

NORFOLK ARCHAEOLOGICAL UNIT

Report No. 817

**An Archaeological Evaluation at Read's Flour Mill, King
Street, Norwich**

38040 N

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Location: Spooner's Wharf, Read's Flour Mill, King Street, Norwich
Grid Ref: TG 2377 0782
SMR No: 38040N
Date of Fieldwork: 17th February to 21st March 2003

Summary

Two trenches were excavated in the northern part of the Read's Flour Mill site, King Street, Norwich and lay perpendicular to King Street and the River Wensum. Trench 1, that closest to the river, contained at least two major phases of revetment and foreshore reclamation evidenced by timbers, including fragments of re-used boats. Fragments of at least four boats of English timber dated to the 12th century were recovered. These increase the existing sample of such material by c. 20% and can, therefore, be said to be of national importance. Other well-preserved organic material was also found. The earliest phase of revetment dated to the late 11th or early 12th centuries.

Trench 2 was situated adjacently to the street frontage. Some evidence of prehistoric activity was found together with a complex sequence of medieval timber buildings. In the post-medieval period the western part of the trench was occupied by a large cellared building and the eastern part by a poorly built flint and mortar structure, possibly a warehouse. The cellared building was probably demolished in the early 20th century.

1.0 Introduction

Two trenches were excavated by Norfolk Archaeological Unit (NAU) in the northern part of the Read's Flour Mill site during February and March 2003. Both trenches measured approximately 9m by 3m. Trench 1, which lay closest to the river was excavated to a maximum depth of c. 3.6m below the modern surface. Trench 2 was excavated to a maximum depth of approximately 2.9m below the extant ground surface. Both trenches were shored.

The evaluation was commissioned by John Samuels Archaeological Consultants acting on behalf of P. J. Livesey Group Ltd. The trenches lay in an adjacent position to what was in 1885 Spooner's Wharf. This was the clear block of land to the north of the terraced cottages at 231-235 King Street and the boathouse behind them. This work was the second archaeological intervention to be carried out within the former City Flour Mills site, the first being a trench excavated adjacently to the former flour mill office block in 1997 (Site 26467, Hutcheson 1998). The proposed development also encompasses Cannon Wharf (the former coal yard to the north of Read's Flour Mill and south of the Novi Sad Friendship Bridge) and the former Kingsway public house, adjacent to Carrow Bridge. Cannon Wharf was also the subject of archaeological investigation in 1997 (Site 26464, Shelley 1998).

The archaeological evaluation was undertaken in accordance with a Brief issued by Norfolk Landscape Archaeology (NLA Ref: 07/01/03/ARJH) and a Specification prepared by John Samuels Archaeological Consultants (Ref: JSAC 0124/03/02).

The objective of this evaluation was to determine as far as reasonably possible the presence or absence, location, nature, extent, date, quality, condition and significance of any surviving archaeological deposits within the proposed

development area. The results will enable decisions to be made by the local planning authority with regard to the treatment of any archaeological remains found.

The site archive is currently held by Norfolk Museums and Archaeology Service, following the relevant policy on archiving standards

2.0 Geology and Topography

The site occupies one side of the southernmost part of King Street within the city walls. It lies sandwiched between King Street and the River Wensum. The two governing topographical features of the site and its surroundings are the Wensum and the Ber Street ridge to the south and west. The present sharp drop down from Ber Street/Bracondale to the Wilderness and the eastern end of Allen Road is almost certainly the result of medieval and post-medieval chalk mining, augmented by more modern terracing. In broad terms spoil from this activity has been dumped on the eastern side of King Street in order to reclaim land from the river foreshore.

In geological terms the site straddles the boundary between the yellow first terrace river gravels and the more recent grey alluvial river sand and gravels. These drift deposits overlie chalk. The depth of overburden covering the chalk varies greatly. It outcrops relatively close to the surface along the Ber Street ridge.

3.0 Archaeological and Historical Background

There is growing evidence for prehistoric activity in the Wensum valley. Fieldwork on the eastern side of the Wensum at Carrow Road football stadium (Adams 2003) and the Riverside development (Wiltshire and Emery 2000) has yielded good evidence for Upper Palaeolithic activity and Neolithic landscape management. Further up-river in the Quayside area evidence of Bronze age activity has also been located (Emery and Ashwin 2001).

Unlike many historic cities in England Norwich has no direct Roman antecedent. The Roman regional capital *Venta Icenorum* lies at Caistor St. Edmund, 5km south of the city centre. Sparse scatters of Roman material have, however, been recovered from Saxon and medieval sites across the city. In the King Street area this material has often been interpreted as being entirely the result of Romano-British manuring or the robbing of tiles from Caistor St. Edmund to make hearths and the like (Shelley in prep. a) although recent finds of unabraded Roman pottery from Old Barge Yard have caused this assumption to be questioned (Percival and Shelley 2003, 16).

Evidence for any sort of Early or Middle Saxon presence in the King Street area is sparse (Shelley in prep. a). By the late 9th century, however, Norwich had begun to develop into a sizeable Anglo-Scandinavian borough (Ayers 2003, 27). Read's Flour Mill lies 600m south-west of the southern defences of the Late Saxon town (Campbell 1975, Lloyd *et al* 2002). Evidence for Late Saxon occupation in the vicinity of the site comes in two forms. The 1997 evaluation uncovered evidence of occupation dated to the Saxo-Norman period together with rubble interpreted as having come from St. Olaf's chapel (Hutcheson 1998). St. Olaf (sometimes spelt Olave) was a distinctly Anglo-Scandinavian saint who was martyred in 1030 (Sandred and Lindstrom 1989, 50). Dedications to this saint have often been used as evidence for pre-Conquest church foundations and, by inference, occupation (Shelley in prep. a). Architectural fragments dating to the 12th century found during the 1997 evaluation have been

used as evidence to suggest a Norman re-modelling for the chapel (Hutcheson 1998, 1).

St. Olaf, together with many other lost ecclesiastical establishments in Norwich, was first identified by the 19th-century historian Francis Blomefield (Blomefield 1806, 65) who identified the chapel as having been on the east side of King Street, adjacent and to the south of a quay owned by the city. This quay is commonly interpreted as Cannon Wharf (Shelley 1998, 3), the northern part of the proposed redevelopment area. Whilst St Olaf is often referred to as a pre-Conquest chapel located beneath the extant Albion Mills building neither of these interpretations can be taken as solid fact. At least part of the Albion Mills building is deeply cellared. It seems very likely that if the chapel was located under Albion Mills its construction in the 1830s (Gurney-Read 1988, 29) would have destroyed any surviving remains. It is interesting that contemporary antiquarians such as Samuel Woodward (e.g. Woodward 1831) made no reference to any significant building remains being found on the site, nor indeed to the site at all. St Olaf's chapel, Conesford (King Street) is referred to in a document of 1186 (Hutcheson 1998, 3). The chapel was demolished between 1327 and 1345 (Blomefield 1806, 65)

Most evidence suggests that the centuries following the Norman Conquest witnessed a massive expansion of settlement and activity in the southern part of King Street. The Music House, the house of Jurnet, an important Jewish banker and merchant survives only c. 200m north-west of the proposed development area. This building dates to around 1175 and is the oldest surviving secular building in Norwich (Ayers 2003, 63-65). It is likely that from the 12th century the majority of the development area was packed with wharves, warehouses and other buildings and King Street in effect became the 'port of Norwich', a role which it retained until the early 1990s.

Documentary evidence indicates that by the mid 16th century the Read's Flour Mill site, excluding the former Kingsway public house, was divided into six plots (Hutcheson, 1998). Evidence from elsewhere on King Street (Shelley in prep. a) indicates that the boundary of these plots probably ran at right angles to the road. Further to the north on King Street some of these strip tenements can be demonstrated to have Late Saxon or early medieval origins. It is likely that the street frontages if not most of the plots were packed with buildings throughout the medieval period.

Cannon Wharf was almost certainly the site of the medieval New Common Staithe, where those without access to private wharves could land their goods for a fee. The land which became the New Common Staithe was purchased by the city in 1379, in whose hands it remained until being bought by P. J. Livesey Group Ltd in 2002-2003. Three trenches were excavated during a 1997 evaluation at Cannon Wharf (site 26464, Shelley 1998). Early Norman buried soils were revealed at the base of Trench A, which lay closest to the street frontage, and these were overlain by a medieval stone building. This building seems to have lasted in one form or another until the early 19th century when it was replaced by brick-built warehouses. North of these building remains external surfaces that possibly formed the entrance to the New Common Staithe were found, together with possible evidence for the location of the entrance gate. The central trench (Trench C) contained 1.5m to 2m of waterlogged medieval material overlain by c. 1.0m of late post-medieval and Victorian overburden and yard surfaces. The medieval waterlogged deposits mostly consisted of dumps designed to reclaim the river margin. Well preserved waterlogged

remains of wattle revetments, board-walk uprights and mooring posts were found. The process of land reclamation began at Cannon Wharf in the Norman period and accelerated after its purchase by the City in 1379. The third trench lay adjacently to the modern river frontage and contained 0.9m of relatively unadulterated organic silts at its base. This material was overlain by chalk-based dumps with a line of three timber piles driven into them at right-angles to the modern wharf edge. The date of these chalk-dumps and piles is not known, although a late medieval or post-medieval date seems likely. These remains were heavily disturbed and truncated by the construction of the extant steel sheet river revetment or its Victorian predecessor.

The earliest evidence for occupation found during the 1997 evaluation on Read's Flour Mill itself (site 26467, Hutcheson 1997a) was described as being Saxo-Norman in date. A hearth or burnt area and post-hole of possibly Late Saxon date were overlain by a well or flint and mortar lined pit and associated wall of possible Norman date. This possible Norman stone building was demolished during the 15th century and replaced with another flint and mortar building of a different plan and on a different alignment. This in turn appears to have been replaced in the late 18th or early 19th century with a brick-built building. This latest structure was probably either demolished in the 1830s prior to the construction of Albion Mills or later prior to the construction of the extant granary building.

Cartographic sources such as Cunningham's view of Norwich (1558) and Cleer (1696) show the southern part of King Street as heavily built up with two or three storey buildings along the street frontage. Both Cunningham's and Cleer's representations lack detail and clarity unlike Hochstetter's map of 1789. Hochstetter shows the King Street frontage to be heavily built-up with many buildings extending eastwards towards the river. In cases where only the frontage is occupied additional buildings line the river with small yards between them and the buildings on the road frontage (Plate 1).

The oldest existing building on the site is Albion Mill, built as a cloth mill in 1836-37 (Hutcheson 1997, 17; Pevsner and Wilson 1997, 305). The construction of Albion Mill was part of an ill-fated attempt to revive Norwich's textile industry, which had provided much of the city's wealth in the medieval and early post-medieval periods. By the early 19th century the cloth trade in Norwich was being out-competed by more heavily industrialised textile production in northern England (Pevsner and Wilson 1997, 105). The North Mills, the section of the main complex of buildings north of the steel-frame and corrugated asbestos infill structure, was constructed shortly after Albion Mill. The terraced cottages (231-235 King Street) were constructed between 1885 and 1905, as was the boat house behind them. The date of 225 King Street, the building that formed the boundary between the City Flour Mills site and Cannon Wharf (north of Trench 2) is not known. It was probably built in the mid-19th century. Unlike the North Mill and Albion Mill 225 King Street has never been examined or described in any detail (Hutcheson 1997, 14-17). The former electricity substation was added onto its eastern end in the late 1920s or early 1930s.

South of Albion Mill, the granary building that lies parallel to the river is also probably mid 19th-century in date. The tower-like protrusion at its southern end is a steel-framed addition to the original structure (Hutcheson 1997, 17). This indicates it could have originally been built to serve another function, perhaps as a malthouse, although it is not marked on the Ordnance Survey 1:500 plan of 1885, and the 1885 Jarrold's directory lists a granary adjacent to Albion Mills. This was owned by E.

Lacon and Son. The Lacons went on to become major brewers and public house owners, particularly in east Norfolk. The interior of the granary has not been examined by a historic buildings expert (Hutcheson 1997, 17). The shed-like industrial building to the south-east of the granary is late 20th-century in date. The office block which has “sixteen reinforced concrete piles for the foundations” (Gurney-Read 1988, 31) was built after 1949.

The former Kingsway public house (249-251 King Street) was built in 1935 as part of a road widening and re-alignment scheme (Plate 2). The King’s Way, as it was originally known, replaced an earlier public house called the Cellar House. The Cellar House reputedly had a large and extensive system of cellars, large enough to be used at times as stables and byres. The date of the Cellar House is not known, although the name dates back to at least the 1830s (information from www.norfolkpubs.co.uk). It is possible that it re-used cellars from an earlier structure. It is also possible that these basements were incorporated into the Kingsway. This may explain the apparently peculiar basement arrangement of the Kingsway, the extent of which can partly be viewed from Carrow Bridge.

The original Carrow Road was built in 1817 to connect Ber Street to the original Carrow Bridge which lay c. 300m south of the remains of the medieval Boom towers and present bridge. The brick abutments of this original bridge can still be seen. In 1935 the present lifting bridge was built in order to facilitate river traffic. The western section of Carrow Road was renamed Carrow Hill (Sandred and Lindström 1989, 94) and the remaining portion, the eastern continuation beyond the river, was renamed Kerrison Road. ‘New’ Carrow Road was routed along the northern edge of Norwich City Football Club Stadium. The 1885 Ordnance Survey 1:500 plan shows the site of the Kingsway occupied by large industrial buildings.

The derelict Albion Mills complex, last used as a sweet and biscuit factory by R. A. Cooper Ltd., was acquired by R. J. Read Ltd. in 1932 for £5,750 (Gurney-Read 1988, 29). The concrete silo was built shortly after the purchase of the site. The southern part of the site, now occupied by the former office block, was purchased after the second world war.

The Kelly’s and Jarrolds directories of Norwich provide a more detailed picture of the more recent history of the site (Table 1).

	1968 Kelly's Directory		1952 Kelly's Directory		1935 Kelly's Directory		1922 Jarrold's Directory		1905 Jarrold's Directory		1885	
	Occu- pant	Activity	Occu- pant	Activity	Occupan t	Activity	Occu-pant	Activity	Occu- pant	Activity	Occu- pant	Activity
213 King Street (Cannon Wharf)	Peter Bridges	(Cottage)	William Percy Emerson	(Cottage)	John Wither	(Cottage)	Thomas Mathew Read	Maltster & Manifac- ture	Small Tenement	(Cottage)	William Kerr	(Cottage)
	Thomas Moy Ltd	Coal Merchant	Thomas Moy Ltd	Coal Merchant	Clement Cooke	Horticultural Sundries Manufacturer			Thomas Mathew Read	Maltster & Manifac- ture	Thomas Mathew Read	Maltster & Manufacture
						Coal order Office			New- house & Co. Ltd.	Wharf	Clarke & Reeve	Warehouse
									R. A. Cooper Ltd	Wharf ?	Mary Baldwin	Private Resident
225 King Street	George Mixer & Co	Insulation Contracto rs	Rowland & Gray	Joinery Manifactu rers	Norwich Corporati on	Electricity Substation	Norwich Corpora- tion	Stores, Office & Weigh- bridge	No Entry		No Entry	
227 King Street	No Entry		No Entry		No Entry		No Entry		Small Tenement	C. E. Y. M. S. Rowing Club Boat- house	No Entry	
229 King Street	No Entry		No Entry		No Entry		No Entry		Small Tenement		Francis Spooner	Private Resident
231 King Street	Henry A. Cushing	Private Resident	Edward Cooper	Private Resident	Edward Cooper	Private Resident	Mrs Howlett	Private Resident	Small Tenement		Elizabeth Spooner	Private Resident

233 King Street	William H. Grant	Private Resident	Alfred Blackburn	Private Resident	Alfred Blackburn	Private Resident	Alfred Blackburn	Private Resident	Small Tenement					
235 King Street	Gerald Woods	Private Resident	Norman Blackburn	Private Resident	Norman Blackburn	Private Resident	Mrs C. Blackburn	Private Resident	Small Tenement					
Albion Mills	Part of Read's Flour Mill complex ?		No Entry		No Entry		No Entry		R. A. Cooper Ltd	?	R. A. Cooper Ltd	Biscuit Manufacturers		
237 King Street			No Entry		No Entry		No Entry		No Entry		Benjamin Betts	Private Resident		
239 King Street			Mrs Wright	Private Resident	Jacob Wright	Private Resident	Jacob Wright	Private Resident	G. Everitt	Piano Tuner	Charles Newson	Private Resident		
241 King Street			Walter Gosling	Private Resident	Walter Gosling	Private Resident	William Eastman	Private Resident	Small Tenement		John Chamberlin	Private Resident		
243 King Street			Thomas Stockwin	General Shop	Mrs Smith	Confectioner	Mary Wright	Shopkeeper	Jacob Wright	Shop-keeper	Henry Jay	Shop-keeper		
245 King Street			No Entry		No Entry		James Sarsby	Private Resident	Small Tenement		Mrs Mary Anne Betts	Private Resident		
247 King Street			No Entry		No Entry		Robert Knights	Private Resident	Small Tenement		Edward Amis	Shop-keeper		
249 King Street			Kingsway PH		Robert Young	Kingsway PH	Thomas Nobbs	Cellar House PH	T. W. Nobbs	Cellar House PH	John Clarke	Cellar House PH	John Clarke	Cellar House PH
251 King Street							R. J. Read Ltd	Cattle Food Manufacturers	Premises Demolished for new Bridge		Edward Amis	Private Resident	George F. Howard	Private Resident

Table 1: Late 19th- and 20th-century directory entries for 213-251 King Street

Table 1 presents a confusing array of information. It is likely that the property numbering system for this part of King Street was changed between 1885 and 1905 following the construction of the terraced cottages at 231-235 King Street. It is also likely that many of the small domestic buildings such as 245 and 247 King Street were progressively demolished or converted into outbuildings. Otherwise the directory information largely backs up the statements made above concerning the late 19th- and 20th-century history of the site.

Reads Flour Mill closed in the early 1990s and the hardwood flooring in Albion Mills stripped out. The last building to occupy the area where Trench 2 was dug (see below) was a single-storey flat-roofed garage-like structure constructed in the 1960s or 1970s. This was used as a quality control testing laboratory.

4.0 Methods

The Read's Flour Mill site had been abandoned for a little under a decade by the time that this phase of archaeological fieldwork commenced. The open area where the trenches were to be located was very overgrown with shrubs, brambles, ivy and other undergrowth. This and an accumulation of detritus including hypodermic syringes, were rapidly cleared using a 7-tonne tracked hydraulic 360° excavator. This material was not removed from site and remains stockpiled in the north-east corner of the plot. During this clearance operation it became apparent that parts of the wall that formed the southern boundary of the site were very unstable. This wall was largely made of flint rubble and soft 'Norfolk red' type bricks. It formed the western two-thirds of the southern boundary of the plot and was up to 2.5m high. This wall was, at the earliest, late 18th-century in date. After photographic recording it was demolished with the excavator bucket.

After this clearance operation the easternmost trench, Trench 1, was machine excavated to a depth of c. 1.35m below the modern surface. The excavator was fitted with a toothless bucket and was operated under constant archaeological supervision. After cleaning and recording, the base of the trench was mechanically excavated further to a depth of c. 1.9m below the modern surface. Steel sheet and hydraulic waling-beam shoring was then installed by specialist contractors. Hand excavation was then undertaken in a longitudinal slot measuring 6m east-to west and 1.2m north-to-south. This slot was initially excavated to a depth of 1.1m below the final machined depth, c. 3.0m below the extant surface. Following this the step around the top of the slot was lowered by c. 0.7m and a further set of hydraulic waling-beams were installed. A further 0.5m of material was then hand excavated from the central slot.

Initially all but the easternmost 2m of Trench 2 was also machine excavated to a depth of 1.35m. The western end of this trench was deeply cellared. At this stage the walls that formed this cellar were left standing to their full surviving height. Both survived to within 0.3m of the modern surface. Following cleaning and recording two sondages were dug, one against the western end of the northern face of the trench, and the other in the centre of the eastern end of the trench. Following recording of the sondages the trench was machine excavated to its full length and the cellar walls were removed. After further excavation and recording in the north-west corner of the trench installation of shoring was attempted. Following the partial removal by machine of the remaining c. 0.4m of cellar rubble infill, efforts were made to drive steel sheets into the north-east and north-west corners of the trench. This proved

impossible due to the relatively high level of natural chalk which was encountered c. 0.3m below the cellar floor. Not only was it unfeasible to drive the sheets through the chalk bedrock but such attempts also caused the collapse of the loose rubble cellar fill and the cracking of the thin concrete slab above. It was then decided to abandon shoring the western end of this trench on health and safety grounds. As probable early medieval features were found in the north-west corner of the trench at a level 0.45m to 0.55m higher than the basal level of the cellar construction cut any negative features cut into the natural gravels or chalk across the western half of the trench would have partially or wholly truncated by the construction of the cellar.

East of the cellar wall shoring was successfully installed and a further c. 0.5m of material was machine excavated from the base of the trench, to 1.85m below the modern surface. The remaining c. 0.6m of deposits in this trench were then hand excavated.

All archaeological features and deposits were recorded using NAU *pro-forma* sheets. Trench locations, plans and sections were recorded at appropriate scales and colour and monochrome photographs were taken of all relevant features and deposits.

Within the limits imposed by working in trenches with steel shoring and on a former industrial site, exposed surfaces and features were scanned with a metal detector. No finds of antiquity were recovered.

A level was transferred from an Ordnance Survey benchmark of 5.04m on the brick pillar which forms part of the revetting wall south of the junction of King Street and Southgate Lane. A non-permanent temporary benchmark (2.43m OD) was used on site. This was located on top of the concrete retaining wall for the boathouse in the south-east corner of the site.

Once the area around the trenches had been cleared of shrubs conditions for excavation and recording were generally good. No adverse weather conditions were experienced during the project.

Following completion of the excavations, both trenches were mechanically backfilled with the material which had been removed from them. This material was summarily compacted with the bucket of the mechanical excavator. It is likely that if left for any length of time the material backfilled into the trenches will compact under its own weight leaving a slight depression within the footprint of the trenches. At present it is inadvisable to try to bring any non-tracked vehicles across the area where the trenches were dug.

5.0 Results

5.1 Introduction

Both trenches measured approximately 3m by 9m in plan. Trench 1 was excavated to a maximum depth of c. 3.5m below the modern ground surface (-1.2m OD). The final depth of Trench 2 was approximately 2.4m beneath the extant ground surface (1.0m OD).

For the sake of convenience of description throughout this section of the report the trenches will be defined as being east-to-west aligned rather than their true alignment which is much closer to northeast-to-southwest.

Despite the proximity of the trenches to each other no attempt has been made to harmonise their phasing sequences. This is due to the disparate nature of the remains found in the trenches. Trench 1 was essentially a waterlogged waterfront trench whilst Trench 2 was 'dry' and contained more conventional urban archaeological remains.

5.2 Trench 1

5.2.1 Trench 1 Phase 1 – Romano-British or Saxo-Norman

The earliest material found in this trench was early Holocene grey river gravels ([76]) of geological origin. These were seen only at the far western end of the slot in the base of the trench. This deposit was saturated and had a discernible flow of groundwater running through it. Above the 'natural' river gravels was a remarkable deposit [115] made-up of partially decayed mosses, twigs and other plant material. The mosses and other material, such as holly leaves, retained their green colour. Prior to specialist examination of plant macrofossil, pollen and diatom samples (see below) from this deposit it was thought to be a pre-medieval natural river foreshore accumulation. It is now almost certain that this deposit was a deliberate dump of material. The plant material was dumped to form a raft or mat onto which a series of laminated dumps of river silts, sands and peats c.0.55m thick were deposited. Six alternating bands of peats and silts were seen ([109], [110], [111], [112], [113], [114]) varying in depth between 0.05m and 0.2m. These deposits represented the first phase of bank stabilisation and river foreshore encroachment.

The other remarkable aspect of this series of deposits was the fact they contained diatoms indicative of brackish estuarine conditions. As outlined below this could indicate a Romano-British date for these layers. Prior to the development in the Saxon period of the sand spit on which medieval port Great Yarmouth was built most of what is now Acle and Halvergate marshes was the 'Great Estuary' of the rivers Yare (into which the Wensum flows), Chet, Waveney and Bure (Gurney 1996, fig. 1). Breydon Water, the brackish body of water and mudflats that lies behind (to the west of) Great Yarmouth is the vestigial rump of the 'Great Estuary'. During the Roman period the Wensum would have been in part brackish and perhaps more heavily tidal.

