An Archaeological Evaluation at Downing College Sports Field, Long Road, Cambridge

Nicholas Armour
With contributions by Chantal Connoller, Gavin Lucas
Andy Clarke and Rachel Ballentyne

Cambridge Archaeological Unit
University of Cambridge
October 2001

Report No. 452

Summary

An archaeological evaluation undertaken on Downing College sports field and an adjacent car park recorded the presence of Late Iron Age and Early Romano-British features representing occupation activity and enclosure. These results confirmed data from aerial photographs and geophysical survey.

Contents

Introduction

An archaeological evaluation was conducted by the Cambridge Archaeological Unit (CAU) on land off Long Road, Cambridge (figure 1), between the 20th September and 4th of October 2001. The site is centred on TL 4625 5535 and overlies Chalk marl interfaced with Second Terrace River Gravels.

The site comprised of two areas, the first area currently being used as a Sports Field and the second a Car Park. These were assessed in three phases. Phases one and two were undertaken on the Sports Field and comprised of seven machine cut trenches and the excavation of five test trenches by hand. Phase three was undertaken in the Car Park area and consisted of two machine cut trenches and five test pits.

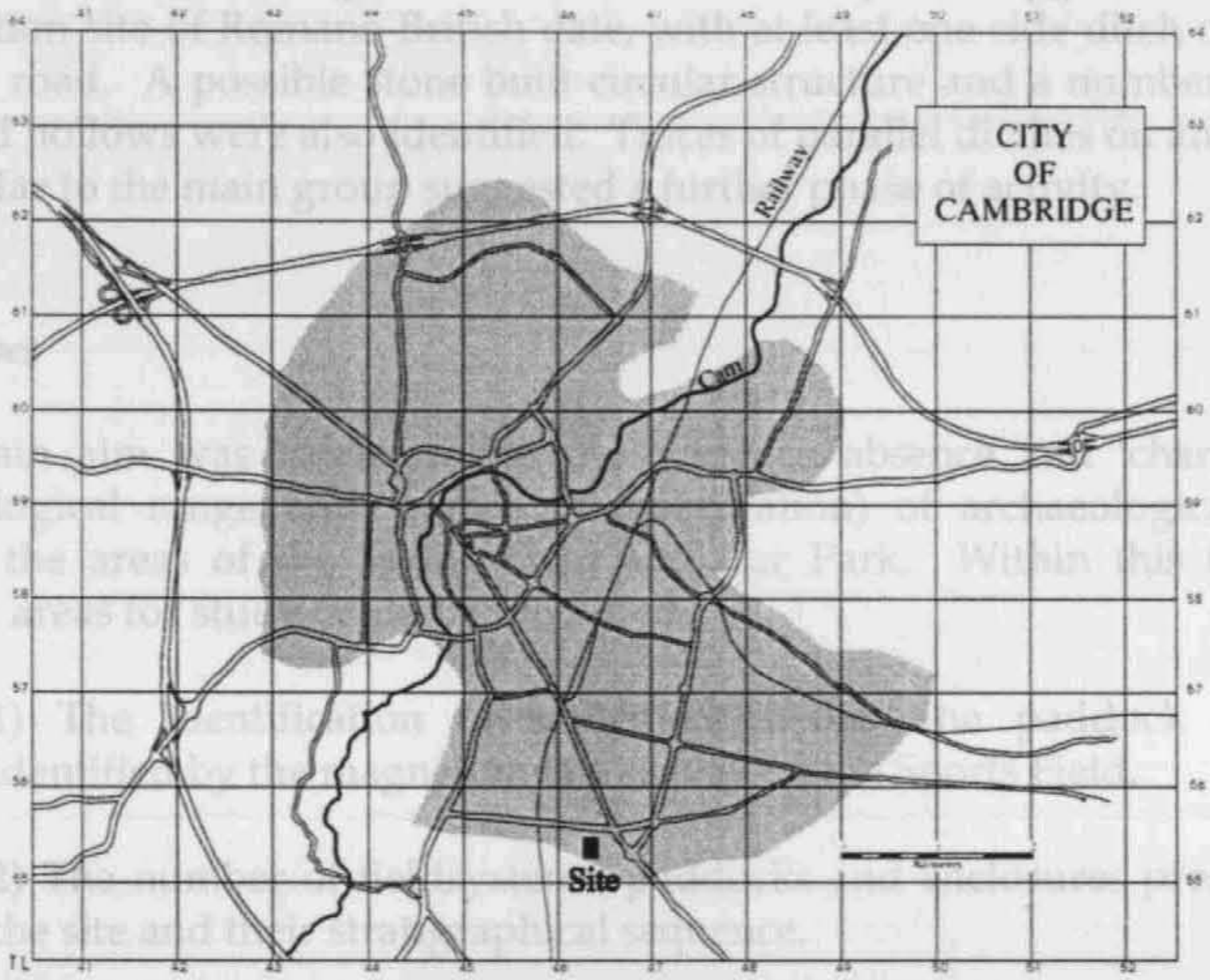


Figure 1 Site location

The excavations were conducted for Davis, Langdon and Everest on behalf of Cambridge University Estates Management Services, prior to proposed redevelopment by the Imperial Cancer Research Fund. All works were undertaken in accordance with the specification (Evans, 2001) and monitored by the Development Control Office of Cambridgeshire County Council.

