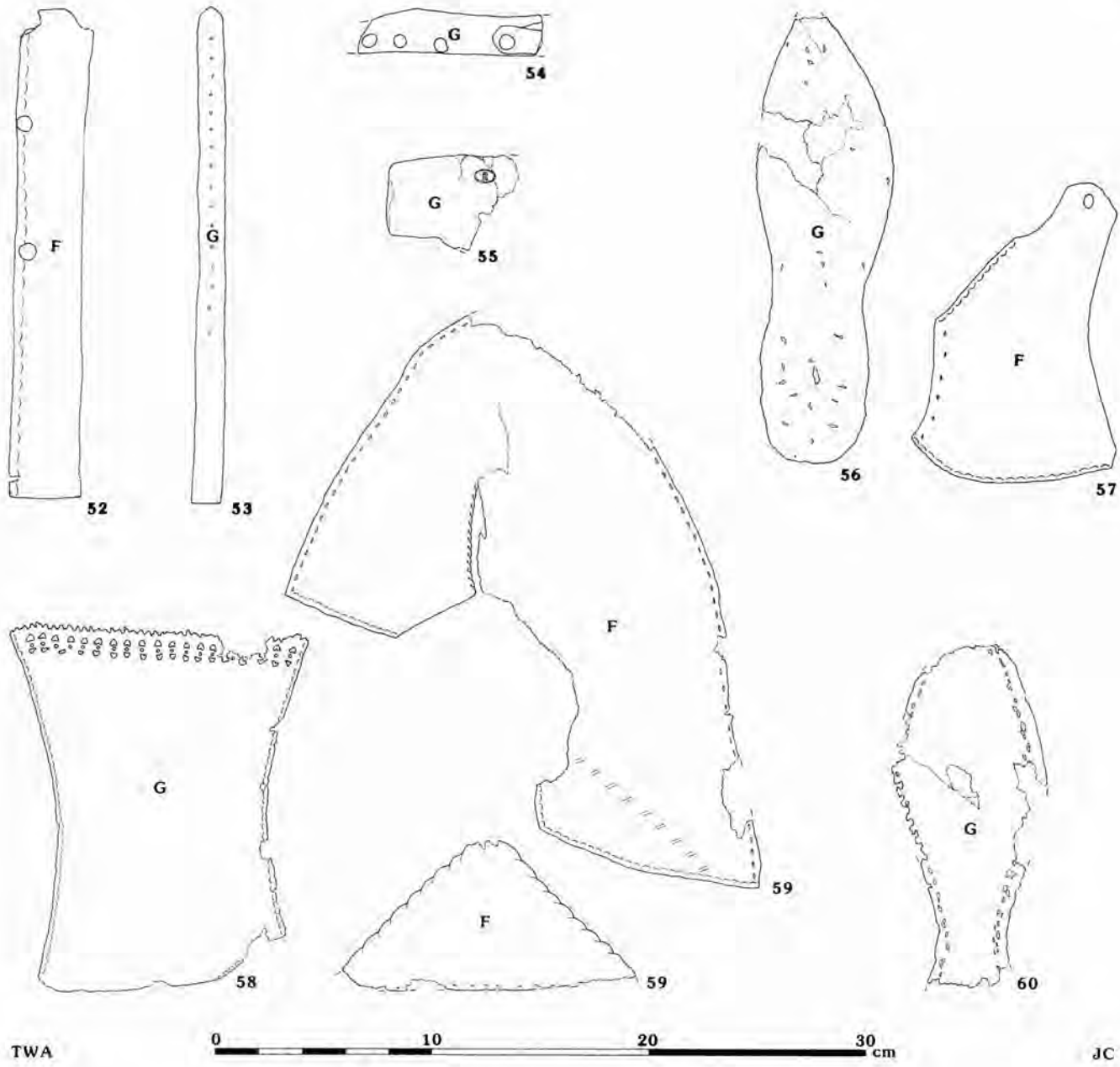


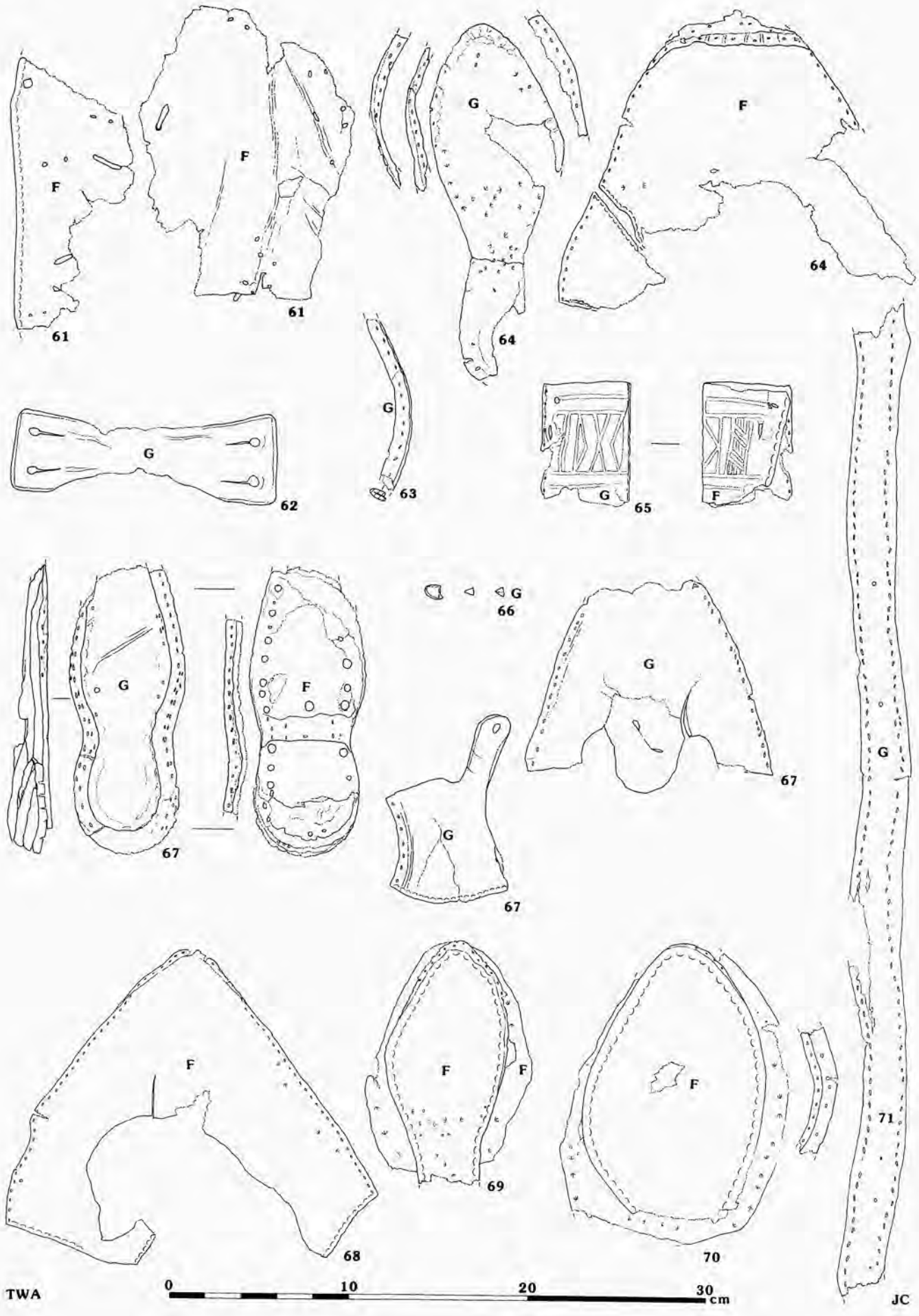
Figure 73 Leather items Nos 52–60. Scale 1:3

they are indistinguishable except by shape, were found unstratified. Four small fragments with similar stitching occurred, two in deposits from late medieval contexts. Two nailed leather strap fragments (Fig. 73, Nos 52 and 54), possibly cut away from wooden-soled pattens were found in Phase 7 contexts. The only positively identifiable patten component is a goat skin patten strap, pierced to take a fastening lace (Fig. 83, No. 112). The strap has a series of punched holes around the perimeter which may be decorative or indicate that the strap was lined and bound originally. The strap which dates no earlier than the 1780s was held by three nails to the wooden patten sole.

Figure 72 Leather items Nos 50, 51. Scale 1:3

Non-Shoe Leather

Only nine items of manufactured leather not belonging to shoes were found in post-medieval deposits, a further six were found unstratified. The majority were fragments of strap. Phase 6 of the 1981 excavations contained a length of strap with a copper alloy stud held by an iron shank (Fig. 67, No. 38). A small tine projects from each side of the stud and has been hammered into the leather as though to butt together two ends of strap. Two lengths of strap decorated with a stamped lozenge design were found unstratified (Fig. 66, No. 32 and 5/W12C/5/931). The former has a D–shaped buckle held by two rivets suggesting it to be a belt of 19th-century date.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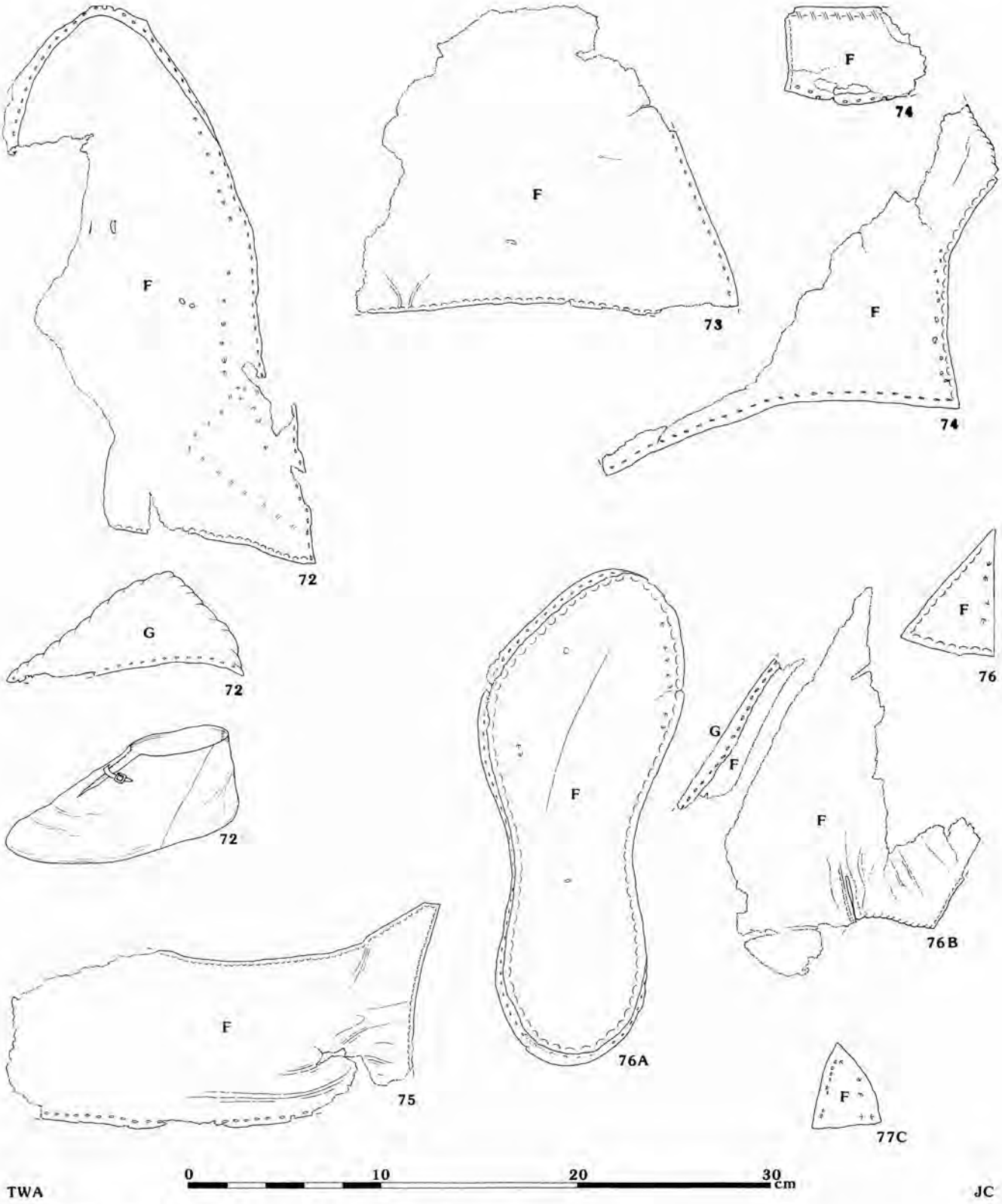
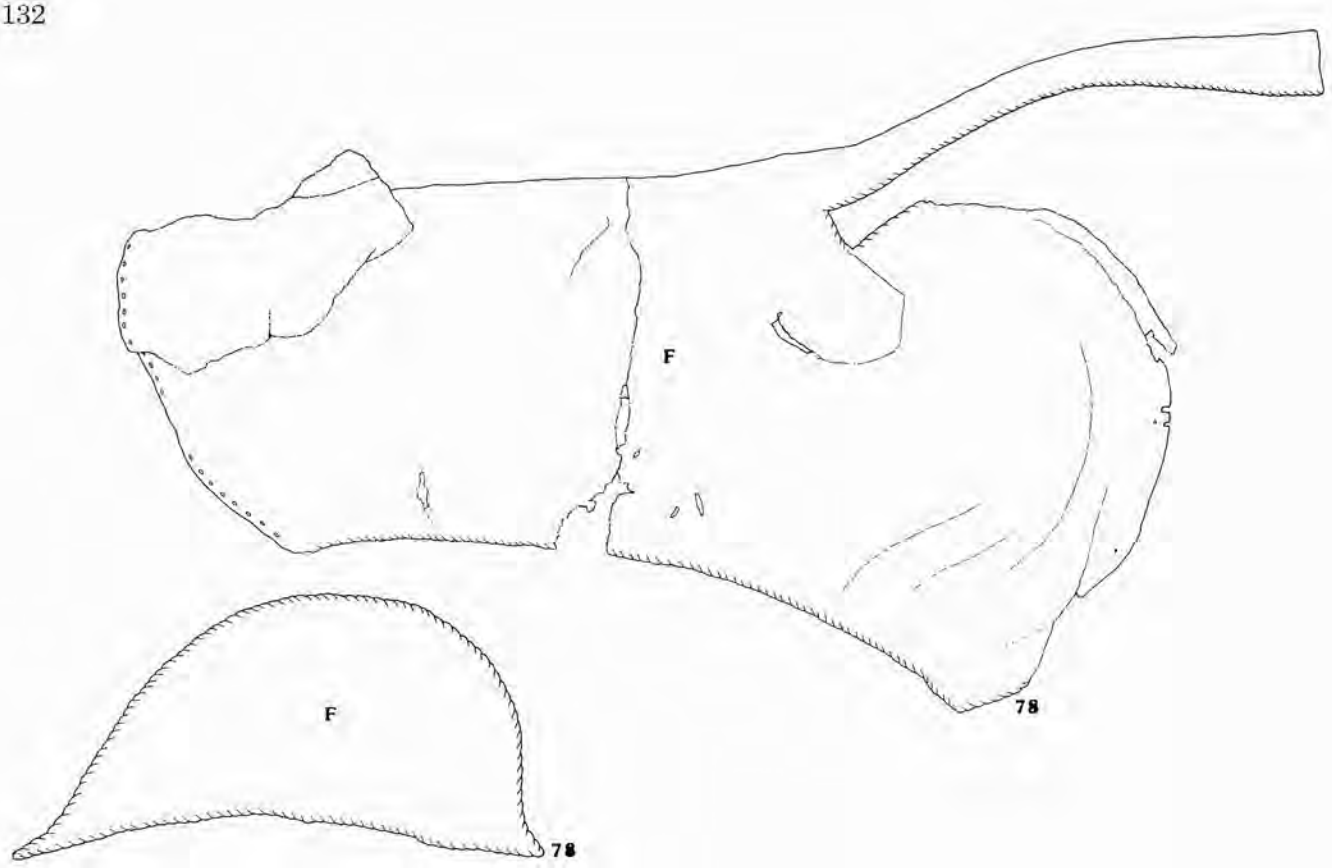
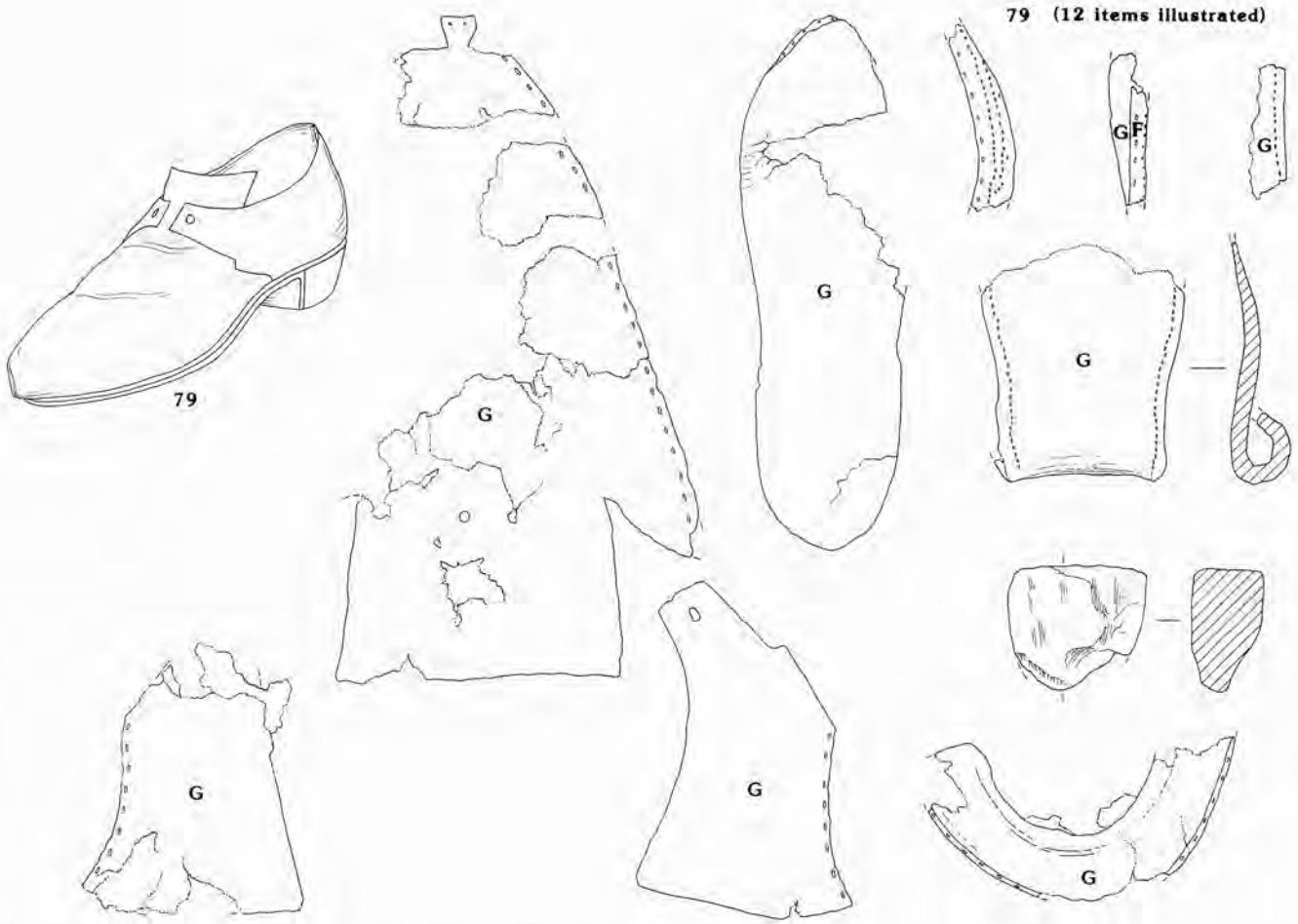


Figure 75 Leather items Nos 72–77. Scale 1:3

Figure 74 (opposite) Leather items Nos 61–71. Scale 1:3



79 (12 items illustrated)



TWA

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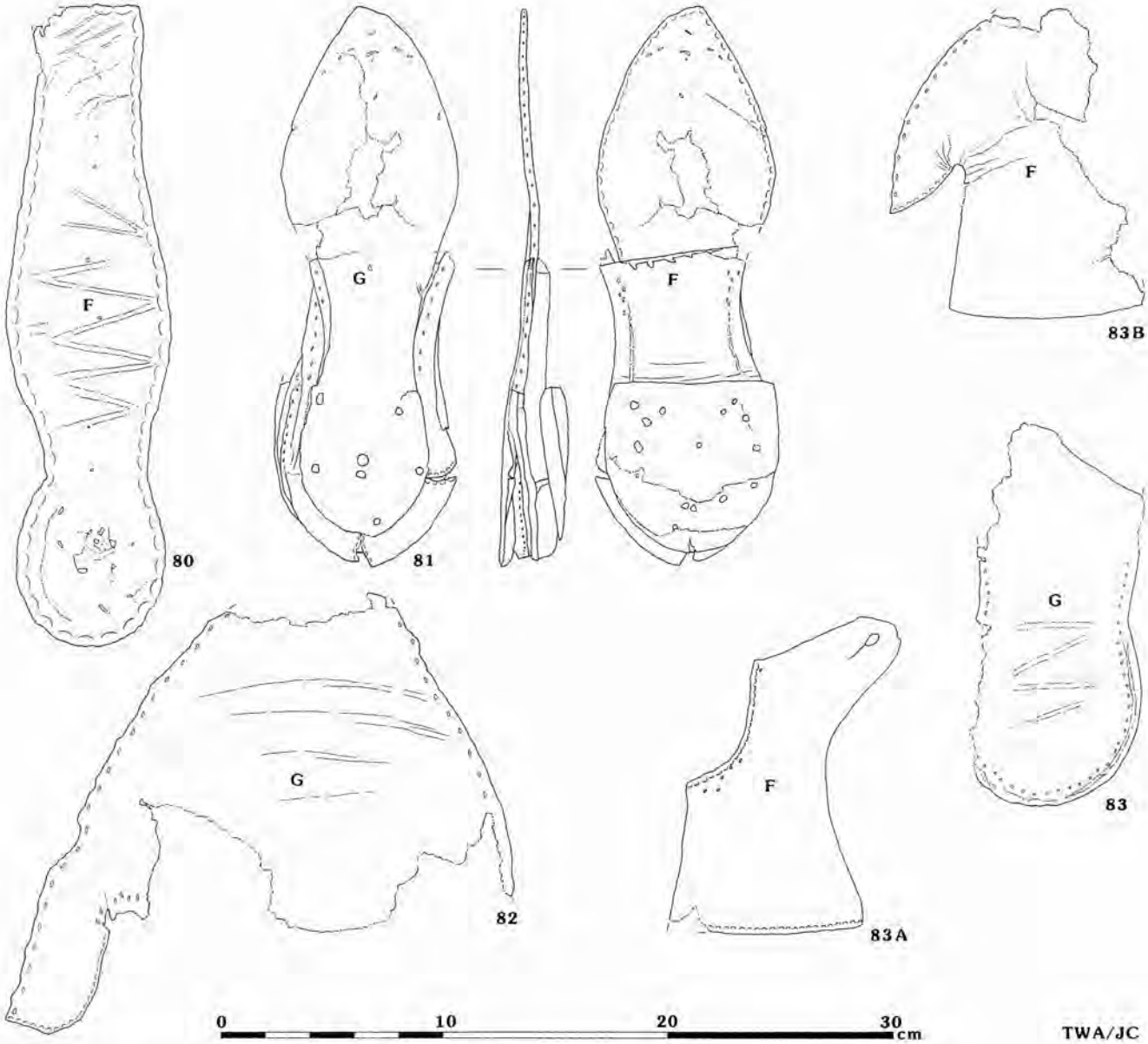


Figure 77 Leather items Nos 80–83. Scale 1:3

Other strap fragments found come from horse harness. A length of plain strap with multiple buckle holes was found in Phase 7 (Fig. 73, No. 53). The divided strap of double thickness cattle hide (Fig. 82, No. 101) found in a Phase 7 context is likely to be a winker or crupper strap from a light town harness, perhaps for a pony and trap. Four fragments from a laminated harness trace were also found (Fig. 83, No. 109), two in Phase 7 contexts and two unstratified. The trace fragments have a double row of stitching along each edge and would originally have been part of a strap comprising three or more layers to attain a thickness of *c.* 10–12 mm. A fragment of wider strap with similar stitching was also found (6/W12C/6/361/SF269.2; L. Stevens, pers. comm.).

A length of rolled edge binding of goat skin (Fig. 79, No. 87), possibly from a harness pad or upholstery occurred in a Phase 7 context. A large fragment of calf skin with lengths of whipped stitched seam, cut for reuse before being discarded was found in a Phase 6 context, along with a crescentic piece with similar stitching (Fig. 76, No. 78). The larger fragment has an area of pronounced wear on the grain surface above a convex cut edge. The object from which these pieces came is unknown.

A small fragment of waste cattle hide (Fig. 73, No. 55) has an initial 'R' within an oval border stamped at one corner, a second initial has been obscured as the leather is torn.

Figure 76 (opposite) Leather items Nos 78, 79. Scale 1:3

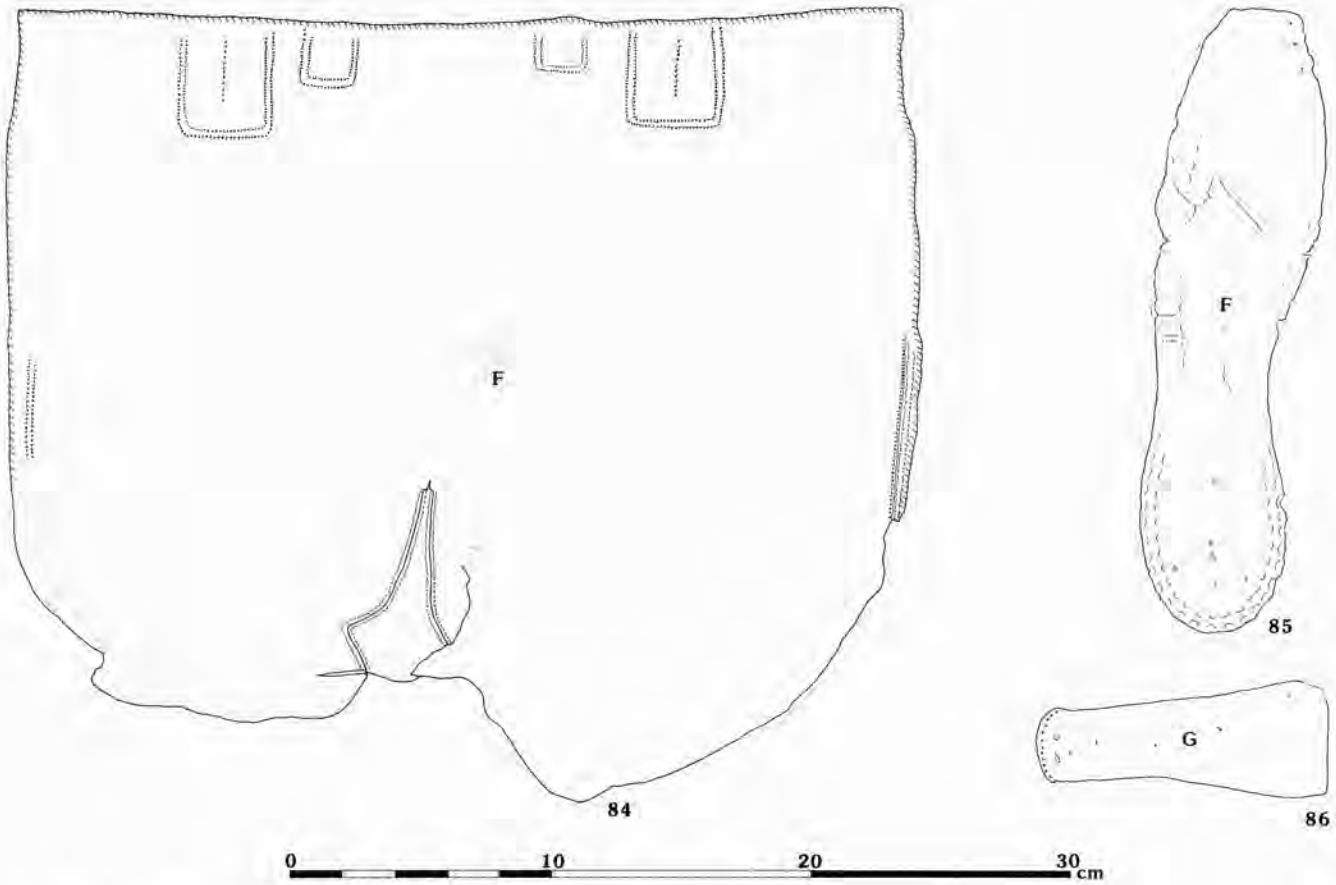


Figure 78 Leather items Nos 84–86. Scale 1:3

Two circular washers (Fig. 80, No. 94, us/W61B/us/2108/SF1079), a circular ?bucket base of thick cattle hide (Fig. 83, No. 106) and a fragment of strap studded on the flesh side with a row of dome headed, copper alloy studs (us/W12C/us/312/SF50) were found unstratified.

Fig. 60
1. us/W12C/us/846/SF986: Turnshoe quarters
2. 1/W12C/1b/894/SF745: Turnshoe vamp
3. 3/W12C/3a/906/SF713: Waste, decorated
4. 3/W12C/3a/909–886/SF755: Turnshoe two-part sole
5. 3/W12C/3d/932/SF1094a: Upper
6. 3/W12C/3d/932/SF1094b: Turnshoe vamp
7. 3/W12C/3e/912/SF808: Turnshoe sole
8. 3/W12C/3e/1083/SF1147: Strap
9. 4/W12C/4/785/SF712: Clump

Fig. 61
10. 4/W12C/4/860/SF890: Turnshoe sole; clump; rand; one-piece upper; top band; tongue; lining; heel stiffener

Fig. 62
11. 4/W12C/4/977/SF1053: Turnshoe sole; upper fragment
12. 4/W12C/4/1048/SF1154: Turnshoe sole; vamp; quarters
13. 4/W12C/4/1048/SF1169: Turnshoe sole; rand; clumps
14. 5/W12C/5/743/SF524: Turnshoe vamp
15. 5/W12C/5/793/SF710: Turnshoe quarters
16. 5/W12C/5/825/SF618: Turnshoe vamp; rand

Fig. 63
17. 5/W12C/5/825/SF619: Turnshoe sole; rand; one-piece upper; upper insert; fragment with buckle; tongue; heel stiffener

Fig. 64
18. 5/W12C/5/825/SF667: Turnshoe vamp
19. 5/W12C/5/825/SF672: Turnshoe vamp
20. 5/W12C/5/825/SF709a and 1228: Turnshoe vamp
21. us/W12C/us/851/SF741b: Turnshoe upper
22. us/W12C/us/855/SF632: Turnshoe one-piece upper; tongue; heel stiffener
23. 5/W12C/5/897/SF861: Turnshoe quarters
24. us/W12C/us/930/SF848: Turnshoe quarters
25. 5/W12C/5/793/SF791 and 792: Clump; turnshoe sole; vamp; quarters

Fig. 65
26. 5/W12C/5/931/SF800: Turnshoe sole; vamp
27. 5/W12C/5/931/SF801: Turnshoe vamp; vamp extension
28. 5/W12C/5/931/SF802: Turnshoe quarters; heel stiffener
29. 5/W12C/5/931/SF803: Turnshoe one-piece upper; tongue; heel stiffener

Fig. 66
30. 5/W12C/5/931/SF812, 813 and 815: Clump; turnshoe sole; turnshoe vamp
31. 5/W12C/5/931/817: Turnshoe sole; vamp
32. 5/W12C/5/931/SF820: Strap and buckle
33. 5/W12C/5/934/SF1058: Scrap (perforated)

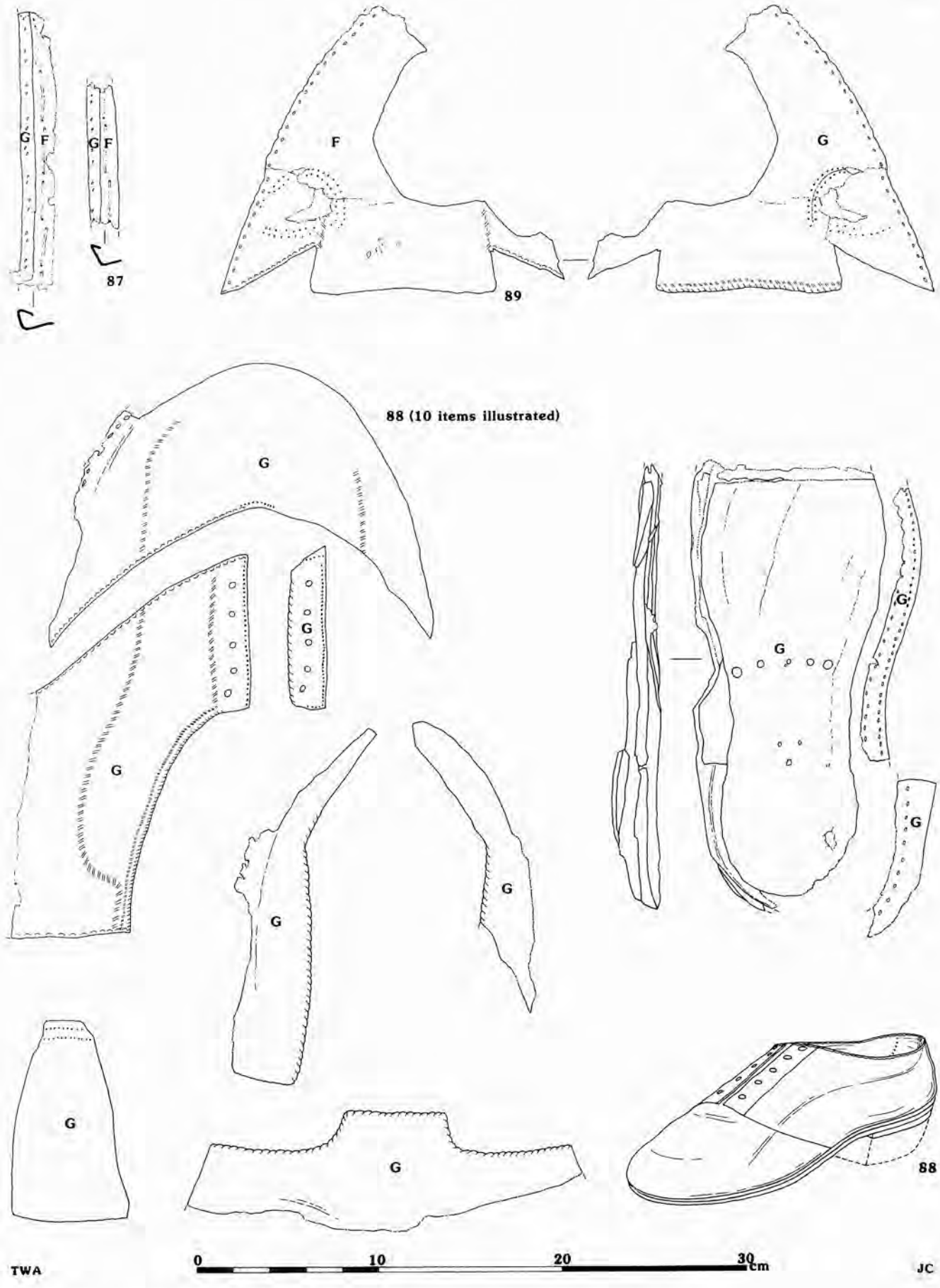
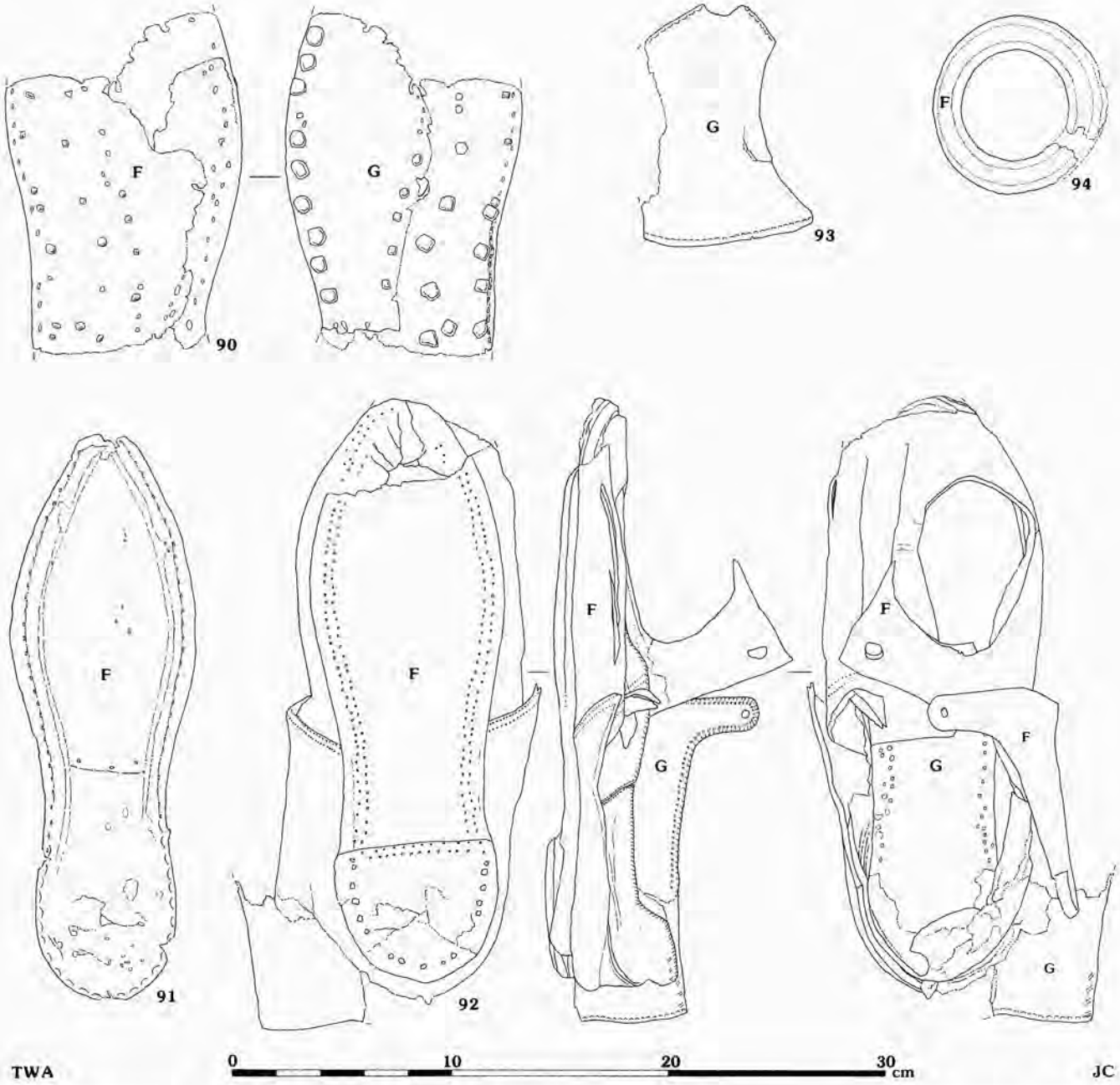


Figure 79 Leather items Nos 87–89. Scale 1:3



34. 5/W12C/5/934/SF1086: Turnshoe sole; rand; vamp; quarters

Fig. 67

35. 5/W12C/5/934/SF1087: Turnshoe sole; one-piece upper; heel stiffener

36. 5/W12C/5/938/SF901: Turnshoe quarters

37. 5/W12C/5/938/SF988: Turnshoe sole

38. 5/W12C/5/942/SF993: Strap and stud

Fig. 68

39. 5/W12C/5/942/SF995: Welted sole; clumps; middle; welt; insole; wooden heel; heel covering; vamp; toe puff; two-piece quarters

Fig. 69

40. 5/W12C/5/946/SF970a: Turnshoe sole; clumps; rand; one-piece upper; tongue; lining; heel stiffener

41. 5/W12C/5/946/SF970b: a) Turnshoe upper insert; b) turnshoe one piece quarters

