Cambridge Rowing Lake
Milton
Landbeach and
Waterbeach
Cambridgeshire

Archaeological Investigation Report

Oxford Archaeology

March 2003

Client: Cambridge Rowing Trust

Issue No: 1
OA Job No: 2004
NGR: TL 490 635

Cambridge Rowing Trust

Cambridge Rowing Lake
Milton, Landbeach and Waterbeach
Cambridgeshire

STAGE 1 ARCHAEOLOGICAL MITIGATION

CONTENTS

LIST OF FIGURES

SUMMARY

During September and early October 2003 Oxford Archaeology carried out Stage 1 Mitigation at the southern end of the proposed international standard rowing course sited on land north of Cambridge. The work comprised twenty one trenches excavated in the floodplain of the River Cam, examining the line of the proposed Canal (from the River Cam to the Rowing Lake) and the Cut (forming the access channel to the main rowing course). In addition to the standard archaeological recording processes, detailed geo-archaeological recording of the alluvial sequence in each trench was carried out.

A pit and a posthole, both containing pottery dated to the Bronze Age were discovered in Trench 18, on what would appear to be a raised gravel island toward the north end of the area under investigation. At the southern end, a middle Iron Age pit and two pits of Roman date were recorded in Trench 3, at the edge of the first gravel terrace, while Roman activity on the floodplain itself was represented by a small number of linear ditches. These features were probably created by communities living on the edge of the terrace, in order to drain the area for use as pasture, and to define trackways providing access to the river itself.

Preliminary assessment of the palaeo-environmental indicators has indicated that the northern half of the area may have existed as a back-swamp, while the southern half was damp grassland or meadow. During or shortly after the Roman period fen conditions developed, resulting in the formation of a layer of peat across the entire area. There was no evidence for subsequent human occupation until the post-medieval period, when a series of boundary ditches were established near the river, along with some small-scale gravel quarrying.

1. INTRODUCTION

1.1.1. The Cambridge Rowing Trust proposes to construct an international competition standard rowing course 2000 m long north of Cambridge on land lying in the parishes of Milton, Waterbeach and Landbeach (NGR TL 490635, centred) (Fig. 1). The development area lies adjacent to the River Cam in an area of high archaeological potential, including areas of former floodplain containing alluvial deposits likely to include significant palaeo-environmental evidence. Oxford Archaeology (OA) has proposed a detailed programme of archaeological investigation in advance of the development, presented in the *Research Design for the Archaeological Mitigation of the Cambridge Rowing Lake in the Parishes of Milton, Landbeach and Waterbeach* (OA 2003, hereafter '*Research Design*'). The current report presents the results of an archaeological investigation carried out by OA in September 2003, designated in the Research Design as Stage 1 Mitigation.

1.1.2. The Stage 1 Mitigation consists of a programme of work designed to provide additional information about and characterisation of particular areas of the development area and to inform further refinement of the overall mitigation strategy. In particular, the work examined the line of 'The Canal' and 'The Cut', two components of the southern half of the Rowing Lake.

1.1.3. The Cut is to consist of a linear channel 40 m wide and 1000 m long aligned SSW-NNE, approximately parallel to the course of the River Cam. The excavation of trenches around the channel to accommodate the clay seal to be inserted around all the water features of the Rowing Lake will result in a total impact some 50-55 m wide. The Canal will be constructed in the same way as The Cut but its channel will be only 20 m wide, giving a maximum impact width of 35 m over its length of 180 m. Both channels will be *c* 2 m deep.

1.2. Geology and topography

1.2.1. The site lies to the west of the River Cam, on the first gravel terrace. The topography is generally flat, lying between 3 m and 7 m OD. The geology consists of Gault clay overlain by Pleistocene river gravel, which in places is blanketed by Pleistocene and later alluvial deposits.

1.3. Archaeological background

1.3.1. The archaeological background to the project has been presented in the *Research Design*, from which the following summary is drawn.

1.3.2. Terrace-edge locations have been favoured for settlement in all periods, since they provide easy access to the river and its associated resources while being safe from the danger of flooding. A revue of previous archaeological investigations in the vicinity, combined with desk-based survey of the existing documentary and aerial photographic evidence and the results of a programme of field-walking, test-pitting and evaluation trenching carried out in 1995 by Cambridge County Council Archaeological Field Unit (Robinson and Guttmann 1996) has identified a number of areas of occupation within the development area, dating primarily from the Iron Age to Anglo-Saxon periods. This settlement predominantly extends in a band along the edge of the second terrace, running NE-SW, obliquely across the northern half of the development area. In the area of The Cut only a low level of activity was identified, comprising a small number of prehistoric struck flint and ditches of probable Roman date, some of which appeared to define trackways leading from the second terrace toward the river. Trenching in the 1995 evaluation also revealed a sequence of alluvial deposits extending across this area. The area of The Canal was not accessible for investigation during the 1995 evaluation, and had not been examined before the current piece of work.

2. AIMS OF THE INVESTIGATION

2.1. General aims

2.1.1. On the basis of the previous evaluation (Robinson and Guttmann 1996) it appears that past human activity in the area of the area under investigation had been at a low level. It was considered that the main priority for the Stage 1 mitigation should be the refinement of understanding of the alluvial sequence, although the identification of

specific areas of human activity could occur as a side benefit of this investigation. The results of this work would also inform the development of any further mitigation if necessary.

2.2. Detailed aims

2.2.1. To develop a deposit model for the sequence of sediments, including the depth and lateral extent of sediment units, and the character of any basal land surface pre-dating these sediments.

2.2.2. To establish an outline chronology for the sediment sequence, using absolute dating techniques where necessary.

2.2.3. To identify significant variations in the deposit sequence indicative of localised features such as palaeochannels, if present.

2.2.4. To clarify the relationships between fluvial sediment sequences and other deposit types, including periods of 'soil' growth and the effects of relatively recent agricultural processes.

2.2.5. To identify and characterise evidence for human activity through a programme of sampling of appropriate deposits (which may include both land surfaces and channel deposits) for artefactual and other culturally-derived material, and to relate any such activity to the wider deposit sequence.

3. METHODOLOGY

3.1. Scope of fieldwork

3.1.1. The mitigation took the form of nineteen trenches at right angles to the line of The Cut (Fig 2). The trenches were spaced sufficiently closely to permit correlation of sequences between them and to provide a fairly detailed reconstruction of changes in the topography of the area. It was initially proposed to excavate a single continuous trench along the full length of The Canal, but the presence of a large drainage dyke running across this area necessitated the division of this trench into two.

3.2. Fieldwork methods and recording

3.2.1. The overburden in each trench was removed under close archaeological supervision by a 360° mechanical excavator fitted with a toothless bucket. Trenches were excavated to the top of the first significant archaeological horizon. Any features exposed at this level were excavated by hand to determine their extent and nature, and to retrieve finds and environmental samples. Machine excavation then continued in slots within each trench to the surface of the terrace gravel in order to allow the recording and sampling of the full alluvial sequence. Where this involved excavation to depths below 1.2 m from the ground surface, the trenches were stepped to allow safe access to the base of the trench. In addition, hand excavated test pits 1 m square

were dug alongside each trench in order to maximise finds retrieval, particularly for worked flint within the alluvial sequence. Test pits were placed at both ends and the midpoint of each trench.

3.2.2. Each deposit encountered was issued a unique context number. A plan was drawn of each trench at a scale of 1:50, and each excavated feature was recorded in section at 1:20. Colour transparency and black-and-white photographs were taken of each feature, as well as more general shots of each trench. All recording was conducted in accordance with the practices detailed in the OA Fieldwork Manual (OAU 1992).

3.2.3. In addition to this standard archaeological recording system, detailed geoarchaeological recording of the alluvial sequence was also carried out (see figs 13a and 13b). This methodology involved the description of sedimentary units using standard geological terminology by suitably qualified stall under the supervision of a geoarchaeologist. These descriptions were used to correlate stratigraphy between trenches and as the basis for the generation of a deposit model for the site which will be undertaken as a separate phase of work.

3.3. Finds

3.3.1. Finds were recovered by hand during the course of the excavation and generally bagged by context. Finds of special interest were given a unique small find number.

3.4. Palaeo-environmental evidence

3.4.1. Advise on the detailed environmental sampling strategy was given by Dr. Martin Bates of Lampeter University, who monitored its implementation through a series of site visits. It was decided to target seven trenches for detailed sampling. Trench 8 was selected as providing a master sequence for the Pleistocene alluvium and later dry land deposits in the southern part of the site, while Trench 9 provided a profile through these deposits at a point where a quantity of burnt flint had been retrieved from buried surface 904 during machine excavation of the trench. Trenches 13, 15 and 19 were sampled in order to obtain sequences through the alluvial deposits in the northern part of the site, which represent a silted-up lake or mere, while Trench 11 was targeted because of its location at the southern edge of this lake. In Trench 16 samples were targeted on a sand bar in the lake, located mid-way along the trench.

3.4.2. In each of the selected trenches, bulk samples of 10 l were taken at 5 cm increments throughout the stratigraphic sequence. These samples were large enough to allow sub-samples to be extracted for analysis for mollusc, microfossil and waterlogged and charred plant remains while still leaving a sufficient volume to be processed for small vertebrate remains. Monoliths were taken from each of the selected sequences for pollen.

3.4.3. In addition to this, individual bulk samples were taken from a number of archaeological features.

3.5. Presentation of results

3.5.1. In Section 4 (below) the stratigraphic sequence revealed in each trench is described individually, followed by descriptions of the artefactual and environmental evidence. These three strands of evidence are then brought together in an overall discussion and interpretation (Section 5).

4. RESULTS

4.1. Description of deposits

4.1.1. Late Pleistocene sands and gravels were encountered at the base of all the trenches, overlain by a sequence of predominantly Holocene alluvial deposits the thickness of which varied locally according to the varying topography of the gravel. This sequence displayed a considerable degree of consistency from one trench to another. From Trench 11 northwards the sequence comprised a series of grey organic layers and carbonate-rich deposits probably representing a shallow body of water. To the south of this a simpler alluvial sequence including a possible buried surface was observed. At the southern end of the area under investigation, the alluvial sequence was absent from Trenches 2 and 3 which were located at the edge of the gravel terrace and from Trenches 1 and 21, in which the gravel was at a higher level.

Trenches 1 and 21 (Figs 3 and 12)

4.1.2. Trench 1 (Fig. 3) was initially proposed as a single trench extending NW-SE for 180 m to examine a continuous transect across the floodplain at right angles to the River Cam between the river and the Cambridge-Ely railway line, along the line of The Canal. However, the area under investigation was found to be bisected by a large drainage dyke, and so it was necessary to divide the trench into a 88m length on the west side of the dyke, which retained the designation Trench 1, and a 40 m-long trench on the same alignment extending from the east side of the dyke to the river, which was re-numbered as Trench 21.

4.1.3. The natural gravel (105, 2104) was exposed at a depth of 0.3 m for most of the length of these trenches, increasing to 1.2 m toward the west end of Trench 1 as it sloped gently downward and was overlain by a layer of alluvium (104). This alluvial layer was 0.45 m thick, composed of a dark greyish brown silt, and was only present in the western half of the trench. It was cut by two ditches (111, 116) running on a N-S alignment. Ditch 116 was the larger of these, at 4.0 m wide and with a depth of 1.25 m. Its sides sloped at *c* 45° to a flat base. A primary fill 0.3 m thick (115) was overlain by a deposit of peaty clay 0.2 m thick (114) indicating that the ditch had become waterlogged and choked with vegetation. Above this was a thin lens of dark reddish brown soil (113), sealed by the main back-fill (112). This uppermost fill was 0.75 m thick and yielded fragments of post-medieval glass and brick. Ditch 111 ran on a similar alignment to 116, 1.5 m to its west. It was 0.65 m wide and 0.7 m deep with fairly steep sides. Its only fill (110) contained no finds.

4.1.4. At the west end of the trench was a modern drainage ditch (109) aligned E-W, with a return extending at a right angle to the south. An iron pipe lay within the ditch to channel water under the embankment of the Cambridge-Ely railway.

4.1.5. These features were overlain by a layer of buried ploughsoil (103) which had been sealed by the gravel up-cast (102) from the excavation of a drainage dyke immediately to the south of the trench. This in turn was overlain by the current ploughsoil.

4.1.6. Trench 21 (Fig. 12) revealed a number of pits and ditches cut into the natural gravel. The pits (2106, 2108, 2121, 2129, 2134, 2142) were all located toward the west end of the trench. Their dimensions were difficult to establish with any certainty as none lay completely within the trench, but typically they were sub-circular or oval in plan.

4.1.7. A sequence of three intercutting pits (2106, 2121 and 2137) lay at the extreme west end of the trench. The earliest of these was pit 2121, which was at least 1.2 m across and 0.7 m deep with moderately steep sides and a flat base. It was cut by pit 2137, a similar shaped feature 1.6 m in diameter and 0.6 m deep. The west side of pit 2137 was truncated by the latest feature in this sequence, pit 2106. This pit was slightly larger than its predecessors, with a diameter in excess of 1.6 m, and was 0.7 m deep. As with the earlier pits it was fairly steep-sided with a flattish base. Each of these pits contained an initial fill of dark blackish-brown silty clay (2138, 2136 and 2139) between 0.1 and 0.2 m thick derived from either primary silting or trampling during the digging of the pit, overlain by a main fill of brown soil (2120, 2135 and 2105) indicative of deliberate back-filling.

4.1.8. Pit 2108 was located adjacent to pit 2106. Less than half the pit lay within the area exposed by the trench, but it was clearly more than 1.5 m in diameter and 0.65 m deep. It contained a single back-fill (2107) similar to the main fills of the other nearby pits, which yielded pieces of clay pipe indicating a post-medieval date.

4.1.9. To the west of pit 2121 lay pits 2129 and 2142, both of which were at the larger end of the size-range of pits present in the trench. Approximately half of pit 2129 was exposed within the trench. It appeared to be circular in plan, with a diameter of 2.15 m. Its primary fill (2128) was once again a dark clay material, sealed by two layers of back-fill (2126, 2127). Pit 2142 was more oval in plan, measuring more than 1.8 m N-S by 1.5 m wide, but was only 0.4 m deep. The sides of this pit were almost vertical, and the base flat. Its lower fill was again a blackish-brown clay silt (2144) 0.15 m thick overlain by a deliberate back-fill of brown gravelly soil (2143).

4.1.10. Both these pits were cut by ditch 2125, which ran NE-SW across the trench. The ditch was 1.5 m wide and 0.6 m deep, with near-vertical sides and a flat base. Its earliest fill was a layer of greyish brown silty clay 0.1 m thick (2124). The anaerobic nature of this deposit indicates that it was deposited in standing water, suggesting that the ditch had a drainage function. As the ditch silted up it began to dry out, resulting in the

formation of a layer of peaty silt (2123) before it was back-filled with a deposit of orangey brown sandy soil (2122).

4.1.11. The ditch was in turn cut by a later pit (2134). This was marginally the deepest of the pits at 0.75 m, and had particularly steep sides. Its sequence of fills was consistent with the other pits, comprising an initial fill of blackish-brown silt (2133) overlain by two layers of back-fill (2131, 2132).

4.1.12. To the east of these features were four ditches (2110, 2112, 2114, 2119), all of which lay on the same NE-SW alignment as ditch 2125. Ditch 2112 was the least substantial of these features, with a width of 0.7 m and a maximum depth of 0.5 m. It contained a single fill of gravelly material (2111) and was cut by ditch 2110.

4.1.13. Ditches 2110, 2114 and 2119 were very similar features. They were each between 1.75 m and 2.4 m wide, with depths of up to 0.8 m, and contained a consistent sequence of fills. The earliest fill in each ditch was a dark silty clay (2115, 2118, 2130), possibly indicating deposition in standing or slow-moving water, overlain by deliberate back-fills of orangey brown sandy soil (2109, 2113, 2116, 2117). Pieces of clay pipe were retrieved from the back-fills of ditches 2114 and 2119.

