UPDATED RESEARCH DESIGN

FOR THE

ARCHAEOLOGICAL MITIGATION

OF THE

CAMBRIDGE SPORT LAKES

IN THE PARISHES OF

MILTON, LANDBEACH AND WATERBEACH

CAMBRIDGESHIRE

Cambridge Rowing Trust
Oxford Archaeology
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Contents

1 INTRODUCTION AND SCOPE OF DOCUMENT

1.1 Introduction

1.1.1 The Cambridge Rowing Trust proposes to construct a 2000 m, international competition standard Rowing Course north of Cambridge on land lying in the parishes of Milton, Waterbeach and (to a much lesser extent) Landbeach. The development area, centred at *c* NGR TL 490635, lies to the west of the River Cam in an archaeologically rich area, including gravel terrace settlement and complementary floodplain locales with potentially rich environmental deposits.

1.1.2 From the beginning of the project it was clear from aerial photographic and other evidence that significant archaeological sites existed in the area under consideration and that the excavation of the Rowing Lake itself and associated watercourses would remove any archaeological features in its course. An initial summary of the state of knowledge of the project area, drawing on a variety of background sources including the County Sites and Monuments Record and taking account of fieldwalking and a small excavation carried out by Professor Frend, was produced by David Miles of the Oxford Archaeological Unit (OAU, now Oxford Archaeology [OA]) in May 1993 (Miles 1993). The westerly line for the main rowing course, indicated in this document (ibid, Fig. 1), was specifically selected as it appeared to be the least damaging archaeologically, though other possible lines had been considered. The westerly route has always been considered preferable from an archaeological point of view, but it is now presented with a channel only 100 m wide rather than the 150 m proposed in an earlier version of the scheme on the same alignment.

1.1.3 A more thorough review of the aerial photographic evidence for the project area was undertaken by Air Photo Services for Cambridgeshire County Council and this work was reported upon in March 1994 (Palmer 1994). While additional cropmark evidence was recorded and the character of crop response across the area was assessed systematically, no significant new concentrations of cropmark features were revealed.

1.1.4 Further work was required to provide more detailed information on the nature and potential of archaeological deposits within the development area, and in particular on the suggested line of the rowing course itself. The principal issue here was to determine if the relative absence of cropmark features evident on the aerial photographs was a true representation of the situation below ground. A specification for archaeological evaluation was drawn up in April 1995 (OAU 1995) and the work was carried out by the Archaeological Field Unit of Cambridgeshire County Council in October and November of that year. This was reported upon in February 1996 (Robinson and Guttmann 1996). The observed pattern of cropmark densities was broadly confirmed, but significant additional information was obtained on a number of aspects, particularly of the pre- and post-Roman use of the area.

1.1.5 In 2003, a preliminary Research Design was drawn up by Oxford Archaeology (OA 2003a) which set out the archaeological potential of the site and proposed a suite of measures designed to mitigate the impact of the scheme proposals upon the archaeological resource. The measures included proposals for a first stage of mitigation to evaluate further certain areas of the site not covered during the earlier phase of mitigation and to produce a sub-

surface deposit model. To this end, a second phase of evaluation was undertaken by Oxford Archaeology in autumn 2003 (OA 2004) which concentrated on areas of alluvial deposits at the southern end of the site.

1.1.6 In autumn 2004, Oxford Archaeology carried out a third phase of evaluation (OA 2005a), consisting of both geophysical survey and trial trenching, in a previously largely unevaluated area of the site.

1.1.7 Finally, in June 2005, Oxford Archaeology produced a sub-surface deposit model drawing upon the results of all previous phases of work (OA 2005b).

1.2 Scope of Document

1.2.1 The present document updates the previous Research Design (OA 2003) with the results of the evaluation work carried out since it was produced and in the light of the most recent design of the rowing lake and associated structures. It follows the same format as the previous document and much of the content, particularly relating to the background to the site, remains unaltered. It outlines the location and physical setting of the project area (section 2), assesses the current state of knowledge of the archaeology of the Rowing Lake area (section 3) and the research frameworks against which the perceived importance of the various components of the area may be judged (section 4). The document has benefited from advice and comments on an earlier draft from a number of authorities with expertise in the archaeology of the region. The direct and indirect effects of the various aspects of the Rowing Lake construction process on the archaeological resource are considered (section 5) and proposals for a range of mitigation techniques put forward (section 6). These proposals are presented at a level of detail sufficient to demonstrate their appropriateness in relation to the issues already discussed, while the fine detail of (for example) excavation and sampling methodologies tailored to individual component areas of the site will be presented as a further stage of project documentation (cf section 6.1.7 below).

1.2.2 In the following discussion the nomenclature of the archaeologically defined 'Areas' of the development site and its immediate surroundings follows that of the 1995 evaluation (with 10 numbered Areas). This in turn was based upon the scheme set out in the evaluation specification (OAU 1995, Fig 2), based on cropmark areas, with the addition of two surface scatters (Areas 9 and 10) of Anglo-Saxon pottery (Robinson and Guttmann 1996, 1, 5).

1.2.3 Where previous evaluation work is referred to, trenches excavated during the 1995 evaluations are prefixed with CCC, those excavated in 2003 are prefixed with OA and those excavated in 2004 are prefixed with TT.

2 LOCATION AND PHYSICAL SETTING

2.1 Introduction

2.1.1 The development area covers approximately 100 ha of land on gravel terraces west of the River Cam at the southern limit of the fenland. It extends from south to north between the medieval and modern villages of Milton and Waterbeach (from TL 482620 to TL 493649), lying east of the A10 and bounded on the eastern side by the Cambridge to Ely railway line.

The land is low-lying, rising from about 3 m OD at its eastern margin to a maximum of *c* 6-6.5 m at the north end, where localised earthwork features are slightly higher.

2.1.2 The underlying geology of the development area consists of gravels of the first and second terraces. These overlie Gault clays, which outcrop in Waterbeach parish but not within the area of the Rowing Lake. At the eastern margins of the site the gravels are sealed beneath alluvial deposits which incorporate peat deposits in places.

2.1.3 Gravel terrace locations are favoured for prehistoric, Roman and medieval settlement. The gravel terraces are relatively free draining and fertile yet are adjacent to the complementary resources of the fenland, without being so vulnerable to the fluctuations of water-level brought on by climatic change, land/sea level changes or human (mis) management.

2.1.4 The area lay for the most part within the open field systems of Milton and Waterbeach and in land which was pasture by the beginning of the 19th century. The southern end of the development area, however, in Milton parish, is situated on land which, in about 1800, was still fen common pasture (Wright and Lewis 1989, 140). Recent land use is principally arable, but with some permanent pasture (Palmer 1994, Fig 2) and some set-aside. Limited parts of the development area have seen small-scale gravel extraction, with larger scale workings in Milton just to the west of the southern end of the development area. Clay is also extracted at Milton, from a site west of the village.

3 THE ARCHAEOLOGICAL RESOURCE

3.1 Introduction

3.1.1 While clearly rich in evidence for past activity this is not an area which has been subject to much systematic archaeological study until recently. It was covered by the *Fenland in Roman Times* survey (Phillips 1970), but this involved compilation of existing data rather than initiation of new survey and other work. The archaeological background to much of the immediate area was summarised by Miles (1993), while a review of the archaeological significance of the project area, updated in the light of the results of the 1995 evaluation, is provided in the report on that work (Robinson and Guttmann 1996, 77-81). The principal sources used in these summaries include a variety of site specific excavation reports (see 3.2.5-3.2.7 below) dating from the beginning of this century onwards, data held in the County Sites and Monuments Record, and more wide ranging work since 1990. Parts of the site which lie on Manor Farm (Milton) and Hall Farm (Waterbeach) have been characterised by Malim (1990, 72-74, 122-125) but with an emphasis on management rather than detailed discussion of the available evidence, which in this case consisted mainly of aerial photographs. The background to the archaeology of the area has also been summarised by Reynolds and Leith (1992) in the context of the study of the A10 corridor between Cambridge and Ely. An important contribution to understanding of the northern part of the project area has now been made by the publication of the relevant part of the Fenland Survey, which includes the parishes of Landbeach and Waterbeach (Hall 1996). In addition to this, the archaeological resource of the wider region - East Anglia - has been summarised (Glazebrook 1997) as a basis for determining research priorities for the region, and a research agenda for the region has now been drawn up (Brown and Glazebrook 2000). A number of recent fieldwork projects in the area have added significantly to the understanding of its past. The

results of much of this work are not yet formally published, but interim statements for several projects have been consulted.

3.2 Sources of Evidence

3.2.1 Aerial photographs provide the bulk of the evidence for the extent of settlement and other sites within the development area. This information is well summarised by Palmer (1994). Crop response is variable across the project area owing to different land use and other factors. Evaluation trenching revealed a fairly close correlation between concentrations of features and the observed pattern of cropmark densities, except perhaps in the western part of Area 6, where moderate feature densities in some trenches were not matched by the aerial evidence.

3.2.2 Limited magnetic susceptibility survey was carried out in two specific locations at the north end of the project area during the 1995 evaluation, but was found to be of little value here (Robinson and Guttmann 1996, 5). Further detailed magnetometer survey was carried out during the 2004 evaluation (OA 2005a, 6 and Appendix 9). The results confirmed the northern part of the complex of cropmarks in Area 6 but elsewhere the results were less clear cut. The survey did, however, produce evidence of the remains of extensive ridge and furrow agriculture in the area of the Proposed Storage Lake. It is likely, however, that magnetometry could provide useful results on other aspects of the archaeology of the area (particularly in relation to pottery kilns, see 6.2.2 below).

3.2.3 The northern part of the area, within Waterbeach parish, has been fieldwalked in the course of the Fenland Survey project, the detailed results of which are now available (Hall 1996, 119-126). The principal result of this work was to identify two probable early Saxon sites within the project area (Areas 9 and 10, see Section 3.3.3 below). Hall also examined the small area of Landbeach parish which fell within the project area, though conditions here were poor (ibid, 128). Further fieldwalking, including a re-examination of a small part of the area covered by the Fenland Survey, took place as part of the 1995 evaluation programme. The position of fieldwalked areas (except for an imprecisely located area examined by Professor Frend in 1992-3) is shown by Robinson and Guttmann (1996, 6).

3.2.4 Excavation within the project area consists of a small trench dug by Professor Frend and two trial holes dug into the early Anglo-Saxon pottery scatters located by the Fenland Survey (Robinson and Guttmann 1996, 3), the 1995 evaluation trenches (Robinson and Guttmann 1996) and the 2003 and 2004 evaluation trenches (OA 2004 and 2005a). Excavation in the near vicinity of the project area (sections 3.2.5-3.2.7 below) has been largely on sites of Roman and later date, while areas slightly further afield have seen a marked upturn in the level of archaeological investigation in recent years, producing evidence for sites of all periods from the Neolithic onwards.

3.2.5 The surviving earthwork of the Roman Car Dyke, the Scheduled Ancient Monument which forms the north-eastern boundary of the project area, was sectioned in 1993 (at TL 49486450). This work, commissioned in respect of the management of the monument, showed that despite 17th century recutting, waterlogged fills, apparently of Antonine date, survived in situ. Part of an old ground surface, probably originally located beneath the bank on the west side of the dyke, was also identified (Macaulay and Reynolds 1994). More recently the site of the original junction of the dyke with the Cam has been examined (at TL496642) revealing, as well as the canal itself, activity of 2nd-4th century date including

two pottery kilns and a timber building (Macaulay 1998). Further north evaluation at Denny Industrial Centre in 2000 (TL 488658) cut through the Car Dyke. A series of deposits that are thought to relate to the filling and flooding of the Dyke were identified. These are presumed to be Roman in date, although dating evidence was lacking. The deposits were sealed by the fill of the 17th century re-cut (Cooper 2000).

3.2.6 In 1926 an early Anglo-Saxon sunken-featured building (SFB) was excavated on the west bank of Car Dyke (Lethbridge 1927) and a kilometre beyond the northern edge of the study area early Anglo-Saxon occupation has also been discovered at Denny End, Waterbeach. This included a further SFB associated with pits, a large posthole and hollows. The building had an entranceway but no structural postholes and in this respect is similar to the SFB excavated by Lethbridge. At Denny End a three-sided post-built structure to the west of the SFB appeared to be of above-ground construction but was too small to be a hall. Finds of pottery, animal bone and weaving equipment indicate a domestic unit (Mortimer 1996).

3.2.7 Other excavations close to the project area relate to Roman pottery production. The important site at Horningsea is centred at *c* TL 497634, only *c* 600 m due east of one of the principal cropmark concentrations in the Rowing Lake development area, albeit across the Cam (McKenny Hughes 1902; Walker 1912). Perhaps as many as eight kilns were excavated in the early part of the century, and surface traces observed more recently indicate the presence of many more (Swan 1984, fiche 1, 233-236). The general dating of this industry is 2nd-3rd century. The two Car Dyke kilns (see above) are also in the Horningsea tradition. At Milton, immediately west of the feeder canal at the south end of the project area, one kiln, probably of late 1st-early 2nd century date, a possible second kiln and a pit containing kiln debris were recovered during gravel digging in the 1950s (Swan 1984, fiche 1, 237). The identifiable products were not obviously in the Horningsea tradition, but Going (in Robinson and Guttmann 1996, 63) suggests that the Milton kilns should be seen as part of this industry.

3.2.8 To the south of the study area at Milton a pit cluster containing a Beaker vessel was discovered. This cluster is therefore dated to the early Bronze Age and may relate to a ring-ditch known to the south-west, possibly suggesting a Bronze Age ritual landscape. A middle or later Bronze Age field system post-dates these features (Lucas 1998).

3.2.9 Evaluation at the Milton Landfill Site, *c* 3 km south west of the study area (TL 461 626-629) in 1995 revealed three areas of high archaeological potential (Bray and Reynolds 1997). Subsequent excavation revealed evidence dating from the late Neolithic to the early Roman period. Area D contained a cremation, several pottery sherds and a flint assemblage; the remains were ephemeral but were thought to date to the late Neolithic/early Bronze Age period. The Bronze Age evidence included a small number of features that may have related to cooking activities. The late Iron Age evidence was stronger, with post-built structures and a possible roundhouse indicating domestic activities. (Connor 1997). Area A revealed middle Bronze Age features which are of regional importance as excavated middle Bronze Age settlements in Cambridgeshire are few. Area A also contained post-built structures and fence lines of the late Iron Age/Roman period. These were post-dated by a track or droveway aligned east-west (Connor 1998b). Area C (TL 461 629) revealed settlement evidence in the earlier middle Iron Age, followed by land clearance during the middle Iron Age to make way for a series of closely spaced parallel ditches. Such intensive cultivation is usually associated

with the Roman period. Unless the pottery is residual, therefore, this may be a very early example of such horticulture in the region (Connor 1999).

3.2.10 The features located at the Milton Landfill Site may be associated with a late pre-Roman Iron Age settlement and associated field system 500 m to the south-east, reported by Reynolds (1994). This was subsequently replaced by a Roman villa, Roman ditches and a pond.

