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CASTLE MILL STREAM

OXFORD

ARCHAEOLOGICAL WATCHING BRIEF REPORT

NGR SP 5093 0612

PLANNING APPLICATION No: 96/896/NFH

OXFORD ARCHAEOLOGICAL UNIT

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Summary

In September 1997 the Oxford Archaeological Unit (OAU) undertook a watching brief at Castle Mill Stream, Paradise Street, Oxford (NGR SP 5093 0612), during refurbishment works to the weir by Dyer and Butler, Civil Engineering Contractors. Massive foundations of wood, clay and stone were encountered in the sections of the main sluice suggesting the presence of a major structure, possibly the Castle Mill itself, but too little of them remained to make for definitive interpretation to be possible. Two of the timbers were felled in the 14th century. Later features on the island between the sluices were examined and the sluice walls were recorded.

1. Introduction

A programme of reconstruction of the sluices on the site of the Castle Mill Weir, Oxford, was undertaken by the Environment Agency in Autumn 1997. The major archaeological impacts of this work included the repair and repointing of masonry in the lasher (east) sluice and main sluice, the stripping out of the lining of the main sluice and formation of a new lining, and the reduction by 1600 mm of the existing river bed in the area of the main sluice, new weir and lasher weir. An archaeological watching brief related to these works was carried out by the Oxford Archaeological Unit (OAU). The watching brief, a condition of the planning consent granted by Oxford City Council under PPG 16, was commissioned by Dyer and Butler Ltd, Civil Engineering Contractors, the principal contractor to the Environment Agency. A Brief for the archaeological work was drawn up for Oxford City Council by the Oxford Archaeological Advisory Service (OAAS) and a Written Scheme of Investigation (WSI) for the archaeological work was prepared by OAU in response. The proposed archaeological programme was approved by OAAS. The WSI and subsequent programme of archaeological work was based largely on information contained in a detailed desktop study of the archaeological potential of the site, carried out by the Oxford Archaeological Unit (OAU) for Peter Brett Associates on behalf of the Environment Agency (OAU 1996). In addition the work was informed by the results of an excavation carried out by the OAU immediately adjacent to the present site, at the south end of Tidmarsh Lane in 1994-5 (Booth forthcoming).

2. Archaeological and Historical Background

The background to the surrounding area (Fig. 1) and to the mill itself is discussed at some length in the 1996 OAU study. The Castle Mill is one of the well-documented early mills in Oxford, being first recorded in Domesday Book, and its later history is known in some detail from city records (Salter 1926), which include a plan of the mill, probably from the early 19th century. Evidence suggests that the castle mill may have been first built on the west bank of the river, opposite the castle itself, the west gate of which lay some 15 m to the north of St George's Tower, and only gradually extended across the channel to meet the tower. The island on which the later mills partly stood may only have been formed at the end of the 16th century when a new channel (almost certainly the present lasher channel) was cut. By the 17th century (and perhaps rather earlier) a building occupied the island between the main and lasher sluices, but it was only in the 18th century that the building appears to have been constructed against the tower. The medieval mill was rebuilt around 1781, and it is this building which was finally demolished in 1930.

This demolition work was observed by the eminent archaeologist J N L Myres, who noted that the buildings were of 18th and 19th century date and that the island on which they stood had been heavily reconstructed, with the revetting walls showing little evidence of being of an early date. More interestingly, he observed that an extensive system of piles and timber baulks, set at an angle to the existing structures, was present 'beneath' and to the north of the island. He interpreted these as being the only remaining traces of the Domesday mill. These timbers were planned and an unknown number were removed and destroyed. Unfortunately the accounts of this discovery leave its exact location somewhat uncertain, and despite considerable efforts it has not been possible to trace either Myres papers relating to the site, or the plan of the timbers prepared by the City Engineer at the time (Mr N C C Barrell).

After examining all the available evidence the desktop study (OAU 1996) concluded that, while accepting the general results of Myres' observations, there remained at least the possibility that ancient material, including timbers, survived in part undisturbed by the 1930 works. The description of the removal of an unknown number of timbers does not in any way imply a complete clearance of the river bed. Therefore the extent, nature and significance of the any surviving archaeology remained unknown, and there was considered to be high potential for significant discoveries to be made on the site, particularly in the bed of the main channel. Prior to the commencement of the recent work there was little clear evidence for the widening of the channel reported to have taken place in 1930. There was therefore the possibility that the stone lined channels may have included remnants of the 1781 mill channels and foundations, with some 1930s repointing and rebuilding. There was even a possibility that traces of the 18th/19th century waterwheel could have survived in the eastern channel.

3. Aims

The aims of the watching brief were to identify and record any important archaeological feature or deposit exposed or disturbed during the works, including any remains of the medieval and later mill. These deposits might include, but not be restricted to:

- Any river bed deposits and any survivors of the river bed timbers seen during the 1930 demolition works.
- Any former mill structures incorporated in the sluices.
- Any timbers or other mill structures exposed in stripping out, cutting back and reduction works for the replacement sluice.

Recovery of dendrochronological samples from any potentially ancient timbers which might be damaged or removed by the works was considered important for providing dating evidence for any structures.

The recording of any archaeological remains exposed on site during the course of the proposed works was to be to established standards (OAU Fieldwork Manual, First

Edition, 1992) to ensure as complete as possible preservation by record of any features, the presence and nature of which could not be established in advance.

4. Methodology

A period of 40 hours standing time for the engineering contractors was agreed in advance, should the proposed works uncover archaeology of such significance that hand excavation and recording would interfere with normal site operations. To this end, and to remove the need for a permanent archaeological presence, Dyer & Butler agreed to liaise with and notify the OAU of significant phases of work likely to disturb or remove *in situ* deposits, and of any changes to their work programme. The principal phases of the work likely to have archaeological implications were the repair of stonework in the walls of the lasher sluice, the removal and replacement of the walls and base of the main sluice and any reduction in level of the ground surface of the island between the two channels. Thus, phased with the contractor's programme of works, a number of inspection visits were made to the site. Photographic recording of the sluice channel walls took place prior to removal and replacement of parts of the stonework and machine excavation of sensitive deposits either took place under archaeological supervision or the results of such work were inspected and records made of faces or areas exposed by such work. Within the constraints imposed by Health and Safety considerations the deposits and features exposed in section and plan were cleaned, inspected and recorded in plan and/or section as appropriate and by colour slide and black and white print photography. Written records were also made on proforma sheets.