Background

The CAU carried out an archaeological desk-based assessment (Hall, 2001) and commissioned an aerial photography study (Palmer, 2001; Appendix 6) that revealed probable later prehistoric settlement archaeology with related fieldsystems immediately adjacent in both the Sports Field and Car Park areas. A Roman road was thought to traverse the site with, potentially, a further important Roman route way immediately to the east. Roman pottery finds on the field itself and the extension of a sub circular enclosure of probable Iron Age date into the western fringes of the field, all provided indication of significant known and potential archaeology within the site.

Based on the findings from the aerial survey and desktop assessment the CAU commissioned Oxford Archaeotechnics Ltd to undertake a magnetometer (gradiometer) survey of the Sports Field (Johnson, 2001; Appendix 7). The survey revealed a complex of ditches whose layout suggested a probable occupation site of Romano-British date, with at least one side ditch of a known Roman road. A possible stone built circular structure and a number of former pits and hollows were also identified. Traces of parallel ditches on an alignment dissimilar to the main group suggested a further phase of activity.

Objectives

The main aim was to determine the presence/absence and 'character' (e.g. chronological range and degree of preservation) of archaeological remains within the areas of the Sports Field and Car Park. Within this framework specific areas for study could be identified:

1) The identification of settlement within the paddock enclosures identified by the magnetometry survey on the Sports Field.

2) The number of fieldsystems, paddocks and enclosures present across the site and their stratigraphical sequence.

3) The interrelationship and sequence of features of possible Late Iron Age (LIA) and Romano-British date especially those related to the supposed late prehistoric type enclosure identified by aerial photographic survey and now located beneath the Car Park.

Methodology

Machine excavation was undertaken with a JCB wheeled excavator utilising a 1.80m toothless ditching bucket and supervised by an experienced archaeologist. All trenches were machine excavated to a width of 2.00m except Trenches 13 and 14 which were located in the Car Park area and required judgmental widths based on the presence of services. Hand excavated test pits

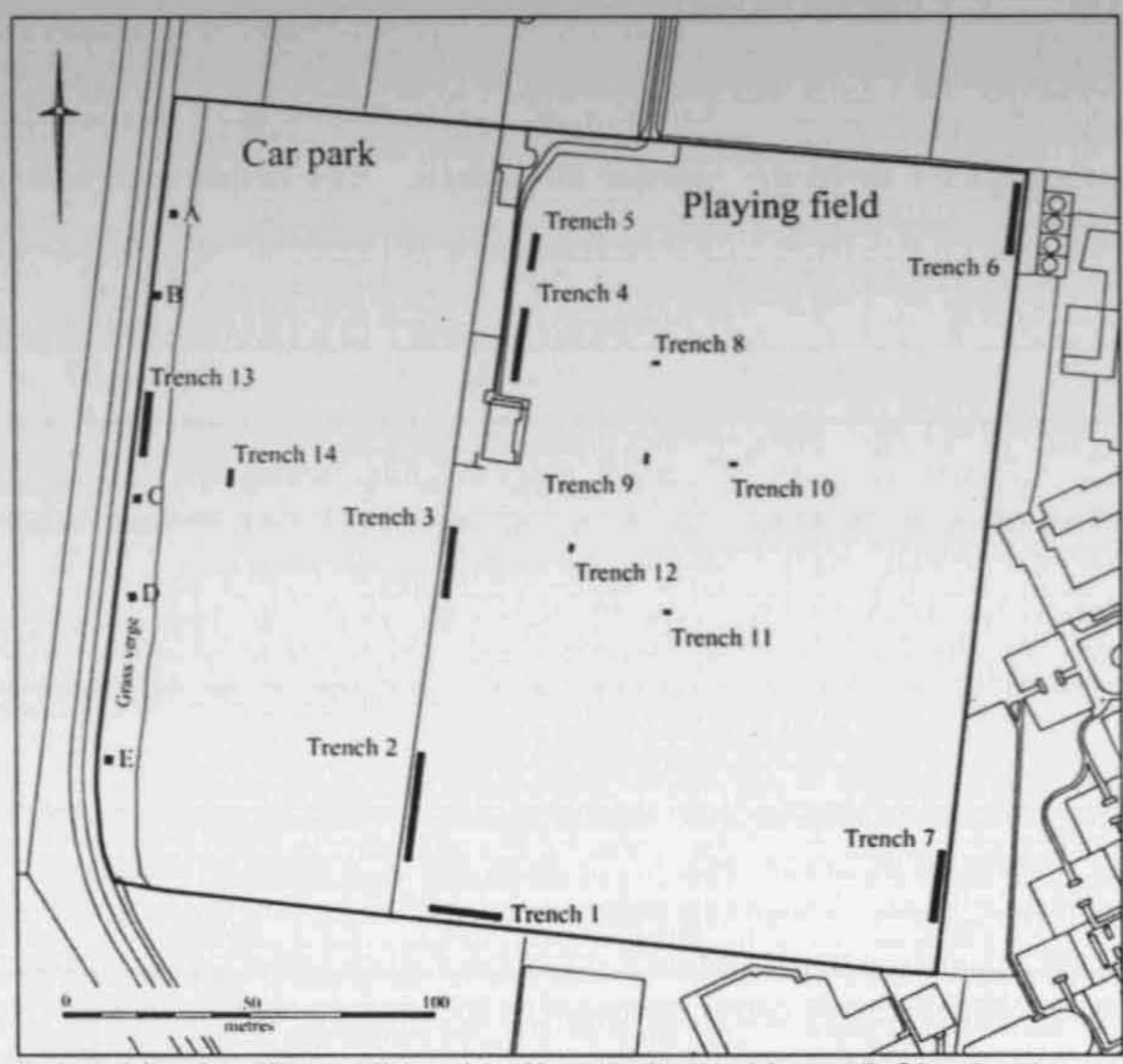


Figure 2 Plan of trenches

Figure 3 Cropmarks and geophysical results

were cut by CAU staff. The location of the trenches was curtailed by the need to maintain access to the Car Park and not disturb the Sports Field pitches. All spoil generated was placed on plastic sheeting to protect the underlying turf and subsequently metal detected. Service plans were consulted and prospective areas examined using a CAT scanner to locate buried services prior to excavation.