An alternative explanation is that parts of the deposits were made of material brought from the Breydon Water area. In this case dendrochronology dates from wood later in the stratigraphic sequence indicates that an 11th- or early 12th-century date for these deposits seems likely. Radiocarbon dating of the plant material may answer this question.

5.2.2 Trench 1 Phase 2 – 11th or early 12th Century

The peats and silts above the mossy deposit [115] were truncated away sharply by the construction cut for the western river revetment. A series of roundwood coppice pole stakes [81] were driven vertically into churned or redeposited peats and silts [105] and [107]. Above this a larger timber, formed from a half or three-quarter round, c.0.2m radius, split log [82], was driven in to the river gravels at an angle a little shallower than 45°. Adjacent to this was a segment of plank with holes drilled in it which was at first thought to be a rudder or steering oar. This timber was sampled for dendrochronological dating and was found to have been felled in the 1070s. Also found in the same deposit was a lozenge-shaped rigging spacer or block. These timber elements were overlain by a further dump of redeposited silty peat ([75]). On top of this lay a considerable quantity of chalk [48] which extended eastwards to cover the top of the driven stakes [81]. The chalk dump had large flints and occasional roughly dressed limestones packed amongst it as well as randomly laid horizontal timbers (Fig. 4). In front of this, and driven from a higher level, a north-to-south aligned wickerwork or hurdle revetment [45] had been constructed which possibly served to protect the chalk dump from water erosion. Behind this revetment a further deposit of peat/silt [31] was encountered, which was either a dump or a more natural accumulation augmented with refuse. This deposit contained pottery of 11th- to 12th-century date.

Only c.1.8m east of wicker revetment [45] a second similar structure [83] was found. This was made of stouter stakes and withies. Another fragmentary mat of well-preserved mosses and other plant material [106] lay to the west of this revetment. Below this deposit was a layer of disturbed river silt [108] which contained some cultural material and was the basal deposit excavated in the eastern three-quarters of the trench. Auger soundings indicated that these riverine silts extended to at least 1.5m below the lowest excavated level.

It is difficult to judge the exact chronological and physical relationship between the two wattle revetments. It is possible that this first phase of revetment allowed dry access and hard standings from which goods could be unloaded via gang planks. All or parts of the revetment structure may have been planked over with damp voids underneath allowing the build-up of deposits such as [31].

In general the pottery from this phase was entirely consistent with an 11th- or early 12th-century date for its construction. Without a firm date for the moss [115] *et al* it is impossible to tell if the construction of the eastern (Phase 2) revetment followed the deposition of the Phase 1 material by weeks, months, years or centuries.

As well as the locally produced Yarmouth and Thetford type wares Andenne and Pingsdorf type pottery from Rhineland and the Low Countries was present. These continental imports, together with the limestone which either came by sea from Caen in Normandy or Barnack, near Peterborough, give this phase a distinctly Norman feel.

5.2.3 Trench 1 Phase 3 – Early to mid 12th century

In between the two wattle revetments and to the east of structure [83] lay a substantial deposit of silt and peat [34, Fig. 5]. This material was up to 0.8m thick and contained late 12th- to 14th-century pottery. It was difficult to determine whether this deposit, which certainly contained dumped refuse, was a 'natural' build-up through plant growth and peat formation or was a deliberately dumped make-up deposit.

Beneath this deposit and towards the eastern base of the trench were four fragmentary pieces of wood from two boat strakes [128].

The top of deposit [34] formed an approximately level surface onto which a rammed gravel path [26]=[56] was laid. Although somewhat fragmentary it is probable that this path ran roughly north-to-south, *ie* parallel to the river. The path could have been up to 3.0m wide. The gravel had been rammed to such an extent that it had compacted the peaty material [34].

5.2.4 Trench 1 Phase 4 –Mid 12th-13th century

Above deposit [34] a further 0.4m of peat and silt deposits [71], [72], [30] [23] and [77] were seen. The lowest of these deposits, [71] and [72], were almost pure clayey silts and may have resulted from an inundation episode. Deposit [77] contained pottery dated to the 13th to 14th centuries. Capping these deposits was a dump of peat ash [63] which was up to 0.25m thick.

In the central part of the trench the area of gravel path [26]=[56] was truncated by features [55], [57] and [64]. These seem to have been part of an initial episode of groundworks prior to the construction of a section revetment structure that lay at the eastern end of the trench (see below). The top fill of cut [64] also contained a significant element of peat ash, perhaps to introduce a temporary, dryer surface to facilitate construction activity.

Approximately 3.0m west of the eastern end of the trench a cut [68] had been made to allow the construction of a second revetment. The base of this was lined with brushwood within a silty peat matrix [50]. Above this a mass of gravel [47] had been dumped. The purpose of the brushwood was doubtless to stop the heavier gravel-rich deposit disappearing into the soft silt below. The eastern side of this cut was truncated by a secondary construction cut [152] with a skim of chalk [153] laid on its base. Above this chalk, at the far eastern end of the trench, a structure of interlaced horizontal oak roundwood timbers had been deliberately laid, in a 'log cabin' manner. These timbers had a diameter of c. 0.15m. Two timbers were recorded in section but not removed. They probably formed the rear (western) side of the riverside part of this phase of revetment.

On top of this timber base lay dumps of redeposited peat and silt ([46] and [169]). Through this material an oak pile [43] had been driven. The pile was made of a log with a diameter of 0.21m, complete with sapwood and bark unworked except for its sharpened point. This pile had been driven well down into the underlying river silt. After its extraction it was sampled for dendrochronology and yielded a felling date of after 1132.

Around the pile a mass of small, upright timbers ([43]) c.1.0m long had been driven, perhaps to stabilise it. These consisted partly of boat timbers. A sample of the luting, the animal hair packing from between two of the boat planks, was also recovered. Dendrochronological dating of these boat timbers indicates that a large number were re-used and came from boats that were 50 or more years old at the time of the construction of the revetment.

In addition to this three non-boat timbers were found. One was a cleft section or a radially-split oak branch or small trunk, slightly pointed at one end; the second an oak off-cut. The third was a partially shaped piece of cleft semi-roundwood, contorted by the post-depositional compaction of deposits above.

On top of the timber interlacing and around the pile a mass of chalky material [52] and [53] had been dumped. These deposits had more randomly set timbers within them, such as [61]. This material was possible spoil from terracing or chalk and flint mining activities that took place on the scarp of the Ber Street ridge.

To the west two further pieces of structural evidence seemed to tie in with this second phase of revetment. A series of parallel sub-circular chalk patches [62], perhaps contemporary to timber pile [43], were seen which ran in east-to-west aligned lines either side of the sondage. It is possible that they represented post-pads and that oak-pile [43] was, rather than a revetment, a corner or major load-bearing pile for an aisled structure such as a timber warehouse. The exact spatial and chronological relationship between these features and the second phase (easterly) revetment was not clear.

5.2.5 Trench 1 Phase 5 –14th-15th century

The eastern revetment and/or possible post-pad building seem to have been in use for up to two centuries. There is some evidence that the structure was then deliberately demolished. A cut [67] was dug around the top of the oak pile. Its top had rotted away so it remains unclear whether it was sawn or snapped off.

At the far western end of the trench deposits related to the first phase revetment were truncated by a large, regular, medieval pit [41]. Two of the fills of this pit, [36] and [38], contained much well-preserved organic matter and plant remains. One of the deposits within this pit [36] was a mat of preserved reeds or straw, possibly discarded floor covering material. It was characteristically similar to the fill of an analogous pit of the same date recently excavated in location at St. George's Street in Norwich (Percival 2002). At St. George's Street the pit was interpreted as having originally fulfilled an industrial purpose, possibly basting, a process whereby wood fibres located inside the tree bark are soaked for long periods in order to make rope or cord. Analysis of plant macrofossil samples from the fills of the Read's Flour Mill pit is needed before any similar conclusions can be drawn. The fills of this pit contained 13th- to 14th-century pottery.

The demolition of the possible building and possible industrial activity in the vicinity does not preclude the eastern revetment from having remained an active wharf.

5.2.6 Trench 1 Phase 6 –Early post-medieval

The upper fills of the medieval pit [41], the second phase revetment and associated structural feature were overlain by a mass of post-medieval make-up [7]. This deposit was a mid-grey brown silt clay of up to 0.85m thickness which contained occasional fragments of pantile. Above this thin deposits of orange gravel [209] and sand/crushed mortar [2] suggest demolition and construction activity was taking place further to the west (see below).

5.2.7 Trench 1 Phase 7 –Later post-medieval

On top of the post-medieval deposits was an approximately east-to-west aligned flint, brick rubble and mortar wall [1], of poor construction. A similar north-to-south aligned return wall [17] was seen 3.0m from the eastern end of the trench. These walls may have formed part of one of the elongated ?warehouse buildings that ran at right-angles to the river and shown on Hochstetter's map of 1789 and the Ordnance

Survey 1885 plan. An associated east-to-west aligned wall [165]=[166] was seen on the southern edge of Trench 2 (see below).

5.2.8 Trench 1 Phase 8 –Victorian

During the 19th century this building was substantially remodelled. This rebuilding was probably associated with the construction of a north-to-south aligned wall [24] at the far eastern end of the trench. It was made of soft 'Norfolk red' type brick set in an English cross bond and generally presented a 19th-century appearance. This wall had a roughly built flint and brick rubble wall [25] on top of it. The brick wall seemed too substantial and well built to be merely a foundation for the slight flint wall above. It perhaps formed the main river revetment wall in the early 19th century and may itself be associated with the construction of Albion Mills.

Further to the west deposits of silty loam make-up [12] and brick/flint rubble [11] attested to the scale of the rebuilding. Also at this time the ?warehouse building was provided with a solid brick floor [10].

5.2.9 Trench 1 Phase 9 – 20th century

Above the level of the Victorian floor [10] the uppermost 0.6m - 0.8m of the trench was made up of a series of 20th-century dumps or make-up layers, interspersed with a flint cobble surface. These layers were much cut by 20th-century services including redundant heavy duty electrical cables related to the use of the rear part of 255 King Street as an electricity substation.

5.3 Trench 2

5.3.1 Trench 2 Phase 1 –Late Saxon

The earliest deposit within this trench at first appeared to lie below natural orange gravels [100] at the eastern end of the trench. A 0.1m thick layer of dark grey sands and gravels [186] was seen which contained some general combustion debris and fire crazed flints. This deposit was overlain by c. 0.3m of 'clean' redeposited natural orange sand and gravel [185] which contained pottery dated to the 10th or 11th centuries. The dark grey sands and gravels [186] were perhaps the result of Late Saxon or Norman activity involving clearance of trees and vegetation beside the river margin. The orange sands and gravels [186] were possibly the result of a landslip, hill-wash or other mass movement, perhaps accelerated by the clearance and over grazing of the sloping western margins of the river in the vicinity. Not enough of the dark grey sands and gravels were exposed to enable an uncontaminated bulk sample to be taken.

This interpretation may be supported by the pollen analysis from Trench 1 (see below). Pollen from the earliest deposit tested consisted largely of grasses and heather, suggested the proximity of heathland. Heathland is usually the result of grazing and was up until the last century managed as part of a pastoral economy. Part of this management often involved deliberately burning to encourage the regeneration heather and grasses (Rackham 2000, 139)

5.3.2 Trench 2 Phase 2 – Saxo-Norman

The redeposited orange sands and gravels [186] were cut by structural features, including two post-holes, one large [175] with a diameter of c. 0.3m, and one smaller example [177] with a 0.1m diameter. A beam slot [194] was also recorded.

Possibly contemporary structural features also survived in the north-west corner of the trench, to the north of the deepest extent of the construction cut of cellared building [73]/[74], where two post-holes [97] and [80] were found. The earliest of these [97] was cut into a layer of possible Saxo-Norman buried soil [102]. The second post-hole cut a layer of ashy dumped material [101]. A further dump of ash ([94]) and a possible fragmentary chalk and mortar floor [98] was also associated with these post-holes.

As a group these features can be dated by pottery to the 11th to 12th centuries and represented at least two or three timber buildings. The westernmost of these buildings probably fronted onto King Street.

5.3.3 Trench 2 Phase 3 – 12th to 13th centuries

The structural features in the eastern half of the trench were overlain by a soil build-up [172] which contained 11th- to 12th-century pottery. This was in turn overlain by a possible flood episode [184]. It is possible that this deposit later formed an occupation surface for a short time. It was soon, however, inundated by dumps of gravel and peat ash [183] and chalky clay [182]. These layers were then truncated by an indistinct feature [190] whose purpose was not clear. The fill of this feature was sealed by a confusing series of dumps made up of sandy silts, clays and smaller elements of crushed chalk [193], [201], [202], [203], [204], [205] and [206]. Although no pottery was recovered from these deposits some animal bone was present and they had the character of redeposited rubbish or occupation material.

All of this took place in the eastern half of the trench. Clearly the timber building or buildings that occupied that half of the trench during Phase 2 was no longer standing, although it is possible that the structures in the western half of the trench were still extant at this time.

5.3.4 Trench 2 Phase 4 – 13th century

The top of the redeposited rubbish deposits of Phase 3 were truncated by a levelling or landscaping operation evidenced by cut [188]. The cut was filled by a grey/brown clay-rich deposit containing pottery dated to the 11th to 13th centuries. This make-up was overlain by a laminated, possible flood deposit [195]. A timber building, evidenced by a chalk post-pad [198] and a chalk mortar floor [181], sat on top of this possible flood deposit. The constructional techniques used in this building bear a superficial similarity to those of the structure formed by chalk post-pad [62] and timber pile [43] in Trench 1.

In the western part of the trench the presence of a single possible pit [116] indicates that the Saxo-Norman Phase 2 buildings were probably not in existence by this time. They were eventually replaced with a building floored with chalk and mortar [93]. The chalk and mortar floor may have been replaced with a tile floor as thin sandy bedding layers [91] and [92] overlaid it. No traces of any floor tile nor any structural features associated with this building were found.

The chalk post-pad building in the eastern part of the trench was re-floored with clay and chalk ([170]). This had a dump of peat ash [179] on top of it.

5.3.5 Trench 2 Phase 5 –Late Medieval

The destruction of the building in the eastern half of the trench was marked by the digging of two substantial robber pits [200] and [208]. The smaller of these [208] undoubtedly removed the post associated with post-pad [198].

After this all of the trench including the King Street frontage seems to have become an open area. Towards the west end of the trench a possible terracing cut ([103]) had been filled with sandy clay [90] and crushed chalk [88]. This seems to have been connected with the deposition of probable late medieval make-up deposits [87], [89]=[32]. One of these contained 14th-century pottery. The building destruction and robbing episode in the eastern half of the trench was sealed by an extensive layer of late medieval make-up [33]=[207]. After the deposition of this raft of material the area was probably left open and free of buildings for a period of time. A small cess pit [122] was dug in the north-west corner of the trench close to the street frontage.

5.3.6 Trench 2 Phase 6 – Early post-medieval

Following the period of disuse a more robust terracing operation [168] occurred across most of the area of the trench. This was the precursor to the construction of the large cellared building formed by walls [73] and [74]. The two walls were built at the same time and formed part of a structure tentatively dated to between the late 16th or 17th centuries, based on the building materials and techniques employed.

5.3.7 Trench 2 Phase 7 –Late post-medieval, Victorian and 20th century

The deeply cellared area south of wall [73] was floored with chalk/mortar [148] laid on a bed of redeposited orange sand and gravel [149]. Below the sand and gravel a levelling layer of ?coal ash containing many roof tile fragments. It is likely that this cellar was a late post-medieval or Victorian addition.

To the east of wall [74] parts of a probably later post-medieval warehouse were seen. A poorly constructed flint wall [165]=[166] which contained many pantile fragments, ran along the south edge of the trench. A chalk and mortar floor [131] was found associated with this wall. The constructional characteristics and alignment of this wall indicate that it was part of the same building as walls [1] and [17] in Trench 1.

The cellared building was in use for several centuries as a domestic dwelling. It can be seen on the Ordnance Survey 1885 plan, with the post-medieval warehouse building behind. Several alterations, which were at the earliest late Victorian, were made to the cellared building. These included blocking an opening at the southern end of wall [74] with soft 'Norfolk red' type bricks. To the east of wall [74] similar, if not the same, cobble and brick surfaces to those seen in the upper levels of Trench 1 were seen. These were capped by a concrete and Portland cement floor [136]=[158]. It is unlikely that this floor is any earlier than late 19th- or early 20th-century.

The directory entries indicate that the demolition of the cellared building, which was probably numbered 227 King Street, took place between 1905 and 1922 and probably relates to Norwich Corporation's use of 225 King Street. This action was evidenced by the detritus amongst the extensive rubble cellar infill [69]. This

demolition material was overlain by a flimsy concrete slab [84] which formed the floor of the late 20th-century quality control testing laboratory.

6.0 The Finds

6.1 The Pottery

by Richenda Goffin

6.1.1 Introduction

A total of 335 fragments of pottery, weighing 4.012kg, was recovered from the evaluation. The assemblage consists of a small quantity of Late Saxon pottery, with a much greater amount of medieval ceramics. No post-medieval wares were recovered. A wide range of fabrics were identified, many of which are imported wares. A third of the ceramics by weight (33.05%) were effectively unstratified, the material originating from the upper part of the slot in Trench 1.

6.1.2 Methods

The ceramics were quantified by the number of sherds present in each context identified by fabric, the estimated number of vessels represented and their weight. Other characteristics such as condition and decoration were noted, and an overall date range for the pottery in each context was established. The pottery was catalogued on *pro-forma* sheets by context using letter codes based on fabric and form. This data was recorded on a spreadsheet and is presented in an abridged form in Appendix 3.

The fabric codes used are based mainly on those identified in *Eighteen centuries of pottery from Norwich* (Jennings 1981), and supplemented by additional ones compiled by the Suffolk Archaeological Unit (S Anderson, unpublished fabric list).

6.1.3 Late Saxon

Ten fragments of Late Saxon date were identified, weighing 0.196kg. The pottery made up 4.88% by weight of the overall assemblage. The material comprised mainly sherds of Thetford-type wares of 10th- to 11th-century date. The majority of these wares were body sherds, but the rim of a straight-sided bowl which was heavily stained and blackened, with an internal recess, was present in [34], a consolidation deposit of organic peat and silt. A single fragment of slightly abraded Thetford-type ware was identified from wattle revetment [45] and a second sherd was present in the upper fill of post-hole [175]. The remainder of the Thetford-type wares were found with pottery which could be 12th-century or later, so it is possible that some of these fragments are residual. The only other Late Saxon fabric present in the assemblage is an unstratified fragment of the strap handle from a pitcher present in [28]. It is made in a coarse Stamford variant, (Fabric A), which has an overall date range of 10th- to mid 11th-century (Leach 1987, 74). The handle has two rows of applied thumbed strips running along its external surface, and is partially covered with a green and yellow glaze.

6.1.4 Medieval

The remainder of the pottery, comprising 325 fragments weighing 3.816kg, spans a relatively homogenous date range within the medieval period, that is the 11th to 13th

centuries. The main exception to this is the group of ceramics recovered from the consolidation deposit [32] in Trench 2, which is of a slightly later date.

6.1.5 The Medieval Pottery by feature

6.1.5.1 Trench 1

A single fragment of Yarmouth-type ware, a sandy fabric containing sparse shell of 11th- to 12th-century date, was recovered from [75], a silty peat dump overlying one of the revetment structures.

Further pottery was present in a possible make-up dump [31] behind the hurdle revetment ([45]). The ceramics consist of a fragment of Thetford-type ware, two sherds of Yarmouth-type wares with internal staining, possibly from madder dyes, a fragment of Red-painted Pingsdorf ware and two sherds which are probably also Rhenish stoneware, but which have a gritty stoneware fabric and different surface treatment. A fragment of the same vessel was identified in make-up deposit [48]. The pottery from this feature could be dated to the 11th or 12th centuries, although Pingsdorf ware also continues into the 13th century.

No pottery was recovered from the reclamation structure ([83]) situated to the east of the revetment ([45]).

A total of 66 fragments of pottery weighing 0.788kg was recovered from [34], a peaty silt deposit which is likely to represent another foreshore make-up dump in between the two wattle revetments. The group comprises a mixture of local pottery, with some regional and imported wares. Nine different Local medieval unglazed cooking vessels all had simple everted rims, typical of the 12th and 13th centuries. There are no examples of the more developed types indicative of a 13th- to 14th-century date. Small quantities of Early medieval ware, Early medieval shelly ware, Yarmouth-type ware and medieval coarseware are also present. In addition two fragments of Stamford fineware with an overall yellow glaze were identified, (c. 1050-12th century). The imports consist of a sherd of Pingsdorf ware, and one of Andenne, together with a possible fragment of Aardenburg-type ware with grey core and oxidised margins with lead glaze. Two hard-fired sandy whitewares may be from Beauvais, or another production centre in Northern France. The lack of Glazed Grimston ware in [34], which appears in late 12th-century deposits and later in Norwich, and the presence of a fragment of leather, may suggest that this dumped deposit is also of 12th-century date, rather than much later. The leather fragment is likely to be part of the vamp of an ankle-boot or shoe upper, which has a strip of stitching down its centre. Such vamp decoration is found on London footwear and elsewhere in the 12th century (Pritchard 230-231).

Above this make-up dump, two other similar deposits contained pottery. Thirteen fragments weighing 0.196kg were found in a silty peat [23]. In addition to a small fragment of Early medieval ware, four fragments of Local medieval unglazed wares were present, including an everted flared rim of 11th- to 13th-century date. Yarmouth-type wares were also recovered, and include several sooted sherds with a purple stain inside, perhaps the result of containing madder dyes. A single fragment of Pingsdorf ware and one of Andenne whiteware are also present. Although the pottery from this deposit could be dated to the 11th to 13th centuries, the everted rim form of the Local medieval unglazed ware cooking vessel indicates a 12th- to 13th-century date for the deposition of the pottery in this context.

A second peaty foreshore deposit [30] contained pottery which was almost exclusively imported. The ceramics consist of 22 fragments of Red-painted Pingsdorf ware, including several joining sherds of a handled pitcher, a single body sherd of Paffrath ware, and the collared rim of an Andenne pitcher. Other locally produced pottery comprises two fragments of Local medieval unglazed wares. Such a range of forms and fabrics suggests a 12th- to 13th-century date for the pottery from this consolidation layer, which is similar to deposit [23]. However, as before, there is no Grimston ware of late 12th- to 14th-century date in either of these two deposits.

A further 11 sherds of pottery were found in [42], a similar deposit to the consolidation layer [34]. In addition to five fragments of Local medieval unglazed wares, which include two simple everted rim types of 11th- to 13th-century date, the group contains three fragments of a sandy jug with splashed glaze, which is as yet unprovenanced. The imports comprise a fragment of Andenne-type ware, a small fragment of Redpainted Pingsdorf ware, and an abraded rim sherd of a Normandy Gritty ware pitcher of 11th- to 13th-century date.

Fill [46] of peat deposit [152] contained six fragments of Local medieval unglazed wares, including a large cooking vessel or jar with a more developed square rim which may be of a 13th- to 14th-century date.

A small group of ceramics was associated with [48], a makeup dump associated with the early revetment [81] and [104]. The pottery consists of three unabraded sherds, the knife-trimmed base of an Andenne ?pitcher, a fragment of Thetford-type ware, and a body sherd of a Redpainted ware vessel which comes from the same vessel as two sherds present in [31], another consolidation layer.

A single fragment of Yarmouth-type ware of 11th- to 12th-century date was present in [75], a redeposited layer in the revetment [81] and [104]. A sherd of Local medieval unglazed ware was found in [76], a riverine deposit.

Twelve sherds weighing 0.235kg were recovered from [77], a silty layer above the gravel surface [26]. The pottery consists of two fragments of Thetford-type ware, small quantities of Early medieval wares, and a fragment of Yarmouth-type ware. Five fragments of Local medieval unglazed ware were found, included a large rim of a cooking vessel or jar with a slightly thickened everted and flared rim, of 11th- to 13th-century date. The thumbled base of a Pingsdorf beaker or pitcher was also present.