4.1.14. These features were sealed by a layer of up-cast (2102) from the digging of a drainage dyke which passed the west end of the trench. Over this lay the modern topsoil (2101).

4.1.15. The ditches recorded in this trench probably represent a series of phases of a single boundary, repeatedly re-defined over time. The relative positions of the features, with the pits toward the west end of the trench, suggests that the digging of the pits was consistently carried out on the west side of this boundary. It is likely that the pits themselves result from gravel quarrying. The sequence of intercutting pits represented by features 2106, 2121 and 2137 indicates that these features resulted from repeated digging in this area rather than from a single episode. It is therefore likely that the quarrying activity they represent was intermittent and small-scale in nature. The finds retrieved from ditches 2114 and 2119 and from pit 2108 indicate that these features date to the post-medieval period.

Trench 2 (Fig. 4)

4.1.16. Trench 2 continued the line of Trenches 1 and 21 on the west side of the railway embankment, and was 30 m long. At its west end the Gault clay (205) which underlies the gravel terrace was exposed. Toward the east end of the trench, the natural gravel (204) was cut by a palaeochannel (208) on a NE-SW alignment. The palaeochannel was 3.8 m wide and 0.7 m deep, with steep sides and a flat base. It contained an initial fill of grey, anaerobic clay silt 0.2 m thick, overlain by a main fill of whitish silt (206) with patches of staining from precipitated manganese and iron oxides.

4.1.17. The surface of the gravel undulated in the west half of the trench, probably due to scouring by flowing water. These undulations were in-filled by an orange mottled silty sand alluvium up to 0.4 m thick (203).

4.1.18. These features and deposits, which are probably Pleistocene in date, were all sealed by a thin layer of grey sandy silt (202) between 50 mm and 0.1 m thick, which contained much gravel, particularly where it directly overlay the natural gravel. This layer was interpreted as being a possible former ground surface.

4.1.19. In the central part of the trench layer 202 was cut by two slightly irregularly shaped features (210, 212) with grey, gravelly silt fills (209, 211), which were interpreted as tree throw holes. The modern ploughsoil (201) overlay these deposits.

Trench 3 (Fig. 5)

4.1.20. This trench was located toward the western edge of the south end of The Cut. The natural gravel (304) was encountered at a depth of 0.4 m at its west end, sloping gently down to 0.8 m at the east end, where it was overlain by a layer of orange clay silt alluvium (303) up to 0.23 m thick. In the central part of the trench the gravel was cut by two pits (307, 312). These features were both roughly circular with bowl-shaped profiles. Pit 307 measured 2.2 m E-W by at least 1.3 m N-S, its south side lying beyond the limits of the trench. It was 0.85 m deep and contained four fills. Its basal fill comprised a dark grey anaerobic silt (311), overlain by a deposit of light grey material (310) which may have been a more oxidised area of essentially the same layer, above which lay a thin sandy lens (309). Overlying this was a final fill of dark brown sandy clay (308). The basal fill yielded a number of fragments of bone, along with a single sherd of Iron Age pottery. The bone came from a number of species, including cattle, sheep/goat, horse and dog, indicating that this may have been a rubbish pit receiving refuse from a number of different sources.

4.1.21. Pit 312 was located 3.5 m west of pit 307. As was the case with pit 307, a substantial proportion of the feature lay beyond the area exposed by the trench. Its dimensions as seen were 1.9 m E-W by at least 0.7 m N-S. It contained a sequence of fills (317, 316, 313) similar to that of pit 307, although lacking an equivalent to sandy lens 309. None of the fills contained any artefactual material, but the similarity between these two pits points to their being of the same date.

4.1.22. Immediately adjacent to pit 312 lay a small oval feature (314) 0.53 m long by 0.42 m wide and 0.09 m deep with a greyish brown fill (315). This was probably a posthole, although it produced no finds and could be the result of root disturbance.

4.1.23. Excavation of a test pit adjacent to the central part of the trench revealed part of what appeared to be a shallow pit or scoop (318). This feature had a maximum depth of 0.28 m and was filled by a deposit of dark brown sandy clay (319) which contained Romano-British pottery dating to the 1st or 2nd century AD, and a quantity of animal bone.

4.1.24. A linear, V-shaped ditch or gully (305) extended across the east end of the trench on an E-W alignment. The ditch was 0.6 m wide and 0.25 m deep, and contained a single fill of grey sandy silt (306). After excavation of an initial segment 1 m long had failed to produce any artefacts, the entire length of the ditch exposed in the trench was excavated but produced only a single piece of bone.

4.1.25. These features were sealed by the modern ploughsoil (301) which was 0.25 m deep.

Trenches 4 and 5 (Figs 6 and 7)

4.1.26. In both these trenches the Pleistocene gravel was encountered at a depth of 1.0-1.1 m below the current modern surface. Trench 4 (Fig, 6) was cut towards its western end by a linear feature (414) on a north-south alignment. The feature measured 8 m across, and its sides sloped very gradually to a flat base at a depth of 0.2 m. It was filled by a pale grey sandy silt alluvial material (415). The feature is interpreted as having been formed by water erosion, and is assumed to be Pleistocene in date. The feature was sealed by a layer of greyish-white alluvial silt (404) with yellow mottling. The deposit was 0.3 m thick, and was overlain by a deposit of light grey silt 0.25 m thick (403). This layer is interpreted as a buried soil horizon, and was cut by three linear features (405, 407, 410) which extended obliquely across the trench on parallel north-south alignments.

4.1.27. The most westerly of these was ditch 410, which was located at the mid-point of the trench. The ditch was 2.0 m wide and 0.3 m deep with sides which sloped gently to a concave base, and was filled by a dark brown humic silt (413). Features 405 and 407 were uncovered at the east end of the trench, situated just 1.5 m apart. Feature 407 was slightly the wider of the two, with a width of 1.5 m compared to feature 405's width of 1.0 m. Both features were very shallow, with depths not exceeding 0.1 m, and had irregular profiles. The profiles and shallowness of these features may indicate that they are the remains of former hedge-lines. Both contained humic fills (406, 408) similar to that of ditch 410, ditch 405 containing part of a cattle skull. These features were sealed by a layer of humic silt (402) indicative of a period of peat formation, overlain by the modern ploughsoil (401).

4.1.28. In Trench 5 (Fig. 7), the Pleistocene gravel (504) was overlain by a layer of pale sandy silt alluvium (513) which probably equates to deposit 404 in Trench 4. As in that trench, it was overlain by a buried soil horizon 503, although no finds were located in this layer in this trench. Three linear features aligned north-south were cut into this layer (505, 507, 510). The alignment of these features indicates that they are identical with features 405, 407 and 410 in Trench 4. Feature 510 is probably part of the same ditch as 410, and had similar dimensions, with a width of 1.7 m and a depth of 0.2 m. Again it was filled by a single deposit of humic silt (511), from which were retrieved finds including a sherd of Romano-British pottery. Features 505 and 507, which correspond with features 407 and 405 respectively, were more substantial than their equivalents in Trench 4. Feature 507 was the wider of the two at 2.5 m and was 0.7 m deep. It contained a lower fill of grey silt (509) 0.5 m deep which produced no

finds, overlain by a dark brown humic silt (508) which yielded Romano-British pottery and animal bone, including a cattle skull showing signs of having been pole-axed and two articulating vertebrae. Adjacent to this feature on its east side was feature 505, which was 1.8 m wide and 0.7 m deep. It too was filled by a water-logged grey silt (512) overlain by a humic deposit (506) which again contained animal bone, most of which was of cattle. As in Trench 4 these linear features were overlain by a layer of dark brown humic silt (502) which was in turn overlain by the modern ploughsoil (501).

Trenches 6, 7 and 9 (not illustrated)

4.1.29. Trenches 6, 7 and 9 revealed the same alluvial sequence as that recorded in Trenches 4 and 5. The Pleistocene gravel (607, 706, 907) was exposed in sondages excavated through the alluvium at either end of each trench. In Trenches 6 and 7 this was reached at between 0.85 m and 1.1 m below the present ground surface, increasing to 1.5 m in Trench 9. In Trenches 6 and 9 the gravel was overlain by a layer of bluish silty clay (606, 906) 0.1 m thick, but this was absent from Trench 7. This was overlain by a deposit of very pale sandy silt alluvium (605, 705, 905) up to 0.4 m thick, above which was the buried soil horizon (604, 704, 904). Pieces of fire-cracked flint were retrieved from this deposit in Trench 9. The humic silt layer (603, 703, 903) again overlay this. In Trench 9 five sherds of Romano-British pottery were found in this layer, along with an iron nail. The humic layer was sealed by a layer of alluvial silt (602, 702, 902) 0.2 m thick, over which lay the modern ploughsoil (601, 701, 901).

Trench 8 (Fig. 8)

4.1.30. The Pleistocene gravel (813) was identified in sondages at either end and half way along the trench. At the south-west end of the trench the gravel was encountered at 1.1 m below ground level, increasing in the other sondages to up to 1.8 m. In the latter two, deeper sondages it was overlain by a band of blue silty clay (812) similar to that seen in Trenches 6 and 9. The pale, yellow-mottled alluvium (805) was once again present, overlain by the former soil layer (804), from which some burnt flint was retrieved. This soil horizon was cut by a ditch on an east-west alignment exposed at the south-west end of the trench. The earlier phase of the ditch (807) was 0.8 m deep and at least 1.1 m wide, with fairly steep sides. It contained a single dark brown silty fill (809) which produced no artefactual material. The south-west side of the ditch had been removed by the digging of a re-cut (810). This re-cut was 1.2 m wide with a V-shaped profile, and dug to the same depth as its predecessor. Its only fill (811) was slightly blacker in hue than 809, but was similarly lacking in finds. The up-cast from the digging of these ditches had been used to create a low bank or trackway surface 0.3 m thick on the south-west side of the ditch (806). This deposit extended for more than 5 m, continuing beyond the south-west end of the trench. A smaller amount of up-cast from the later ditch had also been thrown up on the north-east side (808), where it partly sealed the earlier ditch. The layer of humic peaty silt (803) recorded in the previous trenches sealed the ditch and in-filled the upper part of the feature, indicating that this layer began to form while the ditch was still at least partly open.

The humic layer was overlain by a light grey alluvial silt 0.1 m thick (802) and the modern ploughsoil (801).

Trench 10 (Fig. 9)

4.1.31. The alluvial sequence recorded in Trench 10 was identical to that seen in the trenches to the south. The natural gravel (1015) was encountered at a maximum depth of 1.9 m, at the south-west end of the trench, and sloped up to a depth of 1.3 m at the north-east end. It was overlain by a layer of bluish silty clay (1016) 0.15 m thick, above which was a more substantial whitish grey alluvial deposit (1014) 0.4 m thick, itself overlain by the buried soil layer (1013). Two features were cut into this horizon. Ditch 1007 was located at the north-east end of the trench and was aligned approximately east-west. It was 1.6 m wide and 0.9 m deep, with a steeply-sloping V-shaped profile. None of its three fills (1004, 1005, 1006) produced any datable artefacts, and it is likely to have been a field boundary ditch, of unknown date. Also in Trench 10 was a small oval pit (1010) 0.4 m long and 0.2 m deep. This feature contained a grey silty fill (1009) overlain by a thin lens of more charcoal-rich material (1008), neither of which produced any finds. These features were both sealed by the humic silt layer (1003), which was overlain by the deposit of light grey alluvial silt (1002). Toward the south-west end of the trench this sequence was cut by a modern ditch (1012) whose fill (1011) contained modern metal objects and a crisp packet. This feature was sealed by the modern topsoil (1001).

Trenches 11, 12, 13, 14, 15, 16 and 19 (not illustrated)

4.1.32. These trenches in the north-eastern half of the area under investigation all exposed a consistent sequence of alluvial deposits, with only minor localised variations. None of these trenches exposed archaeological features. The Pleistocene gravel (1109, 1208, 1307, 1406=1408, 1508=1509, 1607, 1900) was found in all these trenches to slope gently down from west to east, from between 0.7 and 0.95 m to up to 1.4 m below the current ground level. This was overlain in the eastern half of Trench 16 by a layer of compact yellow sand with patches of iron panning (1608). The sand layer was 0.1 m thick for most of its extent, increasing in the central part of the trench to 0.4 m to form a bar. In all of the trenches, these deposits were overlain by a layer of pale, calcareous alluvium with yellow mottling (1108, 1207, 1305, 1405, 1507, 1609, 1906=1910), which may also be of Pleistocene date. This layer increased in thickness from 0.1 m at the west end of the trenches to 0.4 m at the east, with the increasing depth of the underlying gravel. The deposits above this level were generally humic in character, as indicated by their darker grey and brown hues. This suggests that they are of more recent date, and were laid down within the Holocene period. The earliest of these deposits was a thin layer of grey alluvial silt (1107, 1206, 1506, 1606, 1909) recorded in Trenches 11, 12, 15 and 19. A horse incisor was retrieved from this layer in Trench 19. The layer was 0.1 m thick and was overlain in Trenches 11 and 12 by an apparently localised deposit of more gravelly alluvial material (1106, 1205). In Trench 11 this gravelly layer was overlain by a thin layer of light grey alluvial silt (1105) which was also present in Trench 16 (1605), and which produced a flint blade.

Next in the sequence came a coarser deposit of very calcareous silty sand with small fragments of chalk and flint (1104, 1204, 1306, 1404, 1505, 1604, 1908). The thickness of this layer increased from west to east with the slope of the underlying deposits, from 0.05 m up to 0.40 m. A lens of mollusc shells (1308) lay on the upper surface of this layer toward the east end of Trench 13. In Trenches 13 and 15 the calcareous layer was overlain by a thin layer of greyish brown alluvial silt (1304, 1504) which seems to have been restricted in extent to these two trenches. The alluvial sequence in these trenches was not seen in Trenches 1 to 10, indicating that it did not extend much further to the south of Trench 11. These deposits were sealed by a layer of humic silt (1103, 1203, 1303, 1403, 1503, 1603, 1903) which occurred in all of the trenches and is interpreted as being the same peaty layer recorded in Trenches 4 to 10 to the south. As in Trenches 6, 7, 8, 9 and 10 this was overlain by a deposit of light brownish grey alluvium (1102, 1202, 1302, 1402, 1602), which in Trenches 15 and 19 was recorded as two distinct superimposed layers (1502, 1510, 1902, 1903). Above this lay the modern ploughsoil (1101, 1201, 1301, 1401, 1501, 1601, 1901).

Trench 17 (Fig. 10)

4.1.33. The alluvial sequence recorded in Trench 17 was consistent with that seen in the trenches described above, but was interrupted by two archaeological features. The gravel (1706) was overlain by a pale alluvial layer (1705=1714) 0.3 m thick, which was cut by two ditches (1708 and 1711). Ditch 1711 was aligned north-south and was exposed at the north-west end of the trench. It was 1.1 m wide and 0.4 m deep, with a fairly steep V-shaped profile. The ditch was recorded as having two fills (1709, 1710) the profile of which suggests that 1709 may be the fill of a re-cut. No finds were forthcoming from this feature. Toward the south-east end of the trench lay ditch terminus 1708. Only the final 0.8 m of the south-west end of the feature lay within the area of the trench, from which it appeared that the ditch was aligned NE-SW. It was 0.6 m wide and 0.2 m deep with steep sides and a flat base, and contained a single fill of grey sandy silt (1707) which produced no finds. Alluvial layer 1705=1714 was overlain by a thin layer of grey alluvial silt (1712=1713), but this was intermittent along the trench and did not occur where the ditches were located, so the relationship between the layer and the features could not be established. The calcareous sandy silt layer noted in Trenches 11 to 16 was here represented by layer 1704, which was again overlain by the peaty layer (1703). Above this was a layer of light brownish grey alluvium (1702), sealed by the modern ploughsoil (1701).