All features were sample excavated, and recorded according to the unit modified Museum of London system of single context recording (Spence, 1990). Detailed context descriptions can be found in Appendix 5.

Results - Trench 1

Trench 1 was 20.00m in length and was placed to investigate geophysical linear anomalies (figures 2, 3 and 4). The natural geology was encountered at approximately 0.70m below present ground surface, subsoil seems to have been removed by Medieval and post-Medieval ploughing. Six linear features were revealed in the trench, four features (cuts [101], [103], [105] and [111]) aligned north northeast to south southwest which were interpreted as ditches and two linear furrows (cuts [107] and [109]), aligned north to south, which were interpreted as Medieval plough furrows. Cut [101] measured 1.95m in width and 0.72m in depth with a 'V'-shaped profile and was filled by [100] which contained potsherds dated from the 1st to 2nd centuries AD and one intrusive post-Medieval sherd derived from the overlying ploughsoil. Cut [103], which measured 1.15m in width and 0.25m in depth, was paired with cut [105], measuring 1.25m in width and 0.35m in depth, probably a re-cut of [103]. Cut [103] was filled by [102], and cut [105] by [104] which contained potsherds dated from between the 1st and 2nd centuries AD. Cut [111] measured 1.20m in width and 0.50m in depth and was filled with [110] which contained potsherds dated from the 1st to 2nd centuries AD and one intrusive post-Medieval sherd derived from the overlying ploughsoil. A further sub circular feature (cut [115]) was identified as a posthole and this was located close to a irregular spread of small rounded stones (layer [118]), measuring approximately 1.00m by 0.85m, which appeared embedded into the natural and was interpreted as a metalled surface.

Where one possible linear feature was identified by the geophysical survey, excavation revealed four on a similar alignment. The dates for these appear to be quite late compared to those in other trenches which suggests that Trench 1 is in an area of comparatively later expansion away from the probable focal settlement areas further to the north and northwest. It is likely that the posthole and metalled surface are evidence of an occupation or working area. The plough furrows are on a different alignment and appear to be part of post-Medieval land usage. Truncation from this phase has removed the subsoil and possibly a quantity of archaeological deposits. Certainly the ditch profiles appear to show just the bases of the original features.

Trench 2

Trench 2 was 30.00m in length and was located to investigate possible geophysical linear anomalies, including the possible Romano-British roadside ditch (figures 2, 3 and 4). Natural geology, second terrace river gravels and chalk marl was encountered at approximately 0.70m to 0.75m below present ground surface. There had been a certain amount of truncation of archaeological deposits towards the southern end of the trench, however to the north this appeared to be lessened and the remnants of subsoil remained approximately 0.15m thick.

In the southern end of the trench there was a cluster of features that included linear feature [215] aligned west northwest to south southeast, interpreted as a large enclosure ditch, a large sub rectangular feature [217], interpreted as a pit or possible ditch butt end and a narrow, shallow linear feature [221] aligned west northwest to south southeast, interpreted as a gully. Cut [215] measured 1.02m in width and 0.78m in depth with a deep 'U'-shaped profile and was filled by [214] from which no finds were recovered, although it was sampled for environmental data (Appendix 4). Cut [215] truncated cut [217], which was filled by [216] and measured 2.5m in width and 0.80m in depth. [216] contained potsherds dated to the pre-Flavian period, worked flint, burnt flint and a quantity of animal bone. Furthermore it also included a copper alloy brooch of a Colchester type dated to around 50 AD and a possible copper alloy spatula fragment. One further cut was identified, [219], but it was largely obscured by the trench edge. There was a good stratigraphic sequence recorded with the gully [221] at the beginning of the sequence followed by obscured feature [219], then pit or ditch terminal [217] with the latest feature being ditch cut [215].

Further to the north of this cluster a truncated linear feature [213], aligned approximately north to south, was revealed although much of it was obscured by the trench edge. This was sectioned three times (cuts [213], [201] and [203]) and at its fullest point measured a minimum of 1.00m in width and 0.25m in depth. The fills of each section ([212], [200] and [202] respectively) were very similar in nature, light sandy and sterile with only two sherds of pottery, which were dated to the Late Bronze Age or Early Iron Age. This was interpreted as an enclosure ditch and it continued to the northern end of the trench where it was truncated by four further linear features (cuts [205], [207], [209] and [211]), which were all interpreted as shallow ditches. These were found to be in pairs with the later pair (cuts [205] and [207]) on a northeast to southwest alignment and the earlier pair (cuts [209] and [211]) on an east to west alignment. Cut [205] measured 1.10m in width and 0.25m in depth and was filled by fill [204] which contained potsherds dated to the Late Bronze Age or Early Iron Age and three pieces of worked flint. Cut [207], measuring 1.00m in width and 0.24m in depth, was filled by [206] which contained animal bone. Both these cuts truncated the lower pair of ditches and their fills were considerably darker than the earlier pair. Cut [209] measured 0.90m in width, 0.25m in depth and was filled with [208] from which no finds were recovered. Cut [211] measured 1.75m in width,

0.25m in depth and was filled by [210] which was devoid of finds. Both cuts truncated ditch [213].