5. Results

5.1. The main channel (Figs. 2 and 3)

Oxford Clay, sealed by a band of natural gravel, was exposed at the base of the dig in the east section of the main channel. Dr Mark Robinson of the English Heritage Environmental Archaeology Unit at the Oxford University Museum visited the site to inspect these deposits, and was of the opinion that the band of gravel (31) represented the first gravel terrace. The gravel sloped down from east to west and tailed out within the width of the channel, not being observed on the west side and being certainly absent at the south-west corner of the area of excavation.

Remains of a substantial timber and clay structure, with its top at c 54.15 m OD, were located in the western half of the main channel, revealed upon removal of the west wall and base of the channel prior to their reconstruction. Most unfortunately, the bulk of this structure was removed by 360° excavator with no archaeological supervision and this excavation was immediately followed by the laying of the new concrete sub-base in the western half of the channel. Virtually no archaeological deposits survived to be recorded in plan in this area, nor was the crucial lower part of the west section accessible because of the presence of the new concrete base. A small part of the west section, above the lowest deposits, was recorded, however, along with more extensive parts of the north and south sections and the whole of the east section of the excavation revealed after removal of the east wall of the main channel.

North Section

The reduction of the base of the main channel revealed a section below the granite setts of the floor of the 1930 weir. The earliest deposit seen here was (17), the natural terrace gravel, numbered (31) in the east section. One further gravel deposit was seen in this section, (16), to the west of (17) and separated from it by cut [14]. (16) was markedly different from (17) in character, being a very mixed yellow/grey/white/orange gravel; but apart from being very mixed and dirty there was nothing to suggest that this was not natural - it contained no finds of any kind. Between 16 and 17 was a cut [14], with a flat base, almost vertical sides and a sharp break of slope to give a flat top, filled with clay and limestone pieces (15). The interpretation of this feature is uncertain. The clay component of fill (15) was very similar to a stone-free clay deposit to the west (12). Within this deposit and immediately above [14] were the remnants of a probable north-south timber (18). To the east, the fill of feature 14 and the adjacent gravel (17) were sealed by 13, a layer of gravelly black silt, possibly analogous with a similar deposit (33) immediately to the east. Layers (12), (18) and (13) were all sealed by (11), a layer of light yellow/white fine-coarse subangular gravels, a bedding layer for the granite setts (10) which formed the floor of the weir immediately above.

West Section

The upper two metres of this section were examined with the lower courses of its facing stones still in place; while the lower portion was only seen after the clearance of the main channel and the insertion of the new concrete sub-base, so the base of this section was not recorded. The broken ends of six large east-west aligned timbers were seen protruding from the section, immediately above the level of the new concrete. At the extreme south end of the excavation of the base of the main channel; a seventh timber (28), had been left intact with its upper surface flush with the level of the concrete sub-base. All the timbers were of oak.

The northernmost timber visible was (6), the splintered end of which protruded 0.70m from the edge of the trench and measured approximately 0.3 m x 0.3 m in section. This was the most intact of those timbers which had been removed, and it was noted by the site workers that, prior to its removal, it extended approximately 2 m eastward from the section. The splintered end of this timber was removed by chainsaw as far back into the section as was practical, and retained for dendrochronological (tree-ring dating) analysis, producing an estimated felling date range of AD 1334-1363 (see further below). Subsequent examination of the section around timber (6) revealed four further timbers in a structural arrangement with it (see Fig. 4). There was one further east-west timber (D) and three north-south timbers, A, B and C, the whole forming a lattice arrangement of north-south and east-west aligned timbers, in which a minimum of four layers was apparent. Most of the timbers were squared, typically c 0.2 m x 0.25 m in section, and were simply laid over one another. Timber D, however, was plank-like and lay within a trench cut in the underside of the overlapping north-south timber (B). The joint was then packed tight with a wedge-shaped piece of wood. The observed height of the timber structure was at least 0.55 m. The spaces between the timbers were packed with a sticky grey clay, probably reworked Oxford Clay, and with irregular pieces of limestone.

Timber 7 was located 0.9 m south of and appeared to be of similar dimensions to (6), although it had splintered very badly and all dimensions are approximate. After hand cleaning the socket from which 7 protruded measured c 0.3 m x 0.3 m. The original length of the timber is unknown.

Four further broken timbers (8, 9, 19 and 20) were evenly spaced approximately 0.9 m apart along the visible base of the section and just above the level of the concrete sub-base. The southernmost visible timber, 28, was the only intact one. Only the upper surface and eastern end were visible as it was flush with the upper level of the new concrete base for the main channel, being at a slightly lower level than the broken timbers to the north. Timber 28 was c 0.3 m x 0.3 m in section and extended two metres from the west edge of the excavation. The exposed surface of the timber were smooth, with no evidence of sockets or jointing. It was possible to remove the east end of this timber for dendrochronological analysis, in the same way as timber 6 and it produced an estimated felling date range of AD 1296-1307.

All these timbers were overlain by layer 5, a mixed deposit of black silty, gravelly loose clay, very charred. This deposit, perhaps comparable with layer 13 in the north section, probably represented a destruction layer associated with the structure. As such it was sampled as extensively as was possible for environmental analysis; but it also contained a small but important finds assemblage. This included a copper alloy pendant and a pin, both found immediately adjacent to timber 28, fragments of iron (particularly nails) and lead, pottery, tile and stone roofing material, some of which material was burnt.

Layer 5 was sealed by 4, a very mixed deposit of sand, gravel, brick and stone. All of the brick appeared to be modern and probably derived from the 1930 works to the weir. Overlying deposits, 3, 2 and 1, were all of recent date. The first of these was a loose grey/brown silty clay loam containing 50-70% brick, tile, stone and glass, which comprised the great majority of the western section.

South Section

The earliest deposit seen here was the Oxford Clay, (32). Much of the section had been obscured by the newly-laid concrete; but it was possible to see that timber (28) (above) appeared to be seated on bedding material formed from large unworked limestone pieces and clean grey clay (37). This material also filled a possible shallow sloping cut immediately to the east of the end of timber 28, although it is more likely that this simply represented the natural topography of this part of the site; both the break of slope and the slope itself being extremely gradual.

As in the west section, timber 28 was sealed by destruction layer 5, in turn sealed by (43), a deposit of clean grey clay and very large rough, unworked limestone blocks, similar to (37); which produced no finds. Directly above layer 43 was 44, the mixed hard-core and concrete bedding for the granite sett floor of the 1930 weir (45), identical to 10 in the north section.

5.2. The Island (Figs. 2 and 3)

The features and deposits revealed by the removal of the east wall of the main channel really relate to the sequence of activity on the island to the east of the structure just described. Furthermore, a combination of the natural contour of the terrace gravel to the east and the degree of destruction of deposits caused by the construction of the 1930 channel meant that there was no stratigraphic connection, apart from the natural gravel, between the sequences revealed in the channel and in its exposed east face. The description of the latter precedes that of later features exposed on the surface of the island.