3.2.11 Further south, evaluation at TL 4715 6085 revealed a late prehistoric or early Roman pit with fire cracked flints. Three ditches, one of 16th century or earlier date, were also discovered (Mackinder 1999).

3.2.12 The Roman road Akeman Street/Mere Way runs parallel to the Cambridge to Ely railway line, *c* 2 km west of the study area. An evaluation trench crossing the road immediately south of Butt Lane (TL 462 632) recorded the dimensions of the flanking ditches and surviving agger (Ozanne 1991). Two kilometres north-west of the study area at TL 475 661 a trackway indicated on aerial photographs was found to predate the road construction. The dating is uncertain but the trackway may also be Roman as pottery from the 2nd to 4th centuries was found in its fill. Akeman Street itself was of five phases. The dimensions give by Ozanne (1991) concur with the measurements at this point on the road. Second to 4th century pottery may indicate a date for the road construction, although this is later than the 1st century sections seen further west (Macaulay 1997).

3.2.13 Four km north of the study area, a possible Neolithic feature at Bannold Lodge was succeeded by two phases of Roman occupation. The first of these, of short duration, was dated to the late Iron Age/Conquest period, while the second comprised an organised settlement of 2nd to 4th century date (Whittaker 1997).

3.2.14 Five km north of the study area evaluation of four areas indicated a late Bronze Age settlement, Roman field systems and Late Roman settlement. Just beyond the evaluation area was the site of a 4th century temple, destroyed by quarrying.

3.3 Chronological Review of the Archaeological Background

Prehistoric

3.3.1 Evidence for the prehistoric background to the area has increased considerably as a result of recent work. Neolithic material and Middle Bronze Age settlement have been located at Milton, west of the development area (Connor 1998a) and Neolithic and Bronze Age lithic scatters (but with no associated features) examined at Chittering just over 4 km to the north (Whittaker 1998). Extensive Iron Age settlement has been excavated at Fen Ditton, *c* 3.5 km to the south (Mortimer 1998) and importance evidence for the late Iron Age/early Roman transition comes from this site, as well as from Milton and Chittering.

3.3.2 The only features visible from the air which are diagnostically of prehistoric date (on morphological grounds) are three probable ring ditches which lie at the western margin of the cropmark complex in Area 5. A further possible ring ditch lies slightly to the east within the main part of that complex (Palmer 1994, 5).

3.3.3 In the absence of substantial diagnostic aerial evidence, the extent of earlier prehistoric activity can be judged in part from the quantity and distribution of flint recovered in the evaluation and, perhaps less reliably, by consideration of the character of feature fills across the area. The total quantity of lithic material recovered from the evaluations was quite small and contained few functionally or chronologically diagnostic pieces. For the most part the material was widely scattered across the project area.

3.3.4 The main 'concentration' of lithics was at the southern end of the project area (Area 1), where flint was recovered from a number of evaluation trenches (CCC1, CCC3, CCC4, CCC5 OA 3, OA8, OA9, OA10 and OA11), mostly from the surface of a single alluvial deposit traced across the area (Unit 3d). The surface of this layer displays signs of weathering and may represent the contemporary landsurface (OA 2005b) to the south of a body of shallow standing water. The total number of pieces involved, however, is 21 from nine trenches which does not suggest significant activity particularly as none of the flint was associated with contemporary features.

3.3.5 Further to the north, in Trench OA18, a ditch, a pit and a posthole were recorded. Both the pit and the posthole produced pottery of Bronze Age date along with animal bone from the pit. It is likely that these represent a small settlement situated on a gravel 'island' and surrounded by a shallow water body (*ibid*).

3.3.6 Further north, in Area 9, a focus of early and possibly middle Iron Age occupation is indicated by the presence of a series of features, including ditches, pits and postholes, in Trenches TT16, TT17, TT26, TT27, TT44 and TT45. Finds from these features include a significant quantity of pottery (3309g) with the vast majority coming from Trench TT44.

3.3.7 Other possible prehistoric activity is indicated on the gravel terrace in Areas 6-10, but the artefactual evidence is exiguous. For example in Area 6, Trenches CCC19 and CCC21 produced two flints and a single prehistoric sherd, and three flints and a prehistoric sherd respectively, while two Late Bronze Age sherds occurred residually in Trench CCC29. In Area 7 one worked flint was recovered from each of Trenches CCC25 and CCC26. Area 8 produced a flint in a residual context in Trench CCC41 and in Area 9 a prehistoric sherd came from Test Pit N and single struck flints were recovered from each of Trenches TT4, TT15, TT31 and 46 and two from TT33. A small sherd of late Bronze Age or early Iron Age pottery was recovered from TT15 and four sherds of early or middle Iron Age pottery were recovered from TT32. In Area 10 a flint was recovered from Test Pit BC, and Test Pit BJ produced a single large sherd of Peterborough Ware. It is possible that this anomalous sherd arrived in this area of Anglo-Saxon activity as a result of 'curiosity' collecting (Robinson and Guttmann 1996, 50).

3.3.8 The evidence of undated feature fills also needs to be considered. In Area 6 it was suggested that "fairly sterile feature fills comprising sandy silts of low organic content" might be characteristic of earlier (therefore prehistoric) features, contrasting with the typically darker fills of probable Roman features (Robinson and Guttmann 1996, 23). The low level of sampling in some of the relevant trenches makes it difficult to assess the validity of this hypothesis, however. For example, in Trench CCC21, only one of twelve visible anomalies (which resolved into two intercutting features, 556 and 558) was part excavated (ibid 24 (Fig

11) and 96-97). If despite the paucity of direct evidence this interpretation is accepted, features across Area 6 (in Trenches CCC19, CCC20, CCC21, CCC22 and CCC34) and in Area 7 (in Trenches CCC25, CCC26, CCC27 and CCC36) are potentially of prehistoric date, and are perhaps more likely to be Neolithic and Bronze Age than later.

3.3.9 The form of the main cropmark enclosure complexes within the development area does not permit their confident attribution to either the Iron Age or the Roman period on morphological criteria alone, with the possible exception of a sub-circular enclosure within the cropmark group west of Area 8S, for which an Iron Age date might be expected. When examined in evaluation Trench CCC41, however, this feature produced no dating evidence. Overall the quantity of possible Iron Age pottery recovered from the evaluation trenches which cut these areas was very small and does not indicate extensive activity of this date. Differentiation of Iron Age and Anglo-Saxon pottery, as is evident from the various pottery assessments in the report on the 1995 evaluation, is a real problem in this region and one that is not readily addressed with small assemblages of relatively undiagnostic sherds. A recent attempt to solve this problem by thermoluminescence dating for an assemblage from Little Linton, some 17 km distant to the south-south-east, showed that all the uncertain material submitted was of post-Roman date (Taylor et al 1995, 169). If this assumption is made for all the pottery of uncertain date from the evaluation the total of Iron Age material away from the focus of occupation in Area 9 could be quite small.

Romano-British

3.3.10 The regional setting of the site in the Roman period is rather better understood than the Prehistoric background, owing partly to the greater visibility of sites and also to the systematic accumulation of data in work such as the Roman Fenland survey and since then by the more wide-ranging Fenland Project.

3.3.11 The principal local centre was at Cambridge, and a report documenting 30 years of excavation, particularly in the Castle Hill area, has recently been published (Alexander and Pullinger 2000; for earlier summaries see Browne 1978, 39-43; Burnham and Wacher 1990, 246-249). Cambridge was initially a military site and then a ‘small town’, defended in the 4th century, with roads radiating from it. The Roman road running north-north-east from Cambridge towards Ely (Akeman Street) forms part of the western boundary of Milton and Waterbeach parishes. Water communications were also very important in this area. It is thought that the ancient and modern courses of the River Cam more or less coincide between Cambridge and the Newmarket railway bridge. However, the Romans cut a series of lodes (e.g. the Bottisham and Swaffham Bulbeck Lodes) which diverted stream water into the Cam. More important was the Roman ‘canal’, now known as Car Dyke, which lies just north of the proposed Rowing Lake and forms the north-eastern boundary of the project area. This appears to have been constructed in the 2nd century AD (see 3.2.5 above; Hartley 1970), linking the Cam to the Ouse. It formed part of a canal system which perhaps ultimately joined the Lincolnshire Car Dyke, though the function of the latter, at least, as a canal seems unlikely (Simmons 1979; Mackreth 1995, 152). A canal system, if that is what it was, rather than a sequence of dykes, could have provided a routeway for distribution of the products of this intensively settled area from the early 2nd century onwards. Interpretation of the Waterbeach Car Dyke as a canal is accepted by Hall (1996, 123-4), who suggests that there was a wharf

near the junction of the canal with the Cam (ibid), and by Macaulay (1994) whose excavations through the Dyke found the dimensions of the feature also supported its interpretation as a canal. The discovery of pottery kilns and a timber structure in this area (Macaulay 1998) might also support such a suggestion.

3.3.12 These major Roman engineering works are in part a reflection of the agricultural importance of the Fenland, which appears to have been one of the most densely settled areas in Roman Britain. This settlement was largely of a 'peasant' character though villas are known along the fen edge, a setting which may also have been important for religious centres (Taylor 1987, 44).

3.3.13 The Roman settlement of the Fenland proper is for the most part characteristically irregular in layout. Its distribution was analysed by Hallam in terms of a range of settlement types (from single farms to small villages) and their spacing (Hallam 1970, 52-60). The great expansion of settlement in the area appears to date principally from the early 2nd century onwards. Flooding on the southern margins of the Fenland in the mid 3rd century seems to have stimulated a movement of settlement onto higher ground, but some elements of the established settlement pattern were retained into the late Roman period.

3.3.14 The status of the Fenland settlement has been much debated, with the view that it formed a substantial imperial estate being widely favoured. A possible 'estate centre' at Stonea lies *c* 30 km north of the project area. This argument is based *inter alia* on the absence of villas except at the fen margins and on the systematic nature of land reclamation and drainage. Some recent commentators have suggested that the evidence can be seen in other contexts (e.g. Millett 1990, 120-123) and that aspects of the settlement pattern have parallels elsewhere in Britain which need not imply imperial control (e.g. Hingley 1989, 131), but the earlier view is still widely held, not least by the excavators of Stonea itself (Jackson and Potter 1996).

3.3.15 The rural settlement of the area immediately surrounding the project area contains a variety of elements. Probable villas are known from Arbury Road and Kings Hedges (Browne 1978, 44) and a further probable 'villa estate' has been identified in excavation at Milton, lying *c* 2 km west of the southern end of the development area (Taylor et al 1995, 169). The location of the first of these sites, at least, may owe much to its proximity to the town of Cambridge. The relationship of sites of this type to the apparently low status river gravels settlements is unclear at present.

3.3.16 The Roman rural settlement evident within the Rowing Lake area is effectively at the interface between a settlement pattern in which villas form a relatively significant component (cf Browne 1978, 45) and the Fenland sites. Its relationship to the Fenland is uncertain, and perhaps marginal to it in every sense. Recent work in the surrounding area has tended to emphasise the number of sites with a transitional late Iron Age/early Roman phase, contrasting somewhat with the pattern traditionally seen in Fenland settlement. The importance of activity of this date in the development area is hard to judge (see k below), but evidence either way will provide a useful comparison for sites such as Milton and Fen Ditton. Romano-British settlement extends through much of the development area and beyond, albeit discontinuously. The generally linear pattern of this settlement, running parallel to the course of the river, is typical of gravel terrace settlements of this date across the country. Associated

systems of tracks and ditched fields are also evident, in part from the air and in part through evaluation trenching.

3.3.17 In the southern part of the site (Areas 1 and 3) Romano-British settlement lies to the west of the development area, but east-west aligned ditches, some at least defining raised trackways (e.g. in Trench CCC3), may indicate exploitation of the lower-lying parts of the river terrace and the need to access these areas effectively. In Area 5 a considerable density of features was revealed, particularly in Trenches CCC13 and CCC14, where there was evidence of crop processing. Proximity to domestic activity is indicated, though the main focus of this may have lain in a group of well-defined interlinked enclosures just to the west (Robinson and Guttmann 1996, 17). These enclosures were not examined in the evaluation, though they lay within the western limit of the overall development area, but west of the line of the Rowing Lake itself. Enclosures in the northern part of Area 5 were probably continuous with those in Area 6 to the north-east, where the densest concentration of cropmarks within the development area was located.. Settlement elements were accompanied by a ?small late Roman cemetery located in Trench CCC29. In addition, the edge of the gravel terrace was located in Trenches TT1, TT4 and TT9. Here, a sequence of organic deposits were recorded. These deposits are probably the equivalent of organic deposits seen in trenches to the south, in Areas 1 and 3, where they partially infilled and sealed features of Roman date

3.3.18 Further north, Roman settlement and other activity seems to have been less extensive and concentrated in two areas, where aerial photograph evidence indicated the presence of groups of enclosures in Area 8, lying towards the north-west corner of the project area. Scattered features were, however, also revealed in the intervening 'blank' area in Trench CCC39. Additionally, test pits in Area 9, intended to examine a surface scatter of Anglo-Saxon material, also produced Roman ditches in an area of minimal cropmark response. Subsequently, Roman features were also recorded in Trenches TT20, TT22 and TT 28. The more northerly of the two cropmark groups in Area 8 showed enclosures clustered around a trackway junction. Surface material was recovered from this site by Hall (1996, 124, his Site 5), who also noted that the principal north-south trackway still survived as a hollow way. One of these enclosures proved to contain at least two pottery kilns and burials were also present here. The more southerly cropmark group was broadly aligned on the principal NNE-SSW trackway which served the northerly group, but curiously was not contiguous with it, at least on the basis of the aerial photograph evidence. It may be noted that the alignment of this trackway is almost exactly parallel to that of Akeman Street, 2 km distant to the west. The significance of this, if any, is uncertain. A further discrete collection of surface material was recorded by Hall south-east of the site in Area 8N but well to the north of the cropmark complex in Area 8S, roughly between the evaluation Trenches CCC38 and CCC39 (ibid, Site 4).

3.3.19 An important element in the Roman economy of the area was pottery production, centred at Horningsea. Some aspects of this industry have been discussed recently by Evans (1991). The extent of the Horningsea production site is considerable (see 3.2.6 above), and while the distribution of its products has not been studied systematically the most distinctive of these, a large jar often with a double-lipped rim, can be traced quite widely. The type is found 'throughout the Fenlands', a distribution pattern which perhaps argues for the use of the waterway system as a means of transport (ibid, 37), but also occurs in places such as

Thetford, over 40 km distant to the north-east. In view of the regional significance of the industry, currently under review, the discovery of two Horningsea-type kilns in Area 8 at the northern end of the development area is particularly important. Kilns in this location would have been well placed to exploit the distribution possibilities perhaps offered by the adjacent Car Dyke. A small spread of Horningsea pottery was noted by Hall immediately adjacent to Car Dyke just outside the north-eastern corner of the project area (Hall 1996, 124, Site 2) and can now be seen to represent further kilns (Macaulay 1998).