Fig. 70

42. 5/W12C/5/946/SF973: Turnshoe sole; vamp; quarters; strap and buckle

43. 5/W12C/5/946/SF980: Turnshoe vamp

44. 5/W12C/5/946/SF981: Lace hole binding

Fig. 71

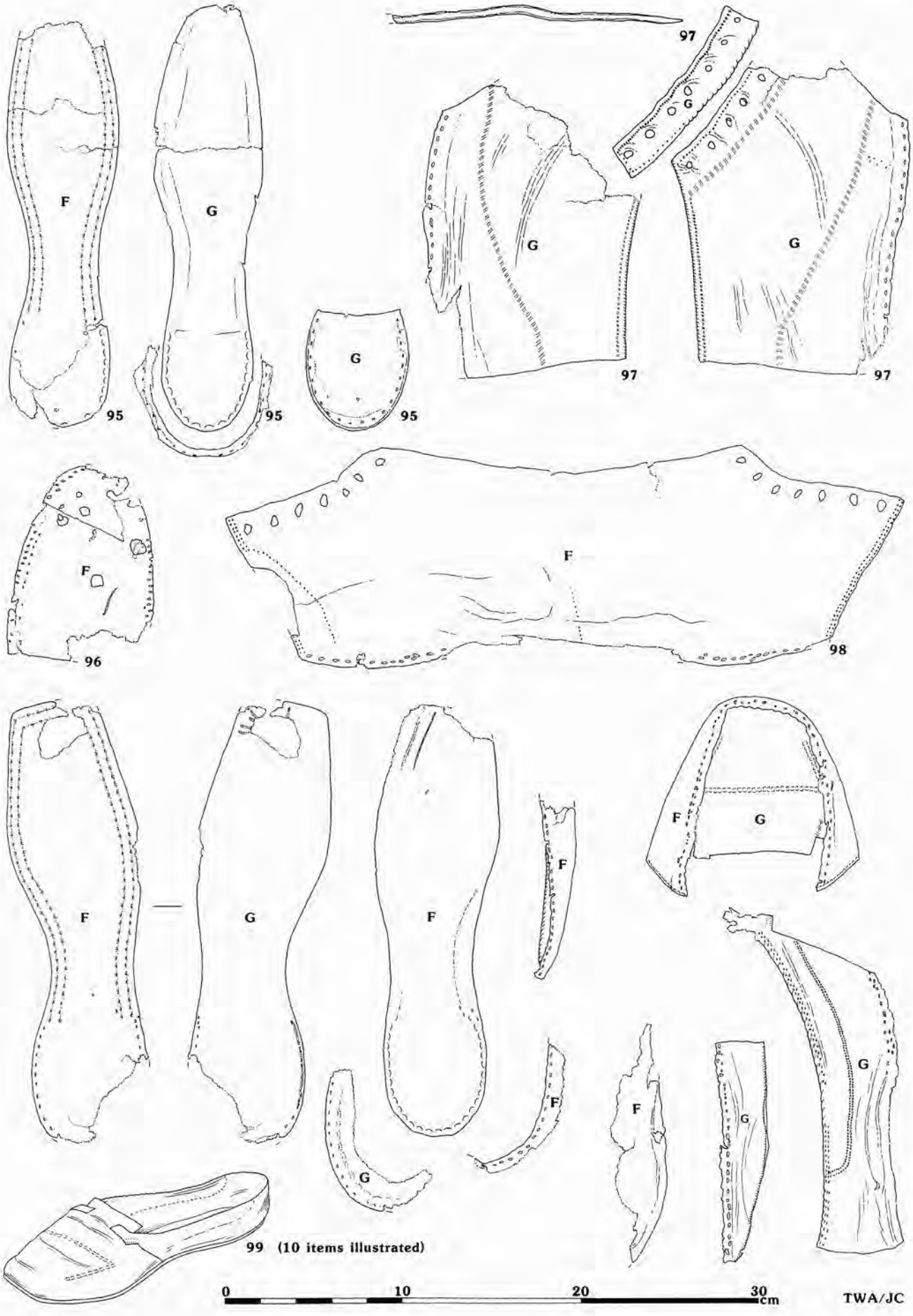
45. 5/W12C/5/942/SF996, 997 and 1000: Welted insole, vamp and toe puff

46. 5/W12C/5/946/SF985b: two part turnshoe sole

47. 5/W12C/5/946/SF985a: Turnshoe vamp and vamp insert

48. 5/W12C/5/946/SF1223: Turnshoe vamp

Figure 81 (opposite) Leather items Nos 95–99. Scale 1:3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99 (10 items illustrated)
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10
20
30
cm
TWA/JC

49. 6/W12C/6/361/SF269: Welted insole

Fig. 72
50. us/W12C/us/801/741a: Welted sole; middle; insole; vamp; toe puff
51. 7/W12C/7a/365/SF230: Welted sole; middle; insole; welt; heel; vamp; two-piece quarters; heel stiffener

Fig. 73
52. 7/W12C/7a/365/SF237: Strap, nailed
53. 7/W12C/7a/365/SF245: Strap
54. 7/W12C/7a/366/SF179: Strap, nailed
55. 7/W12C/7a/366/SF300: Waste, stamped
56. us/W12C/us/705/SF366: Welted insole
57. us/W12C/us/705/SF479: Welted quarters
58. us/W12C/us/1082/SF1139: Turnshoe upper, decorated
59. us/W12C/us/1082/SF1140: Turnshoe one-piece upper; heel stiffener
60. us/W12C/us/Borehole 1/SF60: Patten sole

Fig. 74
61. 1/W61A/1/1194/SF390.1: Sole and upper
62. 2/W61B/2/2114/SF1264: ?Dress fastening
63. 3–4/W61A/3–4/1226/SF468: Top band, folded
64. 4–5/W61B/4–5/2100/SF1190: Turnshoe sole; one-piece upper
65. 4–5/W61B/4–5/2103/SF1119: Knife sheath
66. 4–5/W61B/4–5/2135/SF1250: Waste, cut-outs
67. 5/W61A/5/1098/SF312a and 312b: Welted shoe; bottom unit; quarters; welted vamp (nb: these are not from the same shoe)
68. 5/W61A/5/1100/SF325: Turnshoe vamp
69. 5/W61A/5/1100/SF326: Turnshoe sole; rand and clump
70. 5/W61A/5/1100/SF328: Turnshoe sole; rand and clump
71. 5/W61A/5/1100/SF330.1: Strap

Fig. 75
72. 5/W61A/5/1100/SF333: Turnshoe, one-piece upper; heel stiffener
73. 5/W61A/5/1100/SF336: Turnshoe vamp
74. 5/W61A/5/1100/SF361.1: Upper side seam
75. 5/W61A/5/1115/SF418: Turnshoe quarter
76. 5/W61A/5/1115/SF444: a) Turnshoe sole; b) Triangular clump repair piece; c) One-piece upper fragment
77. 5/W61A/5/1115/SF447: Clump (triangular)

Fig. 76
78. 6/W61A/6/1034/SF320: Non-shoe fragments
79. 7/W61A/7/1077/SF284: Welted shoe; vamp and quarters; bottom unit, wooden heel, heel cover

Fig. 77
80. 7/W61A/7-8/1113/SF358: Welted insole
81. 7/W61A/7-8/1113/SF355: Welted bottom unit
82. 7/W61A/7-8/1113/SF366: Welted vamp
83. 7/W61A/9/1081/SF427 and SF927 a) Welted quarters; b) welted vamp

Fig. 78
84. 7/W61A/9/1001/SF5: Boot leg
85. 7/W61A/9/1001/SF122: Welted insole
86. 7/W61A/9/1001/SF130: Shoe strap

Fig. 79
87. 7/W61A/9/1001/SF131: Binding
88. 7/W61A/9/1009/SF227: Welted high-low; bottom unit; vamp and quarters; internal linings
89. 7/W61A/9/1019/SF215: Welted vamp

Fig. 80
90. 7/W61A/9/1020/SF44: Clumps
91. 7/W61A/9/1065/SF230: Welted insole
92. 7/W61A/9/1072/SF246: Riveted shoe; vamp and quarters; internal linings
93. 7/W61A/9/1072/SF449: Welted quarters
94. 7/W61B/9/2041/SF1018: Washer

Fig. 81
95. 7/W61B/9/2046/SF1070: Welted bottom unit
96. 7/W61B/9/2046/SF1146: Welted sole
97. 7/W61B/9/2063/SF1033: Welted quarters; lace hole facing
98. 7/W61B/9/2088/SF1149: Welted quarters (sole not drawn)
99. 7/W61B/9/2088/SF1064: Welted shoe (Type 4C) sole, insole vamp, quarters, internal lining

Fig. 82
100. 7/W61B/9/2088/SF1067: Quarters
101. 7/W61B/9/2088/SF1068: Divided strap
102. 7/W61B/9/2088/SF1125: Sole and welt
103. 7/W61B/9/2088/SF1037.1: Welted shoe, sole, insole welt, heel vamp, quarter top binding
104. 7/W61B/9/2088/SF1039: Welted insole (Type 2B)
105. 7/W61B/9/2088/SF1041: Welted bottom unit

Fig. 83
106. us/W61B/us/2009/SF1046: ?Bucket base
107. us/W61B/us/2009/SF1015: Welted bottom unit
108. us/W61A/us/0000/SF102: Welted vamp
109. us/W61A/us/0000/SF105: Strap
110. us/W61A/us/0000/SF109: Welted sole
111. us/W61A/us/0000/SF110: Welted quarters
112. us/W61A/us/0000/SF115: Patten strap

3. Leather from Other Sites

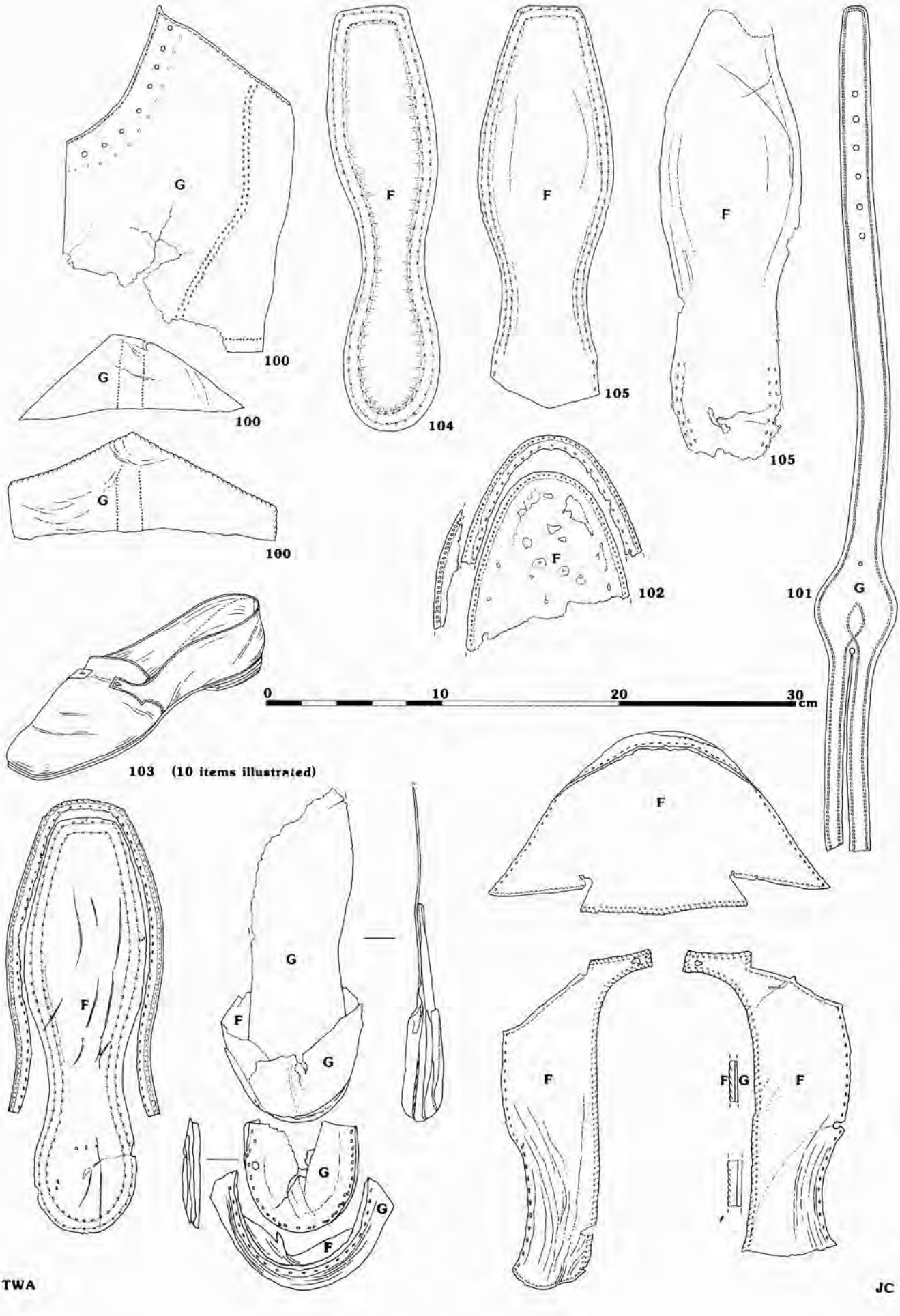
Only very small quantities of leather were recovered from other waterfront sites, and these were examined subsequent to the completion of the main analysis. All leather was examined washed, wet, and untreated. Further details and dimensions are in archive.

Fobney Street (W152)

A single shoe was recovered from structure 1000, a post-medieval stream revetment. The main part was a welted bottom unit with wide, square toe, wide tread of similar width, medium waist and wide seat. The remaining components comprised a middle, sole, forepart clump, and stacked heel. The forepart clump repair had originally been secured with iron nails (two shanks *in situ*), and was worn on one side. The large, low, stacked heel had four separate lifts and was straight-breasted with a crescentic 'horseshoe' heel iron nailed to the top piece. The sole had two holes in the tread worn through from nailing which were covered by the existing forepart clump, thus suggesting the shoe had been repaired twice.

The shape of the toe and the low stacked heel suggests a date in the middle years of the 17th century.

Figure 82 (opposite) Leather items Nos 100–103. Scale 1:3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103 (10 items illustrated)
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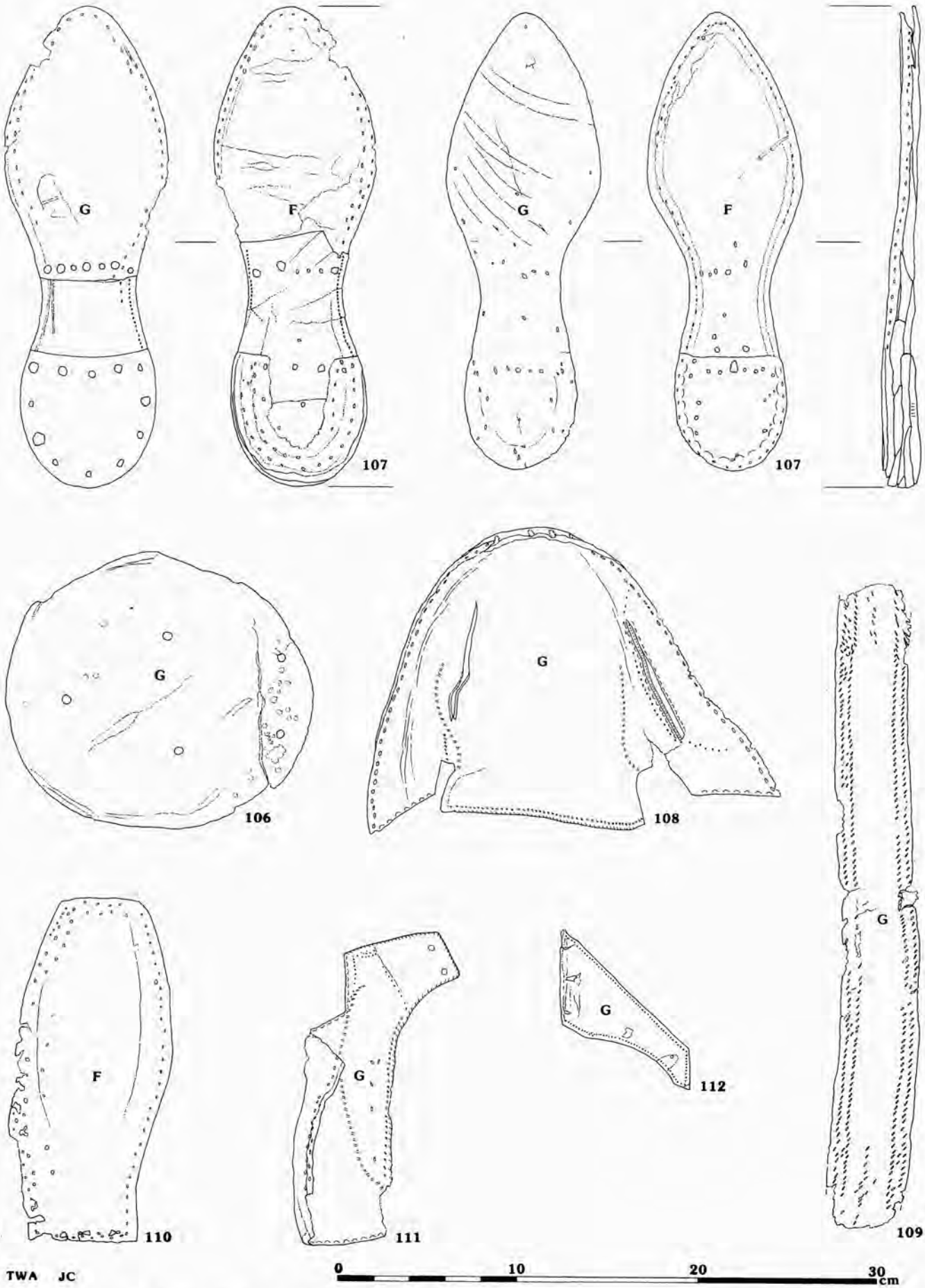


Figure 83 Leather items Nos 107–112. Scale 1:3

'Horseshoe' heel irons are documented in this period: Pepys refers to shepherds on Epsom Downs with iron at toe and heel, whilst a shoe of the *c.* 1660s or earlier with a 'horseshoe' iron at the heel has been found near Portsmouth (J. Swann, pers. comm.).

The bottom unit's present length is equivalent to a modern adult size 3 which, allowing 10% for shrinkage during burial, represents a man's shoe of adult size 6. The repairs to the sole forepart and the reinforcing heel iron suggest it belonged to a working shoe.

2. Bridge Street East (W158)

Period 1, Phase 1: Small organic fragment, possibly leather but with no grain pattern visible. Context 2678

Period 4, Phase 2f: Leather sole scrap fragments, including one piece with two stitches from an edge/flesh seam and another with a possible single tunnel stitch. Context 2677.

Period 6, Phase 3a: Leather welted bottom unit fragments, likely to be of 17th-century date. Includes parts of welted square-toed sole, waist area of forepart of two-part welted sole, thick heel lift with straight breast, plus fragments from same shoe. Context 2530.

Period 6, Phase 3f: Leather scrap with all edges torn. Context 2528.

3. Animal Hair, by M.L. Ryder

Samples were supplied from two contexts from the Bridge Street East W158 excavations: context 2063, comprising three separate subsamples (2063, 2063/10, 2063/22) and context 2248, subdivided during analysis into two subsamples, a and b. Both contexts were fills of what had been interpreted as Period 7 Phase 4b 'tanning' pits, although the evidence in this report suggests that they are better considered as relating to an earlier stage of skin processing.

The material supplied comprised four lumps of wet, silty clay from which tufts of hair were protruding. There was no evidence of any skin within the sediment. The hair was first sampled by pulling tufts from the earth, during which gross observations and length measurements were made, and then washed and dried. This was done by air drying the tufts overnight, and then rinsing in absolute alcohol which combined washing with dehydration.

After further air drying the hair was mounted in Euparal to give 'whole mount' preparations for microscopic examination. The international standard (IWTO) method of measuring wool fibre diameter was used to measure the diameter of 100 hairs in each of five preparations, two samples being taken from 2248. The measurements were made with a projection microscope at a magnification of x500.

Gross Observations

The fibres were too coarse to be wool and all had natural brown pigmentation, which was paler in samples 2063/22 and 2248, the latter appearing 'white' when dry. The hair (tuft) lengths were 25 mm in 2063/10, 20 mm in 2063/22, 45 mm in 2063, and 60 mm in 2248. All gave the general impression of cattle hair but, by eye, 2063 was the coarsest with the hint of a pointed staple (lock) that could indicate goat hair.

Microscopic Observations

The hairs were reasonably well-preserved. Not many 'bites' into the hair indicating degradation were observed. Examination under the microscope revealed that the hair in each sample had the characteristics of cattle hair — straight hairs of medium diameter with moderately-dense brown natural pigmentation. No sample had sufficiently dense pigmentation to indicate a black animal, and, although the finer hairs often had less or no pigmentation, only in sample 2063/22 was the proportion of pigmented fibres sufficiently small (21%) to give a mixture resulting in a (light) grey cow. All the other samples indicate cattle of brown rather than dun coloration.

There were also too few finer hairs to constitute the underwool of a double coat, which is found in goats and also in prehistoric cattle. Sample 2063 did not contain the coarsest hairs, and no sample had coarse hairs with the wide latticed medulla (central core) typical of goat hair. Most samples had the moderate amount of narrow medullation typical of cattle hair. The hair diameter measurements plus the percentage of pigmented and medullated fibres are listed in archive.

All samples had a symmetrical (statistically normal) hair diameter distribution. Sample 2248 was sampled twice because one part appeared coarser than another by eye. The similarity of the modes (most frequent diameter) and the range between samples 2248a (mode 40; mean 44.8±16.6 μm) and b (mode 40, mean 46.5±14.4 μm) supports the conclusion that the two samples are from the same animal. The variation in other characteristics is to be expected with such a small sample size, but the means are reasonably similar. Biological characteristics vary so much that it is rare to get identical values in repeat measurements, and it is usual to take an average of several measurements. The similarities and differences are such that four animals of the same cattle 'breed' are represented here.

Discussion

The interpretation of the samples is that they represent fell mongering, ie the removal of hair and wool from skins prior to tanning. Although it does indicate skin working, tanning was not necessarily done at the same site. The hair can easily be scraped off the skin after allowing putrefaction to begin, but the process is speeded by treatment with dilute alkali such as lime or stale urine. Modern skin wool obtained in this way has soft fibre roots, which are likely to survive less well than the hard keratin of the bulk of the fibre, so the lack of clear evidence of such roots, or the brush ends of hairs that had completed their growth cycle, does not go against this interpretation.

Unlike sheep, from which there is a wealth of fleece material in wool textile remains, cattle hair remains are not common. Superficial observations of cattle indicate much less coat variation than with the fleeces of sheep, presumably because there has not been the same selective breeding for different varieties of coat for textile use. For the same reason, any coat variation there might be in modern cattle has been little studied.

Previous investigations, however, have shown that the general trend in the coat of cattle since domestication has been towards hairiness, unlike sheep, for which the trend has been away from hairiness (Ryder 1980). Two main types of cattle coat have been identified. The first, a primitive type having a double coat (coarse outer hair and fine underwool, as with many wild animals), has a skewed hair diameter distribution in which most of the hairs are fine. Excavated samples from Aberdeen (Ryder 1984a) and Rochford, Essex, dated to *c.* AD 1600 (Ryder 1984b) show that this persisted beyond the medieval period alongside the second, coarser 'modern' type, which has a symmetrical hair diameter distribution, and which has been found as early as the Bronze Age in Britain. The Reading cattle hair belongs to this 'modern' type because of its symmetrical hair diameter distribution.

4. Some Documentary Aspects of the Late Medieval Leather Industry, by S. Kerrane

The first reference to Shoemaker's Row on the east side of the Market Place is as early as 1134 (Coates 1805, 450), and it may have been a primary feature. At least for certain individuals, a connection with the leather trade could be both lucrative and prestigious: In 1302–1303 the future Edward II wrote to the Abbot of Reading on behalf of his 'good friend Adam the Skinner', urging that the latter might not be subjected to a novel tallage. Records from the town corporation demonstrate leather-workers playing leading roles: In 1444 Thomas Webbe, tanner, was one of the chief burgesses, and two wardens of the art of shoemaking were appointed (Corp. Diary 1). The following year Thomas Mylle, skinner, was appointed as cofferer. Dils (1980) provides figures to illustrate the substantial investment in tools and equipment required by the trade.

The *Book of Regulations* of the Tanners and Leathersellers Company (1550 and 1570) directs that 'no shoemaker to make any boots or shoes in any part of town, but only in shoe-makers row'. A list of 1584 of those liable to attend the court leat shows that almost two-thirds of the tenants of Shoemaker's Row were indeed shoemakers, living with their apprentices and as many as six servants. The emphasis on shoemaking as against other aspects of leatherworking (the survey lists only one currier) reflects the range of items being deposited at the Abbey Wharf site, although it is interesting to note that this period of decisive documentary evidence for shoemaking in the east of the town is coincident with a gap in the sequence of shoe and shoe fragments recovered from excavations. Any dislocation of normal activities caused by the Dissolution seems in this case to have affected disposal rather than production.

The occurrence of horn cores on the Abbey Wharf site connected with tanning processes also finds no echo within the documentary sources. Dils (1980) has demonstrated that, whilst all the shoemakers lived in the parish of St Lawrence, the tanners invariably operated in St Giles's or St Mary's, parishes west of the town spanning the Kennet, Holy Brook, and their various braids and branches adjacent to Bridge Street. By the 16th century a contrast is evident between a manufacturing zone to the west, and the retail centres of St Lawrence's, which contained the Market Place, Butcher's Row, Cheese Row, and the retail aspects of the leather trade – the *Book of Regulations* distinguishes between glovers, saddlers, and jerkin, bottle, and collar makers. In 1575 the Commission of Sewers forbade the discharging of 'dunge', 'lyme pitts', 'tanvatts', and 'woodvatts' into the Holy Brook or Kennet, suggesting that such pollution had hitherto been a serious problem, of which the possible lime barrels from the Abbey Wharf Phase 6 may be evidence.

The population of Reading in 1547 has been estimated as approximately 3500 (Dils 1980), and it would seem unlikely that the local market would be sufficient to maintain the scale of activity indicated by the documents. There is little evidence of trade links with the surrounding area, however, and petitions from the Reading traders to the Corporation against 'foreigners' selling leather goods in Reading suggests that a general protectionism may have made exporting difficult.

9. Pottery
by C. Underwood

All ceramic material from the four Reading waterfront sites relating to the Abbey area was examined: Abbey Wharf (W12C, W61A and W61B), Reading Library site (W60B and W60C), Crane Wharf (W112), and 27 Kings Road (W140). It had originally been intended that these four sites should be published separately from excavations in the west of the town and it was only at a late stage that the information was combined with the data from the largest Bridge Street East assemblage (W158) in order to establish an overall sequence of ceramic forms and fabrics.

Absolute dating was provided by the dendrochronological evidence augmented by the datable leather objects and the documentary sources. The stratigraphic sequence from the Abbey Wharf sites has been used to define key ceramic groups, and recognition of elements of these groups on other sites provides the basis for the overall phasing system common to all sites.

The main objectives of the study of this group of pottery were:

1. To describe the nature of the assemblages from the Reading sites.
2. To establish the major chronological trends in the pottery and to attempt to link the phasing from different sites.
3. To ascertain the main fabric types and, if possible, their provenance, to highlight the changes in pottery supply through time, especially the probable emphasis on river traffic.
4. To compare pottery from the reclamations, the channels and other types of contexts, in order to achieve a better understanding of the site formation processes.

This report summarily describes the nature of the pottery assemblage under the headings of fabric, vessel form, and decorative technique. Quantification by phase for the principal sites, further descriptive details, and quantifications are held in archive. A chronological summary describes the criteria for equating individual site phases and a further section considers the question of site formation.

1. Methods

The material was grouped into 68 fabric types to include Iron Age, Saxon, medieval, and post-medieval pottery. The fabric types have been defined on the basis of identification of the predominant rock and mineral inclusions present within the clay body according to Trust for Wessex Archaeology pottery guidelines (Davies and Hawkes 1983), which divides the fabrics on the basis of hardness, texture, and fracture as well as inclusion type. Details of inclusions are recorded according to the Peacock system (Peacock 1977). A type series of typical sherds has been retained by the Trust for Wessex Archaeology.

Editor's note: This report was written prior to the establishment of Wessex Archaeology's current guidelines for pottery analysis from which the fabric codes used here differ considerably.

All medieval fabric types were assigned an alphabetical code dependent on their main constituents, and in some cases the surface treatment, according to the system adopted by the Department of Urban Archaeology (DUA), Museum of London (Orton 1978). Extra fabrics were added to this main series as they were recognised.

The early post-medieval groups were divided by their main inclusions, where visible under a x30 microscope, by their surface treatment and, in the case of the stonewares, by their firing technique. Stoneware groups have been designated 'B', for stoneware, and 'f' for salt-glazed, again following the DUA system, followed by a number or letter in brackets denoting its type or provenance. Early 16th- and 17th-century red earthenwares can vary from the hard-fired, semi-stoneware fabric Bw, to the reversed slip ware types (Ik) and the mottled brown wares (Sk). All of these are unprovenanced and are consequently identified only by their fabric coding. Types such as Tudor Green have also been coded, the main group being SXwg, with a smaller group Mg representing the pink-firing, very fine, micaceous version used in the manufacture of money boxes and bottles. Other recognisable groups such as Cistercian ware and Staffordshire-type wares have been given a common name code, following the system used in Oxford (Hassall *et al.* 1984, 176).

Known later post-medieval groups were also given common name codes. Only a small number of sherds could be attributed to any particular factory. For more complete later post-medieval assemblages (in particular W61B) additional attributes of the sherds were recorded in the hope that further analysis of future material might clarify the different production centres supplying Reading.

Archive records include sherd counts and weights for each fabric from each context, with additional quantification of identifiable rim, base, and decoration types. Summaries by phase and by site have been produced. It was possible to calculate the number of vessels present within each fabric and context from the rim and base percentages, but, due to the variety of context types (reclamations, channels, etc) and likely variability in rate of recovery rates, numbers of handles were used to provide a control. The presence and extent of glazing, decoration, surface treatment, knife-trimming, and sooting were recorded to assess differences in vessel manufacture and possible usage. Differences in glaze colour, application, extent, and the presence of under-

glaze slip were visible, and were recorded in detail, being possible chronological indicators. Variations in colour depend on firing conditions and the composition of the clay and therefore differ on the same vessel; only a general summary of colour and type was noted.

2. Fabrics

Fabric types present at Reading are listed below by period. Total numbers and weights by site are given in Table 16. More detailed quantifications are in archive.

Fabric codes, as listed below, combine major inclusion types (upper case letters) and surface treatment (lower case letters), as follows:

B = stoneware; C = organic; F = flint; I = ironstone; L = limestone; M = mica; S = sand; V = volcanic/igneous; X = other/unknown; b = burnished; f = salt-glazed; g = copper-stained glaze; k = other glazed; s = slipped; w = wheelthrown; y = not wheelthrown/doubtful.

Prehistoric

SMy Soft; abundant clear sand and mica grains; handmade, wiped; unoxidised. Iron Age.

SFy Soft; moderate–common sand; occasional flint. Handmade, wiped; irregularly fired. Iron Age.

FMb Very soft; common flint and mica. Handmade, burnished; unoxidised. Middle Iron Age.

Saxon

CS Soft; common elongated voids; abundant sand. Handmade; unoxidised. Early/Middle Saxon.

CM Soft; sparse sand, mica and elongated voids. Handmade, smoothed; unoxidised. Early/Middle Saxon.

Medieval

FLS Coarse angular flint; abundant limestone and sand. Handmade, wiped; cooking pots; irregularly fired.

FL Moderate angular flint and limestone; some sand. Handmade, wheel-finished; cooking pots; irregularly fired.

SL Abundant iron-stained sand and rounded flint (gravel); occasional chalk. Handmade; cooking pots; unoxidised.

S Abundant, iron-stained sand; occasional angular flint. Handmade, wiped; cooking pots; unoxidised.

SI Abundant sand; common iron oxides. Handmade, wiped; cooking pots; unoxidised with oxidised core.

SM Abundant fine sand; sparse iron oxides. Handmade, wheel-finished, wiped; cooking pots; irregularly fired.

LSF Abundant coarse limestone; occasional flint and fine sand. Handmade, wheel-finished; cooking pots, skillets; irregularly fired.

SGg Abundant fine sand; occasional grog. Handmade, wheel-finished; tripod pitchers, skillets, cooking pots and bowls; oxidised with unoxidised core.

Ssg Common coarse sand; moderate iron oxides. Handmade; spouted pitchers, pans, and skillets; unoxidised with oxidised exterior.

SIw Abundant very fine sand and mica; moderate iron oxides. Rounded and baluster jugs; oxidised.

SIBg Abundant fine sand; sparse iron oxides. Pitchers, rounded, decorated, and baluster jugs; oxidised with unoxidised core.

SIV Moderate sand; sparse iron oxides; abundant mica; black igneous flecks. Baluster jugs; irregularly fired.

IMS Abundant sand and mica; abundant iron oxides. Rounded, decorated, and baluster jugs; oxidised.

ILS Common sand and mica; moderate iron oxides; occasional fine chalk/limestone. Baluster jugs; oxidised.

SVg Moderate sand; occasional grog and iron oxides. Thick-walled vessels; oxidised with unoxidised core.

FS Moderate flint; common sand. Baluster jugs; oxidised.

Sg Common fine iron-stained sand; occasional black iron oxides. Jugs; oxidised white/buff; ?Surrey White ware.

SMIg Common iron-stained sand; sparse iron oxides. Cooking pots, jugs; oxidised pink/buff; Coarse Border ware.

SMg2 Moderate iron-stained sand; micaceous. Wheelthrown; bifid-rim cooking pots; oxidised buff/pink; Coarse Border ware.

SMIg2 Abundant fine iron-stained sand; micaceous. Wheelthrown; oxidised pink/buff; Coarse Border Ware (?Farnborough kilns).

LSMg Common iron-stained sand; micaceous. Wheelthrown; rounded jugs; ?Kingston-type ware.

Sg2 Abundant sand. Wheelthrown; bowls/open vessels; oxidised buff/grey.

SMg Sparse iron-stained sand; micaceous. Wheelthrown; oxidised; Brill-type ware.

IMg Moderate fine iron oxides; abundant mica. Wheelthrown; jugs; oxidised; ?import.

ISg Moderate iron-stained sand; sparse iron oxides. Handmade; glazed jugs; oxidised; Laverstock-type ware.

Post-medieval

Mg Abundant very fine mica. Wheelthrown; money box; oxidised pink/buff; Tudor Green.

SXwg As Mg but slightly coarser. Wheelthrown; bowls; oxidised pink/buff; Tudor Green.

VBg Moderate fine sand; sparse black igneous flecks; micaceous. Wheelthrown; glazed vessels; oxidised with unoxidised core; Cheam White ware.

Bw Sparse sand and iron oxides. Wheelthrown; hard-fired red earthenware; Surrey Red ware.

CIST W Cistercian ware.

STAFFS Staffordshire-type slipwares.

Xk Common fine sand. Pans, butter pots, tea pots; oxidised; mottled brown glaze; Brown ware.

Bg Stoneware type. Purple/orange; partially glazed olive green.

Sk Common fine sand. Oxidised white/buff; thick dark brown glaze; Brown ware.

Ik Common very fine sand. Oxidised red; thick metallic glaze; Brown ware.

Xk2 Rare very fine sand. Oxidised brick red; thick brown/olive green glaze; Brown ware.

MVw	Common coarse mica; sparse unident. rock fragments, possibly mica schist. Wheelthrown; large storage vessel; oxidised; ?Merida ware.
SBf	Salt-glazed stoneware. Drinking jugs; dark purple; mottled brown glaze; ?Cologne/ Frechen.
Bf1	Salt-glazed stoneware.Light grey; metallic brown glaze.
Bf2	Salt-glazed stoneware. Barrel jugs, mugs; white/grey; mottled grey/light brown glaze.
Bf3	Salt-glazed stoneware. Blacking bottles/ storage jar; white/grey; light brown glaze.
Bf4	Salt-glazed stoneware. Light grey; light grey glaze.
Bf6	Salt-glazed stoneware. Frilled base drinking jugs; purple/grey; streaky grey/brown glaze; Raeren.
Bf7	Salt-glazed stoneware. Buff; light golden brown glaze; ?Cologne.
Bf8	Salt-glazed stoneware. Purple/grey; dark grey glaze.
Bf9	Salt-glazed stoneware. Mugs; light orange/ grey; light brown wash; Siegburg.
Bf10	Salt-glazed stoneware. Bellarmine jugs; orange/light grey; mottled light grey/brown glaze.
BfW	Westerwald stoneware. Mugs, drinking jugs.
MAIO	Maiolica.
CRM	Creamware.
PW	Pearlware.
WHSG	White salt-glaze.
TNG	Tin-glazed ware.
WHW	White ware.
WHEW	White/patterned ware, mass produced.
BWPW	Blue-and-white printed ware.
BBAS	Black basalt ware.
RBAS	Red basalt ware.
PO	Porcelain (European).
CHIPO	Chinese porcelain.
REWSL	Red earthenware slipware.
REW	Red earthenware.
REW	Red earthenware.
BEW	Buff earthenware. Surrey types.

Possible Sources

As noted by Jope (1947), there are a number of potential local sources for the pottery, although the majority of the kilns are known only from documentary references, such as those at Woodstock, Benson, and Nettlebed. Flint- and chalk-tempered wares found at Oxford have been attributed to a source near Newbury because of the preponderance of this kind of material at Newbury itself during the 13th and 14th centuries (Mellor 1980, 181). These are equated with the fabric LSF at Reading and the group B fabric types at Newbury, for which a source in the Kennet Valley, possibly Crockersthorpe to the north of the Savernake Forest, has been postulated (Vince 1981, 312; Vince 1997).

The dominant fabric at Reading, the spouted pitcher fabric Ssg equates to the Oxford fabric AG (Haldon 1977; Mellor 1980). This fabric is common at Wallingford, and a source nearer Reading and Wallingford has been suggested, possibly at Tilehurst (Weare 1977; Mellor 1980, 181). The close affinity between the cooking pot fabric SI, fabric Ssg, and the later jug and pitcher fabric SIBg implies a similar source, and the sheer quantity of these fabrics suggests an origin in the near vicinity. An alternative source is the Camley Gardens kiln site at Maidenhead, which was producing pots in the 13th century and even into the 15th century (Pike 1965). Sandy wares of both the Camley Gardens kiln type and Surrey kilns occur at Newbury (Vince 1997). At Reading the sandy fabrics SIBg and Ssg do not appear to overlap with the Hampshire/Surrey wares, and it is likely that the Surrey kilns were providing the wares in the later period following the decline of Camley Gardens. This pattern is echoed at Windsor, where probable Camley Gardens products have also been found in large quantities (Mepham 1993).

The fine sandy fabric SIV is of the same period and similar to wares recovered at Abingdon and Seacourt which have been attributed to the Brill/Boarstall kilns (Haldon and Parrington 1974–5; Biddle 1961–2). It has been observed that the transport of pots would have been seriously hindered by the road system which did not effectively cross ranges of hills, in this case the Chilterns (Moorhouse 1981, 111), and thus the range of the Brill/Boarstall wares would be expected to be confined within a 20 mile (32 km) radius of the kilns (Jope 1947). An alternative source nearer to Reading is possible, perhaps the documented site of Nettlebed, which supplied Oxford in the 15th century and is equidistant from Reading and Oxford (Mellor 1980, 181). Three glazed sherds in a fine sandy fabric (ISg) have been identified as products of the Laverstock kilns, which were producing glazed jugs from the late 13th century (Musty *et al.* 1969).

Given the importance of riverine trade in the medieval period (Moorhouse 1981, 108), it might be expected that some contact between Reading and London might be reflected in the pottery assemblage. Certainly Newbury Group C vessels have been found in London (Vince 1985, 84). However, there is little evidence at Reading of any up-river traffic from the city, despite the occurrence of London-type ware as far upstream as Henley (*ibid*). There is a small amount of possible Kingston-type ware, which might have used this route, in late 13th- or early 14th-century contexts, but in general it seems that sources outside Berkshire to the east were not exploited, at least until the demise of the Camley Gardens kilns, and that pottery was travelling largely by overland routes.

In the 14th and 15th centuries with the appearance of Coarse Border ware from the Hampshire/Surrey border the sources expand; possible sources here include the kilns at Farnborough, Aldershot, and possibly also Ash (Holling 1971). The evidence from W61A, however, suggests that the links with the north represented by the fine jugs in SIV are maintained into the 15th century. The products from the Hampshire/Surrey kilns indicate that the main product used at Reading seems to have been cooking wares not represented at this period by fabrics from other sources.