Two further fragments of Local medieval unglazed ware, and a possible fragment of underfired Pingsdorf ware were found in [26], a gravelled surface which may be from within a timber building.

Three fragments of pottery were recovered from two fills of pit [41] which was recorded at the far end of the trench. A single fragment of a Dutch-type red earthenware of medieval date was present in [35]. A highly abraded rim sherd of Local medieval unglazed ware with simple everted rim and a glazed greyware sherd of local origin in [37] may indicate a late 12th- to 14th-century date for this fill, although the redware sherd may be later.

6.1.5.2 Unstratified pottery in Trench 1

A total of 133 fragments of medieval pottery weighing 1.313kg was recovered from [27], [28] and [29], which were found in the upper part of the slot in Trench 1 but are unstratified. The pottery comprises many of the early medieval and medieval fabrics

which are present in the stratified deposits, although some unprovenanced wares are also in the group. The local wares consist of Early medieval wares, Yarmouth-type wares and Local medieval unglazed wares. As well as simple everted rims, several developed rims in Local medieval unglazed wares are present in [27], and suggest a 13th- to 14th-century date. Fragments of Andenne-type ware, ?Flemish greyware, and Pingsdorf wares occur frequently.

6.1.5.3 Trench 2

The pottery from [185], a redeposited layer of orange sands and gravels, consists of a fragment of Thetford-type ware and one of Yarmouth-type ware of 11th- to 12th-century date.

Fill [78] of a posthole of a possible early medieval structure located in the north-west corner of the second trench contained seven sherds of pottery. These comprise a strap handle of an Early medieval sandwich ware pitcher, a single fragment of Early medieval ware, two sherds of Yarmouth-type ware and three body sherds of Local medieval unglazed ware, indicative of a possible 11th- to 12th-century date, although Local medieval wares cover the 11th- to 14th-century period.

One fragment of a medieval coarseware sherd was present in the floor deposit [170]. It is pale grey with a partially oxidised inner core, sandy with a shallow applied strip.

Five sherds of pottery were found in [171], a make-up deposit for the timber building with chalk mortar floor. The group consists of two fragments of Early medieval wares, a Local medieval unglazed ware cooking vessel or jar with simple everted rim, a fragment of Yarmouth-type ware, and a fragment of Andenne-type ware, dating to the 12th or 13th centuries.

Fill [174] of posthole [175] contained one fragment of Local medieval unglazed ware of 11th- to 14th-century date.

A single fragment of Yarmouth-type ware of 11th- to 12th-century date was found in the fill [178] of beamslot [194], together with two fragments of Early medieval ware.

The largest quantity of pottery recovered from Trench 2 was found in a deposit of consolidation material at the western end of the trench. This feature contained a wide range of imported wares of a later date than the waterfront dumps in Trench 1. Twenty-nine fragments of pottery were recovered from this deposit, weighing 0.327kg. The local wares include five body sherds of Local medieval unglazed wares, and two fragments of Glazed Grimston wares with plain olive lead glazes. Fragments of two vessels imported from South-western France are present. A small sherd of a Saintonge polychrome jug decorated in brown slip and green glaze is likely to be of a late 13th- to early 14th-century date. A second, better preserved Saintonge vessel in the form of a large pitcher with wide pouring lip and mottled glaze may date to the late 13th century (Platt *et al* 1975, 138). Fragments of Low Countries redware include four fragments from a jug. Three additional glazed fragments may be imported or are perhaps Yarmouth Glazed ware of 13th- to 15th-century date. A body sherd of Andenne-type ware was also recovered from [32], and a glazed strap handle with stabbed decoration, with a grey fabric and oxidised margins, is also likely to be an import, but requires further investigation.

6.1.6 Discussion

The pottery recovered from the excavation provides useful dating evidence for the history of the development of the waterfront along this part of the River Wensum during the medieval period. The pottery from the consolidation material associated with the structural elements of the different revetments appears to be of a similar date range in Trench 1. Precise dating may not be possible, although some dendrochronological samples have been taken, but the evidence overall may indicate a 12th-century date for these events.

Perhaps the most noticeable feature of this assemblage is the high percentage of imported wares found in both of the trenches. As much as 31.4% by weight, and 22.9% by sherd count of all the pottery recovered from the evaluation was imported. These figures may be slightly amended when precise identifications of certain fabrics have been confirmed.

Such a pattern is typical of other sites located along this stretch of the river Wensum of medieval date. This part of the river frontage would have been in the centre of the mercantile quarter of the city, so some degree of imported wares are to be expected, although the figures are especially high.

Comparison with the pottery recovered from the excavations at Dragon Hall, further north along King Street, provides the following information. For Period 2 (11th -12th century) the imports made up approximately 2% of the total (Anderson forthcoming). This increases to approximately 5% in Period 3 (12th - mid 13th century) and 5% in Period 4 (mid 13th - mid 14th century). Since the Dragon Hall site is situated much further away from the river than the Flour Mill evaluation a more meaningful comparison should perhaps be made with the pottery from excavations at St Anne's Wharf (Shelley in prep. b) and Cannon Wharf upstream (Shelley 1998).

In spite of the fact that a much higher quantity of imports were recovered at Read's Flour Mill than at Dragon Hall, the range of the imported fabrics recovered from both sites is very similar. The pottery comprises many examples of Pingsdorf-type wares, which were produced in the Rhineland, although other similar pottery was made at centres near the Meuse, and at Beauvais (Ludtke 1989, 40). Other common imports identified from the evaluation are fragments of Andenne-type wares produced in the Middle Meuse Valley (Giertz 1996, 33-64). A single fragment of Pathraff ware, which was also made in the Rhineland, was present in one of the consolidation dumps dating to the 12th to 13th centuries. A pitcher rim made in Normandy Gritty ware is an unusual but not unknown type of pottery found in Norwich. Two sherds of this fabric were identified from the excavations at St Faith's Lane (Blinkhorn forthcoming). Small quantities of Dutch redwares were identified, and a number of unprovenanced glazed wares are also likely to be of Low Countries origin. Two jugs from the south-western part of France were present in the consolidation deposit [32] in Trench 2. These comprised a highly decorated polychrome jug and a pitcher with a wide pouring lip. All of these fabrics, apart from the Normandy Gritty ware were identified at Dragon Hall, and they are not uncommon from other sites in central Norwich.

6.1.7 Conclusions

The ceramic assemblage recovered from the evaluation is particularly interesting due to the wide range of pottery which is present, and its deposition within a comparatively short time-scale. In addition there are several unidentified fabrics which are of a non-local origin and may be further evidence of imported wares. It is

hoped that further study of this pottery will enable more precise identifications to be made.

6.2 Ceramic Building Material

by Lucy Talbot

6.2.1 Introduction

The site produced forty-two pieces of Roman, medieval and post-medieval ceramic building material weighing (5.325kg). The entire assemblage was fragmentary and no complete examples were recovered.

Context	Form	Quantity	Weight (kg)	Period
29	Brick	2	0.452	Post-medieval
30	Brick	1	0.007	Medieval
32	Brick	10	0.752	Medieval
32	Flat roof tile	1	0.193	Post-medieval
34	Floor tile	1	0.153	Roman
37	Brick	17	2.467	Medieval
37	Flat roof tile	3	0.339	Post-medieval
42	Brick	1	0.239	Undated
46	Floor tile	1	0.184	Roman
76	Pan tile	1	0.068	Post-medieval
77	Floor tile	1	0.180	Roman
77	Tegula	1	0.141	Roman
170	Flat roof tile	1	0.150	Post-medieval
TOTAL		41	5.325	

Table 2: Ceramic Building Material

6.2.2 Roman

This group consists of three pieces of brick / tile (0.517kg, [34], [46] and [77]) and one fragment of tegula (0.141kg, [77]), a specific form of Roman roof tile.

6.2.3 Medieval

Twenty-eight pieces of medieval brick (3.226kg) were recovered from [30], [32] and [37].

6.2.4 Post-medieval

This assemblage consists of two fragments of brick (0.452kg, [29]), five pieces of flat roof tile (0.682kg, [32], [37] and [170]), some of which have traces of clear glaze present, and one piece of pantile (0.068kg, [76]).

6.2.5 Undated

A single piece of burnt brick weighing (0.239kg) was recovered from [42]. It has been exposed to a very high temperature, which has vitrified the material, rendering it undateable.

6.3 *Small Finds and Other Finds*

by Lucy Talbot

6.3.1 Small Finds

Eight small find numbers were allocated to more than 18 artefacts recovered from the site (see Appendix 4). The majority of the assemblage consists of small fragments of leather (SF4, [34]) and a single piece of medieval shoe upper (SF1, [34]). This has been provisionally identified as a vamp, with the possible stitch scarring of a 'vamp stripe', created for decoration of the shoe. The shoe fragment, which may be of 12th-century date, is in good condition, with clear stitch marks still visible.

The remainder of the group includes a wooden medieval rigging block (SF2, [82]), and a single post-medieval blue/green glass bead (SF7, [69]). Four iron objects were also recovered and include two unidentified artefacts (SF3,[32] and SF8 [171]) and two clench nails. One has a square rove (SF5, [35]) and the other a lozenge-form rove (SF6, [46]). These nails are often associated with clinker-built boats.

6.3.2 Metalworking Debris

The site produced a single piece of metalworking debris, a classic example of a convex hearth bottom (0.266kg, [75]), associated with the smithing process. This material has been exposed to further high temperature which has vitrified part of the upper surface.

6.3.3 Iron

Four miscellaneous nails were collected from [32].

6.3.4 Non-local Stone

by Lucy Talbot and John Percival

The site produced nine pieces of non-local stone (6.316kg, [28] and [42]). All of the material is fragmentary and none is worked. These are probably re-deposited pieces of ship's ballast incorporated into both phases of revetment. Most appear to be either partially dressed lumps of limestone, probably Caen or Barnack stone, and an unidentified lump of ?mudstone

6.3.5 Shell

Oyster, Cockle, Mussel and Whelk shell weighing (0.202kg) was recovered from [23], [27], [31], [32], [34], [35], [37] and [96].

6.4 *The Architectural Fragments*

by Neil Moss and John Percival

In addition to the stone fragments listed in 6.3.4 five pieces of worked stone were recovered from the cellar rubble infill [69].

Small Find No.	Context	Description	Stone	Style	Date
9	69	Small fragmentary reused ashlar block, original weathering on two faces. Tooling details and smallness indicate early style.	Barnack limestone	Romanesque	12th-century
10	69	Large complete ashlar block	limestone	?	Medieval
11	48	Smallish ashlar block. Tooling details indicate early style. Damage on one face may be a point for a derick caliper.	? Caen limestone	Romanesque	12th-century
12	69	Chamfered ashlar block	limestone	?	Medieval
13	69	Moulded springer with simple chamfered moulding to soffit. Keel moulding with arris on outer edge. Keel moulding forms engaged colonette with badly damaged roll moulding. Heavy diagonal tooling and an 'X' mason's mark on the mating surfaces	limestone	Romanesque	12th-century

Table 3: The architectural fragments

All of the dateable fragments seem to derive from roughly the same period and could easily have come from the same building. It was common practice to mix Barnack and Caen stone within the same walls or structures in order to exploit the differing properties of both and ensure differential strain, wear and weathering (Stephen Heywood pers. comm.). Whilst it is probable that both the nearby ecclesiastical buildings, St Olaf's Chapel and St. Peter Southgate, had stone-built 12th-century elements it is difficult to reconcile a 1940s or 1950s date for the deposition of the stone with the histories of the two buildings. St Olaf's had disappeared well before the end of the medieval period and the 1885 1:500 Ordnance Survey plan shows St Peter Southgate as intact but presumably derelict. By 1907 the tower alone is shown, probably in a condition not so different from its present fragmentary state.

6.5 The Worked Flint

by Sarah Bates

6.5.1 Methodology

Each piece of flint was examined and recorded by context. The material was classified by *category* and *type* (see archive) with numbers of pieces and numbers of complete, corticated, and patinated pieces being recorded. Numbers and weights of burnt flint were also recorded with material then being discarded. Additional descriptive comments were made as necessary.

6.5.2 Flint

Twenty-one pieces of struck flint were recovered from the site. Nine fragments of burnt flint were also found. The flint is summarised in Table 1 and listed by context in Appendix 1.

Type	Number
Core trimming flake	1
Flake	6
Blade-like flake	3
Blade	5
End scraper	1
Retouched flake	2
Retouched fragment	1
Utilised blade	2
Total	21
Burnt fragment	9

Table 4: The flint

Some of the flint is unpatinated and is mid grey in colour. Cortex, where present is usually a slightly flecked dirty cream colour from gravels. It is noticeable that much of the material is patinated, often quite heavily, ranging in colour from pale brownish grey to pale bluish grey. Many of the flints have some degree of edge damage.

No cores are present but a flake from the face of a blade core was found [172]. It has had several previous blade removals from one platform and is patinated a mottled pale bluish grey.

Nine flakes are present. They range from a broad hard hammer struck piece [185] to thin soft hammer struck blade-like pieces [174]. Five blades were also found.

A thick, quite broad, flake [172] with steep retouch across its narrow distal edge has been classified as an end scraper. Its other edges are damaged.

The only other flints are two retouched hard hammer struck flakes and a utilised blade [172], a utilised soft hammer struck blade [185] which is patinated a pale grey and a possible retouched thermal fragment [29].

6.5.2 Distribution

Only two burnt fragments and a thermal fragment which may have been retouched, or might be accidentally edge damaged, came from Trench 1.

Almost all of the flint from the site was found in Trench 2. A small fragment of a blade and a flake as well as seven burnt fragments were found in a layer of dark grey sand [186] which was the earliest deposit excavated at the site. Unlike most of the flint from the site, both of the struck flints were sharp. A utilised blade and a flake were found in a layer of re-deposited sand and gravel [185] which overlaid this deposit.

A total of six struck flints were found in the fills of post-holes which cut a buried soil of possible Late Saxon date. These were mainly blades, or soft hammer struck blade-like pieces. Most of the material was edge damaged to some degree.

A total of nine struck flints, mostly edge damaged, were found in deposit [172], a build up of soil of early medieval date. They included a flake from a blade core, a flake, a blade-like flake, two blades, an end scraper, a utilised blade, and a retouched flake. Several of these flints were patinated a bluish grey in colour.

6.5.3 Discussion

The flint is significant as, although quite a small assemblage, there is an apparent predominance of blade and blade-like pieces including a flake from the face of a neatly prepared blade core. These suggest that much of the material could date to the Mesolithic or earlier Neolithic period.

A few pieces of undiagnostic flint, mostly burnt fragments, but including two sharp struck pieces, were recovered from a probable prehistoric deposit although most of the site assemblage, including most of the blade-like pieces, was found residually in later deposits. However, due to the nature, patination and edge damage to most of the lithic material it seems likely that much of it may date to a relatively early period and relate to activity in the vicinity of the site, perhaps represented by the lowest excavated deposit.

The flint may be compared with that from other sites close to the banks of the river Wensum such as Dragon Hall (Shelley in prep a), Old Barge Yard (Percival and Shelley 2003), St Annes Wharf (Shelley in prep b). At all these other sites the lithic assemblages included material, found residually, likely to date to the Mesolithic or early Neolithic periods. On the east bank of the river several worked flints of probable early Neolithic date were found from peat deposits during work on the Riverside Development and more recently Mesolithic flints have been found during work at Carrow Road (Adams 2003). The diverse and fertile nature of the river valley is seen as the ideal environment for occupation from the Mesolithic period onwards on the banks of the River Wensum and in its vicinity (Emery 1998, Wiltshire and Emery 2000).

6.6 The Boat Timbers

by Richard Darrah

6.6.1 Introduction

This report on the timbers found in Trench 1 at Read's Flour Mill is an assessment of the material found, and an indication of the potential of the whole site to provide well preserved dateable boat timbers and building timbers dating from the 10th to 14th centuries. Appendix 6 provides a glossary of technical terms used in this report. In Appendix 7 a suggested methodology for dealing with boat timber and a short glossary of boat terms is provided. Table 5 below summarises the boat and other timbers examined. Where timber was found to be part of a structure a context number was assigned to each structural element. The individual timbers within each context were then differentiated by sample number with the exception of [82] where the small oak spacer was assigned a small find number. In cases where timber were found within dumps or make-up layers and performed no obvious structural function the timber were assigned the context number of the layer in which they found and then given a sample number.

Context	Sample No	Description all timber oak unless species stated.	Sampled for dendro-chronology	Should be drawn	Keep until site excavated
43	3	Oak pile complete with sapwood	yes	no	no
43	5	Oak off-cut			
43	6	Parts of 2 boat strakes, one with scarf part of hood-end		yes	yes
43	7	Parts of 2 boat strakes, joined with 6 nails and roves,	yes	yes	yes
43	8	Parts of 2 boat strakes, joined with 5 nails and roves, one strake has scarf	yes	yes	yes
43	9	Parts of 3 boat strakes from hood end one with scarf on one strake, two carved lines follow edge of strake	no	yes	yes
43	10	Cleft oak stake			
48	47	Possible boat frame badly damaged	no	no	no
61	44	Reused radially cleft oak timber	no	no	no
61	45	Reused cleft half oak timber	no	no	no
61	46	Packing wedge	no	no	no
82	SF 2	Shaped oak spacer	no	yes	no
82	33	Oak plank with seven auger holes.	yes	yes	keep
128	34	Parts of two boat strakes, joined with 5 nails and roves.	no	yes	no

Table 5: The boat timbers and other timbers

6.6.2 General description of contexts containing timbers

Context [43]

Several lengths of oak plank were found on end surrounding a vertical oak pile in material making up the eastern revetments [53] and [46] and driven through the thick silts [34]. It is not clear whether these thin pieces of wood were used torevet the upper part of the hole that the pile was set into, or as packing to make the pile more secure.

Context [48]

One possible fragment of boat frame found horizontally and seemingly randomly within [48], part of the make-up for the eastern revetment.

Context [61]

A stake and horizontal timber separated by a packing wedge. Found within revetment make-up material [53].

Context [82]

These timbers were found lying horizontally with the make-up of the western revetment sandwiched between deposits [31] and [105]. The timbers formed part of the structural interlacing within the western revetment.

Context [128]

Non-structural boat timbers found within thick silts [34] which lay physically under and earlier than the western revetment.

6.6.3 Brief Description of Timbers

[43] Sample 3

An oak pile of 0.2m diameter complete with bark, tapered to a point over one metre. The top had rotted away, the timber was fast grown, and poor quality. There were a large number of epicormic growths around the trunk. The lower end was damaged where it had entered the river gravels.

[43] Sample 5

Off-cut from upper end of a trunk produced in cutting to length of halved fast grown oak trunk. All surfaces split except that some of the sapwood rings have been hewn away. Sapwood in excellent condition, suggesting that this piece was buried within weeks of being cut. This piece was very fast grown - 6mm annual ring width, and had only 22 rings. The preservation of the timber was excellent suggesting that had it had sufficient rings it would have dated to the year of felling, giving a precise date.

[43] Sample 6

Parts of clinker boat strakes near to hooked hood end of boat (port stern). 0.50 x 0.13 x 0.022 (at plank centre). The upper strakes consists of parts of two radial planks scarfed together. The scarf angles the plank edge up at 25°. The lower incomplete plank's bottom edge is a fresh split. Inboard face of upper strake has lost at least 2mm of thickness except in land it is now 11mm thick, against 21mm for the lower plank. Luting in 50mm wide land only two clenched nails and roves survive, shanks look square but may be round.

[43] Sample 7

Parts of two clinker boat strakes 0.86 x 0.2 x 0.25 (at land). Joined together with six clenched nails and roves at an average of 0.13m spacing. Three nail holes at lower edge of upper plank 185mm apart indicate that this plank was re-used. Three treenail holes in lower plank of 22mm diameter, hole spacing 0.225m one peg *in situ* not oak. The lower plank has a surviving thickness of 13.5mm but neither surface survives so it will have been several millimetres thicker. Both planks are radial.

[43] Sample 8

Parts of two clinker boat strakes 0.62 x 0.18 x 0.028 (at land), mid plank thickness survives at 22mm but probably originally 25mm as original surface survives at side of peg, and this surface is 2mm above existing surface elsewhere. Peg *in situ*. The grain looks odd because of small branch in head. It has a peg hole of 22mm diameter, Scarf with two clenched nails and hole for third surviving, scarf overlap 170mm. Roves odd as 40mm x 20mm. Nails on land 110mm spacing. Estimate plank width originally 0.24 in width. All three planks are radial.

[43] Sample 9

Parts of three clinker strakes, with luted land and scarf at end of the middle strake, lower strake survives as fragment, all planks broken and incomplete. 0.5 x 0.18 x 0.021 (in middle of plank). The curved edge at the bottom of the middle strake, suggests that this is part of a hood end. As scarfs usually face the back of the boat this is likely to be the hooked hood end at the starboard stern of the vessel. There are two very faint lines parallel to the curved edge of the middle strake on its outer face. These lines cut through a medullary ray as a fine score, but as there has been some surface loss they could originally have been a shallow groove. Land overlap 50mm, nail spacing 150mm.

[43] Sample 10

Radially cleft oak stake 0.9 x 0.065 x 0.05 with wedge shaped pointed over 0.2m. Very fast grown felled when two thirds of the summerwood had formed. Although there was some natural twist in the grain the wood had become distorted because of the weight of overburden. Used when wood green as no decay to sapwood.

[48] Sample 47

A curved fast grown timber, probably branch wood, that had two flat sides one radially split, the other axe hewn. There was an auger hole drilled through from side to side. Both the top and bottom faces were damaged and split. These pieces had the shape of a frame, but no features which identified it as a frame. If it had been intended to be a frame all the evidence had been split away, possibly in preparation.

[61] Sample 44

A half round split piece 0.7 x 0.12 x 0.06 with the outer part of the sapwood dressed off down the centre and the remains of a point.

[61] Sample 45

A length of radially cleft timber 0.6 x 0.12 x 0.05 with a single 20mm auger hole from previous use. The sapwood had been dressed off but the remaining surfaces were as split, very fast grown 5mm annual ring width.

[61] Sample 46

A tangentially faced packing wedge 0.15 x 0.06 x 0.03 found *in situ* between the two pieces of timber. This wedge had been made from a piece of timber with a 23mm diameter auger hole drilled part way through it.

[82] SF2

[128], [34]. Seven pieces of boat plank, of which three could be joined to form part of two strakes. Two were held together by iron.

[128] Sample 34

Eight broken pieces of boat planks, three from part of two strakes 0.42 x 0.22 x 0.021 (at peg hole). Strakes held together by five clenched nails at 90mm to 110mm centres, heads 20mm diameter shanks square. Peg hole 18.5 mm.

6.6.4 The level of preservation of the timbers

The level of preservation on site is best described by looking at the boat planks and pile from [43]. When the boat planks were found the upper ends were thinned and decayed and may originally have been longer as they had decayed to the same level as the pile. The lower ends were damaged and bent where they had been in contact with the river gravels below the sediments. Just above this level some of the wood was well preserved and near its original thickness.

Between the gravels and top of the longest boat plank were 0.8m of deposits in which the conditions for preservation of wood were excellent. The preservation of the iron boat nails was almost perfect at the top 0.4m but worse lower down in this silt.

The inside of the boat planks (the side of the planks that were originally inside the boat) were heavily decayed, having lost several millimetres of surface before re-use alongside the pile. The damage to the planks was limited near the roves suggesting that the upper plank had been completely worn away and that the upper edge of the bottom plank was also worn except where protected by the roves. This suggests that the inner faces of the planks were exposed to conditions where they were abraded and decayed before use with the pile.

The bottom edge of one of the planks was split along the grain through a pre-existing peg hole. This split was fresh and may be contemporary with the planks use alongside the pile. This all indicates that decay occurred before the boat planks were put in to the silts, where preservation was excellent. There has been some distortion of the vertical timbers due to vertical compression caused by the weight of overburden, so some boat planks no longer retain their original shapes.

6.6.5 The interpretation of dendrochronological dates from the site

The pile and a fresh oak off-cut both survived with complete preservation of sapwood and bark. This suggested that a dendrochronological date on these pieces would give the year of felling. As timber used was freshly felled it could have been possible to date precisely the construction of the eastern revetment. Unfortunately it was not possible to obtain dendrochronology dates from either of the two pieces (see below).