It appears that at least two separate ditch sequences are represented in this trench. Generally speaking the later ditches were filled with a darker siltier fill and the earlier ditches had lighter sandier deposits. The earlier ditches also appear to be on a north to south and east to west axis whilst the later ditches follow the alignments seen in the geophysics results and contain Early Romano-British potsherds. There is a possibility from the finds recovered that the ditches not on the former alignments may date to the Bronze Age. Alternatively they may be backfilled with material sourced from Bronze Age deposits now lost through Medieval and post-Medieval truncation. Preservation of the northern shallow ditches is almost certainly due to their protection within the ridge of a Medieval fieldsystem, whilst it is possible that there are other unseen factors causing the truncation within the southern end of the trench.

Trench 3

Trench 3 was 20.00m in length and was placed to investigate geophysical linear anomalies and the possibility of encountering occupation evidence (figures 2, 3 and 4). The natural geology, second terrace river gravels, was at approximately 0.40m below present ground surface towards the northern end of the trench, whilst at the south it appeared to have been truncated to a depth of 0.60m. This trench showed variations in preservation, being greater in the northern end where some subsoil and a possible buried soil remained. Five linear features were recorded in the northern half of the trench. Feature cuts [301] and [309] were aligned east to west and were interpreted as possible ring gullies due to their morphology and the large quantity of pottery sherds recovered from their fills. Cut [301], partially obscured by the trench edge, measured 0.55m in width, 0.18m in depth and was filled with deposit [300] which contained potsherds dated to the pre-Flavian period. Cut [309] measured 1.20m in width, 0.36m in depth and was filled by deposit [308] from which the remnants of a large pre-Flavian jar and other pre-Flavian potsherds (figure 5). These were truncated by a wide but shallow linear cut [311], aligned approximately north to south that seemed to be contemporary with linear cuts [305] and [307] which appeared to project from cut [311] in a westerly direction. These linear features were interpreted as shallow ditches.

All these features were aligned on the probably earlier fieldsystem axis and their association with this fieldsystem is perhaps strengthened by the similarity in fill types to those earlier features found in Trench 2. Neither of the two possible linear features identified as crossing the trench area from the geophysical survey were located however it does seem likely that feature cuts [301] and [309] represent occupation evidence lying just below the topsoil.