3.3.20 On present evidence the settlement within the development area is mostly of 2nd-3rd century date. Pottery attributable with some confidence to the 1st century AD is only indicated as occurring in a single ditch in Test Pit I, Area 9 (Robinson and Guttmann 1996, 44). While perhaps better represented than is suggested in the description of the 1995 evaluation (cf the Roman pottery assessment by Going, which refers to "*comparatively* little material of the first century AD" (ibid, 62, my italics)), there is no doubt that such material was in a minority. Fourth century material was perhaps a little more widespread, but was also scarce (ibid). Possible foci of activity of this date include Trenches CCC29 and CCC31 in Area 6, and the small trench adjacent to the former, excavated by Professor Frend; Trench CCC38 in Area 8; and Area 9. Hall noted late material from his two main Roman concentrations (Hall 1996, 124, Sites 5 and 4, in our Areas 8N and 8S respectively).

3.3.21 Consideration of the ceramic evidence is again important for understanding the general character of the Roman settlement. The very substantial absence of imported pottery and of fine and specialist wares, except from the most obvious regional sources such as the Nene Valley and Hadham industries (Going in Robinson and Guttmann 1996, 63) is consistent with other rural assemblages in the region and indicates low status rural settlement. The absence of substantial structural evidence is also consistent with this, but given the present state of knowledge of the development area is not conclusive. A fragment of box flue tile from Trench CCC31, and a further piece plus floor tile fragments, a shell-tempered tegula and a piece of a shale box, all from the small trench excavated by Professor Frend, may indicate the presence of at least one partly-Romanised structure (and its inhabitants), perhaps in the later phases of the life of the Area 6 settlement.

Anglo-Saxon

3.3.22 The pattern and density of Anglo-Saxon settlement in the area is less well known than that of the preceding period. This is particularly the case in the Fens, and it is still thought that early Anglo-Saxon settlement in the region was “largely restricted to the lighter soils and river valleys” (Wade 1997, 47). There may have been extensive depopulation as conditions deteriorated and the fen of immense size, foul streams and thickets developed which was so vividly described in the 8th century by the biographer of St Guthlac (Ravensdale 1974, 1). Early Anglo-Saxon activity in the Cambridge region is indicated by the presence of a number of cemeteries in and around the city (summarised in Meaney 1964, 61-62; see also Robinson and Duhig 1993, 33 (fig 12)), described by Myres (1969, 77) as “a remarkable collection of early cemeteries”. These all lie some 5-6 km south-west of the project area, and a probable cremation vessel is known from Anglesey Priory, 4 km to the east. A recently discovered inhumation cemetery of 6th century date lies *c* 8 km due west of the development area at Oakington (Taylor et al 1998).

3.3.23 Evidence for Anglo-Saxon settlement in the area is rarer than that for cemeteries. Even after intensive survey parts of the region, particularly into the Fens, have produced very little early Anglo-Saxon material (Hall 1992, 103). The major excavated settlement site in the region remains that at West Stow, just over 30 km distant east-north-east of the development area (cf English Heritage 1991a, 17). The site at Waterbeach excavated by Lethbridge was discovered fortuitously in an excavation intended to locate a possible boat found in the Car Dyke some years previously (Lethbridge 1927, 141). The Anglo-Saxon deposits encountered initially may not have belonged to an absolutely typical sunken-featured building of that date, though this may have been a consequence of the dyke edge location of the ?structure. Subsequent work revealed two more sunken featured buildings and there were "signs that others existed" (Lethbridge and Tebbutt 1933, 133). The presence of a similar building 1 km to the north of the study area at Denny End, associated with a post built structure (Mortimer 1996), indicates the potential importance of this area for early Anglo-Saxon settlement.

3.3.24 In this context the evidence for Anglo-Saxon settlement within the development area is of considerable significance. The initial discovery of Anglo-Saxon settlement came during fieldwork for the Fenland Project, but additional material was recovered from further fieldwalking and from trenching during the 1995 evaluation. A slight surface scatter of Anglo-Saxon material is tentatively suggested at the south end of the major cropmark complex in Area 6 (the lack of certainty about this is owing to the problems of ceramic dating, see above 3.3.1). In Area 7 early Anglo-Saxon pottery was recovered from a ditch of uncertain associations in Trench CCC25 and perhaps also from an enclosure ditch in Trench CCC26. In Area 8 features in Trenches CCC41 and CCC43 also produced possible Anglo-Saxon pottery, though in neither case is the identification conclusive. In fact the 16 sherds from context 381 (Trench CCC41) are variously described as "(possible) Saxon", "? Late Iron Age", "Preh/Saxon", "pre? Post-R?" and "Middle IA" (Robinson and Guttmann 1996, 38, 106, 117, 120, 121), which emphasises the difficulty of confident attribution.

3.3.25 The principal foci of Anglo-Saxon activity were in Areas 9 and 10, both originally located by fieldwalking in areas of minimal cropmark response. Both areas were subject to a magnetic susceptibility survey, but this produced poor results. They were then examined by test pitting with additional peripheral trenches intended to define the maximum extent of the areas of occupation. The site in Area 9 is Site 3 in Hall's inventory of Waterbeach parish (Hall 1996, 124) and was identified on the basis of pottery finds and a piece of gilded metalwork (ibid). In test pitting, Anglo-Saxon features were shown to overlie unsuspected Roman ones. Problems were experienced in distinguishing between features of these two periods (Robinson and Guttmann 1996, 46), so the full extent of Anglo-Saxon settlement here was uncertain. The absence of features in Test Pits G, K, R and S does suggest, however, that the eastern limit of the area of activity was located here. Elsewhere, only Test Pit C was completely without features. Recent evaluation work (OA 2005a) suggests that the Anglo-Saxon settlement does not extend far beyond the area of test-pitting: certainly, no Anglo-Saxon features were revealed in Trenches TT20, TT22, TT23, TT24 or TT28 which were positioned to investigate this issue.

3.3.26 The site in Area 10 was seen in field walking as smaller than that in Area 9 (Hall 1996, 124, Site 6). This area was examined by fewer test pits (the 'B' series), but produced clearer evidence of Anglo-Saxon activity. Structural features (postholes and a possible hearth) were

located in Test Pit BC and further structural traces occurred in Test Pit BI, perhaps in BG and BD, and certainly in Trench CCC49, where the north end of a posthole building 4.8 m wide was located, 100 m north of the test pits. The dating of the Trench CCC49 structure was, however, based entirely on criteria of structural morphology and stratigraphic analogy with the sequence recorded in the B series test pits, since no pottery of any date came from this trench. In the test pits themselves Anglo-Saxon pottery was only recorded from BC, BD, BG and BI. The identification of the Trench CCC49 structure as an Anglo-Saxon 'hall' is the most likely interpretation, however, and this may indicate that Anglo-Saxon occupation extended across the area intervening between the trench and the test pits to the south.

Medieval and later

3.3.27 The medieval settlement pattern of the parishes containing the development area has been fully reviewed in the Victoria County History (Wright and Lewis 1989, 177-192 (Milton), 237-266 (Waterbeach)) and aspects of its operation have also been examined extensively by Ravensdale (1974). Some of the western parts of the development area lay within the open field systems of Milton and Waterbeach. The meadow known as Great Hollow at the south end of Waterbeach parish, within which a substantial portion of the development lies, was occasionally ploughed in the 14th century but was normally described as marsh at that time. Subsequently it was mostly meadow (ibid, 248). Further south, however, in Milton parish, the eastern part of the development area is situated on land which in about 1800 was still fen common pasture (Wright and Lewis 1989, 140).

3.3.28 No significant features of medieval date were found in the evaluation of the southern parts of the area. In Area 7 a linear feature in Trench CCC26 was suggested as a possible medieval precursor of the Milton/Waterbeach parish boundary. In Trench CCC36 ditches identified from the air and perhaps defining the medieval Cambridge Way (which crossed the open fields of Waterbeach) were located, but their fills were undated. The principal alignment of the Cambridge Way, however, is thought to be that also visible from the air in Area 8, some 170 m west of the alignment seen in Area 7 and approximately parallel to it. This is consistent with the alignment of the Cambridge Way as discussed by Ravensdale (1974, 139). Here, however, the expected trackside ditches were not certainly located in Trench CCC40. In the north-east corner of the development area (Area 10), the line of the Cambridge Way survived as an earthwork ridge.

3.3.29 Evidence of medieval arable agriculture in the form of ridge and furrow was identified in trenching with varying degrees of confidence in Areas 7 (Trench CCC46), 8 (Trenches CCC38 and CCC47), 9 (Test Pit Q) and 10 (Trench CCC50 and Test Pit BE). Further evidence of ridge and furrow was found during geophysical survey undertaken during the 2004 evaluation (OA 2005a). It is noticeable that all these instances lie to the east of the line of the Cambridge Way (although a few faint cropmarks west of this line at the extreme north end of Area 10 might have represented ridge and furrow). The significance of this observation is unclear, since much of Area 8 should have lain within Croft Field, part of the open field system of Waterbeach. Post-medieval ploughing might have truncated remains of ridge and furrow, however.

3.3.30 Probable or possible post-medieval linear features, mostly interpreted in the evaluation report as relating to drainage for orchards etc (e.g. Robinson and Guttmann 1996, 52) were recorded

in trenches in Areas 7, 8, 9 and 10. The only other post-medieval feature of obvious significance is a small gravel quarry lying at the western margin of the development area immediately south of the small projection of Landbeach parish into that area (Area 7).

3.4 Deposit Model

3.4.1 Recent consideration of specific environmental issues such as alluviation have concentrated on the western Fen-edge in the valleys of the Welland, Nene and Great Ouse (French et al 1992; French and Pryor 1992). While general principles are applicable equally there and in the valley of the Cam, local conditions may produce differences of detail in, for example, alluvial sequences.

3.4.2 The deposit model developed by Oxford Archaeology (OA 2005b) draws on all of the evaluation work carried out to date at the site and represents a significant advance in understanding of the depositional history of the site and extends the work carried out by Robinson and Guttmann (1996).

3.4.3 The model demonstrates that variable thicknesses of undisturbed alluvial and peat deposits exist, predominantly on the low-lying areas of the floodplain and terrace edge, sealed beneath a thin layer of ploughsoil. The greatest depths of fine-grained alluvium appear to date to the late Pleistocene to early Holocene periods and consist of sands, sandy clays and silts, which directly overlie the Pleistocene gravels. In Areas 1 and 3, these deposits infill undulations in the surface of the gravels which may represent relict Pleistocene or Early Holocene channels. In areas at the edges or between the channels, sand bars, eyots or elevated gravel ridges may have existed which persisted as 'islands' of drier ground during later periods before they were buried by later alluvial deposits. As such they may have acted as a foci for later activity (eg in Trench OA18) and provided a platform from which the abundant resources of wetland environment could be exploited.

3.4.4 The sediment sequences recorded have been correlated into ten major stratigraphic units. To summarise the sequence, the basal deposits comprise bedrock (Unit 1) overlain by coarse sandy gravels (Unit 2) probably deposited in cold climate braided stream systems during the Pleistocene. These deposits extend over the entire development area. Any artefactual material is likely to have been reworked by fluvial processes.

3.4.5 Overlying the gravels, a sequence of fine-grained silts, sands and clays were noted (Unit 3). These suggest a reduction in the flow regime and may represent the shift during the late Pleistocene and early Holocene to anastomising (fewer channels) and then meandering river systems. These deposits are quite extensive, covering a large part of the development area, although they were thickest on the floodplain and absent at the highest elevations to the north-west. Overall, the fine-grained nature of these deposits suggests lower energy deposition and increased potential for *in situ* archaeological remains, although it should be noted that no artefactual material was recovered from the lower levels of these deposits during the evaluation phases. The upper surface of Unit 3 appears to represent a stable weathered horizon that may have undergone soil-forming processes. As such artefactual material will have suffered minimal lateral transport and this horizon has potential for the recovery of *in situ* prehistoric archaeological remains although the presence of Romano-British features suggests it represents a surface that may have been extant over a considerable timespan. A

small number of prehistoric worked flints have been recovered during the various evaluation phases from this horizon in trenches to the south of Fen Road.

3.4.6 To the north of OA10 (on the floodplain) this weathered horizon was not identified with certainty. A localised sequence of peat/organic mud (Unit 4) was identified in two trenches (CCC10, CCC11) overlying the basal gravels. Between OA11 and CCC12, Units 2, 3 and 4 were overlain by a complex sequence of intercalated minerogenic sediments and grey, carbonate rich deposits (Unit 5). Initial impressions indicate that a permanent shallow water body, perhaps a poorly drained backswamp, probably existed to the north of Fen Road, while the margin of this feature lay somewhere between OA10 and OA11. The predominantly fine-grained nature of these deposits suggests that artefactual material could be relatively *in situ* although some localised reworking may have occurred in the vicinity of active channels. The dating of this sequence is somewhat problematic and although a broad prehistoric date can be inferred it has been suggested that sedimentation may not have occurred contemporaneously across this area (OA 2005b, 9). Sedimentation however appears to have ceased by the early Roman period as evidenced by features of this date cut into the surface of this unit.

3.4.7 Overlying Unit 3 south of Fen Road, and Unit 5 to the north, an extensive deposit of peat/organic silt clay was noted (Unit 6) A lateral equivalent of this unit was also noted at lower lying elevations in the area of the proposed Storage Lake (Trenches TT1 and TT4). This deposit sealed and infilled features dated to the early Roman period and indicates a subsequent expansion of fen environments. This unit was, in turn, overlain by an intermittent minerogenic silt-clay (Unit 7) indicative of seasonal overbank flooding and alluviation from adjacent river channels. Archaeological remains associated with these deposits are likely to be relatively *in situ*. On the floodplain and terrace edge the sequence is capped by modern ploughsoil (Unit 9), whereas on the higher ground of the terrace a possible remnant ploughsoil (Unit 8) was identified at the interface between Units 1/3 and 9. This deposit seals features of Roman date.

3.5 **Environmental Deposits**

3.5.1 Sampling was carried out for mollusca, ostracods, pollen and charred and waterlogged plant remains and soils and sediments were also assessed. The mollusc, ostracod and pollen samples, mostly from Areas 1 and 3 in the low-lying eastern margin of the development area (OA 2004), have informed, in particular, the development of the deposit model. Waterlogged and carbonised plant material has also been recovered from both sediment sequences and archaeological features in this area.

3.5.2 Pollen samples from a ditch and a pit in Trench CCC13, securely on the gravel terrace, showed good preservation but low quantities of pollen (Robinson and Guttmann 1996, 58). Macroscopic plant remains occurred as both waterlogged and carbonised material. Samples of both types from adjacent to the Area 5 and 6 Roman settlement included plentiful crop processing waste and suggest intensive arable agriculture. Samples for carbonised material from the principal foci of Anglo-Saxon activity in Areas 9 and 10 were much less productive. Charcoal and sparse cereal remains were recovered, but the quantities were small and preservation was poor.