The boat planks from Read's Flour Mill are all made of straight-grained, often slow-grown oak. Such are often readily dated by dendrochronology. This proved to be the case at Read's Flour Mill (see below). However the boat timbers from [43] were all heavily decayed and abraded on one side before being used around the pile. This

means that they are likely to have been taken from an abandoned boat or boats in the river, rather than pieces being removed from a boat in the process of repair. It is likely that these boats were built at least fifty years before they were incorporated into the pile structure. As no sapwood has survived the dendrochronologist had to adjust for this. Thus the boat timbers from [43] will date the boats but not directly the construction of the western revetment. Initial on-site examination of the boat planking indicated some of it may have been imported timber or part of an imported boat. All pieces have square nail shanks, which are generally defined as an English boat building feature. There are a group of odd-shaped roves on one boat plank, which could be used as evidence to indicate foreign construction. Dendrochronological analysis proved that all of the timber examined was English (see below).

6.6.6 Potential of the material for further research

The excellent preservation of wood once it has been buried in these silts means that wooden objects survive in a recognisable form. The preservation is not restricted to oak, since all species found were preserved. Although the boat timbers are all decayed, all the elements of boat construction are present. This means that it would be possible to identify the position of the planks within boats, and the size of the boats from plank thickness, and treenail size.

One piece in the hood end has carved profiles parallel to the plank edge. Although we have six pieces of boats and can identify hood ends and different parts of the boat planking only one piece has two sets of treenail holes, indicating the frame spaces. Hopefully a more detailed picture of the size, shape, provenance and function of the boats will be identified from boat finds from a full excavation, should one take place. Where the building timbers provide dates or can be dated from their context, they may give us an insight into Saxon and Norman building techniques.

The sections of boat plank found have all been less than 0.25 square metres, most as part planks of strakes, with small pieces of planks from adjacent strakes attached. The pattern of decay on some of these pieces indicates that they were partly decayed before being used in the pile structure.

However some surfaces were freshly broken when they were used in the structure. This means a larger fragments of a boat or boats had been abandoned and were available and broken up to be used around the pile. Another method of dealing with soft muds other than piling, is to use large sections of boat planking flat on the mud and pile rubble on top of them to form a firm base for a building. It is possible therefore that further large sections of preserved boat lie close to Trench 1.

6.6.7 Conclusions

Should any future excavations at Read's Flour Mill take place on the area around Trench 1 there is a likelihood that there will be boat finds dated to the 9th to 15th centuries. These will all be important as our knowledge of the boats used in this period is very limited (Marsden 1994, 173).

The dendrochronological dating of the Read's Flour Mill boat timbers is most useful, as it tells us that the timber is English (from the London area), and the dated boats were built in the first half of the 12th century. As the timber is English, these boats were probably built or repaired in England, and so demonstrate the boat building techniques used in England at that period. This helps us to differentiate our boat

building techniques from other Northern European clinker-built construction techniques.

It is difficult at this stage to tell how many boats are represented. An initial simple assessment of boat numbers (below) may change as a result of further research.

At the moment it is suggested that we have pieces of four boats on the following basis:

- [43] Sample 7 and [43] Sample 6 from their similar dates may be from the same English-built boat.
- [43] Sample 8 has two dated planks. This piece of boat has unusual roves, which are twice as long as wide. On this basis I suggest that it is a different English-built boat from that above.
- [43] Sample 9 has moulding lines parallel to the plank edge. This feature in 11th-century boats is thought to be Scandinavian. It is therefore assumed that this is part of a separate boat not built in England.
- [128] Sample 34 has closer nail spacing and thinner planks than the other boats, as well as being from an earlier context. These details all suggest that it is from a different boat from the above.

Boat timbers from the first half of the 12th century are rare and these two dated boats of English timber increase our existing sample by about 20%. The boat timbers already found at Read's Flour Mill are, therefore, potentially of national importance.

6.7 *Dendrochronological spot-dates*

by Ian Tyers

6.7.1 Introduction

A total of eight samples from timbers excavated from Trench 1 consisted of five re-used boat fragments, and three structural timbers from a revetment.

A preliminary assessment of the samples concluded that whilst all the boat fragments were of dendrochronological potential the structural timbers were much more marginal, with only one of these containing sufficient rings for tree-ring analysis. Standard dendrochronological methods (e.g. English Heritage 1998) were applied to these six samples (Table 6).

Sample	Species	Rings	Sapwood	Growth (mm/year)	Sequence date	Interpreted date
(43) <3>	Oak	62	11+Bark	1.99	undated	-
(43) <4>	Oak	c. 39	-	-	unmeasured	-
(43) <6>	Oak	74	-	1.54	AD1049-AD1122	after AD1132
(43) <7>	Oak	130	-	1.43	AD989-AD1118	after AD1128
(43) <8>a	Oak	124	-	1.23	AD969-AD1092	after AD1102
(43) <8>b	Oak	160	-	0.98	AD912-AD1071	after AD1081
(81) <31>	Oak	c. 41	-	-	unmeasured	-
(82) <33>	Oak	151	-	1.63	AD913-AD1063	after AD1073

Table 6: Dendrochronology sample details

The tree-ring sequences from the five boat fragments were found to cross-match with each other (Table 7) and with reference chronologies (Table 8). It is important to appreciate that although the dendrochronological dates will not change in the future, any interpretations of these results are of necessity interim and liable to change, particularly as aspects of re-use and repair are revealed by post-excavation analyses. The other measured sample was not found to cross-match reference chronologies and is undated by the analysis reported here.

	43 7	43 8a	43 8b	82
43 6	5.95	-	-	-
43 7		-	4.99	-
43 8a			-	3.17
43 8b				-

Table 7. Correlation *t*-values (Baillie and Pilcher 1973) between the dated sequences (- = *t*-values less than 3.0).

	43 6	43 7	43 8a	43 8b	82 33
London Billingsgate (Tyers and Hillam unpubl.)	7.54	9.85	4.58	6.85	6.01
London Bull Wharf (Tyers and Boswijk 1997)	6.61	10.60	5.20	7.76	6.45
London Custom House boat (Tyers 1996)	6.23	9.85	-	3.23	-
London Fennings (Tyers 2001a)	5.92	10.22	4.69	6.87	6.05
London Fleet Valley (Tyers and Hibberd 1993)	7.59	12.10	5.43	7.05	5.55
London Guildhall (Tyers 2001b)	9.20	13.28	4.02	7.54	5.73
London Merton Priory coffins (Tyers 1988)	4.80	9.06	3.58	5.92	3.77
London Seal House (Morgan 1978)	6.41	10.63	4.68	6.79	4.12
London Thames Exchange (Nayling 1991)	8.02	8.40	4.25	5.57	5.69
London Vintry (Hibberd 1992)	5.36	11.29	4.34	7.30	5.86

Table 8. Correlation *t*-values (Baillie and Pilcher 1973) for the dated sequences against a series of independently dated chronologies from London (- = *t*-values less than 3.0).

Three types of dating result are usually obtained by dendrochronological analysis. Firstly, where a sample is complete to bark-edge, a precise year of felling is obtained directly from the date of the last ring on the sample and where there is good survival of this outer ring it is sometimes possible to assign seasons to the felling period. The principal distinctions are between early Spring, early summer and winter. Where a sample has some sapwood, but is not complete to the bark-edge, a felling date range is obtained by applying the maximum and minimum numbers of rings of sapwood normally seen in oaks for the relevant areas, to the relevant samples. The range 10 – 46 has been used in this report. Finally, where no sapwood survives a *terminus post quem* (*tpq*) date is obtained by adding the minimum number of sapwood rings likely to have been lost to the date of the latest surviving ring. This type of date is very much less useful than the other two types since a very great number of rings could have been lost either through ancient carpentry practise, or poor site preservation, and thus the felling date of such material may be considerably later than the tree-ring date.

6.7.1 Results and Discussion

A summary of the findings is presented in Tables 7 and 8. All the material was identified as oak (*Quercus* spp).

The interim evaluation report (Percival 2003, 5-6) makes it clear that the re-used boat timbers are thought to derive from more than one boat, one larger than the other. Which of these samples belong with which fragment is not currently known to the author. The tree-ring results from them are clearly only capable of indicating the date of construction or repair of the boat or boats from which they originally derive, not the date of construction of the revetment from which they were excavated. None of the samples retained sapwood, although it seems reasonable to conclude that the clustering of the end-dates indicates that a mid-12th-century vessel, or vessels, have been recycled into the revetment, or revetments.

The dated timbers do not match each other particularly well (Table 6), which may indicate they are derived from different vessels. What is particularly noticeable is that they all match well to material from London (Table 8). Unfortunately this does not necessarily indicate that the timbers originally came from London or the Southeast since there is relatively little contemporaneous tree-ring data from Norfolk or East Anglia with which to compare this assemblage. It does not preclude the possibility that some of this material may not be in its originating port.

The non re-used structural material cannot be dated and thus dendrochronology cannot provide a date for these structures. The interpretation of the date of these structures is therefore dependent on alternative archaeological evidence. Comparison with similar assemblages of re-used boat fragments in both London (Tyers 1996) and Dublin (Baillie pers. comm.) has indicated that some boats may be re-used quite rapidly, whilst others may be in use for more than a century before they are re-used.

7.0 The Environmental Evidence

7.1 *The Faunal Remains*

by Julie Curl

7.1.1 Introduction

A total of 3.928kg of faunal remains were recovered from the evaluation. Although this is a small assemblage, it contained a good range of species including bird and fish and produced primary and secondary butchering evidence that includes skinning and hornworking. A small quantity of hair was also recovered that may have been used as caulking.

7.1.2 Methodology

All of the bone was scanned for basic information, primarily to determine species, ages and elements present. Bones were also examined for butchering or other modifications, gnawing and pathologies. Bones were quantified; total counts were noted for each context and the total for each species in the individual contexts was also recorded, along with the total weight for each context. All information was recorded on the faunal remains recording sheets and a summary of the information is included in a table with this report. The material provisionally identified as hair was rinsed in clean water to remove excess soil and examined under a microscope to determine if hair was indeed present and if present, what type (by comparing with examples of known hair-types).

7.1.3 Results

The assemblage was dominated by the main domesticated food species: sheep/goat, cattle and pig. All of the bone was in good condition, although most of the assemblage was a very dark brown in colour, which is typical of bone which has lain in very organic and waterlogged deposits.

Sheep/goat were the most commonly identified and included young juvenile remains, which suggest that they were bred locally. The sheep/goat had been extensively butchered; the animals had been skinned, horns had been removed for working, cuts of meat prepared and at least one bone had been split for marrow extraction. The juvenile sheep/goat remains had also been butchered for meat.

Both primary and secondary butchering of cattle was present and included evidence of tongue removal (for meat) and cut marks on metapodials that usually occur when the animal is skinned. Most cattle remains were from adult animals, although one sub-adult mandible was recovered from a medieval context. Pig remains were mostly primary butchering waste, although one scapula was recovered. The pig bone also produced one pathological bone; a mandible from (35) had an extra fourth premolar growing between the normal fourth and third premolars.

Several birdbones were recorded. Butchered goose was recorded in four contexts and domestic fowl noted in one context. Other birdbones, which included juvenile remains, need further species identification. Fish bone was also recovered from four contexts, although not identified to species at this stage.

One equid tibia was identified from (171), which has been butchered and exhibited gnawing marks and scratches, probably from a domestic dog, fox or possibly (if pre-17th century) from wolf.

A small quantity of hair was recovered from (43). Analysis and comparison of this hair showed most of it to be very coarse, similar to either goat or horse hair. Material like waterlogged leather is also included and some of the hairs appear to be coming from this material which would suggest that at least some of the animal skin is included. Some much finer hairs are also present and these are probably the finer guard hairs that grow close to the skin underneath the coarser hair.

7.1.4 Conclusions

The presence of roughly equal amounts of primary and secondary butchering waste at this site would suggest that whole animals were being processed here. Animals appear to have been skinned and processed into joints of meat locally. Butchered horns from sheep are present and it is possible that these were worked on a small scale on or near the site. The butchered equid bone is more unusual as horse meat is not often eaten by humans. It is possible that the horse was butchered to provide meat for pet or working dogs, a possibility which is supported by the presence of the canid gnawing on the equid bone in this assemblage.

It is likely that the fish present in this assemblage was caught in the nearby river. The geese and domestic fowl would have probably been kept on or close to site or the geese may have also been caught in the vicinity of the river.

The hair and skin recovered from [43] is likely to be caulking (or luting) from between two of the boat planks. Animal hair and/or wool (often mixed with resin or tar) would be used to fill gaps between wood and make the boat waterproof.

7.2 *The Plant Macrofossils*

by Val Fryer

7.2.1 Introduction

Samples for the extraction of the plant macrofossil assemblages were taken from a selection of features/deposits found during the evaluation and eight were submitted for assessment.

7.2.2 Methods

The samples (or sub-samples thereof) were processed by manual water flotation/washover, collecting the flots in a 500 micron mesh sieve. As it was anticipated that waterlogged macrofossils would be present, the flots were stored in water until sorted. A maximum of three 9cm diameter petri dishes of the wet retents were scanned under a binocular microscope at magnifications up to x16, and the plant macrofossils and other remains noted are listed on Appendix 9. Nomenclature within the table follows Stace (1997). Tabulated material was waterlogged unless otherwise stated.

The non-floating residues were collected in a 1mm mesh sieve and sorted when dry. Artefacts/ecofacts were removed for further specialist analysis. As the plant macrofossils within the assemblages were generally robust and well preserved, and as further analysis was not anticipated, the flots were dried after assessment to

facilitate long term storage. Unprocessed material is still available if required for dating or identification purposes.

7.2.3 Results

Cereal grains/chaff, seeds of common dry land weeds and wetland plants, and tree/shrub macrofossils were present at varying densities in all samples. Preservation was moderate to good. Most of the cereal remains recorded were preserved by charring, and although some grains were puffed and distorted (probably as a result of high temperatures during combustion), most material was easily identifiable. With rare exceptions, the seeds and tree/shrub macrofossils were preserved in a waterlogged state. The majority of specimens were very robust and in an excellent state of preservation.

Cereals

Charred oat (*Avena* sp.), barley (*Hordeum* sp.) and wheat (*Triticum* sp.) grains were recorded, with barley being predominant. Chaff elements were rare, but barley/rye (*Hordeum/Secale cereale*) type rachis nodes were noted in Samples 1, 2 and 16. Charred and waterlogged bread wheat (*Triticum aestivum/compactum*) type rachis nodes were also found in Samples 1 and 2.

Dry land herbs

Seeds/fruits of common weed plants were present in all samples. Segetal taxa were predominant, and included corn cockle (*Agrostemma githago*), stinking mayweed (*Anthemis cotula*), orache (*Atriplex* sp.), cornflower (*Centaurea* sp.), fat hen (*Chenopodium album*), wild radish (*Raphanus raphanistrum*), dock (*Rumex* sp.) and chickweed (*Stellaria media*). Seeds of ruderal taxa, including hemlock (*Conium maculatum*), dead-nettle (*Lamium* sp.), indeterminate grasses (Poaceae), sow-thistle (*Sonchus* sp.), stinging nettles (*Urtica dioica*) and annual nettles (*U. urens*), were also recorded.

Wetland/aquatic plants

Seeds/fruits of wetland and aquatic plants were present throughout. Sedge (*Carex* sp.), spike-rush (*Eleocharis* sp.), bog-bean (*Menyanthes trifoliata*) and wood-rush (*Scirpus* sp.) were predominant, but other taxa included rush (*Juncus* sp.), mint (*Mentha* sp.), pond-weed (*Potamogeton* sp.), small-flowered buttercup (*Ranunculus parviflorus*) and celery-leaved crowfoot (*R. sceleratus*).

Trees/shrubs

A low density of tree/shrub macrofossils, including hazel (*Corylus avellana*) nutshell fragments, bramble (*Rubus* sect. *Glandulosus*) 'pips' and elderberry (*Sambucus nigra*) seeds were noted in all but Samples 2 and 32. A single possible spindle (*Euonymus europaeus*) fruit was recovered from Sample 1.

Other plant macrofossils

Charcoal fragments and pieces of waterlogged root, rhizome or stem were abundant throughout. Reed (*Phragmites* sp.) stem fragments were noted in Samples 1, 2 and 15 and bracken (*Pteridium aquilinum*) pinnule and stem fragments were recorded from Samples 1, 2, 12, 14 and 32. A single possible fragment of charred heather (Ericaceae) stem was found in Sample 16. Other plant macrofossils included

indeterminate fragments of bark, fruit stones, leaves, moss and twigs, buds, culm nodes, thorns and small pieces of wood.

Molluscs

Mollusc shells were extremely rare, being noted in only four samples. With the exception of a single specimen of *Pupilla muscorum* (an open country species), all shells were of freshwater obligate taxa including *Anisus leucostoma* and *Bathyomphalus contortus*.

Animal macrofossils

With the exception of Sample 16, waterlogged arthropods were present throughout. Other animal macrofossils were rare, but did include bone, fish bone and eggshell fragments.

Other materials

Other material types including black porous 'cokey' concretions, fragments of burnt or fired clay and pieces of vitrified material were only recovered at very low densities from Samples 13 and 16.

7.2.4 Discussion

The earliest deposit in the stratigraphic sequence to be sampled was layer [115] (Sample 32) although, at the time of writing, the exact date of this context is unknown. The plant macrofossil assemblage consists almost entirely of moss and waterlogged stems, and leaves (including holly (*Ilex aquifolium*)) were noted during excavation. Although the excavator has tentatively described this deposit as a 'foreshore accumulation' of plant material, it is perhaps unlikely to be a natural deposit, as there do not appear to be parallels on similar sites elsewhere within the city. It may, however, be a deposit of waste material associated with some unknown foreshore activity, for example packaging.

Samples 12, 13, 14 and 15 are from deposits of probable 12th- to 14th-century date. The amorphous nature of the assemblages may indicate that the material present is derived from a variety of sources including charred detritus (probably deliberately deposited within the river), cereal processing waste and the riverside flora. Parallel assemblages have been noted at other sites adjacent to the River Wensum within the city.

The assemblage from Sample 16 appears to be derived from a low-density deposit of charred refuse (possibly including domestic hearth waste) of late medieval date. Charcoal fragments are abundant, along with charred cereal remains, charred weed seeds and pieces of bone, fish bone and eggshell. The almost total absence of charred wetland plant macrofossils may suggest that this deposit is not related to peat ash, as was originally suspected.

Samples 1 and 2 are from two fills within late medieval pit [41]. Charred cereal remains and charcoal fragments are common in both assemblages along with un-charred seeds of cereal crop contaminants and elements of the local flora. It is unclear at present whether these assemblages represent primary refuse deposits or further lenses of naturally deposited material. The *Phragmites* stem fragments, which are abundant in Sample 2, may be derived from discarded flooring or thatching materials, although these too may be indicative of the local flora.

7.2.5 Conclusions

In summary, the assemblages from Samples 1, 2, 16 and 32 may be indicative of deliberate deposition of refuse including charred detritus and/or other materials associated with local riverside activities. The remaining assemblages may be derived from natural fluvial deposits, including riverine detritus and elements of the local flora. It would appear that whilst some areas adjacent to the river were overgrown with colonising weeds, the river banks were well kept with very little shrubby overgrowth.

As much of the material recovered is probably derived from fluvial detritus, further analysis would add little to the overall interpretation of the site. However, the mosses within Sample 32 may merit further study, as this material appears to be unparalleled within the city. As part of any future programme of analysis a sub-sample of the processed and unprocessed material should be submitted to Dr Allan Hall, Environmental Archaeology Unit, Dept. of Biology, University of York, P.O. Box 373, York, Yo10 5YW (E-mail: biol8@YORK.AC.UK).

7.3 The Pollen and Diatoms

by Dr. Frances Green

7.3.1 Introduction

Four pollen and diatom samples were selected from a sequence of silty sands, organic muds and detrital peat which immediately overlie Holocene river gravels in an evaluation trench within a few metres of the margins of the modern river Wensum. The aim of the assessment is to present the potential of pollen and diatoms to reconstruct the environmental conditions at the time the sediments were deposited.

I am grateful to Mr Keith Clarke (Honorary lecturer at the University of East Anglia) for his valuable contribution in the interpretation of the results.

7.3.2 Sampling

A 70cm monolith <30> was sub-sampled for parallel pollen and diatoms as follows:

Pollen			Diatoms		
Sample Number	Depth from top of monolith <30>	Context	Sample Number	Depth from top of monolith <30>	Context
1	8-9cm	(109)	1	8-9cm	(109)
2	16-17cm	(110)	2	16-17cm	(110)
3	35-36cm	(111)	3	35-36cm	(111)
4	48-49cm	(113)	4	48-49cm	(113)

Table 9: Pollen and Diatom sub-samples taken from monolith <30>

7.3.2 Methods

Pollen sub-samples of 1-2cm³ were cut from the cleaned face of the monolith.

Pollen preparations used techniques based on the method of Hunt (1985). The sediments were desegregated by boiling in 5% NaOH for 5-10 minutes, sieved through 120µm and 10µm wire and nylon sieves to remove the sand and clay-sized fractions. The remaining silt-sized fraction was removed by swirling (panning) on a large watch glass. The remaining material was stained and mounted on slides with a semi permanent mountant "aquamount". A count of a minimum of 200 non-tree pollen types per sample was attempted under a magnification of x400 and x1000. Pollen identifications were assisted by reference to Moore *et al.* (1991) and Andrew (1984). Diagrams were drawn using TILIA (Grimm 1991) with all data expressed as a percentage of total land pollen (tlp *i.e.* trees shrubs and terrestrial herbs).

Diatom samples were prepared by boiling 2cm³ of sediment in 10% hydrogen peroxide until all the organic material disappeared, and mounting the sample in Naphrax. Routine counting under x1000 magnification attempted to count 200 frustules. Diatom nomenclature follows Hartley (1986) with identification assisted by reference to Van der Werf and Huls (1957-74), Hendey (1964), and Hartley (1996). Diagrams were constructed as a percentage of all diatom frustules counted (%TDV) The diagrams have been produced to indicate the salinity tolerance of each species.

The salinity coding used in this report is based on several sources, principally De Wolf (1993), Denys (1990) and Van de Werff and Huls (1957-1974). Any classification is however a simplification and many diatom species are tolerant of intermediate stages of this classification and across a broad spectrum of classes.

The salinity data is drawn up according to the salinity classification by Hustedt (1957) where:

A	Polyhalobian=	marine (optimum range of 30°/00)
B	Mesohalobian=	brackish (30-2°/00)
C	Oligohalobian-halophile=	requires some low salinity
D	Oligohalobian-indifferent=	can tolerate low salinity
E	Halophobes=	freshwater only

7.3.3 Results

Pollen and spores were obtained in good condition from all samples, but at relatively low concentrations. Two coverslips were counted for all pollen and diatom samples but the total count never exceeded 150 and in some cases only reached 20. The pollen results are illustrated in Figure 9 and Table 10. Charcoal is found in all samples.

		8cm	16cm	35cm	48cm
Trees	Alnus	0	0	0	1
	Betula	0	2	1	3
	Quercus	4	0	0	0
Shrubs	Calluna	0	0	2	24
	Corylus	3	4	6	4
	Sambucus	0	3	0	1
Herbs(terrestrial)	Caryophyllaceae	1	0	2	2
	Cereale	0	0	0	2
	Compositae tub.	1	2	0	0
	Cruciferae	0	2	0	2
	Cyperaceae	0	0	6	7
	Leguminosae	0	1	0	2
	Poaceae	25	18	30	60
	Taraxacum-type	1	0	0	0
	Umbelliferae	0	0	0	3
Fern spores	Filicales	6	2	1	0
	Polypodium	1	0	0	0
	Pteridium	5	0	0	1

Table 10: Pollen and spore counts from monolith <30>

The lowest sample (48-49cm) was from a green-grey sandy silt [113] and was dominated by grasses (Poaceae) and contained very little tree pollen. This indicates most of the trees in the area were cleared by the time this deposit accumulated. Of note are the relatively high levels of *Calluna* (heather) that suggest the proximity of heathland. Two grains of cereal pollen indicate probably local agricultural activity since cereal grains do not generally travel great distances. However since this is most likely a sediment deposited by the river, the cereals may have come from anywhere in the catchment.