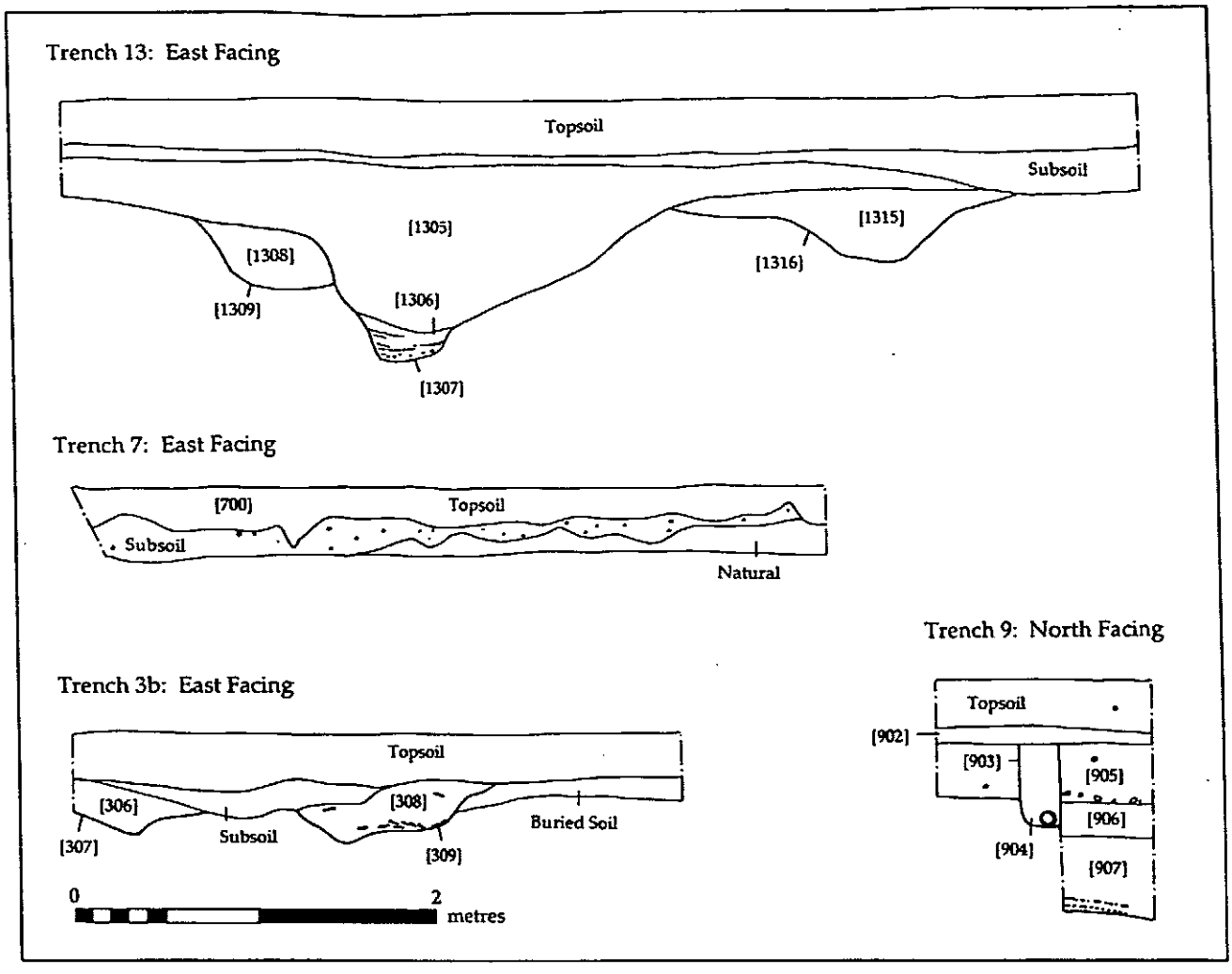


Figure 5 Sections from Trenches 3, 7, 9 and 13

Trench 4

Trench 4 was 20.00m in length and was placed to investigate possible linear geophysical anomalies (figures 2, 3 and 6). The natural geology, second terrace river gravels and chalk marl, was encountered at between approximately 0.50m and 0.70m below present ground surface. Four linear features and two possible subcircular features were identified in Trench 4. Two linear features, cuts [401] and [405], located to the south of the trench appeared to be associated and were both aligned west northwest to east southeast and interpreted as ditches. Cut [401] measured 1.64m in width, 0.75m in depth and was filled by [400] from which no finds were recovered. Cut [405] measured 0.70m in width, 0.10m in depth and was filled by [404] which contained potsherds dated to the 1st century AD Late Iron Age or Early Romano-British period and one piece of animal bone. Both were cut into the natural geology. To the north of the trench were a further pair of features that appeared associated; cuts [409] and [411], both aligned roughly east to west. [409] measured 1.80m in width, 0.90m in depth and was filled with [408] from which animal bone and pre-Flavian

potsherds were recovered. It was interpreted as a ditch and was sampled for environmental data (Appendix 4). Cut [411] was 3.50m wide and 0.50m deep. It was filled with three deposits; the primary fill [410] was a disturbed mixture of natural and silty material which was interpreted as natural churned up through the passage of animals. Over this was laid a rough layer of medium sized rounded and irregular cobbles [412], which was interpreted as an attempt to create a stable surface. Above this was an abandonment deposit [413] which contained a good assemblage of pre-Flavian potsherds. Feature [411] was interpreted as a rough hollow way caused by the passage of animals and it overlay two unexcavated subcircular features that were interpreted as postholes suggesting that it post-dated some form of structure.

These features would appear to represent enclosure ditches of possibly two distinct fieldsystems given the differences of alignment. The more northern appear to be a boundary ditch with a possible trackway to the north side of it. That attempts had been made to repair the which suggests that it was in regular use and of some importance. The lower fill was essentially disrupted natural geology mixed with soil such as might be created with the constant or seasonal passage of animals over wet ground. Perhaps more importantly it does not appear to follow any of the alignments set by the geophysical survey results.

Trench 5

Trench 5 was 10.00m in length and was located to investigate geophysical anomalies (figures 2, 3 and 6). The natural geology was encountered at approximately 0.50m below present ground surface. One possible feature was identified but on examination appeared to be caused by rootmass turbation and was interpreted as a possible hedgeline.

One potential hedgeline of uncertain date was recorded on an alignment similar to early features identified in Trenches 2, 3 and 4.

Trench 6

Trench 6 was 20.00m in length and was placed to investigate a possible linear geophysical anomaly (figures 2, 3 and 6). The natural geology, chalk marl, was encountered at approximately 0.40m below present ground surface. One shallow linear feature, cut [601], measuring 0.6m in width and 0.05m in depth with a shallow 'U'-shaped profile, was recorded in the trench on a northeast to southwest alignment and this was interpreted as a ditch. No associated finds were recovered.

The ditch recorded in Trench 6 appears to be a continuation of a paddock enclosure that had been tentatively identified on the geophysical plot.