Trench 18 (Fig. 11)

4.1.34. Trench 18 was situated at the location of a gravel island where the gravel (1804) rose up and the alluvial sequence seen in the other trenches was consequently absent. At the north-east end of the trench the gravel was cut by a ditch (1805) running on an east-west alignment. The ditch was V-shaped in profile with a width of 0.6 m and was 0.3 m deep. It contained a single fill of grey silt (1806) which produced no datable material. Approximately 15 m from the north-west end of the trench were two

features identified as a pit and a posthole. Pit 1809 was roughly circular in plan with a bowl-shaped profile and a concave base. It was 0.5 m in diameter with a depth of 0.17 m. A quantity of animal bone and pottery dated to the Bronze Age was located at the base of the pit, which was filled by a single back-fill (1810). Next to this pit was posthole 1811. The posthole was 0.25 m in diameter with vertical sides and a depth of 0.27 m. It had a single fill (1812) containing pottery similar to that found in the adjacent pit. An apparently linear area of root disturbance (1807) recorded in this trench probably relates to a former continuation of a tree-line marking a field boundary to the east of the area of the investigation. The features were sealed by a layer of humic silt (1802) identical to the peaty layer recorded in other trenches (1103 etc.), which was overlain by the modern ploughsoil (1801).

Trench 20

4.1.35. The gravel (2001) was found to be at a higher level in Trench 20 than in most of the other trenches, being encountered at a depth of 0.8 m. Consequently, the earlier part of the alluvial sequence recorded elsewhere was absent from this trench. The earliest alluvial layer encountered here was a grey silt layer (2007), which probably correlates with the earliest of the more humic, Holocene deposits seen in the other trenches (1107 etc.). The layer was only present in the western half of the trench and was up to 0.15 m thick. This was overlain by a calcareous deposit (2003=2005=2006) 0.3 m thick which equates with the similar layer seen in all the other trenches in the northern half of the are under investigation except Trench 19 (1104 etc.) and was overlain at the eastern end of the trench by a grey alluvial silt (2002=2004) 0.1 m thick. This may be the same deposit as the layer recorded as 1304 and 1504 in Trenches 13 and 15, or could be a different deposit localised to this trench. The peaty silt layer (2008) was again seen in this trench, and was overlain by the current ploughsoil (2000).

4.2. Finds

Pottery (see appendices 1 and 2)

4.2.1. Nineteen sherds of plain handmade prehistoric pottery were recovered from the fills of a pit and posthole in Trench 18. The grog-tempered fabric indicates a probable Bronze Age date and more likely early Bronze Age than late.

4.2.2. Some 22 sherds (298 g) of later prehistoric and Roman pottery were found. Of this material, a single middle Iron Age sherd was retrieved from pit 312 in Trench 3. The largest single assemblage was the 13 sherds of early Roman pottery from pit 318 in the same trench, while Romano-British pottery was also recovered from ditches in Trench 5 and from the peat layer (903) in Trench 9.

Lithics (see appendix 3)

4.2.3. A total of eight struck flints were recovered from the site, along with 29 pieces of burnt unworked flint weighing 641 g. The majority of this assemblage came from

contexts 804, 904 and 1013, which are probably part of the same possible buried ground surface. The remainder occurred as residual material in later contexts.

Animal bone (see appendix 4)

4.2.4. A total of 276 fragments of tooth and bone weighing 4861 g were retrieved during hand excavation. Re-fitting of broken elements reduced this count to 134 pieces. The small size of the assemblage precludes any interpretation of the diet and animal husbandry practices in use on the site.

Other finds

Metal

4.2.5. Trench 4: context 402. Cu alloy object. Strip with T-shaped profile, 41 mm x 7 mm with one roughly pointed end, other end broken. Fine milling along outer edges of upper surface. On the rear is a rib, deepening from nothing at the pointed end to 4 mm at the broken end, where it was perforated by a small hole. Date and function uncertain.

4.2.6. Trench 9: Context 903. Small iron nail. Square section. Undatable.

Glass

4.2.7. Trench 1: Context 112. Glass fragment. Brown bottle glass, post-medieval.

Clay pipe

4.2.8. Trench 21: Five fragments. Four stems, from contexts 2113 and 2117 (3) and a complete bowl of ?18th century type from 2107.

Ceramic building material

4.2.9. Trench 1: A single fragment from context 112, post-medieval.

Fired clay

4.2.10. Trench 3: A single fragment (97 g) from context 311. Irregular fragment with traces of two perpendicular surfaces in fairly fine sand-free fabric, irregularly fired. Perhaps part of a triangular loomweight.

4.3. Palaeo-environmental remains (see appendix 5)

4.3.1. Since many of the sequences were lithologically similar it was decided that the best approach to preliminary assessment was to identify those which gave the best representative sequences and to assess them in detail for preservation levels. 14 samples from Trenches 8 and 19 were selected, as well as samples from Romano-British ditch fills 509, 512, 809 and 811 and Bronze Age pit fill 1810. The remainder of the samples were retained for future analysis.

Plant remains

4.3.2. The preservation of waterlogged plant remains from the sediment sequences in Trenches 8 and 19 was poor to fair. Context 804, however, the buried land surface in

Trench 8, contained both charred and waterlogged cereal chaff. Bronze Age pit fill 1810 in Trench 18 contained very little material, but the Romano-British fills provided more useful assemblages, with waterlogged seeds particularly abundant in contexts 809 and 811.

Molluscs

4.3.3. Molluscs were preserved in all of the samples assessed in varying quantities. The lower alluvial deposits, thought to be of late Pleistocene date, contained an extremely sparse assemblage of molluscs that are likely to be intrusive. The assemblage from buried surface 804 in Trench 8 is indicative of open grassland or meadow conditions. The samples from the Romano-British ditches which cut this layer yielded a similar assemblage, along with freshwater slum species indicative of the features having held standing water, perhaps seasonally.

4.3.4. The alluvium and mere deposits in Trench 19 all contained abundant very well preserved mollusc shells, dominated by freshwater species. Terrestrial species are virtually absent indicating very wet conditions, possibly an open area of standing water such as a poorly drained backswamp. The presence of flowing water species in a fragmentary condition suggests the occurrence of periodic flooding that transported shells from the river.

4.3.5. The overlying peat contained a very sparse mixed assemblage. The alluvium above this contained species typical of wetter conditions, as well as flowing water species, suggesting that some flooding was occurring.

Pollen

4.3.6. The pollen assemblage from the sediment sequence in Trench 8 was generally not well preserved. The identifiable pollen in contexts 802 and 803 was dominated by grass and sedge, indicating a preponderance of grassland or meadow. The samples also contained cereal pollen showing that arable farming was taking place close by. A similar though more well preserved assemblage was observed in the Romano-British ditch fill. The latter also contained spores from a coprophilous fungus indicative of animal dung.

4.3.7. Preservation of pollen in the Holocene part of the sequence in Trench 19 was quite good. Although the samples are dominated by herb pollen, there is more tree and shrub pollen in the basal samples, particularly that of *Alnus* (alder). As the tree pollen values decline, those of herbs and ferns increase, possibly suggesting clearance, although there is little evidence of arable cultivation. Increasingly high values for sedges through the sequence suggest the development of sedge fen, while the presence of pollen of the aquatics yellow waterlily and waterweed in samples 1907 and 1908 show that there was shallow water at the site at this time.

Ostracods

4.3.8. Freshwater ostracods occurred in all the samples, and were particularly abundant in the Holocene alluvial deposits 1908 and 1909, and the overlying peat 1903. The species present in these layers are indicative of a well vegetated, permanent shallow body of water which was at most very slow flowing. Through time this silted up to become a swamp.

5. DISCUSSION AND INTERPRETATION

5.1.1. The Stage 1 Mitigation was able to examine a 1000 m long area along the edge of the floodplain of the River Cam, along the proposed line of The Cut, the main channel of the Rowing Lake's initial stage. Trenches 1 and 21, located on the line of The Canal, also provided a transect across the floodplain to the west of the River. The floodplain between the current river channel and the line of the Cambridge-Ely railway, *c* 150 m to the west, was found to be an area of flat Pleistocene gravel. To the west of this, the gravel forms a shallow basin in which an alluvial sequence has formed spanning the Pleistocene and Holocene periods.

5.1.2. A palaeochannel was recorded cutting the gravel at the southern end of The Cut in Trench 2, and shallower linear undulations that were probably similarly created by the scouring action of the river during the Pleistocene period were also present. These features were in-filled and the gravel generally overlain by calcareous, iron oxide-stained alluvium which is probably Pleistocene in date. This material lacked the humic component present in the later deposits and was more coarse-grained. This layer was present throughout the trenches excavated along the line of The Cut except in Trench 3, which was located at the edge of the gravel terrace, and Trench 18, where the gravel rose up to form a small island.

5.1.3. During the Holocene period, the area of the investigation consisted of two distinct environmental zones, with a body of water in the northern half contrasting with the drier conditions of the southern part. The division between these zones lies between Trenches 10 and 11. The alluvial sequence recorded in the northern half of the area indicates that this was an open body of water. The environmental indicators suggest that this was a shallow lake or back-swamp, consisting of permanent standing water, well-vegetated and occasionally inundated by flooding from the adjacent river. As the mere silted up, the area developed into a sedge fen. The pollen record also shows a decline in tree pollen from the earliest layers, possibly as a result of deliberate clearance of the surrounding area to create grassland for pasture.

5.1.4. In the southern half of the site a layer which may represent a buried land surface was identified overlying the Pleistocene alluvium. Fragments of burnt and fire-cracked flint were retrieved from this deposit in Trenches 4, 8 and 9, as well as three pieces of worked flint including a backed knife. These artefacts indicate a prehistoric date for this surface, the knife in particular being diagnostic of the Neolithic or earlier Bronze Age. The analysis of the pollen and molluscan remains from Trench 8 indicates that

this area can be typified as damp grassland or meadow at this time. The surface of this layer was the horizon from which the archaeological features were cut.

5.1.5. A human presence during prehistory was also demonstrated by a pit and posthole in Trench 18, both of which contained pottery dating to the Bronze Age. The gravel rose up to form an island in the vicinity of this trench, and the choice of this location for these features is likely to reflect the utilisation of such drier areas, either as permanent locations or as convenient crossing points from the gravel terrace to the west to the river. It is probably no coincidence that the modern Pinney's Lane re-used the same crossing point.

5.1.6. A pit (312) containing a single sherd of middle Iron Age pottery excavated in Trench 3 indicated that activity of this period may be found along the edge of the gravel terrace. This could mean that some of the crop-mark complexes observed along the terrace edge on aerial photographs and believed to be of Roman date may also contain Iron Age elements.

5.1.7. Exploitation of the floodplain during the Roman period was evidenced by the ditches recorded toward the southern end of the area of mitigation. The three ditches running north-south through Trenches 4 and 5 are of this date, while ditch 807, in Trench 8, is one of a pair of Roman ditches excavated in Cambridge County Council Archaeological Field Unit's evaluation trench 4. These two ditches defined a trackway and can be traced on aerial photographs, running down to join the river in the vicinity of Baits Bite Lock. The undated ditches in Trenches 3 and 10 may be of a similar date, laid out to drain and divide this part of the floodplain. The palynological evidence derived from ditch 807 for an open, grassed landscape is likely to reflect use of the area for pasture, as is graphically shown by the presence of spores indicative of animal dung. The communities exploiting the grassland in this way were probably resident on the gravel terrace, as indicated by the known crop-marks.

5.1.8. All the archaeological features were sealed by a layer of humic silty peat which extended across the entire site from Trench 4 northward. In Trenches 4, 5 and 8 this layer was seen to in-fill the upper parts of Roman ditches, indicating that these features were still partly open when the deposit formed, and that this must therefore have occurred during or very shortly after the Roman period. This suggestion is also supported by the sherds of early Roman pottery retrieved from this layer during machining of Trench 9. This phase of peat formation reflects a return to fen conditions across the whole site, which may be the reason for the abandonment of the ditch system.

5.1.9. No evidence was found for human exploitation of this area between the disuse of the Romano-British features and the post-medieval period, when gravel quarrying and a series of ditched boundaries were established near the river, alongside which gravel quarrying was carried out, as demonstrated in Trench 21.

5.1.10. Preliminary assessment of the environmental samples has demonstrated the preservation of a wide range of palaeo-environmental indicators, providing a high potential for environmental reconstruction. The geo-archaeological recording of each trench will also enable a deposit model for the site to be developed as part of a later stage of analysis. The results of the assessment indicate that charred and waterlogged seeds and other plant remains survive in sufficient quantities to provide material for radiocarbon dating to establish an absolute chronology for the environmental sequence, as well as for the human activity within it represented by the worked and burnt flints and charred remains within buried surface 804.

Appendices

APPENDIX 1 PREHISTORIC POTTERY

by Alistair Barclay

Nineteen sherds of plain handmade prehistoric pottery were recovered. These came from two contexts. A large base sherd was recovered from context 1812 and a further *c* 18 fragments (including fresh breaks) were recovered from context 1810. Many of the fragments are in relatively poor condition, have surfaces missing or have begun to laminate - perhaps due to the clayey nature of the fills. The large base sherd from 1812 is from a large, relatively thick-walled, coarse ware jar or urn and appears to be tempered with angular fragments of clay or grog. Grog is also present in some of the sherds from 1810, although other fragments appear to be made from non-tempered or inclusion free clay. Some fragments from 1810 are from a base, and at least one contains charred residue. It is possible that all the fragments from 1810 are from the same vessel and a similar vessel to the base sherd from 1812. The grog-tempered fabric indicates a probable Bronze Age date and more likely early Bronze Age than late.

APPENDIX 2 LATER PREHISTORIC AND ROMAN POTTERY

by Paul Booth

Some 22 sherds (298 g) of later prehistoric and Roman pottery were recovered. These were scanned briefly. The pottery was generally in moderate to poor condition. Sherd sizes were variable and surfaces were often quite eroded, removing traces of surface treatment such as burnishing. Three main ceramic periods, ?late Bronze Age, middle Iron Age and early Roman, were represented. Single sherds of probable late Bronze Age (context 806) and middle Iron Age date (context 311) were present. These were in heavily flint-tempered and sand-tempered fabrics respectively, neither with any other diagnostic characteristics.

Roman pottery was recovered from four contexts, 319, 508, 511 and 903. All the diagnostic fragments were consistent with a 1st-2nd century AD date range. Sherds in 508, 511 and 903 consisted entirely of very similar sand-tempered coarse wares, both oxidised and reduced, and probably of local origin. The group from context 319 was more mixed and included two samian ware rims (forms 18 and 29, both South Gaulish) and grog-tempered sherds in a late Iron Age tradition as well as oxidised sand-tempered sherds. This group could date as early as the late 1st century AD, though a slightly later date would also possible. It contained, however, a single sherd of Black Basalt ware which, if not intrusive, would indicate a much later date for this group.

Table 1: Summary of all ceramic evidence

Context	Trench	No. sherds	Weight (g)	Date	Comment
311	3	1	25	Middle Iron Age	Sand-tempered
319	3	13	64	1-2C	Samian ware, grog and sand-tempered coarse wares
319	3	1	7	Post-medieval	Black basalt ware - intrusive?
508	5	1	46	Roman	Reduced coarse ware, not closely dateable
511	5	1	9	Roman	Ditto
806	8	1	4	Late Bronze Age?	Flint-tempered
903	9	5	50	1-2C	Sandy oxidised and reduced coarse wares
1810	18	18?	47	Bronze Age	Grog-tempered
1812	18	1	43	Bronze Age	Grog-tempered

APPENDIX 3 WORKED FLINT

by Kate Cramp

A total of eight struck flints were recovered from the site (Table 2), along with 29 pieces of burnt unworked flint weighing 641 g (Table 3). Most of the burnt unworked material came from context 904 (26 pieces weighing 614 g); only small quantities were recovered from context 403 and 804.

Table 2: Struck flint by type from Cambridge Rowing Lake.

Category:	Context:						Total:
	319	804	904	1013	1105	1806	
Flake	2						2
Blade					1		1
Bladelike flake		1				1	2
Irregular waste			1	1			2
Backed knife			1				1
Total:	2	1	2	1	1	1	8

Table 3: Quantification of burnt unworked flint.