A mid brown well-compacted detrital peat [111] was sampled at 35-36cm and contained a similar proportion of grass pollen to the underlying deposit (ca. 60% tlp). Trees were still almost absent from the landscape, although hazel (*Corylus* appears to have been growing close to the site. Heather was still present but at lower frequencies than the lower sample. There was no aquatic pollen but pollen from sedges (Cyperaceae) suggest wet conditions.

Overlying this deposit was a mid grey silt/sand with mussel shells and occasional fragments of wood (110). Trees were again hardly represented with grass and herbs of open ground being the most abundant. Heather was not encountered but dwarf elder (*Sambucus*) was found at low percentages. *Sambucus* is a shrub, which is common today on riverbanks and open places. This deposit contained a significant proportion of whip worm eggs which suggests the river was heavily polluted with effluent at this time. It is of course possible this is part of pit infilled with cess material, but the stratigraphy does not suggest this. The diatoms as discussed below are indicative of an aquatic deposit in particular that deposited on the margins of a river.

The upper deposit was from a well humified dark brown detrital peat with *phragmites* (reeds) with patches of silt and sand (109). The sedimentology of this deposit is unclear but may be a peat which dried out forming cracks into which silt and sand later washed in. Alternatively this is an intentionally dumped deposit, since the sand occurs in blocky patches, not in discrete lenses as would be expected if it had naturally accumulated. The pollen was similar to that from the deposit below but contained a higher proportion of fern spores. These spores tend to be resistant to decay and can be recycled many times and may be derived from soils. This deposit also contains whip worms suggesting the river contained effluent and also a relatively high proportion of soil fungal bodies which suggests inwashing and erosion of local soils.

7.3.4 Diatoms

The results are shown in Figure 10 and Table 11.

Salinity code	Diatom species	8cm	16cm	35cm	48cm
A	Rhaphoneis amphiceros	0	0	0	2
B	Cyclotella striata	0	1	0	3
B	Diploneis interrupta	0	0	0	14
B	Surirella ovalis	0	0	0	1
B	Thalassiosira bramaputrae	0	0	0	5
C	Cyclotella meneghiniana	1	0	0	0
C	Navicula cari var cincta	1	2	0	10
C	Navicula mutica	2	0	0	0
C	Nitzschia brevissima	0	0	0	2
C	Nitzschia frustulum	0	0	0	3
D	Achnanthes lanceolata	0	1	0	11
D	Achnanthes minutissima	1	0	0	2
D	Achnanthes ploenensis	0	1	0	0
D	Amphora pediculus	8	0	0	0
D	Caloneis bacillum	1	0	0	0
D	Cocconeis placentula	4	0	5	5
D	Cymbella affinis	3	0	0	0
D	Diploneis ovalis	4	0	0	0
D	Fragilaria vaucheriae	10	0	0	0
D	Gomphonema parvulum	7	2	0	0
D	Gyrosigma acuminatum	1	0	0	0
D	Hantzschia amphioxys	0	2	1	0
D	Navicula lanceolata	2	0	1	0
D	Navicula pupula	1	0	0	0
D	Navicula tripunctata	0	0	1	0
D	Nitzschia amphibia	7	0	0	1
D	Nitzschia archibaldii	0	0	0	5
D	Nitzschia dissipata	0	3	0	0
D	Rhoicosphenia curvata	1	2	0	0
D	Synedra parasitica	5	0	0	0

Table 11: Diatom counts from monolith <30>

Diatoms were found in all samples in relatively good condition, but were relatively sparse. Two coverslips were counted for all samples. The basal sample (48-49cm) indicated these sediments were deposited in water strongly influenced by estuarine conditions. The brackish (mesohalobous) nature of the assemblage, together with the

occasional marine (polyhalobous) diatoms, are characteristic of the lower estuarine conditions. The River Yare has similar salinity conditions near Reedham Marshes today. In particular *Diploneis interrupta* and *Thalassiosira bramaputrae* are typical of lower estuarine water conditions with the former commonly found in the Romano-British silts that accumulated in the flood plains of the lower reaches of the Norfolk rivers (Keith Clarke pers comm.)

It is therefore possible that this deposit is Romano-British in date and corresponds to higher sea-levels during this period, when the saline wedge would have been pushed up the rivers far inland. However, no such brackish deposit has been encountered this far up the river valley in any previous studies and therefore an alternative source of these brackish muds seems likely. Keith Clarke (pers. comm.) recalls that in the 20th century the catchment board of the time used dredgings from near Yarmouth to construct river banks higher upstream along the Yare valley. It seems plausible that boats, which sailed down to Yarmouth from Norwich with loads to export, may well have returned with a load of de-watered dredgings either as ballast or as a paid load to save the return journey from Yarmouth with an empty boat. This dredged mud could have been used in the construction of riverbanks or to raise the level of marginal land close to the river. As yet no other record of the practice of using dredged mud from Breydon or Yarmouth for bank construction has been found but the Draft Broads Plan 2004 (strategic plan to manage the Norfolk and Suffolk Broads) proposes it may use such dredging in the future for the construction of flood embankments.

Immediately below this sample a twiggy deposit with moss and holly leaves [115] was encountered which in turn lay above river gravels. It was too full of voids for pollen or diatom work and is an intriguing deposit. If the muds [113] were intentionally deposited as a bank or as part of a land reclamation as seems likely then the twiggy deposit [115] seems most likely to represent fascins or bundles which are still laid as standard engineering practice today below artificial river bank muds. Such fascins are most commonly made of willow.

The rest of the diatom sequence was entirely freshwater, with the exception of a single frustule of *Cylcotella striata* that may in fact be *Cyclotella menenghiana* (freshwater). *Cocconeis placentula* is commonly found attached to macrophytes and may indicate the presence of reeds *etc* on the margins of the river. Similarly *Synedra parasitica* is usually found attached to water weeds.

Despite the overall aquatic nature of the deposits above 35cm, there is some evidence to indicate an input of soil, in particular *Hantzchia amphioxys* at 16cm. This diatom is more typical of soils than aquatic deposits and indicates either erosion of bank material or intentional dumping of soil on the river margins.

It is possible these latter freshwater deposits may have accumulated naturally but they may equally well be dumped dredgings from the freshwater regime of the river. The presence of effluent indicators (see pollen) suggests that if these latter deposits are dredged muds they are derived from the river within the city.

7.3.5 Conclusions

The deposit analysed contained a good if sparse record of the development of the margins of the river Wensum within the city of Norwich. The deposits were principally aquatic but their mode of deposition is complex.

It appears likely that all the deposits above the river gravels were artificially deposited as part of land reclamation or bank construction. The brackish lower deposits suggest the muds were imported, perhaps from Breydon Water near Yarmouth, and may have been a return load on sailing boats from Yarmouth to save them returning empty.

The upper freshwater muds and organic accumulations are most likely dredged from the river within the city of Norwich. The river seemed heavily polluted with effluent towards the top of the sequence.

The significance of this land reclamation or bank construction may become clearer when the OD level in relation to the modern river levels is established. It may represent bank construction or land reclamation during a period when the river was either higher or lower than the present day.

5.0 Overall Conclusions

During the excavation of Trench 1 the notable smell of hydrogen sulphide in the trench suggested that the organic preservation in the trench had recently begun to decline and decay set in. Subsequent on-site consultations with a range of specialists, including Dr Peter Murphy (English Heritage Regional Archaeological Science Advisor), Richard Darrah, (archaeological timber specialist) and Dr. Francis Green (NAU pollen and diatom specialist) disproved this. Hydrogen sulphide forms chiefly under condition of slow anaerobic decay and had probably been contained with the excavated deposits for many centuries. Initial assessment of the wood showed that its preservation was excellent. The presence of moss and holly leaves which still retained their green colour in deposit [115] in Trench 1 also points to extremely good organic preservation.

In general both the quality and quantity of the archaeological remains in Trench 1 confirmed the results of the 1997 work at Cannon Wharf. Starting in the Norman period the river frontage begins to be revetted and built outwards. The character of the remains found at Cannon Wharf and in Trench 1 suggest a piecemeal plot by plot development of the river front with individual revetments, wharves and embayments being created in a series of property strips running between King Street and the river.

The main question which remains unanswered by this evaluation is the date of the moss/twigs layer [115] and its associated deposits. Radiocarbon dating might resolve whether it was Romano-British or Late Saxon/Norman in date. Dating this layer would also help date the possible heathland pollen found in layer [113] and confirm the hypothesis put forward in this report regarding the genesis of the layer of hillwash-like material [185] and the grey sand with burnt material below it [186] found at the very base of Trench 2. It might also illuminate their relationship to possible ?Late Saxon heathland management. Specialist identification and analysis of the preserved mosses themselves would need to form part of any study.

A feature of the remains found in Trench 1 was the relative speed and intensity of expansion of development of the waterfront in the decades following the Norman

Conquest. Both the eastern and western revetments were constructed within little more than 100 years of each other. This period of growth seems to have been followed by a period of stabilisation.

The potentially national importance of the preserved boat timbers is of special note since they represent approximately one-fifth of the national sample of early medieval boat remains.

Another unanswered question is the total extent of the waterlogged remains sampled by Trench 2. It is clear that they extend into Cannon Wharf to the north. It is highly likely that they also lie just below the extant surface in the area of the former boathouse to the rear of 231-235 King Street. This area is entirely free of the Victorian and later overburden that protected the waterlogged deposits in the vicinity of Trench 2. It is likely that any significant remains under Albion Mill and North Mill would have been destroyed by cellaring and construction activity. Between the site of the boathouse and the 1997 Reads Flour Mill trench the percentage of river frontage containing well-preserved waterlogged archaeological remains is debatable. The 1997 trench contained essentially 'dryland' archaeology and the topography of the southern part of the site hints that the pre-Norman landscape in that area consisted of a steep slope descending from Bracondale/Ber Street, The Black Tower and the Wilderness to river cliff. How far north such a cliff may have extended and where it met the river frontage strip containing the waterlogged remains is an open question.

The rubble fill [69] of the cellar on the King Street frontage did contain one whole, and two fragmentary limestone ashlar blocks, as well as a fragment of late medieval window. This architectural fragment is too late in date to be connected to St. Olaves's Chapel, the site of which is said to have been under Albion Mills (Fig. 2). It is possible that the architectural fragments came from St Peter Southgate church, c. 65m south of Trench 2. This church was late 12th- or 13th-century in date and was probably rebuilt in the late medieval period (Ayers 2003, 128). It was demolished in 1887 (Hutcheson 1997, 1). An alternative source for the architectural fragments could have been Hildebrand's Hospital, a small early 13th-century monastic foundation that lay on the opposite side of King Street to Cannon Wharf (Rawcliffe 1995).

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Appendix 1: Context Summary

Context	Category	Trench	Description/interpretation
1	Deposit	1	Mortar and flint make up, possibly a wall or wall foundation associated with wall [17] and wall visible on the south edge of Trench 2
2	Deposit	1	Chalk and mortar floor
3	Deposit	1	Iron-rich gravel and clay make up
4	Deposit	1	Clay and silt make up, possibly contaminated by chemicals
5	Deposit	1	Loam and gravel make up
6	Deposit	1	Loam make up, with lime, sand, mortar and bricks
7	Deposit	1	Clay and silt deposit, below deposits [12] and [23]
8	Deposit	1	Silty crushed mortar make-up layer, similar to [216]
9	Deposit	1	Thin layers of sand, gravel and chalk, possibly floors or make up for floors
10	Deposit	1	Loose brick rubble make up or demolition debris, below possible floors [9]
11	Deposit	1	Sand, silt and rubble make up or demolition debris, below deposit [10]
12	Deposit	1	Silt and mortar make up with flints, below deposit [11]
13	Deposit	1	Sand, gravel and chalk fill of pit [20]
14	Deposit	1	Mixed fill, containing water pipes and electricity ducts, of service trench [21]
15	Deposit	1	Clay silt make up
16	Deposit	1	Silt and mortar make up, under make up [15] and over floor [2]
17	Masonry	1	Mortar, brick and flint wall foundation, aligned N-S, possibly associated with ? wall [1]
18	Masonry	1	Flint and brick wall aligned E-W. Possible Victorian warehouse wall, possibly associated with floor [2]
19	Deposit	1	Fill of very modern cut [22]
20	Cut	1	Modern pit, filled by [13], [210] and [211]
21	Cut	1	Very modern service trench, filled by [14]
22	Cut	1	Very modern cut, filled by [19], which cuts service trench [21]
23	Deposit	1	Dark peat and silt deposit in upper part of W end of slot in Trench 1
24	Masonry	1	Brick river retaining wall, aligned E-W, under Victorian warehouse wall [25]
25	Masonry	1	Flint and brick Victorian warehouse wall, built on top of river retaining wall [24]. Possibly associated with floor [2]
26	Deposit	1	Gravel metalled service, possibly the same as deposit [56]. Possible floor of a riverside timber building (see also [52])?
27	Deposit	1	Same as [28]
28	Deposit	1	Finds recovered from various contexts during excavation of slot in Trench 1. In effect unstratified finds form lower central part of Trench

Context	Category	Trench	Description/interpretation
			1
29	Deposit	1	Same as [28]
30	Deposit	1	Dark peat and silt make up and / or river foreshore consolidation
31	Deposit	1	Dark, highly organic peat and silt, probably redeposited as make up and / or river foreshore consolidation
32	Deposit	2	Dump of make-up material. Same as [89].
33	Deposit	2	Dump of make-up material. Same as [207].
34	Deposit	1	Very dark, highly organic peat, silt and clay, probably redeposited as river foreshore make up and / or consolidation.
35	Deposit	1	Fill of pit [41]
36	Deposit	1	Fill of pit [41], possible reedy floor covering or stable sweepings.
37	Deposit	1	Fill of pit [41], containing Medieval brick fragments
38	Deposit	1	Fill of pit [41], possible reedy floor covering
39	Deposit	1	Second fill of pit [41]
40	Deposit	1	Primary fill of pit [41]
41	Cut	1	Large Medieval pit at W end of Trench 1
42	Deposit	1	Same as 34
43	Timber	1	Eight (? oak) timbers, collectively forming a vertical pile driven into underlying peat make up [34] Includes parts of at least two boats
44			
45	Timber	1	Wattle revetment aligned N-S
46	Deposit	1	Very dark, highly organic peat and silt, probably redeposited as river foreshore make up and / or consolidation. Fill of [152]
47	Deposit	1	Very dark silt, peat and gravel deposit backfilled into cut [68]. Possible river foreshore make up and / or consolidation
48	Deposit	1	Redeposited natural chalk make up. Clearly associated with the construction of early revetment [81] and [104]
49	Deposit	1	Dump of material containing some peat ash into cut [64]. Tip lines visible.
50	Deposit	1	Deliberate deposition, into cut [68], of very dark silty peat with layers of brush wood, presumably for consolidation. Below [47]
51	Deposit	1	Compacted layer of chalk probably comprising, with ? post pads [62] and wooden piling [43], the floor of a possible riverside timber structure (see also [26]). Same as [52].
52	Deposit	1	Deliberate deposition of yellow chalk, possibly a compacted floor. Same as [51]. Some diesel contamination.
53	Deposit	1	Pure, white natural chalk backfilled into cut [65] at E end of slot in Trench 1. Clearly associated with timbers [61]
54	Deposit	1	Clay and silt deposit with peat ash lenses
55	Deposit	1	Ephemeral cut, visible only in section, truncating gravel surface [56]
56	Deposit	1	Truncated gravel deposit, possibly the same as deposit [26].

Context	Category	Trench	Description/interpretation
57	Cut	1	Cut filled by deposits [58] and [59], cutting deposit [34]
58	Deposit	1	Chalky primary fill of cut [57]
59	Deposit	1	Back fill of cut [57]
60			
61	Timber	1	Seemingly a horizontal timber frame laid around vertical timber piling [43]. Probably also associated with chalk deposits [52] and [53]
62	Deposit	1	Four chalk ? post pads, possibly associated with a riverside timber structure (see also [51] and [26])
63	Deposit	1	Clay, silt and peat ash dump and / or make up. Probably same as [49]
64	Cut	1	Ephemeral cut or interface, possibly truncating gravel surface [26]. Filled by [49]
65			
66	Deposit	1	Fill of possible post pit [67]
67	Cut	1	Small cut located directly above and therefore potentially linked with vertical piling [43]
68	Cut	1	Cut visible only in section, filled by deposits [47] and [50]. Possibly linked to river foreshore consolidation?
69	Deposit	2	Cellar fill in W end of Trench 2
70	Deposit	1	Gravelly lens below possible [52]
71	Deposit	1	Lens below [30]
72	Deposit	1	Mid grey organic silty clay lens below [30]
73	Masonry	2	Cellar partition wall aligned E-W
74	Masonry	2	Large cellar wall aligned N-S
75	Deposit	1	Dark silt and peat, comprising primary make up and / or back fill of revetment features [104] and [81]. Essentially redeposited natural
76	Deposit	1	Natural riverine silty sand
77	Deposit	1	Very dark silt, clay and organic layer above gravel surface [26]
78	Deposit	2	Backfill of redundant post hole [80]
79	Deposit	2	Backfill of redundant post hole [80]
80	Cut	2	Post hole, possibly deliberately voided
81	Timber	1	Multiple wood items set vertically and at 45° to form part of revetment along the W bank of the Wensum. Associated with cut [104] and chalk deposit [48]. Same as ship's steering board [82]
82	Timber	1	Ship's steering board set at 45° to form part of revetment along the W bank of the Wensum. Same as multiple wood items [81]
83	Timber	1	Woven wooden structure, probably a revetment or perhaps a breakwater. Same phase as W revetment [81] and [104]
84	Deposit	2	Concrete slab floor
85	Deposit	2	Sand and gravel make up / hoggin for concrete slab floor [84]
86	Deposit	2	Mixed soils and tips, comprising dumps of previous make up material

Context	Category	Trench	Description/interpretation
87	Deposit	2	Tip of sand and clay, possibly truncated. Clearly seals [91] and possibly related to building
88	Deposit	2	Crushed mortar residue from reclaiming building material? Putative wall?
89	Deposit	2	Soil tip, possibly part of make up activity. Same as [32]
90	Deposit	2	Compacted sand clay deposit behind mortar residue / putative wall [88], probably associated with construction of cellar to S. Fills cut [103]
91	Deposit	2	Sand bedding for robbed out tile surface overlying floor [93], similar to [92]
92	Deposit	2	Sand bedding / make up for robbed out tile surface overlying floor [93], similar to [91]
93	Deposit	2	Crushed chalk and clay floor
94	Deposit	2	Ashy soil
95	Deposit	2	Fill of cut [116]
96	Deposit	2	Fill of post hole [97], possibly washed in sand
97	Cut	2	Definite post hole with stone and gravel packing
98	Deposit	2	Crushed chalk floor with ash laminations
99	Deposit	2	Fill of post hole, perhaps packing material indicating edge of post
100	Deposit	2	Yellow brown sand and gravel, natural in Trench 2 overlies chalk bedrock
101	Deposit	2	Thin ash deposit, perhaps burned in situ
102	Deposit	2	Probable original soil, overlying natural
103	Cut	2	Cut, possibly for construction of wall. Filled by [103]
104	Cut	1	Cut into natural deposits made as a preliminary action in the construction of chalk and timber revetment [48] and [81]
105	Deposit	1	Natural riverine silt and sand redeposited into cut [104] as part of revetment construction
106	Deposit	1	Thin layer of moss and twigs, same as [115]
107	Deposit	1	Dark silt and peat natural, redeposited behind timber revetment [81]
108	Deposit	1	Dark silt and peat, very different to overlying [34]. Probably half cultural and half disturbed natural
109	Deposit	1	Peat deposit, possibly in situ natural
110	Deposit	1	Naturally accumulated riverine silt sand, under [109]
111	Deposit	1	Naturally accumulated peat deposit, under [110]
112	Deposit	1	Naturally accumulated sand silt
113	Deposit	1	Naturally accumulated sand silt, under [111]
114	Deposit	1	Naturally accumulated peat, under [112]
115	Deposit	1	Thin layer of moss and twigs, same as [106]
116	Cut	2	Cut assigned during post-excavation, filled by deposit [95]

Context	Category	Trench	Description/interpretation
117	Deposit	2	Clay, sand and silt make up, upon which wall [74] seems to have been constructed
118	Cut	2	Construction cut for cellar formed by walls [73] and [74], same as [151]
119	Deposit	2	Backfill of construction cut [118], essentially redeposited natural
120	Deposit	2	Crushed chalk layer sealing backfill [119] of construction cut [118]
121	Deposit	2	Olive green-grey sandy silt, filling possible cess pit [122]
122	Cut	2	Small probable cess pit, filled by [121]
123	Cut	2	Robber cut, associated with demolition of wall [73]
124	Deposit	2	Backfill of robber cut [123], redeposited natural
125	Deposit	2	Loamy make up and levelling fill, laid over demolished and backfilled cellar
126	Deposit	2	Orange brown clay sand with frequent crushed chalk and brick/tile fragments. Levelling fill and / or landscaping over [125]
127	Deposit	2	Loamy levelling fill and / or make up over demolished cellar. Over [126]
128	Timber	1	Several fragments of clinker-built boat, possibly associated with revetment [83]
129	Deposit	1	Small deposit of well preserved moss and other plant material
130	Deposit	2	Extensive dump of sandy make-up material east of wall [74]..
131	Deposit	2	Chalk/mortar floor associated with wall [165]=[166]
132	Deposit	2	Make-up material , fill of landscaping cut [168]. Deposit heavily oxidised
133	Cut	2	Terracing cut, associated with partial demolition of building represented by [165]=[166].
134	Deposit	2	Flint cobble surface seen at modern surface near west end of Trench 2
135	Deposit	2	Either make-up for concrete floor or possible flood deposit
136	Deposit	2	Portland cement/concrete floor, same as [158]
137	Deposit	2	Make-up/demolition deposit
138	Deposit	2	Upper fill of construction cut [146]
139	Deposit	2	Lower fill of construction cut [146]
140	Deposit	2	Brick rubble and chalk dump. Possibly associated with the construction of walls [73] and [74]
141	Deposit	2	Brick rubble and chalk dump. Possibly associated with the construction of walls [73] and [74]
142	Deposit	2	Brick rubble and chalk dump. Possibly associated with the construction of walls [73] and [74]
143	Deposit	2	Fill of post-hole [144]
144	Cut	2	Scaffolding post-hole.
145	Cut	2	? Demolition cut, contains [130]

Context	Category	Trench	Description/interpretation
146	Cut	2	Construction cut or terracing, contains floor [131]
147	Deposit	2	Mixture of gravel and demolition debris, possibly a short-lived surface.
148	Deposit	2	Chalk/mortar floor for cellar formed by walls [73] and [74]
149	Deposit	2	Redeposited orange gravel natural. Bedding for floor [148]
150	Deposit	2	Ashy make-up layer between [149] and natural [100].
151	Cut	2	Construction cut for cellar formed by walls [73] and [74], same as [118]
152	Cut	1	Secondary construction cut for eastern major revetment structure
153	Deposit	1	Chalk-based primary fill of [152]
154	Deposit	2	Make-up for modern concrete floor [84]
155	Masonry	2	Red brick blocking in southern end of wall [74]
156	Deposit	2	Make-up associated with concrete floor [84]
157	Deposit	2	Make-up associated with concrete floor [84]
158	Deposit	2	Portland cement/concrete floor, same as [136]
159	Deposit	2	Brick floor or Yard surface
160	Masonry	2	Brick buttress associated with wall blocking [155]
161	Deposit	2	Make-up for floor/surface [159]
162	Deposit	2	Make-up for floor/surface [159]
163	Deposit	2	Bedding for floor/surface [159]
164	Deposit	2	Make-up for floor/surface [159]
165	Masonry	2	Poor quality east to west aligned flint wall with pan tile fragments, same as [166]
166	Masonry	2	Poor quality east to west aligned flint wall with pan tile fragments, same as [165]
167	Cut	2	Construction cut for brick buttress [160]
168	Cut	2	Landscaping cut filled with [117] and [132]
169	Timber	1	Interlaced logs, main structure of eastern revetment.
170	Deposit	2	Chalk/clay floor
171	Deposit	2	Make-up for timber building
172	Deposit	2	Early medieval or late Saxon buried topsoil
173	Deposit	2	Upper fill of post-hole [175]
174	Deposit	2	Lower fill of post-hole [175]
175	Cut	2	Post-hole
176	Deposit	2	Fill of post-hole [175]
177	Cut	2	Post-hole
178	Deposit	2	Fill of beam-slot [194]
179	Deposit	2	Dump of peat ash on top of floor [170]