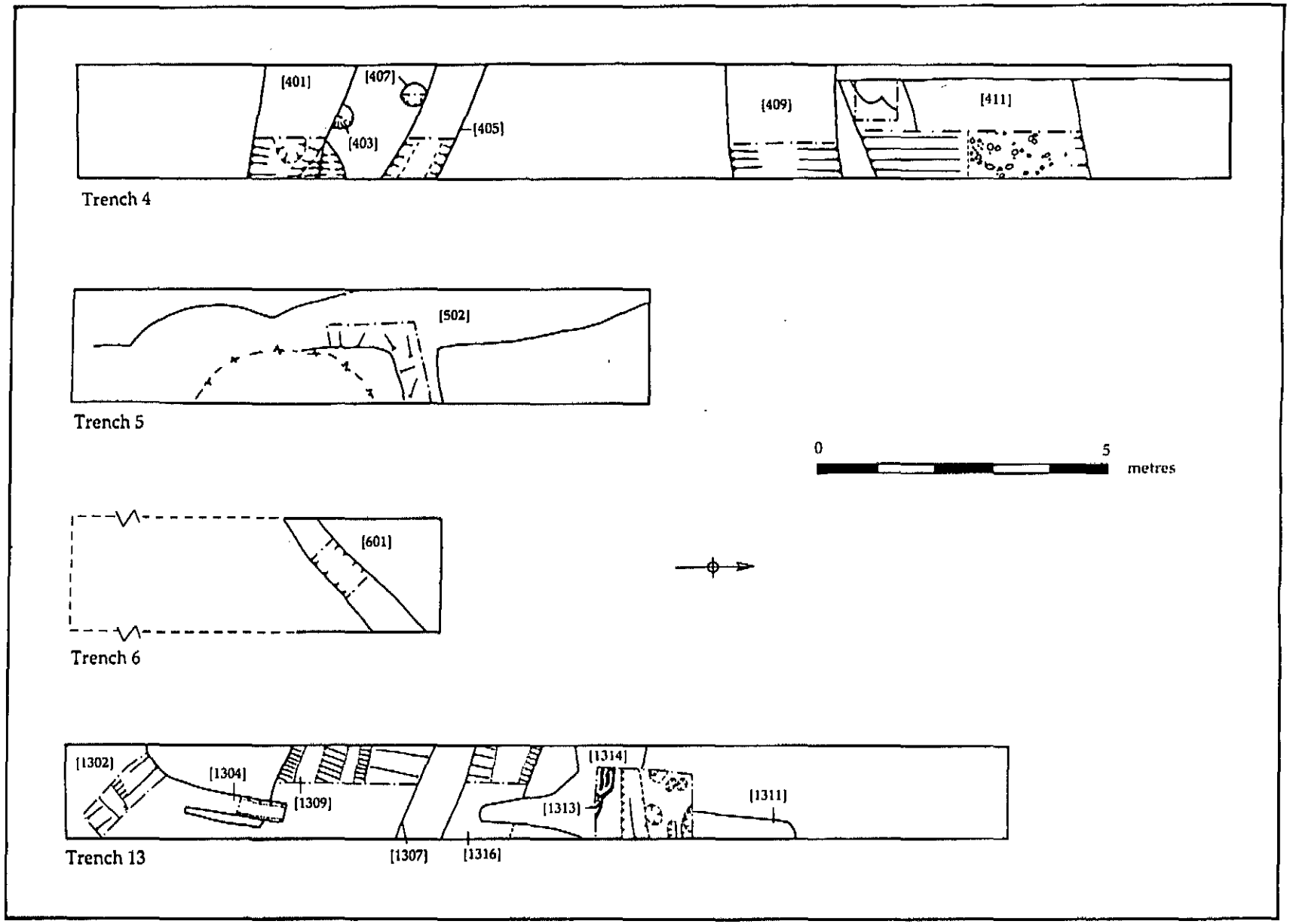


Figure 6 Plans of Trenches 4, 5, 6 and 13

Trench 7

Trench 7 measured 20.00m in length, 2.00m in width and was placed to investigate an area that the geophysical survey suggested was devoid of archaeological deposits (figures 2 and 3). The natural geology, second terrace river gravels and chalk marl, was encountered at approximately 0.40m below present ground surface. No archaeological features were recognised within this trench although evidence for Medieval ridge and furrow was seen in the sections (figure 5).

Test Trench 8

Test Trench 8 was 1.00m wide, 2.00m long and was hand excavated to the natural geology, chalk marl, encountered at a depth of 0.50m below present ground surface (figures 2 and 3). One possible archaeological feature was recorded, a small semi-circular cut ([801]), which was interpreted as a posthole. No finds were recovered from this and so it provided inconclusive evidence as being a possible occupation feature.

Test Trench 9

Test Trench 9 measured 1.00m in width, 3.00m in length and was placed over a geophysical anomaly that was tentatively interpreted as a circular stone building (Appendix 7). It was hand excavated to archaeological deposits encountered at a depth of 0.38m below present ground surface (figures 2, 3 and 5). No lateral limits to the deposits were visible but natural was revealed at a depth of 1.37m below modern ground surface. Three distinct archaeological deposits were recorded, [905] which measured 0.34m in thickness, [906] which measured 0.20m in thickness and [907] which measured 0.55m in thickness. Deposits [905] and [906] produced potsherds dated around the 1st to 2nd centuries AD with deposit [907] containing pre-Flavian potsherds. Deposit [907] was sampled for environmental data and this showed that it had been laid down in damp conditions (Appendix 4). These deposits were interpreted as being from a possible well or pond situated in the corner of one of the enclosures identified by the geophysical survey. It appears to have been initially created in the pre-Flavian period and backfilled around the end of the 1st century AD.

Test Trench 10

Test Trench 10 measured 1.00m in width, 2.00m in length and was hand excavated to the natural geology, chalk marl, encountered at a depth of 0.50m below present ground surface (figures 2 and 3). One possible linear feature

[1004] was revealed in the northern edge of the test trench on an east to west alignment and, as excavated, was found to be at least 0.28m in depth. Cut [1004] was filled by [1003] from which one sherd of Late Bronze Age or Early Iron Age pottery was recovered. This was interpreted as a ditch and may be an enclosure ditch of some kind; the fact that it is aligned east to west and contained prehistoric pottery and a struck flint suggests that it is a part of the stratigraphically early fieldsystem.

Test Trench 11

Test Trench 11 measured 1.00m in width, 2.00m in length and was hand excavated to the natural geology, chalk marl, encountered at a depth of 0.42m below present ground surface (figures 2 and 3). This test trench had a series of three intercutting linear features on an east to west alignment. The predominant feature was cut [1101] which measured at least 1.00m in width, 0.20m in depth and truncated earlier cuts [1103] and [1105]. The group was interpreted as an original ditch re-cut twice although the precise stratigraphy could not be determined and no dating evidence was recovered.