	403	804	904	Total:
Total number of burnt unworked flints:	1	2	26	29
Total weight of burnt unworked flint (g):	19	8	614	641

The struck component was thinly spread across six contexts, none of which contained more than two pieces. The assemblage is dominated by unretouched types, including several flakes, bladelike flakes and pieces of irregular waste. Context 1105 produced a large side-trimming blade, which was probably struck from an opposed platform blade core using a soft-hammer percussor. Both lateral margins have been utilised and display a slightly serrated use-wear. The blade can be tentatively dated to the Mesolithic.

A single retouched tool - a backed knife - was recovered from the site. This piece has been manufactured on a thick tertiary blade with bifacial retouch along the right-hand edge and abrupt, inverse retouch on the left-hand edge; the distal end is also truncated by abrupt retouch. The knife is slightly curved in plan, narrowing towards proximal end where it may have terminated in a point. A later Neolithic or earlier Bronze Age date is suggested for this piece.

APPENDIX 4 ANIMAL BONE

by Emma-Jayne Evans

Methodology

A total of 276 fragments (4861 g) of bone and teeth were retrieved by hand during the excavation. Identification of the bone was undertaken at Oxford Archaeology with access to the reference collection and published guides. All the animal remains were counted and weighed, and where possible identified to species, element, side and zone (Serjeantson 1996). Also, fusion data, butchery marks, gnawing, burning and pathological changes were noted when present. Ribs and vertebrae were only recorded to species when they were substantially complete and could accurately be identified. Undiagnostic bones were recorded as small (small mammal size), medium (sheep size) or large (cattle size). The separation of sheep and goat bones was undertaken using the criteria of Boessneck (1969) and Prummel and Frisch (1986), in addition to the use of the reference material housed at OA. Where distinctions could not be made, the bone was recorded as sheep/goat (s/g).

The condition of the bone was graded using the criteria of Lyman (1996), grade 0 being the best preserved bone and grade 5 indicating that the bone had suffered such structural and attritional damage as to make it unrecognisable.

The quantification of species was carried out using the total fragment count. Tooth eruption and wear stages were measured using a combination of Halstead (1985), Grant (1982), and Levine (1982), and fusion data was analysed according to Silver (1969). Measurements of adult, that is, fully fused bones were taken according to the methods of von den Driesch (1976), with asterisked (*) measurements indicating bones that were reconstructed or had slight abrasion of the surface.

Results
The hand collected bone analysed for this assessment has been recorded in full, with broken fragments re-fitted, reducing the number to 134 fragments of bone and teeth. A total of 33 fragments were identified to species, 24.6% of the total fragment count. It can be seen from Table 4 that only domestic species are present, with no evidence of wild animals.

Table 4: Total number of bones identified to species and phase

	Cattle	S/g	Pig	Horse	Dog	Domestic fowl	Unid	Total
Prehistoric	5	3	3	1	1	-	74	87
Romano-British	12	-	-	-	-	-	21	33
Romano-British?	-	-	-	3	-	-	1	4
Post-medieval	1	-	-	1	1	1	2	6
Undated	-	-	-	1	-	-	3	4
Total	18	3	3	6	2	1	101	134

There is a marked difference in the condition of the bone from the site, with the bone from the prehistoric period surviving in poor condition, and the Romano-British and post-medieval bone surviving in reasonably good condition, as shown in Table 5.

Table 5: Condition of the bone

	Condition				Total
Date	1	2	3	4	
Prehistoric	2.3%	21.8%	9.2%	66.7%	-
Romano-British	6.1%	87.9%	6.1%	-	-
Romano-British?		50.0%	50.0%	-	-
Post-medieval	33.3%	33.3%	33.3%	-	-
Undated	25.0%	50.0%	25.0%	-	-
Total	5.2%	40.3%	11.2%	43.3%	100.0%

The small quantities of bone identified from the site do not give very much information regarding the diet and the animal husbandry practices of the inhabitants of the site. Tooth eruption and wear stages data only give age at death information for three animals, giving an age of young adult for a loose cattle 3rd molar, and > 8 years for a sheep/goat mandible, both from the prehistoric period, and 14+ years for a loose horse tooth from the Romano-British period.

Measurements could only be taken on two cattle bones from the Romano-British period and one domestic fowl bone from the post-medieval period, and butchery marks were only noted on two bones, one unidentified fragment and a cattle skull from the Romano-British period which appears to have been pole-axed.

APPENDIX 5 ENVIRONMENTAL DATA

Water-logged plant remains

By Denise Druce

Introduction

Eighteen samples of up to 10 litres in size were processed in order to assess the potential for the preservation of waterlogged and charred plant remains. The samples derive from two sequences of alluvial deposits from Trenches 8 and 19. The majority of the deposits are thought to be Holocene in age although the two earliest samples from the sequence in Trench 19 (context 1910) are thought to date to the late Pleistocene. A selection of features, preliminarily dated by pottery sherds to the Romano-British period, were also examined.

Methodology

1 litre of each sample was hand floated and the flots collected onto a 250µm mesh, air-dried and examined under a binocular microscope. The presence of any charred/ waterlogged seeds and other environmental indicators was noted and the material assessed for its potential in providing information about the site.

Results (see Table 6)

Archaeological features:
The sample from the Bronze Age pit (context 1810) contained very little material. The Romano-British ditches, however, provided more useful assemblages of plant remains, with abundant waterlogged seeds noted in contexts 809 and 811. Context 512 also contained a limited seed assemblage. Most of the samples examined contained some fragments of insect remains and shell fragments.

Sediment sequences:
The preservation of waterlogged plant remains from the sediment sequences in Trenches 19 and 8 was poor to fair. Context 804, however, from one of the possible buried land surfaces in Trench 8 contained both charred and waterlogged cereal chaff. Charred cereal remains were also identified in context 1903 from Trench 19. The presence of the algae *Chara/Nitella* in some of the lower samples in Trench 19 suggests that conditions were wet and calcareous during their deposition. Preservation of insect remains was generally poor.

Discussion and recommendations

Though variable, the results showed potential for the preservation of both charred and waterlogged plant remains, particularly within the archaeological features. Any further work to be undertaken on the terrace edge/floodplain should employ an appropriate strategy for the retrieval of plant assemblages.

With regard to the samples retrieved during this phase of the archaeological programme it is recommended that further analysis should be considered for the waterlogged remains in contexts 809 and 811 from the Romano-British ditch toward the south end of the site in order to provide an environmental context for these possible ‘dry land’ features.

Further investigation should also be carried out on the both charred and waterlogged remains in context 804, the buried soil from Trench 8. As the assessed material contained both charred and waterlogged cereal remains it is recommended that at least 40 litres of this context is

examined further (i.e. four 10 litre samples). The charred material may provide a radiocarbon date for this period of former soil development and associated human occupation.

It is also recommended that an assessment for waterlogged plant remains is carried out on Trenches 11 and 13 from the possible lake/lake edge deposits in order to provide information on the environment/setting of the site.

Table 6: Results of the environmental indicator evaluation from Cambridge Rowing Lake.

Trench		Ctxt	Feature	Date	*Remains
5		509	Ditch	RB	Monocot, small charcoal, snails 1, seeds 2
5		512	Ditch	RB	Monocot, shell frags, seeds 3
8		802	Alluvium	RB?	Monocot, small charcoal, snails 5, seeds 1
8		803	Peat	RB?	Monocot, insect frags, snails 1
8		804	Buried soil?	U/D (Prehistoric?)	Monocot, small charcoal, shell frags, ch glume 1, wtl rachis 1, seeds 1
8		804	Buried soil?	U/D (Prehistoric?)	Monocot, small charcoal
8		804	Buried soil ?	U/D (Prehistoric?)	Monocot, small charcoal, insect frags, Chara/Nitella
8		809	Ditch	RB	Monocot, insect frags, shell frags, seeds 4
8		811	Ditch	RB	Monocot, small charcoal, insect frags, shell frags, seeds 4
18		1810	Pit	BA	Monocot, small charcoal
19		1903	Peat layer	?	Monocot, small charcoal, insect frags, snails 2, ch cereals 1, seeds 2
19		1903	Peat layer	?	Monocot, insect frags, snails 5, seeds 2
19		1907	Alluvial layer	RB?	Monocot, small charcoal, insect frags, shell frags
19		1908	Mire deposit?	?	Monocot, small charcoal, insect frags, Chara/Nitella, snails 5, seeds 2
19		1909	Alluvial layer	?	Monocot, small charcaol, snails 4, Chara/Nitella, seeds 3
19		1909	Alluvial layer	?	Monocot, small charcoal, insect frags, Chara/Nitella, snails 4, seeds 3
19		19	layer	Pleistocene	Monocot, small charcoal, shell frags

		10			
19		1910	layer	Pleistocene	Monocot

*Scored on a scale of 1-5 where: 1=<5, 2=5-25, 3=25-50, 4=50-100, and 5=>100

Molluscs

by E C Stafford

Introduction

The nature of the soils and sediments at the site are calcareous and therefore conducive to the preservation of mollusc shells. Intensive sampling at 0.05 m intervals through the sediment sequences from eight trenches was undertaken during the fieldwork producing 219 samples in total.

Methodology

Since many of the sequences were lithologically similar it was decided that the best approach to preliminary assessment was to identify those which gave the best representative sequences and to assess them in detail for preservation levels. 14 samples from Trenches 8 and 19 were selected, including samples from the fills of a Romano-British ditch stratified within the sediment sequence within Trench 8. The samples were disaggregated in water and floated onto 0.5 mm mesh. The remaining residues were also sieved to 0.5 mm and airdried. Both the flots and residues were scanned under a low power binocular microscope at magnifications of x10 and x20.

Results

Snails were preserved in the majority of the flots in varying amounts from moderate to very abundant. The abundance of taxa was recorded on a scale of + 1-5, ++ 6-25, +++ 26-50, ++++ 51-100, +++++>100. An estimate was also made of the total number of individuals in each flot. The identifications are divided into species groups in the tables of results (Table 7) Nomenclature follows Kerney (1999) and habitat information has been indicated following Robinson (1979).

For the freshwater molluscs:

- Slum species are those able to live in water subject to stagnation, drying up and large temperature variations.
- Catholic or intermediate species tolerate a wide range of conditions except the worst slums.
- Ditch species require clean slowly moving water often with abundant aquatic plants.
- Flowing water species require a clean stream with a current.

For the terrestrial fauna habitat preferences are:

- open-country
- shade-loving
- catholic or intermediate tolerating a wide range of conditions
- obligate marsh species
- terrestrial species that can tolerate wet conditions.

Trench 19

The samples from Trench 19 were selected for assessment since the sequence of alluvial deposits was thickest in this area of site. The sequence also contained the thickest deposit of calcareous material thought to represent a 'mere' or shallow lake deposit.

The basal deposit (1910), thought to be of late Pleistocene age contained an extremely sparse assemblage of molluscs that are very likely to be intrusive elements from overlying deposits. The overlying alluvium (1909) and calcareous deposits (1907) all contained abundant assemblages (>100 individuals) dominated by freshwater species. A large proportion of the assemblages consisted of very well preserved, often whole, slum, catholic and ditch freshwater species suggesting at least a semi-autochthonous assemblage. Terrestrial species are virtually absent indicating that very wet conditions prevailed, possibly consisting of an open area of standing water such as a poorly draining backswamp that may have persisted throughout the year rather than just seasonally (Dr. M. Robinson *pers comm*.). The presence of significant numbers of flowing water species such as *Bithynia* sp. and *Valvata piscinalis* suggests that periodic flooding occurred, transporting shells from the river. This is supported by the fact the majority of the identifiable fragments of these species were broken apices and operculae characteristic of channel bed deposits.

Preservation was very poor in the deposit of alluvium (1903) overlying the calcareous material. This contained only a very sparse assemblage of mixed freshwater species.

Trench 8
The samples from Trench 8 were selected for assessment since this sequence was located beyond the southern edge of the 'mere' deposits and could be indicative of an area of drier ground. Archaeological remains were also stratified within the sequence in the form of a Romano-British ditch, providing some chronology for the deposits.

Preservation was very poor in the lower part of the basal alluvium (804). The upper part of (804) however, provided a much more useful assemblage. A number of damp tolerant terrestrial species (*Vallonia pulcella, Vertigo pygmaea, Nesovitrea hammonis, Trichia hispida*) and marsh species (*Vertigo antivertigo, Oxyloma/Succinea* sp.) were present. This suggests overall drier conditions than in Trench 19 but also a rather open landscape, perhaps some form of damp grassland/meadow (Evans 1991) With regard to the freshwater species *Lymnaea truncatul*a predominates; this is the slum species having the greatest tolerance of seasonal drying (Robinson 1988, 107).

Preservation in the later Romano-British ditch (809) that cuts (804) was relatively good and produced an assemblage of similar character. The presence of the freshwater slum species *Anisus leucostoma* in the ditch deposits does suggest that it held standing water, perhaps seasonally.

The overlying peat (803), thought to be Roman in date, contained a very sparse mixed assemblage. The alluvium (802) above the peat contained abundant shells of ditch and slum species, however, suggesting wetter conditions. Terrestrial species are still present but are not as abundant as in (804). Flowing water species are present in quantities, particularly *Valvata piscinalis,* suggesting that some flooding was occurring.

Potential and recommendations

Molluscan remains were identified in all the samples examined from Trenches 8 and 19, often in great abundance and in an extremely good state of preservation. After initial assessment of a limited number samples from these trenches it is clear there is ecological variation between the assemblages, both temporally through the profiles, and spatially across the site. Research

undertaken by Dr Mark Robinson at sites in the upper Thames valley floodplain, on modern and archaeological molluscan assemblages, demonstrated the potential for distinguishing between various types of grassland, for example hay meadows and pastureland, from the percentages of groups of aquatic, amphibious and terrestrial taxa (Robinson 1988). Although not entirely comparable, the samples from Trenches 8 and 9 at Cambridge Rowing Lake can potentially provide information on local environmental change and landuse in conjunction with other lines of investigation such as ostracods, pollen and plant macroremains. The value of that work will be greatly enhanced with tighter chronological control. This may be provided from radiocarbon dating of organic remains such as charred or waterlogged plant remains if suitable material can be identified. Other sequences or discrete deposits could be examined where there is variation in the general sequence identified on the site. Additional information may be provided for the deposits in Trench 11 which is thought to be located at the margins of the shallow water body.

Intensive sampling at high resolution was carried out during the evaluation trenching from numerous profiles. If further fieldwork is undertaken at the site, it is recommended no further sampling should be carried out unless deposits exposed are thought to differ significantly in lithology or date from those already recorded.

Table 7: Results

Trench		8	**8**	**8**	8	8	**8**	8	19	19	19	19	19	19	19
Context		802	802	804	804	804	809	811	1903	1903	1907	1908	1909	1909	1910
Sample		122	124	126	128	130	2	3	12	11	13	14	18	16	19
Estimate of abundance		A	SP	MO	SP	SP	MO	SP	SP	SP	MO	A	A	A	SP
TAXA															
Valvata cristata	D	+		+					+	+	++	++	+++	+++	+
Valvata piscinalis	F	+++									+++	+++	++	+++	
Bithynia sp.	F	+	+						+		+	+++	++	+++	
Carychium sp.	(M)s						+		+		+		+		
Lymnaea sp.	M S D C F	+++	+						+	+		+	++	++	+
Lymnaea truncatula	S M	++	+	++							++	+	+	++	
Lymnaea palustris	C S M	++													
Lymnaea stagnalis	C											+		+	
Planorbis planorbis	D	+++	+	+	+	+		+	+		+	+	+	+	+
Planorbis carinatus	D								+		+			+	
Anisus leucostoma	S	++					++		+		+	+	+	++	
Anisus vortex	D												+		
Bathyomphalus contortus	C								+				+		
Gyraulus albus	C	+	+								+	+	+	++	
Gyraulus crista	C	+									++	+	+	++	
Hippeutis complanatus	C										+		+	+	
Planorbarius corneus	D											+			
Oxyloma/Succinea sp.	Mo	++		+			+				+	+	+	+	
Vertigo antivertigo	M			+											
Vertigo pygmaea	(M)o			+	+										
Vallonia sp.	(M)o	+		++			+								
Vallonia costata	To						++								
Vallonia pulcella	(M)o	+		++	+										
Punctum pygmaea	(M)						+								
Nesovitrea hammonis	(M)			+											

Trichia hispida	(M)	+		+			+								
Helicidae	T						+								
Psidium sp.	M S D C F	+									+	++	++	++	
operculuae	F								++++	+++	++	++	+++	+++	

A = ABUNDANT MO= MODERATE SP = SPARSE

+ 1-5 ++ 6-25 +++ 26-50 ++++ 51-100 +++++>100.