Imports are strictly limited at Reading with only three sherds of possible 12th-century Andenne ware recovered. It is not until the 16th century that imported wares are present in any quantity, including stonewares from the Rhineland, especially from Raeren and

Table 16: pottery fabric totals by site

	W12C		W61A		W61B		W112		W60B/C		W158	
Fabric	*No.*	*Wt(g)*	*No*	*Wt(g)*	*No.*	*Wt(g)*	*No.*	*Wt(g)*	*No.*	*Wt(g)*	*No.*	*Wt(g)*
Prehistoric												
SMy	–	–	–	–	2	29	–	–	–	–	–	–
SFy	–	–	–	–	1	11	–	–	–	–	–	–
FMb	–	–	–	–	7	482	–	–	–	–	–	–
Total	–	–	–	–	10	522	–	–	–	–	–	–
Saxon												
CS	2	82	–	–								
CM	–	–	–	–	1	4	23	156	–	–	–	–
Total	2	82	–	–	1	4	23	156	–	–	–	–
Medieval												
FLS	2	27	–	–	–	–	2	4	–	–	7	49
FL	8	78	22	629	15	115	–	–	–	–	6	179
SL	60	760	24	659	23	187	11	175	6	101	21	297
S	38	467	168	2418	64	814	40	301	2	49	15	174
SI	74	884	51	936	38	384	3	37	2	42	24	296
SM	82	1633	14	254	18	135	4	32	1	49	2	50
LSF	37	588	11	312	5	74	–	–	4	180	4	33
SGg	40	810	12	221	58	694	8	141	1	98	9	181
Ssg	93	1499	145	2900	35	364	1	13	4	132	19	273
SIw	12	322	23	689	1	21	–	–	–	–	1	13
SIBg	40	649	187	4628	20	186	6	75	48	715	4	45
SIV	23	678	124	5352	9	300	1	6	6	66	2	41
IMS	15	266	56	1801	–	–	13	136	57	936	4	27
ILS	4	59	37	1215	4	21	18	240	17	278	5	116
SVg	2	92	–	–	–	–	–	–	–	–	–	–
FS	–	–	5	111	1	28	–	–	–	–	–	–
Sg	20	215	4	53	–	–	2	15	9	101	1	4
SMIg	82	1096	27	340	–	–	13	116	4	11	–	–
SMg2	38	519	5	158	–	–	2	1	–	–	–	–
SMIg2	36	420	2	4	–	–	1	3	–	–	1	20
LSMg	7	63	12	317	–	–	–	–	2	2	1	30
Sg2	26	309	6	195	–	–	–	–	–	–	–	–
SMg	4	124	3	33	–	–	–	–	–	–	2	10
IMg	–	–	1	10	–	–	–	–	1	5	1	3
ISg	–	–	–	–	–	–	–	–	–	1	3	17
Total	743	11,558	939	25,235	291	3323	125	1295	164	2765	132	1858
Post-medieval												
Mg	1	2	–	–	–	–	–	–	–	–	–	–
SWwg	25	163	26	382	1	6	–	–	3	17	35	466
VBg	16	349	1	17	–	–	–	–	–	–	1	5
Bw	123	1198	10	246	1	6	1	15	4	30	5	81
CIST	10	59	5	62	–	–	–	–	–	–	–	–
STAFFS	17	113	15	485	8	171	–	–	–	–	2	5
Xk	16	206	18	284	2	13	2	15	–	–	2	7
Bg	6	59	1	34	–	–	–	–	–	–	–	–
Sk	15	94	24	149	–	–	–	–	–	–	4	18
Ik	1	31	13	248	–	–	–	–	–	–	4	69
Xk2	7	106	4	110	3	98	–	–	–	–	–	–

Table 16 (cont)

	W12C		W61A		W61B		W112		W60B / C		W158	
Fabric	*No.*	*Wt(g)*	*No*	*Wt(g)*	*No.*	*Wt(g)*	*No.*	*Wt(g)*	*No.*	*Wt(g)*	*No.*	*Wt(g)*
Post-medieval (cont.)												
MVw	–	–	–	–	2	138	–	–	–	–	–	–
SBf	10	144	1	6	5	70	2	239	–	–	5	47
Bf1	1	3	6	286	7	257	1	1	–	–	2	6
Bf2	1	45	3	44	30	1202	–	–	–	–	3	51
Bf3	6	78	22	1226	33	1290	–	–	–	–	–	–
Bf4	–	–	–	–	8	140	–	–	–	–	–	–
Bf6	33	610	1	11	–	–	–	–	–	–	2	14
Bf7	20	216	–	–	2	80	–	–	–	–	1	17
Bf8	6	64	–	–	–	–	–	–	–	–	–	–
Bf9	1	9	2	115	–	–	–	–	–	–	–	–
Bf10	2	281	–	–	–	–	–	–	–	–	–	–
BfW	4	159	4	73	5	29	–	–	–	–	1	3
MAIO	1	3	–	–	–	–	–	–	–	–	–	–
CRM	5	25	22	816	496	5660	1	3	–	–	22	222
PW	–	–	–	–	17	180	–	–	–	–	–	–
WHSG	–	–	8	118	26	363	–	–	–	–	6	133
TNG	66	579	21	175	23	542	–	–	–	–	27	213
WHW	–	–	9	94	49	689	–	–	–	–	1	9
WHEW	3	5	5	297	160	1922	–	–	–	–	1	6
BWPW	2	7	25	455	256	4278	–	–	–	–	–	–
BBAS	–	–	2	92	–	–	–	–	–	–	–	–
RBAS	–	–	–	–	1	51	–	–	–	–	–	–
PO	3	6	12	92	20	109	–	–	–	–	–	–
CHIPO	–	–	11	333	26	296	–	–	–	–	–	–
REWSL	3	70	7	752	2	111	–	–	–	–	10	317
REW	132	2874	129	8868	218	12,122	–	–	–	–	86	3002
BEW	82	1029	40	1039	18	249	–	–	–	–	54	1563
Total	618	8587	447	14,892	1419	30,072	7	273	7	47	274	6254
TOTAL	1363	20,227	1386	40,144	1721	33,921	155	1724	171	2812	406	8112

Frechen and with some sherds of 15th-century Siegburg wares. Two conjoining sherds in a very micaceous fabric with unidentified rock inclusions (MVw), from a Phase 9 context at W61B (Abbey Wharf), may derive from a large storage vessel of Iberian origin, possibly Merida ware. However, its dating remains uncertain, as such vessels were produced from the 13th century right up to the present day (Hurst *et al.* 1986, 69).

Other 16th-century sources appear to be the kilns at Cheam, with lid seated pans, lids, and the later Surrey red wares. Other connections with the Farnham area include the introduction of Tudor Green cups and bowls at this time.

From the 17th century onwards the variety of material increases with Staffordshire-type posset bowls and slipped dishes, and Midlands-type brown wares with large pans and butter pots. The Surrey kilns still seem to be supplying the area with small pipkins, pancheons, and dishes. A local source of red wares is probably at Inkpen, manufacturing such items as butter pots, bushel pans, creaming pans, lidded flour bins, and other large open vessel types, a similar range to that produced by other localised industries providing the basic kitchen products. The larger kitchen vessels are present in the assemblage at Reading into at least the 19th century.

The increase in factory-produced wares in the 18th century may owe something to the development of the Kennet and Avon Navigation from 1720. A range of salt-glazed wares, some probably from the Nottingham area, and white salt-glazed press-moulded vessels are present from *c.* 1760 onwards. Tin-glazed wares, probably from London, are also evident from the late 17th or early 18th century, with creamware dishes, plates, and chamber pots. The range of factory-produced, traded wares from the late 18th and 19th centuries are only poorly represented due to excavation and collection strategies employed on site.

3. Vessel Types

The correlation of principal medieval vessel types to fabrics is given in Table 17.

Cooking pots

A great variation in rim types occurs in the cooking pots, which have been grouped into nine vessel types on the basis of manufacturing techniques, fabric, diameter range, and shape.

CP1 (Fig. 85, Nos 7, 8)
Diagonal or straight-sided cooking pots/bowls with inward turning thickened rims are described by Jope (1949). Very few examples are represented; most are from early contexts on site W61B and W12C in fabric FLS. Some body sherds occur in Site W158 (Bridge Street East) in site Phase 2d context 2422, Period 2.

CP2 (Fig. 85, Nos 9–13)
This vessel type consists of a handmade, well-rounded body with a short-necked, everted rim, and thick sagging base. The body is very thin-walled, and is notable for its 'dimpled' appearance from the finger smoothing and thumbing. The rims also show some fingertip impressions on exterior surfaces, often with burnt patches especially under the rim. A small number of sherds are decorated with combing. Most examples are in fabric FL, a very heavily flint-gritted, thin-walled (*c.* 4 mm) fabric. Most examples of this fabric are found on the smaller sites which are not easy to place within the stratigraphic phases, although definite examples of the vessel type are restricted to Periods 2 and 3. Comparable fabrics at Oxford (Haldon 1977, fabric BF) are dated to the 12th century or earlier, but at Newbury (Vince 1997, fabric group A) continue into the mid 13th century.

CP3 (Fig. 85, Nos 14–18)
Cooking pots with thickened rims, especially internally, give a bulbous appearance. The rim is probably wheel-finished and added to the vessel body. Both interior and exterior surfaces are heavily wiped. All examples are in fabric LSF, a Limestone-tempered fabric with occasional flint; later types have a more even finish with a flattened top, but the rounded rim type is also found in pitchers manufactured in this fabric (Fig. 91, Nos 137, 138). Examples are mainly from the W12C site, with a small quantity from the Bridge Street East site. The cooking pot rims occur in Period 2 and Period 3 contexts, and continue into some Period 4 contexts, but as few of the sherds are diagnostic it is difficult to ascertain whether the cooking pots or the pitchers are the long-lived vessel types.

CP4 (Fig. 85, Nos 19–29)
Large cooking pots; diameter of rims averages 300 mm and the bases vary between 220 and 280 mm. Rims are slightly everted, necked, and have a variety of flat-topped finishes, from bevelled exterior edges to slight internal projections. All examples are an even thickness throughout the vessel (*c.* 7 mm), which, combined with the well-wiped finish, suggests either a wheel-finished or wheelmade technique. The bases are sagging. Decoration on the vessel body comprises straight line combing and overlaid curvilinear designs (Nos 26 and 28). The majority of examples of this larger vessel type are made from the dense 'gravelly' textured fabric SL paralleled at Newbury (Vince 1997). Found mainly on the Abbey area sites, some examples are known from Bridge Street East, with thickened, flat-topped rims in fabric FL (No. 24). Rim diameters on Fobney Street and the Bridge Street sites seem to be distinctly smaller than on the other sites, ranging between 160 and 320 mm, and there is no evidence of the combed style decoration on any of the body sherds. Their presence is limited to the site Phase 2d contexts, Period 2.

CP5 (Fig. 86, Nos 30–42)
This is the largest group represented on all sites and incorporates examples in several fabrics, including all three sandy fabrics S, SM, and SI. Vessels are necked, upright or semi-everted, flat-topped cooking pots with sagging bases. Some rim examples have thumbing or fingering on the top surfaces of the rim. All rims are wheelthrown, and, in the case of those in fabric S, possibly added to a handmade body. The decorative techniques of combed patterns visible in fabric SL are also repeated in fabric S, suggesting a link between the two types of vessel.

Cooking pots in fabrics SM and SI have a finer finish, with evidence of a better throwing technique on a faster wheel, and are presumed to be later in date than fabric S vessels. There is a degree of overlap between the SI fabric, the spouted pitcher fabric Ssg and the later slip-painted pitchers SIBg in the type of inclusions visible in the paste; the continued presence of the SI cooking pots into the late 13th-century groups tends to corroborate the association. A large number of the rims from Bridge Street East are long necked, ridged-rim forms with a well-wiped finish, a type which is not well represented on other sites, in fabric SI (No. 38). These vessels are noticeably harder and are likely to represent cooking pots rather than pitchers or jugs.

Differences in rim and base measurements apparently correspond to variations in fabric: Fabric S cooking pot rims are limited to the range 220–260 mm with bases averaging 220–280 mm; fabric SI rims are usually 260 mm and bases 220 mm; fabric SM rim diameters appear to be on average much smaller than the base measurements. However there does seem to be an overlap between the SM examples in this group and the Type 7 cooking pots. It is difficult to ascertain whether the different rim sizes correspond to particular usage as there are very few remnants of actual deposits, with the exception of fabric SM where distinct horizons of burnt matter are visible. Analysis of the different deposits on pots from the sites in Exeter does not readily suggest any direct correlation between rim size or particular rim forms and one type of use, many uses from making milk-based sauces to boiling meat being possible in the same type of pot (Allan 1984).

CP6 (Fig. 86, Nos 43–7)
These vessels are only represented in fabric group type S. Type 6 is very distinctive with a bulging, slightly seated rim with diameters range from 220–280 mm.

Table 17: principal medieval vessel forms by fabric (no. examples)

Fabric	*CP1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*Pitch.*	*Pitch/ jug*	*Jug*	*Bowl*	*Skillet/ pan*
FL	1	7	–	1	–	–	–	–	–	–	–	–	–	–
FLS	1	2	–	–	–	–	–	–	–	–	–	–	–	–
LSF	–	–	5	–	–	–	–	–	–	2	–	–	–	1
LSMg	–	–	–	–	–	–	–	–	–	–	–	3	–	–
SL	–	–	–	8	–	–	–	–	–	–	–	–	–	–
S	–	–	–	–	11	31	–	–	–	–	–	–	–	–
SI	–	–	–	–	7	–	–	–	–	–	–	–	–	–
SM	–	–	–	–	7	–	2	–	–	–	–	–	–	–
SGg	–	–	–	–	–	–	–	–	–	11	–	–	2	1
Ssg	–	–	–	–	–	–	–	–	–	17	3	–	2	4
SIw	–	–	–	–	–	–	–	–	–	–	–	5	–	–
SIBg	–	–	–	–	–	–	–	–	–	1	5	10	1	–
SIV	–	–	–	–	–	–	–	–	–	–	–	12	–	–
IMS	–	–	–	–	–	–	–	–	–	3	1	11	–	–
ILS	–	–	–	–	–	–	–	–	–	–	1	2	–	–
SMg	–	–	–	–	–	–	–	10	–	–	–	3	–	–
SMIg	–	–	–	–	–	–	–	2	–	–	–	–	–	1
SMIg2	–	–	–	–	–	–	–	1	3	–	–	–	–	–
Total	2	9	5	9	25	31	2	13	3	34	10	46	5	7

Examples at Oxford and Seacourt, Berkshire (Haldon 1977; Biddle 1961–2) suggest a probable 13th-century date. Localised burning on the interior surface of the rim could indicate a special usage, or that they were fired upside-down. All sherds in this group are considerably thicker than the Type 4 sherds, but this could be explained by a manufacturing error with the vessels being overblown, ie overfired. 'Bloating' in this case may cause the rim to sag over or into the vessel, which may partially explain the rim formation (Rye 1981). This type is only represented on site W61A in Period 2 contexts.

CP7 (Fig. 86, Nos 48, 49)
Only a small proportion of the rim sherds can be attributed to this group, all occurring in the fine sandy fabric SM. The rims are very everted and flat-topped, and it is difficult to ascertain whether the thin-walled, very well-finished bases and body sherds are associated with this rim form or the cooking pot Type 4 forms. The majority of fabric SM sherds are to be found in Period 3, 13th-century groups. The SM cooking pot forms are notable for the degree of burning on the external surfaces *c.* 25 mm up from the base bottom, a possible indication that the vessel was used inside another.

CP8 (Fig. 86, Nos 50–2)
This type is almost exclusively limited to the Coarse Border ware fabric SMIg, with a flat, wide T–headed rim with short, bulging neck and slightly rounded, flat base (Pearce and Vince 1988, fig. 114). Some thick yellow/green glazing is invariably visible just under the rim. In some instances the rims are out-turned, as in one example in fabric Smg2 (No. 52) dated to Periods 4 and 5, mid 14th–15th century.

CP9 (Fig. 86, Nos 53, 54)
These vessels are bifid-rim cooking pot types in fabric SMg2, a sand-gritted Coarse Border ware fabric (Pearce and Vince 1988, fig. 115). Partial glazing in a yellow/green speckled glaze is evident on the exterior. The diameters of these seated types are much smaller than the other vessels, *c.* 120 mm.

The vessels can be dated from the late 14th century into the 15th, and are found in Period 5 and 6 contexts. The majority of the Hampshire/Surrey cooking pot types are from site W12C, with only a small proportion occurring on the other sites.

Bowls / Dishes; Skillets / Pans
(Fig. 86, Nos 55–62)

The majority of examples occur in the spouted pitcher fabric Ssg. These are large rounded-base pans (diam. 320 mm) with a shiny green/brown interior glaze. One example has a triangular rouletting pattern on the flattened edge of the pan (No. 59). The handles are hollow, presumably for a wooden extension to be inserted.

The skillet in fabric SGg has a thin green/yellow glaze on the interior and punched holes on the rim (No. 58), and derives from a Period 2, 12th-century context. Another example (No. 62), in the Coarse Border ware fabric SMIg and with a wider, more developed handle and a glaze-splashed interior, derives from a Period 4, mid 14th-century context (Pearce and Vince 1988, fig. 117). A skillet handle in fabric LSF (No. 57), residual in a post-medieval context at Bridge Street East, is the only example from any of the sites in Reading. Flat T–headed

rims to bowl forms in fabrics S and SGg with splashed glaze interiors also occur only on this site (Nos 55 and 56). The main difference in bowl forms in the two fabrics is the rim diameter; the bowl form in fabric SGg tends to be 180 mm, and in fabric SMIg 240 mm.

Dripping pan fragments can be observed in very small quantities on site W12C and W61A, all in fabric Ssg with internal 'bubbly' green glaze, and are recognised by the pinched pouring lip (No. 61).

Pitchers: Spouted and Tripod
(Fig. 87, Nos 63–72; Fig. 88, Nos 73–94)

The most distinctive element of the Reading assemblage is the high proportion of slip decorated pitchers — a feature already noted on previous sites in Reading (Moorhouse 1971–2), and also at Wallingford and Abingdon, Oxfordshire (Weare 1977; Haldon and Parrington 1974–5). The spouted pitchers are mainly restricted to fabric Ssg. The majority have a thick shiny dark green/brown glaze, with either diagonal or vertical slip lines beneath (Nos 75, 77, 85).

Rim forms are either flaring with angular, collared detail around the neck (Nos 74, 77), or a simple 'bell'-mouthed shape (Nos 90, 93). The collared detail is designed to be incorporated into the wrapover strut around the O-shaped tubular spout (Nos 74, 75.). The restricted range of rim sizes (invariably 120 mm diam.) is notable, and indicates a high understanding of the firing and shrinkage conditions of the clay used, especially as the vessels show evidence of being handmade (probably coil built).

Only one tripod base example survives (No. 86) although numerous rounded thumbed bases occur (No. 87). Decorative elements include line and dot slip and other painted line designs in a band around the shoulder (Nos 84–6, 91, 94). These pitchers are dated to the 12th or 13th century, although they do appear early in Period 2 contexts.

Tripod pitchers with a thin yellow/green glaze and incised line decoration at regular intervals down the vessel are represented in fabric SGg. Unfortunately the rims do not survive in any great number and the few available are limited to the traditional long-necked vertical examples with rouletted detail around the top of the rim (Nos 63, 70). Handles have inset plaited strips and/or thumbed edges (Nos 66, 67, 70). The SGg forms are in the minority on sites W12C and W61A, perhaps due to the competition from spouted pitchers. However, they are present on W61B, Crane Wharf, and the Library sites W60B and C in Period 2 contexts.

Later versions of the slip-decorated pitchers do not possess a spout, although the only discernible difference in the use of fabric Ssg is the hardness of the material and the manufacture: Earlier pitchers were partially handmade with the rim and neck portion added as coils and then smoothed. The spout was inserted through a hole in the shoulder and the handle very often attached in the same manner. Later examples have wheelthrown or wheel-finished rims. Some of the later pitchers are found in a finer version of Ssg, fabric SIBg. All the highly decorated pitchers are in this fabric, often with intricate slip designs — circles, lines, and dots incorporated into patterns over the top half of the vessel body — and a thick green/orange partial glaze. Most examples seem to be oxidised, although a hard, reduced, dark grey finish does occur. This later pitcher/jug horizon is noted at other sites dated on typological grounds to the 13th century (Moorhouse 1971–2, 93).

Jugs (Fig. 89, Nos 95–114; Fig. 90, Nos 115–36)

The jugs have been divided on the basis of decoration, glazing, rim type, and also the fineness and hardness of the fabric. The majority of the jugs occur in fine sandy fabrics of a light orange colour, the exception being SIw which is an orange/brown. The pitcher fabric SIBg is dominant in this group.

Type 1 (RJ): Rounded jugs (Fig. 89, Nos 95–102)
These are rilled-necked, round-bodied jugs with narrow, grooved strap handles. Diameter range is 90–100 mm, fabrics represented being SIW, IMS, and SIBg.

Type 2 (Gj): Glazed jugs (Fig. 89, Nos 103–5)
Rod-handled jugs with an all-over speckled green glaze. Only apparent in fabric LSMg.

Type 3 (Dj): Decorated jugs (Nos 106–14)
Copies of North French and Rouen type decoration: applied slipped strips with rouletted, rectangular detail, and red slip panels. Fabric types include both SIBg and IMS. Similar copies are found in London from the early 13th century (Vince 1985, 46).

Type 4 (Bj): Baluster jug (Fig. 90, Nos 115–23)
Long-necked, tall jugs with developed triangular-sectioned rims and a splayed foot. Splashed glaze, slipped lines, and patches are common in this form. Fabrics represented include SIBg, SIw, SIV (a very distinctive micaceous fabric), and IMS.

(DBj): Decorated baluster jugs (Fig. 90, Nos 124–7)
Short balusters with glazed and slip patterns, with the same rim and base types as type Bj (above), including vessels from Period 5 contexts on site W61A in fabric SIV.

(SGj): Slipped and glazed jugs (Fig. 90, Nos 128–36)
A baluster type with a distinctive style of decoration in fabric IMS – a white underslip with a speckled green glaze and impressed double ring and dot motifs on the body of the vessel and rod handles, known also from Newbury (Vince 1997, fabric N17; Hawkes 1997). It is possible that local potters were trying to compete with the arrival of Surrey type wares by disguising the vessel body with white slip.

4. Decoration Types

The variety of decoration types was recorded in detail by context and by phase, and the results of the comparisons of fabric, form and decoration (detailed quantification in archive) suggests some strong associations.

Incised and rouletted decoration is a recognisable element of the tripod pitcher finish in fabric SGg (Fig.

87, Nos 64, 65, 68, 71). The incised type of decoration is evident on examples from Gloucester (Bruce-Mitford 1940) and from Bristol (Barton 1963), which indicates a possible West Country influence. Combed detail can be observed on cooking pot types in fabric S and SL, (Fig. 85, Nos 26–8, Fig. 86, 33) which include the baggy-rimmed Type 5, and the large cooking pot Type 4. The occurrence of a few examples of scratch-marking is unusual, given the general distribution of this decorative technique to the south and west of Berkshire. However, the presence of a few sherds of fine glazed Laverstock-type ware has been noted, and it is possible that small quantities of coarse scratch-marked wares were arriving from the same source.

Slipped decoration is by far the most common finish evident on the pottery, and it is present on spouted pitchers, pitcher/jug types, and rounded jugs, the only differences being in the complexity of the design. A variety of slip line and band designs (Fig. 88, Nos 74, 76. 84–6) predominates in the tripod/spouted pitcher fabric Ssg, whilst more complex 'expanded' slip designs extending beyond the shoulder or neck detail are evident in SIBg. This increased vigour of decoration is accompanied by a gradual decrease in the use of glaze. A few examples of pitchers in SIBg demonstrate that some pitcher forms retain a extensive, thick yellow–green glazes (Fig. 88, Nos 93 and 94).

Vertical slip line designs, such as crosses and lines painted down from the pinched spout, occur on rounded jugs in fabrics SIBg and SIW. Slip designs on pinched lip and thumbed base jugs have been recognised as a 13th-century feature (Jope 1947). Slip line patterns appear on both the rounded jug and the pitcher/jug forms, suggesting a variety of jug types from the same production area. The provenance of fabric SIBg has not been resolved, although it is more than probable that Ssg is its precursor. The range of decoration types, however, does suggest a connection with the Camley Gardens kiln site at Maidenhead (Pike 1965).

Other types of design, such as the applied slip and rouletted strip detail commonly observed on northern French imports, is evident in fabrics SIBg, SIV, and IMS. Rouletted strip patterns are also noted as an Oxford feature, especially when the rouletting is square to the strip (Jope 1947). At Reading this type of decoration is found from Period 3 contexts onwards, but only as a minor element in the whole assemblage.

Complicated thumbed applied designs are evident in the Surrey-type fabrics, such as Sg, SMIg2, and LSMg. Other designs include impressed 'ring and dot' decoration, (Fig. 90, Nos 128 and 129), applied pellets (Fig. 90, Nos 131 and 132) and overlapping 'pine cone' effect decoration (Fig. 90, No. 133) in fabrics SIBg and IMS. These are combined with an underslip and flecked green glaze finish, and probably represent the highly decorated division of the local production, datable by comparison with the Oxford material to the late 13th or 14th centuries.

5. Ceramic Phasing

The pottery chronology for the waterfront sites depends on the long sequences from Abbey Wharf, principally trenches W12C and W61A. Trench W61B, the smaller sites W112, W140, W60B and C, and site W158 have been incorporated into this main series where possible. The dating is based on the internal evidence and by comparison with material from sites at Oxford (Haldon 1977; Mellor 1976; 1980), Newbury (Vince 1997; Hawkes 1997) and London (Pearce *et al.* 1985). The dating of the Hampshire/Surrey white wares derives from Holling (1971) and Pearce and Vince (1988).

Tables in archive give the various fabric types by site phase for each of the main sites. The general development of ceramic typology is described below, with a description of the more notable variations in the assemblages particularly apparent on the smaller sites such as W60, W112, and W158.

Period 1: Pre-Monastic (pre-c. 1120)

Only a small amount of material was consigned to this pre-monastic phase, although a wide date range is evident.

A semi-complete, finely burnished biconical bowl (Fig. 84, No. 1) was retrieved from an early context on site W61B. The vessel falls within the range of middle Iron Age bowls known from the Thames Valley, with a broad date range of 5th–3rd century BC (Cunliffe 1978, figs A:8, A:9). A sherd from a bowl, not the same vessel, with burnished, curvilinear decoration was retrieved from the same context (Fig. 84, No. 2). The micaceous flint-gritted fabric (FMb) is noted as unusual in the Thames Valley area (Lambrick 1984), although similar fabric and vessel forms are available from Aldermaston Wharf, to the south-west of Reading (Cowell *et al.* 1978).

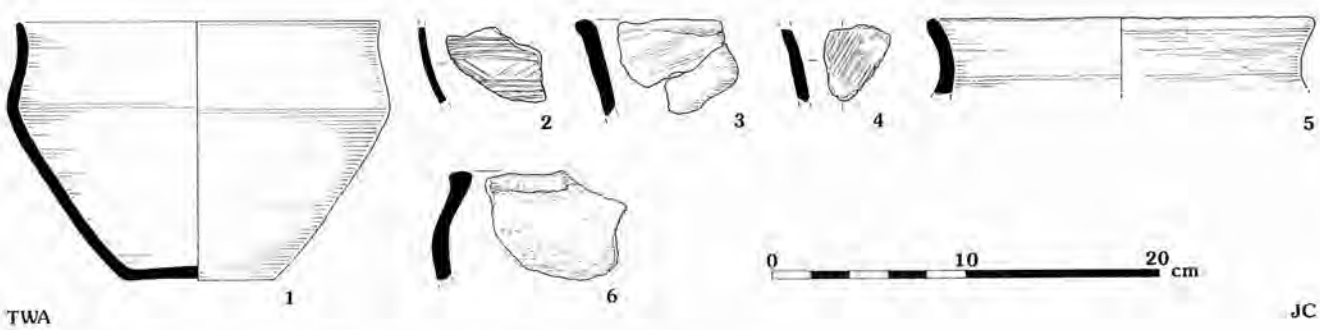


Figure 84 Iron Age and Saxon pottery Nos 1–6. Scale 1:4

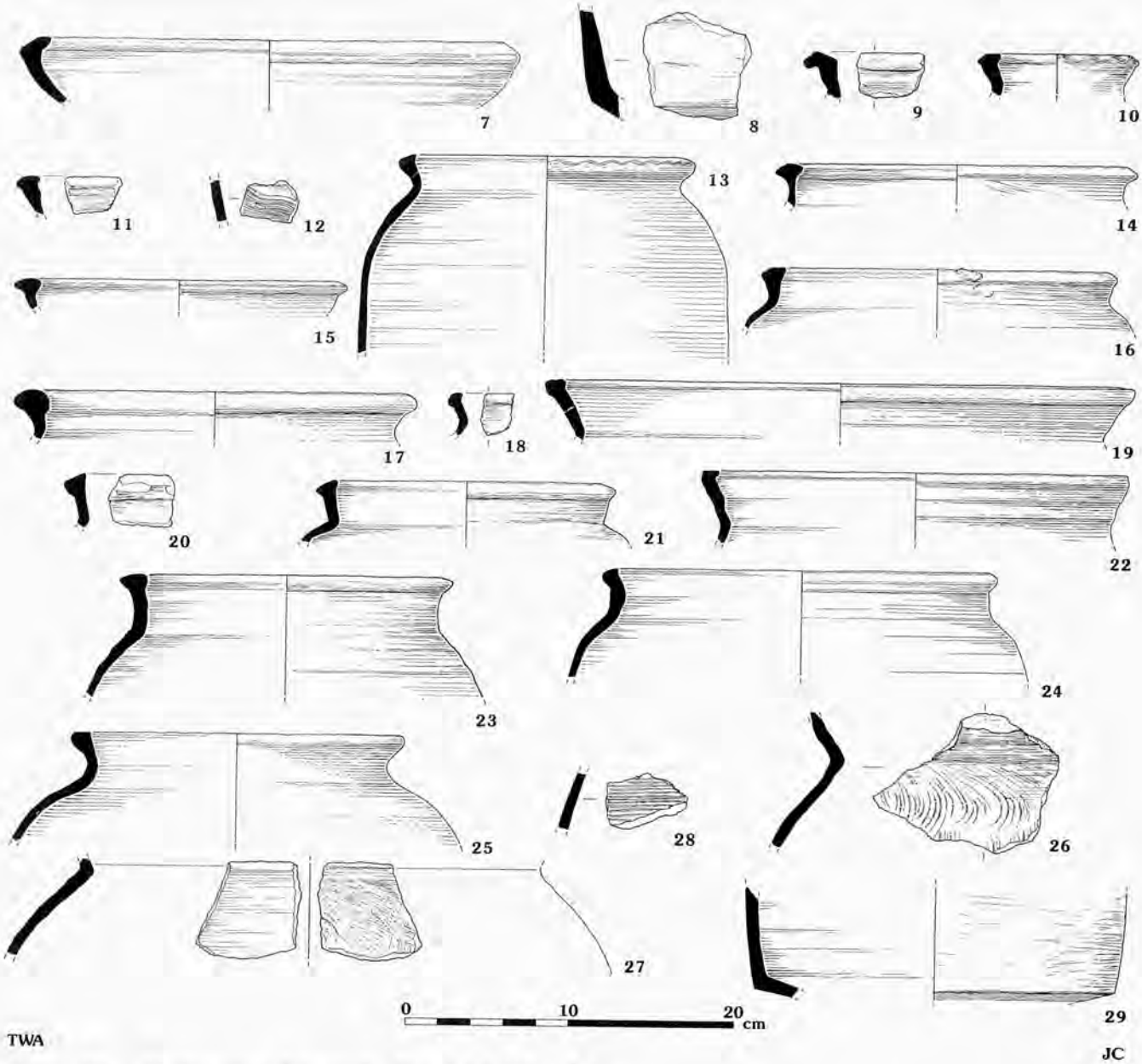


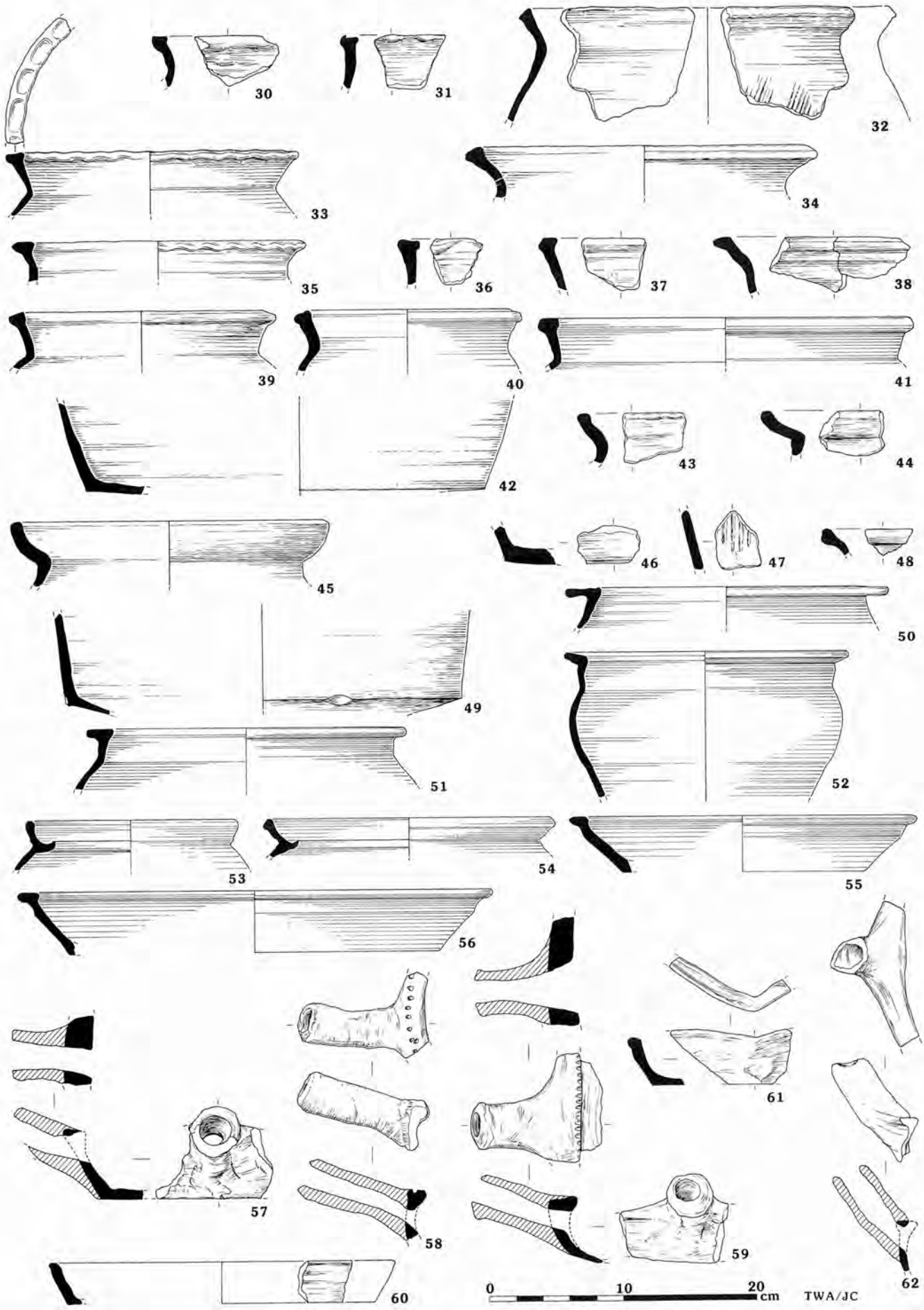
Figure 85 Medieval cooking pots, Nos 7–29. Scale 1:4

Other early fabrics are mostly sandy and micaceous organic-tempered mid Saxon wares (fabrics CS and CM respectively, Fig. 84, Nos 5, 6) restricted in the most part to Phase 1b/2 contexts from W112 Crane Wharf. Sherds in similar fabric types have been recorded before in Reading (Slade 1975/6) and are comparable with other material from the middle Thames region (Berisford in Brodribb *et al.* 1972; Brown 1972). Very small quantities of other residual material can be attributed to the Iron Age (Fig. 84, Nos 3, 4) and the Roman period.

Period 2 (mid–late 12th–early 13th century)

Sandy cooking pot fabrics S and SL dominated these assemblages, although there was also a small proportion of flint- and Limestone-gritted fabrics (FL and LFS). The larger cooking pot types comparable to examples at Newbury (Fig. 85, Nos 22, 23) are probably mid–late 12th century (Vince 1997), and the presence of West Country style incised and combed patterns (Fig. 85, Nos 26, 27) as at Exeter (Allan 1984) can be limited to 12th-century forms. Tripod pitchers as found at Oxford and Gloucester and other west England types (Bruce-Mitford 1940) in fabric SGg at Reading (Fig. 87, Nos 63–72) could also be linked with the cooking pots in style and date range. Tripod pitchers at Oxford are known to date back to the early 12th century and continue into the 13th. Plain, rilled-neck jugs also appear in Period 2 (as at Newbury) but do not become numerous until Period 3. Slip decorated pitchers do not appear until late 12th- or 13th-century contexts.

Figure 86 (opposite) Medieval cooking pots (Nos 30–54); bowls (Nos 55, 56), and skillets / pans (Nos 57–62). Scale 1:4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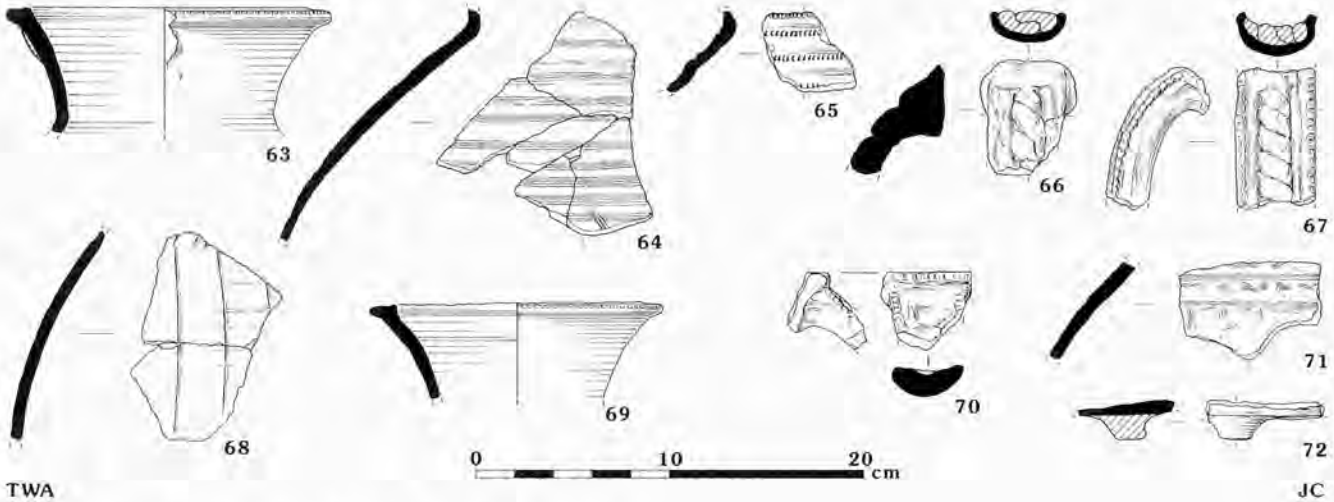

Figure 87 Tripod pitchers, Nos 63–72. Scale 1:4

Period 3 (mid 13th–early 14th century)

Pitcher types in both fabrics Ssg and SGg dominate. Sandy fabric S is now combined with finer more well-sorted fabrics SI and SM in the form of well finished cooking pots with wiped, long-necked rims (Fig. 86, Nos 33, 35) and also as everted-rim cooking pots with extensive burning on the exterior surfaces (Fig. 86, Nos 48, 49). Towards the end of Period 3, fabric Ssg becomes harder in texture with more developed slip decoration. Developing from this are the highly decorated pitcher forms with jug type rims in the well sorted sandy fabric SIBg in Period 3/4 (*see below*). Fabric SIBg was also used in the manufacture of rilled-neck, rounded jugs with a simple, single painted slip, linear design dated to the late 13th century. Rilled-neck jugs do occur in fabric SIw mostly in Period 3, but do also occur in Period 2 on site W12C.

Period 3/4 (latest 13th or early 14th century)

Some contexts not directly related to structural changes between Periods 3 and 4 can be suggested on the basis of the pottery evidence to occupy a transitional phase containing highly-decorated pitchers in an increasing variety of designs (Fig. 88, Nos 92, 93), ranging from slipped circles in between diagonal lines to slip dots in bands combined with a thick golden/green glaze. The majority of slipped jugs evident in W112 and W60 are of this type and period. Although this form does continue into Period 4 it is present in lesser quantities.

Jugs copying Rouen or north French types, in fabrics IMS and SIV (Fig. 89, No. 107), are considered to date from the early 13th century in London, and may be considered to be residual in this phase. They occur together with baluster jugs with white underslip, speckled green glaze, and 'ring and dot' decoration akin to an Aardenburg-type finish (R.G. Thomson, pers. comm.; Fig. 90, Nos 128, 129). The type is paralleled at sites at Newbury (Vince 1997, Hawkes 1997). Decorated jugs in a gritty sandy white ware (LSMg) with an all-over dark mottled green glaze also appear in this phase, but do not figure largely in the whole assemblage. It is likely that these jugs derive from the Surrey area and, following comparable examples in London, could be described as Kingston-type ware (Pearce and Vince 1988). A very highly-decorated example of this type of jug was found at W158 Bridge Street East (Fig. 89, No. 105).