Trench 11 corroborates the geophysical evidence for boundary or enclosure ditches but not enough was revealed to interpret these features fully. The north to south orientation of these cuts are at odds with the enclosure alignments shown by the geophysical results and in which these ditches are located.

Test Trench 12

Test Trench 12 measured 1.00m in width, 2.00m in length and was hand excavated to the natural geology, chalk marl, encountered at a depth of 0.50m below present ground surface (figures 2 and 3). No archaeological deposits were identified but unstratified potsherds of various periods were recovered from the subsoil.

Trench 13

Trench 13 was 20.00m in length, 1.80m in width and was placed to test the features interpreted from the aerial photograph assessment (figures 2, 3 and 6). The natural geology, second terrace river gravels, was encountered at approximately 0.50m below present ground surface. There was little subsoil in this trench and archaeological deposits survived at 0.36m below present ground surface. Seven linear features and a human skeleton were identified.

Three linear features (cuts [1309], [1307] and [1316]) were aligned east-southeast to west-southwest and these were interpreted as boundary or enclosure ditches.

Cut [1307] measured at least 2.50m in width, approximately 0.90m in depth and was later than [1309] which measured 0.67m in width, 0.36m in depth and was filled by [1308] which [1307] truncated. Cut [1307] was filled with [1306], the primary fill, and also [1305] which was at least 0.90m in thickness and which appeared not to be contained by the cut edges (figure 5). From this deposit pre-Flavian potsherds were recovered and it was interpreted as a deliberate backfill deposit that was also used to level the surrounding area. Cut [1307] also truncated cut [1316] which measured at least 1.20m in width, 0.45m in depth and which was filled by [1315], also cut by [1307] and overlain by deposit [1305]. Deposit [1315] was interpreted as representing an episode of backfilling and bank creation from the excavation spoil of cut [1307] due to the nature of its soil matrix and section profile.

Two other linear features appeared to be related, cuts [1302] and [1304], which were both primarily aligned north northeast to south southwest but which appeared to turn to the west at the southern end of the trench. Cut [1304] measured 0.42m in width, 0.14m in depth and was interpreted as a gully. It was truncated by cut [1302], interpreted as an enclosure ditch, which measured 1.27m in width and 0.45m in depth and was filled by deposit [1301]. Both these features were later than cut [1307].

Linear feature cut [1314] was difficult to excavate and record due to the fact that human skeleton [1313], aligned east to west, was located within its upper fill [1312] and was not to be removed. The one sherd of pottery recovered from deposit [1312] was dated to the 1st to 2nd century AD. It was not certain whether cut [1314] represented an isolated grave cut or was a ditch with an opportunist burial within it. Skeleton [1313] was exposed to an extent only deemed necessary to assess the condition and completeness of the remains. This led to the exposure of the left arm, lower vertebrae, left half of pelvis and the upper half of the left femur which confirmed that the skeleton was in good condition, articulated and not modern. Initial examination showed a partially fused distal epiphysis of the ulna and gracile long bones which would tend to suggest that the skeleton was that of a late teenage female. The burial appeared to be supine with head to the east and legs towards the west with the hands resting on the lower abdomen. The feet appeared to have been truncated by north to south aligned linear feature [1311], filled by [1310], from which human foot bones were recovered, but as it was mostly located beyond the trench edge this was not fully excavated.

Trench 13 seems to have located the enclosure ditches that were identified in the aerial photographic assessment and also confirmed that the thicker lines visible were multiple ditch features. There are clearly many more archaeological features that were not visible on the aerial photographs assessed and these seem mostly to be enclosure ditches although the pottery assemblage suggests nearby settlement activity. The trench also revealed the presence of a complex stratigraphy, only 0.36m below the present ground surface, which represents the existence of truncated yet still extant cut features, levelling deposits and possible buried soils.

Trench 14

Trench 14 was 5.00m in length, 1.00m in width and was placed in the Car Park area to test the features interpreted from the aerial photograph survey. The Car Park tarmac and concrete base was removed to reveal 0.35m of rubble and hardcore makeup on terram matting. Natural geology was second terrace river gravels, heavily truncated. No archaeological features were present.

The construction of the Car Park area appears to have involved a certain amount of ground reduction that has led to the potential truncation of archaeological features.

Test pits

A series of machine excavated test pits were placed on the grass verges between the Car Park area and the access road. These were primarily dug to test the levels of truncation to underlying deposits during the Car Park construction. Archaeological material encountered was also recorded. There appears to have been very little truncation along the verges and this will enable a detailed projection of feature truncation and survival elsewhere in the Car Park area. Furthermore, three of the test pits appeared to have archaeological features cutting natural and Test Pit E had a very thick subsoil layer and almost no topsoil which suggests modern truncation to this level. This subsoil deposit appeared to have been uncontaminated by modern activity, thus suggesting some upstanding archaeological deposits are extant, although currently undated.

Test Pit	Topsoil Thickness	Subsoil Thickness	Reduced Level to Natural	Archaeological features
A	0.28m	0.40m	16.88mOD	One possible posthole
B	0.30m	0.37m	17.04mOD	None
C	0.30m	0.38m	16.65mOD	One possible large ditch
D	0.32m	0.28m	16.65mOD	One possible gully
E	0.05m	0.60m	16.95mOD	Very thick subsoil may be archaeological. One possible posthole

Table 1 Test Pit results

Truncation Modelling

A surface inspection of the Car Park revealed that it had clearly been terraced during construction. Furthermore, the excavation of Trench 14 showed that the Car Park foundations and surfaces measured at least 0.48m in depth at which level no archaeological materials survived. It has therefore been necessary to create a model based on the likely truncation of the archaeological deposits to show a probable survival rate should open area excavation be undertaken there. A series of test trenches (A-E) were excavated along the grass verges of the Car Park in order to gather data for the modelling.