F = Flowing water D= Ditch (M) = Terrestrial species that can live in wet conditions
M = Obligate Marsh C = Catholic T = Terrestrial
S= Slum o = open
D= Ditch s= shaded
C = Catholic c= catholic

Pollen

by Sylvia Peglar

Introduction

Twelve samples were submitted for assessment for pollen. Pollen analysis has the potential for reconstructing the local environment, including agricultural practices, at the time of sediment deposition.

The samples were from two trenches on the site: five samples from Trench 19, which contains the thickest sequence of 'alluvial silts & organic sediments' (Bates 2003), and seven samples from Trench 8, probably with Pleistocene sediments, and with a Roman ditch fill in the base. The samples were also assessed for their diatom content.

Methodology

The samples were prepared for pollen analysis using a standard chemical procedure (method B of Berglund & Ralska – Jasiewiczowa (1986), using HCl, NaOH, sieving, HF, and Erdtman's acetolysis to remove carbonates, humic acids, particles >170 microns, silicates, and cellulose respectively. The samples were then stained with safranin, dehydrated in tertiary butyl alcohol, and mounted in 2000 cS silicone oil. Slides were examined at a magnification of 400x (1000x for critical examination) by equally spaced traverses across a slide to reduce the possible effects of differential dispersal on the slide (Brooks & Thomas 1967). The aim was to obtain a pollen count of at least 100 grains. This was achieved in 10 of the samples, but 2 contained very few pollen grains. Pollen identification was made using the keys of Moore *et al*. (1991) and Faegri & Iversen (1989), and a small modern pollen reference collection. As this was a rapid assessment, time was not spent on identifying pollen grains to the lowest possible taxonomic level unless immediately obvious. Indeterminable grains were also recorded, based on criteria given by Birks (1973), as an indication of the state of the pollen preservation. Charcoal particles >7microns were also recorded, together with some non-polliniferous remains found on the slides.

The results are given in Table 1 as percentages of the total pollen sum, SumP (trees + shrubs + herbs + ferns). Smears of fresh sediment in water were examined at a magnification of 1000x to determine if diatoms were present. The results are shown at the foot of table 1. + = present, (+) = very rare.

Results

Trench 19

At least 100 pollen grains were counted from all five samples. The preservation was quite good. From Table 1 it can be seen that there was some change in pollen assemblages from the basal sample (1909: 0.84 m) to the topmost sample (1903: 0.33 m). Although the samples are dominated by herb pollen, there is more tree and shrub pollen in the basal samples, particularly that of *Alnus* (alder), a tree of wetlands. As the tree pollen values decline, those of herbs and ferns increase, possibly suggesting clearance. Herb types include high values of Gramineae (grasses) and Cyperaceae (sedges), and other taxa which may be associated with grasslands and grazing: Compositae (Liguliflorae) (dandelion – type), and *Plantago lanceolata* (ribwort plantain). There is little evidence of arable cultivation (only one grain of cereal pollen), but cereals produce few large heavy pollen grains that are only dispersed a short distance, and with such a low pollen sum are unlikely to be encountered.

Increasingly higher values of Cyperaceae (sedges) and *Typha angustifolia/Sparganium* up through the sequence suggest the increasing development of sedge fen and wet grasslands around the site. The presence of pollen of the aquatics *Nuphar* (yellow waterlily) and *Potamogeton* (waterweed) in samples 1907: 0.46 m, and 1908: 0.58 m show that there was shallow water at the site at this time. This is further evidenced by the finding of the remains of the green alga *Mougeotia* in sample 1903: 0.40 m, which is indicative of warm, shallow, fresh water.

Reasonable numbers of diatoms were found in the two basal samples (1908: 0.58 m & 1909: 0.84 m).

Trench 8
The pollen from the samples from Trench 8 was of variable quality and quantity. That of the uppermost three samples (802: 0.22 m, 803: 0.28 m, 803: 0.36 m) was countable, but of rather poor preservation, with high values of indeterminable pollen. The assemblages were dominated by herb pollen, especially that of Gramineae (grasses) and Cyperaceae (sedges) indicating the preponderance of grasslands and wetlands, as in Trench 19. The samples also contained pollen of cereals, including that of oats and/or wheat, showing that arable farming was taking place close by.

The two samples 804: 0.22 m & 805: 0.70 m were impossible to count as they contained very little pollen. These are probably of Pleistocene age (Bates 2003). One dinoflagellate cyst was found, usually indicative of the sediment being laid down in a brackish/marine environment – but this is only one cyst. A couple of badly preserved (reworked?) bisaccate grains (from coniferous trees) were identified.

The pollen in the two basal samples from the Romano-British ditch fill was very well preserved, again dominated by grasses, sedges, and other herbs indicative of an open landscape with grasslands and grazing, and with some cereal grains evidencing arable activity close by. These two samples also contained *Cercophora* – type spores which are from coprophilous fungi, often indicative of animal dung, and *Gaeumannomyces* fungal spores which are associated with *Carex* (sedge) species.

Recommendations
Trench 19
Pollen was quite well preserved and of a high enough quality to enable further analyses to be undertaken to elucidate the local environment and agricultural activities which appear to have changed to some extent over the time represented by the samples. It is recommended that some further analyses be undertaken.

Trench 8
Pollen was not very well preserved, or almost non-existent, in the upper five samples from this trench, and no further work is recommended. However, pollen concentration and preservation was very good in the two basal samples from the ditch fill (809, 811). It is recommended that full analyses be undertaken from the ditch fill, so that a fuller picture of the local environment and agricultural activities at the time of sedimentation may be obtained.

Table 8: Results of palynological assessments as percentages of total terrestrial pollen and spores

Context **Depth (m)**		1903 0.32	1903 0.40	1907 0.46	1908 0.58	1909 0.84	802 0.22	803 0.28	803 0.36	804 0.48	805 0.70	809 Ditch	811 Ditch
Trees & Shrubs													
Betula	Birch	-	-	-	-	-	0.7	-	-	-	-	0.7	0.7
Pinus	Pine	-	-	0.8	0.9	1.7	0.7	-	0.9	-	-	1.4	-
Quercus	Oak	1.7	1.1	-	1.8	1.7	1.4	0.8	-	-	-	-	1.3
Tillia	Lime	-	-	-	-	0.9	-	-	-	-	-	-	-
Alnus	Alder	-	1.1	0.8	3.6	10.3	-	0.8	0.9	-	-	0.7	2.6
Fraxinus	Ash	-	-	-	-	-	-	-	-	-	-	-	0.7
Corylus	Hazel	0.9	0.6	1.6	4.6	2.6	1.4	-	0.9	-	-	-	-
Salix	Willow	-	0.6	-	0.9	1.7	0.7	-	-	-	-	-	-
Herbs													
Gramineae	Grass family	40.0	42.2	33.2	35.5	44.7	25.6	35.7	21.2	3*	2*	38.5	46.8
Cerealia und.	Cereals	-	-	0.8	-	-	1.4	1.5	-	-	-	-	1.3
Avena/Triticum-type	Oats / Wheat	-	-	-	-	-	1.4	-	-	-	-	-	0.7
Cyperaceae	Sedge family	41.8	39.9	35.6	25.5	17.2	51.1	51.7	47.8	6*	1*	28.0	11.7
Solidago-type	Daisy-type	-	0.6	-	-	-	0.7	1.5	1.8	-	-	1.4	2.6
Achillea-type	Yarrow-type	-	0.6	-	-	-	0.7	-	0.9	-	-	-	-
Centaurea nigra-type	Knapweed-type	-	-	0.8	0.9	-	-	-	-	-	-	-	-
Compositae (Liguliflorae)	Dandellion-type	2.6	1.7	6.5	8.2	0.9	3.6	4.6	18.4	-	-	8.4	5.2
Cerastium-type	Chickweed-type	-	0.6	-	-	-	-	-	-	-	-	-	-
Caryophyllaceae und.	Chickweed family	-	0.6	-	-	-	-	-	-	-	-	-	-
Chenopodiaceae	Goosefoot family	-	0.6	0.8	0.9	-	-	-	-	-	-	0.7	0.7
Capsella-type	Shepherd's purse-type	1.7	1.1	-	0.9	0.9	-	-	-	-	-	0.7	1.3
Sinapis-type	Mustard-type	0.9	-	-	-	-	2.8	-	-	-	-	-	-
Filipendula	Meadowsweet	-	-	-	-	-	-	-	-	-	-	8.4	7.8
Lotus-type	Trefoil-type	-	-	-	-	-	-	-	-	-	-	-	0.7
Trifolium-type	Clover-type	-	-	-	-	1.7	-	-	-	-	-	-	-
Vicia/Lathyrus	Vetch/Pea	-	-	-	-	-	-	-	-	-	-	-	1.3
Mentha-type	Mint-type	-	-	-	-	-	-	-	-	-	-	-	0.7
Plantago lanceolata	Ribwort plantain	0.9	0.6	3.4	5.5	6.0	2.1	2.3	-	-	-	2.8	7.8
Plantago major/P. media	Greater / hoary plantain	-	-	-	1.8	-	-	-	-	-	-	-	-
Polygonum aviculare-type	Knot grass	-	-	-	-	-	-	-	-	-	-	-	0.7
Ranunculus acris-type	Buttercup-type	-	-	-	-	0.9	-	-	-	-	-	-	1.3
Rhinanthus-type	Yellow rattle-type	-	-	-	-	-	-	-	-	-	-	0.7	-
Rosaceae und.	Rose family	0.9	-	-	-	0.9	-	-	-	-	-	-	-
Rubiacae	Bedstraw family	0.9	0.6	-	0.9	0.9	-	-	-	-	-	-	-

Rumex acetosa-type	Common sorrel-type	1.7	0.6	0.8	-	-	-	-	0.9	-	-	1.4	0.7
Rumex crispus-type	Dock-type	-	-	-	-	-	-	-	-	-	-	-	0.7
Umbelliferae	Carrot family	-	2.3	1.6	-	2.6	-	-	0.9	-	-	2.1	-
Urtica	Nettle	-	-	0.8	-	1.7	-	-	-	-	-	2.1	2.0
Ferns & fern allies													
Equisetum	Horsetail	-	1.1	-	-	-	-	-	-	-	-	-	-
Polypodium	Polypody fern	-	-	-	-	0.9	-	-	-	-	-	-	-
Pteridium	Bracken	4.4	2.9	8.9	6.4	-	2.1	0.8	2.8	-	-	1.4	0.7
Dryopteris-type	Und. Ferns	0.9	1.7	3.4	1.8	0.9	2.8	-	2.8	1*	-	-	0.7
Aquatics													
Iris	Iris	-	-	0.7	-	-	-	-	-	-	-	-	-
Nuphar	Yellow waterlily	-	-	0.7	-	-	-	-	-	-	-	-	-
Potamogeton	Waterweed	-	-	-	1.7	-	-	-	-	-	-	-	-
Typha latifolia	Bulrush	-	-	-	0.9	-	-	-	-	-	-	-	-
T. angustifolia/Sparganium	Bulrush	5.7	6.1	9.4	2.6	1.7	6.0	7.1	4.4	1*	-	7.8	5.5
Sphagnum	Bog moss	-	-	0.8	0.9	-	-	-	0.9	-	-	-	-
Indeterminable													
Broken		0.8	-	-	0.8	0.8	-	-	0.8	-	-	0.7	0.6
Concealed		-	-	0.7	0.8	-	-	0.7	0.8	-	-	-	-
Corroded		2.4	2.2	1.4	3.2	0.8	9.2	6.8	12.3	5*	1*	0.7	-
Crumpled		1.6	1.1	0.7	2.4	0.8	4.3	2.0	1.5	-	-	0.7	0.6
Degraded		-	0.5	0.7	-	-	-	-	-	-	-	1.4	1.9
Unknown		0.8	0.5	-	-	1.6	-	0.7	0.8	-	-	-	1.3
Charcoal		53.4	62.0	62.6	54.6	53.6	67.6	52.2	72.2	-	-	66.3	62.2
Sum Trees & Shrubs		2.6	3.4	3.2	12.7	18.9	5.0	1.5	2.8	n/a	n/a	2.8	5.2
Sum Herbs		92.2	90.9	84.6	79.1	79.2	90.0	97.7	91.7	n/a	n/a	95.8	93.5
Sum Ferns		5.2	5.7	12.2	8.2	1.7	5.0	0.8	5.5	n/a	n/a	1.4	1.3
No. of grains in pollen sum		115	177	123	110	116	140	131	109	n/a	n/a	142	153
Diatoms		-	-	(+)	+	+	+	(+)	(+)	-	-	(+)	(+)

(SumP = sum of trees + shrubs + herbs + ferns).
Aquatics, Sphagnum, indeterminable, and charcoal, are given as percentages of SumP + sum aquatics, SumP + Sphagnum, SumP + sum indeterminable, and SumP + charcoal, respectively.
* = no. of grains und.= undifferentiated

Ostracods

by John E. Whittaker,

Methodology

Six samples from Trench 19, nominally of 200 g each were taken for retrieval of microfossils. The sample numbers, their contexts and actual weights washed, are given below:

Sample	context	depth in trench	weight (wet) washed
12	1903	50 cm	250 g
13	1907	55-60 cm	290 g
14	1908	60-65 cm	300 g
16	1909	70-75 cm	350 g
18	1909	80-85 cm	250 g
23	1910	115-125 cm	240 g

Each of the samples were first thoroughly dried in an oven, then soaked in hot water (with a little sodium carbonate added to remove the clay fraction) and finally washed through a 75 micron sieve. The residues were again dried and picked for their microfaunal content.

Results

The significant organic remains found in the samples are listed (on a mere presence/absence basis) in Table 9.

Table 9: Microfaunal remains

ORGANIC REMAINS	12 <1903>	13 <1907>	14 <1908>	16 <1909>	18 <1909>	23 <1910>
molluscs	x	x	x	x	x	x
Bithynia operculi	x	x	x	x	x	
charophyte oospores	x	x	x	x	x	
earthworm granules	x		x			
freshwater ostracods	x	x	x	x	x	x
fish bone/teeth		x	x			
amphibian bone			x	x		
small mammal bone/teeth			x	x	x	
insects				x		
slug plates						x

Molluscs were found in all the samples while *Bithynia* operculi occurred in all but sample 23, and in many cases they were very common. Charophytes oospores (fruiting bodies of the stonewort) were also found in all but sample 23, and in samples 14, 16 and 18 they were extremely abundant. Useful finds were also made of fish bone/teeth, amphibian bone and small mammal bone/teeth in spite of the relatively small samples; bulk samples should be even more rewarding. Simon Parfitt (The Natural History Museum, pers. comm.) additionally reports the following identifications: the presence of a 9-spine stickleback dorsal spine in sample 13; cyprinid (fish) teeth in sample 14; amphibian bone (either frog or toad) in samples 14 and 16; and small vole (*not* water vole) teeth in samples 16 and 18. Seeds were noticeable in the more organic-rich samples and in sample 16 many seeds of the distinctive horned-pondweed, *Zannichellia palustris,* were much in evidence.