4 POTENTIAL AND PRIORITIES

4.1 Introduction

4.1.1 The overall importance of the archaeological remains within the project area is evident on the basis of their extent, good preservation (in places) and relationships to sources of high quality environmental data. In this section some attempt is made to assess the relative significance of the various components of the area drawing on the period and subject summaries in Section 3 above and informed by the discussions of research agendas and strategies set out by Brown and Glazebrook (2000).

4.2 General

4.2.1 The Eastern Counties framework (ibid) has identified a number of broad research themes to which the Rowing Lake project has demonstrable potential to contribute. The most important of these are 'Origins and development of the agrarian economy' (Brown et al 2000, 44-45) and a range of environment-related aspects subsumed under 'Selective survey' (ibid, 46-47), although the project area also clearly has potential to produce data relevant to questions of production and exchange in the Iron Age, Roman and Anglo-Saxon periods, identified as a sub-set of 'Artefact studies' (ibid, 45-46).

4.2.2 Within this broad framework the development area offers the potential to examine the evolving use of a significant block of gravel terrace landscape together with parts of the adjacent fen edge area. This constitutes a topographical combination which has not hitherto been studied on a large scale in the immediate environs of Cambridge and would complement work carried out in the lower Welland and Nene valleys (cf French et al 1992). The preservation characteristics of the development area have been summarised in the 1996 evaluation report (Robinson and Guttmann 1996, 79) and subsequent work has generally supported these conclusions. This shows that the principal foci of intensive settlement and other activities lie on the gravel terrace which has been subject to recent agricultural processes and therefore has preservation which may be regarded as typical of sites of this type. There can, however, be considerable variation in the 'typical', as a recent assessment of the effects of agriculture on selected sites within the Cambridgeshire County Farms Estate has shown. So for example at Limes Farm, Landbeach, close to the present application area, archaeological features on the second terrace gravels were consistently protected by a significant subsoil deposit (Abrams 2001, 22), the presence of which might not have been anticipated from the topography and recent land use of the area. In contrast such deposits exist at best in very localised zones within the Rowing Lake area. The character of surface finds in Area 6 indicated some recent disturbance of Roman deposits (Robinson and Guttmann 1996, 22), though there was no evidence of extreme plough damage either in the evaluation trenches or in the total quantity of material recovered in fieldwalking of the main settlement area; at just over 6 kg of pottery from 17 100 m transects (an average of 72 g of pottery from each collection unit) this suggests no more than moderate damage – in recent times at least. Even within the gravel terrace areas there are localised zones of better preservation, including part of the Area 10 Anglo-Saxon settlement, and some waterlogged feature fills may survive, particularly on the eastern margins. The whole of the eastern edge of the development area is characterised by excellent preservation conditions as a result of alluvial deposition and the

high water table. The Rowing Lake has been sited to avoid this area as much as possible. Upstanding features and buried soils survive and there is extensive waterlogging of deposits.

4.3 Prehistoric

4.3.1 The potential importance of the development area for the Palaeolithic archaeology of the region was indicated in the evaluation report (Reynolds in Robinson and Guttmann 1996, 76). The recent deposit model suggests that the potential for such deposits to exist undisturbed is, in general, relatively low. However, in the late Pleistocene and early Holocene, there may be a change to anastomising and meandering river systems giving rise to the possibility that localised remains could survive, relatively undisturbed, at the edges of, or between, channels, or on sand bars, eyots or elevated gravel ridges in Areas 1 and 3. The specific potential remains unknown, however, because it cannot be evaluated by conventional archaeological techniques.

4.3.2 The later prehistoric component of the archaeology of the development area is, on present evidence, limited although the most recent evaluation has shown that significant early, and perhaps middle, Iron Age evidence is present in Area 9. There are a few features in the southern area (Areas 1 and 3) where some prehistoric finds (particularly flint) occur, and in the north there are some possible prehistoric features but dateable material is absent.

4.3.3 In the south, prehistoric material occurs consistently in a single stratigraphic horizon (on the upper surface of Stratigraphic Unit 3) to the south of Trench OA11, but in limited quantities. It is arguable that the only meaningful concentration of such material was in Trench CCC5. This area lies immediately adjacent to the possible area of standing water (Unit 5) described above, making it a favoured location for activity of this date. However, other such localised concentrations of prehistoric activity, for example flint-working areas, might have gone undetected elsewhere. It is possible that some of the low-density flint distributions derive from zones peripheral to such working areas. The potential therefore exists for pockets of this type of prehistoric activity to be located within Area 1. The importance of these will be enhanced by their association with the sequence of alluvial deposits close to the fen edge. This association means that deposits containing flints, or with such material resting upon them, may be well-preserved although the presence of Roman features cut into this horizon does indicate that it remained exposed for a considerable period.

4.3.4 Immediately to the north, the potential exists for prehistoric material to be present on higher gravel ‘islands’ within the shallow lake or backswamp and this has been demonstrated by the presence of Bronze Age features in Trench OA18.

4.3.5 Further north, within the area of the proposed Storage Lake, an area of significant Early Iron Age activity has been located. The distribution of pottery of this date indicates that this activity is not particularly extensive.

4.3.6 Elsewhere within the development area the most obvious prehistoric features are the ring ditches at the western periphery of the development area, all of which lie beyond the western edge of the revised Rowing Course alignment. In adjacent areas the artefactual evidence for prehistoric activity of any period is slight. It is assumed that features located in the evaluation, undated but with fill types which suggest that they are prehistoric, are, where genuine, more

likely to have been of Neolithic and Bronze Age date than later. If the suggestion is accepted, these features could be of considerable importance in view of the relative scarcity of excavated evidence for Neolithic and Bronze Age settlement (if it is assumed that these features have a settlement-related function) - though useful comparative data are now available from Milton. Such features appear to have concentrated in Areas 6 and 7, some distance west of the margin of the gravel terrace. In the first instance basic spatial, functional and chronological characterisation will be necessary. Beyond this it will be of considerable importance to try and establish their spatial and temporal relationship with the potential fen edge activity located further south as well as with the ring ditches to the south-west.

4.3.7 There is no indication that the Roman settlement focus had a significant Iron Age precursor, and the bulk of Roman dating evidence from the 2nd century onwards suggests that there was no significant continuity from earlier Iron Age settlement. The low level of evaluation within the principal Roman settlement focus in Area 6 again makes assessment of negative evidence difficult, but the presence of important Iron Age settlement is precluded on present knowledge. Given the location of the project area in a topographical zone which was normally intensely exploited by the later prehistoric period, however, it will be important to confirm that this absence is real and then to try and account for it. The existence of recently excavated evidence for the Iron Age/Roman transition at a number of sites within the region does now allow scope for comparison between these sites and the sequence of development within the project area.

4.4 **Roman**

4.4.1 Roman activity is more widespread within the project area than that of any other period. It is certainly appropriate to see the whole project area as a single landscape entity containing a number of distinct but interrelated components (cf Going 1997, 37). The Rowing Lake is sited to preserve the densest and most important elements of this settlement but the opportunity exists within the Rowing Course to sample the range of components.

4.4.2 A number of the Roman components are of considerable importance in their own right. On present evidence a major block of interlinked enclosures and other features extends along the gravel terrace through the central part of the development area and beyond it to the south. It is unclear whether apparent morphological differences between the northern (Area 6) and southern (Area 5) parts of the settlement reflect distinctions of chronology or function. It is less likely that they relate to differing degrees of visibility of the cropmarks. The evidence suggests a sizeable nucleated settlement with associated paddocks, fields and trackways (see 3.3.2.l above), as well as a cemetery. The latter feature is significant, since Roman rural cemeteries with very clear settlement associations are not very common. However, the cemetery is situated at the eastern edge of the gravel terrace and will not be impacted by the Rowing Lake development.

4.4.3 The economic focus of the settlement was presumably agricultural, indicated most obviously by the possible ‘corn drier’ in Trench CCC13 and evidence for crop processing in Trench CCC14 in the southern part of the settlement and from Trenches TT1 and TT4 in the Northern part. Extensive sampling for carbonised plant remains can be used not only to elucidate the character of the arable component in the settlement’s economic base, but also to indicate foci

of agricultural activity which may contrast with evidence for other aspects of the economy of the settlement.

4.4.4 Two further probable settlement components of somewhat contrasting form, also known from the air, are found to the north of the major cropmark complex, in Area 8. The more southerly of these is important in including the only aerial photograph component which on morphological grounds might be of Iron Age date, though it appears to have been integrated with later features. The more northerly cropmark complex, directly linked to a major trackway, was at least partly concerned with pottery production, with kilns aligned on the enclosure boundaries. The kilns belong to the regionally important Horningsea industry which has not had systematic investigation in modern times (until the very recent initiation of a new project to consider aspects of the industry). The opportunity to investigate a production complex would be of great significance not only for this industry, but also for Romano-British pottery studies as a whole, as well as being of direct relevance to the current study. If the recently excavated kilns and timber building adjacent to the Car Dyke do relate to a possible wharf it will be important to consider the connection of these features with those in Area 8, and the implications which this might have for the economy of the site as a whole. A small inhumation cemetery, probably of later Roman date, was also located in this area, close to the kilns but not necessarily contemporary with them. The relationship of these components needs to be investigated.

4.4.5 In addition to the study of contrasting settlement components, their chronological development and their associated social and economic elements, the scale of the project area allows examination of all these within a wider landscape. The landscape includes field systems, the fen edge with its contrasting environment and range of resources, and a communications infrastructure including trackways and, at the north-eastern margin of the project area, the Car Dyke. Only slightly further afield, the Cam to the east and Akeman Street to the west provide communications with the wider region. The pattern of trackways within the development area can be seen in relation to the settlement foci and the points beyond, with which they were connected. These include evidence for access to the fen edge, particularly in the southern part of the area. An important point to consider here, however, will be the question of whether these tracks served the settlement complex in the centre of the development area or whether they related to the southerly extension of the gravel terrace settlement formerly located in the gravel quarries east of Milton village.

4.5 **Anglo-Saxon**

4.5.1 Anglo-Saxon features, while more restricted in extent than Roman ones, were nevertheless quite widespread in the northern half of the development area, particularly in Areas 9 and 10. Suggestions that activity of this period was also located at the southern end of Area 6 and locally in Areas 7 and 8 are based on very slight evidence. These claims cannot be discounted, but the quality of the evidence is such that the importance of any Anglo-Saxon activity in these areas is impossible to assess. Given the general importance attached to understanding of the Anglo-Saxon settlement pattern, however, the possibility that features of this period might be present in these locations has to be taken into account in developing mitigation strategies.

4.5.2 The areas of more confidently identified Anglo-Saxon settlement are of major regional significance owing to the relative scarcity of such evidence. While that identified in Area 10 may have extended considerably beyond the area initially identified in fieldwalking (as far as Trench CCC49 at the northern extremity of the site), the evidence from Trenches CCC38, CCC47, CCC50, TT20 and TT22 suggests that the Area 9 and Area 10 sites were not continuous. The spacing between the foci of Anglo-Saxon activity in these areas and the location of the features examined by Lethbridge further north is roughly similar, at *c* 600-700 m, while the distance between the Area 9 focus and the possible scatter in Area 6 is about 800 m. This might suggest a model of settlement density and type in which settlement units were relatively small and discrete but quite closely spaced. The West Stow model, in which structures are relatively densely (if unevenly) distributed over a distance of almost 200 m, seems less likely to be appropriate here. The importance of the present project area is that it presents an opportunity to gather further data to test such simple models of settlement pattern and develop more meaningful ones.

4.5.3 All aspects of these settlements are important, including their extent, plan, the types and functions of structures, artefactual and ecofactual record, and dating evidence. In the context of the last question the relationship of the Anglo-Saxon sites to elements of the Roman landscape, whether settlement or otherwise, is a significant issue. The present pattern of the data, in which the most confidently identified Anglo-Saxon foci appear to lie at some little distance from Roman activity, whereas the less confidently identified Anglo-Saxon finds come from areas of more intensive Roman settlement, requires consideration. The solution to the question may, however, have more to do with problems of recognition and attribution of Anglo-Saxon pottery than with genuine differences of relationship between major and minor settlement units of successive periods.

4.6 Medieval and Later

4.6.1 Significant medieval features only occur sporadically across the development area, mainly in its northern part. The principal medieval features are in fact more important for the masking/protective effect they have had on earlier deposits than in their own right, particularly in Area 10. The main feature of the medieval landscape here is the Cambridge Way. It seems unlikely that understanding of this track would be significantly enhanced by archaeological investigation. The possible alignment of the Cambridge Way visible from the air in Area 8 was intersected by evaluation Trench CCC40, which failed to produce any definite evidence for trackside ditches. Further north there are no signs of metalling associated with the earthwork feature. Investigation of the latter could be carried out incidentally in the context of examination of underlying features of Anglo-Saxon date in Area 10. Targeted examination does not seem appropriate.

4.6.2 No post-medieval features have been identified within the project area to date which are likely to merit archaeological investigation.

4.7 Environmental and Ecofactual Evidence

4.7.1 Recovery of environmental and ecofactual data across the Eastern Counties has varied chronologically and spatially (Brown et al 2000, 44). The continuing importance of the need

to generate such data is generally implicit rather than explicit in the Research Agenda for the region, although environmental data are fundamental to consideration of specific topics included in the Agenda, such as palynology of sediment sequences, buried land surfaces and the development of river valleys (ibid, 46-47). With respect to the last of these, reconstruction of the alluvial history of the Cam is not achievable in the context of a single project, but the palaeoecological evidence that has already been recovered has made a significant local contribution to understanding of this development.

4.7.2 The potential for the recovery of further high quality environmental data at least from parts of the Rowing Lake area is very good. These data can be used to characterise aspects of the general environmental setting of the area, to provide a framework for the development of the fen edge in tandem with associated adjacent settlement, and to provide information on the economic basis of successive periods of activity both on the gravel terrace and into the fen edge, involving the exploitation of a wide spectrum of resources.

4.7.3 The whole range of sample types considered in the evaluation needs to be employed to provide a comprehensive picture of the environment of the development area. Many are directly complementary. Molluscan analysis will be particularly important for further elucidation of the alluvial history of the area. This may be augmented by pollen and perhaps by waterlogged plant macro-remains. Survival of these last also allows the possibility of radiocarbon dating of the sequence if necessary.

4.7.4 Plant macrofossils, both waterlogged and (in particular) carbonised will provide the bulk of the evidence for the arable aspects of the agricultural base of the settlements of different periods. Preliminary work indicated that preservation of such remains in the principal areas of Anglo-Saxon settlement is poor. Since the understanding of the economic base of these settlements is an important objective (at least in part to allow comparison with the agricultural regime of the preceding Roman period, though current evidence suggests continuity of practice up to the 7th century (Wade 1997, 50)) recovery of substantial carbonised plant remain samples from the Anglo-Saxon settlements may need to be specially prioritised.