Period 4 (14th century)

A small proportion of the Limestone-tempered fabric LSF persists into the 14th century, accompanying the more fancy jugs. The forms are rolled-rim, long-necked pitchers with wide, thumbed strap handles. Fabric LSF seems to have been a very long-lived, durable fabric, in common with chalk- or limestone-tempered fabrics in Oxford and Newbury (Mellor 1976; Vince 1997).

Glazed and partially-glazed jugs are the most common forms in this phase, usually in fabric SIV, which is closely related to Oxford Late Sandy wares (AM) in date range if not so closely in texture. Some distinctive surface treatments occur, with white slip under a mottled glaze being one common example. The jugs are usually finished in a rough orange/brown copper glaze. Any conclusions as to size of the jugs depends on the portion that survives and the measured diameters of the rims and bases; the decorated baluster jugs have been assumed to be of the squat type based on the small diameter of rims and bases, whereas the large, splayed bases (Fig. 90, No. 116) are linked with the tall, long-necked forms which appear to extend into the 15th century. There are no examples of cooking wares evident in the sandy orange fabrics used in the manufacture of the jugs evident at W61A, although some tripod pitcher examples do occur in fabrics IMS and ILS, an oddity already noted elsewhere in Reading and in north Hampshire, from where the fabric is assumed to have derived (Moorhouse 1971–2, 93). On site W12C the kitchen element is supplied by Coarse Border ware. The sequence of sandy fabrics being gradually replaced by

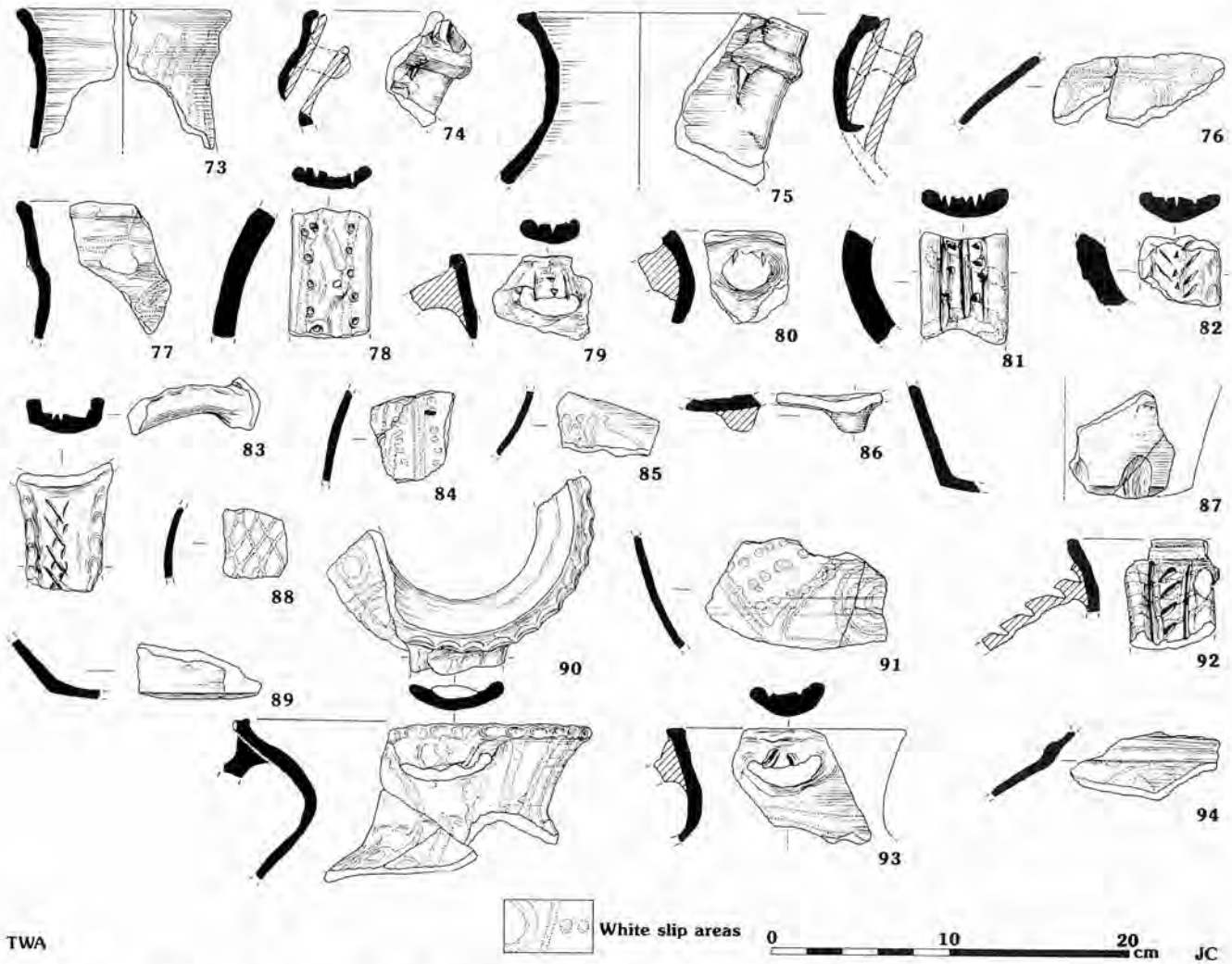

Figure 88 Spouted pitchers (Nos 73–89) and slipped pitchers/jugs (Nos 90–4). Scale 1:4

Surrey wares in the late 14th century is echoed at Newbury.

Period 5 (latest 14th–early 16th century)

The continued use of balusters into the 15th century is very apparent at Reading, the only discernible difference in the later vessels being the extent of glazing reduced to faint dribbled lines and a poorly-applied off-white slip. The fabric appears to be less highly-fired with a high iron content: lower firing temperatures may be required to allow for a greater amount of shrinkage in iron-rich clays. The use of balusters into the 15th century is paralleled at the Barbican Ditch, Oxford (Mellor 1976).

On W12C the assemblage is dominated by Coarse Border ware, a combination of fabrics SMIg, SMg2, and SMIg2, which probably represent different production centres within this group (Fig. 91, Nos 141–6). There is a sequence of the introduction of the wares with SMIg first appearing in the 14th century with SMg2 and SMIg2 in the 15th. Smg2 and SMIg2 comprise the fine end of the market with long-necked jugs with pinched-lip spouts together with bifid cooking pots (SMg2) and glazed counterparts in fabric SMIg2. Coarse Border ware is dated from the early 14th–mid 15th century (Pearce and Vince 1988).

Mid–late 15th-century wares include Cheam type white and red wares (respectively fabrics VBg and Bw). Vessels include white-ware dishes and pots with lid seating and examples of lids in fabric VBg. Similar types have been recovered at Oxford (Jope 1949). The red wares are represented by jugs, round-base cooking pots, and small, handled dishes and costrels (Fig. 91, Nos 157–9). These red wares extend into Period 6.

Period 6 (mid 16th and 17th century)

Some of the Hampshire/Surrey wares are still present in this period, but other finer white Surrey wares such as Tudor Green and a buff Surrey type (BEW) are introduced. Small quantities of Raeren, Frechen, and Siegburg stonewares are present in both Period 5 and 6 contexts at least in site W12C (Fig. 91, Nos 165–8). A good selection of post-medieval Surrey White wares from W158 containing chamber pots, handled cooking

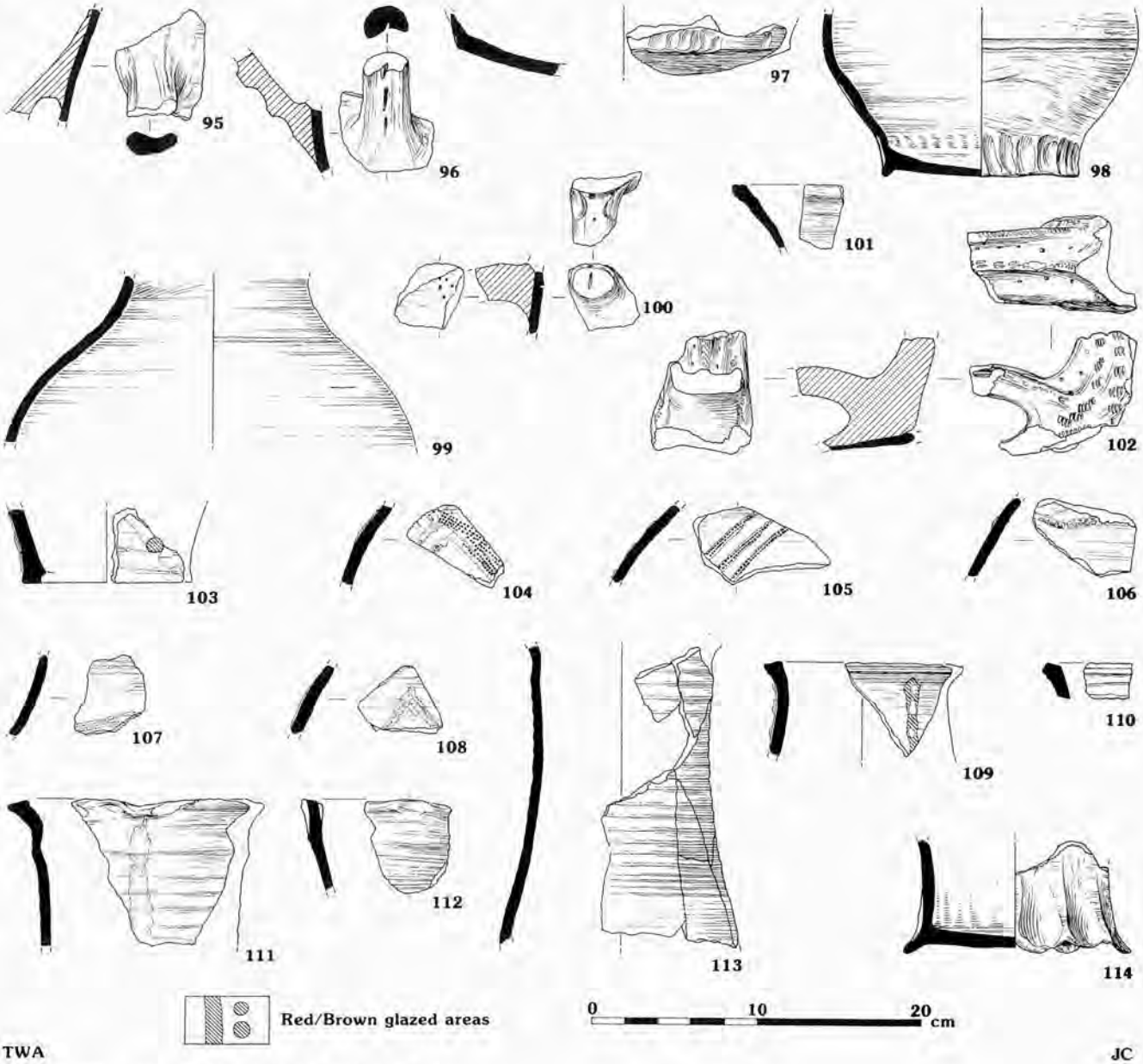

Figure 89 Jugs, Nos 95–114. Scale 1:4

pots with tripod feet, and large shallow pans illustrates some of the range available (Fig. 91, Nos 154–6), but these wares are poorly represented on other sites where immediately post-Dissolution contexts are rare.

Period 7 (early 18th–19th century)

Red wares (Bw) and the buff earthenwares of Surrey extraction (BEW) are represented by pipkins, flanged jars, and dishes. Local red earthenwares include slipwares, some possibly from further afield from centres such as Graffham, Sussex, or Potterspury, Northamptonshire, and more local wares, probably from Inkpen, four miles north of Newbury (Vince 1997). Large open forms, some with a very distinctive double-frilled rim noted as a characteristic of the late Surrey kilns (Holling 1971, 74), are also found. The range of fabrics and forms is expanded during this phase with Staffordshire-type slipwares (STAFFS), mottled brown-glazed wares of probable Staffordshire extraction (Sk; Fig. 91, Nos 163, 164), and tin-glazed wares (TNG). The latter wares comprise mainly drug jars with painted purple and blue lines and are of Lambeth type, for which a date range of 1680–1740 would be expected (Bloice 1971).

Phase 8 material is poorly represented at W12C and W61A, and few conclusions may be drawn from the material. The dominance of red earthenwares as large dishes, creaming pans and bushel pans with either a yellow/brown or orange/brown internal glaze is very pronounced. Lidded jars are also found, but the glazing on most of the jar forms seems to be a streaky green. Brown wares (fabrics Ik, Sk, and Xk2) are present in small quantity in the form of pancheons and bowls. Tin-glazed wares and buff earthenwares are still present in small quantity along with small amounts of porcelain.

There is a large increase in different wares in this period of Abbey Wharf Phase 9 and comparable phases elsewhere, ranging from late 18th-century factory-produced wares such as creamware and pearlware, to mid 18th-century white salt-glazed ware and red basalt ware. Red earthenwares still provide the large kitchenware forms, closely matched by the creamware 'domestic' vessels. The obvious transition towards a higher proportion of factory-produced traded wares is masked by the excavation and collection policies on site which have under-represented the later post-medieval and modern wares in the collections.

6. Taphonomy and Site Formation

A combination of methods was utilised in order to ascertain the deposition processes on all the waterfront sites, to clarify the dating mechanisms provided by the pottery, and to determine how far the pots may be deemed to date a particular construction such as a reclamation.

The pottery dating is dependent on two factors: the length of time a pot was in use and the length of time the sherds may have spent in a primary rubbish deposit before being removed to their recorded position as infill for a reclamation or channel. The size and break of sherds in most cases intimates that the interval between breakage and final deposition may have been short because a large number of sherds are fairly large with clear breaks that do not show much sign of wear.

The use of ceramic and other debris for the 'make-up' of riverbanks and wharf sites is well documented; accounts for building works reveal that wasters and other material were ordered especially for construction purposes, as at Luton, where the Trinity Guild paid for a load of 'tyle sherdes' for levelling up the underpinning of a wharf foundation (Murray *et al.* 1933). Quantities at Reading are too small for this to provide an explanation for the incorporation of finds within reclamation dumps.

Percentages of the total weight of a fabric by phase in a particular context type were calculated in order to see if any one fabric and/or vessel type was limited by type of context. The average sherd size (weight divided by number of sherds in any one fabric) for each phase and context type was calculated with the aim of discovering the degree of wear for material in reclamations, channels and 'others', including dumps and layers (details in archive).

Average sherd size figures indicate that the sherd sizes in the channels tend to be smaller than in the other types of context, and the variety of material of differing periods should indicate the gradual silting up of the channels; for example, in the Phase 2 channel contexts on W61A early material such as the flint-gritted cooking pot fabrics are evident along with other later baluster fabrics showing that the channel infilling could continue into the late 14th century.

There is consequently no evidence to suggest a greater degree of abrasion and breakage of pottery from the reclamation contexts which might suggest that it is derived from a rubbish deposit elsewhere, and, in view of the small quantities involved, it is not possible advance any argument in favour of the material incorporated within the reclamation being anything other than casual loss.

Fig. 84: Iron Age and Saxon

Note: For pottery from the Abbey Wharf sites, featured sherds are uniquely referenced by Featured Sherd Number (FSN) except where they were assigned small find (SF) numbers on site.

1. Period 1/W61B/1a/2131/SF1261a. Angular bowl, lightly burnished int. and ext. Iron Age. Fabric FMb.
2. 1/W61B/1a/2131/SF1261b. Decorated sherd. Iron Age. Fabric FMb.
3. 3/W61B/3/2127/FSN236. Rim, wiped int. and ext. Iron Age. Fabric SMy.
4. 3/W61B/3/2127/FSN237. Combed body sherd. Date uncertain. Fabric SFy.
5. 1/W112/2/116/SF44. Necked jar rim. Middle Saxon. Fabric CM.
6. 7/W12C/7a/375. Angular bowl. Middle Saxon. Fabric CS.

Fig. 85: Medieval cooking pots

7. 3/W12C/3b/956. CP1 or bowl. Handmade (?coil-built). Fabric FL.
8. 3/W12C/3a/906/FSN173 and 174. CP1. Fabric FLS.
9. 2/W12C/2b/983/FSN121. CP2. Burnt patches on ext. Fabric FLS.
10. us/W135/us/285. CP2. Thumbing on ext. edge. Fabric FL.
11. 4/W61A/4/1030/FSN376. CP2 Short rim, thickened on ext., wiped int. and ext. Fabric FLS.
12. 7/W112/4/102/FSN3. CP2, decorated combed body sherd. Fabric FL.
13. 2/W61A/2/1152. CP2. Externally thickened rim, body smoothed with burnt patches on ext. Fabric FL.
14. 3–4/W61A/3–4/1222/FSN328. CP3. Fabric LSF.
15. 3/W12C/3a/863/FSN94. CP3. Fabric LSF.
16. 2/W12C/2b/983. CP3. Fabric LSF.
17. 2/W12C/2b/929/FSN77. CP3. Fabric LSF.
18. 4/W12C/4/856/FSN146. CP3. Fabric LSF.
19. 2/W12C/2b/1350/FSN90. CP4. Fabric SL.
20. us/W135/us/510. CP4. Fabric SL.
21. us/W135/us/558. CP4. Fabric SL.
22. 2/W158/2d/2425. CP4. Wheelthrown or finished. Fabric SL.
23. 2/W61A/2/1152/FSN317. CP4. Fabric FL.
24. 6/W158/3e/2361. CP4. Oxidised. Fabric FL.
25. us/W135/us/751. CP4. Fabric SL.
26. 5/W61A/5/1186/FSN374. CP4. Combed body decoration. Fabric SL.
27. 2/W12C/2b/993/FSN86. CP4 .Shallow combed decoration. Fabric SL.
28. 2/W12C/2b/993/FSN87. CP4. Horizontal combed decoration. Fabric SL.
29. 3/W61B/3/2127/FSN30. CP4. Finely wiped. Fabric FL.

Fig. 86: Medieval cooking pots

30. 3/W61B/3/2127/FSN222. CP5. Thumb-impressed on rim top, burnt patches on ext. Fabric S.
31. 3/W61B/3/2127/FSN225. CP5. Heavily wiped int. and ext. Fabric S.
32. 3/W61B/3/2127/FSN224. CP5. Finger impressions on ext. edge. Fabric S.
33. 3/W61B/3/2127. CP5. Wheelthrown rim with combed body decoration. Fabric S.
34. 2/W12C/2b/1350/FSN91. CP5. Wheelthrown. Fabric SI.
35. 3/W61B/3/2118/FSN212. CP5. Large thumb/finger impressions on ext. edge. Fabric SI.

Figure 90 Jugs: Type 4 (Nos 115–23), decorated baluster (Nos 124–7), all-over-slipped and decorated (Nos 128–36). Scale 1:4

36. us/W135/us/526. CP5. Thumb impressions on top surface. Fabric SI.
37. 3/W61B/3/2058/FSN238. CP5. Fabric SI.
38. us/W135/us/764. CP5. Wheelthrown. Fabric SI.
39. 1/W61B/1/2129/FSN201. CP5. Wheelthrown. Regarded as intrusive in disturbed context. Fabric SM.
40. 3/W12C/3a/1025/FSN114. CP5. Wheelthrown with grooved top to rim. Fabric SM.
41. 4/W12C/4/1048/FSN156. CP5. Burnt patches on neck. Fabric SM.
42. 2/W12C/2b/1075/FSN74. CP5. Burnt patches on ext. Fabric SM.
43. 3/W61B/3/2118/FSN209. CP6. Heavily-wiped ext. Fabric S.
44. 3/W61B/3/2127/FSN226. CP6. Fabric S.
45. 2/W61A/2/1151/FSN310. CP6. Burnt patches on int. and ext. shoulder. Fabric S.
46. 2/W61A/2/1128/FSN302. CP6. Handmade with semi-oxidised/reduced ext. Fabric S.
47. 2/W61B/2/2114. CP6. Deeply incised or combed. Fabric S.
48. 2/W12C/2b/983/FSN65. CP7. Fabric SM.
49. 2/W12C/2b/1075/FSN73. CP7. Burnt int. and burnt patches on ext. Fabric SM.
50. 4/W12C/4/757/FSN162. CP8. Splashed-glaze on ext. Fabric SMIg.
51. 6/W61A/6/1034. CP8. Splashed-glaze under rim. Fabric SMIg.
52. 5/W12C/5/740. CP8. Burnt ext, especially rim and neck. Fabric SMg2.
53. 6/W12C/6/361/FSN195. CP9. Splashed-glaze and burnt patches on ext. Fabric SMg2.
54. 6/W12C/6/748/FSN185. CP9. Remnants of int. light yellow/ green glaze. Burnt patches on ext. Fabric SMg2.

Bowls / Dishes; Skillets / Pans
55. 6/W158/3e/2137. Shallow bowl, partially glazed int., burnt patches on ext. Fabric SGg.
56. 7/W158/4a/2510. Shallow bowl, partially glazed int. Fabric S.
57. 7/W158/4a/2069. Hollow skillet handle. Traces of glaze int. Fabric LSF.
58. 2/W12C/2b/936. Hollow skillet handle with 'punched dot' decoration on flattened rim top. Splashed-glaze on int. Fabric SGg.
59. 2/W12C/2a/1078/FSN56. Hollow skillet handle. Rouletted triangular notches on in-turned rim top. Splashed-glaze int. Fabric Ssg.
60. 2/W12C/2b/929/FSN125. Simple flat-topped pan or dish. ?Knife trimmed, handmade. Glazed int. Fabric Ssg.
61. 3/W12C/3a/909/FSN108. Pinched pouring lip. Splashed-glaze int. Fabric Ssg.
62. 4/W12C/4/757/FSN164. Hollow skillet handle. Splashed light-green glaze. Fabric SMIg.

Fig. 87: Tripod pitchers
63. us/W60C/us/811. Fabric SGg.
64. 3/W61B/3/2127/FSN233. Fabric SGg.
65. 1/W12C/1b/978/FSN51. Fabric SGg.
66. 4/W112/3/102/FSN4. 'Plaited' strap handle. Fabric SGg.
67. 3–4/W61A/3–4/1222/FSN385. Strap handle. Fabric SGg.
68. 3/W12C/3a/909/FSN173. Fabric SGg.
69. 3/W61B/3/2058/FSN248. Fabric SGg.
70. 7/W112/4/47/FSN20. Rim and strap handle, rouletting and applied detail on handle. Fabric SGg.
71. us/W112/us/12. Fabric SGg.
72. 2/W61B/2/2115/FSN207. Tripod foot. Fabric SGg.

Fig. 88: Spouted pitcher — slipped
73. 2/W12C/2b/1042. Fabric Ssg.
74. 3–4/W61A/3–4/1222. Fabric Ssg.
75. 3/W12C/3a/864/FSN95. Fabric Ssg.
76. 2/W12C/2b/983/FSN62. Fabric Ssg.
77. 2/W12C/2b/1075/FSN71. Fabric Ssg.
78. 4/W61A/4/1095/FSN438. Pitcher handle. Fabric Ssg.
79. 3/W12C/3b/984/FSN126. Fabric Ssg.
80. 3/W12C/3b/980/FSN120. Slip line visible beneath handle. Fabric Ssg.
81. 3/W61A/3/1176/FSN373. Fabric Ssg.
82. 3/W61A/3/1196/FSN338. Wide strap handle. Fabric Ssg.
83. 2/W61A/2/1174/FSN344. Wide strap handle. Fabric Ssg.
84. 1/W12C/1b/978/FSN50. Green/orange glaze over slip. Intrusive in disturbed context. Fabric Ssg.
85. 2/W12C/2b/983. Orange/green glaze over slip. Fabric Ssg.
86. 2/W12C/2b/983/FSN63. Orange glaze over slip. Fabric Ssg.
87. 2/W61A/3/1171/FSN368. Tripod foot. Fabric Ssg.
88. 2/W12C/2a/1078/FSN57. Two conjoining pieces. Fabric Ssg.
89. 3–4/W61A/3–4/1226/FSN352. Fabric Ssg.

Slipped pitchers / jugs
90. 3/W61A/3/1171/FSN369. Fabric SIBg.
91. 2/W61A/2/1152. ?Wheelthrown. Fabric SIBg.
92. 3–4/W61A/3–4/1222. Handmade. Fabric SIBg.
93. 3–4/W61A/3–4/1215/FSN356. Handmade. Fabric SIBg.
94. 4/W61A/4/1166/FSN363. Two sherds. Fabric SIBg.

Fig. 89: Jugs
95. 3–4/W61A/3–4/1213/FSN340. Type 1. Fabric SIBg.
96. 3–4/W61A/3–4/1222/FSN331. Handle. Fabric SIw.
97. 4/W158/2f/2401. Type 1. Fabric SIw.
98. 5/W61A/5/1100/FSN462. Type 1. Fabric SIw.
99. us/W60C/us/811. Type 1. Fabric IMS.
100. 3–4/W61A/3–4/1222/FSN333. Rod handle to Type 2. Fabric LSMg.
101. 5/W61A/5/1164/FSN388. Type 2. Fabric LSMg.
102. 6/W158/3e/2137. Type 2. Fabric LSMg.
103. 6/W158/3e/2137. Type 3. Fabric SIBg.
104. us/W60C/us/806/FSN514. Type 3, copy of N. French/Rouen type. Fabric SIV.
105. us/W60C/us/807/FSN524. Type 3. Fabric SIV.
106. 7/W112/4/32/FSN26. Type 3. Fabric IMS.
107. us/W60C/us/801. Type 3. Fabric IMS.
108. us/W135/us/751. Type 3. Fabric SIBg.
109. us/W12C/us/501/FSN161. Type 3. Fabric SIV.
110. 5/W61A/5/1117/FSN488. Type 3. Fabric IMg.
111. 3/W61A/3/1129. Type 4. Fabric SIBg.
112. 5/W61A/5/1100/FSN382. Type 4. Fabric SIBg.
113. 3–4/W61A/3–4/1222. Type 4. Fabric SIw.
114. 3–4/W61A/3–4/1222/FSN319. Type 4. Fabric SIw.

Fig. 90: Jugs
115. 5/W61A/5/1115. Type 4. Fabric SIV.
116. 5/W61A/5/1187/FSN401. Type 4, wheelthrown. Fabric SIV.
117. 5/W61A/5/1189/FSN395. Type 4. Fabric SIV.
118. 5/W61A/5/1100/FSN371. Type 4. Fabric SIV.
119. 5/W61A/5/1189/FSN473. Type 4. Fabric SIV.
120. 5/W61A/5/1187. Type 4. Fabric SIV.
121. 5/W61A/5/1187. Type 4. Fabric IMS.
122. 5/W61A/5/1187/FSN391. Type 4. Fabric IMS.
123. 4/W61A/4/1162/FSN360. Type 4. Fabric IMS.

Decorated baluster jugs
124. 5/W61A/5/1187/FSN401. Fabric SIV.
125. 5/W61A/5/1186/FSN457. Fabric SIV.

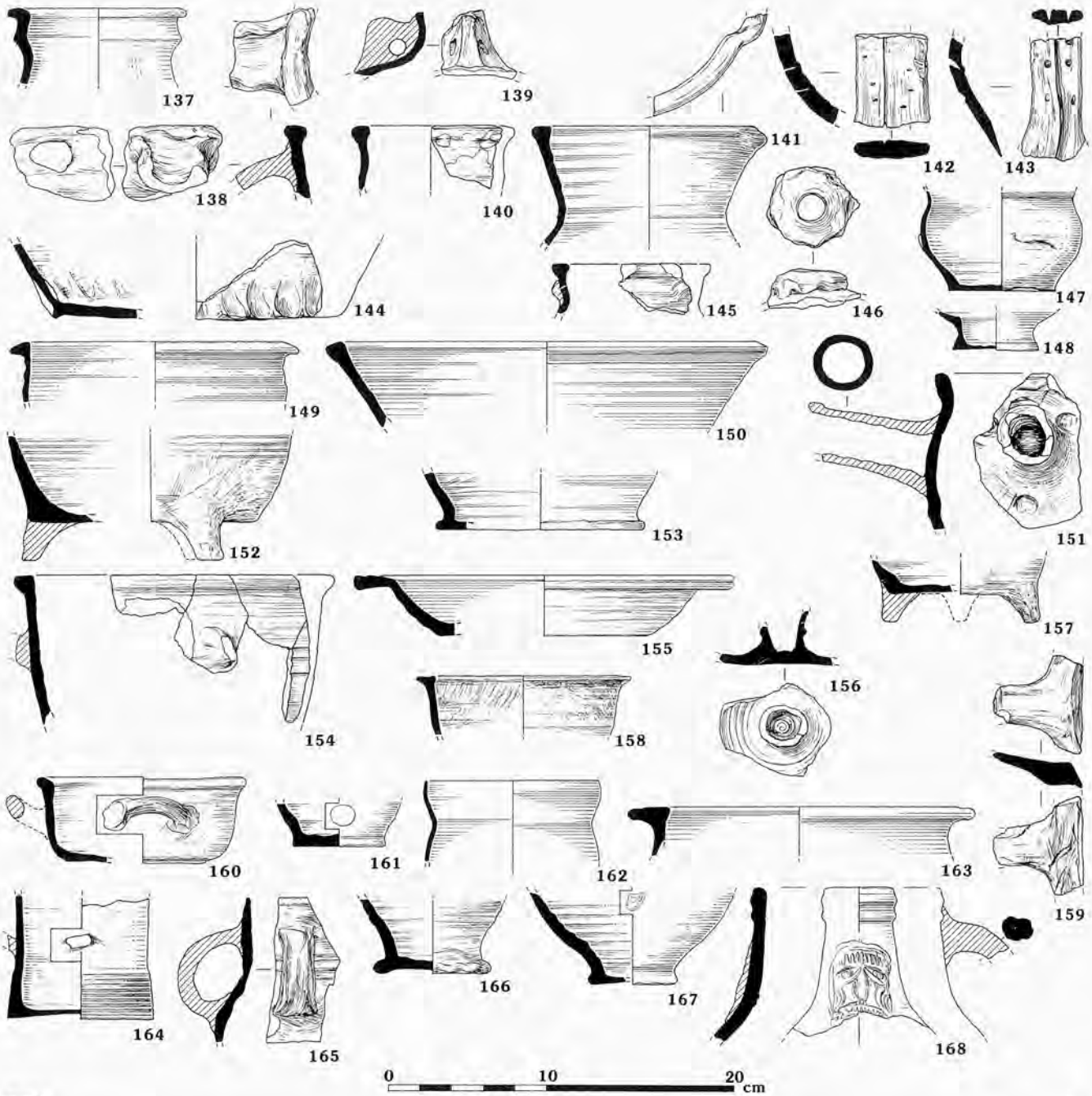

Figure 91 miscellaneous pottery vessels (Nos 137–9), Coarse Border ware pitchers/jugs (Nos 140–6), Post-medieval vessels (Nos 147–68). Scale 1:4

126. 5/W61A/5/1187. Fabric SIV.
127. 5/W61A/5/1187/FSN452. Fabric IMS.

All-over-slipped and decorated jugs
128. 5/W61A/5/1115. Fabric IMS.
129. 5/W61A/5/1115. Fabric IMS.
130. 3/W61A/3/1196/FSN346. Fabric SIBg.
131. 3/W61A/3/1196. Fabric SIBg.
132. 3/W61A/3/1170/FSN483. Fabric IMS.
133. 7/W158/4c/2069. Fabric SIBg.
134. 4/W61A/4/1111/FSN358. Fabric ILS.
135. 4/W12C/4/758. Fabric IMS.
136. 5/W61A/5/1115. Fabric IMS.

Fig. 91: Other vessels
137. 4–5/W61B/4–5/2135/FSN244. Pitcher with flat-topped rim and cordoned neck. Fabric LSF.
138. 5/W12C/5/934. Pitcher or jug with wide strap handle. Fabric LSF.
139. 7/W12C/7a/215/FSN196. Barrel costrel handle. ?Cheam type. Fabric Bw.

Coarse Border ware pitchers/jugs
140. 3/W12C/3e/912/FSN152. Fabric Sg.
141. 5/W12C/5/995. Fabric SMg2.
142. 5/W12C/5/358/FSN180. Fabric SMIg.
143. 4/W12C/4/856/FSN145. Fabric SMIg.

144. 5/W61A/5/1100/FSN370. Fabric SMIg.
145. 4/W12C/4/890/FSN150. Fabric SMIg.
146. 7/W12C/7a/364. Fabric SMIg2.

Post-medieval
147. 6/W61A/6/1096/FSN449. Tudor Green ?Two-handled cup, int. green glaze. Fabric SXwg.
148. 5/W12C/5/934. Int. green glaze. Fabric SXwg.
149. 6/W158/3d/2092. Int. green glaze. Fabric SXwg.
150. 6/W158/3g/2030. Int. green glaze. Fabric SXwg.
151. 7/W61A/9/1079. ?Ash/Farnborough, int. yellow glaze. Fabric BEW.
152. 7/W61A/9/1019. Int. yellow glaze. Fabric BEW.
153. 7/W61A/9/1010. Int. yellow glaze. Fabric BEW.
154. 6/W158/3d/2092. Ext. yellow–green splashed-glaze, int. thick yellow-green glaze. Fabric BEW.
155. 6/W158/3c/2335. Int. yellow glaze. Fabric BEW.
156. 7/W158/4b/2060. Fabric BEW.
157. 7/W12C/7a/355. Int. oxidised orange to orange–brown glaze. Fabric Bw.
158. 6/W12C/6/359/FSN187. Fabric Bw.
159. 5/W12C/5/732/FSN181. Fabric Bw.
160. 7/W12C/7b/268. Int. thick green to olive-green glaze. Fabric Xk.
161. 7/W12C/7a/396. Slipware posset. Fabric Bw.
162. 6/W12C/6/392. Rim to No. 161. Fabric Bw.
163. 7/W61A/7/1080. Brown ware ?butter pot. Fabric Sk.
164. 7/W61A/8/1081. Brown ware tankard. Fabric Sk.
165. 7/W12C/7a/823. Raeren stoneware mug. Fabric Bf6.
166. 4/W12C/4/356. Raeren stoneware drinking jug. Fabric Bf6.
167. 5/W12C/5/715. Frechen-type bellarmine base. Fabric SBf.
168. 7/W12C/7a/391. Frechen bellarmine. Fabric Bf10.

10. Other Finds

by J.M. Mills

1. Introduction

The major categories of finds (leather, animal bone, and pottery) have been considered at some length both because of their intrinsic interest, and because of their importance for understanding site formation and function, trade, and industry. The other categories are in general less helpful in advancing the principal themes, and are seldom present in useful quantities in closely datable contexts. As a consequence, presentation here is in summary form only, with more detailed levels of analysis confined to archive.

Distinction is made between those 'major' sites where at least some internal phasing could be constructed, and where controlled excavation methods should have ensured reasonably consistent retrieval for phases as late as Period 6 (post-medieval), and other sites where it is likely that the limitations of evaluation or watching-brief work will have led to uncertain and incomplete recovery. The first category of sites comprises the Abbey Wharf (W12 and W61), Crane Wharf (W112), and the main Bridge Street East (W158) excavations; the waterfront trenches from the Library site (W60B and C) also fall within this group, despite the small quantities of finds recovered.

Excavation of Period 7 (early modern) contexts has been less uniform and (often) less rigorous on all of the sites. Even where there has been extensive investigation of early modern contexts (eg at Abbey Wharf and Bridge Street East) this has been undertaken selectively; an unquantified but inevitably large proportion of these deposits will have been removed by machine, and excavation will have concentrated on the rapid recovery of structural evidence at the expense of the recovery of finds. Assemblages from this period must therefore be considered biased and incomplete, and comparisons between sites to be largely invalid. Finds of this period have not been considered in detail or selected for illustration unless of particular intrinsic merit.

The sites other than at Abbey Wharf and Bridge Street East are of limited scale and may be less securely phased. Finds from these sites are grouped in the tables under the heading 'Other sites'; quantification by individual site and context is available in archive.

An attempt has been made to provide a consistent level of information within the text and within the supporting archives. Each finds' table in text gives quantification by period, with quantification by site phase (for bulk-recorded finds categories) or by phase and context in archive. Details of finds from the 1979 Abbey Wharf evaluation are in archive only.

Each find type section contains the criteria for selection for illustration, and any necessary observations on retrieval or analysis. Irrespective of site and period, all illustrated objects are referenced to context and special find number where appropriate.

In the catalogue below, the code at the beginning of each entry denotes the following: Period/Site code/Phase/Context/Special find number.

2. Coins and Tokens, by J.M. Mills with B.J. Cook and D.M. Metcalf

Comparatively few coins and tokens were recovered. Except for one coin from Reading Library (W60A), all are from the Abbey Wharf sites (W12C, W61A, W61B). Full details are contained in archive.

All ten coins from stratified contexts are of 18th century or later date; there are two other, earlier coins (a William I half-penny, and a penny of Edward IV minted between 1476 and 1480), both from unstratified contexts.

Only three of the eight tokens can be dated, and the earliest of these (from a Period 6 context) was issued in the 15th or 16th century. The remainder are from Period 7 contexts or were unstratified.

3. Metalwork

Gold and Gold-Plated Objects

Nos 1 and 2 are too fragmentary to warrant illustration, and No. 3 is probably modern.

1. 6/W12C/6/392/SF478. Two small fragments of gold sheet, rolled into tube-shape.
2. 5/W61A/5/1098/SF310. Gold-plated copper finger ring, 19mm diam., 3mm wide.
3. 7/W61A/9/1014/SF35. Gold-plated copper alloy (?ear-) ring).

Copper Alloy Objects

Large numbers of copper alloy objects were recovered, the overwhelming majority from the Abbey Wharf sites, and more than 50% of these comprise pins from Period 7 contexts. The objects are listed by type and period in Table 18. The copper alloy from all sites, in particular the Abbey Wharf waterlogged contexts, was generally found in very good condition. Little chronic corrosion is evident, most objects retaining a 'brassy' yellow surface colour. In addition to more detailed identification, dimensions, X-rays, and laboratory reports, the archive includes metrical analysis of the pins. Only the illustrated items are described here.

Fig. 92

1. 7/W61B/7–8/2110/SF1104. Clasp/lock or binding plates. Two sheets 29 x 21 mm, originally riveted in each corner.

Table 18: copper alloy objects by Period, all sites

	1	*2*	*3*	*4*	*5*	*6*	*7*	*U/S*	*Total*
Needles	–	–	–	–	–	–	1	–	1
Thimbles	–	–	–	–	–	–	1	1	2
Pins	–	–	–	2	2	10	336	72	422
Buttons/button covers	–	–	1	1	–	1	6	–	9
Lace tags	–	–	–	–	–	1	24	–	25
Buckles	–	–	–	–	1	1	5	–	7
Strap-ends	–	–	–	–	–	1	–	–	1
Wire	1	–	–	–	–	1	6	1	9
Rings	–	1	–	–	–	–	2	–	3
Misc. objects	1	2	2	–	2	2	12	6	27
Fragments	–	3	3	2	–	2	15	–	25
Total	2	6	6	5	5	19	408	80	531

Three copper alloy rivets *in situ*, additional, larger copper rivets half-way down each long side. Simple, incised decoration on one sheet with irregular central perforation; oval perforation on other sheet to match.

2. 5/W12C/5/934/SF1029. Strap-end buckle with hooked end, and two rivet holes for attachment. Length 48 mm, width 14 mm (max.).
3. 2/W61A/2/1134/SF369. Copper harness pendant, some traces of enamel still visible. Comparable to London Museum Medieval Catalogue 1954 (LMMC, type V). Decoration may be arms of England current for period *c.* 1190–1340 (N. Griffiths, pers. comm.). 52 x 30 mm (max.).
4. 6/W12C/6/359/SF488. Strap-end of folded sheet, with boss and incised decoration. Three rivets for attachment. 39 x 12 mm.
5. 3/W61B/3/1120/SF1120. Key-like object, no evidence of bit. Loop and stem are single piece. 37 mm.
6. 7/W61B/7–8/2110/SF1109. Spoon or toilet item of 2 mm diam. wire, spoon-shaped at one end. 'Fish-tail' terminal bound below with finer copper wire.