Table 10: Freshwater ostracods

FRESHWATER OSTRACODS	12 <1903>	13 <1907>	14 <1908>	16 <1909>	18 <1909	23 <1910>

Candona neglecta (Sars, 1887)	x	xx	xx	xxx	x	x
Limnocythere inopinata (Baird, 1843)		xx	x	x		
Nannocandona faba (Ekman, 1914)		xx	x			
Ilyocypris bradyi (Sars, 1890)		x	xx	xxx	x	
Pseudocandona marchica (Hartwig, 1899)		x		x		x
Herpetocypris reptans (Baird, 1835)		o	x	x	o	
Cypridopsis vidua (O. F. Muller, 1776)		o	o	x		o
Cyclocypris laevis (O. F. Muller, 1776)				x		

o - one specimen; x - present (a few specimens); xx - common; xxx - abundant

Freshwater ostracods occurred in all the samples, but only in any great abundance in samples 13, 14 and 16.
The supposed Pleistocene age of sample 23 <context 1910> can neither be proved or disproved, as it contains few ostracods, none of any age significance, and none which do not occur higher in the sequence.

The other samples are presumed to be Holocene in age. Samples 18 (from the proposed lower alluvium) and sample 12 (from the upper alluvium) also contained few ostracods, but because of the very nature of the deposit (laid down in flowing water) the ostracods might have been more susceptible to dispersal or breakage.

It is the organic-rich silty-sands of samples 13, 14, and 16 which have the best ostracod faunas and about which most can be said. All the species (Table 10), particularly the common/abundant ones, indicate a permanent shallow body of water, either fed by springs or by associated rivers/streams. The water must have been, at most, very slow flowing (as *Ilyocypris bradyi*, which occurs in large numbers, cannot swim). The large number of whole carapaces (of several species) in sample 16 in particular, moreover, indicates calm conditions of sedimentation and total lack of transport. It was also well vegetated (evidenced by the charophyte remains, the horned-pondweed seeds and several weed-liking ostracods), before "silting-up" and ultimately becoming a swamp. This last phase is clearly shown by the increasing abundance of the ostracod *Nannocandona faba* which has a semi-terrestrial habitat, living within the surface vegetation.

Recommendations

Freshwater ostracods occur in great abundance in some of these samples and preservation is always good; at least there is no sign of decalcification. With only a very few samples it has still been possible to reconstruct the environment of a major part of the section in Trench 19. I would suggest that this trench contains the thickest sequence for the very reason that it marks the centre of a shallow waterbody, which silted up and became a swamp. Dependant on how much variability is suspected over the whole, very extensive site, other trenches could be examined for ostracods (particularly as samples have already been taken). For instance, Trench 11, which it has been suggested (Bates 2003) may have a marginal location to this waterbody and of some archaeological potential, would have a high priority. Further work on the supposed Pleistocene deposits at the base of the sequence could also be done. If they are of Devensian age and of the right facies, then there are several cold-indicator ostracods which may be expected.
Finally Simon Parfitt (pers. comm.) recommends that, should OSL dating be undertaken on these samples and that an Early Holocene age be proven, then the small vertebrate remains would be of great significance as there are virtually no such assemblages of this age from the British Isles.

Acknowledgement

I acknowledge the kind assistance of Simon Parfitt for his identifications and comments on the fish/amphibian/small mammal remains and their potential.

APPENDIX 6 REFERENCES

Bates, M R, 2003 *Cambridge Rowing Lake. Geoarchaeological notes prepared for Oxford Archaeology following a site visit,* Report to Oxford Archaeology, dated 16.9.2003. 3pp.

Berglund, B E, & Ralska-Jasiewiczowa, M, 1986 Pollen analysis and pollen diagrams, in B E Berglund (ed), *Handbook of Holocene Palaeoecology and Palaeohydrology*, Wiley, Chichester, 455-484.

Birks, H J B, 1973 *Past and Present Vegetation of the Isle of Skye – a Palaeoecological Study*, Cambridge University Press..

Boessneck, J, 1969 Osteological Differences in Sheep (*Ovis aries* Linné) and Goat (*Capra hircus* Linné), in D Brothwell and E Higgs (eds), *Science in Archaeology*, Thames and Hudson, 331-358.

Brooks, D, & Thomas, K W, 1967 The distribution of pollen grains on microscope slides. The non randomness of the distribution, *Pollen & Spores* **9**, 621-629.

Faegri, K, & Iversen, J, 1989 *Textbook of modern pollen analysis (*4th ed), Wiley, Chichester.

Evans, J G, 1991 An approach to the interpretation of dry- ground and wet-ground molluscan taxocenes from central-southern England, in D R Harris and K D Thomas, *Modelling ecological Change,* London, University College, 80-95.

Grant, A, 1982 The Use of Tooth Wear as a Guide to the Age of Domestic Ungulates, in B Wilson *et al* (eds), *Ageing and Sexing Animal Bones from Archaeological Sites*, BAR British Series **109**, Oxford, 91-108.

Halstead, P, 1985 A Study of Mandibular Teeth from Romano-British Contexts at Maxey, in F Pryor, *Archaeology and Environment in the Lower Welland Valley*, East Anglian Archaeology Report **27**, 219-224.

Kerney, M P, 1999 *Atlas of the land and freshwater molluscs of Britain and Ireland*, Harley Books, Colchester.

Levine, M A, 1982 The Use of Crown Height Measurements and Eruption-Wear Sequences to Age Horse Teeth, in B Wilson *et al* (eds), *Ageing and Sexing Animal Bones from Archaeological Sites*. BAR British Series **109**, 223-250.

Lyman, R L, 1996 *Vertebrate Taphonomy*, Cambridge Manuals in Archaeology, Cambridge University Press, Cambridge.

Moore, P D, Webb, J A, & Collinson, M E, 1991 *Pollen analysis*, Blackwell Scientific Publications, Oxford.

OA 2003 *Research Design for the Archaeological Mitigation of the Cambridge Rowing Lake in the Parishes of Miltoon, Landbeach and Waterbeach, Cambridgeshire (Revised)*, Oxford Archaeology.

OAU 1992 Fieldwork Manual (1st edition, ed. D Wilkinson).

Prummel, W, and Frisch, H-J, 1986 A Guide for the distinction of species, sex and body size in bones of sheep and goat, *J Archaeol Science* **13***,* 567–577.

Robinson M, 1979 Biological evidence, in G Lambrick and M Robinson, *Iron Age and Roman riverside settlements at Farmoor, Oxfordshire*, CBA Research Report **32**, 77-133.

Robinson M, 1988 Molluscan evidence for pasture and meadowland on the floodplain of the Upper Thames basin, in P Murphy and C French (eds), *The Exploitation of Wetlands*, BAR British Series **186**, 101-112.

Robinson, B and Guttmann, E B, 1996 *An Archaeological Evaluation of the Proposed Site of the Cambridge Rowing Trust Rowing Lake at Milton and Waterbeach, Cambridgeshire*. Cambridgeshire County Council Archaeological Field Unit Report No. **120**.

Serjeantson, D, 1996 The Animal Bones, in E S Needham and T Spence (eds), *Refuse and Disposal at Area 16, East Runnymead: Runnymead Bridge Research Excavations,* Vol. 2, British Museum Press, London.

Silver, I, A, 1969 The Ageing of Domestic Animals*,* in D. Brothwell and E.S. Higgs*, Science in Archaeology*, Thames and Hudson, London, 283-302.

von den Driesch, A, 1976 *A Guide to the Measurement of Animal Bones from Archaeological Sites*, Peabody Museum.

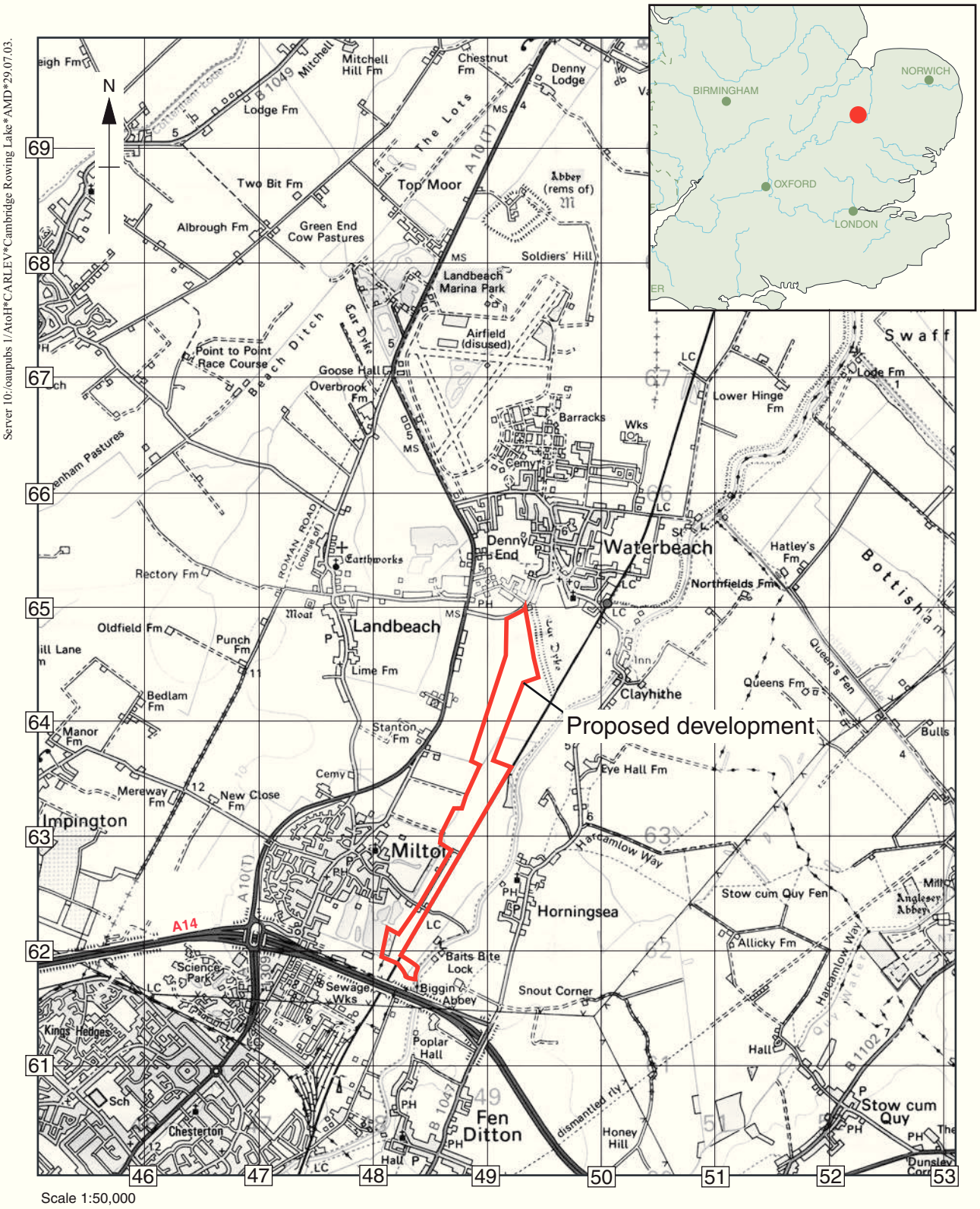
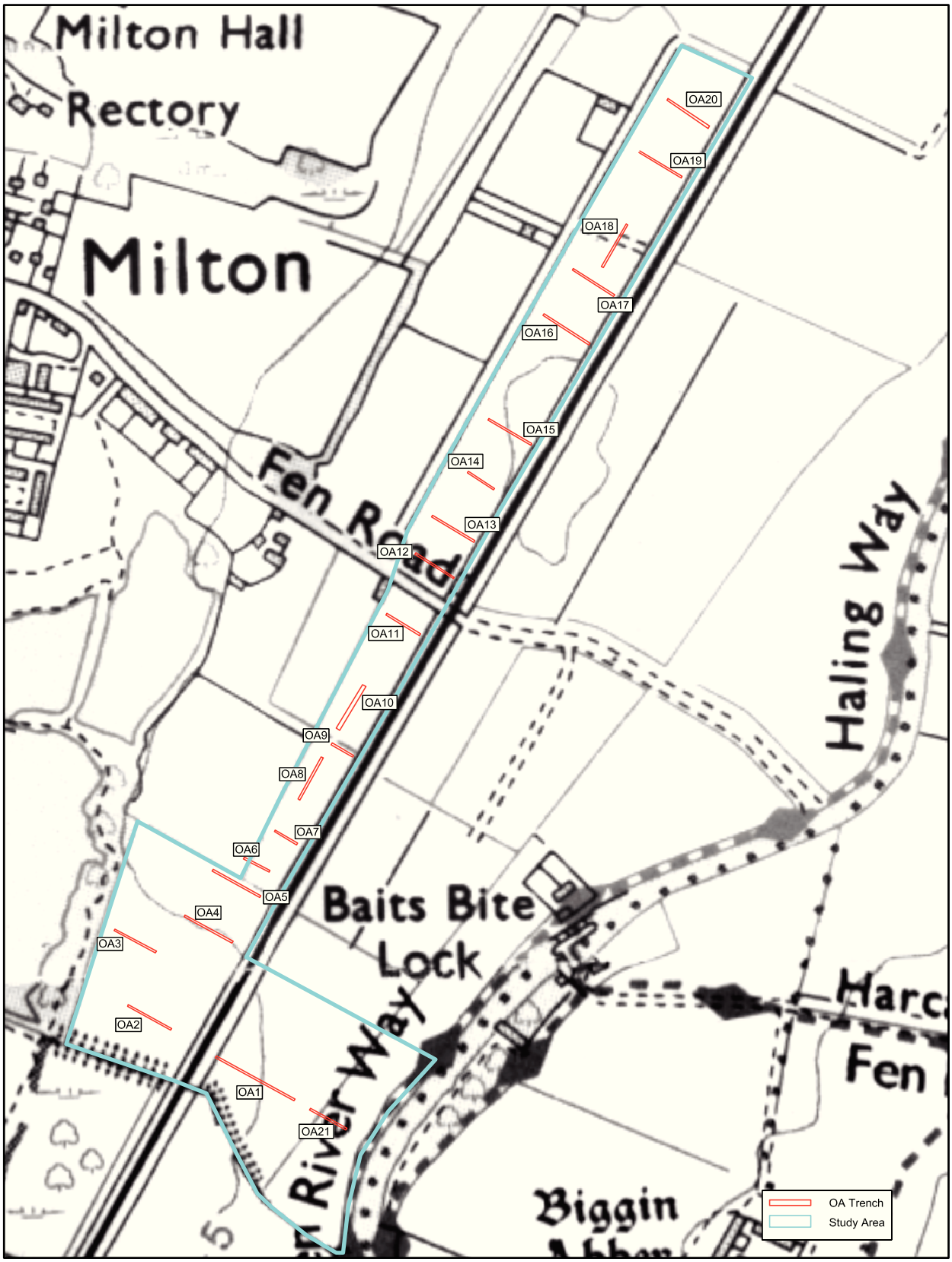


Figure 1: Site location

Server 10:/oaupubs 1/AtoH*CARLCO2*Cambridge Rowing Lake*LM*03.02.04.