4.7.5 The plant remains evidence for settlement economy can be complemented by animal bones. Initial assessment indicates that these also have high potential for yielding important information. Bone preservation was generally very good, with little evidence of weathering or extreme fragmentation. Material comes from both Roman and Anglo-Saxon contexts, so that chronologically successive animal husbandry regimes could be compared and contrasted.

4.8 **Summary - Potential**

4.8.1 The development area has good potential for the study of a gravel terrace/fen edge landscape through time, but particularly in the Romano-British and Anglo-Saxon periods, examining developments in human exploitation of the landscape and its resources, and of the range of interactions with the environment. The scale of the project is such that there is the potential to sample significant parts of the landscape while ensuring that important elements are preserved for the future.

4.8.2 An aspect of the archaeology of the development area which gives it particular significance is the degree of preservation. For buried features this ranges from moderate to excellent, and for

their fills and contents the same range is evident, with waterlogged material present in places and good preservation of vital ecofactual material. The general potential for environmental studies is extremely high. Unusually for river gravel site complexes there is apparently relatively little overlap of settlement of successive major periods, so problems of residuality may be considerably reduced and there is some evidence (e.g. from the animal bone) that the taphonomic development of assemblages may have been relatively straightforward. These characteristics will considerably enhance the evidential value of artefactual and ecofactual material. At the same time the best preserved settlement areas east of the Rowing Course will be protected from development and from further ploughing and dewatering.

4.9 Summary - Priorities

4.9.1 The first priority of study of the development area is to clarify the broad picture of development of the floodplain/gravel terrace interface topography and integrate this with the successive phases of adjacent human activity, assessing the impact of the latter.

4.9.2 Within this broad picture more specific themes emerge. The first of these is the definition of the nature and extent of prehistoric activity, particularly at the southern end of the development area, and determination of its links, if any, with possible areas of activity further north and west, away from the floodplain edge.

4.9.3 The principal interest of the development area, however, lies in its evidence for the Roman and Anglo-Saxon periods, with extensive evidence for settlement. Aspects of major importance for both periods, all of which can be addressed here, include the chronological development of settlement morphology, structures, all aspects of the economy and the relationship of the settlements to environmental resources within the broad river valley setting.

4.9.4 The extent of the project area enables the question of the development of the landscape from the Roman through to the Anglo-Saxon period to be considered on an unusually large scale. Examination of this very important period of transition must be a major priority for further work and has been highlighted as such in *Exploring Our Past* (English Heritage 1991a, 36) as well as by contributors to the Resource Assessment for the eastern counties (Glazebrook 1997) and, to a slightly lesser extent, in the subsequent Research Agenda (eg Brown et al 2000, 45). Questions to be considered in this context would include aspects of chronology (what was the true extent of late Roman activity and was it chronologically contiguous with subsequent settlement?) spatial organisation (did the Anglo-Saxon settlement develop in an empty landscape and if not what was its relationship to (previous) Roman settlement foci; why was the Anglo-Saxon settlement pattern apparently fragmented?) and economy (in what ways were the economic bases of Roman and Anglo-Saxon settlements comparable or different?).

5 IMPACTS

5.1 Quantification

5.1.1 The construction of the Rowing Lake involves a variety of potential impacts from both temporary and permanent aspects of the development which need to be considered and, if necessary, mitigated. These can be summarised as follows:

- Waterways

- Temporary works
- Landscaping
- Car parks, roadways and other ancillary features
- Tree planting
- Water drawdown effects

5.1.2 *Waterways*: The most obvious and substantial of these is the main rowing course itself (the Competition Lake), though this has been reduced in size compared to the original proposals. The channel is some 2170 m long and 100 m wide (i.e. covering *c* 22 ha), the excavation of which will inevitably result in the removal of any archaeological features in its path. Additional waterways include a launching lake (The Channel) in the north-east corner of the development area, a canal of 1000 m x 37 m which extends from the southern end of the rowing course parallel to the railway line (The Alan Burrough Training Lake) before turning eastwards to link the course to the Cam (The Canal) and a Storage Lake some 600m long and 200m wide to the south of The Alan Burrough Training Lake. Additional minor waterworks include drainage features and small connecting channels. Even these could have a significant localised impact on archaeological features. The extent of totally destructive water features is therefore *c* 40 ha, or roughly 40% of the total project area.

5.1.3 *Temporary works*: There are two aspects to temporary impacts, first the location of construction roadways and works compounds and second, the location of temporary spoil heaps (particularly for topsoil). The scale of earthmoving involved in the construction of the lake is very substantial and will involve large numbers of heavy plant movements. The location and construction techniques of roadways and compounds could have significant implications for underlying archaeological deposits. The potential impact of spoil heaps will depend on their location and the method of their accumulation and ultimate dispersal.

5.1.4 *Landscaping*: Landscaping of spoil from the excavation of water features to form permanent features of the Rowing Lake will be on a considerable scale. The volume of material to be removed to form the water features will mean that much of the remaining project area, with the exception of the water meadows at the north-eastern margin of the development (and therefore including much of the Roman settlement in the eastern half of Area 6), will lie beneath a significant depth of spoil, mostly gravel. Features such as the spectator banks towards the northern end of the course are also likely to be particularly prominent. These features could impact on archaeological deposits in two ways; both in the course of their construction and from the possible effects of compression of deposits from the weight of superimposed material.

5.1.5 *Car parks, roadways and other ancillary features*: The effects of these aspects of construction are evident. Those located in areas where archaeological features are present will generally impact on these features if conventional construction techniques are involved. While they may be relatively restricted in terms of the overall scale of the development they could still be very destructive, for example construction of the boathouses area at the northern end of the main course is likely to involve very considerable disturbance of any underlying deposits.

5.1.6 *Tree planting*: Tree planting on a substantial scale is envisaged as part of the general presentation of the Rowing Lake. This could have very serious consequences for underlying archaeology, though the extent to which this is a problem will depend on the physical level of

planting in relation to the currently existing ground level; i.e. planting at such a level could be extremely damaging, not so much from the actual planting process itself as from the subsequent development of root networks, while planting in areas of made up ground (formed by distribution of the spoil from the excavation of water features) might be much less damaging.

5.1.7 *Water drawdown effects*: The potential problem of water drawdown effects as a consequence of the Rowing Lake construction is a (relatively) more long-term difficulty. An inevitable consequence of the excavation of such a large feature is some disturbance of the water table. Any long-term reduction in the water table level would have a significant effect on the preservation of waterlogged material, whether incorporated in archaeological features as at the eastern side of the main Roman settlement, or in the adjacent alluvial deposits which are at least partly waterlogged. The impact of dewatering on the basal Roman fills of the adjacent Car Dyke has been noted as an area of potential concern (Robinson and Guttmann 1996, 81).

5.1.8 In recent years there has been growing concern about the effects of water abstraction on archaeological deposits (French and Taylor 1985), both in the immediate vicinity of pumping and further afield (Corfield 1996). Anoxic environments require a neutral pH value and low redox potential for their maintenance; an increase in these as a result of lowered groundwater levels is likely to result in deterioration of organic materials in affected deposits (Caple and Dungworth 1997). The effects of dewatering have been studied in a five year programme of research (now extended) initiated by French, Davis and Heathcote in 1994 to monitor soil moisture and groundwater levels and other changes of regime in an area between the lower Great Ouse Valley and the fen-edge of western Cambridgeshire before, during and after gravel extraction (French et al 1999; French in prep).

5.1.9 Within the Great Ouse study area pre-extraction groundwater levels fluctuated between 0.6 and 2.1 m OD, influenced by seasonal variations in rainfall and levels of irrigation. During the extraction phase the groundwater levels were controlled by the pumping and extraction process and dropped on average some 3.5-4 m within two months of the commencement of extraction, though data from neutron probes suggested ‘that there is no appreciable draw down affect ... more than *c* 600m away from the extraction zone’ (French in prep). Localised bunding at the southern perimeter of the study area, however, allowed ‘a rapid (within one month) restoration of groundwater levels to the south or inland side of the extraction area’ (ibid).

5.1.10 Before extraction the groundwater had a circum-neutral pH (6.4-7.65), seasonally fluctuating levels of dissolved oxygen, and redox values which indicated an exclusion of oxygen in the subsoil creating an anoxic environment (French et al 1999). During the extraction phase pH values initially remained as they had been but then rose to a maximum of 8.5. The amount of dissolved oxygen in the groundwater also increased, as water was pulled through the system by pumping rather than natural forces. Redox values indicated a return to reducing conditions after an initial period of oxygenation, but at the new watertable, considerably lower than the archaeological deposits. An increase of iron oxides in the water was also noted (cf ibid, 55)

5.2 Mitigation

5.2.1 As far as possible the effects of the range of impacts have been minimised by design with due regard to the archaeology. The proposed design solutions, where applicable, are outlined here, while the scope of mitigation measures involving intrusive archaeological work, designed to secure 'preservation by record', is presented in greater detail in section 6 below.

5.2.2 *Waterways*: The excavation of the waterways will inevitably be destructive. The line of the Rowing Course has been chosen to avoid the best preserved and densest concentration of archaeological features (as defined on current evidence) and with the reduction of the width of the course known foci of significant archaeological activity are largely avoided. The design of the Storage Lake has also been modified in order to avoid any impact on the major cropmark complex in Area 6. Within the Rowing Course area a coherent programme of archaeological excavation will ensure 'preservation by record' of significant zones and elements.

5.2.3 *Temporary works*: The effect of temporary works can be significantly neutralised by careful control of vehicle movements along specially constructed roadways and clear designation of 'no-go' areas. Roadways and works compound surfaces will where necessary be based on geotextiles laid at present ground level. Temporary spoil heaps should be located only in areas with no significant underlying archaeological deposits and access routes to them should be carefully defined and constructed.

5.2.4 *Landscaping*: Preservation of archaeological features and deposits *in situ* beneath earthworks has been approved and practised widely in various circumstances, including the burial of complex archaeological deposits as at Alchester (Oxon), initiated by English Heritage. Recent experience of removal of substantial earthworks at Terminal 5, Heathrow, showed that archaeological features survived in good condition beneath earthworks up to 5 m high constructed with no regard to archaeological preservation over a wide period from the 1930s to the 1980s. The key to minimisation of the impact of extensive spoil dumping to form landscape features lies in the methodology of their construction. There is no intention to remove topsoil in those areas where such dumping is proposed. In this way underlying deposits will be blanketed, affording protection from vehicle movements. Moreover, the construction of mounds will be by 'end tipping' of spoil, with machinery only driving over material which has already been dumped, so that machine movements at contemporary ground level in areas of mound construction will be extremely limited, again minimising if not eliminating potential disturbance. The maximum height of the proposed earthwork features will generally be *c* 5.5 m and most earthworks will be lower than this. Adverse effects on archaeological deposits buried beneath such features are not anticipated. They could possibly be a problem in areas with significant vertical stratigraphy, a situation which is not likely to prevail over much of the development area but could be encountered locally at the eastern margins. Here, however, earthwork heights will be quite low. The long term use of the areas of preservation *in situ* (i.e., under earthworks of varying heights) will be as landscape features, supporting the banks adjacent to the lake itself and, in the area east of the lake and south of the boathouses etc, as a camping and recreational area. None of these uses is anticipated to involve further impacts on the buried archaeological deposits.

5.2.5 *Ancillary works*: These potentially fall into two groups. Those related to transport (i.e. roads and carparks) can be mitigated by employing the same approach used for temporary roads but in a more substantial way to permit of extended use. For other structures rafted foundations may be appropriate in some cases. If conventional construction is preferred, impacts could be significant. In this case they will be seen as an extension of the impacts of the main water features (to which the buildings are generally adjacent) and will be dealt with in tandem with these. It is accepted that the northern tip of the island at the north of the rowing course lying between it and the launching lake is effectively an area of destruction and will therefore have to be treated in the same way as areas of water feature excavation.

5.2.6 *Tree planting*: The extent of spoil dumping is such that the great majority of tree planting will be sited on top of dumped material, much of a considerable depth. By this means the impact of planting should be minimised. It is proposed that archaeologically sensitive areas which are only covered by a thin layer of dumped material (i.e. *c* 1 m or less) will, if planted at all, bear shrubby species which do not develop destructive deep root systems.

5.2.7 *Dewatering effects*: The potential disruption to the level and other characteristics of the groundwater of the Rowing Lake area is acknowledged, but can be minimised in a number of ways. Piezometers have been in place for some time and will continue to be used to monitor water levels so that the efficacy of the proposed mitigation measures can be assessed and added to the data from other projects. The maximum depth of excavation for the water features in the development area is c 4 m, substantially less than in many gravel quarries. The water level in the Rowing Lake will be the same as that in the nearby River Cam above Baits Bite Lock, almost equivalent to the modern ground level at the southern end of the development area. This is higher than the natural water table of the surrounding ground. Most importantly it is proposed to construct a clay seal around the perimeter of the water features (i.e. enclosing the canal, rowing course, launching lake and storage lake) to virtually eliminate the drawdown effects of the relatively deep excavations. The clay seal will be inserted *prior* to the excavation of the Rowing Lake itself and will be set in a trench cut down to the level of the underlying Gault clay. A method statement describing the process of construction of the clay seal has been submitted separately. Water abstraction for the construction of the clay seal will be on a far lesser scale than that of gravel quarries and the effects on the surrounding water levels should be short term. Increases in dissolved oxygen levels, noted at Over even with bunding in place, may be seen largely as a factor of the pull of constant pumping to retain low water levels. At the Rowing Lake such activities will be very short term.

5.2.8 *Summary*: While a wide range of potential impacts exists and damage to the archaeological resource can be minimised by careful regulation of a number of these, the major impact will come from excavations for water and related features, with additional damage in the area of the boathouses on the island at the north end of the course. The area of destruction or extensive damage is roughly 40 ha. In archaeological terms the impacts can be summarised as follows:

- Areas 1 and 3, prehistoric and Roman deposits and features.
- Area 5, Romano-British settlement and other features.
- Area 6 west, areas of possible prehistoric activity of uncertain character
- Area 8, the eastern peripheries of two apparently discrete cropmark complexes principally of Roman date. The bulk of these complexes, including well-defined enclosures (in the group to

the south) and trackways, pottery kilns and burials (in the group to the north) will, however, lie outside the line of the Rowing Lake.
- Area 9, the focus of early Iron Age activity and the southern focus of Anglo-Saxon activity.
- Area 10, the northernmost focus of Anglo-Saxon activity.

6 FIELDWORK STRATEGIES

6.1 General

6.1.1 The strategies proposed here result from consideration of the importance of the various archaeological components of the development area (Section 4 above) seen against the range of impacts (Section 5). The proposed strategies also take into account experience gained by OA on the partly comparable rowing lake project for Eton College, where extended fieldwork has recently been completed, as well as wider experience of a range of other projects on gravel terrace and related topographies, including the very large scale work undertaken by Framework Archaeology at Terminal 5, Heathrow. In essence, there is no reasonable alternative to extensive excavation of a number of key areas within the Rowing Lake area.