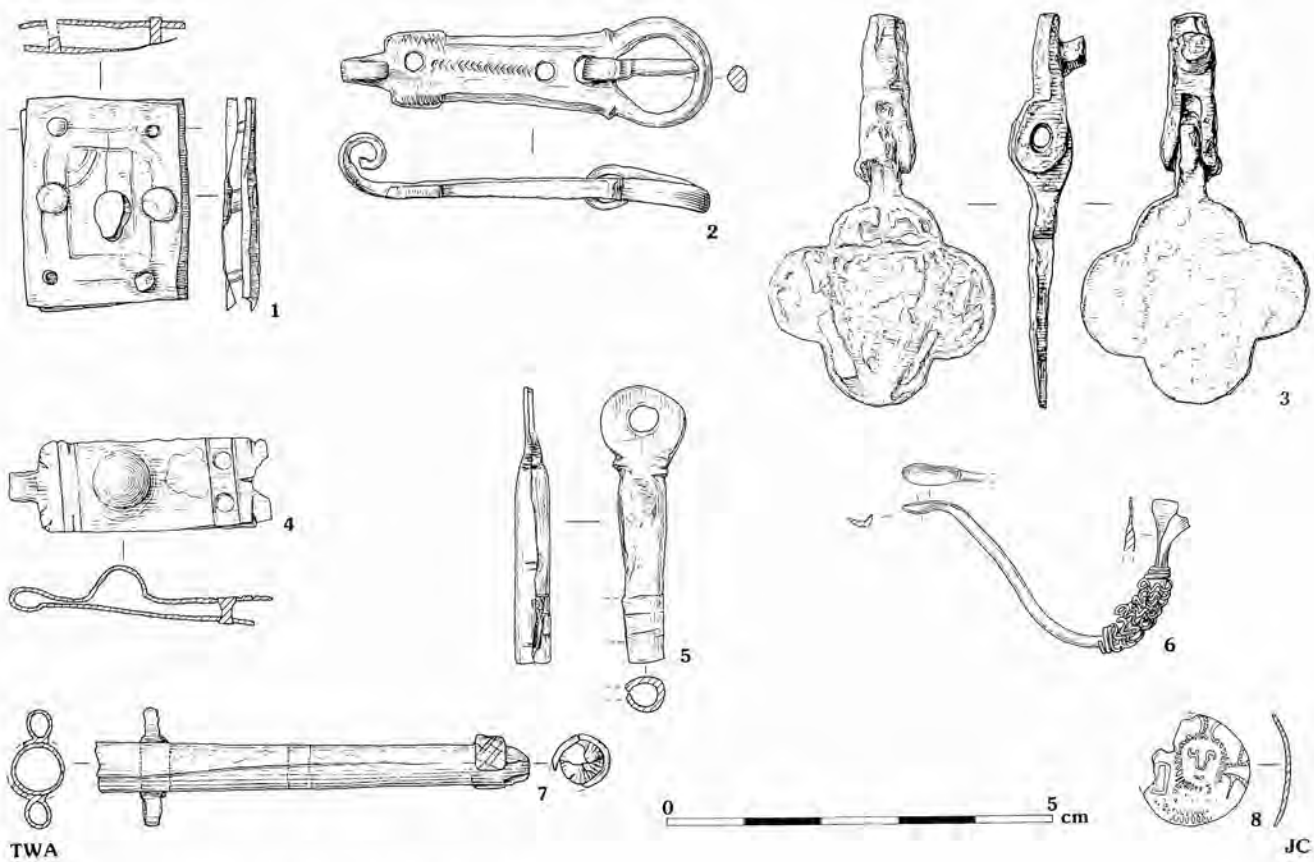

Figure 92 Copper alloy objects. Scale 1:1

Table 19: lead and lead alloy objects

Period	*Abbey Wharf*	*Library*	*Crane Wharf*	*Total*
1	1	–	–	1
2	7	–	–	7
3	4	–	–	4
4	3	–	1	4
4/5	1	–	–	1
5	3	–	–	3
6	10	–	–	10
7	15	–	1	16
U/S	–	1	–	1
Total	44	1	2	47

7. 5/W61A/5/1187/SF383. Ferrule, tapered, decorated with three bands of copper alloy; uppermost band has loop or lug on either side. 56 x 6 mm diam. (max.).
8. 6/W12C/6/398/SF312. Disc, 15 mm diam. X-radiograph shows crudely-wrought head of Christ superimposed over crucifix.

Lead and Lead Alloy Objects

Lead and lead alloy objects are listed in Table 19. Most are unidentified strips, lumps, sheet fragments, or window came. Only the illustrated objects are described here.

Fig. 93

1. 2/W12C/2b/983/SF1104. Irregular tapered rod, pierced near wider end. Possibly fishing weight or plumb-bob. Length 82 mm, diam. 11 mm (max).
2. 5/W112/3/5/SF4. Cylindrical lead weight. Length 30 mm, diam. 25 mm, central longitudinal hole, diam. 11 mm. Weight 108 g (3.8 oz).
3. 6–7/W112/4/47/SF1. Disc, slightly domed. Raised side has depression in centre, reverse has curvilinear design executed by punched dots. Small, incomplete extension suggests object was intended for suspension. Possibly a pilgrim badge, but no parallel found. Diam. 26–30 mm, thickness 4 mm (max.).
4. 7/W12C/8/245/SF272. Octagonal seal, probably a cloth seal. Width 14 mm, decorated with cross-shaped motif.
5. 7/W12C/7/366/SF189. Three-part cloth seal, *fleur-de-lys* design in central panel. Overall length c. 50 mm.
6. 7/W61B/7–8/2110/SF1168. Plain, circular two-part cloth seal. Diam. 22 mm.
7. 7/W61B/7–8/2110/SF1108. Circular two-part seal, inscription H I LEEDS. Diam. 38 mm.

Iron Objects

A total of 190 iron objects (excluding nails) was identified. These are listed in Table 20 by period and type. Eighteen objects from sites W60, W135, and W152 have not been included as they cannot be ascribed to a specific period or range of periods. Periods 2 and 3, and 4 and 5 have been combined in the table due to the attribution of these finds to these broad periods in the archive.

The condition of most of the iron is very good, with the material from the waterlogged deposits of the Abbey Wharf sites usually having a solid core, little surface

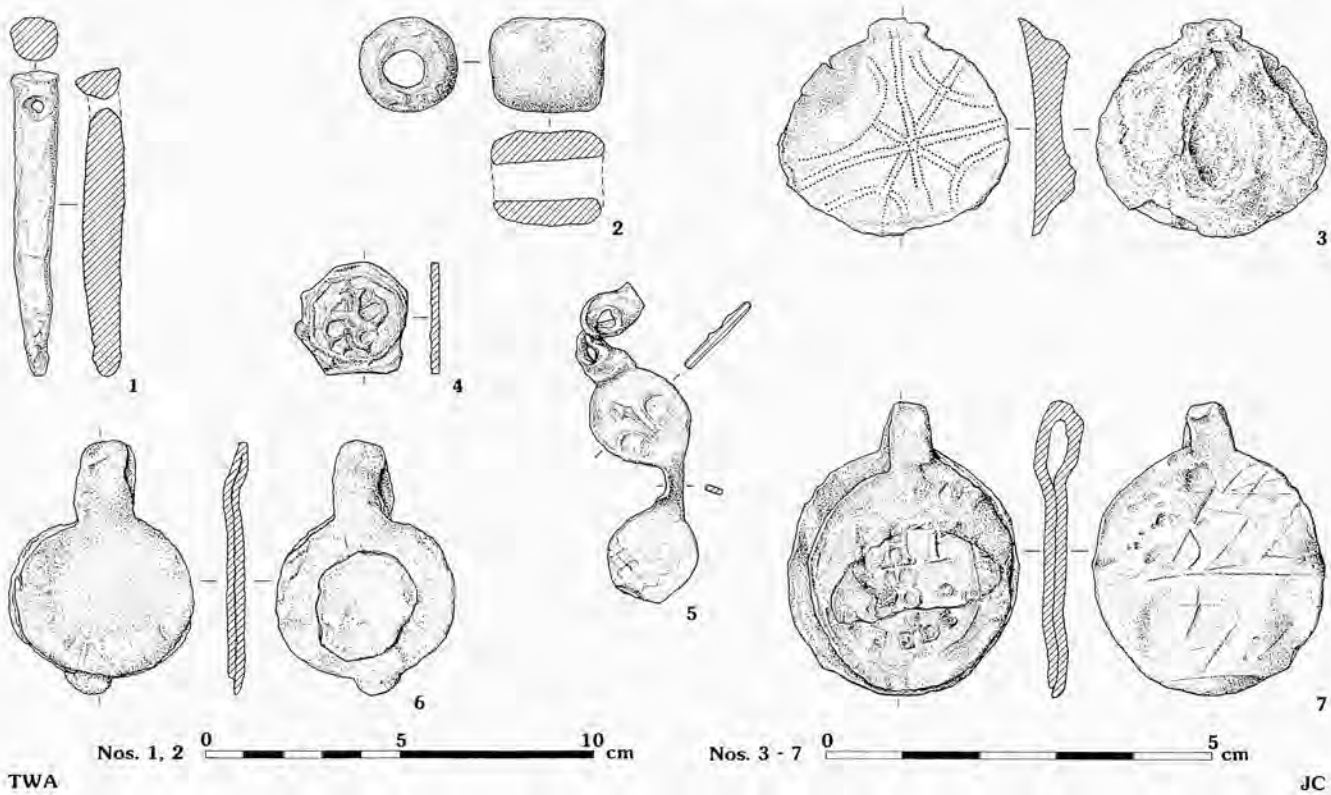

Figure 93 Lead and lead alloy objects. Scale 1:2 (Nos 1, 2), 1:1 (Nos 3–7)

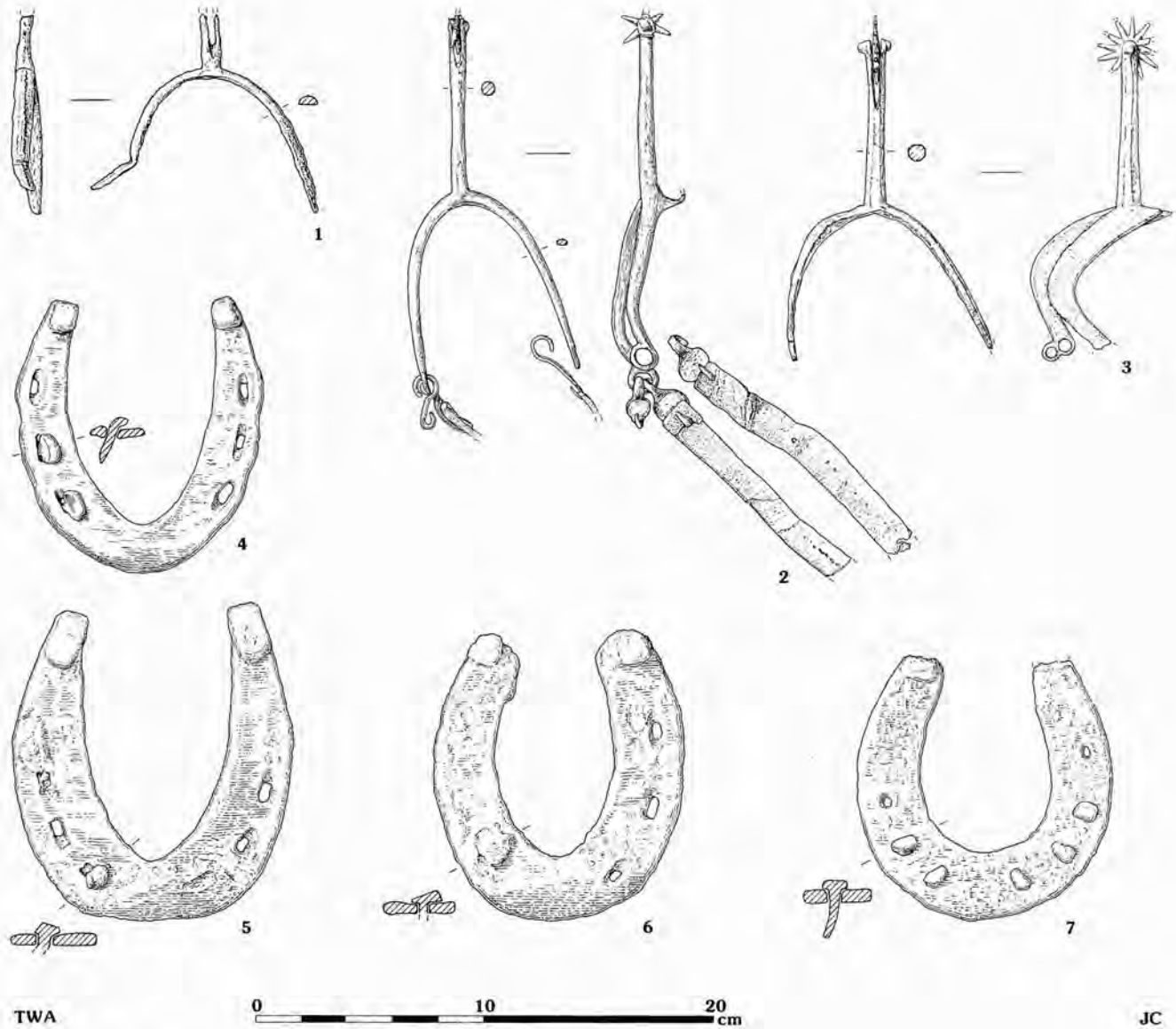

Figure 94 Iron objects: horse furniture. Scale 1:4

Table 20 ironwork by type and Period

Period / type	*1*	*2/3*	*4/5*	*6*	*7*	*U/S*	*Total*
Horse furniture	—	7	5	3	10	4	29
Weaponry	—	2	1	—	6	—	9
Keys and lock furniture	—	2	1	1	7	—	11
Buckles and strap-ends	—	—	2	1	5	—	8
Architectural fittings	—	1	1	1	2	1	6
Knives	—	13	3	—	9	3	28
Other fittings and misc.	—	9	10	11	45	6	81
Total	0	34	23	17	84	14	172

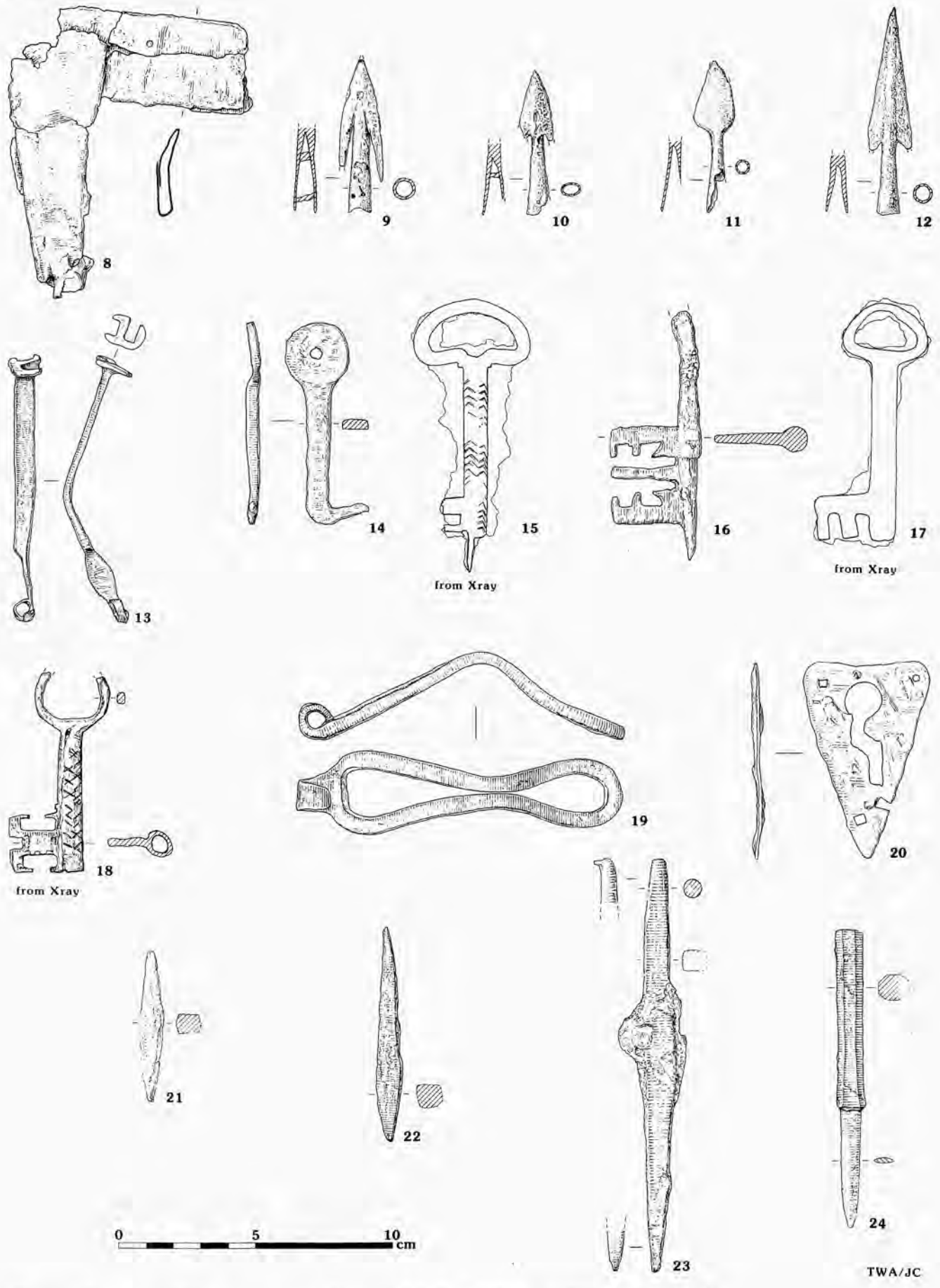

Figure 95 Iron objects: weaponry, keys and lock furniture, and tools. Scale 1:2

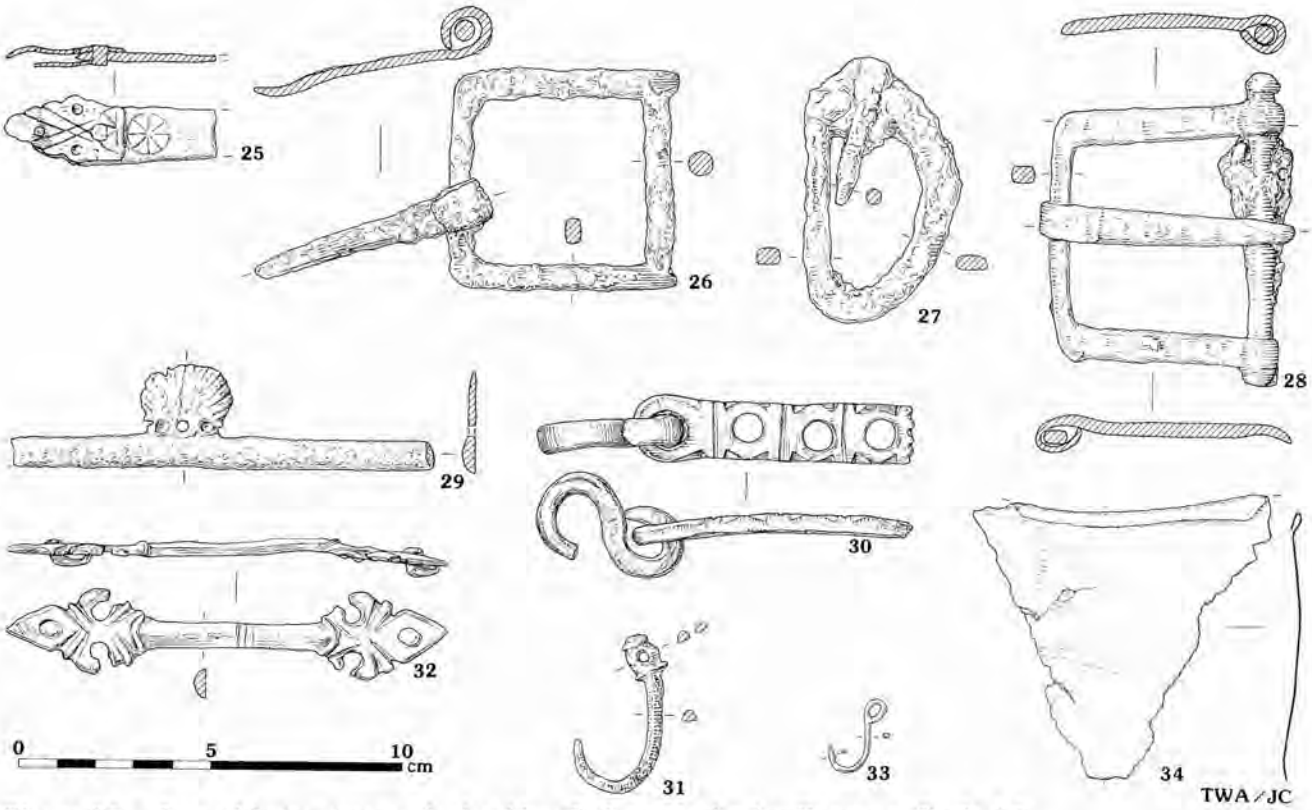

Figure 96 Iron objects: strap-ends, buckles, fittings, and miscellaneous. Scale 1:2

fissuring and only rarely with sediment adhering to surface corrosion in any great quantity. Vivienite (iron phosphate) was noted as a surface deposit on many objects from Abbey Wharf W12C. The material from the Crane Wharf, Bridge Street East, and Library sites is less well-preserved, with that from W158 and W60 the poorest of all; little solid iron remains, and significant quantities of sediment were incorporated within the surface corrosion.

Only illustrated items are described. (Cutler's marks were recorded on nine objects; details of these are in archive).

Fig. 94: Horse furniture

1. 4/W12C/4/356/SF220. Incomplete rowel spur with inlaid decoration on arms and shank. Length 95 mm.
2. 5/W12C/5/934/SF1088. Rowel spur, complete, length 150 mm with long (75 mm) shank, 6–point rowel (diam. 24mm) and decorative point at junction between shank and arms. Comparable to LMMC (fig. 33) type B1, terminals of LMMC (fig. 28) type F. Two lengths of leather strap with three iron connecting links were preserved with the spur. Length of shank suggests mid–late 15th-century date.
3. 5/W12C/5/1187/SF382. Rowel spur, complete, length 165 mm, comparable to LMMC type B1, terminals of LMMC type F. Rowel (diam. 31 mm) has 12 points. Shank length 74 mm, octagonal in section. Iron plated with tin. Probably similar date to No. 2.
4. 7/W61B/7–8/2112/SF1177. Horseshoe, slightly wavy ext. edge, three countersunk square nail holes either side. Calkins turned flat. Length 126 mm. Variety of Norman type, mid 12th– first half 13th century (Clark 1986, 2, fig. 4), residual in context.
5. 3/W12C/3a/906/SF761. Horseshoe, smooth outside edge, arched inside. Countersunk nail holes, three on one side, four on the other. Calkins turned flat. Length 138 mm. Later medieval type, appears by mid 14th century (Clark 1972, 3).
6. 7/W61B/7–8/2057/SF1034. Horseshoe, smooth outside edge, tongue-shaped inside. Three countersunk square nail holes either side. Calkins turned down. Length 137 mm. Date range *c.* 1675–1850.
7. 4/W12C/1048/SF1171. Horseshoe, smooth outside edge, rounded inside. Four circular nail holes either side. One calkin turned down. Transitional type, second half 13th century into early 14th (Clark 1972, 3).

Fig. 95 Weaponry

8. 7/W12C/7a/355/SF1204. Scabbard/sheath, incomplete, length *c.* 150 mm, width 35 mm. Tin-plated with traces of ?wood lining evident.
9. 7/W61B/9/2046/SF1087. Socketed, barbed arrowhead. Length 59 mm. Similar to LMMC (fig. 16) type 16, although barbs are larger and extend further from socket. Rivet hole in socket visible on X–radiograph.
10. 7/W61B/9/2046/SF1089. Socketed, barbed arrowhead. Length 56 mm, LMMC (fig. 16) type 16. Rivet hole in socket visible on X–radiograph.
11. 2/W61B/2/2115/SF1117. Socketed arrowhead. Length 58 mm. LMMC (fig. 16) type 3, 13th century.
12. 2/W61B/2/2114/SF1192. Socketed arrowhead with small barbs. Length 80 mm. No parallel found.

Keys and lock furniture

13. 7/W61B/7–8/2133/SF1123. Barrel padlock key, length 105 mm.
14. 4–5/W61B/4–5/2100/SF1100A. Latch lifter, length 78 mm.
15. 4–5/W61B/4–5/2100/SF1100B. Key with oval bow, inlaid decoration on stem. Length 105 mm, LMMC (142 and fig. 42) type VIIA.
16. 4–5/W61B/4–5/2110/SF1166. Key bit and stem fragment, length 95 mm, LMMC (142–3 and fig. 42) type VIIB.
17. 4/W12C/4/808/SF594. Key with oval bow, simple bit with teeth parallel to stem. Length 90 mm.

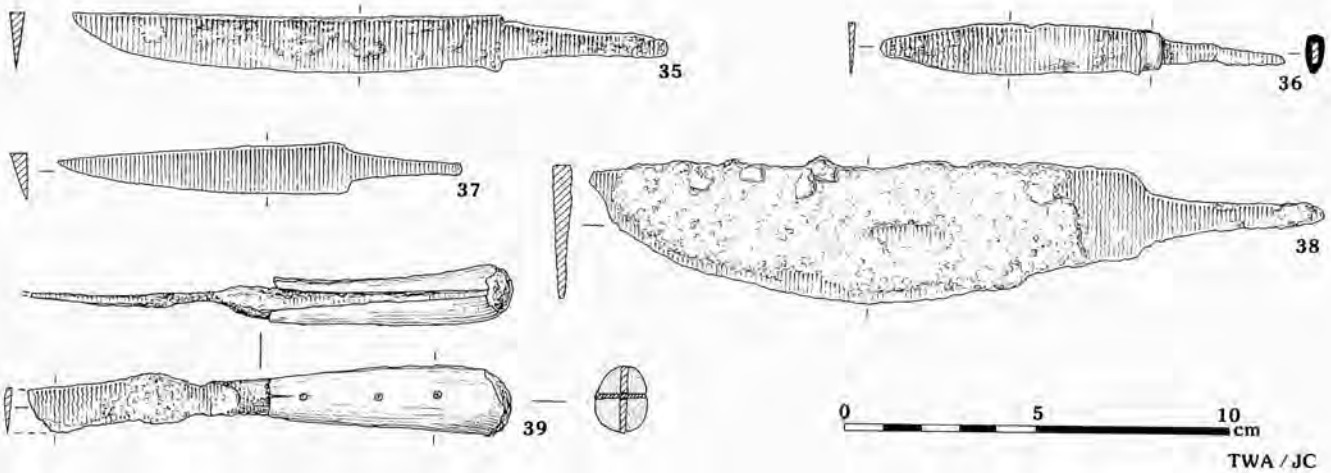

Figure 97 Iron objects: knives. Scale 1:2

18. 3/W12C/3b/985/SF1156. Key, bow incomplete. Plated with unident. white metal, incised decoration on hollow stem. Comparable to LMMC (138–40 and fig. 42) type IV. Length 78 mm.
19. 2/W12C/2b/993/SF1120. Hasp, length 121 mm, width 30 mm.
20. 3–4/W61A/3-4/1213/SF425. Triangular escutcheon, plated with tin and lead. Three square nail/rivet holes, one in each corner. Length 72 mm, width 46 mm.

Tools
21. 4/W112/ 3/5. Awl, length 51 mm, 8 x 10 mm in cross-section.
22. 4/W12C/4/356/SF228. Awl, length 82 mm, 8x10 mm in cross-section.
23 6/W61A/6/1034/SF307. ?awl, length 154 mm, 8 x 10 mm in cross-section. Rounded section towards one end, which has a burred tip.
24. 4/W12C/4/977/SF1023. ?Awl, length 113 mm. Tool made from a single piece of iron; ovate-section 'blade' (2 x 8 mm), tapering to a point; octagonal-section handle, 10 x 12 mm in cross-section.

Fig. 96 Strap-ends and buckles
25. –/W12C/–/US/SF1034. Decorated, zoomorphic strap-end, traces of unident. white metal plating. Length 55 mm.
26. 5/W61A/5/1098/SF308. Square buckle with pin. 56 x 58 mm.
27. 4/W61A/4/1131/SF370. Oval buckle with pin. Length 64 mm.
28. 4–5/W61B/4–5/2100/SF1195. Square buckle with pin. 67 x 58 mm.

Other fittings and miscellaneous
29. 6/W12C/6/359/SF502. Purse mount, incomplete with bar only. Length 11 mm.
30. 6/W61A/6/1096/SF299. Decorated fitting with S-shaped hook, incomplete. Plate 72 x 15 mm, hook 40 x 22 mm. Both parts tinned.
31. 3/W12C/3a/944/SF929. Small hook or catch with decorative pierced head. Length 43 mm.
32. 6/W12C/6/930/SF869. Decorative fitting, possibly for casket or door. Terminals pierced by nail or rivet holes. Length 117 mm.
33. 5/W12C/5/992/SF1010. Fish hook, 1 mm wire with barbed end. 22 x 13 mm.
34. 5/W12C/5/933/SF866. Fragment of iron vessel, rim strengthened with iron wire. 77 x 70 mm.

Fig. 97: Knives
35. 3/W12C/3a/864/SF951. Whittle tang knife. Blade 164mm, tang 64 mm long. Slightly concave back, edge curving up to tip.
36. 2/W61B/2/2114/SF1217. Whittle tang knife. Blade 102 mm, tang 48 mm long. Back and edge curving to tip. Copper alloy ferrule between blade and tang.
37. 3/W61A/3/1196/SF391. Whittle tang knife. Blade 106 mm, tang 40 mm long. Sloping back, edge curving up to tip. Edge welded.
38. 4/W12C/4/895/SF1144. Knife/cleaver with whittle tang. Blade 205 mm long, 51 mm wide (max.); tang 68 mm long. Straight back, edge curving up to tip.
39. 4–5/W61B/4–5/2100/SF1179. Knife with scale tang, blade worn and broken. Two-piece bone handle originally attached with ferrule (missing) and three copper alloy rivets. Length 186 mm.

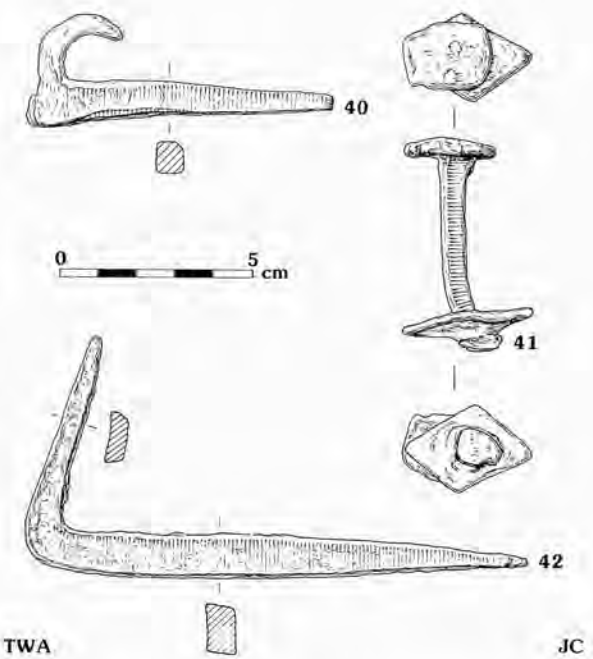

Figure 98 Iron objects: architectural fittings. Scale 1:2

Fig. 98: Architectural fittings
40. 4–5/W61B/4–5/2100/SF1187. Wall hook, 80 x 28 mm.
41. 7/W61B/7–8/2113/SF1205. Clench bolt with diamond-shaped rove, length 60 mm.
42. 6/W12C/ 6/359/SF395. Pintle, 132 x 58 mm.

Nails

A total of 2080 nails was recovered. These have been divided into 21 types based on head and shank shapes (full details of the typology are contained in archive). Approximately 57% could be assigned to type, the remainder being either too fragmentary or too poorly preserved. The principal types comprise general timber nails, roofing nails, horseshoe nails, and small tacks, with over 74% of the total coming from Period 7 contexts at Abbey Wharf.

There were some 350 timber nails, with 70 being exceptionally large with shank lengths usually being in excess of 100 mm. These occur from Period 3 onwards, and the majority were used in the construction of the various timber revetments. Of the remaining identifiable nails, 266 are horseshoe nails of various types, and 226 have their heads missing.

Slag, by C.N. Thompson, incorporating identifications by J. Bayley

A total of 32,156 g of iron-smithing slag was recovered, more than 50% (16,302 g) from Period 2 contexts, c. 25% (7577 g) from Period 3 contexts, and much smaller quantities from the remainder. No significant quantities were found in any single context or area of the sites. In addition to the smithing slag, there is 4592 g of fuel ash slag and 2360 g of hearth lining, neither of which are necessarily associated with iron-smithing or other metalworking activity.

Table 21: clay pipe, identifiable bowl types

	Oswald	*Period*					*Total*
Type	*Date range*	*4*	*5*	*6*	*7*	*Unph*	
3	1580–1610	–	–	–	1	–	1
4	1600–1640	–	–	1	3	1	5
5	1640–1660	1	2	6	9	1	19
17	1640–1670	1	–	1	8	1	11
6	1660–1680	–	–	5	22	1	28
7	1660–1680	1	–	2	4	–	7
18	1660–1680	2	2	4	11	4	23
8	1680–1710	3	1	3	40	2	49
9	1680–1710	–	–	1	17	–	18
19	1690–1710	1	–	–	4	–	5
20	1690–1738	–	3	2	11	1	17
10	1700–1740	–	–	–	15	–	15
11	1730–1760	–	–	–	1	–	1
12	1730–1780	–	–	–	30	–	30
22	1730–1780	–	–	–	2	–	2
13	1730–1820	–	–	–	1	1	2
24	1810–1840	–	–	1	15	2	18
14	1820–1840	–	–	–	1	–	1
15	1840–1880	–	–	–	1	–	1
	Total	9	8	26	196	14	253

4. Glass

Glass from each site was collected, comprising a total of 833 sherds weighing 71,340 g (full details in archive). Most is bottle glass, the identifiable fragments being largely straight-sided wine bottles of the late 18th or early 19th centuries, although one 'onion'-shaped bottle base of probable 17th century date was recovered from a Period 6, Phase 3c context at W158 Bridge Street East. Much of the intrusive material in contexts up to and including Period 5, comes from disturbed contexts at Abbey Wharf site W61B.

5. Clay Pipe

A total of 1980 fragments of clay pipe bowl and stem weighing 11,640 g were recovered from the various sites (full details in archive). Those from Period 5 and earlier are evidently intrusive material, and generally comprise small stem fragments. Details relevant to the dating of individual phases are shown in Table 21.

Table 22: clay pipe, makers' marks and stamps

Mark	*Name*	*Location*	*Date*
SB	Unknown	–	–
MG	Moses Gee	London	1681–1696
IH	Unknown	–	–
WI	William Ilsey	Reading	1756
IN	John Norris	Reading	1828–1848
WN	William Norris	Reading	1854–1864
IM	Unknown	–	–
RM	Richard Moon	Reading	1828–1831
EP	Edward Parker	Wallingford	1757
IP	Unknown	?London	–
IP with crown	?John Pinkard	London	1703 or 1732
MP	?Mrs M. Pullinger	London	1857
PP	Unknown	–	–
RP	Richard Pickman	Henley	1752
SP	Unknown	–	–
TP	Thomas Parr	London	1839–1852
HS	Unknown	–	–
IS	Unknown	–	–
RS	Robert Smith	London	1732
RT	Unknown	–	–
WW	Unknown	?London	–
Stylised crown	Unknown	–	–
Glove/ hand	Unknown	?London	–

In the absence of any previous detailed survey on the clay pipe industry in the Reading area, all bowls were identified and dated by reference to Oswald's (1975) general simplified typology (Table 21). Difficulty was experienced in assigning some of the bowls to type, particularly prominent bases and 'tulip'-shaped bowls which seem to be local variants. No analysis of fabrics was undertaken, but a tendency for 19th-century types to be manufactured in a micaceous fabric more susceptible to rust-staining was noted. No attempt was made to distinguish different finishes such as polishing.

A total of 82 fragments displayed marks or stamps; the range is listed in Table 22. With the exception of one stem stamp, probably a wheelmark, and two unidentified heel-stamps (both incuse in heart-shaped frame, initials H.F. and G.I., neither identified), all were relief-mould imparted initials or motifs on spurs or bases.

6. Stone

The various sites produced a total of 211 fragments of unworked stone weighing 17,602 g, and 125 pieces of worked stone weighing in excess of 120 kg. The stone occurred in all phases, with the greatest quantities in Periods 2 and 7, and almost all of this is from the Abbey Wharf sites.

The stone has been identified broadly to type by the author. More detailed identification of a selection of examples was undertaken by Mr.P. Ensom of Dorset County Museum; these details and tabulation of the material are in archive. No attempt has been made to assign all the stone to specific sources. Most of the non-local stone fragments recovered are limestones, greensand, and chalk, and these make up *c.* 90% of the assemblages for both worked and unworked fragments. Chalk as well as the Upper and Lower Greensands can be found within a 65 km radius of Reading.

The worked stone comprised principally building stone. There was also the base of a mortar, a ?weight, two pieces of probable quern, and four whetstones. The latter were all from the Abbey Wharf sites, from Period 3 or later, and all are described and illustrated.

Fig. 99

1. 5/61A/5/1115/SF413. Mortar base. Shelly limestone.
2. 7/61A/9/1021/SF204. ?Weight. Oolitic limestone.
3. 5/W12C/5/825/-. Quern fragment. Silaceous rock (?French burrstone).
4. -/W12C/-/1086/-. Quern fragment. As No. 3.
5. 3/W12C/3a/864/SF933. Whetstone pierced for suspension. Quartz muscovite schist.
6. 7/W61A/9/1019/SF199. Whetstone, incomplete. Sandstone.
7. 7/W61A/9/1067. Whetstone. Hornfels (metasediment).
8. 7/W61A/9/1085/SF205. Whetstone, incomplete. Greensand.

7. Worked and Burnt Flint

The worked flint can be divided into two groups: probable prehistoric flakes, and material almost certainly shaped by metal hammers and probably the waste from wall building activity. None of the 24 prehistoric flints is retouched or shows any signs of usage. Two battered flint nodules recovered from immediately behind the Phase 5 (Period 5) revetment from the Abbey Wharf site W12C have apparently been used as hammerstones, possibly in connection with the revetment construction.

Burnt flint totalling 2283 g was recovered in small quantities from contexts of all periods.

8. Ceramic Building Material

Full details of material by period and site are in archive.

Brick

Thirteen pieces were identified as probable Roman brick, all from Periods 1, 2, 3, and 7 at Abbey Wharf W61B. The upper surfaces of five fragments have been incised with concentric circles before firing. Such marks are often to be seen on Romano-British tile and brick, and are usually interpreted as makers' 'signatures' (Brodribb 1987, 99–105).

Two pieces retain measurable widths (270 and 276 mm). If originally square it is likely that these are *pedales*, or, if rectangular, lydion bricks. Brodribb (1987, 36, 40) records the average size of *pedales* to be 281 x 281 x 46 mm, and lydion bricks as 403 x 280 x 41 mm; the thicknesses (29–40 mm) and widths recorded at Reading fall within the range for either type. There is no known major Roman building in the area from which these finds may have derived.

Later brick was not routinely collected, except where its appearance in stratigraphically early contexts suggested that its retention might serve to identify areas of disturbance and highlight other suspected intrusive material. Some 1374 fragments were collected weighing 17.7 kg. Occurrences in Periods 1–3 are likely to reflect contamination, but are confined to relatively few individual contexts, all at the Bridge Street East site. Metrical analysis (in archive) suggests that most of occurrences in Period 5 or earlier are less than 40 mm thick, whereas those of later date are normally in excess of 45 mm, and it is possible that some examples could be reconsidered as floor tile.

Floor tile

A total of 79 fragments of floor tile weighing 30.7 kg was recovered, 76 of them from Abbey Wharf. No tiles were found *in situ*, and only two with complete widths were recovered. Ot the 79 fragments, 65 are probably from medieval floor tiles, and include unglazed, glazed, and decorated examples.