0 250 m
1:4,000

Figure 2: Trench Location Plan

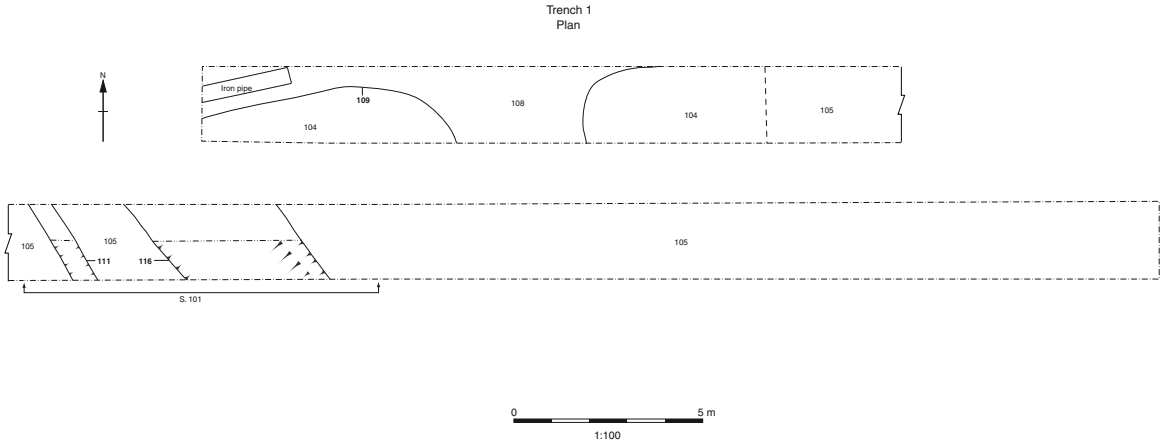


Figure 3: Trench 1. Plan and section through ditches 111 and 116

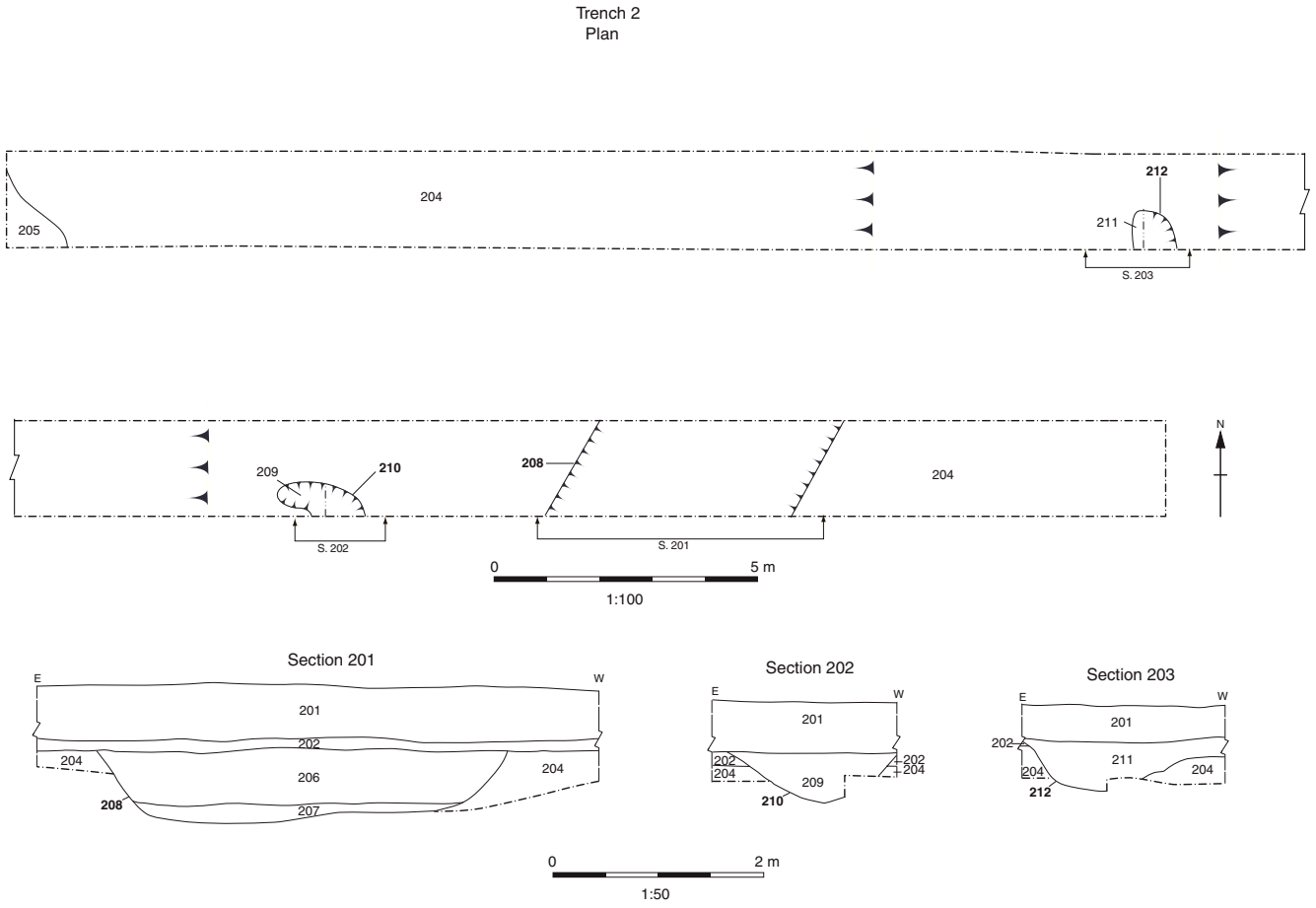


Figure 4: Trench 2. Plan and sections through paleochannel 208 and tree throw holes 210 and 212.

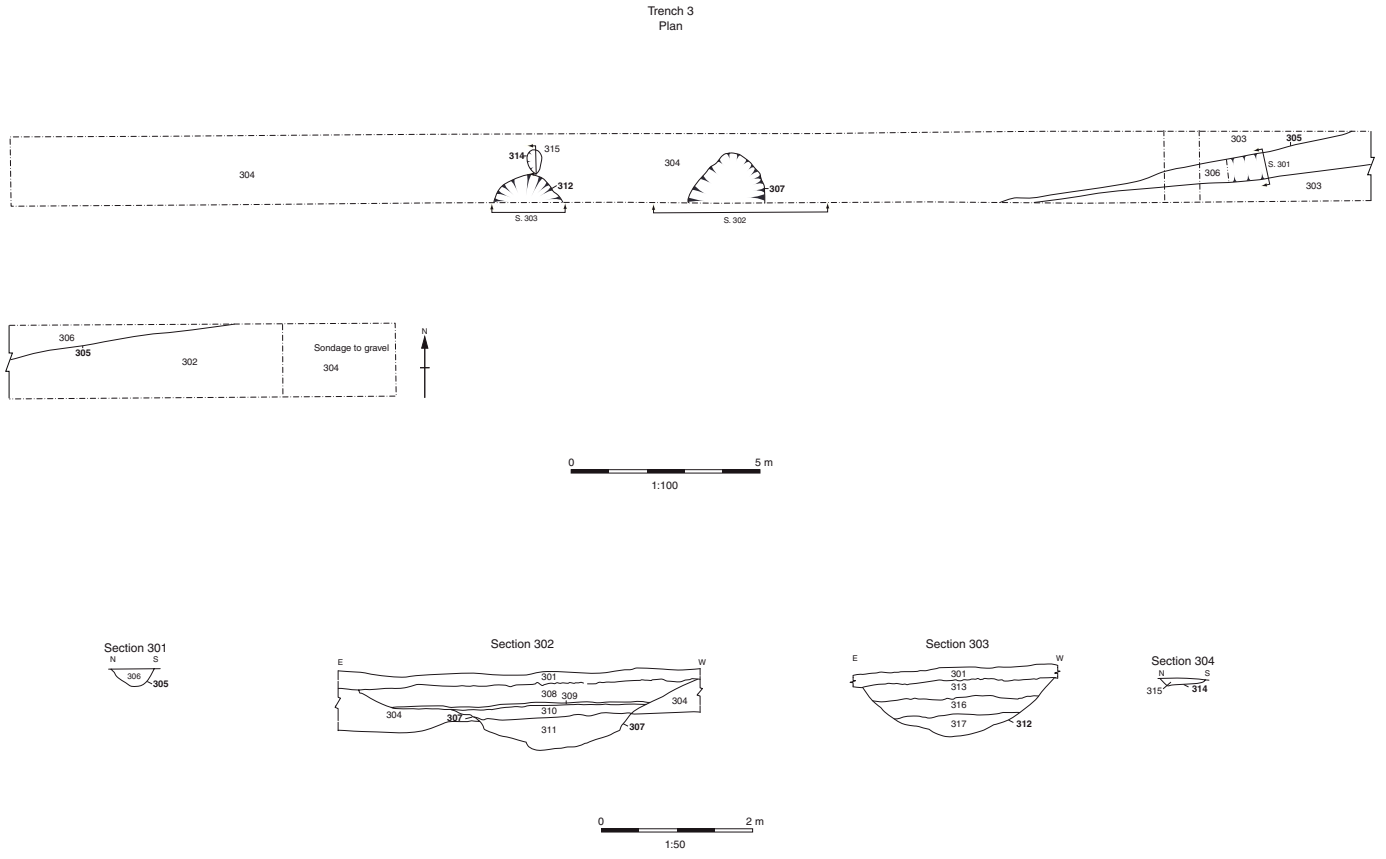


Figure 5: Trench 3. Plan and sections through ditch 305, pits 307 and 312 and posthole 314

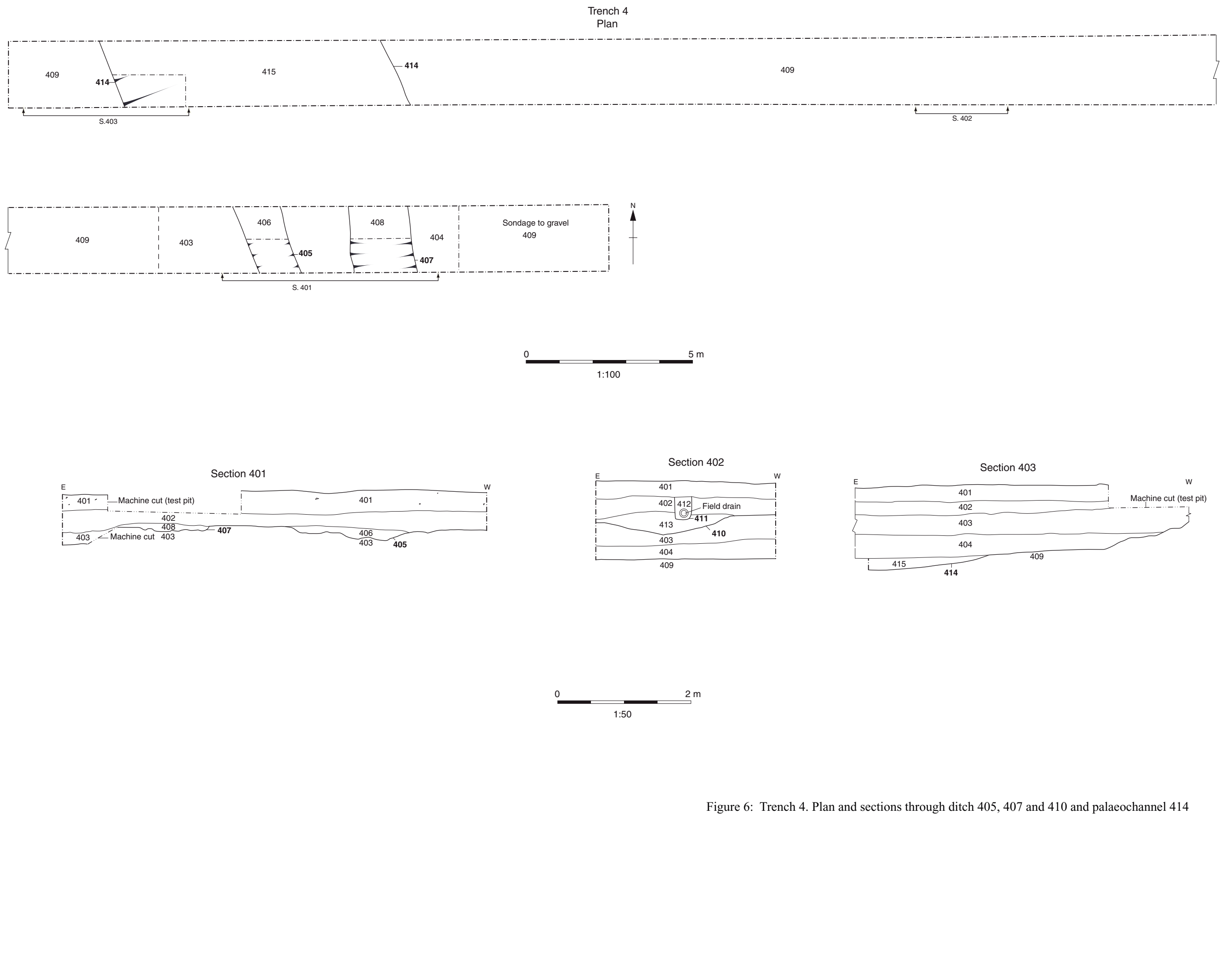
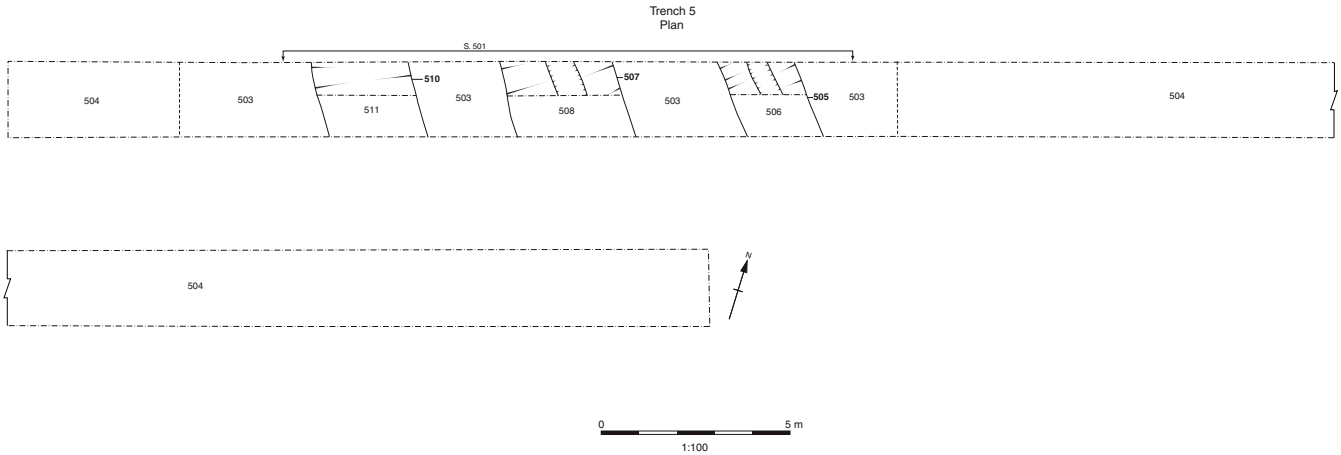


Figure 6: Trench 4. Plan and sections through ditch 405, 407 and 410 and palaeochannel 414



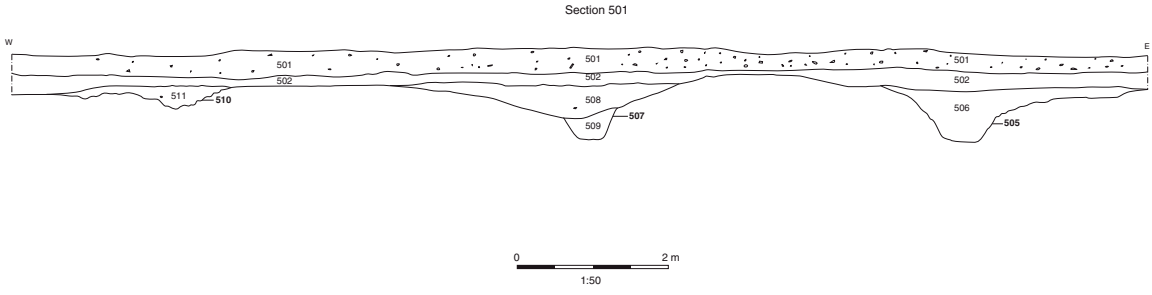
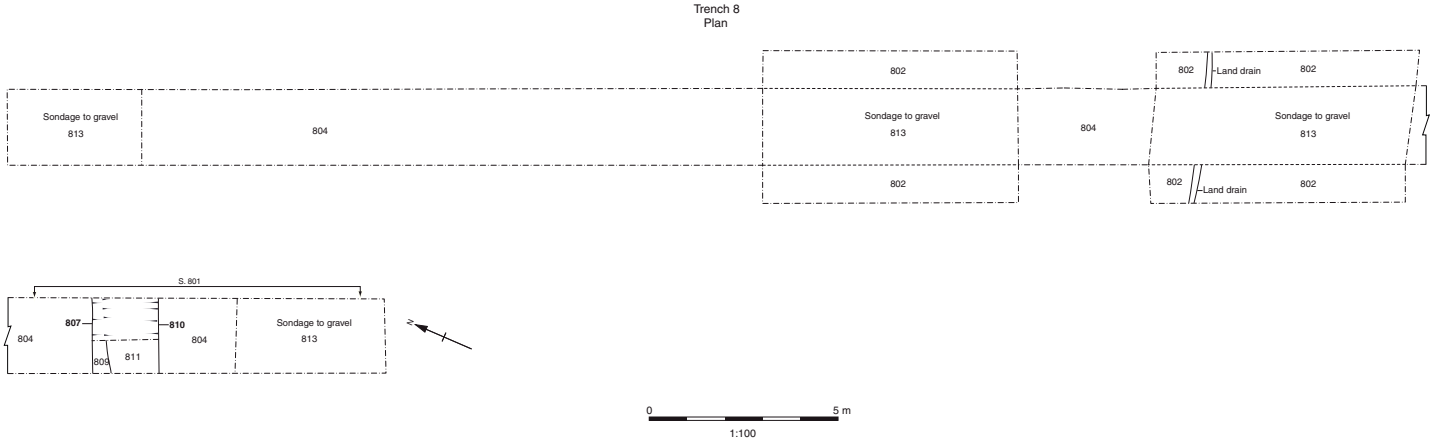