Main Channel East Section

The earliest deposit seen here was the Oxford Clay (32) sealed by terrace gravel (31) as described above. The latter was a great deal thicker towards its northern end than to the south, where it was overlain by (36), a layer of black gravelly silt very similar to (5), (8) and (25) and interpreted as a demolition/destruction layer. Protruding from the section, and perhaps lying partly within this material, was timber (35); a large rectangular plank set on edge, the top edge of which lay at c 54.6 m OD. A sample was taken from its projecting end for dendrochronological analysis. Timber (35) was abutted to the north by 39, 41 and 42. Layer 39 was a water-laid dark orange gravel; sealed by 42, a deposit of mixed clay silts and gravels with a series of flat pieces of stone c.0.10 by 0.07 m in diameter at its upper horizon. The horizontal spacing of the stones was suggestive of some form of surface. The stones were overlain by 41, a layer of assorted pieces of wood typically 0.07m thick. This appeared to be a water-laid deposit of individual small pieces of unworked wood, rather than a structural feature. Both layer 41 and timber 35 were sealed by 40, a very mixed, mottled olive brown/grey silty sand with 20% fine-medium subrounded gravels which also sealed 34, a lens of very loose pink brown/grey medium subrounded sand, with 5% fine-medium subangular gravels. Interleaved with 34 and 40 was a tenacious black clay layer (25). This was initially seen at the north-east corner of the excavation resulting from the removal of the east wall of the main channel and continued into the east section. The interpretation of this deposit is uncertain, but it was widespread and in the north-east corner of the area was in close association with (surrounding) a number of structural timbers (24, 29, 30 and 33).

Features 24 and 29 were the only vertical timbers seen anywhere on the site; 24 comprised a cluster of three stakes wedged behind a flat piece of limestone, while 29 was a single stake wedged behind a small plank (30), lying on edge and disappearing into the north section. Stake 29 was removed and retained after recording. Just west of 29 and 30 was a large rectangular timber (33), disturbed by the machine bucket but clearly lying within layer 25, although only a very thin band of this material separated it from the natural gravel. Timber 33 was not seen to be directly associated with any of the other timbers, despite its proximity to 29 and 30. It also was retained for dendrochronological analysis after recording.

Layer 25 was sealed by 23, a very mixed orange/brown silty clay loam with occasional small pieces of unworked limestone, which appeared to be filling a hollow containing some loose packing stones immediately adjacent to stakes 24 in the north section. Above 23 was a very mixed mid brown silty clay loam with some small

unworked limestone pieces (22). No finds were retrieved from this material, but it is very similar to the post-medieval/modern layer 3 as seen in the western section. Layer 22 was sealed by 21, a loose, rubbly modern deposit which extended all along the east section. The east wall of the channel itself was numbered 27. This was constructed of large squared stone blocks with a substantial backing of concrete, the poorly defined construction cut behind the wall being packed with brick and rubble infill (26) comparable to layer 21.

The upper surface of the island was cleared in connection with the works. This area was cleaned and planned. Traces of a north-south aligned structure roughly 6.5 m by at least 3 m were revealed, the principal elements being a brick east wall, which appeared to return to the east at its south end, and a poorly-preserved north wall of stone. There was no trace of a west wall, which had presumably been removed by the reconstruction of the channel in 1930. Slight traces of an east-west alignment of small stone fragments may have been part of another wall line, and a short north-south stretch of bricks was probably an internal feature. No certain floor surfaces were associated with these features. South of these features this level was disturbed by machine excavation and a pile of spoil adjacent to the edge of the disturbance. This material was subsequently levelled and no further examination of the area took place.

5.3. The Channel Walls (For location see Fig. 2a)

The channel walls were the subject of photographic recording supplemented with explanatory sketches. The walls of the east channel were partly rebuilt using existing material and the purpose of the record was to document the condition and nature of these walls before this work. In the main channel the existing walls and channel base were completely removed, the photographs therefore provide a record of the 1930 structure. The details of this work are contained in the project archive.

6. Environmental results

Assessment of preservation in deposit 5, by Greg Campbell

In order to assess the potential of this deposit, ten litres of 5, a possible destruction deposit, had their charred and waterlogged remains extracted by bucket flotation onto 0.5 mm mesh. A subsample of 1 kg was retained for further detailed work, such as pollen and soil chemistry. The flot was large, and clearly contained waterlogged plant tissue. Both the subsample and the flot are in storage at the OAU. The mineral residue from the flotation was sieved through 10, 4 and 2 mm sieves. The coarsest portion (<10 mm) and the fine gravel portion (10-4 mm) were fully sorted. The coarse portion contained about ten potsherds, for which a 16th century date was suggested. It also contained a fragmented tobacco pipe-bowl, which could be a recent intrusion, and several metal objects (large-headed nails in the main, but including one lead bar fragment). There were about a dozen identifiable marine shells, and about fifteen bones of large animals. Wood artefacts were confined to a single worked plank-like object, possibly a paddle. About ten other pieces of wood were recovered.

The fine gravel contained about a half dozen small fragments of large animal long-bones (which were not retained) and two copper alloy pins, but no ceramic objects.

The coarse sand portion (4-2 mm) was scanned for very small artefacts and for the bones of small animals and fish, but these were not observed and the residue was discarded without sorting.

The deposit clearly has some potential, and merits specialist assessment of its waterlogged plant remains (both in their own right and as a guide for pollen analysis). The present sample is too small to have retrieved fully interpretable assemblages of its artefacts (an acute problem, since it is necessary to resolve whether the pipe-bowl is intrusive into a late medieval deposit). It is also too small to have retrieved interpretable assemblages of its bone and marine shell.

7. The Finds

7.1. Timbers: Tree-ring dating, by Daniel W H Miles

Summary

Four waterlogged timbers were sampled from the site of a medieval mill adjacent to St George's Tower, Oxford Castle. Two of these were dated, OXCAML 6 spanning the years AD 1241-1333 and giving an estimated felling date range of 1334-1363, and OXCAML 28 spanning the years AD 1107-1296 and producing an estimated felling date range of AD 1296-1307.

Introduction and Objectives

Rescue excavation of timbers uncovered on the site of a medieval mill adjacent to St George's Tower, Oxford Castle was undertaken by the Oxford Archaeological Unit during 1997. The timbers apparently formed a base for some sort of structure within the mill stream. Four timbers with dendrochronological potential were lifted and were subjected to analysis to enable a date to be ascribed to the structure.