6.1.2 The proposals are based on the broad view that a further phase of evaluation *per se*, carried out significantly in advance of excavation in order to refine priorities for that excavation, is not the best approach to the archaeology of the development area (for limited and specific exceptions to this, now proposed as early stages of a phased programme of mitigation, see Section 6.2 below). There are two reasons for this view; first that the areas thought to be most in need of further definition potentially contain activity (for example possible prehistoric in Areas 1, 3 and the western part of Area 6) which is not necessarily susceptible to ready identification in conventional evaluation trenches; second is the fact that all the areas in question will be subject to the maximum impact from the development and in view of the proposals for dealing with such areas (below) further evaluation is unlikely to be the most effective way of refining understanding of these areas.

6.1.3 The proposed programme of work is based on the priorities discussed above (section 4) set against two practical considerations; that the understanding of the site based on evaluation evidence is always going to be incomplete whatever the extent of evaluation, and that the resources available to address the archaeological questions of the development are inevitably finite. For these reasons prioritisation of archaeological objectives and associated input will be necessary, but it is also vital that the implementation of the fieldwork programme is as flexible as possible in order to take account of changes in the assessment of the importance or potential of different parts of the development area as work proceeds. In general terms, achieving understanding of the landscape as a whole is the primary objective, but since it is clearly impossible to examine all parts of it comprehensively, selectivity of approach is essential. This Research Design is based on the view that the landscape of the Rowing Lake area will be best understood by looking at identifiable foci of settlement and other activity areas (and their immediate environs) within this landscape, together with features such as trackways which link them together into an integrated whole. While this approach does not intend to downplay the importance of the intervening areas, nor to ignore them archaeologically, the principle of focusing most attention on a variety of nodal points seems to offer the most effective way of maximising the archaeological potential of the development area. Complementary programmes of intensive (6.1.4) and extensive (6.1.5) examination are proposed.

6.1.4 Within the general framework set out in 6.1.3 above a range of areas can be proposed for detailed examination. These are described in more detail below (sections 6.3-6.10) in relation to the major component areas of the Rowing Lake. This area by area approach is for convenience only, and should not distract from the fact that the proposed excavation areas are seen as complementary contributions to the comprehension of the wider landscape. The proposed detailed excavations constitute a substantial sample of this landscape, *c* 11.8 ha or a little over 25% of the entire area of destruction or damage. The areas are selected to give a wide spread sample across the various component elements, both chronological and functional, identified in the landscape. As already stated, however (6.1.3), the outlines of excavation areas proposed here are not intended to be rigidly prescriptive should changing circumstances and understanding suggest rather different approaches to the areas thought to be of greatest archaeological potential. Most of the areas of proposed excavation are quite large. This approach reflects the view that greater understanding will result from the relatively detailed examination of a smaller number of significant samples which will incorporate a range of juxtaposed activity areas and feature types, the relationships of which to each other can then be examined, rather than the implementation of a more piecemeal approach in which archaeological effort is dissipated across the landscape. This approach can, however, be supplemented by carefully selected small-scale examination of significant features, such as trackways, in order to provide spatial and chronological definition. In addition, a reflexive approach will be taken to issues of detail such as the level of sample excavation of features within the agreed excavation areas in order to maximise the effective deployment of resources (see further below).

6.1.5 The incidence of known or potential archaeological features and deposits within the areas of destruction, and the possibility of the occurrence of as yet undetected features, means that archaeological observation of topsoil removal across the whole of the areas of destruction is necessary to complement the various more detailed examinations. For significant parts of the areas of destruction topsoil stripping will already be under strict archaeological supervision as part of the programme of controlled excavation of substantial parts of the development area. The need to observe areas beyond those selected for detailed examination relates to the prime importance of the development area as a landscape, in which understanding of the elements which lie between and link settlements is in its own way as significant as understanding of the settlements themselves (cf English Heritage 1991a, 37-38). Provision has therefore been made for a phase of watching brief/salvage recording work during contractors' stripping operations. The more specific area-by-area mitigation strategies detailed below are predicated on the assumption that all necessary large scale topsoil removal will be done at an early stage in the programme of archaeological works (though clearly the scale of the operation is such that this will not be a simultaneous event across the development area).

6.1.6 In addition to a programme of watching brief work relating to the main earthmoving programme, provision has been made for contingency funding in the event of this work revealing significant and substantial unexpected archaeological remains (for resource allocations see section 8)

6.1.7 The breakdown of the approach to the excavation of the development area given below presents objectives and methodologies at a fairly generalised level. Flexibility of approach to more specific questions is essential. This is discussed further in the introduction to Appendix 1, and details of standard excavation and recording procedures and methodologies are also contained in Appendix 1. Typical sampling levels for examination of various feature types and their

artefactual and environmental contents are also set out there. A more detailed statement of excavation objectives and (where necessary) methodologies based on the MAP2 model (English Heritage 1991b) will be produced for each of the individual areas of the site to be examined as appropriate, in advance of the commencement of fieldwork.

6.2 Stage 1 Mitigation

6.2.1 The previous version of this Research Design proposed a primary stage of work which was largely evaluatory in character. Much of this work has now been completed, for example, the production of a site-wide deposit model (OA 2005b). One case for further evaluation work relates to the northern part of Area 8, where Roman pottery kilns were located in an evaluation trench. This area now lies almost entirely to the west of the band of destruction which will result from the excavation of the rowing course. Further definition of the overall extent of pottery production, however, will assist significantly in the formulation of a mitigation policy for this area. The question of the extent of pottery kiln structures, in particular, but also of related features, can be resolved quickly and cost-effectively by magnetometer survey. Such a survey will not only be of value for deciding detailed mitigation strategies, but in the event that excavation is confined to the rowing course channel will provide important evidence for the scale and context of pottery production activity in the unexcavated areas. The total area of magnetometer survey required would be of the order of *c* 3 ha to provide extensive coverage of the enclosure complex within which the kilns lie.

6.2.2 At the extreme northern end of the site an area of probable Anglo-Saxon settlement (Area 10) is already proposed for excavation. This area has been sampled by test pitting, but its definition remains slightly unclear and there is, in particular, little evidence relating to the area to the south of the test-pitted area which will be impacted by the launching lake, boathouses, a grandstand and roads. It is therefore proposed that the area of impact south of Area 10 should be subject to examination at an early stage. This will be examined by 'evaluation style' trenching at the lowest sample level which will allow the extent of Anglo-Saxon activity to be determined.

6.3 Stage 2 Mitigation

Area 1

6.3.1 An extensive weathered land surface (Stratigraphic Unit 3d) has been identified in this area, in almost all trenches south of Fen Road. Occasional struck flints have been recovered from this deposit as well as charcoal and very sparse cereal chaff.. This deposit has the potential to contain relatively undisturbed deposits of prehistoric date, eg *in situ* flint knapping scatters although it is not possible to predict where, or even if, these will occur. On topographic grounds, it is suggested that the margins of the mere, around Trench OA10, may be the most likely location for such deposits and indeed the greatest concentration of flintwork has been recovered from this area (Trench CCC5).

6.3.2 Objectives:

- To test for the presence of prehistoric deposits such as flint knapping scatters at the margins of the silted mere.
- To obtain further stratigraphic evidence for the alluvial sequence and gather associated environmental data.

- To obtain samples from the deposit sequence suitable for scientific dating

6.3.3 Methodology:

- Machine stripping of topsoil and subsoil to the surface of Statigraphic Unit 3d in the area of Trench OA 10 and Trench CCC5. Cleaning of stripped surfaces by hand to identify lithic scatters or cut features, where appropriate. Excavation of a sample of lithic scatters or feature fills, if encountered, by hand. Approximate area of stripping 2000 sq m.

Area 3

6.3.4 This area contains the deposit sequences associated with a shallow mere or backswamp (Stratigraphic Unit 5) in Trenches OA11-OA20 and CCC6-CCC11. The dating of these deposits is somewhat uncertain at present. Prehistoric activity of Bronze Age date has been recorded on a gravel 'island' within this area.

6.3.5 Objectives:

- To define the extent, chronological sequence and character of the prehistoric features
- To obtain further stratigraphic evidence for the alluvial sequence and gather associated environmental data.
- To obtain samples from the deposit sequence suitable for scientific dating

6.3.6 Methodology:

- Machine stripping of topsoil and subsoil in the area of Trench OA18. Cleaning of stripped surfaces by hand to identify cut features, where appropriate. Excavation of a sample of feature fills, if encountered, by hand. Localised cutting of sections into Stratigraphic Unit 5 to elucidate stratigraphic relationship with prehistoric features and for dating and environmental samples as required. Approximate area of stripping 4000 sq m.
- Machine stripping of topsoil and upper alluvial deposits in a sample strip at the north end of the impacted area (and beyond it to the east), linked to the adjacent excavated part of Area 5 except where upstanding linear features are encountered. Sample lengths of these will be retained in situ to allow cleaning and examination of their upper surfaces. Approximate area of stripping 2000 sq m.

Area 5

6.3.7 Much of this area is occupied by poorly defined cropmark features relating to Roman and perhaps earlier settlement. Nearby relatively well defined enclosures now lie to the west of the line of the Rowing Lake. Prehistoric activity may also be represented. The southern end of the area is relatively empty of archaeological features on present evidence. Elsewhere a high density of features can be expected. The general depth of overburden is *c* 0.40-0.50 m over silts and gravels of the river terrace, with alluvial deposits surviving in the eastern part of the area.

6.3.8 Objectives:

- To define the extent, chronological sequence and character of a significant sample of the prehistoric and Roman settlement and related features.
- To relate the Roman settlement and other features to the alluvial sequence to the east.

6.3.9 Methodology:

- Machine stripping of the northern two-thirds (the area of densest features) of impacted area to first significant archaeological horizon (the top of the gravel subsoil for much of the area). Further cleaning as necessary in order to produce an overall plan of features. Sample excavation of features at a level consistent with achievement of the stated objectives,

including determination of relationships and recovery of adequate artefact and ecofact assemblages. An easterly extension from this area of excavation into the alluvial sequence falls mainly in Area 3 (above). Approximate area of stripping 30,000 sq m. The exact outline of the area indicated on Fig 3 will be subject to review and if revision seems appropriate (e.g. to reveal areas of unexpectedly high feature density at the expense of those where few significant features emerge) this will be done.

Area 6 West

6.3.10 The density of archaeological features in this area is uncertain. On present evidence they concentrate in the southern part of the area and are mostly perhaps of prehistoric date. Features are mostly cut into the gravel subsoil at a depth of *c* 0.45 m below modern ground level, with very localised survival of a buried soil (above feature fills) at a greater depth.

6.3.11 Objectives:

- To define the extent, density, character and date of archaeological activity in a sample part of the area, incorporating the eastern half of evaluation Trench CCC21, which included a number of possible prehistoric features (the western half of this trench lies outside the line of the Rowing Lake).

6.3.12 Methodology:

- Machine stripping of impacted area to first significant archaeological horizon (the top of the gravel subsoil for much of the area). Further cleaning as necessary in order to produce an overall plan of features. Sample excavation of features at a level consistent with achievement of the stated objectives, including determination of relationships and recovery of adequate artefact and ecofact samples. Approximate area of stripping 8000 sq m. The exact outline of the area indicated on Fig 3 will be subject to review and if revision seems appropriate (e.g. to reveal areas of unexpectedly high feature density at the expense of those where few significant features emerge) this will be done.

Area 7

6.3.13 Present evidence indicates a relatively low density of features, distributed unevenly across the area. A cluster of generally rather indeterminate cropmark features (but including an (undated) track) occurs in the north-eastern corner of the area. A probable rectilinear enclosure further south in the eastern edge of the area is the most significant element (and is possibly of Anglo-Saxon date), but the aerial evidence is incomplete. Other features were identified nearby in evaluation trenches located in areas producing no cropmarks. They are mostly cut into silts and gravel subsoil at a depth of *c* 0.55 m below modern ground level.

6.3.14 Objectives:

- To determine the date and character of the rectilinear enclosure by sampling its western part, and to examine its relationship to adjacent elements in the broader landscape

6.3.15 Methodology:

- Machine stripping of sample zone of impacted area to first significant archaeological horizon (the top of the gravel subsoil for much of the area). The sample will concentrate on the western end of the enclosure and an associated area to the west, particularly in the vicinity of Trench CCC25, to provide a more extensive sample of this part of the Rowing Lake which appears to have a relatively poor cropmark response. Further cleaning as necessary in order to produce an overall plan of features. Sample excavation of features at a level consistent with achievement of the stated objectives, including determination of relationships and recovery of adequate artefact and ecofact samples. Depending on the character and extent of the

rectilinear enclosure and details of the adjacent Rowing Lake construction, some excavation of this feature beyond the eastern edge of the rowing course may be desirable to ensure that it is properly understood. Approximate area of stripping *c* 8000 sq m.

Area 8 South

6.3.16 In this area the rowing course impacts on the eastern margin of a relatively well-defined cropmark complex consisting of enclosures of various forms and a trackway thought to represent the medieval Cambridge Way. The enclosures appear to be of Roman date and at least some domestic occupation is indicated. Features are generally cut into gravel and alluvial sands and silts about 0.40-0.50 m below the modern ground surface.

6.3.17 Objectives:

- To define the extent, chronological sequence and character of features marginal to the Roman settlement and to assess the reliability of aerial photographic cover in this area.
- To confirm the postulated medieval date of the trackway.

6.3.18 Methodology:

- Machine stripping of sample part of impacted area to first significant archaeological horizon (the top of the gravel (etc) subsoil for much of the area). Further cleaning as necessary in order to produce an overall plan of features. Sample excavation of features at a level consistent with achievement of the stated objectives, including determination of relationships and recovery of adequate artefact and ecofact assemblages. Depending on the character and precise extent of the enclosures within the impacted zone, and on details of the adjacent Rowing Lake construction, limited excavation of the enclosure complex beyond the western edge of the rowing course may be desirable to ensure that it is properly understood. However, if, as seems likely, the exposed features are clearly peripheral to the enclosure complex preservation of the whole of the latter in situ is likely to be more appropriate. Approximate area of stripping 2000 sq m. The exact outline of the area indicated on Fig 3 will be subject to review and if revision seems appropriate (e.g. to reveal areas of unexpectedly high feature density at the expense of those where few significant features emerge) this will be done. In this case a small sample area could be opened in Area 7 in the vicinity of Trench CCC36 in order to investigate further the undated trackway and related features there.

Area 8 North

6.3.19 As in the southern part of Area 8 the rowing course here just skirts the eastern edge of a relatively well-defined cropmark enclosure complex which is linked to a system of trackways lying to the west, within the development area but towards its western margin and probably providing a link with the enclosure complex in Area 8 South. The enclosures contain *inter alia* 2nd-3rd century pottery kilns and ?Roman burials. A scheme for non-intrusive investigation of this complex, with the objective of providing further definition for the important pottery production aspect of the area, will be implemented if possible (Section 6.2). The approach to this area outlined here is therefore to some extent conditional on the results of that work. Features are cut into gravel and alluvial sands and silts about 0.40-0.50 m below the modern ground surface.