Fragments of 24 plain unglazed tiles, 29 plain glazed tiles, and 12 glazed and decorated tiles were found, all from Abbey Wharf, principally from W12C. The 54 tiles with evidence for their original thickness range between 14 and 37 mm with no pronounced mode (for dimensions see archive). It is possible that fragments less than *c.* 24 mm thick may, in the absence of diagnostic features such as peg holes or cut edges, be misidentified roof tile, although the single example 14 mm thick is certainly a

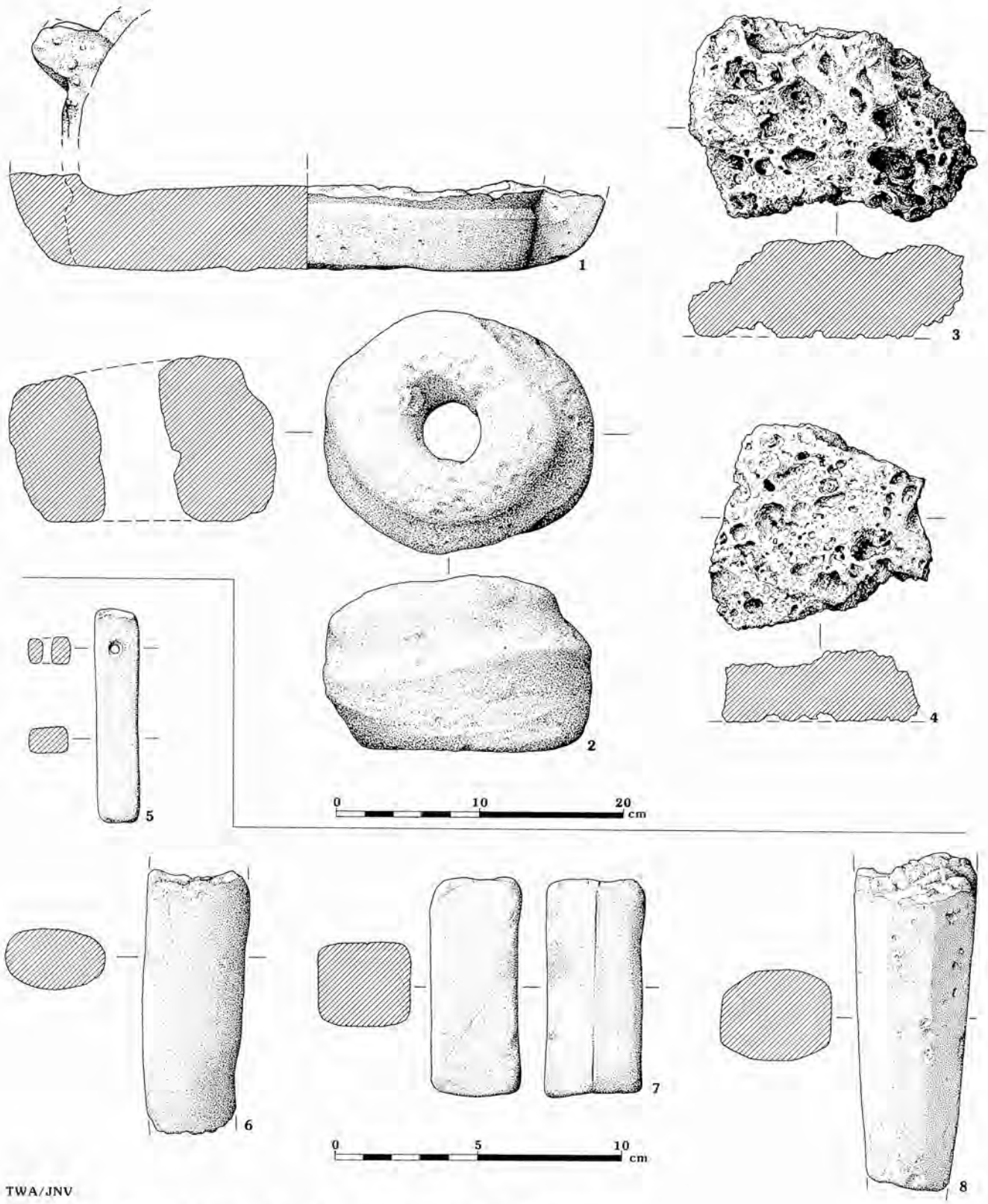

Figure 99 Stone objects. Scale 1:4 (Nos 1–4), 1:2 (Nos 5–8)

floor tile. No complete lengths were preserved, but it was possible to identify six triangular tiles, five of which are decorated.

The decorated tiles are in poor condition and fragmented, making identification difficult. Those positively identified or attributed to a known design are all of 13th- or 14th-century date, and include examples (from Period 6 onwards) with parallels at Reading Abbey (Eames 1980, cat. nos 11563, 11564) and possibly at Chertsey (*op. cit.* cat. nos 11045, 10609 and 10610).

Roof tile

All roof tile from hand-excavated contexts was collected, counted, and weighed. Overall, 14,952 fragments were recorded, all from Period 2 onwards, except for a small quantity of intrusive material in Period 1. Only examples with distinctive features were subsequently retained: fragments with peg holes, with measurable lengths or widths, with glaze, and any unusual variation in fabric. No formal analysis of fabric was undertaken. Overall 14,952 fragments were recorded. Most fragments are from plain peg tiles, some with their lower third glazed, although fragments of ridge tiles, pantiles, and flanged tiles were also found. All the material can broadly be assigned a medieval to post-medieval date.

The thickness of a sample of 1790 fragments (excluding ridge tile) from Abbey Wharf, Crane Wharf, and the Library site was measured. Thickness ranges from 10–24 mm, with most (*c.* 85%) falling between 13 and 18 mm.

One hundred and fifteen tiles with complete widths were also measured. The bi-modal distribution suggests that two width groups of tile were manufactured: 170–190 mm and 208–230 mm. Neither a correlation of width with thickness nor any trends through time were observed. Only five peg tiles with complete lengths were recovered (289–295 mm).

Fig. 100: Brick and tile

1. 7/W61B/7–8/2105. Decorated Roman brick.
2. 7/W12C/7a/215/SF1277. Decorated medieval tile. *Fleur-de-lys* decoration in counter-relief.
3. 5/W12C/5/925/SF1284. Decorated triangular medieval tile.

9. Other Fired Clay

Very few fragments of fired clay were recovered, except for sixteen pieces weighing 10.3 kg from a single pit dug into the Phase 2 reclamation layers on Abbey Wharf W61A. Two of these pieces were substantial, and exhibited a curve with a diameter of *c.* 0.50–0.55 m. These fragments are interpreted as hearth lining, probably from a nearby hearth which had been broken-up and redeposited in this pit. X–ray fluorescence analysis detected copper, zinc, and tin in significant amounts, suggesting the hearth may have been used in the smelting of a gunmetal-type alloy (J. Bayley, pers. comm.). Further details are in archive.

10. Mortar and Plaster

A total of 13.5 kg of mortar was collected, 80% of which comes from Period 7 contexts on Abbey Wharf W12C, and was probably associated with the stone revetment. Samples of mortar were retained from the Abbey Wharf stone revetment walls, but have not been analysed. Only three fragments of plaster were recovered, with a total weight of 40 g.

11. Textiles, by E. Crowfoot, with notes on the fibres by H.M. Appleyard and the dyes by P. Walton Rogers

The following fragments of textile were recovered from the Abbey Wharf sites. This account combines Ancient Monuments Laboratory reports 3952 and 4815, copies of which are in archive.

1. 1/W61A/1/1192/SF458. Carbonised fragment, 6 x 2 mm, probably worsted wool. Spin Z/Z, slightly uneven, weave tabby, fine but slightly open. Thread count *c.* 20/25 per 10 mm. Fibres: fine animal fibres, very brittle and black with much degradation. Identification not possible.
2. 4/W12C/4/759/SF536. Small fragments together making up *c.* 90 x 70 mm, curved, cut edge from a garment. Wool fibres mixed light and dark, originally dyed red. Spin Z/Z, hard, even threads, near worsted appearance, weave 2/2 twill, no selvedge preserved, thread count 13–14/14–15 per 10 mm. Although slightly matted, this fabric was

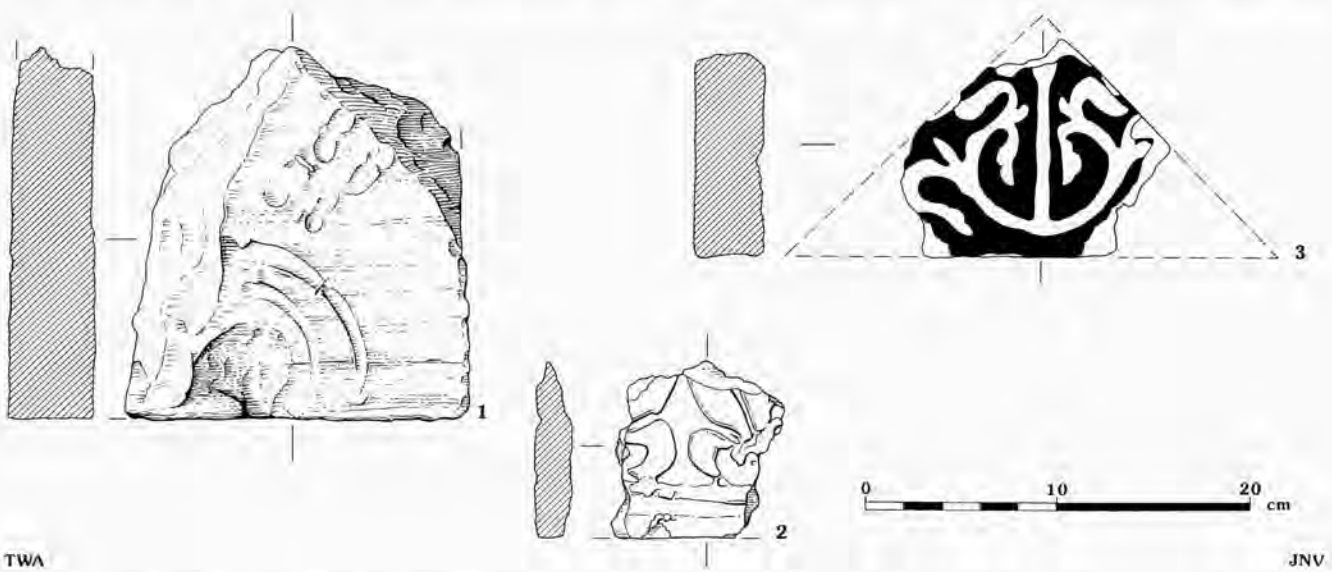

Figure 100 Brick and tile. Scale 1:4

probably not originally fulled or napped, which applies to other four-shed twills of 14th–15th-century date from the City of London (in some of which madder was also identified; Crowfoot *et al.* 1992, 36–41), and 16th-century levels in the Castle Ditch, Newcastle-upon-Tyne (Walton in Harbottle *et al.* 1981). Fibres: wool, dyed. Badly degraded with much bacterial damage. Dyes: madder.

3. 6/W61A/6/1034/SF219. One fragment, 11 x 18 mm, damaged. The lack of spin, certainly in one thread system and possibly also in the other, suggested silk, but the very fine fibres could not be certainly identified. Weave tabby, thread count 31–32/40–41 per 10 mm. The quality of this fabric suggests it might have been associated with relics of the Abbey, although it derives from a post-Dissolution context. Fibres: much degraded, very little sign of surface structure. Tentatively could be wool, but this is uncertain. Dyes: no dye detected. If this fragment had contained kermes, as in other cases from church burials, this should have been evident from a sample of this size.
4. 7/W12C/7a/366/SF186. Three scraps, (a) two adjoining, cut edges, together 40 x 15 mm, (b) 17 x 6 mm, folded. Possibly a bast fibre, heavily matted. Black, piece (b) is slightly paler than (a). Spin Z/Z, weave impossible to see clearly, though the length of occasional visible threads suggests twill rather than tabby weave. Perhaps from sacking, hemp or flax. Fibre: some kind of bast fibre. There is very little detail, but the fibres are splitting longitudinally into long, fine filaments typical of bast.
5. 7/W12C/7a/366/SF205. Fragment 61 x 35 mm, 1.5–2 mm thick. Possibly wool, heavily felted, spin direction and weave impossible to see. Fibres: animal fibres, but unidentifiable due to surface damage. This is a woven felt; there is some yarn structure, but the face of the fabric appears to have been felted.
6. 7/W12C/7a/767/SF430. String, 140 mm long, unspun grass stems. Loosely Z-twisted, then S-plyed.
7. 7/W61A/9/1072/SF203. Wad of fine black hair. Fibres: coarse straight fibres with smooth profiles, some very densely pigmented. Where scale structure can be seen, margins are close and crenate, with some medullation; also a few fibres similar to wool. Sample is most likely to be goat hair.
8. 7/W61A/9/1072/SF343. Two fragments, 20 x 14 mm and 8 x 7 mm. Wool, fibres mixed browns, spin Z/S, weave tabby, thread count estimated 40/36–40 per 10 mm, possibly lightly fulled. A type of broadcloth suitable for light jackets and ladies' dresses.
9. 7/W61A/9/1066/SF422. Rectangle 330 x 210 mm, torn from heavy wool fabric, spin Z/Z, weave four-shed diagonal twill, thread count 4/4 per 10 mm, selvedge with cord of paired warp. The brown wool of the warp appears darker than that of the weft, but there is no natural pigment. The weight and weave could have been used for a heavy outer garment, but, though matted, the fabric is not fulled, and if, as seems likely, originally undyed, may have been torn from the edge of a blanket. Fibres: warp: well-preserved wool, mostly fine, some fibres coarse with continuous medulla. Weft: wool similar to warp, but far more deposits and degradation; colour lighter. Dyes: very strong yellow organic substance present, but not identifiable as a dye.
10. 7/W61B/9/2088/SF1050. Ribbon of good quality blue–black silk, both threads reeled, weave tabby, regular, thread count 48/25 per 10 mm, selvedge simple. Three strips, ribbon 10 mm wide, combined length 565–570 mm. The strips have been folded down the middle and sewn double with light grey-brown thread, silk, Z,S-ply. The longest piece has a neat bow of slightly wider ribbon (width 15 mm) of similar quality (thread count 45/28 per 10 mm, ends mitred) tied round it, held in position by a length of silk thread similar to that used in the sewing. The overall length is consistent with the circumference of a small bonnet or hat. The sewing, despite the ingenious method of attachment of the bow, is rather uneven for the work of a professional milliner, and the colour and very good condition suggests that perhaps these ribbons were temporarily added to the hat or bonnet during a period of mourning, and then discarded. Dated by pottery to around 1820–1830. Dyes: unidentified blue–black dye. This dye did not extract from the fibre into any of the solvent systems used for natural dyes or early synthetics.

12. Worked Bone

Thirty objects of worked bone were recovered, including 24 from theAbbey Wharf sites. Fourteen of the total are from Period 7, with five from Period 6 and four from Period 5; only three are from Period 4 or earlier. Handles

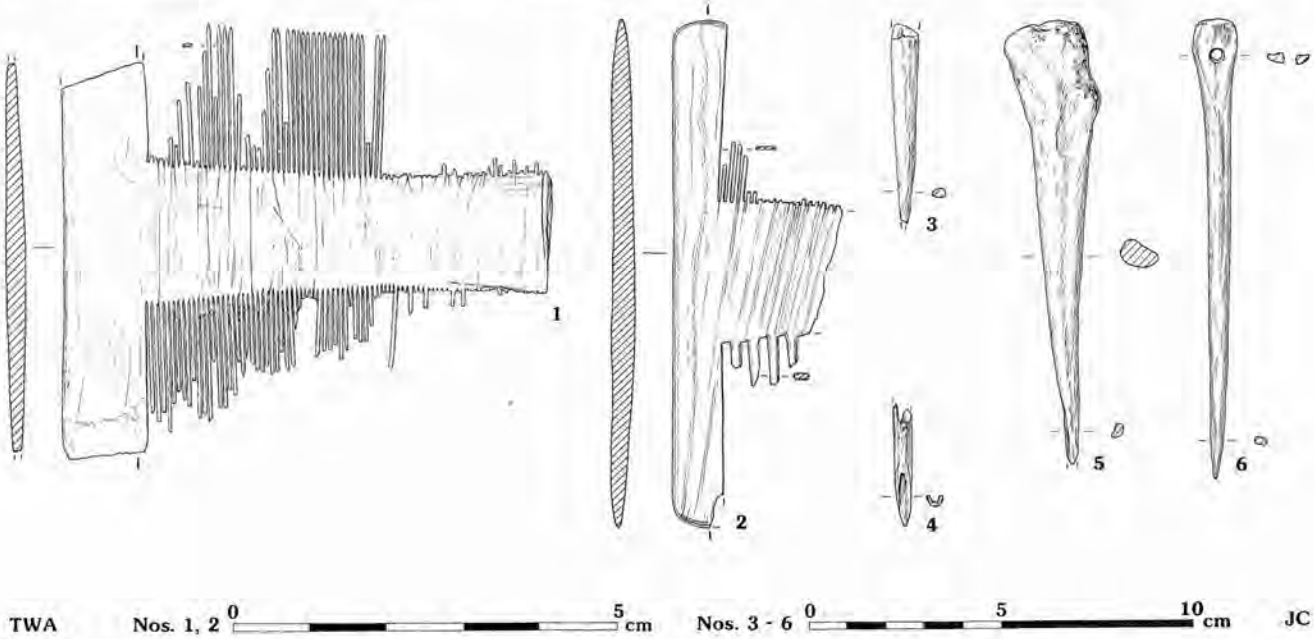

Figure 101 Worked bone objects. Scale 1:1 (Nos 1, 2), 1:2 (Nos 3–6)

(probably from knives) are most common (13 examples; all but two from Period 7), with a smaller number of needles, awls, or points (six examples), and 11 miscellaneous objects including two fragments of double-sided combs. A representative selection of these are descibed and illustrated.

Fig. 101

1. 6/W12C/6/359/SF396. Double-sided comb fragment; max. surviving width 54 mm.
2. 6/W12C/6/359/SF1200. Double-sided comb fragment; 67 mm wide.
3. 5/W12C/5/825/SF694. Point, incomplete. Length 53 mm, oval cross-section 7 x 3 mm (max.).
4. 5/W12C/5/934/SF1081. Point, formed by oblique cut across hollow bone; incomplete. Length 32 mm.
5. 5/W12C/5/925/SF971. Point or awl. Tip broken, some wear polish towards the tip. Length 117 mm.
6. 4/W12C/4/858/SF682. Needle. Circular eye 3 mm diam. Length 122 mm.

13. Worked Wood

The structural timbers, and the species of woods used for both these and the small finds have been considered in Chapter 6.

There are 24 objects of worked wood which fall into three broad categories: Vessels, tools/handles, and miscellaneous. All come from the Abbey Wharf sites, and all of the vessels (Nos 1–8), the two barrels (Pl. 8), and the 'mallets' (Nos 9 and 10; Pl. 22) are from contexts assigned to Period 5 or earlier. The remainder, except for the jointing peg, are from Period 7.

Fig.102: Vessels

1. 1/W61A/1/1194/SF387. Wide, shallow dish. Rim diam. *c.* 260 mm, height 48 mm. Ash (*Fraxinus excelsior*).

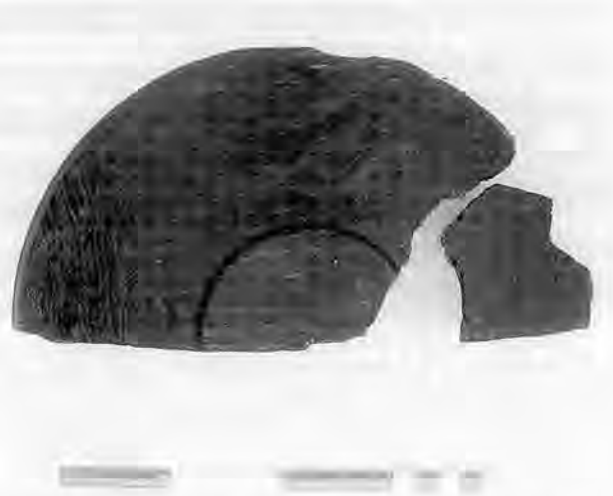

Plate 21 Wooden bowl (SF1173) made of alder

2. 2/W12C/2b/1350/SF1173. Bowl base with two deep S–shaped cuts, possibly a maker's mark, cf. example from the Austin Friars, Leicester (Mellor and Pearce 1981, fig. 52, 77). Base diam. 66 mm, surviving height 49 mm. Alder (*Alnus glutinosa*). (Pl. 21).
3. 3/W61A/3/1129/SF412. Bowl fragment, base missing. Rim diam. *c.* 160 mm. Alder (*A. glutinosa*).
4. 5/W61A/5/1115/SF414. Two fragments of a small bowl, with two S–shaped marks burned into the base (cf. No. 2). Base diam. 55 mm, height 38 mm. Alder (*A. glutinosa*).
5. 5/W61A/5/1115/SF416. Two fragments of a small bowl with base marks as No. 4. Base diam. *c.* 68 mm. Alder (*A. glutinosa*).
6. 5/W12C/5/938/SF899. Platter with out-turned rim. Rim diam. 123 mm, height 28 mm. Alder (*A. glutinosa*).
7. 3/W61A/3/1142/SF392. Bowl base fragment, base diam. 52 mm. Alder (*A. glutinosa*).

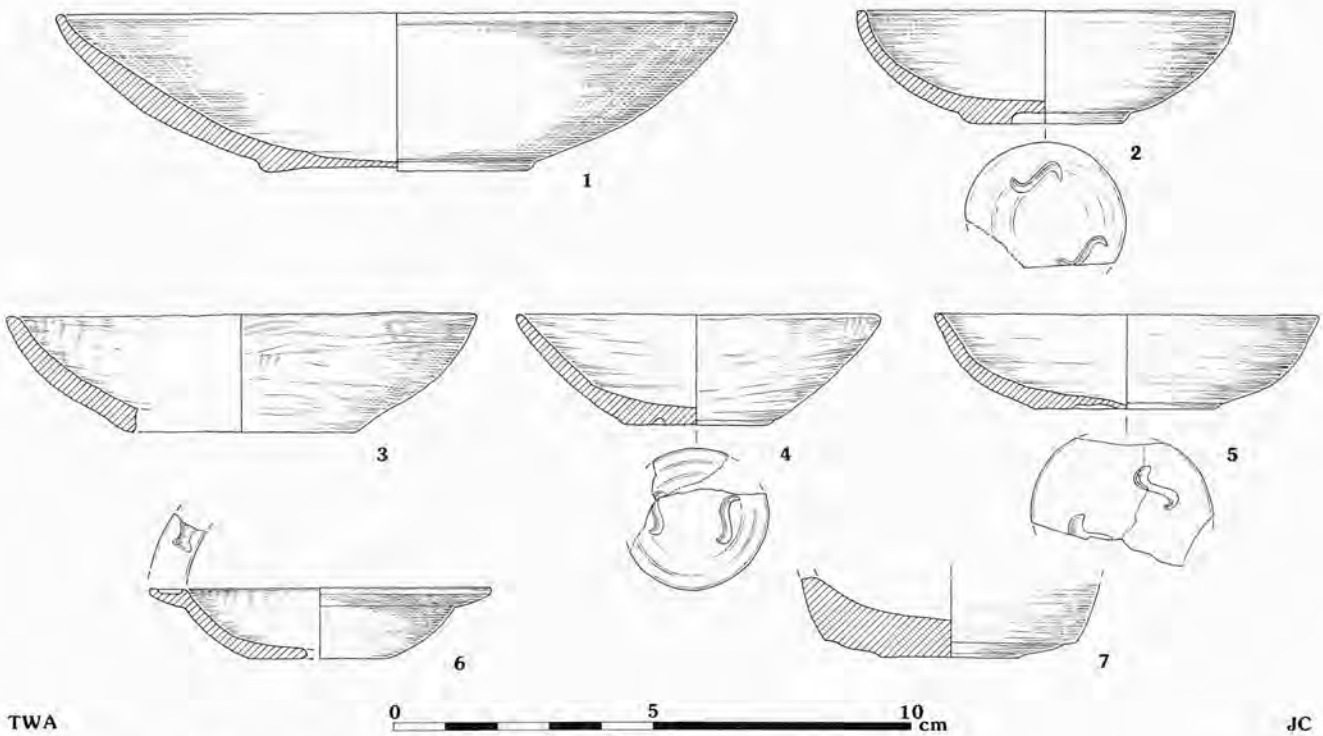

Figure 102 Worked wood: vessels. Scale 1:2

Fig.103

8. 3/W61A/3/1129/SF448. Possible lid or cover. Circular piece of wood (incomplete) *c.* 270mm diameter and c.16mm thick. The function of the diamond-shaped and linear gouges is unknown. Oak (*Quercus sp.*).

Vessels (not illustrated)

1. 7/W61B/9/2017/SF1147. Turned lid, 137 mm diam. Foreign hardwood (unident.).
2. W61A/F1151 BARREL 1. Barrel base with three upright staves surviving up to 50 mm above base. Base comprises 6 or 7 planks up to 10–25 mm thick. All components peg jointed. Five holes *c.* 30 mm diam. recorded in base, three with pegs *in situ*. Base diam. *c.* 1.25 m. All timbers and pegs oak (*Quercus* sp.) (Pl. 8).
3. W61A/F1178 BARREL 2. Barrel base with five stave fragments *in situ*, surviving to 70–130 mm above base. Base comprises five sawn planks 10–15 mm thick. Base diam. *c.* 1.12 m. Thirteen pegs 10–12 mm diam. pegging base planks. Pegs are ash (*Fraxinus excelsior*); planks and staves oak (*Quercus* sp.).

The platter and small bowls are all made of alder (*Alnus glutinosa*) whilst the large shallow dish (No. 1) is made of ash (*Fraxinus excelsior*). Three of the bowls (No. 2, 4, 5) have a double 'S' device on their bases which are likely to be a maker's mark. The marks on No. 2 were carved while those on Nos 4 and 5 appear to have been burnt into the surface. The small bowls may have been used for drinking.

Fig. 103: Tools / handles

9. 1/W12C/1b/894/SF768. Mallet or maul-shaped object, function unknown. Handle set centrally to the 'head'. A hole, diam. 18 mm, drilled through head. Length 308 mm, diam. 123 mm (max). Oak (*Quercus* sp.) (Pl. 22).

10. 1/W61A/1/1194/SF385. Similar No. 9. Handle missing. Length 120 mm, diam. *c.* 85 mm (max.). Oak (*Quercus* sp.).

Tools / handles (not illustrated)

1. 6/W61A/6/1088/SF298. Iron blade fragment with two-piece wooden handle. Total length 210 mm. Wood species unident.
2. 7/W12C/7/355/SF118. Possible 'gimlet-like' tool with an iron shaft 98 mm long. Round-sectioned and 7 mm diam. near handle but oval/rectangular-sectioned at end, 7 x 3mm. Probably incomplete. Oval wooden handle, 68 x 33 mm and 23 mm thick. Alder (*Alnus* sp.).
3. 7/W61B/7-8/2110/SF1106. Fragment of iron knife blade with a two-piece wooden handle, length 83 mm, width 20 mm. Heavily encrusted with silts, gravels, and corrosion products. Wood species unident.
4. 7/W61A/9/1001/SF55. Oval object with circular section 72 x 25 x 11.5 mm with a central hole *c.* 4 mm diam. Similar in appearance to No. 14. Made from Pomoideae cf. *Sorbus* sp. (includes apple/pear/hawthorn/rowan/whitebeam).
5. 7/W61B/9/2046/SF1073. A cylindrical wooden knife handle 107 mm long, 22 mm diam. with leaf-shaped iron blade 103 mm long and 24 mm wide. Birch (*Betula* sp.).
6. 7/W61B/9/2006/SF1042. Fork handle to two-pronged iron fork. Total length 230 mm. Possible carving fork. Maple (*Acer* sp.).

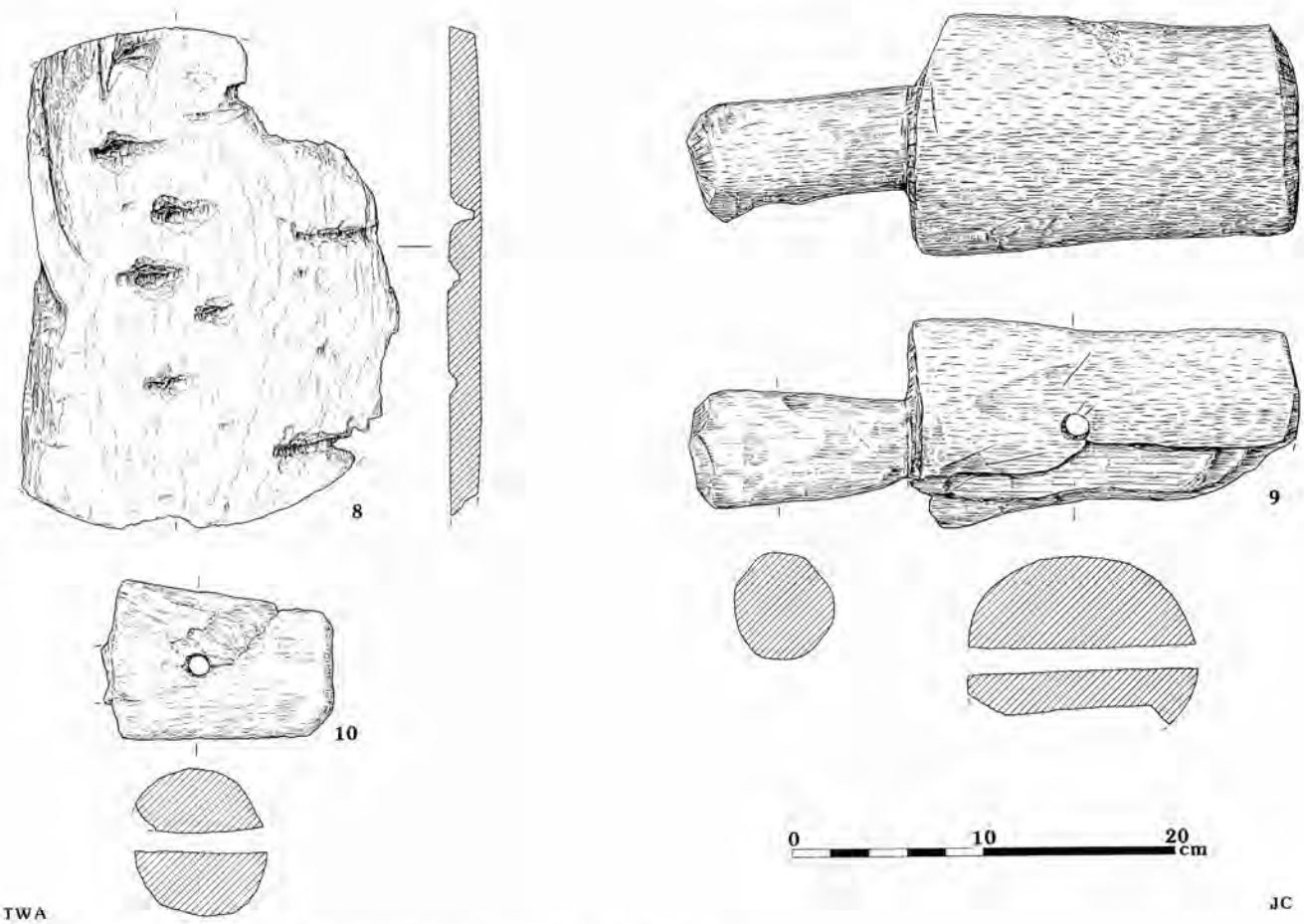

Figure 103 Wooden objects: tools and handles. Scale 1:4

Plate 22 Wooden mallet or maul-shaped object (SF768) of unknown function. Made of oak

7. 7/W61B/9/2016/SF1009. Clothes peg 143 mm long. Made of two tapering semicircular-sectioned pieces of wood bound with a non-ferrous (?tin) band and closed with a (?ferrous) rivet. Willow or poplar (*Salix* sp./*Populus* sp.).
8. 7/W61B/9/2046/SF1094. Shaped wooden handle with non-ferrous incomplete ferrule at base. Total length 68 mm. Maximum diam. of ferrule and handle 10 mm. Possible bottle stopper. Wood species not ident.

Miscellaneous (not illustrated)

1. 3/W61A/3/1174/SF460. Jointing peg. Two fragments with worked faces of uneven size. One with eight uneven sides, 49 mm long, diam. *c.* 28 mm; other with six sides tapering to a broad point, 31 mm long with cross-section 24 x 19 mm. Both oak (*Quercus* sp.).
2. 6/W12C/6/705/SF408. Possibly furniture part *c.* 341 x 55 mm, 31 mm deep. Scots pine (*Pinus sylvestris*).
3. 7/W12C/7/355/SF154. Wooden bead. 11.5mm diam. 7.5 mm high, central hole 1.5 mm diam. Wood species not ident.
4. 7/W61B/7-8/2113/SF1121. Knee-piece of wood joint. Sides 160 x 100 mm long. Faint saw marks on upper surface of longest side. Possibly a reinforcement to an angled timber joint of a roof structure or boat. Oak (*Quercus sp.*).

11. Documentary Evidence

by John Chandler

1. Introduction

The aim of this chapter is to present, from documentary and cartographic sources, as full a picture as possible of the land use history of each excavated site and to relate that evidence to the archaeological discoveries. It also explores more general historical issues relating to monastic involvement in waterborne traffic and the navigation of the Thames and Kennet. The minor investigations of Holy Brook outside central Reading have not been considered.

Research for this report is divided into four main sections, dealing with the Abbey Wharf site to *c.* 1830 and since *c.* 1830; the Bridge Street sites; and a discussion of the historical context of the excavations (*see* Table 1 for correlation of site phasing and date ranges).

Research for this section has explored as fully as possible secondary historical sources, and primary sources held locally but has not investigated material of possible relevance among the national archives in the Public Record Office and British Library.

2. Reading Abbey Wharf to *c.* 1830

This section attempts to trace the history of the whole block of land bounded by the River Kennet on the south and east, the Holy Brook on the north, and Duke Street/ High Bridge on the west (*see* Fig. 7). Holy Brook was sometimes known by the alternative name of 'Granator's Brook', variously spelled (Gelling 1973,11), and Duke Street (sometimes corrupted to Duck Street) in the middle ages was called High Street (Slade 1969). It also considers land opposite Abbey Wharf on the east bank of the Kennet. The post *c.* 1830 history of each excavation site within this area is treated in subsequent sections. In the following paragraphs 'site' refers to the whole area as here defined.

Abbey Foundation

There can be little doubt that the site was included among the lands in Reading which Henry I granted to the new Reading Abbey in its foundation charter of 1125. The relevant passage of the charter (in Kemp 1986, 34) may be translated as follows:

> 'I grant to the monastery Reading ... and its appurtenances, with woodland, arable and pastures, meadows and waters, mills and fisheries...'

The Abbey was begun in 1121, the conventual buildings were complete by *c.* 1126, and the Abbey church was consecrated in 1164 (Cox 1907, 62–3; Slade 1969, 3). Caen stone, flint, and timber were among the building materials employed but no documentary reference has been found detailing the construction phase nor, therefore, the transport and unloading of materials. Although the Abbey went through a period of financial crisis during the 13th century, important new building works were being undertaken, *c.* 1334 (Cox 1907, 65–6).

The site, apart from most of the Duke Street frontage and the town wharf (*see below*), belonged to the Abbey until its dissolution in 1539. It has been suggested (Slade 1969, 2) that settlement may have extended along what became Duke Street as far as High Bridge before the Abbey's foundation, in which case tenements in this area may already have existed, and may not have become Abbey demesne. A deed of *c.* 1230 (BRO T/A 31/2) relates to a meadow in private ownership next to High Bridge, but its position is not clear. Slade's suggestion, however, must be set against the evidence of deeds preserved in the Abbey cartularies (Kemp 1987, 115–16, no. 834, 148–50, nos 893–4). At a date between 1173 and 1186 the Abbey leased to Ralph Purcel and his heirs:

> 'all the land on the eastern side of the road which goes between the new ditch and the Kennet (*totam terram ex orientali parte vie que est inter novum fossatum et Kanetam*)'.

Later, at an unknown date, Ralph Purcel granted this land back to the Abbey: 'and it has now been built upon (*et modo edificata est*)'. He also granted back land leased to him from the Abbey but now with houses and buildings occupied by tenants. If this land could be securely identified as the Duke Street frontage and the 'new ditch' identified as Holy Brook, then these deeds would be evidence that this part of the site was first built up during the late 12th century. Certainly there were houses here during the middle ages, as might be expected, and Amyce's survey of Reading just post-Dissolution (*see below*) implies that by then there were six tenements listed along the east side of Duke Street between Holy Brook and the Kennet, only one of which still belonged to the Abbey in 1539.

Wharf Construction

Other deeds recorded in the Reading Abbey cartularies shed light on the Abbey's management of the rest of the site and the building of wharves. Between 1173 and 1186 the abbot and convent leased to Adam of Earley three messuages, of which one was 'between the two bridges' and the others were 'beyond the bridge' (Kemp 1987, 117, no. 837). Another lease to the same man concerned a messuage 'beyond the two bridges' (*ibid.* no. 836). Between 1186 and 1213, the abbot and convent leased to Godfrey of Binfield one messuage 'between the

two water courses of the Kennet next to the land which had been Adam of Earley's' (Kemp 1987, 22, no. 845).

Taking the evidence of the three leases together, it appears that the two bridges referred to are High Bridge and the bridge which carried Duke Street (High Street) over Holy Brook. The Abbey must have leased two adjacent messuages which lay in the area between these two bridges and between the two courses of the Kennet (ie the river itself and Holy Brook). Assuming that wharves were built during the medieval period on the Kennet only below High Bridge (*see below*), another lease (*ibid.* 123–4, no. 846) seems to suggest that these two adjacent messuages lay east of Duke Street and, therefore, formed part of the site. This lease also gives a context for the building of the excavated wharf, for it is a lease made by the abbot and convent of Reading, between 1186 and 1213, to Osbert of Waltham and his heirs, and the salient details may be translated as follows:

> '...to hold of our church all the land situated between the Kennet and the messuage in Reading which Adam of Earley held of us, apart from a quay (*kaio*) and what pertains to it, which shall be thirty feet long and sixteen feet broad, for an annual rent of two shillings payable at Michaelmas for every other service due to us. Likewise we also grant to him the quay, to the east of his house, which he should build (*faciat*) and repair whenever work is needed on it (*quotiens opus fuerit reficiat*), and so should his heirs after him; and he should take care and ensure that boats are not prevented from berthing there (*naves ibidem applicare inpediantur*) either by the flooding of the waters in winter or at other times, or by drought in summer (*pro siccitate in estate*). And he will maintain in front of the quay a space sufficiently large and level (*ante kaium autem tam amplum plenum et planum procurabit spatium*), and through the middle of his courtyard (*curiam*) a way to the quay, so that there can be no hindrance of any kind either to boats or to waggons (*quadrige*) coming there for loading and unloading. In return for this care and maintenance we grant to the said Osbert, and his heirs coming after him, one half of the profits of this quay, from wherever they might come, retaining the other half for ourselves. It is our wish that the said Osbert and his heirs should hold the said tenement freely and quietly, peacably and respectably, in the same way as the other free and honourable burgesses of Reading...'

Kemp, in his summary of this document (Kemp 1987, 123, no. 846), distinguishes between the quay of 30 x 16 feet, and the one to be built. However, it might be suggested that they are the same.

Identification of Wharf

Neither Osbert of Waltham, nor this or any other quay, are mentioned elsewhere in the published edition of the cartularies (Kemp 1986; 1987), and a search among other appropriate sources of *c.* 1200 has failed to discover another reference to Osbert. However, a cartulary is essentially a record of title, not of estate management, and no conclusion should be drawn from this silence about the subsequent history of this quay, if indeed the terms of the lease were ever fulfilled. It would, of course, be very satisfactory if the intended quay described in this lease could be identified with the excavated structure.

The date of the agreement (1186 x 1213) corresponds well with the late 12th or early 13th century proposed date for Phase 2a, the first constructional episode of the excavated Abbey Wharf. The wording of the lease implies that the quay was to lie east of a dwelling and access to it would be through that dwelling's courtyard. Furthermore, it should be noted that, since no abuttals are mentioned other than the Kennet and Adam of Earley's holding (which, since it lay between the two bridges, was presumably towards the west of the site), it is perhaps reasonable to assume that the lease covered all the eastern part of the site ('all the land (*totam terram*)'), including where the excavated waterfront lay. It seems quite possible, therefore, that the excavated quay is the one constructed by Osbert of Waltham on behalf of the Abbey, and that the forming of the 'hard' and other river management measures were attempts on the part of his heirs to fulfil their maintenance obligations under the terms of their lease.

Even if the document could be shown not to relate to the excavated waterfront, it would nevertheless be of considerable interest in revealing the practical considerations and the bargain which the Abbey was prepared to strike with a tenant constructing a wharf at this period on its land.

River Traffic and the Abbey

No subsequent documentary evidence has been found for a wharf at Reading belonging to the Abbey. Four references, however, make it clear that the Abbey was involved in riverboat traffic. A mid-12th century grant to the Abbey by Adela, queen of Henry I, included an annual payment of £5 derived from a wharf in London (Cox 1907, 63). In 1228, a dispute was adjudicated (in the Abbey's favour) over whether the abbot should pay tolls to the bailiff of Windsor in respect of vessels of men of his lordship plying the Thames to London with goods and merchandise (Cox 1907, 63–4; Kemp 1966, 413). In 1327, the Abbey purchased four houses and a stone quay in London (Cox *loc. cit.*). And in 1405, the abbot reached an agreement (Slade and Smith 1963–4, 49–50) with the Reading townsmen over right of passage by the boats and 'showtes' (working riverboats, usually with a sail: Milne and Milne 1982, 64) of townspeople and strangers:

> 'from the greate Ryver callid Thames thorowe the severall waters of the said abbot and convent callid Kennett which enclosith thone parte of the said abbay unto the High Bridge...'