Context	Category	Trench	Description/interpretation
180	Deposit	2	Combustion debris on top of floor [181]
181	Deposit	2	Chalk/clay floor
182	Deposit	2	Dump of chalk/clay
183	Deposit	2	Dump of peat ash and gravel
184	Deposit	2	Occupation surface or flood residue above [172]
185	Deposit	2	Redeposited orange sand and gravel natural, ? prehistoric colluvium
186	Deposit	2	Dark grey sand with charcoal and burnt flint, prehistoric combustion episode.
187	Cut	2	Construction cut for chalk/clay floor [170]
188	Cut	2	Construction/terracing cut for make-up deposit [171]
189	Deposit	2	Chalk/clay layer
190	Cut	2	Truncation, contains [189]
191	Deposit	2	Layer of destruction/demolition debris
192	Deposit	2	Redeposited chalk/clay floor material
193	Deposit	2	Redeposited occupation material/rubbish layer
194	Cut	2	Beam-slot
195	Deposit	2	Possible flood deposits or floor make-up
196	Deposit	2	Fill of demolition/destruction cut [208]
197	Deposit	2	Chalk fill of post-pad [198]
198	Cut	2	Chalk filled post-pad
199	Deposit	2	Fill of demolition/destruction cut [200]
200	Cut	2	Demolition/destruction cut
201	Deposit	2	Thin layer of redeposited chalk, probably not a floor
202	Deposit	2	Redeposited layer of clay
203	Deposit	2	Layer of sandy silt
204	Deposit	2	Dump of clay
205	Deposit	2	Layer of sandy silt
206	Deposit	2	Layer of sandy silt
207	Deposit	2	Dump of make-up material. Same as [33].
208	Cut	2	Demolition/destruction cut
209	Deposit	1	Make up / hoggin for floor [2]
210	Deposit	1	Mixed sand, gravel and chalk, fill of pit [20]
211	Deposit	1	Chalk fill of pit [20]
212	Deposit	1	Dump/make-up
213	Deposit	1	Dump/make-up
214	Deposit	1	Dump/make-up
215	Deposit	1	Mixed layer of sand, gravel and chalk

Context	Category	Trench	Description/interpretation
216	Deposit	1	Silty crushed mortar make-up layer, similar to [8]

Appendix 2: Finds by Context

Context	Material	Quantity	Weight (kg)	Period
23	Pottery	13	0.198	Medieval
23	Flint	1	0.074	Prehistoric
23	Animal bone	-	0.006	
23	Shell	-	0.014	
26	Pottery	3	0.023	Medieval
27	Pottery	28	0.372	Medieval
27	Flint	1	0.294	Prehistoric
27	Animal bone	-	0.651	
27	Shell	-	0.111	
28	Pottery	76	0.562	Medieval
28	Stone	5	2.655	
28	Animal bone	-	0.180	
29	Pottery	29	0.365	Medieval
29	Ceramic building material	2	0.452	Post-medieval
29	Flint	1	-	Prehistoric
29	Animal bone	-	0.360	
30	Pottery	26	0.485	Medieval
30	Ceramic building material	1	0.007	Medieval
30	Animal bone	-	0.127	
31	Pottery	6	0.082	Medieval
31	Animal bone	-	0.078	
31	Shell	-	0.001	
32	Pottery	29	0.326	Medieval
32	Ceramic building material	11	0.945	Medieval and post-medieval
32	Iron (SF3)	1	-	
32	Iron	4	-	
32	Animal bone	-	0.057	
32	Shell	-	0.008	
33	Animal bone	-	0.017	
34	Pottery	66	0.788	Medieval
34	Ceramic building material	1	0.153	Roman
34	Leather (SF1 & 4)	12+	-	Medieval
34	Animal bone	-	0.025	
34	Shell	-	0.003	
35	Pottery	1	0.011	Post-medieval

Context	Material	Quantity	Weight (kg)	Period
35	Mortar	1	0.390	
35	Fired clay	1	0.111	
35	Iron (SF5)	1	-	
35	Animal bone	-	0.363	
35	Shell	-	0.014	
37	pottery	2	0.019	
37	Ceramic building material	20	2.806	Medieval and post-medieval
37	Shell	-	0.045	
42	Pottery	12	0.167	Medieval and post-medieval
42	Ceramic building material	1	0.239	Post-medieval
42	Stone	4	3.661	
42	Animal bone	-	0.139	
45	Pottery	1	0.005	Medieval
46	Pottery	6	0.073	Medieval
46	Ceramic building material	1	0.184	Roman
46	Iron (SF6)	1	-	
46	Animal bone	-	0.147	
48	Pottery	3	0.057	Medieval
48	Stone (SF12)	1	-	Medieval
69	Glass (SF7)	1	-	Post-medieval
69	Stone (SF9)	1	-	Medieval
69	Stone (SF10)	1	-	Medieval
69	Stone (SF11)	1	-	Medieval
69	Stone (SF12)	1	-	Medieval
75	Pottery	1	0.016	Medieval
75	Metal working debris	1	0.266	
75	Animal bone	-	0.095	
76	Pottery	1	0.045	Medieval
76	Ceramic building material	1	0.068	Post-medieval
76	Animal bone	-	0.052	
77	Pottery	12	0.238	Medieval
77	Ceramic building material	2	0.321	Roman
77	Animal bone	-	0.502	
78	pottery	7	0.049	Medieval
78	Flint	1	-	Prehistoric

Context	Material	Quantity	Weight (kg)	Period
78	Animal bone	-	0.028	
82	Wood (SF2)	1	-	Medieval
96	Flint	2	-	Prehistoric
96	Shell	-	0.006	
170	Pottery	1	0.014	Medieval
170	Ceramic building material	1	0.150	Post-medieval
171	Pottery	5	0.053	Medieval
171	Iron (SF8)	1	-	
172	Animal bone	-	0.835	
172	Pottery	1	0.016	Medieval
172	Flint	9	-	Prehistoric
172	Animal bone	-	0.218	
173	Pottery	1	0.007	Medieval
174	Pottery	1	0.007	Medieval
174	Flint	2	-	Prehistoric
174	Animal bone	-	0.040	
178	Pottery	3	0.029	Medieval
178	Flint	1	-	Prehistoric
178	Animal bone	-	0.004	
185	Pottery	2	0.039	Medieval
185	Flint	3	-	Prehistoric
186	Flint	9	0.050	Prehistoric

Appendix 3: Pottery by Context

Context	Fabric	Form	Quantity	Weight (kg)	Date
23	Pingsdorf type ware	Body	1	0.022	10th to 13th century
23	Yarmouth-type ware	Body	5	0.098	11th to 12th century
23	Yarmouth-type ware?	Body	1	0.043	11th to 12th century
23	Local medieval unglazed ware	Cooking pot or jar	1	0.009	11th to 14th century
23	Local medieval unglazed ware	Body	3	0.021	11th to 14th century
23	Early medieval ware	Body	1	0.001	11th to 12th century
23	Andenne type ware	Body	1	0.002	11th to 13th century
26	Local medieval unglazed ware	Body	2	0.010	11th to 14th century
26	Pingsdorf type ware?	Body	1	0.013	10th to 13th century
27	Local medieval unglazed ware	Cooking pot or jar	1	0.003	11th to 14th century
27	Local medieval unglazed ware	Cooking pot or jar	5	0.101	11th to 14th century
27	Local medieval unglazed ware	Cooking pot or jar	2	0.046	11th to 14th century
27	Early medieval ware S	Body	1	0.005	11th to 12th century
27	Andenne type ware	Body	1	0.007	11th to 13th century
27	Local medieval unglazed ware	Body	11	0.116	11th to 14th century
27	Early medieval ware	Body	2	0.020	11th to 12th century
27	Yarmouth glazed ware?	Body	2	0.034	13th to 15th century
27	Flemish grey ware?	Body	2	0.047	11th to 12th century
27	Early medieval ware, with sparse sand?	Body	2	0.014	11th to 12th century
28	Pingsdorf type ware	Body	2	0.009	10th to 13th century
28	Stamford ware A	JUG	1	0.046	900 to 1050
28	Yarmouth-type ware	Cooking pot or jar	1	0.013	11th to 12th century
28	Yarmouth-type ware	Body	7	0.096	11th to 12th century
28	Local medieval unglazed ware	Cooking pot or jar	2	0.024	11th to 14th century
28	Unprovenanced glazed ware	Jug	1	0.008	12th to 14th century
28	Unprovenanced glazed ware	Body	3	0.027	12th to 14th century
28	Early medieval ware, with sparse sand	Body	1	0.022	11th to 12th century

Context	Fabric	Form	Quantity	Weight (kg)	Date
28	Local medieval unglazed ware	Body	55	0.304	11th to 14th century
28	Yarmouth-type ware?	Body	1	0.006	11th to 12th century
28	Early medieval ware	Body	1	0.004	11th to 12th century
29	Pingsdorf type ware	Pitcher	11	0.182	10th to 13th century
29	Andenne type ware?	Pitcher	1	0.032	11th to 13th century
29	Yarmouth-type ware	Body	3	0.051	11th to 12th century
29	Yarmouth-type ware	Cooking pot or jar	2	0.017	11th to 12th century
29	Early medieval ware	Cooking pot or jar	1	0.004	11th to 12th century
29	Yarmouth-type ware?	Body	1	0.014	11th to 12th century
29	Early medieval ware, with shell	Body	1	0.003	11th to 12th century
29	Local medieval unglazed ware	Body	2	0.015	11th to 14th century
29	Miscellaneous wares	Body	1	0.008	Medieval
29	Miscellaneous wares	Body	4	0.008	Medieval
29	Medieval coarseware	?Jug	1	0.019	11th to 14th century
29	Early medieval Sandwich ware	Body	1	0.008	11th to 12th century
30	Andenne type ware	Pitcher	1	0.010	11th to 13th century
30	Blue grey Paffrath ware	Body	1	0.007	12th to 13th century
30	Pingsdorf type ware	Pitcher handle	22	0.443	10th to 13th century
30	Local medieval unglazed ware	Body	2	0.022	11th to 14th century
31	Thetford-type ware	Body	1	0.019	10th to 11th century
31	Yarmouth-type ware	Body	2	0.046	11th to 12th century
31	Pingsdorf type ware	Body	3	0.022	10th to 13th century
32	Saintonge Polychrome	Jug	1	0.001	1280 to 1350?
32	Saintonge mottled glazed ware	Jug	5	0.094	1250+
32	Andenne type ware	Body	1	0.006	11th to 13th century
32	Unprovenanced glazed ware	Jug	4	0.072	12th to 14th century
32	Dutch redware	Body	5	0.024	1300+
32	Yarmouth glazed ware?	Jug	3	0.037	13th to 15th century
32	Flemish grey ware?	Body	1	0.004	11th to 12th century
32	Grimston ware	Body	2	0.013	L12th to 14th century

Context	Fabric	Form	Quantity	Weight (kg)	Date
32	Local medieval unglazed ware	Body	5	0.020	11th to 14th century
32	Unprovenanced glazed ware	?Pipkin	2	0.056	12th to 14th century
34	Local medieval unglazed ware	Cooking pot or jar	10	0.189	11th to 14th century
34	Local medieval unglazed ware	Body	32	0.353	11th to 14th century
34	Yarmouth-type ware	Body	4	0.055	11th to 12th century
34	Early medieval ware	Body	2	0.016	11th to 12th century
34	Thetford-type ware?	?Bowl	1	0.023	10th to 11th century
34	Pingsdorf type ware	Body	1	0.012	10th to 13th century
34	Early medieval ware, sandy	Cooking pot or jar	8	0.051	11th to 12th century
34	Medieval coarseware	Cooking pot or jar	1	0.007	11th to 14th century
34	Andenne type ware	Body	1	0.004	11th to 13th century
34	Stamford ware B	Body	2	0.002	1050 to 12th century
34	Red painted ware?	Body	2	0.027	10th to 13th century
34	Aardenburg type ware?	Body	1	0.032	L12th to 14th century
34	Local medieval unglazed ware	Body	1	0.017	11th to 14th century
35	Unprovenanced glazed ware?	Body	1	0.010	12th to 14th century
37	Local medieval unglazed ware	Cooking pot or jar	1	0.007	11th to 14th century
37	Unprovenanced glazed ware	Body	1	0.012	12th to 14th century
42	Local medieval unglazed ware	Cooking pot or jar	2	0.037	11th to 14th century
42	Local medieval unglazed ware	Body	3	0.016	11th to 14th century
42	Normandy gritty ware	Jug	1	0.028	11th to 13th century
42	Pingsdorf type ware	Body	1	0.006	10th to 13th century
42	Unprovenanced glazed ware	Jug	3	0.033	12th to 14th century
42	Thetford-type ware?	Body	1	0.014	10th to 11th century
45	Thetford-type ware	Body	1	0.005	10th to 11th century
46	Local medieval unglazed ware	Body	5	0.032	11th to 14th century
46	Local medieval unglazed ware	Cooking pot or jar	1	0.041	11th to 14th century

Context	Fabric	Form	Quantity	Weight (kg)	Date
48	Andenne type ware	Body	1	0.034	11th to 13th century
48	Pingsdorf type ware	Body	1	0.013	10th to 13th century
48	Thetford-type ware	Body	1	0.009	10th to 11th century
75	Yarmouth-type ware	Body	1	0.015	11th to 12th century
76	Local medieval unglazed ware	Body	1	0.044	11th to 14th century
77	Yarmouth-type ware	Body	1	0.028	11th to 12th century
77	Local medieval unglazed ware	Cooking pot or jar	2	0.029	11th to 14th century
77	Local medieval unglazed ware	Body	3	0.019	11th to 14th century
77	Early medieval ware, with shell	Body	1	0.033	11th to 12th century
77	Local medieval unglazed ware	Cooking pot or jar	1	0.037	11th to 14th century
77	Early medieval ware?	Body	1	0.007	11th to 12th century
77	Thetford-type ware	Body	2	0.042	10th to 11th century
77	Pingsdorf type ware	Base	1	0.040	10th to 13th century
78	Yarmouth-type ware	Body	2	0.020	11th to 12th century
78	Early medieval ware	Body	1	0.004	11th to 12th century
78	Local medieval unglazed ware	Body	3	0.003	11th to 14th century
78	Early medieval Sandwich ware	Pitcher	1	0.018	11th to 12th century
170	Medieval coarseware	Body	1	0.013	11th to 14th century
171	Local medieval unglazed ware	Cooking pot or jar	1	0.035	11th to 14th century
171	Yarmouth-type ware	Body	1	0.009	11th to 12th century
171	Andenne type ware	Body	1	0.003	11th to 13th century
171	Early medieval ware	Body	2	0.005	11th to 12th century
172	Yarmouth-type ware	Body	1	0.016	11th to 12th century
173	Thetford-type ware?	Body	1	0.007	10th to 11th century
174	Local medieval unglazed ware	Body	1	0.006	11th to 14th century
178	Yarmouth-type ware	Body	1	0.013	11th to 12th century
178	Early medieval ware	Body	2	0.014	11th to 12th century
185	Thetford-type ware	Base	1	0.031	10th to 11th century
185	Yarmouth-type ware	Body	1	0.008	11th to 12th century

Appendix 4: Small Finds by Context

Small Find	Context	Quantity	Material	Object Name	Description	Date
1	34	1	Leather	Shoe	Upper vamp	Medieval
2	82	1	Wood	Rigging block	Hole in middle	Medieval
3	32	1	Iron	Artefact		
4	34	11+	Leather	?Shoe	Fragments	Medieval
5	35	1	Iron	Clench nail	With rove	
6	46	1	Iron	Clench	With rove	
7	69	1	Glass	Bead		Post-medieval
8	171	1	Iron	Artefact		
9	69	1	Stone	Architectural fragment	Fragment of ashlar block	12th-century
10	69	1	Stone	Architectural fragment	Complete ashlar block	Medieval
11	48	1	Stone	Architectural fragment	Complete ashlar block	12th-century
12	69	1	Stone	Architectural fragment	Chamfered ashlar block	Medieval
13	69	1	Stone	Architectural fragment	Moulded springer	12th-century

Appendix 5: Worked Flint by Context

Context	Type	Number
23	Burnt fragment	1
27	Burnt fragment	1
29	Retouched fragment	1
78	Flake	1
96	Blade	1
96	Flake	1
172	Blade	2
172	Core trimming flake	1
172	Blade-like flake	1
172	Flake	1
172	Retouched flake	2
172	End scraper	1
172	Utilised blade	1
174	Blade-like flake	2
178	Blade	1
185	Flake	2
185	Utilised blade	1
186	Blade	1
186	Burnt fragment	7
186	Flake	1

Appendix 6: Glossary of Boat Terms

Clinker built The boats described are clinker-built, in which the hull shape is created by adding shaped planks to the outside upper face of the plank below, which is bevelled. The planks are joined together by nails clenched over roves. The boat shell is reinforced with frames (ribs) that were added after the boat's shell was complete. The boat strakes are generally nailed together, and the frames were attached with willow treenails.

The nail heads are generally on the outside of the boat or ship and the lozenge shaped roves are on the inside of the boat.

The scarfs joining the planks end to end usually have the outer edge of the joint towards the stern of the boat.

Land Overlap of the plank faces, at the edge of planks, joining strakes together sometimes called lap.

Scarf A lengthening joint joining two planks together without increasing the thickness of the plank.

Strake A single plank or number of planks joined end-to-end with scarfs, which stretches from one end of the boat to the other.

Treenail In this case a mushroom-headed peg that joins the boat strakes to the boat frame. The head is on the outside of the boat.

Hood-end End of strake fitting into a rabbet in stem or sternpost.

Luting Stopping placed in joint before fasten, to differentiate from caulking which is forced into joints after fastening.

Rove A lozenge-shaped iron washer with a hole through it. The boat nail point is forced through this hole after it has passed through the boat planking, and riveted over it (clenched) holding the planks tight together.

Appendix 7: Methodology for Dealing with Boat Finds

by Richard Darrah

Future excavations at Read's Flour Mill could potentially provide nationally important evidence of 9th- to 15th-century boats and boat building. If this were the case a detailed understanding of the boats and ships of the period could be built up. To do this information would need to be recorded in order to answer the following questions.

- The dates
- The size of the boats and ships
- The shapes and types of craft found
- The function of the boats and ships

Should there be further excavation which reveals boat artefacts a visual catalogue of the objects associated with boats found on the site, as well as recording rope, luting (caulking), tar *etc*, should also be made. To do this economically identification of which pieces of boat structure can be removed from site needs to be made, and which will require detailed three dimensional recording *in situ* so that the shapes of the structure as found can be accurately recorded.

The boat timbers will probably divide up into two groups.

A. Those found in a vertical plane

B. Those found in a horizontal plane

Those found in a vertical plane can be extracted and recorded off site as long as they are less than one metre long. The reason why these can be extracted and recorded is that their shape will have been distorted by their use either as a revetment, or by the compressive forces caused by the reduction in thickness of the preserving silts.

Those found in a horizontal plane will require detailed recording on site, dismantling or extracting as a unit and each individual piece washed and dimensionally recorded off site (unless they are less than 0.5 square metres in area in which case they can be treated as above). The reason that they will require detailed recording *in situ* is that they will have maintained their shape as a boat. It is this evidence, and the evidence of distortion of this shape that should be recorded on site before they are lifted.

Both groups would require complete sampling for dendrochronology of all pieces with more than 50 rings. This dating would provide dates of 50 years before the boats were built or repaired, unless sapwood is found in which case the dating will be more accurate.

Both groups should be recorded in order that a set of information of plank widths, thickness, shape, curvature, and the spacing and size of joints and fastenings is built up. From this it should be possible to identify the types and sizes of boats working in and from Norwich over this period. Additionally it may also identify local building techniques, and foreign craft. McGrail gives a detailed list of features that can be recorded in *Medieval Boat and Ships Timbers from Dublin* (McGrail 1993).

A useful way of recording these details would be to draw 1:1 tracings on transparent plastic with indelible pens, and annotate them. Using this technique details from both

sides of a plank can be recorded on the same sheet, giving scarf lengths and nail hole details that can be difficult to record on drawings. The three dimensional curvature of the planks should also be recorded. The aim of this recording is to have the precise plank shapes recorded, enabling the boat shape to be reconstructed. Some timbers will also require drawing for publication.

It would be important that all boat timbers be preserved until the excavation is complete, when a decision could be made as to which pieces require conservation. As with all excavated material it is important to determine how this archive will be kept before any excavation begins. Additionally the boat evidence may be amplified by a study of the Customs Rolls for the period.

Waste timber from riverside activity (probably from boat building) may become buried in the mud within a few years of felling and can have complete sapwood. These are the most likely pieces to date the site accurately and the preservation of wood off-cuts found during the evaluation was excellent.