6.3.20 Objectives:

- To define the extent, chronological sequence and character of any features at the eastern margin of the area of Roman activity, and particularly to determine if any such features relate to pottery production and burials. To characterise any other features which may be exposed in the area.

6.3.21 Methodology:

- Machine stripping of a small sample area adjacent to the Roman complex to first significant archaeological horizon. This may be the top of the gravel (etc) subsoil for much of the area, but particular care should be taken because of the possible presence of pottery kilns and burials to ensure that these are not adversely affected by stripping. Further cleaning as necessary in order to produce an overall plan of features. Sample excavation of features at a level consistent with achievement of the stated objectives, including determination of relationships and recovery of adequate artefact and ecofact assemblages where present. Depending on the character and precise extent of activity within the impacted zone, and on details of the adjacent Rowing Lake construction, limited excavation of the enclosure complex beyond the western edge of the rowing course may be desirable to ensure that it is properly understood. Alternatively, if the exposed features are entirely peripheral to the enclosure complex preservation of the latter *in situ* is likely to be more appropriate. The impact of the award drain at the western margin of the area on the enclosure and trackway complex will need to be considered. Further, limited excavation may be required here to further elucidate aspects of these features. Approximate area of stripping 2000 sq m.

Area 9

6.3.22 Situated in the north-eastern part of the project area, this area has been shown to contain probable occupation evidence dating to the Early/Middle Iron Age, Roman and Saxon periods. Evaluation work has demonstrated that the Early/Middle Iron Age occupation evidence occupies a limited area to the east of the focus of Saxon activity. Additional trenching to the south, north and east of the Saxon focus has also demonstrated that this activity is unlikely to extend beyond the area originally targeted for test-pitting. Underlying the Saxon remains is a more extensive area of Roman activity.

6.3.23 Objectives

- To define the extent, chronological sequence and character of the early Iron Age settlement and related features including determination of relationships and recovery of adequate artefact and ecofact assemblages.
- To define the extent, chronological sequence and character of the early Roman activity.
- To define the extent, chronological sequence and character of the Anglo-Saxon activity settlement and related features, including the relationship of such activity to the underlying Roman activity and the recovery of adequate artefact and ecofact assemblages.

6.3.24 Methodology

- Machine stripping of a sample of the impacted area within the northern part of the proposed Storage Lake. Further cleaning as necessary in order to produce an overall plan of features. Sample excavation of features at a level consistent with achievement of the stated objectives, including determination of relationships and recovery of adequate artefact and ecofact assemblages. Approximate area of stripping 30,000 sq m.

Area 10

6.3.25 Situated at the northern extremity of the project area, this area contains a focus of Anglo-Saxon settlement identified in fieldwalking and examined by test pitting. The boundaries of this area of settlement are not yet established with certainty, but a north-south extent of at least 200 m is possible on the basis of the evaluation data. Definition of the southern extent of this area, which may therefore be subject to some change, will be refined through the Stage 1 mitigation proposed for this area (see 6.2.2 above). At present no other significant archaeological features are known within this area. The medieval Cambridge Way survives in

part as an earthwork feature here, providing localised preservation of a buried soil which appears to seal Anglo-Saxon features cut into a further silt layer overlying the natural subsoil. Otherwise, features are cut into ?alluvial sands and silts about 0.40-0.50 m below the modern ground surface in the southern part of the area and a little deeper (up to *c* 0.65 m) at the north.

6.3.26 Objectives:

- To define the extent, chronological sequence and character of the Anglo-Saxon settlement and related features (and of any other features which may be exposed in the area), including determination of relationships and recovery of adequate artefact and ecofact assemblages.
- To characterise the settlement layout in terms of density and distribution of structures and other significant activity areas.

6.3.27 Methodology:

- Machine stripping of sample of impacted area at northern end to first significant archaeological horizon. This will generally be the top of the subsoil for much of the area, but locally, where a greater depth of stratigraphy is preserved beneath the mound of the Cambridge Way, stripping in the vicinity of settlement areas should be to the top of the probable buried soil, which may then have to be removed by hand (it has good potential for examination of artefact distributions etc) to reveal features beneath. One or more upstanding sections through the earthwork should be retained as a check on the relationship of the vertical sequence and horizontal settlement components. Further cleaning as necessary in order to produce an overall plan of features. Sample excavation of features at a level consistent with achievement of the stated objectives, including determination of relationships and recovery of adequate artefact and ecofact assemblages. Emphasis will be placed on the recovery of environmental information, from bulk samples, monoliths and hand retrieval of faunal remains. Approximate area of stripping 30,000 sq m.

6.4 Environmental Sampling

6.4.1 The gathering and interpretation of data for the natural environment of the development area, human impacts upon it and exploitation of plant and animal resources has been indicated as an important objective of the project (4.7 above). It is intended that these should contribute to an integrated approach to environmental evidence to complement that of stratigraphy, structures and artefacts. Current OA standard sampling strategies are defined in Appendix 1 section 9, but these will be modified as required to address specific questions related to the Rowing Lake area, particularly as advised by the English Heritage Regional Science Advisor. The fine details of level of sampling, location and size of samples will be established in close liaison with the appropriate specialists. Particular attention will be paid to palynological sequences and retrieval of palaeoecological data from areas blanketed by alluvial deposits; any buried soils encountered will be subject to artefact and environmental sampling.

6.5 Absolute Dating

6.5.1 Refinement of chronology is identified as a specific regional issue in a number of periods (eg Bryant 2000, 14) and has been identified as a national priority for periods such as the Iron Age (Haselgrove et al 2001). In view of some of the difficulties of dating ceramic material discussed above it is important that chronological frameworks are established using absolute dating techniques. It has recently been stated, for example, that for the later Iron Age ‘routine use of absolute dating techniques is essential’ (ibid, 31) and this view can be applied with equal justification to other prehistoric periods, in particular. Some areas of the site may be

more than usually dependent upon absolute dating for establishment of their chronology - for example the sequence of alluvial and other deposits in Area 1 may not produce artefactual material and its refinement could be based largely if not entirely on absolute dating techniques.

6.5.2 Radiocarbon will be the principal absolute dating technique deployed, but consideration will be given to the use of other techniques where appropriate. These could include archaeomagnetic dating of suitably-fired structures and thermoluminescence dating of ceramic material.

6.6 Pleistocene Deposits

6.6.1 The potential for the occurrence of Pleistocene deposits has been referred to briefly above (section 4.3.1). It is clear that, while some general statements can be made about the likely location of deposits which have the potential to contain Palaeolithic remains, it is not possible to predict where such deposits might occur with any precision. The results of the deposit model do suggest that, prior to the Late Pleistocene or Early Holocene periods, suitable environments for the preservation of archaeological remains are unlikely to have existed. During the Late Pleistocene or Early Holocene, changes to the fluvial regime may have given rise to more favourable conditions, both for human activity to have occurred and for any archaeological remains related to such activities to have been preserved.

6.6.2 At present it is proposed that the excavation of the Alan Burrough Training Lake cut will therefore be monitored at intervals, the exact frequency and timing of monitoring visits being dependent on the rate of progress of the contractors' excavation. It is envisaged that about ten formal inspections of these excavations (i.e. the equivalent of ten man-days work) should suffice to indicate the extent to which the gravels and overlying strata produce significant information. Additional, informal monitoring may also be possible, particularly if some of the construction work is concurrent with part of the main archaeological programme. Beyond this, since it is clear that constant monitoring would not be possible or desirable, unless the specific potential of these deposits were very well established, ad hoc methods of data gathering may still have a part to play. In this respect the establishment of close contacts with the earthmoving contractors, particularly with regard to the rapid passing on of information about significant deposits, may result in the accumulation of extra data.

6.6.3 Health and Safety considerations are of paramount importance in the case of the deposit monitoring proposed here, the principal issues being those relating to the proximity of heavy plant and the stability and other physical characteristics of the deposits to be examined.

7 POST-EXCAVATION

7.1 General

7.1.1 Detailed proposals for post-excavation work are inappropriate at this stage. Their substance will be dependent on the quantity and quality of the data recovered in fieldwork. This will be examined in a fairly formal MAP2-style post-excavation assessment programme, in the course of which priorities and a timetable for further analysis will be drawn up and proposals put forward relating to the extent and format of publication. It is clear, however, from the

assessment of the potential of the project area presented above that a substantial post-excavation and publication programme is likely to be required. The likely publication format for the excavation report would be a monograph style (A4) volume or volumes but consideration will also be given to the use of appropriate digital media in tandem with or supplementary to the monograph format. OA has considerable experience in the production of such reports. The production of a more popular account of the excavation and its findings, to complement the formal publication, could be of considerable educational benefit at local level and beyond (see 9.3).

7.1.2 The complete project archive, including finds, will be deposited with Cambridgeshire County Council for long term storage and curation. The archive will be prepared in line with the requirements of *Deposition of Archaeological Archives in the County Archaeology Store. Guidelines (Ref SMR 2002/1)*. A microfilm security copy of the project archive will be deposited with the NAR.

8 RESOURCES, TIMETABLE AND CONTINGENCY

8.1 General Resourcing

8.1.1 The fieldwork phase of the project is envisaged as running in two phases, related to the proposed construction programme. The first phase (Phase 1) of work would focus on the proposed Storage Lake, The Alan Burrough Training Lake and the Canal. The second phase (Phase 2) of work would focus on the Competition Lake itself . In both cases, it is envisaged that the investigations would run in part concurrently with the first phases of the construction operation; this will allow the closest monitoring of the overall topsoil stripping and offers the possibility of a rapid response to problems caused by unforeseen discoveries resulting from topsoil stripping.

8.1.2 Within this framework the manpower resources for each excavation area, as set out in section 6, have been calculated in terms of approximate numbers of working days. It is emphasised that these figures are a guide, and if it seems appropriate for the balance of personnel deployment to be shifted from one area to another (for archaeological reasons) this will be done. Here as elsewhere flexibility of approach is essential. Such flexibility should be achievable relatively easily as it is likely that for much of the programme more than one area will be under examination at any one time.

8.2 Specific Resourcing

8.2.1 The proposed provisional allocation of working days per area is as follows:

Phase 1 fieldwork

- Area 1 50
- Area 3 100
- Area 9 900

Stage 2 fieldwork

- Area 5 1500
- Area 6W 400

- Area 7 400
- Area 8S 100
- Area 8N 100
- Area 10 1000

8.2.2 Assuming a hypothetical team of 20 the projected 1050 working days of Phase 1 fieldwork could be completed in about 10 weeks following machine-stripping.

8.2.3 Assuming a hypothetical team of 20 the projected 3600 working days of Phase 2 fieldwork could be completed in about 9 months. In reality the excavation team should be considerably larger than this at times, and as far as possible winter excavation will be avoided to minimise loss of working time or inefficiency, and reduction in quality of data recovery, as a consequence of poor weather conditions. The above figures are for site technicians only, supervisory and senior staff have not been included in these totals.

8.3 Timetable

8.3.1 The exact timetable for the archaeological programme will be worked out in more detail once the viability of the project is established. Factors to be taken into account in determining the sequence of excavation include:

- Variations in ground conditions in different parts of the project area.
- The archaeological logic of examining potentially most problematic areas at an early stage, to allow time for strategies for different approaches to be put in place if required.
- Practical aspects of earthmoving, both in relation to the archaeological work and subsequent construction operations.

8.4 Contingency Arrangements

8.4.1 An allocation of funding within the proposed project budget has been made for contingency work, in the event of significant unforeseen discoveries at any stage in the fieldwork phase of the project. This is in line with current best practice as expressed in IFA guidelines for excavation (IFA 2001, section 3.2.16). In the present context the contingency is set at *c* 20% of the total fieldwork costs (excluding plant), with a pro-rata allocation for post-excavation work arising from any contingency excavation. The deployment of this funding would be agreed between the project manager and the local authority archaeologist monitoring the project (see below), but possible contexts might include the discovery of significant concentrations of archaeological deposits within Area 1 or within in Area 10 and, in particular, similar discoveries during the phase of monitoring of general topsoil stripping for the construction of the Rowing Lake. The contingency allocation is intended to be used principally in relation to significant variations in density and type of archaeological features in areas where the presence of such features has already been broadly established or predicted on good evidence, the unforeseen nature of these features resulting from the impossibility of predicting feature type and density *in detail* prior to extensive excavation. While it may be possible for some of the contingency funding to be allocated to a category of totally unforeseeable discoveries (i.e. those which could not reasonably have been predicted by a

competent professional in full possession of the archaeological information available at the time that the fieldwork commenced) it is emphasised that the contingency is not intended to provide blanket coverage for such 'worst case scenario' discoveries (this would require a quite unrealistic earmark of funds which could easily amount to *c* 50% of the entire project budget). Should significant unforeseeable archaeology be revealed all possible avenues of additional funding and possible redefinition of the existing project would have to be explored.

8.5 Monitoring Arrangements

8.5.1 It is anticipated that in addition to the application of internal procedures for the monitoring of progress and standards of fieldwork and post-excavation work the archaeological programme will be monitored regularly by the local authority archaeologist. Excavation and recording standards, the rate of progress and the deployment of resources within the project can thus be kept under review. The precise timing and frequency of such monitoring visits will be agreed by the project manager and the County Archaeological Officer or his/her representative. In addition it is proposed that an advisory panel should be assembled to monitor progress and provide guidance and advice on a range of aspects of the project. Such a panel has been established for the Eton Rowing Lake project and its advice is considered to be very beneficial to the project. The Eton panel is chaired by Professor James Graham-Campbell of UCL and the principal academic advisor is Professor Richard Bradley. It includes other eminent authorities on the archaeology of the relevant area and principal periods represented on the site, the County Archaeologist and an educational representative. A similar panel for the Cambridge project would undoubtedly be beneficial. Possible members could include Professor Martin Millett, Professor of Classical Archaeology, University of Cambridge; Dr Charly French, Senior Lecturer and Head of Archaeology Department, University of Cambridge; Dr Catherine Hills, University of Cambridge; Dr Peter Murphy, English Heritage; Professor Peter Salway; Professor Martin Jones, Professor of Environmental Archaeology at Cambridge; the County Archaeologist/planning archaeologist and English Heritage, CBA and/or educational representatives.

9 EDUCATIONAL BENEFIT

9.1 General

9.1.1 The Cambridge Rowing Trust is a registered educational charity. While the principal thrust of its interest is directed towards sporting matters, it is proposed that other potential educational benefits of the development should also be fully exploited. With regard to the archaeological aspects of the development the educational potential is high, both during the excavation phase and subsequently.

9.1.2 It is therefore proposed that the excavations should be accessible to visiting school parties and similar groups. Such visits will be carried out with due regard to health and safety considerations, particularly in respect of the proximity of heavy plant to areas of excavation and accesses to such areas. Close liaison will be maintained with Cambridgeshire's Department of Education, Libraries and Heritage in order to maximise the effectiveness of site visits and any more wide-reaching educational aspects of the project. It is proposed that one or more general open days be arranged to provide wider public access to the site during the fieldwork stage of the project.