When a vessel reached 'Brokenburghlok' (Broken Brow Lock, perhaps on the site of Blake's Lock: Thacker 1932, 330) one of its crew was to be sent:

'to the places within the said abbay callid Blankport Conventkothyr and Westhey att one of the which places shall be founde a person that shall be deputid there by thabbot ... to entend and to opyn the lok ...'

A scale of charges was imposed for this service and so, in effect, the Abbey exacted a toll from all vessels visiting Reading. Two points should be noted: navigation higher than High Bridge is not envisaged, and one of the places where the lockopener might be found is given as 'Westhey'. The significance of these points is discussed below (the other places have not been identified).

Medieval Town Wharf

The earliest reference to the town wharf found so far comes in a cofferer's account of 1420/1 (Slade and Smith 1963–4, 66, 69). This refers to the customs of the wharf and mentions a wooden tun and some barrels impounded for non-payment of the custom. The principal series of Reading municipal records (the diaries) begins in 1431 and the first reference to the town wharf in the published edition occurs in 1463, when a council meeting received a presentment relating to 'le Wharfe' (Guilding 1892, 54). In 1464, money was spent on its repair and in 1481, William Lynacre leased, 'all that house with the wharf and appurtenances called le Wharffhowse'. Improvements made by him included hanging the common bell, repairing the wharf, and providing firehooks (which might suggest that the wharfhouse was thatched). In c.1500, a dispute arose between the abbot and townspeople over (*inter alia*) the ownership of the town wharf (Slade and Smith 1963–4, 52 and 54). The mayor asserted that he:

> 'hath been seasid of a wharf and a tenement joyned and assigned to the same with the common beme and weights to the value of 8s 4d and better.'

The abbot replied that:

> 'as to the said wharf and tenements the said mair and burges have not ben thereof lawfully seasid but have held and occupied the same withoute lawfull tytle.'

The argument then passed on to other matters and the question of the wharf seems not to have been decided. However, oversight of the wharf had reverted to officials of the council during the period 1511–1518 and 1533–1535 (Guilding 1892, 57, 80, 82, 122, 123–35, 160). There seems never to be any suggestion that there was ever more than one town wharf and therefore its location can be determined with confidence by the 1552 survey (*below*).

1552 Survey

Two surveys, of 1552 and 1650, provide useful information about the land use and occupancy of the site during the century after the dissolution. The earlier, by Roger Amyce (transcript in Reading Central Library (RCL)), is topographically arranged and provides a directory of holdings in Reading in 1552, including the demesne lands of the former Abbey. It suggests that the eastern frontage of Duke Street between Holy Brook and High Bridge was built up with six tenements. From the north, the second had belonged to the Abbey (as is proved by a 1547 will; Kerry 1883, 174), and the southernmost belonged to the corporation. It adjoined the 'Common Wharf', which can thus be identified on the north bank of the Kennet close to High Bridge.

The former Abbey demesne included an orchard called 'le West Heys' in which were four ponds (*stagna*) and six fishponds ('stewes'), in total two acres; also a garden called 'West Heys' garden containing one rood. Below the site of the monastery was a mill called the 'Gryste Myll' and a malthouse (*domo brasiatoria*). Furthermore, a meadow called 'Tanhowse Mede' was held by lease of 21 years.

1650 Survey

The locations of these former demesne lands are supplied by the later document, the parliamentary survey of former crown lands, 1650 (printed in Coates 1802, 267–70). Land called 'Pondhaies' is said to lie south of the Abbey house and its appurtenances; and 'Pondhaies alias Westhaies' is a small tenement in the occupation of Henry Aires. The Abbey stable and granary are described in these terms:

> 'A large barn, formerly a stable, in length 135 feet, in breadth 30 feet, with a great yard and small garden, bounded by the hollow brook south, and the said great garden north, and all that granary standing over the said hollow brook butting upon the said garden called West-haies, alias Pond-haies south, in occupation of Mr Sharp.'

The land on the opposite bank, elsewhere called Tanhouse Mead or Tanner's Mead (eg in 1539/40, Coates 1802, 293–8), is listed thus:

> 'All those two small tenements with three peeces or parcells of meadow ground now lying in one, in the occupation of John Terrill, bounded with the said Kennet north and west, the towne-Orts, south, and butting upon the said Orte-lane, east, containing by estimation five acres two roods...'

Finally, there is reference in this document to a wood-wharf called 'the Grange wharfe, in the occupation of John Blake', and there can be little doubt that this represents the area later known as Blake's Wharf beyond Blake's Bridge and well away from the site.

Abbey Fishponds and Water Supply

Taking together the evidence of these two surveys and other references, it appears that much of the site had, by the Dissolution, taken the names West Hayes and

Pond Hayes. 'Westhey', it will be recalled (*see above*), was referred to in 1405 when, significantly, it was one of the haunts of the lock-keeper. The existence of monastic fishponds on the site has not, apparently, been noted hitherto but the evidence of the 1552 survey seems quite unequivocal on this point. Because of the slope of the land they must, presumably, have been fed with water from Holy Brook and it might be worth considering whether or not the excavated 'bypass' watercourse could be associated with an outlet channel from fishponds (and that some of the stakes might have been used for trapnets; Beresford and St Joseph 1979, 67–9; Bond 1988). In this context it should also be noted that a deed of 1317 (Kemp 1987, 171–2, no. 945) defines a house and garden in London Street as extending to a small stream running down from the mill of the abbot and convent, for which (ie the house and garden) the lessee had to pay rent to the Abbey granger.

The actual or former existence of ponds in this area was recorded in the name of a house, the Pond House, which is named in evidence before the corporation in 1632 (Guilding 1896a, 123) and listed in a land tax assessment for 1704 (BRO D/P 97/28/13). It was then occupied by 'The Widow Head', so it is conceivable that the building is to be identified with a house in St Lawrence's parish occupied by H. Head and assessed at four hearths for the 1662/3 hearth tax assessment (Powell 1913, 12, copy in BRO T/A 63). Pond House can be identified as Pond Hayes alias West Hayes by the 1710 deed printed below.

Attention should be drawn to one other aspect of monastic involvement with water. Hurry (1901, 23) believed that the Abbey received its water not only from Holy Brook, but also from a spring near Highgrove, Whitley, which was piped by a 2 inch lead conduit under the Kennet and the Abbey Wharf site to the precinct. Its presumed course is mapped in his book, but no evidence for it was apparently found during the excavation.

The Wharf After the Dissolution

The process of abandonment of the excavated medieval wharf, as might be expected, is not well documented. The presence at West Hayes in 1405 of an Abbey official competent to open a flashlock (*see above*) may be evidence that the wharf was still in action then. Detailed accounts of the structures demolished and materials removed in 1549 after the Dissolution of the Abbey have been published, and include two buildings which might have been associated with the wharf: 'a lytle howse standing by the water syde called a slaughter howse'; and 'a litle howse by the water syde' (Preston 1935, 123). Negative evidence for its disappearance, by various dates, include John Leland's account in 1542 (Smith 1906–10, 111), which mentions the confluence of Holy Brook and the Kennet but does not refer to a wharf; the 1552 Amyce survey (*see above*), which mentions no wharf among the Abbey's demesne lands; and Speed's map of Reading, 1610 (inset on his published map of Buckinghamshire), which depicts no structure near the confluence. None of these is conclusive by itself but taken together they suggest that the wharf had gone out of use before the end of the 16th century.

The Holy Brook After the Dissolution

The archaeology and history of the Abbey mill and stables, on the northern edge of the site, have been discussed elsewhere (Slade 1971–2, 67–79; Hawkes 1986–90). Excavations on the presumed site of the stables discovered that a 12th or 13th century building had been destroyed by fire and replaced, probably post-Dissolution, by a second structure, which is marked on Speed's map (1610) as the queen's stables (Hawkes 1986–90, 71). Excavations and observations on the Abbey mill site suggested that the mill was in continuous use from the 12th century until 1959. The central part of the mill was found to project only a minimal distance south of Holy Brook (Slade 1971–2, 67, 73, 75). It is clear that, once monastic authority had disappeared (if not before), Holy Brook suffered from pollution. John Leland, who visited Reading in 1542 (Chandler 1993, xxviii–ix), assumed that Holy Brook had acted as the Abbey's sewage outfall. In 1575, Commissioners of Sewers ordered that various measures be taken to improve matters. These included deepening and cleansing the watercourse, repairing its bank, removing encroachments, and making grass hatches to prevent gravel washing into it from the streets. Outfalls into it were to be fitted with grates; and hogsties, stables, and similar buildings were to be removed if they drained into it (Dormer 1937, 77–8; cf. Macray 1888, 224). Further orders were made in 1596 and these describe the course of Holy Brook, including the following,

> '...and there driving the said Mills at the end of a house called the Wast House a little beneath the said Mills it falleth again into the said River of Kennet.' (Dormer 1937, 79; *see also below*).

It is worth considering whether 'Wast House' (otherwise unrecorded) might not be a misreading of 'West Haise'. It is also possible that, before the Dissolution, the Abbey had encouraged sewage disposal into Holy Brook as a nutritional supplement for the fishponds (cf. Bond 1988, 99, 101).

The Town Wharf after the Dissolution

If, as suggested, the excavated wharf fell into disuse by or during the 16th century, activity at the town wharf or common wharf certainly continued. The corporation diary has been published to 1654 (Guilding 1892; 1895; 1896a; 1896b) and includes several references to the wharf, wharfinger, and river traffic generally during the period 1608–1638. The activities of boatmen and bargemasters were curtailed during the 1625 plague epidemic (Guilding 1895, 242, 245); the theft of beef from a barge moored at the wharf was reported by the wharfinger in 1633 (Guilding 1896a, 165–7); and the wharf and wharfhouse were leased at various dates and at least one of the lessees (Symon Dye) was, himself, a boatman (Guilding 1895, 242, 416; 1896a, 321, 434). The 1704 land tax assessment (BRO D/P 97/28/13) includes, for Duck [*sic*] Street, David Bullock for the Wharf, John Piggott for granaries, for the passage to the Wharf, and

for 10 granaries. Granaries are also listed within the former Abbey demesne lands. Man (1816, 164–5) noted that the name changed during the 17th century to 'the common landing place' and it was so called after 1700. He assumed that by his day, when the area was privately owned, the right to use it had never been formally given up but had been lost by disuse or ignorance.

Proposals for a New Wharf, 1710

Meanwhile the Abbey demesne lands had been leased in 1661 by Sir Thomas Clarges (Hurry 1901, 142, who miscalculates the regnal year (13 Charles II) and gives the date as 1673, but Clarges occurs as occupier of the Abbey in the 1662/3 hearth tax returns; Powell 1913). Pond Hayes, alias West Hayes, remained in the possession of the Clarges family in 1710, for in that year, Dame Elizabeth Clarges, widow, sublet the property to Robert Kent of Reading, wharfinger, and John Piggott of Reading, bargemaster. Portions of this most informative lease (BRO D/EB 833/T46: lease of 5.12.1710) are worth quoting in full (slightly paraphrased). The property is described as:

> 'All that orchard and garden parcell of the pondhayes alias westhayes with a messuage or tenement and other buildings there upon erected or thereunto belonging ... in the tenure or occupation of Mary Head widow [thus the Pond House: *see above*] and now in the occupation of the said Robert Kent and John Piggott containing by estimation three acres be it more or less being bounded with the River Kennett south and east and the Holy Brooke north and abutting upon divers parcells of garden ground heretofore parcell of the said demised premises on the west, with free liberty of ingresse egresse and regresse way and passage to the said pond hays for all servants teems carts and carriages at all seasonable times in and through a certaine way or passage leading out of Duck Street in Reading through a yard or backside now in the possession of the said John Piggott called or known by the name of the Duck Yard to the aforesaid ground called the pondhayes...'

The lessor reserves from the lease:

> 'all those severall pieces and parcells of garden ground with buildings thereupon erected now in severall tenures or occupations of John Abery, Deodatus Bye, and — Debbatt widow...'

The lessor places a condition on the lease, that:

> 'Robert Kent and John Piggott during the term of three years at their own cost will spend £150 (£100 in the first year, and the rest within three years) in building granarys and storehouses upon the said premises and in making a good strong oak campshutt [a facing of piles and boarding: OED] to keep up the banks of the said premises adjoining to the River Kennett, and in about levelling and making good the ground for the conveniency of a public wharf for loading and unloading of goods to and from the said River Kennett.'

A further condition is imposed, that the lessees do not themselves, nor allow anyone else to, set up ricks of hay or straw on the premises, except for their own horses. If the stipulated works are carried out within the three years, the lessor promises to renew the lease for a further 22 years, for an annual rent not exceeding £30. Measures are also taken to safeguard the right of way from the proposed wharf to Duke Street:

> 'And whereas the present way or passage leading into the said premises from Duck Street is and lyeth in and through a certain entry or gatehouse lately demised and granted by one Abraham Dee to Sir Walter Clarges, Bart, deceased, for 21 years, Dame Elizabeth Clarges agrees to pay to renew the lease to procure like way and passage as now through the entry or gatehouse and the backside of John Piggott out of Duck Street.'

The Construction of New Wharves

Unfortunately, no corresponding lease three years later between the parties appears to exist in BRO, so we cannot be sure that the terms of the lease — the building of the wharf, campshut, and granaries — were observed. Nevertheless, the deed appears to give a firm *terminus post quem* for Phase 7 of the Abbey Wharf excavation of 5th December 1710, since no wharf already existed at that date on the property being leased and the property must, from its description, have included the excavation site. John Piggott, it will be recalled (*see above*), was already in 1704 the occupier of granaries and the passage to the wharf off Duke Street. Robert Kent also had a tenement nearby in Duke Street in 1704, according to the land tax assessment. It is probably fair to assume, therefore, that the Pond Hayes wharf project was well considered and took place as envisaged, commencing *c.* 1711.

A fairly certain *terminus ante quem* for Phase 7, assuming that the excavated wharf *is* Pond Hayes wharf, is 1731, because for that year a poor rate assessment for St Laurence's parish survives (BRO D/P 97/11/1). Richard Bromfield is assessed for Pond Heys and Wharf, and also for the Upper Wharf. Also relevant may be two earlier pieces of evidence. The first is the testimony of an eyewitness. In 1725, Daniel Defoe published a description of Reading in the second volume of his *Tour* (Defoe 1927, vol. 1, 291). The relevant passage is as follows:

> 'The town lies on the River Kennet, but so near the Thames, that the largest barges which they use, may come up to the town bridge, and there they have wharfs to load, and unload them.'

He goes on to describe in detail the commodities traded, including (from London) coal, salt, grocery

wares, tobacco, oils, and heavy goods; and (to London) malt, meal, and timber. The second piece of evidence is a petition made in 1715 to the House of Commons opposing the Kennet Navigation Bill (*JHC* 1803, 116–17). It provides evidence (though perhaps exaggerated) for the financial basis on which wharves, such as the Pond Hayes wharf, were built and managed and is worth quoting (slightly paraphrased):

> 'A petition of Thomas Parr, gentleman, and Arthur Walter, for and on behalf of themselves and their wives, and Lyford Kent an infant, was presented to the house and read; setting forth that the petitioners are owners of certain wharfs at Reading ... and by the Bill, now depending, for making the River Kennet navigable, find themselves in a peculiar manner aggrieved. These wharfs are held by leases, of which there are long terms of years to come, at the rent of £10 per annum; and there is chargeable on them, during the life of an annuitant, £40 per annum; and on taking these leases, large fines were paid, and great sums of money afterwards laid out in improving the said wharfs, so that now, and for many years last past, they have been let at, and produced £150 per annum; and are the only fund, or estate, out of which the portions and provisions intended the petitioners' wives, and the said Lyford Kent, by their father's will, are now to be raised; but by making the said river navigable from or beyond these wharfs, or present landing places, the value of the said wharfs will not only be totally lost, and those portions and provisions intended the said children be defeated, but the annuitant must lose her £40 per annum or your petitioners be bound to pay the said rent and annuity (full £50 per annum) without having wherewithal to do it ...'

It is tempting to assume that Robert Kent and his wife had died by the time of this petition and that Mrs Parr, Mrs Walter, and Lyford Kent were his daughters and son but his will has not been found nor the relationships confirmed.

Kennet Navigation

Moves to make the Kennet navigable from 'the wharf or common landing place at Reading' as far as Newbury began in 1708, but the enabling bill was not enacted until 1715 (the act is printed in Pritchard 1913, 830–7) and the work was not complete until 1723. This and other petitions having failed, the work was violently opposed by Reading watermen and was damaged by a mob in 1720. A death-threat was issued against a Maidenhead bargemaster who used the new navigation in 1725 (Clew 1985, 24–7). The Kennet, between High Bridge and the Thames confluence, was not part of the navigation but was brought under the jurisdiction of the Thames Commissioners by the *Thames Act* 1750 (Thacker 1932, 328). This stretch was canalised in 1802 (Childs 1910, 14) and, at the same time, Blake's Lock was converted from a flash lock to a pound lock (Thacker *op. cit.*, 329).

18th Century Developments

The period *c.* 1730–1830 may be more summarily dealt with, because the existence of accurate maps at reasonably large scale makes the topographical development of the site easy to trace. Examination of the relevant portions of printed maps (in archive) by Rocque (1752–3), Rennie (*c.* 1800), Tompkins (1802), and Man (1813), of a recent cartobibliography (Burden 1992), and of the BRO map catalogue, suggests that no printed map of importance has been omitted.

Rocque depicts buildings and a channel in existence on the Abbey Wharf site and possibly the Crane Wharf site by 1752, but nothing between them and the High Bridge. By 1802, the finely drawn map by Tompkins depicts three main complexes of wharf and granary buildings irregularly fronting the Kennet. They are described by Rennie as Blandy's Wharf (ie the town wharf end and in the centre towards Crane Wharf) and Maynard's Wharf (Pond Hayes wharf end)). Man (1816, 164–5) seems to explain why Blandy's Wharf lay in two parts: they were divided by posts which marked the boundary between corporation and crown lands. From this proliferation of wharves it is clear, therefore, that the fears expressed in the petition (*see above*) were unfounded, and the Kennet Navigation did not destroy trade at the Reading wharves. The northern half of the site, fronting Holy Brook, was, in 1802, largely laid out as gardens with a few buildings. Duke Street was built up but the passage remained.

King's Road

In 1832/3, the Crown estate land on the eastern side of Reading (which appears at this date to have included part of the site, *see above*) was auctioned (Phillips 1980, 123–4). King's Road resulted from this piece of speculation and the bridge carrying it over the Kennet bore the date 1832 (Thacker 1932, 330). The auctioneers considered that the western portion of King's Road (ie where it crosses the site) would be suitable for shops, warehouses, and factories (Phillips *loc. cit.*) and, indeed, Weller's 1840 map of Reading (in Phillips 1980, 110–11), shows it continuously built up on the northern side, and partially on the southern side, by this date. The present arrangement of property boundaries over much of the site dates, therefore, from the 1830s and it will be convenient to restrict the later history to the specific archaeological sites under discussion.

3. Reading Abbey Wharf from *c.* 1830

In this section, each of the five excavation sites in the area of Reading Abbey is dealt with separately and a summary land use history of each is presented. The cartographic evidence for 19th century Reading is excellent, with three surveys covering the built-up area at very large scale. Sketches derived from tracings of the

earliest of these, the Board of Health maps 1853 (BRO R/4521) are in archive, together with photocopies of the relevant portions of Ordnance Survey 1:500 sheets surveyed in 1875–6 and published in 1879; Goad fire insurance plans of 1895 (BRO D/EZ 75/1); and later Ordnance Survey revisions at 1:2,500, of 1898, 1909–10, and 1931–2. To complement the cartographic evidence, local trade directories have been examined at approximately five-year intervals from *c.* 1830 to 1976. In the following paragraphs, therefore, dates derived from directories are approximate to within about five years.

Abbey Wharf

Pre-1830s maps (Rocque 1752–3; Rennie *c.* 1800; Tompkins 1802) depict buildings on the site and Rennie describes it as Maynards' Wharf. An 1827 directory lists two bargemasters (William Hedges and Richard Mills junior) at 'Abbey'; in 1837 and 1842–3, Richard Buncombe, timber merchant and wharfinger, is listed at Abbey Wharf. The 1837 reference is the earliest so far found to the name 'Abbey Wharf'. By 1860, William Ridley and Sons were at Abbey Wharf and they occupied the site continuously for about a century, since the last directory in which they appear is 1960; they are not in the 1962 or 1964 issues. In 1870, they are described as 'timber and slate merchants, steam sawing, planing, and corn crushing mills'; in 1900 they are, 'timber, slate, tile, and cement merchants'.

The Goad 1895 plan shows how their yard and works were arranged and this should be compared with earlier and later maps. In general, after a realignment of Holy Brook between 1802 and 1853, little radical change seems to have occurred on the site, apart from the construction of a wooden bridge across the Kennet between 1875 and 1895. Ridley's had acquired Clay Cross Wharf by 1885 (*see below*) and presumably the bridge was made to connect their two sites.

Abbey Wharf, King's Road Frontage

In addition to Ridley's frontage on to King's Road, three other premises fronted the street to the Abbey Street corner. From the 1870s they were numbered 43, 45, and 47 King's Road and, after 1900, 45, 47, and 49 King's Road. The easternmost was a private house, probably throughout its life. The others were shops, generally butchers, purveyors, and/or bakers until the 1920s, by when they had become a single premises. One had briefly been used in the 1880s as offices of the Salvation Army. From *c.* 1925–1944, a steam laundry occupied both shops and by 1949 Morgan and Sons, ironmongers, are listed. By 1964, they are described as 'heating equipment distributors'. A private residence, Abbey House, seems to have existed along the Abbey Street frontage adjacent to Ridley's yard between *c.* 1900 and *c.* 1915 but it is not distinguished on any map.

Abbey Gardens

This was a timber wharf in 1752, according to Rocque's map, but by *c.* 1800 it had reverted to meadowland. It was 'Mr West's Meadow' in *c.* 1800 (Rennie) and is shown as open ground, perhaps part of Tan House Mead, then and in 1802 (Tompkins). Apart from the King's Road frontage it is still shown as open ground in 1840 (Weller). However, by 1842–3, William Holley, grocer and coal merchant, is listed in a directory at 'Kennet Wharf' which, from its position in the list, appears to be immediately east of the King's Road bridge.

By 1860, John Lawrence and, by 1875, James Lawrence, occupied the site, described variously as 'lime, slate, coal, cement and broom merchant', and 'drain pipe, cement, tile and coal merchant'. The premises were known as Clay Cross Wharf in 1879 and are so called on the 1875 Ordnance Survey map and the 1895 Goad plan. By 1885, Ridley's had replaced Lawrence's, and remained there until after 1944. By 1949 and until 1964 Morgan and Son appear to have had the yard but they had gone by 1969. The northern end of the site is shown as a timber yard until after 1912 and, on the western edge, adjoining the river and King's Road bridge, was built a showroom for Ridley's merchandise by 1895; it still appears on the 1931/2 map.

27 King's Road

This was the site of a Baptist church. The Baptist community in Reading has preserved records back to before toleration in the 17th century, and it moved to its King's Road premises (designed by John James Cooper) in 1834 (thus it presumably purchased the plot at the time of the 1832/3 auctions). The church was enlarged in 1857–8 and 1890, when a classical front was added; in 1875 it was said to seat 960 (details from catalogue to D/N 2 in BRO; Stell 1991, 10). The interior and front of the chapel are illustrated in Stell (*ibid.*, 13). The chapel is listed in directories to 1973 and a new meeting house was built at the rear in 1975.

Also listed in directories at 27 King's Road in 1925 and 1929 was a millwright and, from the 1930s until *c.* 1969, Julians of Reading, motor car agent. By 1960 this firm had acquired additional King's Road premises.

Crane Wharf

A building is depicted nearby on Rocque's map (1752–3), and another, possibly part of Blandy's Wharf, is shown by Rennie, *c.* 1800 in this area. Tompkins (1802) has quite an accumulation of industrial buildings on and around the excavation site. Some perhaps remained in 1840 (Weller's map) and thus prevented building here along the King's Road southern frontage. An 1842–3 directory refers to Weighbridge Wharf and Birmingham Wharf along this river frontage. By 1853, a public house named *the Crane* occupied the corner opposite the site and in 1860, Crane Wharf is named. *The Crane* itself is not depicted on the 1876 Ordnance Survey map but its position is shown on the Goad plan (1895). Buildings along King's Road were renumbered after *c.* 1870 and the excavation site was subsequently 30, 32, and 34 King's Road.

A wide variety of trades was carried out in these three premises between 1860 and the 1970s, including

building and decorating trades, cycle and motor dealers, piano warehouse, ironmongers, jewellers, and tailors. Part of No. 32 was used, *c.* 1920, by the Reading Marxian Working Men's Club. The most consistent use was the shop premises of No. 32, which belonged to a tailor by 1905 and continued as a draper's and tailor's (latterly Ives and Ives) until after 1969.

Library Site

The site is shown as built over on Weller's map (1840), the Board of Health map (1853) and subsequently, but the occupier cannot be traced in directories until *c.* 1875. Then, and until after *c.* 1905, the corner portion was used as coffee rooms and restaurant. In 1875, the description is 'W.F. Sherval, British Workman temperance eating house' and, by 1900, 'Francis W. Sherval, Old Abbey Restaurant, coffee rooms'. No occupier is given in 1909 but in 1915 and 1920, these premises appear to have been used by Sutton and Sons as warehouses. From *c.* 1925 until after 1969 they were the wholesale warehouse of E. Jackson and Sons. From Goad's plan, 1895, it is clear that the eastern portion of the site then belonged to the occupier of the adjacent King's Road frontage, E. Grace, grist mill. It is likely, therefore, that, if this part of the site continued to be used by King's Road premises, it would not be separately listed in directories.

4. The Bridge Street Sites

This section examines documentary evidence for land adjacent to Seven Bridges (as this portion of Bridge Street was formerly known) on both the eastern and western sides. In the modern period, attention is directed specifically to the excavation sites at Bridge Street East, Bridge Street West, and Fobney Street.

Early References

Topographical considerations and the earliest name applied to this road line, Old Street, suggest that the crossing of the Kennet and its streams here was an important feature of the late Saxon borough and its continuing importance as a thoroughfare in the early medieval period is confirmed by the formation of a suburb (St Giles) along it during the 12th century or earlier (Slade 1969, 2; Astill 1978, 77–8). The name 'Seven Bridges' was in use by 1287 and perhaps as early as *c.* 1260 (Kemp 1987, 128, no. 855, 141–2, no. 882), thus implying the braiding of watercourses south of the town at this date.

In addition to important corn mills, St Giles' Mill and Minster Mill, close to this area (probably on the sites of Domesday mills), there are medieval references to cloth-making activities of various kinds which can be identified here. An early (1204 x 1215) deed (Kemp 1987, 147 no. 891) describes three islands, one of which lay opposite the guildhall and another next to the third, which was where there had been a tenteryard (*insulam ubi tentorium fuit*). The use of the past tense implies cloth making at Reading some years earlier, presumably in the 12th century, and is the earliest reliable record of the trade (cf. Clark nd, 1).

The existence of a fulling mill in St Giles's parish during the 13th century and probably of a dyer, William *Tinctor*, living nearby, is stated in deeds of *c.* 1260–1290 (Kemp 1987, 135, no. 869, 178 no. 959). At the same period, a messuage within the Seven Bridges which lay opposite the messuage of Thomas *le Tanner*, was sold by Geoffrey the Smith (Kemp 1987, 141–2, no. 882). Another deed of *c.* 1260 x 1290 describes a meadow within the Seven Bridges next to other meadows, one of which once belonged to John *Tinctor*, as well as a pasture within the Seven Bridges, approached through the middle gate and across the middle of the pasture of John *Tinctor* (Kemp 1987, 128, no. 855). There is also mention of 'the mede at the vii Brygge' in *c.* 1300 (Harman 1946, 8). Although they cannot be precisely located, the cumulative evidence of these references suggests that, by *c.* 1300, the land on either side of Seven Bridges was being used both for cloth making and other industrial processes and as riverside pasture/meadowland.

a'Larder's Dye-House

An almshouse was established under the will of John Leche, alias John a'Larder, dated 1477, and among the properties bequeathed to it was a tenement:

> 'on the Seven-Bridges, between a certain tenement of the abbot and convent in Reading ... on the north part, and by a watercourse of the river Kennet, on the south part'

which John a'Larder and John Dry of Billingsgate, London had purchased. An earlier deed had apparently conveyed this property from William Vachell to William Scott in 1435 (Coates 1802, 399; Man 1816, xx–xxii; Harman 1946, 29, who, however, wrongly locates it). As the property of Larder's charity it was leased in 1518 and was clearly a dyehouse, since dyeing vessels and vats were included in the lease. It passed by marriage to John Winchcombe of Newbury (son of 'Jack o' Newbury') and he purchased the dyeing vessels in *c.* 1557 from the charity (Clark nd, 8). Its position, west of Seven Bridges adjoining the Kennet, seems to be established by the Amyce survey (*see below*) and, if correct, implies a tenement in Abbey ownership next to it on the north.

Abbey Property at the Dissolution

The schedule of Abbey property in Reading at the Dissolution included two grain mills and fulling mills called St Giles' mills and a fishery called Tan Lock (Hurry 1901, 88). Among the Abbey property in St Giles parish granted in 1545 to William Grey were: 'le storehouse, the Tymber house, two corn mills, one fulling mill called St Giles' mills, and one le lock called Tanlock...' (Hurry 1901, 138). Since the northern parish boundary of St Giles parish ran along the Minster Mill Stream (Oracle Brook) and further east along the Kennet (Slade 1969, map), it is likely that most of these premises lay in the area between Seven Bridges and High Bridge.

1552 Survey

The Amyce survey of 1552 (transcript in RCL; cf. Harman 1946, 18–31; *see also above*) gives details of the owners and occupants of all tenements and other properties in Reading and is topographically arranged. From this survey, it appears that the area continued its earlier mix of industrial and agricultural uses, including dyers' premises, enclosed meadow and pasture land, barns, and an orchard. East of Seven Bridges, the river pastures may have been known as 'The Hayes', since this name occurs here twice in the survey; to the west, the equivalent land was later known as 'Bear Mead', after the *Bear Inn* (Man 1816, 163).

Developments, c. 1550–1750

A connected history of the ownership and use of specific land parcels during this period has proved impossible but various references have been discovered.

In 1655, some dispute arose about the ownership of the barn which stood next to the *Bear*, and evidence was presented to the city council by the inn landlord (Guilding nd., *Reading Records* mss in RCL, sv.21.11.1655). Its position was described as a curtilage at the end of the *Beare Inn* between Gerenters Brooke [Holy Brook] on the north part and the river of Kennett [?Minster Mill Stream] on the south part, a tenement of one Keynes on the west side of the *Beare*. It appears that the city council laid claim to the barn but the outcome of the dispute is not stated.

Speed's map (1610) emphasises the braiding of the Kennet under Seven Bridges and appears to depict a building on the east side of the street by the Minster Mill Stream and buildings further south, perhaps at Tan Lock. This should be compared with a map of the 1643 civil war defences (copy in RCL); it shows few buildings but appears to mark an extra watercourse which corresponds vaguely with the excavated channel in Trench B of W158. In respect of Holy Brook, there are instructions for its repair in 1575 and 1596 (Dormer 1937, 77–80) and these may provide a context for the reused medieval stonework discovered during the culvert survey.

Rocque's detailed map of Reading, published 1752–3, suggests that Seven Bridges was by then considerably built up at its northern end on both sides and that gardens or closes had been laid out between the Minster Mill Stream and Back Brook (the next stream to the south) eastwards from Seven Bridges. Elsewhere open (presumably meadow) land remained.

Developments, c. 1750–1820

The first evidence of a wharf above High Bridge occurs on Rocque's map, immediately upstream from the bridge on the south bank of the Kennet. Maps of *c.* 1800 (Rennie in Man 1816; Tompkins 1802) depict considerable industrial development east of Seven Bridges. A suite of buildings around an open area, described as Dodd's Wharf, occupied the north bank of the Kennet adjacent to the bridge. The identity of Dodd is uncertain and no-one of that name is listed in a trade directory of 1795. However, John Dodd of Swallowfield served as MP for Reading in 1741 and from 1755 until his death in 1782 (Aspinall 1962, 76–9), so perhaps he was involved in the venture. Other land in the vicinity was occupied by Simonds' Brewery. West of Seven Bridges, land on the north bank of the Kennet remained open but further north, towards the Minster Mill Stream, closes or gardens had been laid out, through which the Back Brook flowed, and towards the street buildings known as Bear Court had been built.

Simonds Brewery

William Blackall Simonds (1761–1834) is believed to have begun brewing in 1785 and acquired the site on the east side of Seven Bridges in 1789. The brewery and his family house were designed by Sir John Soane and built on what was presumably open land by 1794 (Corley 1975–6, 78). Brewing continued on the site until *c.* 1980 when Courage, successor to Simonds, moved to a new site outside Reading. The progress of development on the site may be traced through the maps and illustrations included in archive.

Fobney Street and Bridge Street West since c. 1820

Navigation through Reading above High Bridge was described in 1816 as 'most intricate and dangerous' and 'a disgrace to the town'; and a plan, not then implemented, had been drawn up to build a new cut using St Giles' mill head for through boat traffic (Man 1816, 1634). Improvements appear to have been made in 1828, when a new wharf (Bear Wharf) and dock were built west of Seven Bridges (Childs 1910, 14). Fobney Street was presumably built at this time as access to the dock and to the canal company offices depicted on the Board of Health plan, 1853 (BRO R/4521/15).

These works impinged on and superseded the layout of closes shown on Tompkins' map (1802), although the sinuous course of Back Brook remained. The canal locks were altered and the dock was filled in *c.* 1875 (Clew 1985, 114) and this coincided with alterations at Simonds' brewery. In 1872, the brewery had converted its malting space to beer stores (Corley 1975–6, 84) and trade directories suggest that the brewery had acquired the former canal site by 1885, first as a yard and workshops but, by 1895, for malthouses as well. Goad's plan of 1895 shows the layout of the malthouses and subsequent developments may be seen from Ordnance Survey maps. Simonds and, later, Courage occupied the whole area until the 1970s. Further north, Bear Court had become Bear Square by 1879 and, in addition to various industrial buildings, a terrace of cottages had been built by 1900; they were known as a'Larders Buildings by 1912. By 1931, all the land southwards from their back gardens to Fobney Street, as well as an area to the west, was covered by buildings, presumably associated with the brewery (all details from Ordnance Survey maps).

5. Discussion

The Reading Abbey Waterfront excavations contribute to our understanding of various aspects of medieval economic and monastic history, as well as being of obvious importance to the local history of the Reading area. In the following paragraphs, documentary and other evidence is presented as a contribution to placing the excavations in their wider historical context; and the relationship between the archaeology and the documented history is assessed.

Religious Houses and Waterfronts

Evidence of monastic involvement in river traffic and wharves is scattered but quite plentiful. It includes details of materials for the fabric of the buildings being transported by river, provisions being brought for the community's use, and more general trading by monastic estates.

Although no historical evidence has been forthcoming relevant to the transport of building stone for Reading Abbey, it is clear that where stone could be brought by river for religious houses and other major works this was done. The expenses of building Norwich Cathedral chapter house during 1288–9, for example, are detailed in the Cathedral Priory's communar rolls. Stone was brought on three occasions by a ship (*navis*) from Caen to Yarmouth, where it was transferred into either four or six smaller boats (*batella*) for the journey to Norwich. Further expense was incurred for horses and workmen in bringing the stone from the water to the great courtyard (Fernie and Whittingham 1972, 54–5). For York Minster, a late 14th century operation involved cartage of stone from the quarry to Tadcaster on the River Wharfe, then water carriage down the Wharfe and up the Ouse, to 'Saint Lenard lendyng' (the wharf at St Leonard's Hospital) in York, followed by 'sleddyng' the stone to the Minster yard (Salzman 1952, 351).

Many religious houses acquired quarries of their own and sometimes the grant included the means of bringing stone from the quarry to the Abbey. Thus Meaux Abbey (E. Yorkshire) was given not only a quarry at Brantingham, but also a place to store the stone and access to the Humber and Hull rivers (Salzman 1952, 120). It has been suggested that the modern town of Hull originated around a wharf or port built by Meaux Abbey, principally to export its clip of wool (Ayers 1981). Abingdon Abbey owned a quarry at Wheatley near Oxford by 1361 and it is probably indicative of the problems of river navigation on the Thames (*see below*) that the Abbey obedientiars' rolls record stone from there and from Taynton near Burford always being brought the entire journey overland (Jope 1948–9, 58–9). In the Fens, however, navigable waterways were extensively used for the transport of stone by East Anglian religious houses, including Crowland, Ramsey, Ely, Sawtry, Bury St Edmunds, and Peterborough (Salzman 1952, 120; 1964, 209–10; Jenkins 1993).

Sawtry Abbey near Huntingdon had, before 1176, built a ditch at its own expense to carry stone from Barnack for building its church (Salzman 1952, 120). Similarly, in the Axe valley in Somerset, Glastonbury Abbey had embanked a waterway at *Andredeseye* (Nyland near Cheddar):

> 'for the abbot to take stone and lime and corn from his manor aforesaid (Nyland) and from other places in those parts to his Abbey of Glastonbury.'

When this bank was repaired and enlarged local farmers demolished it and, in 1276, were taken to court by the Abbey. The jury found for the Abbey, confirming that it was an old bank and that the abbot had a thoroughfare by his boats for carrying to and from Glastonbury, Nyland and other places in those parts (Landon 1926, 75–80; *see also* Williams 1970, 65). It is worthy of note that Nyland and Glastonbury are only *c.* 15 km apart overland but the journey by water would have involved a distance of some 50 km, via the Axe, Bridgwater Bay, and the Brue. A recent excavation at Glastonbury detected a possible waterside timber structure beside an artificial watercourse (Russett 1991, 65–6), which may, therefore, have been connected with this traffic to the Abbey.

There is good evidence that other religious houses in the same position as Reading, adjacent to navigable waterways, exploited their location by building wharves or staithes. At York, Clementhorpe nunnery had a staithe whose stone foundations were visible and recognised as such as late as *c.* 1730. Its purpose, it is suggested, was as a convenient method of receiving supplies for the nunnery (Dobson and Donaghey 1984, 19). Several other religious houses in York had river frontages and some may have built staithes (Hall 1991, 182; cf. St Leonard's Hospital, *above*). At Gloucester, St Oswald's priory lay next to the quay but, as reported by Leland *c.* 1543, friction between the town and the monastery had caused the quay to be moved to a new site (Smith 1906–10, vol. 2, 57).

Two excavations of waterfronts associated with monastic precincts provide close parallels to the situation at Reading. At Oseney (Oxford), artificial river channels, 12th-century waterfronts, and industrial buildings were explored (Sharpe 1985). At Waltham Abbey (Essex), a dock with slipway, possibly of *c.* 1200, on the River Lea was excavated close to the site of the Abbey's great barn (Huggins 1972).

The administration of monastic estates, which of necessity involved moving agricultural and other commodities between manors and to markets, naturally involved water transport wherever it was most convenient. The bishop of Winchester rented granaries at Henley-on-Thames, to which tenants of his Thames valley manors were required to deliver produce for shipment to London. He also moored boats at Wargrave, upstream from Henley, for the same purpose.

The bishop of Ely operated a chain of collecting points on Fenland waterways (Farmer 1991, 354). An excavated example of a wharf built by a monastery on one of its estates has recently been published. This is at Woolaston on the Dean bank of the Severn, near Chepstow, which became a manor of Tintern Abbey in 1131. The quay structure has been dated mid 12th–early 13th century and is thus contemporary with the principal

constructional phase at Reading. It is suggested that most manorial produce was not taken to Tintern itself, but sent to markets at Bristol, Gloucester, and South Wales, so that a quay on the Severn was an obvious advantage. The structure may have continued in use until the Dissolution and thereafter been destroyed by a storm, perhaps in 1606 (Fulford *et al.* 1992, 119–20).

Waterborne Traffic on the Thames and Kennet

The extent to which the Thames was navigable during the middle ages and later has been often discussed. The evidence provided by this excavation, and by documentary references relating to it, may serve to overturn commonly held beliefs. The possibility of commercial navigation on the Kennet above Reading before the 18th century remains doubtful.

It has been suggested that a Roman settlement at Reading may have served as a river port for Silchester, providing access for heavy cargoes to London via the Thames (Astill 1978, 77). That the Thames was navigable to Oxford in the 11th century is implied by the Abingdon Chronicle, which explains a diversion of the river at Abingdon in terms of a petition by Oxford citizens whose boats used the river and would be prepared to pay a toll if the improvement was carried out. Later references implying London to Oxford river traffic occur in 1163 and 1205. Thereafter, it has been argued, the construction of fishweirs on the river made navigation increasingly difficult, until it effectively ceased above Henley. The consequent loss of trade by Oxford sent the town into a long and severe decline between *c.* 1250 and 1350 and the existence of numerous abandoned properties made it attractive to poor scholars seeking cheap accommodation as the university began to expand (Salter 1936, 17; Davis 1973, 263–7).