Methodology

All the samples were of oak (*Quercus* spp.) taken from salvaged waterlogged structural timbers. Slices 25 mm thick were cut from the timbers and were frozen. After 24 hours the surface of the slices were pared with a sharp chisel to allow two or three radii to be measured. On sample **OXC28** the sapwood was re-frozen after measuring and the surface cleaned again to enable four further radii to be taken of the sapwood.

Once the ring boundaries could be clearly distinguished, all samples were then measured under a x10/x30 microscope using a travelling stage electronically displaying displacement to a precision of 0.01 mm. After measurement, the ring-width series for each sample was plotted as a graph of width against year on log-linear graph paper. The graphs of each of the samples in the phase under study were then compared visually at the positions indicated by the computer matching and, when found satisfactory and consistent, were averaged to form a mean curve for the site or phase. This mean curve and any unmatched individual sequences were then compared against dated reference chronologies to obtain an absolute date for each sequence.

Here this was accomplished by using a combination of both visual matching and a process of qualified statistical comparison by computer. The samples were first matched by computer, and then independently visually checked with graphs. The ring-width series were compared on an IBM compatible 486SX computer for statistical cross-matching using a variant of the Belfast CROS programme (Baillie and Pilcher 1973). A version of this and other programmes were written in BASIC by D Haddon-Reece, and latterly re-written in Microsoft Visual Basic by M R Allwright and P A Parker.

Once a tree-ring sequence has been firmly dated in time, a felling date, or date range, is ascribed where possible. With samples which have sapwood complete to the underside of, or including bark, this process is relatively straightforward. Depending on the completeness of the final ring, i.e. if it has only the spring vessels or early wood formed, or the latewood or summer growth, a *precise felling date and season* can be given. If the sapwood is partially missing, or if only a heartwood/sapwood transition boundary survives, then an *estimated felling date range* can be given for each sample. The number of sapwood rings can be estimated by using a statistically derived sapwood estimate with a given confidence limit. An accepted sapwood estimate for British and Irish oaks is given as between 10 and 55 rings with a 95% confidence range (Hillam *et al* 1987). A recent review of the geographical distribution of dated sapwood data from historic buildings timbers has shown that a 95% range of 9-41 rings is more appropriate for the southern counties (Miles 1997a) and this sapwood estimate has been used throughout this report.

Results

The four samples obtained from the excavations were designated *OXC6*, *OXC28* etc. The sample locations are indicated on the site plan. Details of each sample, including locations, date ranges, sapwood, number of rings and other characteristics are summarised in Table 1.

Two radii from timber OXCAML 6 were compared and found to match each other with the *t*-value of 6.66. These were combined to form the mean *OXC6* of 93 rings. This was compared with the reference chronologies and was found to match with the first ring of the sequence at AD 1241 and the final ring at AD 1333 (Table 2). Although some sapwood survived on the sample, it was clearly not complete. Given that the average last heartwood ring date was AD 1322, this would give a felling date range of AD 1334-1363 for this timber.

The seven radii from timber OXCAML 28 were compared and found to match each other with the *t*-values shown in Table 3. These were combined to form the mean *OXC28* of 190 rings. This was compared with the reference chronologies and was found to match with the first ring of the sequence at AD 1107, and the final ring at AD 1296 (Table 4). This did not, however, match sample *OXC6*, only producing a *t*-value of 2.41. Although a substantial amount of sapwood survived on the sample, it was not possible to say with certainty that this was complete. Given that the average last heartwood ring date was AD 1206, this would give a reduced felling date range of AD 1296-1307 for this timber.

Two radii from timber OXCAML 33 were found to match together with a t -value of 7.99 and were combined to form the mean **OXC33** of 68 rings. Similarly, three radii from timber OXCAML 35 were found to match with t -values of 6.17, 6.68 and 7.43, and were combined to form the mean **OXC35** of 132 rings. Neither of the timbers matched any of the reference chronologies, nor did they match each other or either of the two dated samples.

Conclusions

Two out of four timbers were dated from this site, although none of the samples matches any of the others, suggesting both different sources and possibly different periods. Timber OXCAML 28 produced a felling date range of AD 1296-1307, whilst timber OXCAML 6 produced a felling date range of AD 1334-1363. Although both timbers appeared to be from the same structure, clearly they are not coeval, implying that either OXCAML 28 is a re-used timber, or that OXCAML 6 is a repair or alteration. Without further samples this fundamental question of interpretation is impossible to reconcile on the basis of the dendrochronology alone.

Acknowledgements

Mr Michael Worthington undertook the laboratory work and sample preparation. Acknowledgements are also given to the Ancient Monuments Laboratory of English Heritage, and to the Sheffield Dendrochronology Laboratory, for both published and unpublished data.

Table 1: Summary of tree-ring dating

Sample number	type	Timber and position	Dates AD spanning	H/S bdry	Sapwood	No. of rings	Mean width mm	Std devn mm	Mean sens mm	Date ranges
OXC6a	s	Timber OXCAML 6	1241-1333	1322	11	93	2.48	1.23	0.235	
6b	s	ditto	1242-1323	1323	h/s	82	2.17	0.98	0.211	
OXC6		Mean of <i>OXC6a + b</i>	<i>1241-1333</i>	<i>1322</i>	<i>11</i>	<i>93</i>	<i>2.28</i>	<i>1.05</i>	<i>0.215</i>	<i>1333-1363</i>
OXC28ai	s	Timber OXCAML 28	1107-1206			100	0.91	0.47	0.239	
28aii	s	ditto	1211-1265	1263	2	55	0.84	0.27	0.232	
28b	s	ditto	1107-1263	1263	h/s	157	0.86	0.39	0.233	
28c	s	ditto	1124-1261	1261	h/s	138	0.85	0.32	0.235	
28d	s	ditto	1239-1287	1266	21	49	0.88	0.33	0.211	
28e	s	ditto	1251-1288	1266	22	38	0.77	0.25	0.226	
28f	s	ditto	1266-1296	1267	29	31	0.61	0.18	0.287	
28g	s	ditto	1257-1294	1273	21	38	0.68	0.23	0.258	
OXC28		Mean of <i>OXC28ai+aii+b+c+d+e+f+g</i>	<i>1107-1296</i>	<i>1266</i>	<i>30</i>	<i>190</i>	<i>0.85</i>	<i>0.38</i>	<i>0.209</i>	<i>1296-1307</i>
OXC33a	s	Timber OXCAML 33	1-68		1	68	1.62	0.87	0.313	
33b	s	ditto	3-66		h/s	64	1.63	0.75	0.305	
OXC33		Mean of <i>OXC33a + b</i>	<i>1-68</i>			<i>68</i>	<i>1.63</i>	<i>0.76</i>	<i>0.281</i>	
OXC35a	s	Timber OXCAML 35	8-132			132	0.95	0.43	0.218	
35b	s	ditto	1-66			66	1.56	0.63	0.235	
35c	s	ditto	11-95			85	1.52	0.62	0.220	
OXC35		Mean of <i>OXC35a + b + c</i>	<i>1-132</i>			<i>140</i>	<i>1.17</i>	<i>0.60</i>	<i>0.212</i>	