Figure 7: Trench 5. Plan and section through ditches 505, 507 and 510



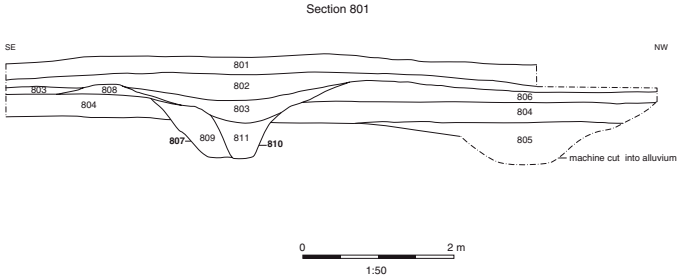


Figure 8: Trench 8. Plan and section through ditch 807

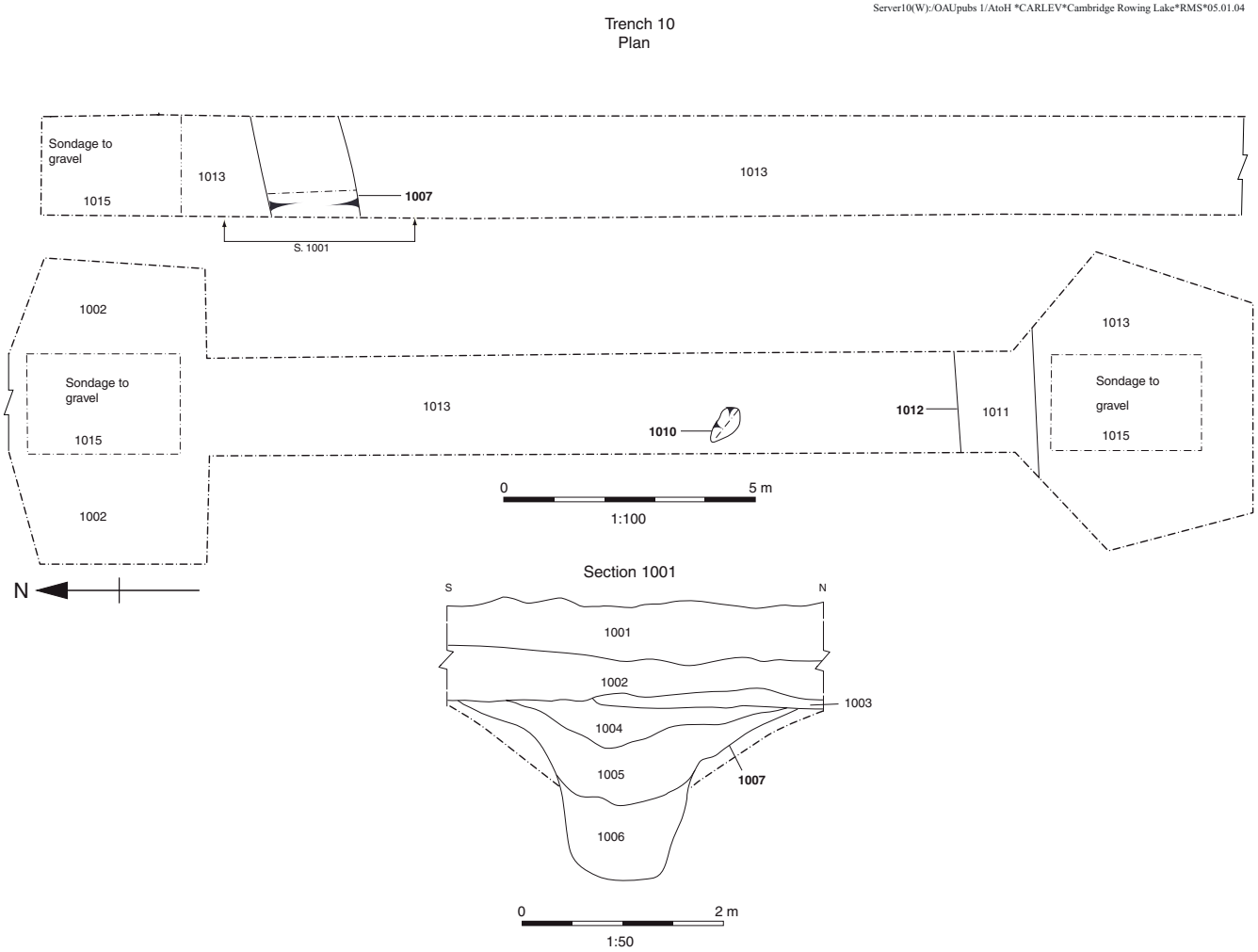


Figure 9: Trench 10. Plan and section through ditch 1007

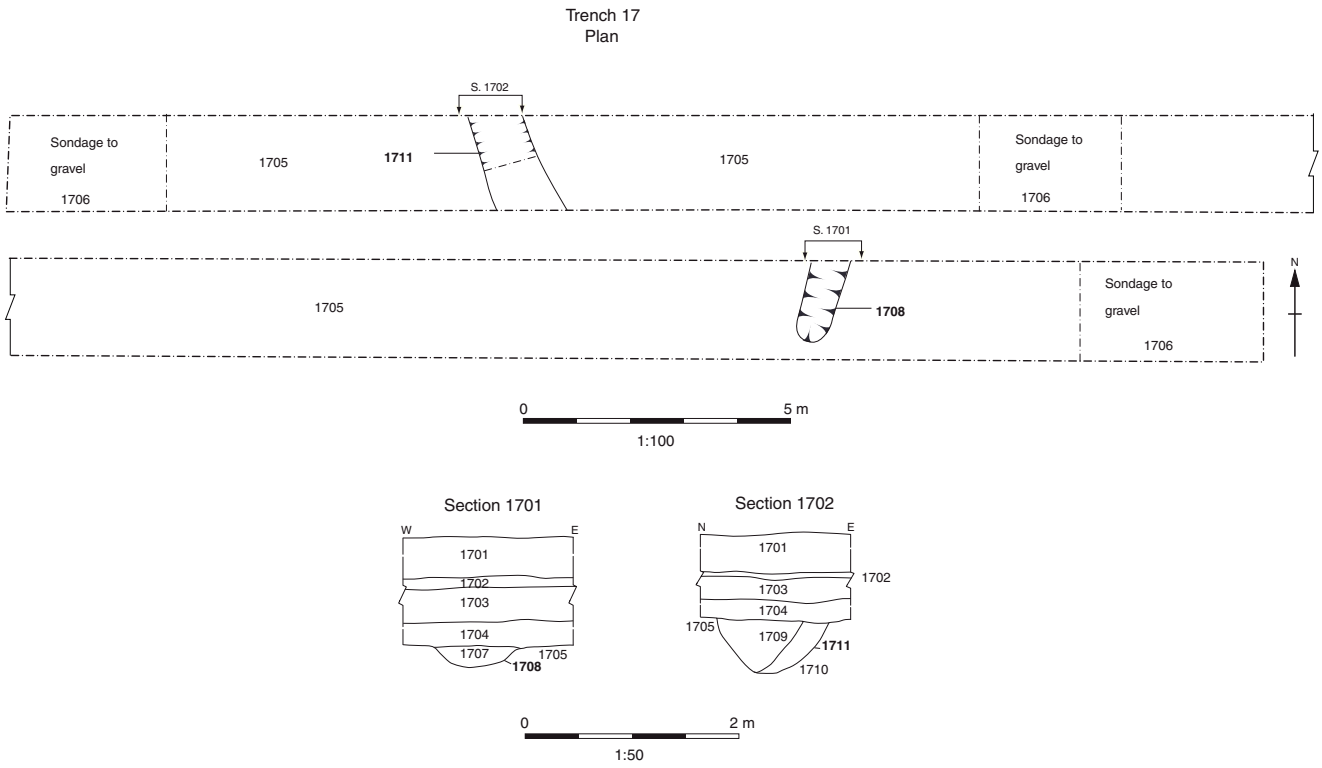


Figure 10: Trench 17. Plan and sections through ditches 1708 and 1711

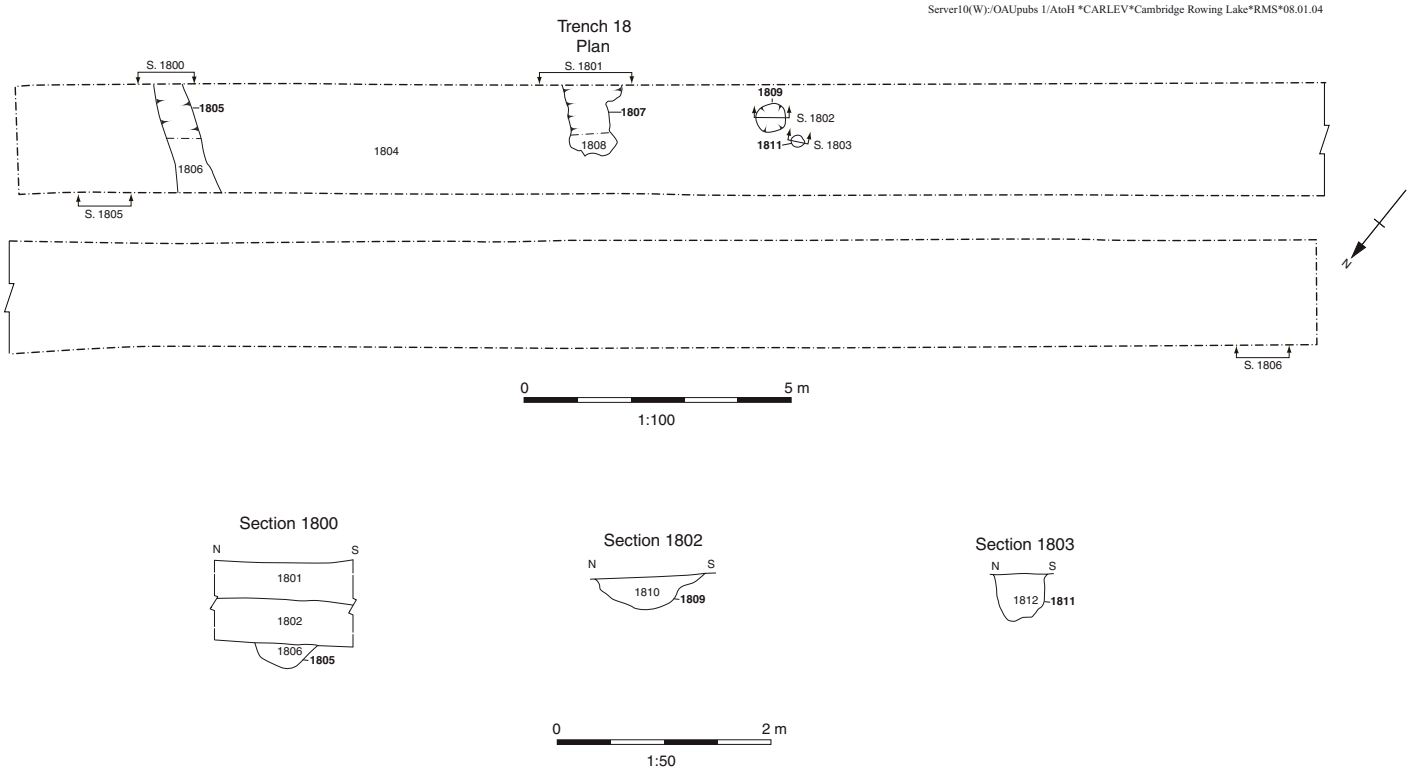
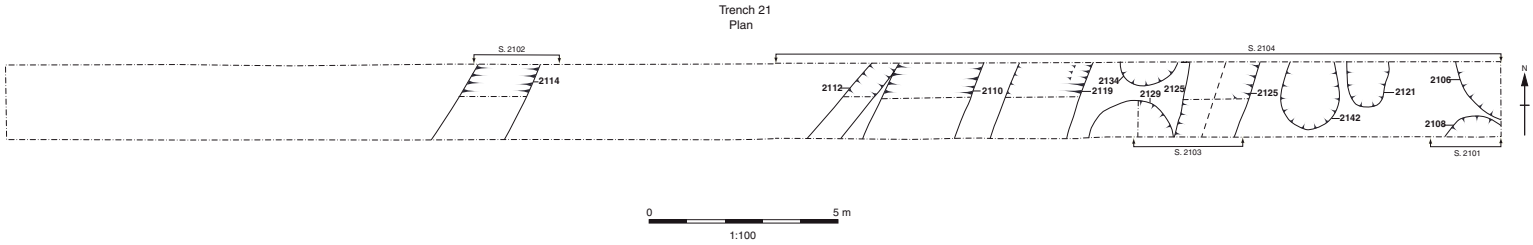
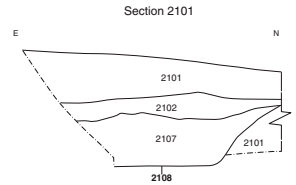
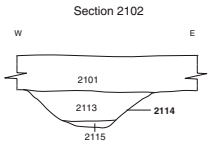
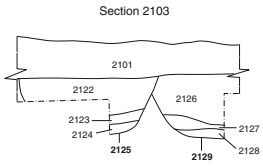


Figure 11: Trench 18. Plan and sections through ditch 1805, pit 1809 and posthole 1811









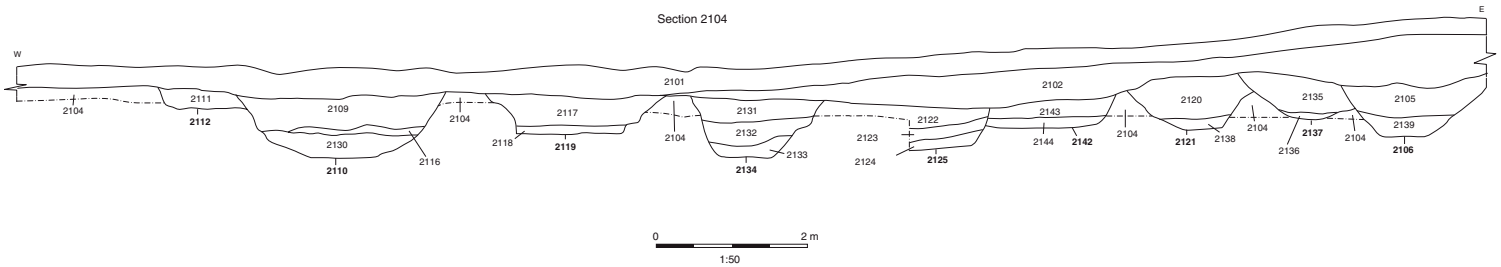


Figure 12: Trench 21. Plan and sections