9.1.3 Existing links between CRT and local and national media will be utilised for the release of updated information on a staged basis, or providing information on discoveries of particular interest should these occur. An important means of providing regularly updated and widely accessible information on the progress of both fieldwork and subsequent stages of the project will be via the internet. Information can be placed both on CRT and OA websites.

9.1.4 Subsequent to the excavation and completion of the development the archaeological significance of the site can be emphasised by presentation of the results as displays in the new buildings and elsewhere within the Rowing Lake complex. The publication of a popular account of the excavation and its results (see 7.1.1 above) could also form part of a wider programme of education aimed not just at schools but at local communities in general.

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Appendix 1

AREA EXCAVATION AND RECORDING METHODOLOGIES (OA STANDARD, 1996, MODIFIED)

INTRODUCTION

Approaches to the methodologies of archaeological excavation and recording in Britain have evolved constantly since the development of the discipline in the later 19th century. Increasing systematisation of these methodologies from the 1960s reflected the increasing size of excavations, the greater complexity of what was recorded and the gradual growth of a body of professional excavators. The advent and implementation of PPG16 resulted in the fossilisation of some recording systems in an understandable move to ensure consistency of approach across a growing profession. As part of this process contracting organisations and some local planning authorities adopted absolute standards in such areas as sample proportions in excavation of archaeological features. While easy to monitor, such systems have had the effect of mechanising the process of excavation and recording and removing the engagement between archaeologist and data from the site into the office, by which stage the possibility of dialogue no longer exists. Recent experience has shown the benefits of re-assessing that balance. A number of archaeologists have emphasised the value of a more reflexive approach to excavation and recording, and the practical benefits of this have been seen in the application of such an approach by bodies such as Framework Archaeology, a joint venture of Oxford Archaeology and Wessex Archaeology, in their work for BAA on very large scale archaeological landscapes at such major sites as Heathrow Terminal 5 and Stansted.

A number of important concepts lie behind the implementation of this new thinking, amongst which some of the most important are those of flexibility of approach and placing the professional judgement of the archaeologist in the field at the heart of the process of decision making in relation to the significance of individual features, within a well-developed conceptual framework. In practice the effect of this is to concentrate archaeological resources where they are most needed to address wide questions about the nature of human activity across landscapes as well as resolving individual problems. OA hopes that some of the beneficial aspects that have emerged from recent experience of Framework and other projects can be put to good use in the diverse archaeological landscape of the Cambridge Rowing Lake. It is emphasised that there is no intention to try and implement a 'watered-down' version of the Framework approach, but rather to apply some of the flexibility inherent in its ethos to beneficial effect.

With this in mind, the following proposed general approaches represent a modified version of previously presented standard methodologies.

EXCAVATION

1 Prior to any area excavation, appropriate survey (eg earthwork, contour, geophysical) or sampling strategy (eg for topsoil artefact densities, phosphate analysis) will be undertaken as necessary prior to mechanical site strip.

2 In most cases area excavations will be stripped of topsoil and other overburden mechanically. An appropriate machine will always be used. This will normally be a 360^{o} tracked excavator with a 1.5 or 1.8 m wide toothless bucket. In other cases a JCB 3CX Sitemaster, or for work with restricted access or working room a mini-excavator such as a Kubota KH 90 will be employed. Lorries or dumpers will be used to move spoil to the storage areas. No machinery will be allowed to cross stripped areas.

3 All machining will be undertaken under direct archaeological supervision.

4 All undifferentiated topsoil or overburden will be removed down to the significant archaeological horizon in level spits; the level of the archaeological horizon having first been established by an evaluation or by the digging of test pits.

5 Mechanically excavated spoil will be monitored in order to recover artefacts that will assist in meeting the aims of the project.

6 The resulting surface will be cleaned adequately by hand using appropriate tools if necessary.

7 A digital base plan of the stripped site will be prepared (see 17-19 below). This will form the basis from which characterisation of the principal site components will proceed.

8 The sampling level of the archaeological remains that will be excavated will be determined after the initial surface clean, but will normally seek to maintain at least the following:

- All structures and all zones of specialised activity (eg industrial, agricultural processing, ceremonial, funerary) will be extensively or fully excavated and all relationships recorded.
- *Ditches and gullies*: all significant relationships will be defined and investigated. All terminals will be excavated. Sufficient of the ditch lengths will be excavated to determine the character of each individual ditch over its entire course with consideration given to possible recutting of ditches which may not have taken place over the entire length. Should specialised deposits (eg localised refuse dumping, industrial wastes) be present, then more extensive excavation will take place. Sufficient artefact assemblages will be recovered to assist in dating stratigraphic sequences and for obtaining sufficient ceramic assemblages for comparison with other sites.
- *Pits:* will generally be half sectioned. Some pits may be fully excavated. Decisions as to which pits will be fully excavated will be made in the light of information gained in half sectioning. Priority will be given to those features containing significant structural traces or important artefactual or environmental material.
- *Post and stake holes*: where not clearly forming a structure will generally be half sectioned ensuring that relationships are investigated. Where deemed necessary on the basis of artefact content a number may require full excavation.
- For other features such as working hollows, quarry pits etc, all relationships will be ascertained. Further investigation will be a matter of on-site judgement, but should seek to define their extent, date and function.

9 Different environmental sampling strategies may be employed according to established research targets and the perceived importance of the strata under investigation. Bulk samples, a minimum of 10 litres, but up to 30 litres where possible for early prehistoric features will be taken for flotation for carbonised remains. Bulk samples will be taken from any waterlogged deposits present for macroscopic plant remains. Columns for pollen analysis will be taken if appropriate. Mollusc samples will be collected if present. Other bulk samples for small animal bones and other small artefacts may be taken from appropriate contexts.

10 All artefacts will be retained from excavated contexts unless they are of very recent origin. In these cases sufficient of the material will be retained to date and establish the function of the feature.

11 All finds of gold and silver will be removed to a safe place and reported to the local Coroner according to the procedures relating to Treasure Act (1996). Where removal can not be effected on the same working day as the discovery, suitable security measures will be taken to protect the finds from theft.

12 All known human remains will be excavated under the appropriate Home Office licence and local environmental health regulations.

13 In certain circumstances where unusual or extremely fragile and delicate objects are to be found, their recovery will be undertaken by appropriate specialists.

RECORDING

14 All on-site recording will be undertaken in accordance with the requirements of the *OAU Field Manual* (ed D Wilkinson 1992), updated where appropriate in line with current best practice.

15 A continuous unique numbering system will be operated. Written descriptions will be recorded on proforma sheets comprising factual data and interpretative elements.

16 Where stratified deposits are encountered a Harris matrix will be compiled during the course of the excavation.

17 The excavation area will be surveyed in using a Total Station Theodolite (TST). All surveying will be related to an appropriate grid (either site specific or OS based) and checked using a three tripod traverse. Temporary control points will be established and used throughout the duration of the project. Any site specific grid will be accurately tied into the OS Grid and located on the 1:2500 or 1:1250 map of the area.

18 Site planning will be conducted using a mixture of analogue and digital planning as appropriate. All plan reference points will be surveyed in using the TST to create a cohesive site plan. In addition, sample locations and key objects will all be located in 3D space using the TST.

19 All information will be logged initially in the TST and then downloaded onto computer, in addition a manual file of all key points will be maintained in case of error. All digital data will be fully backed up in the field and copies stored centrally by the archaeological contractor.

20 Hand drawn plans will normally be drawn at 1:50 but in urban or deeply stratified sites a scale of 1:20 will be used. Detailed plans will be at an appropriate scale. Burials will be drawn at 1:10.

21 A register of plans will be kept.

22 Long sections of trenches showing layers will be drawn at 1:50 or 1:20. Sections of features or short lengths of trenches will be drawn at 1:20 or 1:10.

23 A register of sections will be kept.

24 All sections will be tied in to Ordnance Datum.

25 A full black and white and colour (35 mm transparency) photographic record, illustrating in both detail and general context the principal features and finds discovered will be maintained. The photographic record will also include working shots to illustrate more generally the nature of the archaeological work. This record will be supplemented with digital photographs as appropriate.

26 Photographs will be recorded on OA Photographic Record Sheets.

27 A register of small finds and environmental samples will be maintained.

28 All identified finds and artefacts will be retained, although certain classes of building material or post medieval pottery may sometimes be discarded *after* recording if an appropriate sample is retained. However, no finds will be discarded prior to post-excavation assessment or without the prior approval of the nominated representative of the local authority and the receiving Museum.

29 All finds and samples will be treated in a proper manner and to standards agreed in advance with the approved recipient museum. These will be exposed, lifted, cleaned, conserved, marked, bagged and boxed in accordance with the guidelines set out in UKIC *Conservation Guidelines No. 2*. All metal objects will be X-rayed and then selected for conservation.

ARCHIVING, POST-EXCAVATION AND PUBLICATION

30 On completion of the fieldwork the site archive will be prepared in the format agreed with the relevant local museum, who will be consulted at this stage concerning their requirements. The site archive will be security copied and a copy deposited with the NAR before post-excavation analysis begins or as soon thereafter as can be conveniently arranged. The Museum will be consulted about their conditions for accepting excavated material prior to commencement of the whole project.

31 The site archive (paper and photographic record, artefacts and environmental samples) will be prepared for long-term storage in accordance with *Guidelines for the preparation of excavation archives for long term storage* (Walker 1990 - UKIC) and *Standards in the Museum Care of Archaeological Collections* (Museums and Galleries Commission 1992).

32 A summary report will be prepared on completion of the site archive. This will include:

- A statement of the research aims of the fieldwork and an illustrated summary of results to date indicating to what extent the aims were fulfilled.
- A summary of the quantities and potential for analysis of the information recovered for each category of site, finds, dating and environmental data.
- A list of the project aims as revised in the light of the results of fieldwork and post-excavation assessment.
- A list of the methods which will be used to achieve the research aims (these should be explicitly linked to aims).
- A list of all the tasks involved in using the stated methods to achieve the aims and produce a report and research archive in the stated format, wherever possible linking each task explicitly to the relevant method statement and indicating the personnel and time in days involved in each task. Allowance should be made for general project-related tasks such as monitoring, management and project meetings, editorial and revision time.
- A report synopsis indicating publisher and report format, broken down into chapters, section headings and subheadings, with approximate word lengths and numbers and titles of illustrations per chapter. The structure of the report synopsis should explicitly reflect the research aims of the project.
- A list of the personnel involved indicating their qualifications for the tasks undertaken.
- A cascade or Gantt chart indicating tasks in the sequence and relationships required to complete the project. Due allowance will be made for leave and public holidays. Time will also be allowed for the report to be read by a named academic referee as agreed with the County Archaeological Officer, and by the County Archaeological Officer.

33 The summary report including analysis and publication proposals will be submitted to the County Archaeological Officer or equivalent for agreement.

34 Once the post-excavation project design has been accepted, the County Archaeological Officer or his appointed deputy will monitor the progress of the post-excavation project at agreed points. Any significant variation in the project design will be agreed with the County Archaeological Officer.

35 The results of the project will be published in an appropriate archaeological journal or monograph. The appropriate level of publication will be dependent on the significance of the fieldwork results, but as a minimum the basic requirements of Appendix 7.1 of *Management of Archaeological Projects* (English Heritage 1991) will be met.

Appendix 2:

GENERAL MATTERS

1 HEALTH AND SAFETY and INSURANCE

1.1 Health and Safety considerations will be of paramount importance in conducting all fieldwork. Safe working practices will override archaeological considerations at all times.

1.2 All work will be carried out to the requirements of *Health and Safety at Work etc. Act 1974, The Management of Health and Safety Regulations 1992*, the SCAUM (Standing Conference of Archaeological Unit Managers) H & S manual *Health and Safety in Field Archaeology 1991*, the OA Health and Safety Policy, and any main contractors' requirements.

1.3 A copy of OA's Health and Safety Policy is available on request. OA will require copies of the H & S policies of all other contractors and operators present on site in compliance with *The Manual of H & S Regulations 1992*.

1.4 OA holds Employers Liability Insurance, Public Liability Insurance and Professional Indemnity Insurance. Details will be supplied on request.

1.5 OA will not be liable to indemnify the client against any compensation or damages for or with respect to:

- Damage to crops being on the Area or Areas of Work (save in so far as possession has not been given to the Archaeological Contractor);
- The use or occupation of land (which has been provided by the Client) by the Project or for the purposes of completing the Project (including consequent loss of crops) or interference whether temporary or permanent with any right of way, light, air or water or other easement or quasi easement which are the unavoidable result of the Project in accordance with the Agreement;
- Any other damage which is the unavoidable result of the Project in accordance with the Agreement;
- Injuries or damage to persons or property resulting from any act or neglect or breach of statutory duty done or committed by the client or his agents, servants or their contractors (not being employed by the Oxford Archaeological Unit) or for or in respect of any claims demands proceedings damages costs charges and expenses in respect thereof or in relation thereto.

2 COPYRIGHT and CONFIDENTIALITY

2.1 OA will retain full copyright of any commissioned reports, tender documents or other project documents, under the Copyright, Designs and Patents Act 1988 with all rights reserved; excepting that it will provide an exclusive licence to the client in all matters directly relating to the project as described in the Written Scheme of Investigation.

2.2 OA will assign copyright to the client upon written request but retains the right to be identified as the author of all project documentation and reports as defined in the Copyright, Designs and Patents Act 1988 (Chapter IV, s.79).

2.3 OA will advise the client of any such materials supplied in the course of projects which are not OA's copyright.

2.4 OA undertakes to respect all requirements for confidentiality about the client's proposals provided that these are clearly stated. It is expected that such conditions shall not unreasonably impede the satisfactory performance of the services required. OA further undertake to keep confidential any conclusions about the likely implications of such proposals for the historic environment. It is expected that clients respect OA's ethical obligations not to suppress significant archaeological data for an unreasonable period.

3 OA STANDARDS AND PROCEDURES

3.1 OA shall conform to the standards of professional conduct outlined in the Institute of Field Archaeologists' Code of Conduct, the IFA Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology, the IFA Standards and Guidance for Field Evaluations, Archaeological Excavations, Desk Based Assessments etc. and the British Archaeologists and Developers Liaison Group Code of Practice.

3.2 OA is a member of the Institute of Environmental Assessment and the Council for British Archaeology and is a registered organisation in the IFA Register of Archaeological Organisations.

3.3 Project Directors normally will be recognised in an appropriate Area of Competence by the IFA. For more extensive and complicated evaluation projects, especially where they are part of large-scale programmes of work in historic urban centres, the procedures outlined in English Heritage's *Management of Archaeological Projects* 2nd Edition 1991 (MAP 2) will be followed for immediate post-field archive preparation and initial assessment. Agreement to then be reached, in collaboration with the local authority's archaeological representative, about what aspects will need to be taken forward to provide a report in the required format containing the information needed for planning purposes.