Key: type s = slice; H/S bdry = heartwood/sapwood boundary - last heartwood ring date; Std devn = standard deviation; Mean sens = mean sensitivity

Table 2: Dating of *OXC6* against reference chronologies at AD 1333

Reference chronology	Spanning	Overlap	<i>t</i> -value
HANTS97 (<i>Miles 1997b</i>)	1041-1972	89	7.63
SOUTH (<i>Hillam and Groves 1994</i>)	404-1594	89	7.51
READING (<i>Groves et al forthcoming</i>)	1160-1407	89	7.44
WINDSOR (<i>Miles and Haddon-Reece forthcoming</i>)	1231-1354	89	6.31
SENGLAND (<i>Bridge 1988</i>)	1083-1589	89	5.93
OXON93 (<i>Haddon-Reece et al 1993</i>)	632-1987	89	5.58
EASTMID (<i>Laxton and Litton 1988</i>)	882-1981	89	5.56

Table 3: *t*-values and overlaps for components of *OXC28*

Sample dated at	<i>OXC28c</i>	<i>OXC28d</i>	<i>OXC28e</i>	<i>OXC28f</i>	<i>OXC28g</i>	<i>OXC28ai</i>	<i>OXC28aii</i>
	1261	1287	1288	1296	1294	1206	1265
<i>OXC28b</i>	<u>9.18</u> 138	<u>3.30</u> 25	<u>5.82</u> 13	<u>0.00</u> 0	<u>0.26</u> 7	<u>12.39</u> 100	<u>12.72</u> 53
<i>OXC28c</i>		<u>1.76</u> 23	<u>1.66</u> 11	<u>0.00</u> 0	<u>0.00</u> 5	<u>8.01</u> 83	<u>5.25</u> 51
<i>OXC28d</i>			<u>7.94</u> 37	<u>3.68</u> 22	<u>4.26</u> 31	<u>0.00</u> 0	<u>3.10</u> 27
<i>OXC28e</i>				<u>5.18</u> 23	<u>3.79</u> 32	<u>0.00</u> 0	<u>3.00</u> 15
<i>OXC28f</i>					<u>3.38</u> 29	<u>0.00</u> 0	<u>0.00</u> 0
<i>OXC28g</i>						<u>0.00</u> 0	<u>0.49</u> 9

Table 4: Dating of *OXC28* against reference chronologies at AD 1296

Reference chronology	Spanning	Overlap	<i>t</i> -value
REF75 (<i>Fletcher 1977</i>)	845-1298	186	7.11
MASTERAL (<i>Haddon Reece and Miles 1993</i>)	404-1987	186	6.95
ASTON (<i>Miles unpublished</i>)	1132-1285	150	6.86
SENGLAND (<i>Bridge 1988</i>)	1083-1589	186	6.67
OXON93 (<i>Haddon-Reece et al 1993</i>)	632-1987	186	6.47
COXWELL (<i>Siebenlist-Kerner et al 1978</i>)	1043-1267	157	6.19
HANTS97 (<i>Miles 1997b</i>)	1041-1972	186	5.86
SOUTH (<i>Hillam and Groves 1994</i>)	406-1594	186	5.01

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7.2. Pottery by P Blinkhorn

The pottery assemblage retrieved from the site comprised 56 sherds with a total weight of 933 g. The pottery occurrence per context by sherd number and weight per fabric type is shown in Table 5. A single sherd of Romano-British pottery occurred, as did two sherds of late/post-medieval red earthenwares. Otherwise the material was medieval in date, and mainly 13th century although fragments of a “drinking jug”, possibly of 15th century date, occurred in context 5. There was no redeposited Saxo-Norman or earlier material from the site, apart from the Romano-British sherd.

The range of fabrics and forms appear typical of the pottery of the period from Oxford, and have been classified using the fabric codes of the Oxford type-series (Mellor 1994).

Table 5: Pottery occurrence per context by sherd number and weight (in g) per fabric type. TPQ = *terminus post quem* (earliest date) for context group

Context	Roman	OXAQ	Medieval Sandy Wares	OXY	OXAM	Red Earthenwares	TPQ
3						2 (50)	15thC+
5	1 (2)		15 (175)	1 (9)	7 (236)*		15thC+?
37		3 (71)	15 (118)	5 (99)	5 (149)		13thC?
38				1 (15)	1 (9)		13thC?
Total	1 (2)	3 (71)	30 (293)	7 (123)	13 (394)	2 (50)	

* late jug form.

7.3. Other Finds

Finds other than ceramic material are tabulated by context

Context	Type/Material	Number
2	Modern coin (Cu alloy)	1
	Strip/bar (Fe)	2
	Nail (Fe)	2
	Glass	57
3	Glass	1
5	Pin (Cu alloy)	3
	Mount/fitting (Cu alloy)	1
	Uncertain object (Pb)	1
	Sheet (Fe)	1
	Strip/bar (Fe)	6
	Strip with nails (Fe)	2
	Nails (Fe)	45
	Leather	2
	Wood (unworked)	3
	37	Leather
Wood (unworked)		3

8. Discussion.

8.1. Earliest Deposits

The site produced useful evidence for the profile of the edge of the gravel terrace above the Oxford Clay. This is entirely consistent with the evidence from Tidmarsh Lane just to the north, which showed the gravel sloping steadily down from east to west. At the Castle Mill the very edge of the gravel was revealed and as exposed probably broadly reflected the 'natural' appearance of the edge of the terrace before the medieval period. The profile of gravel and Oxford Clay could have been modified by the stream channel and possibly by human agency, but there is no evidence for the latter.