Appendix 8: Faunal Remains by Context

Context	Weight (kg)	Context Quantity	Species	Species Quantity	Comments
23	0.006	1	Fish	1	Large species of fish – needs ID
27	0.651	66	Cattle	1	Chopped metatarsal
27			Sheep/Goat	12	Metapodials, jaws, humeri, tibia. Includes juvenile or neonatal bones. Butchered.
27			Goose	4	Humerus, radius, ulna, carpo-metacarpus. Some cut.
27			Bird	9	Need species ID
27			Fish	10	Fragments of large species
27			Mammal	30	No species ID, butchered
28	0.180	22	Sheep/Goat	2	Chopped tibia, molar
28			Pig	1	Metapodial
28			Bird	7	Needs species ID
28			Mammal	12	No species ID, butchered
29	0.360	35	Sheep/Goat	4	Femur, scapula, metapodials, Inc juv. Butchered.
29			Fish	6	Fragments of large species
29			Bird	2	
29			Mammal	21	Butchered. No species ID.
30	0.004	127	Cattle	1	Complete metacarpal with cuts on shaft from skinning.
30			Mammal	3	Butchered fragments
31	0.078	8	Cattle	1	Chopped phalange
31			Sheep/Goat	1	Pelvis
31			Mammal	6	Butchered fragments
32	0.057	5	Sheep/goat	1	Phalange
32			Pig	1	Scapula
32			Bird	1	Femur – needs species ID
32			Mammal	2	Butchered fragments.
33	0.017	1	Mammal	1	Butchered
34	0.025	4	Fish	1	Large species – vertebrae
34			Mammal	3	Butchered fragments
35	0.363	10	Cattle	1	Mandible, P2 still not erupted – young adult
35			Pig	3	2 right side mandibles – chopped, 1 extra P4 growing at an angle between normal P4 and P3 . Tusk
35			Mammal	6	Fragments of jaw and teeth – probably pig

Context	Weight (kg)	Context Quantity	Species	Species Quantity	Comments
42	0.139	19	Sheep/goat	3	Metatarsal, tibia – both chopped. Molar
42			Domestic fowl	1	Femur
42			Goose	1	Chopped humerus
42			Mammal	14	Butchered fragments
46	0.147	5	Cattle	1	Chopped metatarsal
46			Sheep/Goat	1	Chopped humerus
46			Mammal	3	Butchered fragments
75	0.095	2	Cattle	1	Heavily chopped pelvis
75			Mammal	1	Butchered rib
76	0.052	1	Cattle	1	Chopped tibia
77	0.502	7	Cattle	2	Cut (skinned) metatarsal, mandible with M3 in wear
77			Sheep/Goat	1	Chopped and cut metatarsal
77			Goose	1	Radius
77			Mammal	3	Butchered
78	0.028	4	Cattle	1	Chopped pelvis
78			Mammal	3	Butchered mammal fragments
171	0.835	21	Cattle	3	Mandible with M3 in wear – chopped and cut- tongue removed. Loose teeth
171			Sheep/goat	2	Chopped/split metatarsal – marrow extraction. Chopped horncore-hornworking
171			Goose	2	Humerus and femur, chopped and cut
171			Equid	1	Chopped tibia with tooth marks/scratches
171			Bird	3	Inc juvenile remains – needs species ID
171			Mammal	10	Butchered fragments
172	0.218	10	Cattle	1	Phalange
172			Sheep/Goat	3	Chopped and cut mandible, chopped and cut horncores X2 – hornworking
172			Pig	1	Chopped and cut mandible – M3 not fully erupted
172			Mammal	5	Butchered
174	0.040	3	Mammal	3	Butchered fragments
178	0.004	1	Mammal	1	Butchered shaft fragment

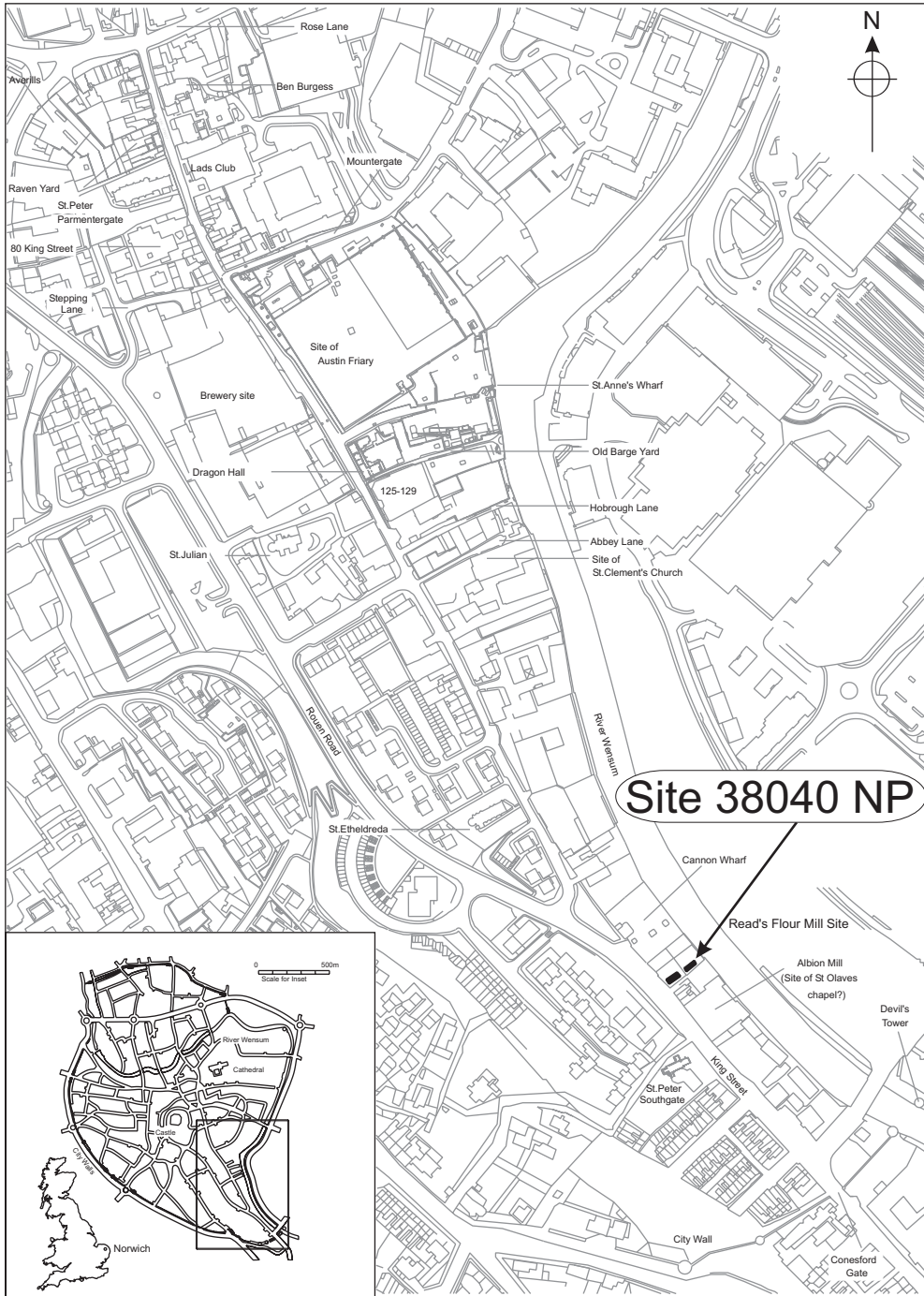
Appendix 9: Plant Macrofossils

Sample No.	1	2	12	13	14	15	16	32
Context No.	36	38	30	31	34	50	63	115
Cereals								
<i>Avena</i> sp. (grains)							XC	
Cereal indet. (grains)	XXC	XC	XC		XC		XC	
(awn frags.)	XC							
(basal rachis nodes)	XC							
<i>Hordeum</i> sp. (grains)	XC	XXC					XC	
(rachis nodes)					XC			
<i>Hordeum/Secale cereale</i> type (rachis nodes)	XC	X XC					XC	
<i>Triticum</i> sp. (grains)	xcfc							
<i>T. aestivum/compactum</i> type (rachis nodes)	x xxc	x						
Dry land herbs								
<i>Agrostemma githago</i> L.	xtf	x xxtf	xtf	x xtf	xtf			
<i>Anthemis cotula</i> L.	x		x	x	x			x
Apiaceae indet.						x	x	
Asteraceae indet.				x		x		
<i>Atriplex</i> sp.	x	x		x	x	x		
<i>Brassica</i> sp.	xx		x	x		x	x	
Brassicaceae indet.		xtf						
<i>Centaurea</i> sp.		x	xcf	x	x	x		
<i>C. cyanus</i> L.			x		x		x	
<i>Chenopodium album</i> L.	x	x	xx	x	x			x
Chenopodiaceae indet.				x				
<i>Cirsium</i> sp.			x					
<i>Conium maculatum</i> L.					x			
Fabaceae indet.				XC				
<i>Fallopia convolvulus</i> (L.)A.Love		x	x					
<i>Galeopsis</i> sp.	xcf							
<i>Lamium</i> sp.		x		x				
<i>Lapsana communis</i> L.	x	x	x		x			
<i>Plantago major</i> L.								x
Small Poaceae indet.	x	x						
Large Poaceae indet.	x	x	x	x	x			
<i>Polygonum aviculare</i> L.			x	x			XC	

Sample No.	1	2	12	13	14	15	16	32
Context No.	36	38	30	31	34	50	63	115
<i>Potentilla</i> sp.			x		x	x		
<i>P. anserina</i> L.						x		
<i>Prunella vulgaris</i> L.					x			
<i>Ranunculus</i> sp.					x	x		
<i>R. acris/repens/bulbosus</i>			x	xcf		x		
<i>Raphanus raphanistrum</i> L. (siliqua frags.)	x	x	x	x	x	x	xc	
<i>Rumex</i> sp.	x xc	x	x	x	x			
<i>R. acetosella</i> L.			x		x			
<i>Scleranthus annuus</i> L.					x			
<i>Silene</i> sp.	xx	x						
<i>Sinapis</i> sp.	x		x		x			
<i>Sonchus asper</i> (L.)Hill	x	xx						
<i>S. oleraceus</i> L.		x						
<i>Stellaria</i> sp.		x						
<i>S. media</i> (L.)Vill.	x	x	x	x	x	x	x	
<i>Urtica</i> sp.					x	x		
<i>U. dioica</i> L.	x	x	x		x	x		
<i>U. urens</i> L.	x	x	x	x	x			
<i>Vicia/Lathyrus</i> sp.							xc	
Wetland/aquatic plants								
<i>Carex</i> sp.	x	x	xx	x	xx	xx	x	
<i>Eleocharis</i> sp.			xx	x	x	x		
<i>Hydrocotyle vulgaris</i> L.					x			
<i>Juncus</i> sp.	x	x		x	x	x		
<i>Mentha</i> sp.		x				x		
<i>Menyanthes trifoliata</i> L.	xcf		x	x	x	x	x xc	
<i>Potamogeton</i> sp.			xcf			x		
<i>Ranunculus parviflorus</i> L.			x					
<i>R. sceleratus</i> L.						x		
<i>Rorippa</i> sp.								xcf
<i>Scirpus</i> sp.		x	xx	x	x	x		
Wetland/aquatic plants (continued)								
<i>Scrophularia auriculata</i> L.					x			
<i>Sparganium erectum</i> L.		x						

Sample No.	1	2	12	13	14	15	16	32
Context No.	36	38	30	31	34	50	63	115
Trees/shrubs								
<i>Corylus avellana</i> L.				xx	x	x	xcfc	
<i>Euonymus europaeus</i> L.	xcf							
<i>Rubus</i> sp.			x		x			
<i>R.</i> sect <i>Glandulosus</i> (L.)Wimmer & Grab			x					
<i>Sambucus nigra</i> L.			x	x	x		x	
Other plant macrofossils								
Charcoal <2mm	xx	xx	xxx	xxx	xx	xx	xxx	x
Charcoal >2mm	x	x	x	xx	x	xx	x	
Charred root/rhizome/stem	x	x					xx	
Waterlogged root/rhizome/stem	xxx	xxx	xxx	xx	xxx	xxx	x	xx
<i>Phragmites</i> sp. (stem frags.)	x	xxx				x		
<i>Pteridium aquilinum</i> (L.) Kuhn (pinnule frags.)	xcf	x	x		x			x
(stem frags.)			x					
Ericaceae indet. (stem frags.)							xcfc	
Indet.bark					x			
Indet.buds/bud scales		x	x		x			x
Indet.culm nodes	xc						xc	
Indet.fruit stone frags.		x			x			
Indet.leaf frags.		x	x		x			
Indet.moss	x	xx	xx		x	x		xxx
Indet.seeds	x		xx	x	x		xc	
Indet.thorns (Rosa type)		x						
Indet.twigs	x		x	x	x			
Wood frags. <5mm	x			x		x		
Wood frags. >5mm	x	x	x	x	xx			
Molluscs								
Open country species								
<i>Pupilla muscorum</i>		x						
Fresh water obligates								
<i>Anisus leucostoma</i>				x		x		
<i>Bathyomphalus contortus</i>				x				
<i>Bithynia</i> sp.				x				
<i>Lymnaea</i> ap.	x			x				

Sample No.	1	2	12	13	14	15	16	32
Context No.	36	38	30	31	34	50	63	115
Animal macrofossils								
Bone frags.							x	
Eggshell				x			x	
Fish bone				x			x	
Marine mollusc shell frags.				x				
Small mammal/amphibian bone	x							
Waterlogged arthropods	x	x	x	x	x	x		x
Other materials								
Black porous 'cokey' material				x				
Burnt/fired clay				x			x	
Vitrified material							x	
Sample volume (litres)	4ss	10ss	4ss	10ss	4ss	4ss	8ss	2.5ss
Volume of flot (litres)	0.6	1	0.4	1.5	0.4	0.3	0.3	0.7
% flot sorted	12.50%	<12.5%	25%	<12.5%	25%	50%	50%	12.50%



0 500m

Figure 1. Site Location, also showing churches. Scale 1:5000

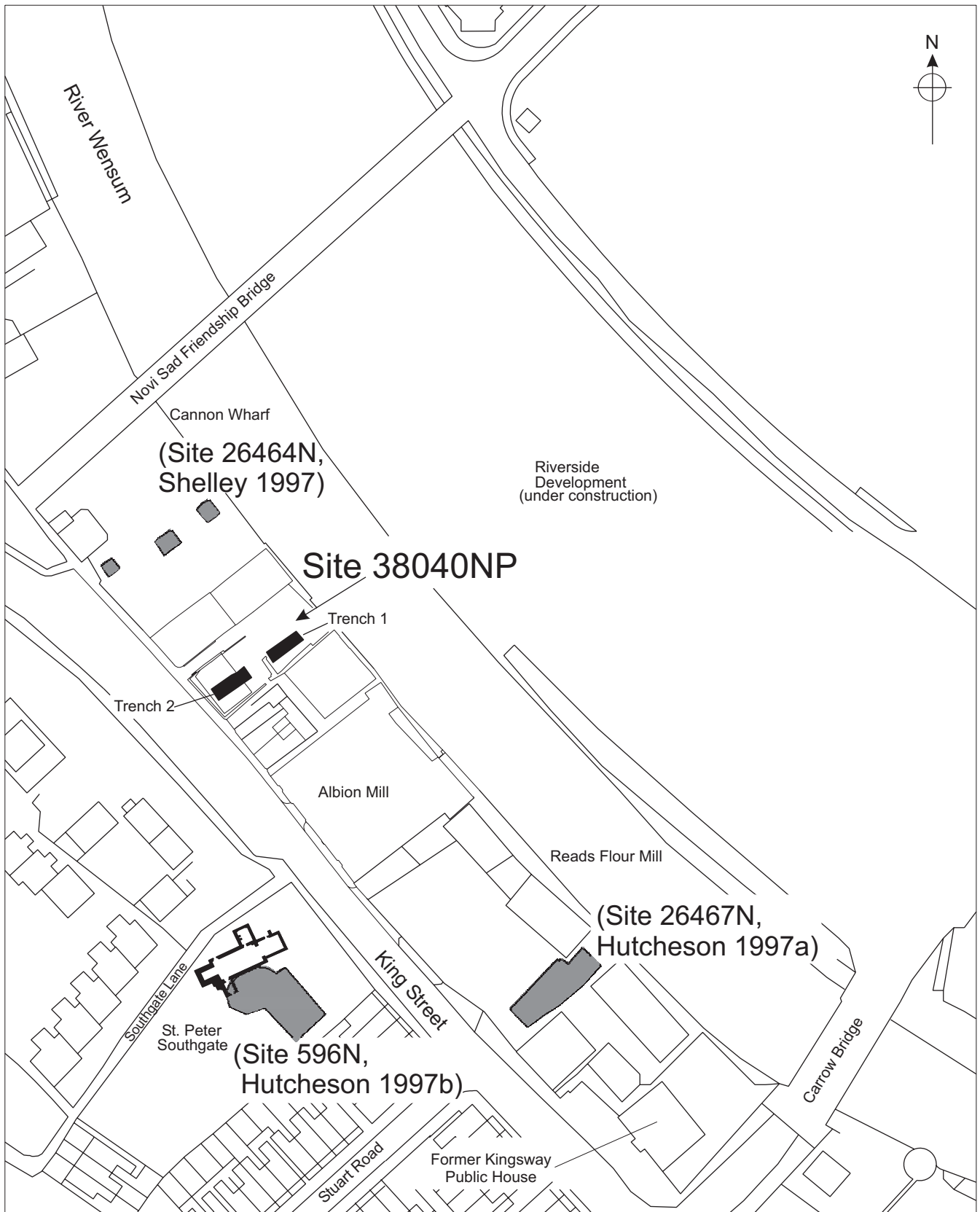


Figure 2. Details of the Read's Flour Mill site, showing trench locations and previous archaeological investigations. Scale 1:1250

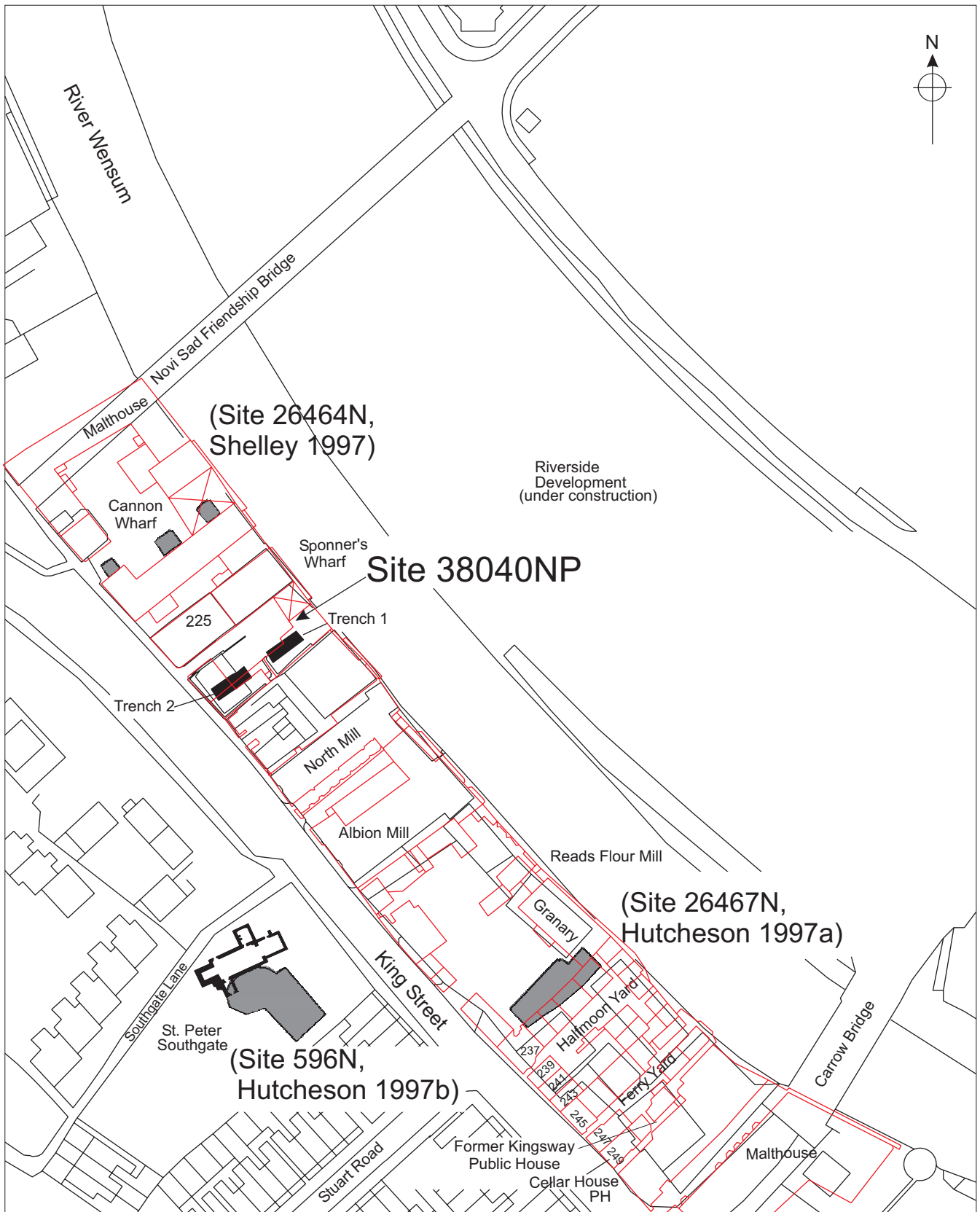


Figure 3. Trench locations and previous archaeological investigations with buildings shown on OS 1885 plan. Scale 1:1250