This view of Thames navigation, seen from an Oxford perspective, can be corroborated from other sources. The manor of Cuxham, near Thame, invariably carted its produce to Henley for shipment down the Thames but never sold corn in Oxford (Harvey 1965, 103). The problems and dangers of negotiating flashlocks when journeying upstream were cited in 1399 as reasons why river traffic had dwindled and the price of food in London increased in consequence. One flashlock near Henley was said (*c.* 1376) to have lost its winch and become so blocked as to be impassable (Salzman 1964, 211). A millstone bought in London for Witney in 1304–5 was taken by river to Henley, where it was transferred to a cart for the remainder of the journey overland (Farmer 1991, 353). Herrings for Eynsham Abbey were brought to Henley by barge and by road thereafter (Salter 1936, 17). Stone for Eton College was quarried from Taynton in 1456–7, and taken by cart via Abingdon to Henley, where it was transferred to barges (Jope 1948–9, 59). And there is the evidence of Abingdon Abbey, cited above, which seems always to have used carts for transporting stone (Jope *loc. cit.*).

The accumulation of evidence such as this led Thorold Rogers, the Victorian economic historian, to conclude that, by the 14th century, Henley was the furthest point to which the Thames was ordinarily navigable and this conclusion has been endorsed by many later scholars (eg Salter 1936, 17; Bowden 1967, 613; Davis 1973, 264). It has also been vigorously opposed, by Thacker (1968, vol. 1, 268–73), with numerous instances of medieval navigation; his views were more guardedly endorsed by Willan (1936, 146), who believed that the passage of the Thames was preserved throughout the middle ages.

Clearly, the argument can be reopened in the light both of the archaeological evidence of active medieval wharves at Reading and Oseney (Sharpe 1985), and a possible medieval wharf excavated at Abingdon (Parrington 1975, 66), as well as the documentary evidence (*see above*) of a presumably regular traffic of boats and barges up to Reading High Bridge by 1405, with the town wharf refurbished later in the 15th century. The two positions are not entirely incompatible, however. Salter in 1936 (*loc. cit.*) conceded that, although laden barges could not travel upstream to Oxford, empty barges might, and that laden barges might, with difficulty, travel downstream from Oxford.

Farmer (1991, 353) hints at the same possibility, noting that most English waterways flowed in the direction of trade, and cites instances of agricultural produce being taken to London from (*inter alia*) Brightwell, Harwell, and Wallingford, all above Reading. Clearly it must have been much easier (if somewhat exciting) to shoot a flashlock with a laden barge going downstream, than to attempt to winch the same laden barge through the flashlock against the flow. The possibility should perhaps be entertained that Reading's medieval wharves were primarily engaged in a one way trade, dispatching produce from the town, the Abbey's estates, and the surrounding countryside, for the London market, but carried in vessels which returned empty.

No documentary evidence has been discovered during this research or by previous investigators (Thacker 1932, 306–7; Willan 1936, 151; Dalby 1973, 6) that navigation took place, or was contemplated, during the middle ages on the Kennet above Reading High Bridge. The first reference generally quoted is the statement of Blome in 1673 that the Kennet was large and navigable for barges (Willan 1936, 151) but this cannot be corroborated. One hitherto overlooked reason for the absence of medieval river traffic may have been High Bridge itself. When a new bridge was built in 1787, part of a much older structure on the site was uncovered:

> 'On digging the foundation for the new bridge, the workmen discovered part of an ancient pier, which, from the spring of the arch, shewed the original span to have been very small ... From the smallness of the span, it is probable the passage of the water in this place was, in the early ages, divided into small streams or brooks, and did not flow in one channel as at present.' (Man 1816, 129 footnote).

It may be, therefore, that medieval High Bridge presented an effective barrier to navigation above it. Thacker (*loc. cit.*) cites as negative evidence that the Kennet was previously used for river traffic, the furore generated among Reading tradesmen at the proposal to make the Kennet navigable; and Willan (1964, 41–2)

cites several towns besides Reading which bitterly opposed similar schemes, including Liverpool, Monmouth, Ipswich, and Maldon. The reason in every case was fear that:

> 'a town which had hitherto been a market at the head of a navigation might become a mere place through which boats passed without stopping'.

But if we concede that medieval Reading was indeed the effective head of navigation on the Kennet, it is nevertheless likely that the river has always been used for transport on a small scale. In Somerset Russet (1991, 64) has demonstrated that placename evidence can be used to show that traffic occurred on even quite minor rivers and one of his significant name elements, 'hythe' (a landing place for boats) does occur on the Kennet. Hidden, near Hungerford, which is mentioned in a charter of AD 984, means 'valley with a landing place' (Gelling 1974, 304); the hythe, according to Gelling (1976, 674) was situated at Kintbury.

Efforts during the 16th century to clear obstructions rendered the Thames navigable to Burcot near Dorchester for laden barges and perhaps to Oxford by 1583 (Willan 1976, 18–19). Pound locks were built to replace the dangerous flashlocks and the London market became easily accessible to Thames Valley producers, with the result that prices in different markets showed less variation (Bowden 1967, 613–14). Paradoxically, this was the period when the Abbey wharf at Reading seems to have fallen into disuse but there is ample evidence that the town wharf continued.

The Archaeological and Historical Record

Aspects of the relationship between the excavated leatherwork and the historical evidence for leatherworking in Reading have been discussed above (p. 142). The following observations relate more generally to the proposed archaeological periods and phases of the various excavations.

The phases proposed for the Abbey Wharf sites conform very well with the documentary record. This sequence may begin with the post-and-wattle construction assigned to Phase 1c at the northern end of W12C, which could be contemporary with the first constructional period of the Abbey, between 1121 and 1126 (*see above*). Phases 2a and 2b, the first major constructional episode on the Abbey Wharf site and the making of the hard, are assigned a late 12th- or 13th-century date and this corresponds neatly with the Abbey engaging in speculative wharf building, possibly on the same site, between 1186 and 1213. The Phase 4 reclamation and extension to the frontage after 1315 occurred when the Abbey, after a period of financial mis-management, appears to have been prospering and engaging in new building work. The abandonment phase (Phase 6), interpreted as a consequence of the Dissolution of the Abbey in 1539, is not contradicted by anything in the documentary record, and the reconstruction Phases 7 and 8 fit well with the documentary evidence of wharf building *c.* 1710, and the cartographic evidence of major work and a new channel in place by 1752.

Apart from this corroboration of the archaeological sequence, the principal contribution of this documentary research is the evidence of medieval monastic fishponds in the area between Holy Brook and the Kennet. It is suggested that various excavated features at 27 King's Road, such as watercourses, birch stakes, and the silty deposits, might be reassessed in the light of the possibility that they may be associated with the management of fishponds.

Other, minor considerations are as follows: the possibility that reworked stone from the Abbey found in repairs to the Holy Brook may have been the result of the 1575 and 1596 refurbishments; that the archaeological record of early domestic and industrial activity in the Bridge Street area may be related to the development of St Giles as a suburb of Reading, as documented by deeds preserved in the Abbey cartularies; and the possibility that the absence of evidence of medieval wharves and navigation above High Bridge may have been the result of an obstruction caused by the bridge itself.

12. Discussion

1. Introduction

The Reading Waterfronts project was conceived as the investigation of a defined area within which the principal aim was the recovery of as much information as possible concerning the management, development, and exploitation of the historic riverside margin of the town. The evolutionary nature of the project through a decade has been previously considered (Chap. 1), and it is not possible to evaluate the results against a single set of goals. Instead, discussion of the results of the excavation is considered in two general areas: the nature of the excavated deposits, their potential, and their formation; and the adaptation and utilisation of the waterfront area. A concluding synthesis is offered.

A brief survey of published syntheses suggests two approaches to waterlogged or water margin sites. The emphasis of prehistoric wetland studies is heavily weighted towards lacustrine and peat bog deposits (eg Coles and Lawson 1987), whereas Roman and post-Roman waterfront studies concentrate on riverfront, riverside, and foreshore activities with little explicit attention paid to the river channels themselves (eg Milne and Hobley 1981, Herteig 1985; Good *et al.* 1991). Fluvial deposits (the focus of the excavations at Reading) are little explored.

River channel deposits are but one category of wetland and, as with all waterlogged deposits, are characterised by anaerobic conditions inhibiting the decay of organic materials. Wetlands are nevertheless variable environments which are not uniform in their preservative qualities (Coles 1987). Waterlogging and the chemical neutrality of the Kennet riverine silts has ensured the survival in good condition of most categories of organic material, animal bone, and metalwork, although many of the deposits examined (reclamations and transgressional silts) are only marginal environments.

The survival in waterlogged conditions of otherwise perishable items is itself of some intinsic importance; the leather assemblage from Reading contributes to an area of study which is limited by a basic lack of data. Other aspects of survival have easily exploitable benefits: The dendrochronology curve generated from the revetment timbers will have application to other sites within the region and beyond, and the consequent closer dating of associated assemblages is proving beneficial in the interpretation of non-waterfront sites elsewhere in the town.

Stable, waterlogged environments comprise only a minority of the riverfront area deposits, however. Within the transgressional river silts and alluvium survival is less complete and less predictable, as demonstrated by the variability of seeds and plant remains on sites away from the Abbey Wharf. Perishable organic artefactual and environmental material is almost wholly absent from the Abbey Wharf reclamations, even from contexts which could not have remained above the prevailing water table for much more than a century.

The incorporation of artefactual material into rivers in prehistory has received attention (eg Bradley 1979), although few of the arguments have any direct relevance to the historic period. Evaluation of the competing explanations as to the means by which deposition occurred is not straightforward and is rarely conclusive. Even where one explanation can be strongly favoured, an understanding of the process may remain restricted: The quantity of partially complete leather items and horn cores recovered from the channels at the Abbey Wharf strongly suggests deliberate dumping which, from a consideration of the shoe types involved and by reference to the observed stratigraphy, must have been repeated over a time scale of some centuries. The frequency of dumping and the composition of individual consignments remain unknown, however, and without this information an important link between the excavated objects and the riverside activities they represent is broken.

Smaller quantities of material present an even more difficult problem. The arguments for the deposition of pottery and non-horn core animal bone have already been considered in the relevant sections, and at the Abbey Wharf site the similarity in composition between assemblages from reclamation dumps and channels has promoted the suggestion that the first are derived from the redeposition of the second. The processes of deposition and redeposition are not easy to reconstruct on such riverfront sites, and it is not always possible to distinguish between small-scale, sporadic dumping and casual loss at low levels over an extended period. At the most general level, absolute quantities of material serve only to distinguish between 'sites' (defined in terms of foci of human activity) and areas less intensively exploited, where no *in situ* evidence for riverside settlement, commerce, or industry is likely to be found.

The situation may be further complicated by the depositional and redepositional forces at work on riverine silts. Currents conspire to disperse (or accumulate) groups of artefacts following their incorporation in channel deposits. Theoretical and practical studies of animal bone movement in river channels suggests that the processes may be predicted given closely defined conditions (Hanson 1980), but that even heavy materials may be transported considerable distances during flood conditions.

Experiments with handaxes have demonstrated movements in excess of 150 m in a little over two months (Harding *et al.* 1987). Although much of the experimental work has been carried out in streams with a far less silty bed than the Kennet, there must be a presumption that movement has occurred. As a consequence, the concentrations of, for example, leatherwork (analysis in archive, not conclusive) on the Abbey Wharf site cannot be taken at face value. Any patterning reflecting discrete episodes of dumping will be initially diluted by random movement and will eventually reform into patterns dictated by currents and river flow. The level to which intra-site spatial analysis is a sup-

portable line of enquiry will vary according to local conditions, but must always be questionable.

2. Deposition of the Silts and Reconstruction of a Wider Landscape

Other aspects may offer more encouraging scope for investigation. The Kennet is a non-tidal river, and, in theory, estimates of contemporary channel height can be obtained from the surviving heights of reclamations, revetments, and channel silts without the need for the complex adjustments necessary for tidal flows (cf Milne and Milne 1982, 60ff). Previous published estimates from W12C Abbey Wharf (Fasham and Hawkes 1985, 135) have been modified by further excavation and subsequent analyses which have provided additional data and altered previous chronological schemes. A more cautious approach to interpretation is now taken.

Too few observations were made to allow for any specific consideration of the prehistoric period but, thereafter, it is possible to discern a similar pattern for the accumulation of both transgressional and channel silts. From the Romano-British period there is an acceleration in the rate of deposition which is seemingly maintained into the medieval period until at least *c.* AD 1300. Subsequently levels appear to stabilise with channel silt levels rising once more during phases associated with the 18th-century canalisation. A number of factors, acting alone or in combination, may affect the behaviour of the river in ways which might produce such results. The principal likely causes are considered below.

Climatic Change

The detailed reconstruction of localised climatic changes for the medieval period relies heavily on the evaluation of contemporary accounts, and this process is open to some criticism on the grounds of the unreliability of the sources and their often uncritical use (Bell and Ogilvie 1978). Nevertheless, certain trends in the weather patterns are generally accepted, although ascribed dates may vary considerably (the following dates and characterisations adapted from Lawler 1987): A period of warming *c.* AD 900–1150, culminating in the climatic optimum of 1150–1300 with temperatures perhaps 1°C higher than the present day; a subsequent cooling and worsening of conditions between 1300 and 1450, leading to the 'Little Ice Age' from 1450–1700 or later, albeit with warmer periods interspersed, notably around 1500.

Rainfall estimates may be even less reliable than temperatures, but suggest an overall rise in precipitation of some 3% during the climatic optimum, strong seasonal variation involving a higher level of rainfall in winter more than off-setting the effects of drier summers (Lawler 1987, 123). Such an alteration in the pattern of precipitation is likely to have made flooding more likely. The period of cooling which followed would have seen a drop in overall rainfall of 7–10%.

The periods of enhanced rainfall correspond with at least part of the duration of increased transgressional silt deposition in Reading. Alternative, earlier, estimates for the start of the period of warming (eg AD 750, following Le Roy Ladurie 1972) would allow an even better match, but it is not clear whether such a pattern could be pushed back into the Roman period.

Indirect Human Action Through Landscape Change

If climatic factors alone cannot provide a conclusive explanation for the changes in river behaviour, then the significance of the results from the excavated sites needs to be considered against the background of the early development of the landscape of the Kennet Valley.

Despite the evidence for widespread Bronze Age settlement within the Kennet Valley there is no indication that this resulted in any more than a marginal effect on river behaviour at Reading. Pollen analysis from Aldermaston and Knight's Farm (Bradley *et al.* 1980), and Anslow's Cottages (Butterworth and Lobb 1992) suggests a progressive opening of the landscape involving the creation of some areas of grassland with at least sporadic cultivation. Evidence from Romano-British deposits at Aldermaston indicates only limited subsequent increases in the areas of open ground and cultivation. That such activities should have so little discernible effect downstream may be due to the width and flatness of the Kennet Valley floor south and west of Coley Park, where changes in vegetational cover and the intensity of settlement activity may have had less impact on drainage into the Kennet than any changes on the steeper valley slopes closer to Reading.

There is some evidence for late- or post-Roman alluvial deposition along the valley at Bellwood, immediately downstream of the Kennet and Lambourn confluence, where deposits of peat overlay a single sherd of Roman pottery (Lobb 1986). At Anslow's Cottages probable fish traps of 7th- or 8th-century date were recovered from channels with apparently clean, fast-flowing water. A phase of late Saxon (possibly 10th century) river management with stake alignments along the bank was overlain by a coarse flood deposit cut by and therefore pre-dating a 12th-century ditch (Butterworth and Lobb 1992).

Other indications of an expansion and intensification of activity in the early–middle Saxon landscape may be inferred from the placename evidence on the Berkshire Downs (Richards 1978, 51–5; Gelling 1974, map III) and documentary and charter records suggesting extensive exploitation of the western half of the county by the 9th century (Astill 1984, 58). The limited environmental evidence available for this period in the region as yet provides little support for this hypothesis, however.

The difficulties of correlating events upstream along the Kennet Valley with the depositional processes in the town suggest that explanations must be sought closer to the urban area. The development of Reading itself would have been a significant factor both in terms of being a direct contribution to altered drainage patterns and, indirectly, as a stimulus to the development of a locally more open landscape. The enhanced rates of transgressional silting from the 8th century onwards may in part follow from the growth and development of the town.

No excavations have been carried out within the supposed area of the Saxon town, and there is little specific evidence from the area immediately beyond; excavation of the pre-Abbey land surface on the Abbey Stables site (Hawkes 1986–90) suggested at least occasional cultivation of soil of poor agricultural potential before the early 12th century, which might be taken to indicate a fully exploited landscape, albeit at a comparatively late stage of urban development. Radiocarbon dates from stakes in the Holy Brook at Coley Park Farm (cal. AD 650–760; Har–8559, 1320±50 BP) and in the Kennet at Theale, 9 km west of Reading (S. Lobb, pers. comm.) imply a concern with the riverside margin, presumably for agricultural purposes, at an early date. However, isolated or small groups of stakes may have been used in the construction of fishtraps.

3. The Management and Exploitation of the Riverfront

The effects of the town and its hinterland on the river regime presumably continued at an ever increasing rate, proportional to the expansion and intensification of the urban settlement. Not all of the deposits from the excavated sites can be explained as the result of processes described above, however, and nor has the human response invariably been the passive acceptance of repeated riverine transgressions and inundations.

The excavations have defined a series of revetments designed to control and manage the river, which, in broad terms, increase in extent and sophistication through time (Chap. 6). The importance and the relevance of the earliest evidence in the historic period is easily over-stated. Finds of Roman brick, tile, and pottery at Abbey Wharf cannot be ascribed to a known site, and need not be connected with the exploitation of the waterfront area. The single stake from the Holy Brook at Coley Park Farm in the mid-Saxon period can hardly be assumed to imply attempts at formal control, whatever indications it might convey of an increasing interest in the riverside margin. Contemporaneous evidence from the town is quantitatively small, and suggests only a limited realisation of the potential of the waterfront.

From the late Saxon through to the post-medieval periods, aspects of motives for the control of the river system are more apparent from the excavated evidence. Management of the channels would have provided some relief from flooding and inundation, and incidentally (or deliberately) improve the river flow, resulting in increased, yet controllable, power for mills; revetments of suitable form would provide opportunities for the development of wharfage; once river behaviour was controlled, adjacent land could be drained to provide managed meadowland, areas suitable for the location of industry, or sites for the expansion of urban settlement.

The utilisation of the waterfront at various periods (Fig. 104) suggests a general chronological sequence, with earlier phases of activity limited to the control of the watercourses, and the subsequent exploitation of the new conditions for water power and wharfage. The secondary benefits of drainage and the consequent utilisation of the adjacent areas was apparently only slowly realised, and then in selected areas only.

Flood Relief

The increased rate of transgressional silt deposition during the late Saxon period has been suggested as a worsening problem. The principal and most immediate effect of any riverfront revetment or consolidation work would have been to reduce flooding in the immediate area, although, until the whole riverfront was encased or raised, localised works could exacerbate problems farther downstream. Until such revetments beyond stream confluences were installed (on the excavated evidence, probably not until the later 13th or 14th centuries) no satisfactory solution could be achieved. It

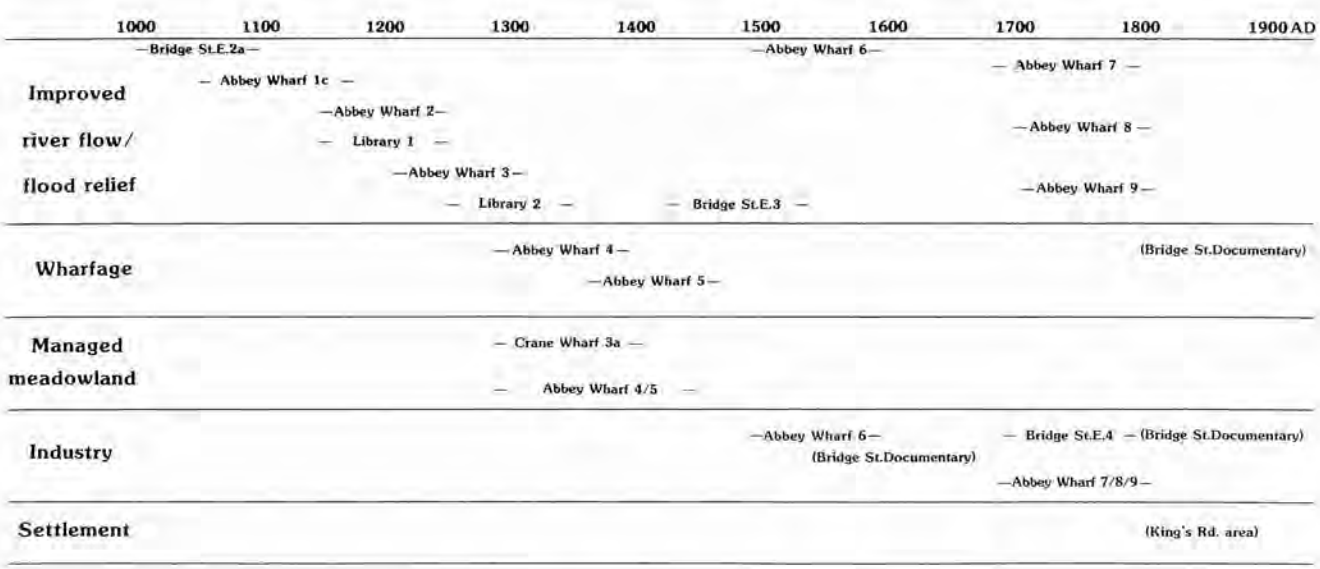

Figure 104 Land use by phase in the waterfront zone

is likely that improvement works early in the system (ie at the upstream end of town, the west) would lead to a deterioration elsewhere; at least some of the measurable increases in flood deposition at Crane Wharf and Abbey Wharf may have been due to the revetment work carried out in the Bridge Street area. The failure to provide comprehensive flood avoidance measures would almost certainly have inhibited the development of surrounding areas for farming, industrial or residential purposes.

Stability in the river system cannot be demonstrated until at least the end of the 14th or early in the 15th century at Crane Wharf (Phase 3 upper levels) and Bridge Street East (Phase 2 upper levels), after which time no further transgressional silts seem to have been deposited in these areas. Nevertheless, a reference in the town cofferer's account for 1420–1 (Smith 1963–4) to the flooding of the cornmarket suggests that drainage and river management could still present difficulties, and even in comparatively recent times (31st January 1814) adverse weather conditions could lead to the Kennet bursting its banks in Reading (Ditchfield 1887, 11).

References to locks on the Kennet in and below Reading can be traced back as far as 1405 (Brockenburgh [?Blake's] Lock; Slade 1963–4, 50), with numerous references from the first half of the 16th century onwards. This system of locks, principally an aid to navigability, enabled active control of the water flow and water levels through the town. The locks would have been more effective than the somewhat passive, defensive measures afforded by the reclamations and revetments. The subsequent utilisation of the riverside margin for the first larger-scale industrial and then domestic purposes may have been dependent on this final stage of riverfront management.

Mills and Fishponds

The appearance of mills on the stream network is a special case of industrial development, directly exploiting the river. Mills are comparatively early features in the urban landscape, and the need to provide an unobstructed flow of water immediately above and below the mill wheel is likely to have been an important motive in revetment construction. Examples here include the series of revetments on the Library site immediately upstream of the Abbey mill, and the construction of the 'hard' on the outflow of the Holy Brook (Abbey mill tailrace). The documentary work has also drawn attention to the existence of fishponds in the vicinity (in the 1552 survey). This may have been supplied by water from the Holy Brook with the 'bypass' watercourse perhaps providing an outlet channel for the fishponds rather than being associated with the Abbey Mill.

Wharfage, Trade, and Transport

The Town Wharf stood on the north bank of the Kennet immediately to the east of Duke Street, south of the market and close to High Bridge. This site was redeveloped in 1983 without any archaeological investigation, planning permission having been granted some time before the potential of the waterfront zone had been appreciated. This failure to excavate, coupled with the limited range of information retrieved from the Abbey site, limits what can be said about the appearance, layout, and physical attributes of Reading's medieval wharfage. In addition to the Period 4 and 5 buildings on the Abbey Wharf, other structures which could be related to the waterfront area might include the flint-and-mortar walls excavated by Vince (1981–2, 38–41) and observed by Fasham and Stewart (1986–90) south of the Abbey refectory wall, north of the Holy Brook. These buildings were not closely dated, but probably should be considered 14th century or later, contemporary with the earliest revetment structures compatible with wharfage. It is possible that two of these various buildings were those recorded as having been demolished in 1549 following the Dissolution, and which may have stood on Abbey Wharf.

The excavations provide little evidence for the volume of trade which might have passed through the Abbey Wharf. With the exception of the east coast shellfish, none of the excavated objects from the sites suggests a point of origin which would have made river transport the most obvious or even likely means of arrival. The paucity of identifiably traded items from the excavations may in part result from the specialised (and, in domestic terms, peripheral) nature of the sites examined, and also from the limitations inherent in the categories of evidence recovered. Materials imported via the wharves might be expected to have included building materials (including those for the Abbey, but there are no records of this), cloth, precious metals, utensils, and foodstuffs; survival of some of these items would, in any case, be questionable but their appearance at a point of embarkation/disembarkation would only be likely as the result of some catastrophic and irrecoverable loss.

Without artefact-rich dumps of reclamation material, it is paradoxically the case that a riverside wharf may be the least useful type of site on which to base assessments of riverborne trade and external economic contacts. In the absence of domestic sequences from the town the question cannot be useful pursued. However, the documentary work has raised an important point concerning trade: that river traffic may have largely been one-way — downstream — before, perhaps, the 18th century. Reading was at the head of a navigable river and traffic along this would also have been restricted by the High Bridge; there may have been local traffic alone but no long distance commercial navigation. If so, the Abbey Wharf would have been the place where goods from the monastic estates were dispatched downstream, with mostly empty vessels coming upstream.

There is substantial documentary justification for expecting a considerable volume of riverborne trade in the later periods. By the early 17th century one debt in every five outstanding to Reading tradesmen originated in London, and the cloth trade with the capital was worth £2000 per week (Dils 1980). A bill to make the Kennet navigable beyond Reading was presented in 1708, and the canalised Navigation was opened to Newbury in 1723 (Clew 1973). Doran (1835, 236) wrote 'Till a very late period, Reading was very deficient in the possession of large and convenient wharfs', although a

plan of proposals for extending the canalisation (reproduced by Man, 1816) shows virtually the whole length of the Reading waterfront zone occupied by private wharves by the early 19th century, including Dodd's Wharf on the excavation site of Bridge Street East, and Maynard's Wharf on the Abbey Wharf site. The economic importance and extent of trade based on the Kennet and Avon Canal is beyond the scope of this volume, and a summary and further references may be found in Clew (1973).

Meadowland Management

Any utilisation of the riverside margins would have been dependent on the success of flood relief measures already outlined, and this is likely to have curtailed any attempts at drainage and management until at least the later 14th century.

Some incentive to expand onto this land is apparent from earlier times. Reading was located on a constricted site where water meadows and the Thames floodplain to the north and east of the town, together with the undrained marshland along the Kennet to the south, limited expansion. The uptake of such marginal land as was available to the east of the town for agricultural purposes by the 11th century (the Library site; Hawkes 1986–90) may be evidence of this pressure. One of the indirect effects of the foundation of the Abbey would have been to intensify such pressures; whether the Abbey displaced established farmland, or whether it was sited on unutilised land, it would in either case have rendered unavailable a large area of otherwise usable ground immediately adjoining the town.

However useful this extra land might have proved, only limited and somewhat belated use could be made of the riverfront area. The Period 4/5 drainage gullies south of the Abbey Wharf and at Crane Wharf suggest at least some attempt to manage part of this area as water meadow. That this episode was not apparently more widespread may be due to the availability of suitable grazing elsewhere, or to the more intractable difficulties of draining the Bridge Street area with its greater number of minor watercourses.

Industry

Industrial activity is an almost inevitable part of urban life from the earliest periods, and the documentary evidence (as presented in Chap. 9) suggests that a manufacturing zone in the west of the town may have emerged by the end of the medieval period. Documentary and cartographic evidence for early modern times demonstrates the eventual utilisation of almost the whole of the Holy Brook and Kennet frontages in the Bridge Street area for industrial purposes. It is likely that much of the early (medieval) activity was taking place in properties backing onto the north bank of the Holy Brook, but it is less evident that the waterfront area between the Holy Brook and the Kennet was being exploited until Period 6, when there is at least limited evidence in the form of the lime barrels from the Abbey Wharf. The circumstancial evidence of deposits of leather waste and horn cores in earlier contexts demonstrates only the dumping of waste material, and not that manufacturing was taking place on, or necessarily even near, to the riverfront sites.

The evidence from the horn cores, in association with the documentary evidence for leatherworking, suggests that tanning was a principal industry. Animal hair from the Period 7 Bridge Street East pits implies an early stage of hide processing involving the maceration of skins, and this seeping process may also have been used to remove the horn from the cores in a method that would leave no visible evidence in the form of cut marks. The documentary evidence also indicates the existence of cornmills and clothmaking (probably from the 12th century), as well as other industries including dyeing and fulling in the suburb of St Giles along Bridge Street, south of the river. An African buffalo horn core from Period 7 Abbey Wharf is rather more likely to have been the by-product of horn stripping rather than hide processing. Although there is no direct or documentary evidence for horn working in this part of the town, it is unlikely that such a valuable resource would have been wasted, and it is possible that the horn was re-exported for manufacture elsewhere.

Settlement

There is no direct evidence for any domestic occupation within the waterfront zone from the excavations except from the 19th-century levels of the Crane Wharf and Abbey Wharf sites on the King's Road frontage. Even before redevelopment from the 1960s onwards, which reduced numbers of houses at the expense of commercial development within the town centre, few dwellings stood in the area between the Kennet and the Holy Brook.

4. Conclusion

Having identified, from the archaeological and documentary evidence, a broad, chronological sequence of revetment structure and waterfront exploitation, it is necessary to consider what forces might have been responsible for stimulating the development of the riverside area. Figure 105 offers a tentative scheme to explain the observed developments in the riverfront area.

The earliest initiatives for improving the passage of water along the stream courses and preventing flooding were limited in extent and specific to certain key, vulnerable areas adjacent to mills or at confluence points. It has previously been suggested that the localised nature of those improvement works may even have contributed to the instability of the river.

A piecemeal approach with little evidence of an overall, strategic policy for overcoming the problems of occasional inundation may eventually have prompted a more organised response. Certainly from 1504, when the abbot was appointed a Commissioner of Sewers, charged with the maintenance of the Kennet, Thames and associated streams, a system of control, arbitration, and enforcement of measures to improve or remedy deficiences in the maintenance of the riverfront was in place. The business of the Commission demonstrates

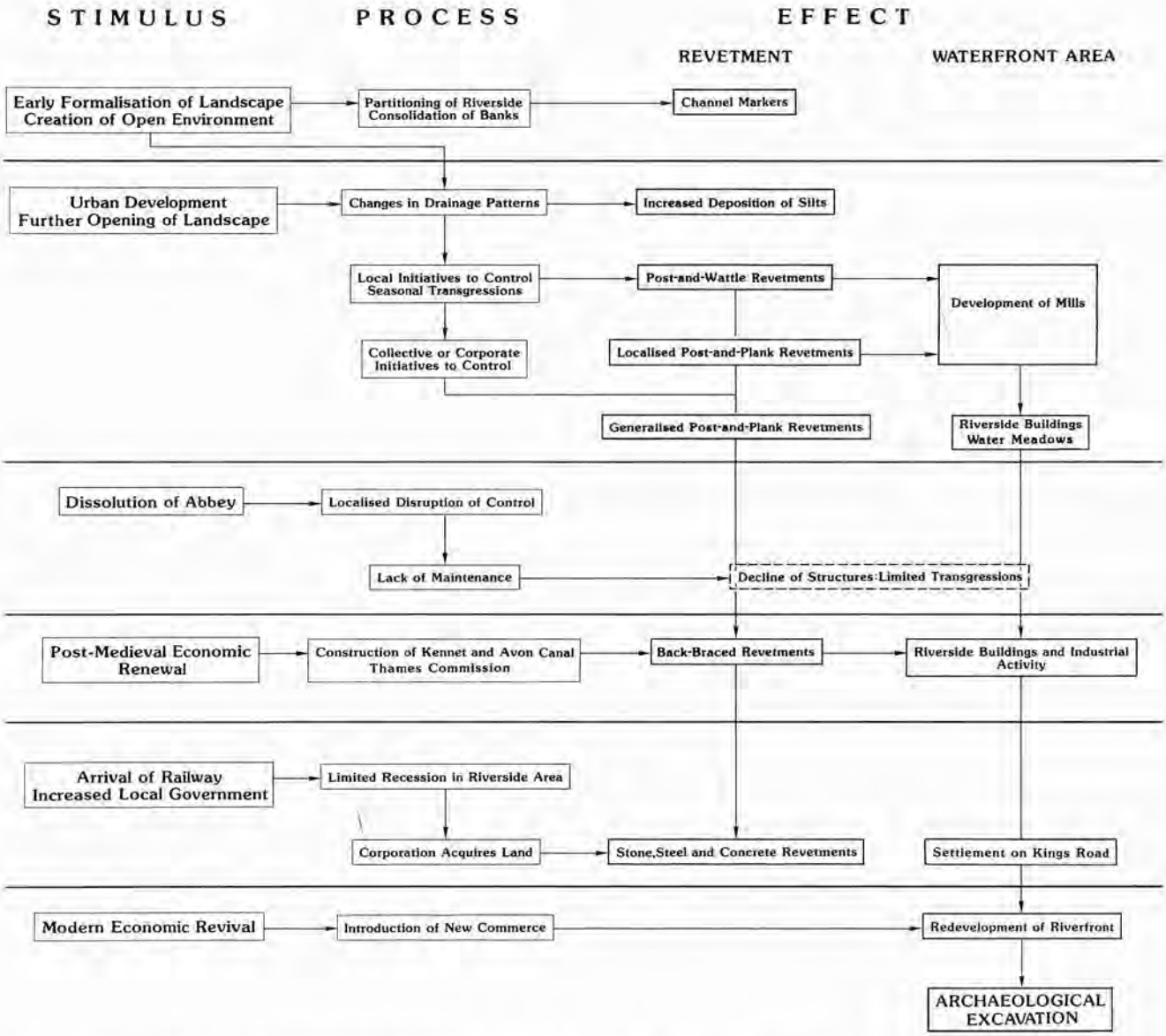

Figure 105 Model for revetment development on the Reading waterfronts

that responsibilities for repair still fell upon individual landowners with property fronting the river, although the Commission could (and did) identify repairs required to revetments and dredging work necessary for the efficient and effective working of the river system. Their authority was reinforced by the ability to impose sanctions (including imprisonment) on those unwilling to comply with their requirements. It may be assumed that the Commission's initiatives led to a general improvement in conditions, coinciding with the first real expansion of wharfage and industrial activity onto the waterfront area.

Any consideration of control and authority in medieval Reading must take account of the role of the Abbey, and the consequences of the Dissolution on the rest of the town. Struggles between the Abbey and the corporation (Slade 1969) had already weakened the control of the monastery and, as far as the riverfront was concerned, the continuing and independent Commission of Sewers would have been a more significant influence. Some hiatus would have been inevitable, however, not least on the Abbey's own holdings, as evidenced by the Period 6 decline on the Abbey Wharf site, although the documentary evidence suggests that the impact on other areas of the town's economy (and, consequently, its fabric) would have been limited.

The motivation for, and realisation of, the Kennet and Avon Canal, linking Reading to Newbury and beyond, has been charted elsewhere (see Clew 1973 for details of events outlined below). Despite the appointment in 1740 of a master carpenter of a central carpentry workshop based at Aldermaston, it appears that much of the repair work was put out to tender; certainly the construction of the new section between Bradford-on-Avon and Newbury following the *Kennet and Avon Canal Act* of 1794 to link the two Navigations was undertaken by a series of small firms tendering labour or material.

Downstream from the Duke Street bridge, the boundary of the Kennet Navigation, ownership, and responsibilities are less clear. The area appears to have been constituted as neutral water by an act of 1714 (Thacker 1932, 328), but subsequently allocated to the Thames Commission by the *Thames Act* of 1750. Certainly the Thames Commission were responsible for the rebuilding of Blake's Lock immediately to the east of the Abbey precinct in 1802, and it is possible that one of the Period 7 revetments at the Abbey Wharf site may relate to this construction. These later revetments must still largely have been local initiatives from the numerous private wharves operating on the river frontage, albeit conforming to the maintenance requirements of the Commission. It is interesting to note the change from timber to stone revetment corresponds almost exactly with the limits of the 14th- and 15th-century Abbey Wharf, and presumably reflects property divisions which were maintained during and after the Dissolution.

The improvement in both riverborne and road communications during the 18th century enabled a continuing increase in the prosperity of the town by means of the expansion and diversification of industries to compensate for the decline in the cloth trade (Slade 1969, 7–9), much of this new commerce being centred on the riverside areas. This realignment of the local economy spawned a wide range of activities from banking (the earliest bank in the town, Marsh, Deane and Co. founded in 1788; Corley 1971–2) to sauce manufacturing (Cocks and Co. operating from 1802; Corley 1979–80), and included the development (in riverside locations) of what were to prove to be two of the town's mainstays during the 19th and early 20th centuries — brewing and biscuit-making: Simonds' brewery moved to an expanded site on Bridge Street in 1790, and Huntley (later of Huntley and Palmer's) opened his bakery in 1826. A list of materials exported from the town in the early 19th century (flour, timber, hoops, bark, wool, corn, and malt) gives some indication of the range of industrial processes at that time (Doran 1835, 239).

There were undoubted economic benefits in river as opposed to road transport: in 1814 goods could be carried from Reading to London for 2*s* 6*d* per hundredweight by road, but at only 11*d* by river (Childs 1910, 16). Barges could not be considered an altogether reliable form of transport, however, and the vagaries of the weather could involve boats being held up by ice (as happened in January 1814), or by drought, which delayed passages by up to a month in the autumn of the same year (Ditchfield 1887). The arrival of the railway in 1840 established a dependable, high-speed link with London with a journey time bettered only fractionally by the present-day service. Although this provided an undoubted boost to local industry — Huntley and Palmer increased their labour force five-fold between the opening of a new factory in 1851 and 1868 (Wykes 1970, 47) — the railway was an effective challenge to water transport and its dependent industries, and river traffic declined sharply (Childs 1910, 16)

The *Municipal Corporations Act* of 1835 replaced the old corporation with a new, directly-elected council which, by representation on the boards, was able to put pressure on the Paving Commission, Board of Health, and other committees responsible for the maintenance of the town's fabric (Alexander 1985, 2–4), resulting in improvements to roads, bridges, water supply, and drainage in the riverfront area at a rather more rapid rate than had hitherto been the case: 'Not until 101 children had within memory been drowned in the Holy Brook was the dangerous brink protected' (*Reading Mercury*, 19 May, 1817). The present character of the Kennet riverfront owes as much to the local authority environmental improvement schemes, starting with the purchase and landscaping of Forbury Gardens in the 1850s, as it does to commercial and industrial development.

The opening of the M4 motorway on 22 December 1971 has enabled expansion on an unprecedented scale, and in 1970 the Reading, Wokingham, Aldershot, and Basingstoke sub-region was identified as the principal major growth area for south-east England (Berkshire, Hampshire, Surrey County Councils Joint Steering Committee *Report* on the sub-region of 1975). In central Reading the inevitable pressures for the redevelopment of the waterfront area have been augmented by the relocation of the Courage brewery to an out-of-town site, leading to a changed emphasis away from industry and manufacturing towards commercial and office-based employment. Many of these newer developments have opened up previously hidden views of the Kennet and Holy Brook, thus restoring the watercourses to their rightful place as important features of the town and, with a satisfying circularity, enabling excavation to add something to an understanding of their predecessors.

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by Lesley and Roy Adkins

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The index is arranged broadly as follows:

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- *Report*
- *General background*
- *Excavation records*: Primary site records, by site, in site number order. Also some post-excavation material which relates to single sites only (there is very little of this, as most of the analyses were carried out on the whole collection).
- *Synthesised data*: All records and reports relating to more than one site. Also most finds analyses, even where files relate to singe sites (because the finds are generally treated as a collection in the report).

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The growth of Reading in the medieval period was due largely to the influence of the Abbey. The waterfront zone, between the Holy Brook and the Kennet, lay at the heart of urban development.

A series of excavations and observations during major redevelopment of the town centre produced substantial evidence for the construction, repeated refurbishment and use of waterfront structures which included hards, wooden revetments, wharfs and associated buildings spanning the medieval period. A period of near abandonment seems to have followed the Dissolution.

The recovery of over 100 timbers has allowed for detailed dendrochronological study and the artefact assemblages including abundant leather shoe fragments chart the varied industrial and commercial functions of the waterfronts.

The archaeological evidence is complemented by a documentary study of the history of the Reading waterfronts.

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