8.2. Medieval Structure

The structural evidence recovered in the main channel excavations is of great interest and importance, and it is particularly regrettable that it was not possible to record this properly. The evidence suggests a substantial platform, formed of a lattice of baulks of oak, the interstices of which were packed with rubble and reworked natural clay. The slightly different evidence from the north section of the main sluice excavations, in which the natural gravel appears to have extended to the western edge of the section, may indicate that the main platform structure did not extend further north than here. Logically, therefore, the north-east corner of the platform should have been located just south of this section. The function of the narrow stone filled cut 14 at this point is unknown, but may have been related to the corner of the platform, though it is not demonstrably contemporary. The platform seems to have been intended to fill the base of the stream channel and the likely contour of this channel, deepening to the west, was probably reflected by the likely existence of more 'layers' of horizontal timbers in the western part of the platform than at its eastern edge.

The function of the platform remains uncertain. It was clearly substantial enough to have supported a major structure, though it is reasonably clear from the limited surviving evidence, particularly of timber 28, that no such structure could have been jointed onto the eastern edge of the platform. It is possible, however, that the north-south cut 14 supported an upright structural feature. The presence of a north-south timber (18) above 14 might argue against this, but only if it could be demonstrated that this timber was an integral part of the platform. This is far from certain, however.

Two timbers from the platform were dated by dendrochronology, but were not closely comparable in date. The later timber had an estimated felling range of 1334-1363. It seems unlikely that this timber represented as repair to the structure, so it is more probable that the earlier timber was reused when the structure was built, and that this took place at about the middle of the 14th century, though it could have been later if all the timbers used in the platform were reused. The destruction layer (5) above the platform is dated by artefactual evidence to the late medieval period, probably the 15th century, but possibly a little later. A clay pipe fragment from this deposit was almost certainly intrusive. The structure, though not as precisely dated as could be wished, is thus nevertheless firmly placed in the late medieval period. That the platform represents some part of the late medieval Castle Mill seems almost certain, and it is quite possible, but not demonstrable, that the platform supported part of the

mill building itself. The destruction deposit clearly derived from a building with a domestic component, though this need not have been sited directly above the part of the platform where it was observed. The location of the mill race and any other channels in relation to the mill structure is uncertain, but prior to the excavation of the new cut adjacent to St George's Tower, in the early 17th century, the principal mill buildings must have been sited on the west bank of the stream. The suggestion that the platform was deepening to the west, i.e. that the west bank of the stream may have lain some distance to the west of the present site, might indicate that the eastern part of platform did not itself carry the mill structure, but that this lay west of the area examined.

8.3. Other ?medieval and later features

The reconstruction of the main sluice in the 1930s removed all stratigraphic relationships between the platform structure and deposits on the east side of the main channel, on what became the island after the cutting of the channel adjacent to St George's Tower at about the end of the 16th century. A small cluster of upright timbers located in the extreme north-east corner of the recent main channel excavation was not closely datable, but presumably formed part of a revetment of the eastern side of the channel. Something slightly more complex may have been represented in the south-east corner of the excavation, where a substantial edge-set plank (35) was encountered. This appears to have been placed in a cut made in the natural gravel and perhaps overlay a deposit which was analogous with the destruction layer above the platform. Once the timber was in place part of the cut filled with water-laid sands and silts. The function of the timber, at a slight angle to the north-south orientation of the main platform structure, is unknown, but if it had been another form of revetment it might have been expected that it would have been held in place by one or more verticals. It is just possible that a vertical timber at the north end of this plank such could have been removed by the 1930s work, but this is speculative. No dating evidence was recovered from the east section of the excavation, so none of these structural phases can be firmly placed in relation to the main platform structure, but if layer 36 beneath timber 35 was the same as the destruction deposit over the platform, a late medieval or later date would be implied for this feature. Curiously, it was not possible to find a match for the tree-ring sequence of this timber.

On the top of the island, poorly-preserved fragments of the 19th century mill structure were encountered. The north wall of this building was of roughly shaped limestone blocks, and part of the east wall, of brick, was also seen. Further patches of brickwork might have represented fragmentary remains of floors, or possibly supports for internal partitions or other features. A fill layer above these features (2) produced a moderate quantity of post-medieval and modern finds, including a number of glass bottle fragments.

Examination of the walls of both main and side channels prior to reconstruction showed that the main channel had been completely rebuilt in the 1930s, but that the side channel walls were probably rather earlier, although undated. These had been subject to a number of phases of repair and reworking, some involving materials such as blue brick, and therefore of 19th century date at the earliest.

8.4. Preservation

The recent works impacted on the archaeology of the Castle Mill in a number of ways, outlined above. Despite this, however, it is likely that significant archaeological deposits survive *in situ* in the vicinity of the reconstructed weir. Three main areas of potential survival may be noted. Firstly, the location of timbers beneath the base of the main 1930 channel supports the view that some of the features observed when that work was carried out could still survive, perhaps in the base of the channel immediately north of the weir. Secondly, it is clear that part of the major timber platform located in the watching brief survives in the west bank of the present stream behind the new west wall of the weir. Thirdly, archaeological deposits were identified on the island between the two channels. Here only the later deposits at the top of the sequence on the surface of the island were disturbed, along with some earlier, potentially late medieval or early post-medieval deposits along its western edge. The presence of the latter suggests that comparable deposits probably remain *in situ* immediately to the east, beneath the poorly-preserved later brick and stone structure.

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OAU 1994 *Boreham's Yard, Tidmarsh Lane, Oxford: Archaeological Evaluation*, unpublished client report