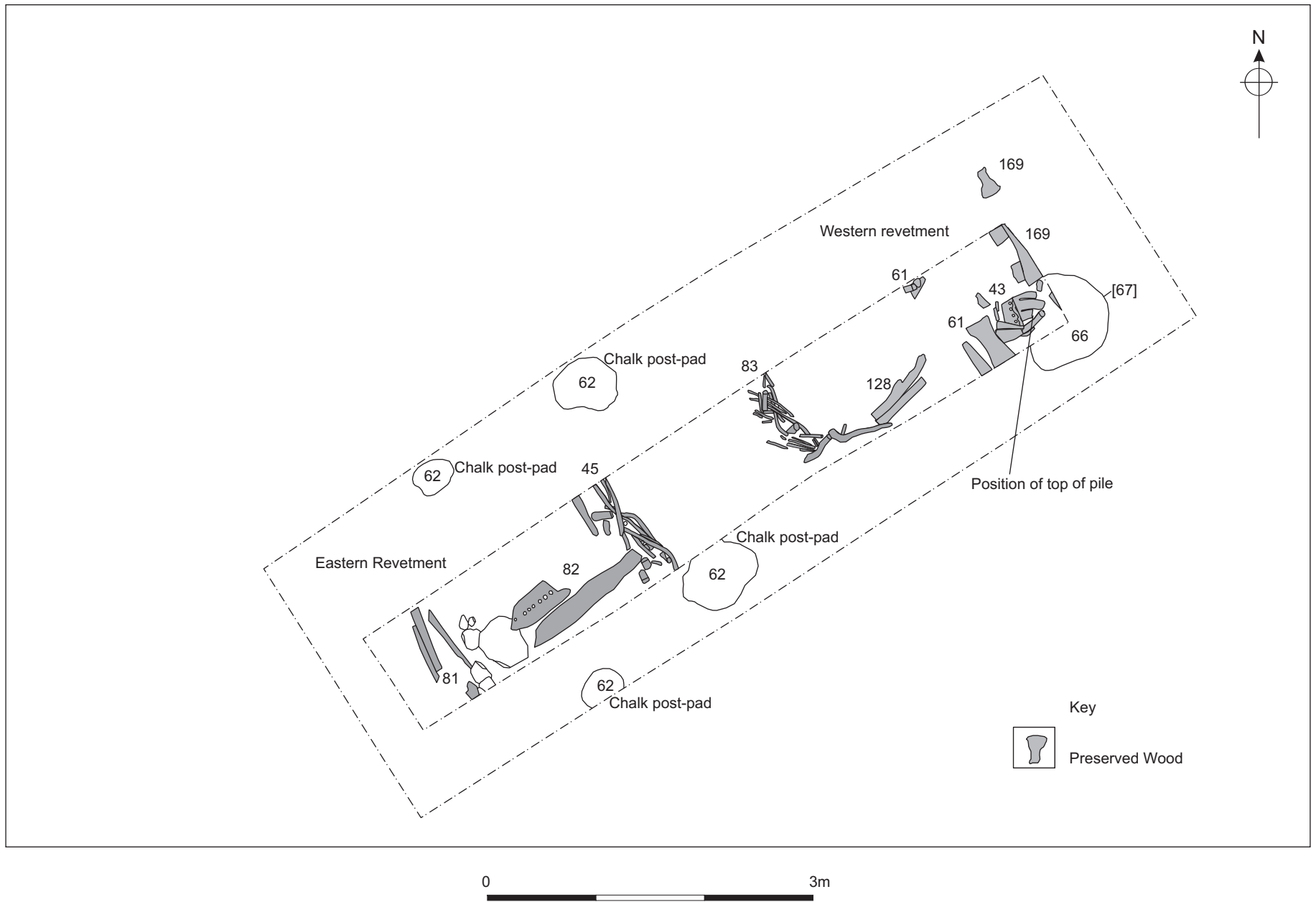


Figure 4. Composite plan of revetments in Trench 1. Scale 1:50

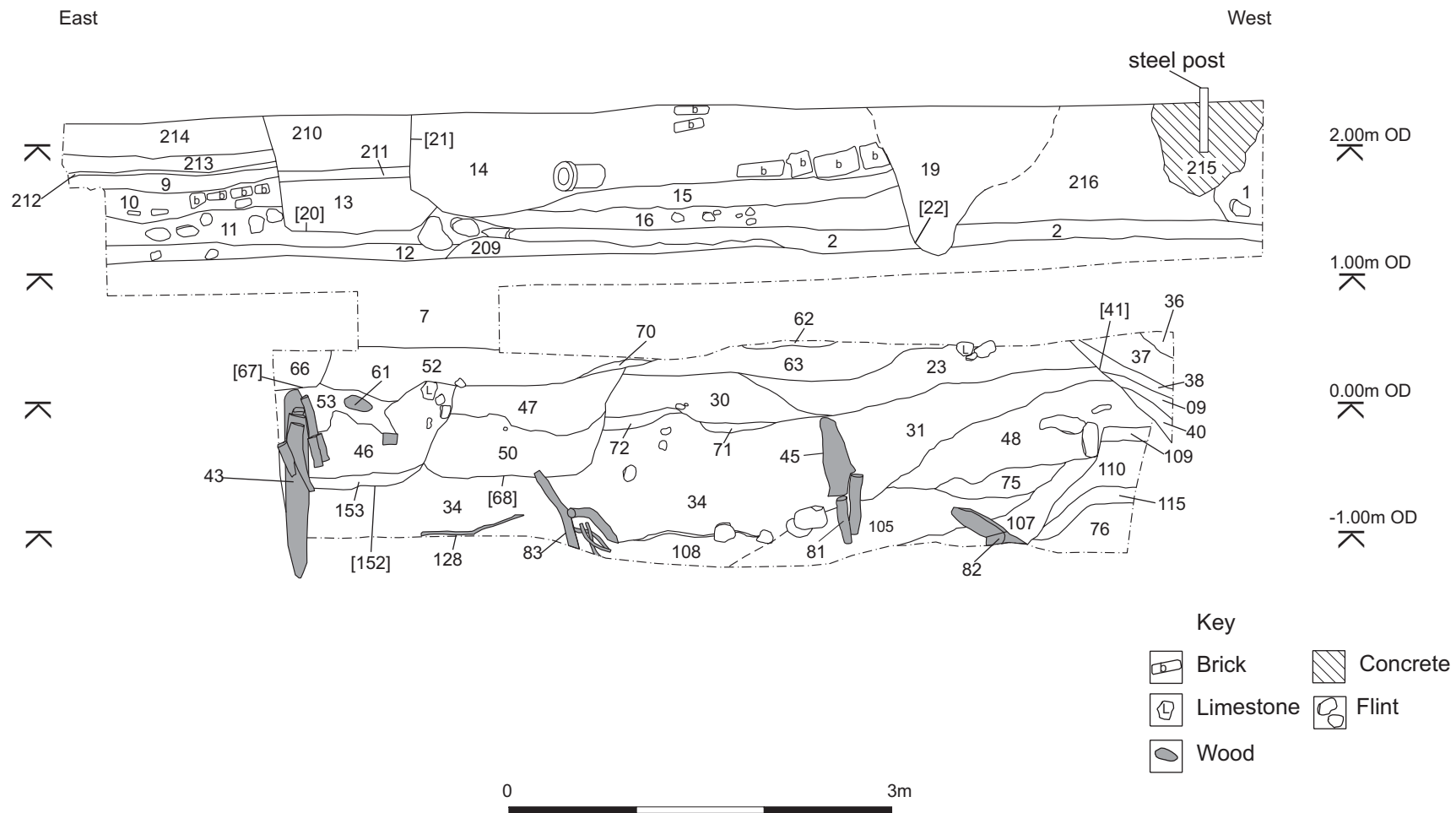


Figure 5. North-facing section of Trench 1. Scale 1:50

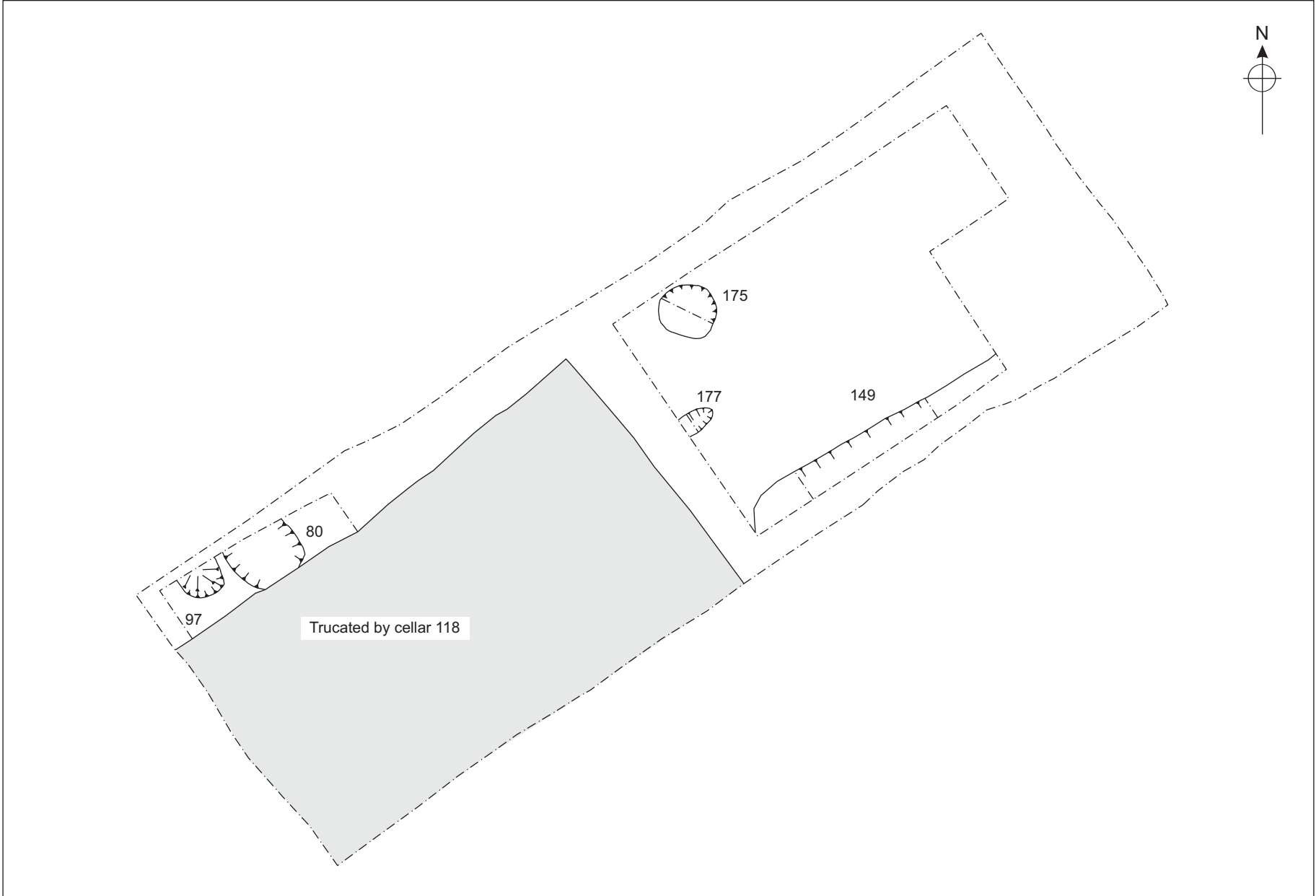


Figure 6. Structural features seen towards the base of Trench 2. Scale 1:50

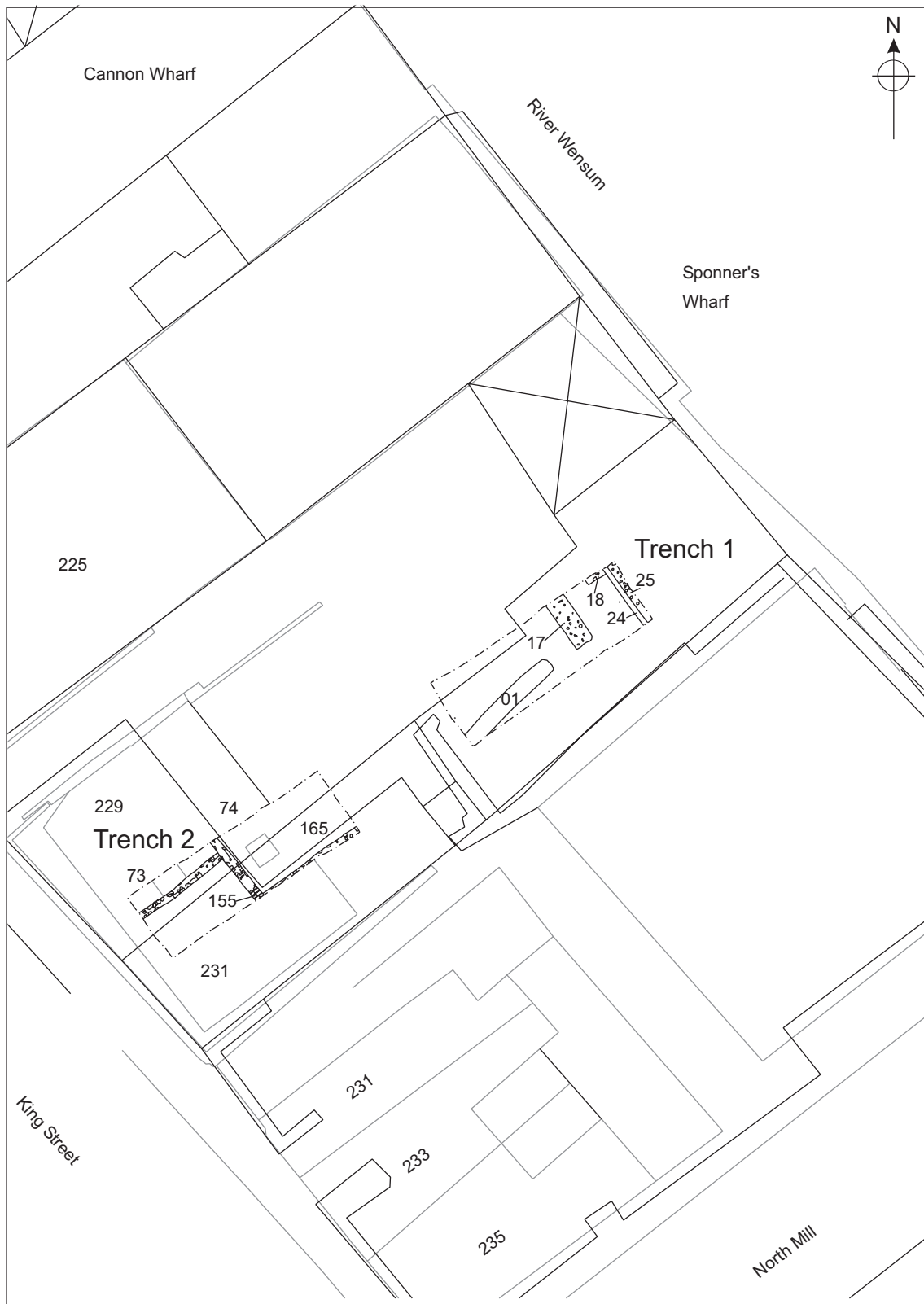


Figure 7. Detailed trench locations showing masonry buildings found in Trenches 1 and 2 and buildings shown on OS 1885 map.
Scale 1:250

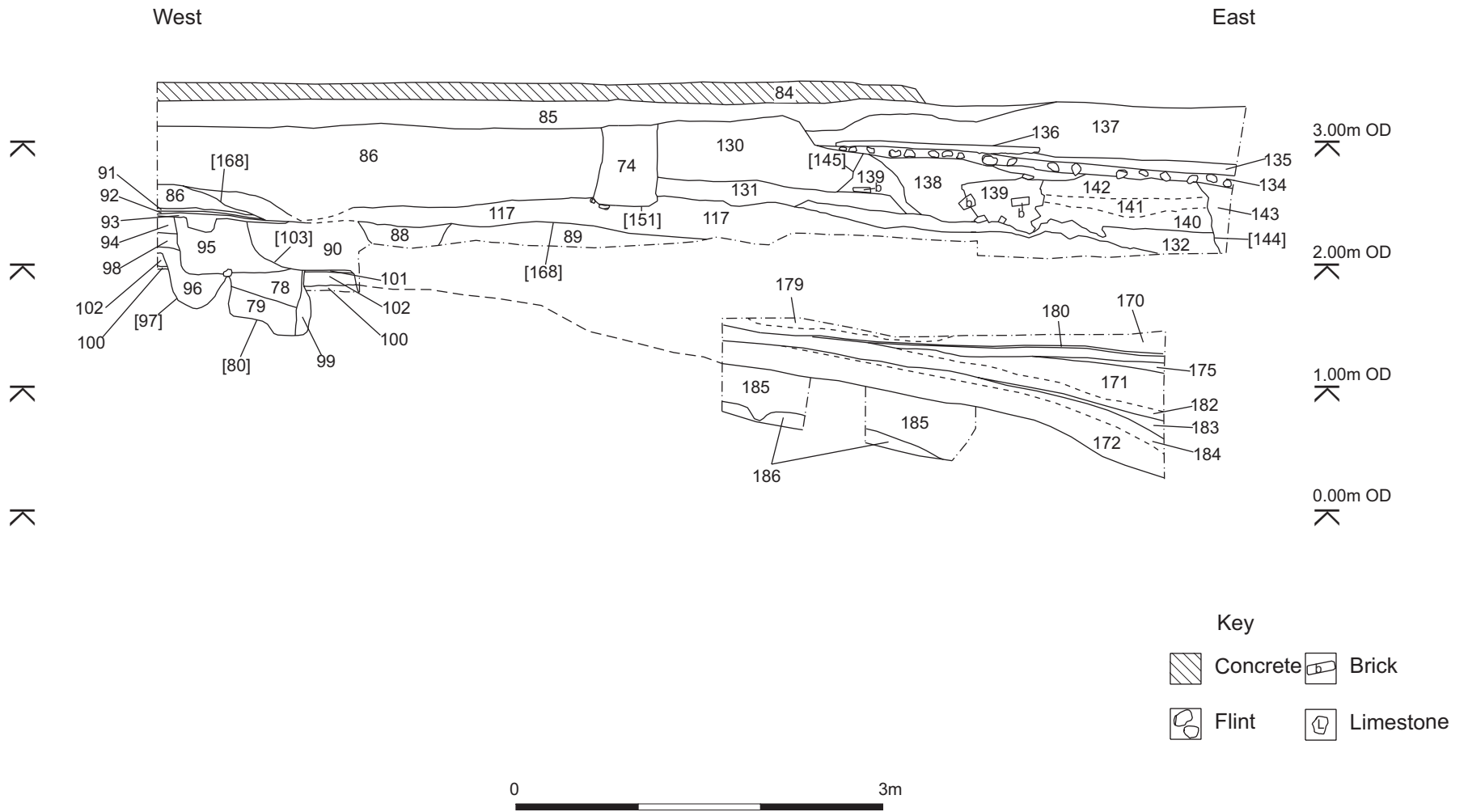


Figure 8. South-facing section of Trench 2. Scale 1:50

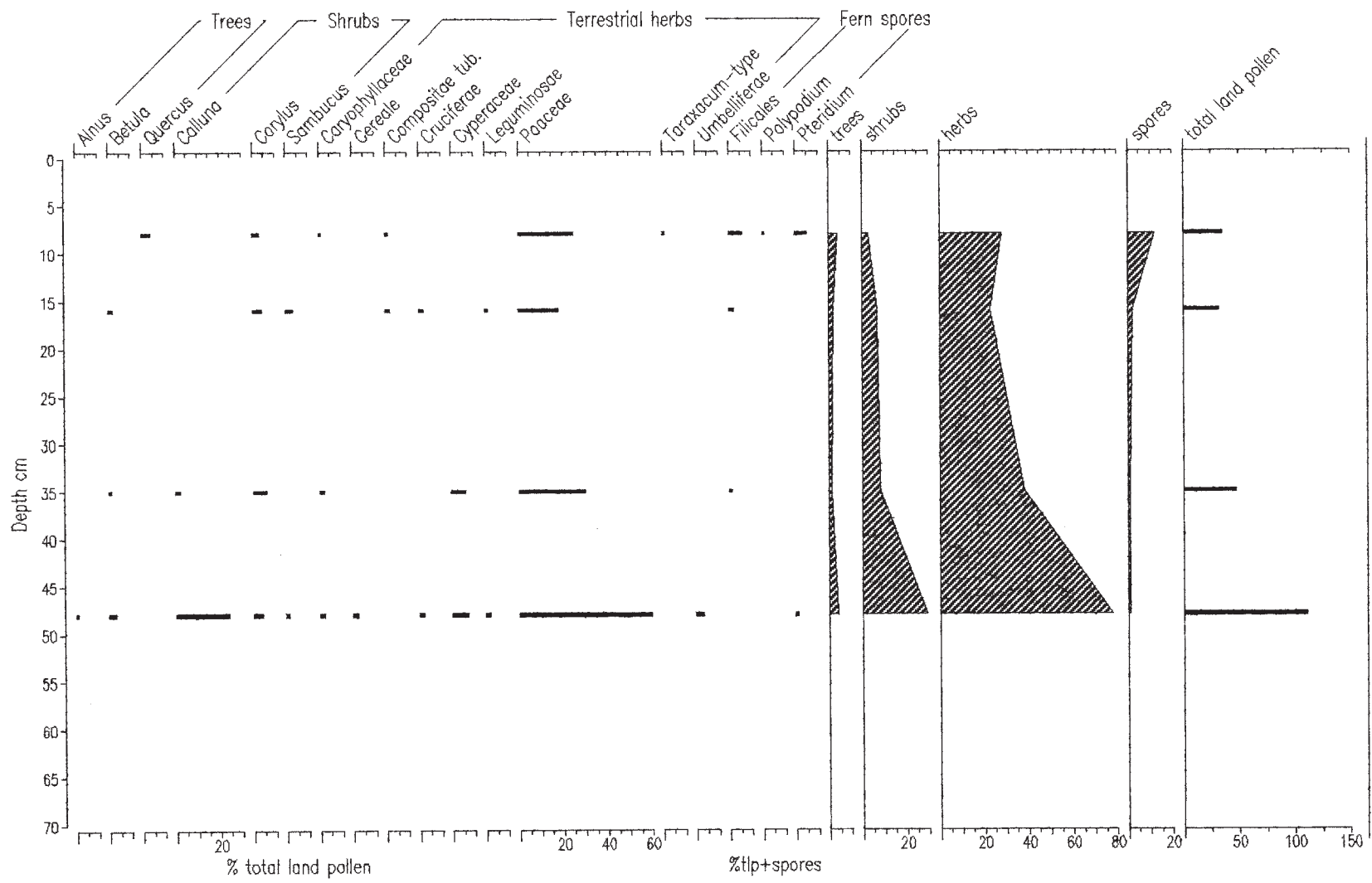


Figure 9. Pollen percentage data for monolith Sample 30

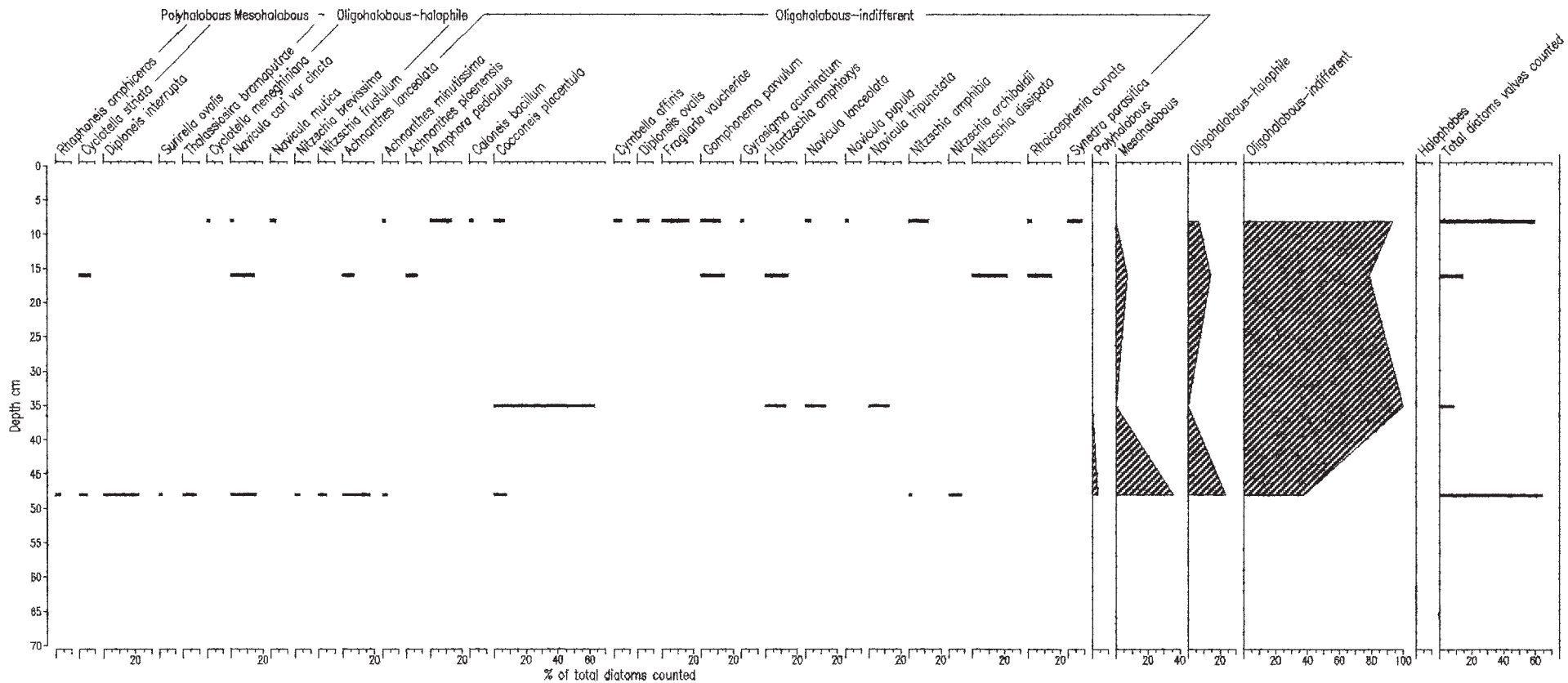


Figure 10. Diatom percentage data, based on salinity, for monolith Sample 30



Plate 1. 1829 engraving of painting by J. Stark, of Harrison's Wharf, King Street, Norwich



THE "KING'S WAY"

This House, rebuilt last year on spacious and sumptuous lines and modernised throughout, has changed its name from the CELLAR HOUSE One of Y., C. and Y.s' most recent successes in transforming an antiquated old " Pub " into a first-class, up-to-date House

The new premises comprise Commodious Bar, Handsome Lounge, Glass-covered Sun Lounge overlooking river

Hygienic Cellar ensuring
BRIGHT AND GOOD BEERS

Car Park for Patrons
Overlooking Norwich City Football Ground
Fully Licensed

E. A. KEWLEY, Proprietor

KING STREET, NORWICH
(Next Carrow Bridge)

Plate 2. 1936 advertisement for the King's Way Public House (supplied by Mr R. Bristow of www.norfolkpubs.co.uk)



Plate 3. The oak plank with auger holes [82] <33> in situ. Scale 30 cm



Plate 4. The western wicker revetment [45]. Scale 30 cm



Plate 5. The eastern wicker revetment [83]. Scale 30cm

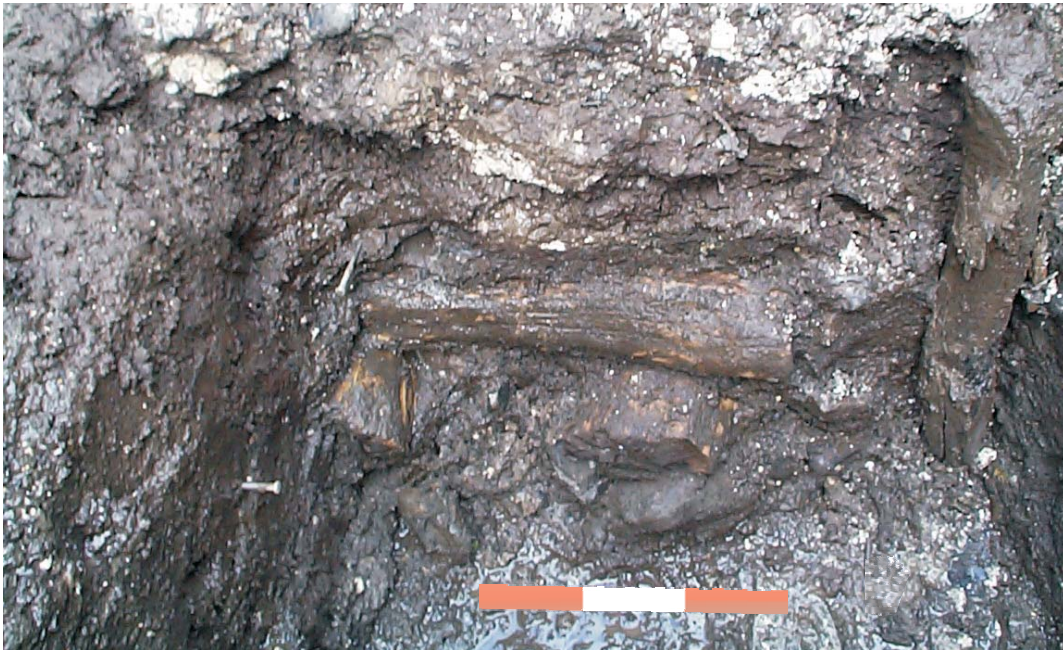


Plate 6. The timber interlacing [169] in the main eastern revetment. Scale 30cm