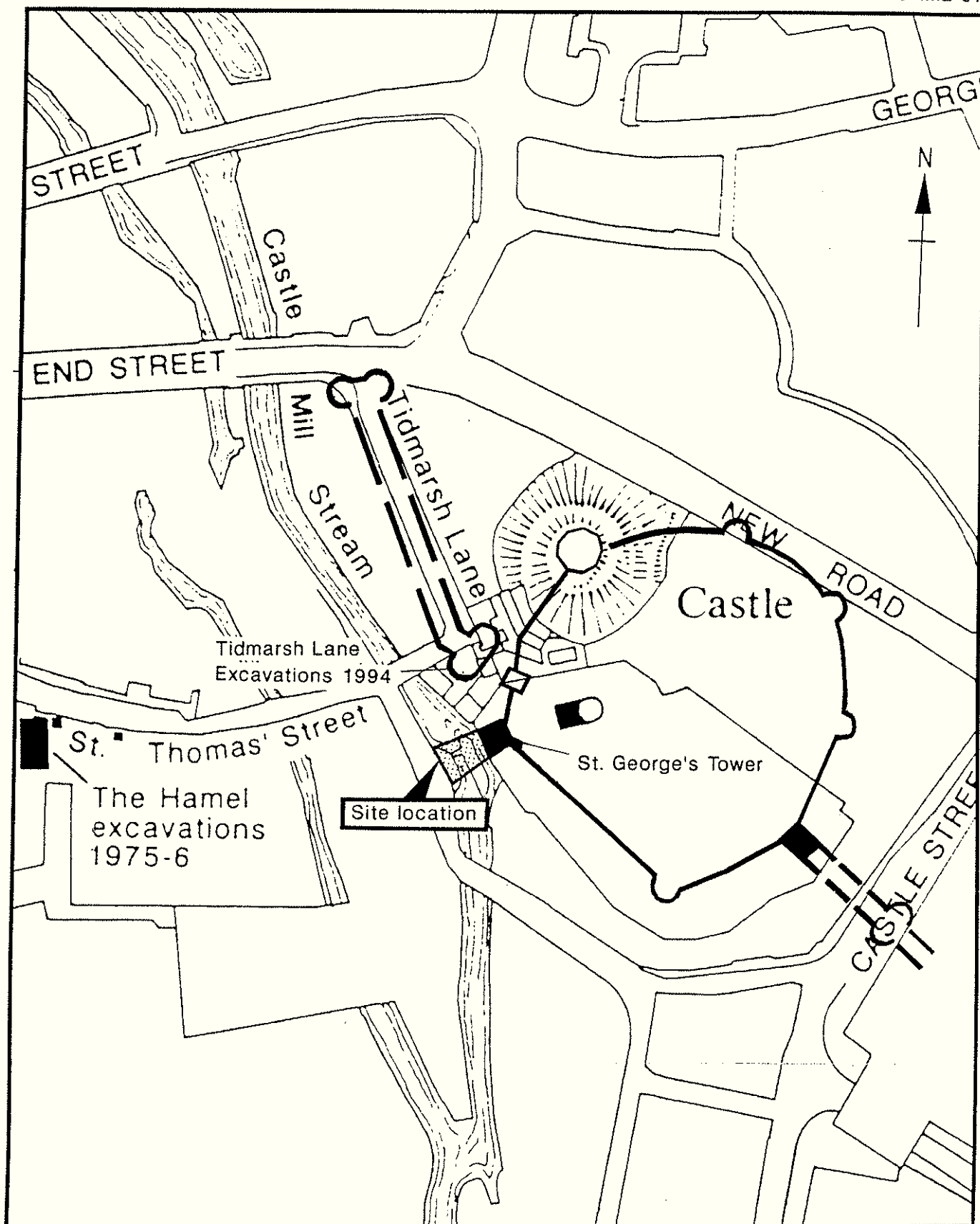
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Appendix 1: Table of Contexts

Context	Type	Date
1	Topsoil	Modern
2	Subsoil	Modern
3	Layer	C18
4	Layer	C18
5	Charred demolition layer	LMed
6	Timber	LMed
7	Timber	LMed
8	Timber	LMed
9	Timber	LMed
10	Granite Setts	PM
11	Layer	PM
12	Layer	?LMed
13	Layer	?LMed
14	Cut	?LMed
15	Fill	?LMed
16	Gravel	?Nat
17	Gravel	Nat.
18	Timber	LMed
19	Timber	LMed
20	Timber	LMed
21	Layer	PM
22	Layer	PM
23	Layer	?PM
24	Timbers	?LMed
25	Layer	?LMed
26	Wall	PM
27	Rubble	PM
28	Timber	LMed
29	Stake	LMed
30	Plank	LMed
31	Gravel	Nat.
32	Oxford clay	Nat.
33	Timber	LMed
34	Layer	PM
35	Plank	?LMed
36	Layer	?LMed
37	Layer/Fill	LMed
38	Patchy layer	PM
39	Gravel	?LMed
40	Layer	?LMed
41	Wood	?/PM
42	Layer	?PM
43	Layer	LMed
44	Layer	PM
45	Granite Setts	PM

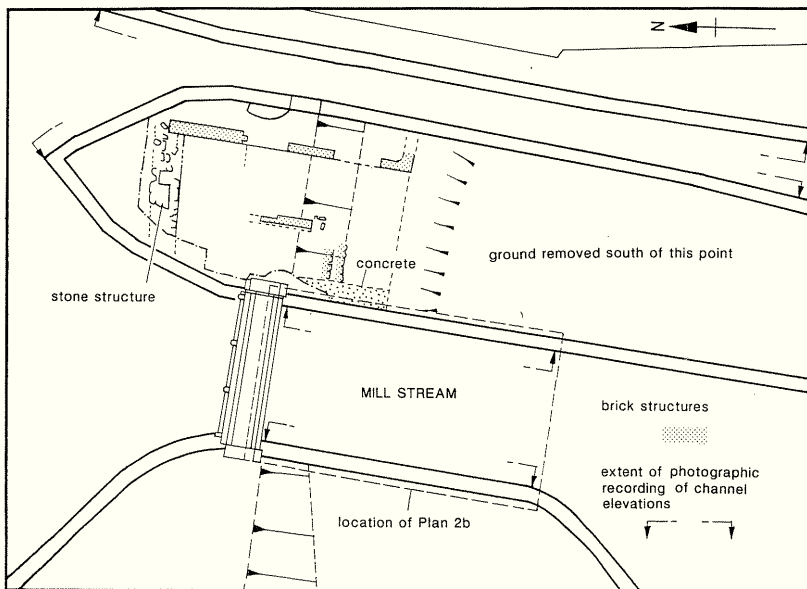
LMed = Late Medieval; Nat = Natural deposit; PM = Post-Medieval



scale 1:2000

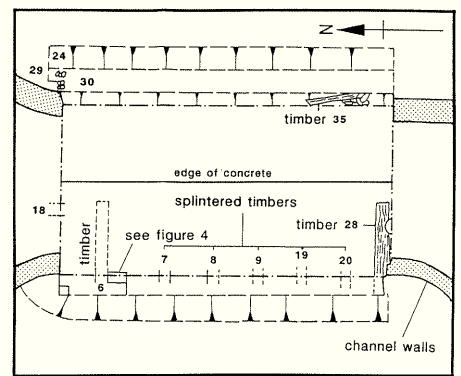
Site location map

Figure 1



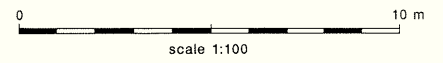
Plan 2a

scale 1:100



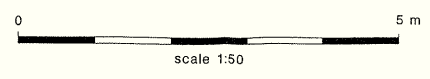
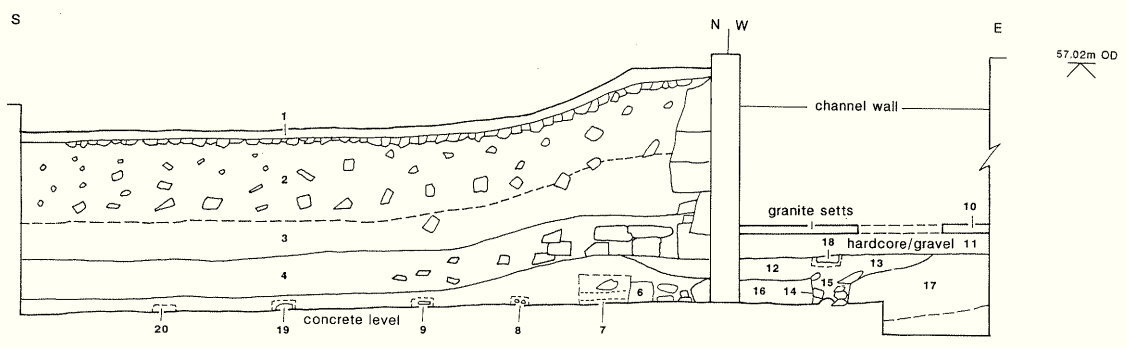
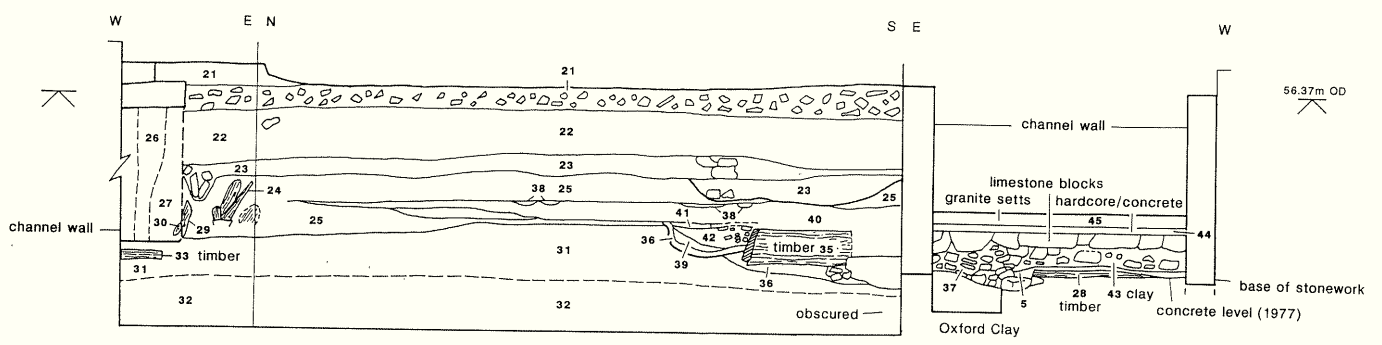
Plan 2b

scale 1:100



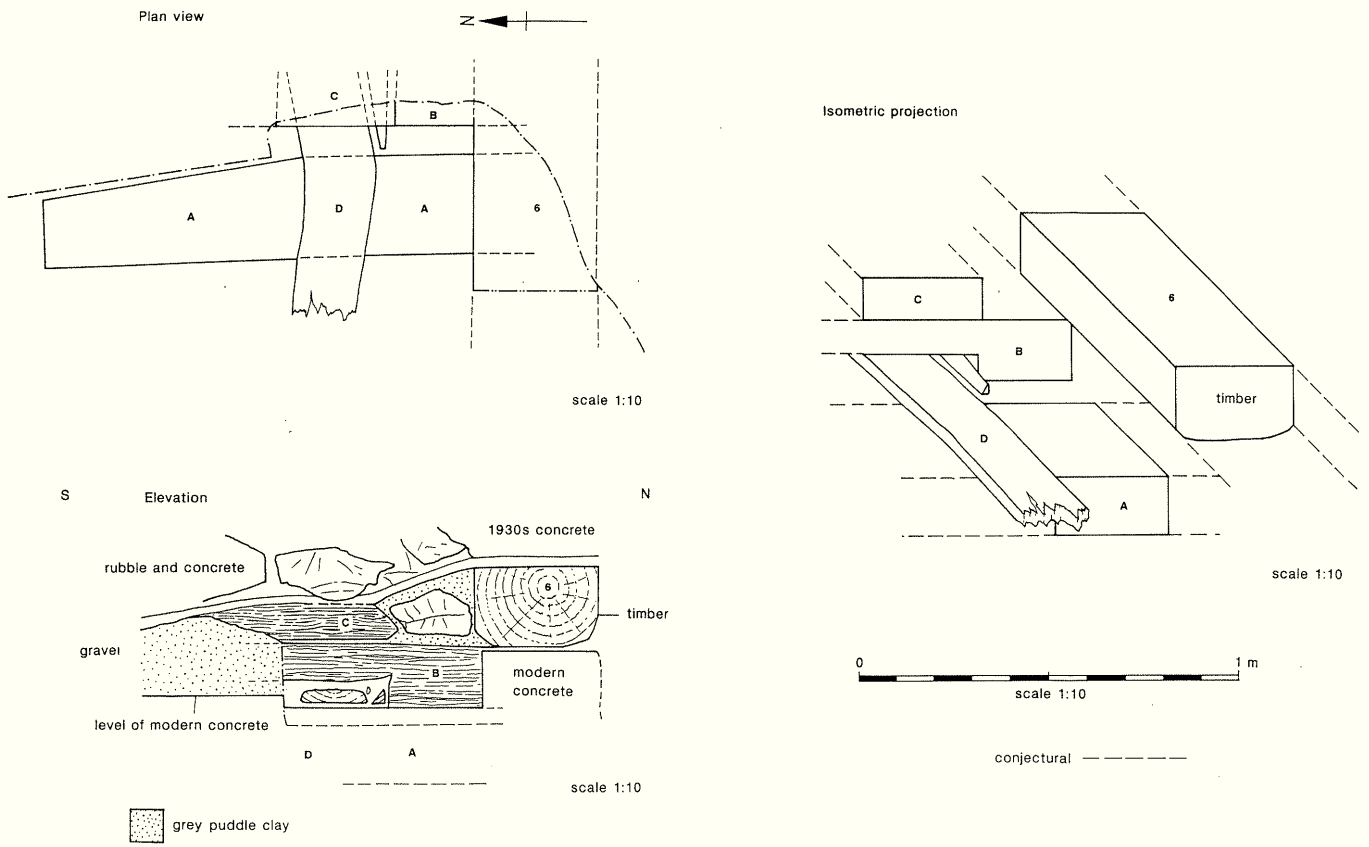
Site plan

Figure 2



Sections

Figure 3



Structure south of former sluice gate

Figure 4



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