It was initially necessary to project the height of the original ground surface prior to truncation. To do this the height of the modern ground surface and the height of natural was calculated for Trenches 2, 3, 4, 5, 13 and 14 and Test Pits A-E. Lines were then drawn between opposing trenches and test pits to allow a projection of the original ground surface and levels of natural. This assumed a flat original land surface and discounted the presence of remnant soils and upstanding archaeological deposits such as banks.

A profile was created of the known feature depths from the assessed area and this showed that approximately 50% of all feature types were less than 0.30m in depth and 80% of all feature types were less than 0.50m in depth. Consequently truncation into the natural of 0.50m would result in a loss of over 80% of archaeological features. The features that survived at this level would be predominantly the large enclosure ditches, robust pits and wells; practically all occupation evidence would be lost.

This indicates that the Car Park was built on ground that was sloping away to the southwest and that this was linked to an increased depth of topsoil and subsoil on that side of the area, presumably caused by colluvial movement. Taking these factors into consideration when calculating loss of archaeological materials they showed that truncation was perhaps slightly less than anticipated on the southwestern corner of the area but that where it had been terraced on the lower half of the Car Park the truncation was correspondingly more severe. The modelling suggests that the northern half of the Car Park has probably only been reduced to the level of the natural in the first place and that although some truncation is inevitable it is likely that the archaeological deposits will remain largely untouched. The southern half of the Car Park is far more truncated with perhaps a third of the area showing a loss of up to 80% of archaeological sub-surface deposits and a further third showing a loss of up to 50%. The periphery of the area appears reasonably secure with losses of up to 20% of sub-surface features.

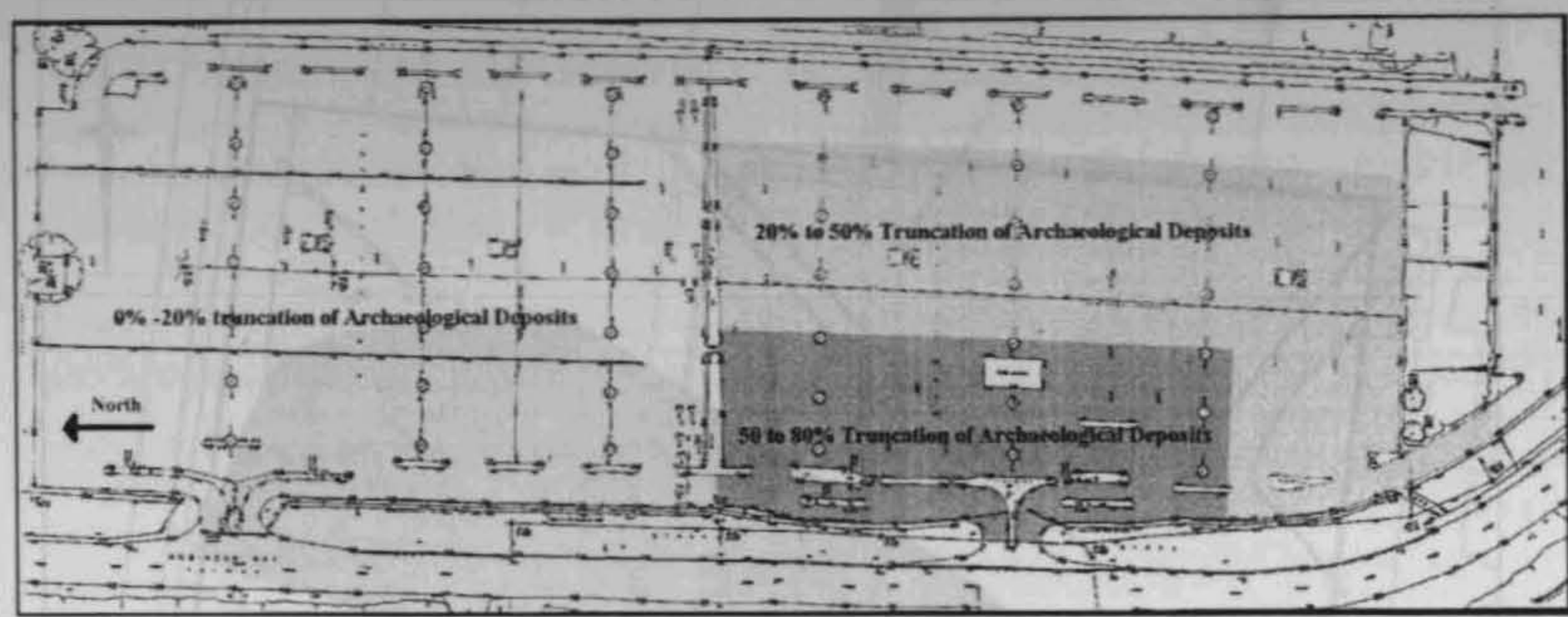


Figure 7 Schematic showing projected loss of archaeological features beneath Car Park.

Overall preservation of the site appears to be good with a small amount of truncation through Medieval agricultural practices. Particularly good preservation was noticed in a strip running across both areas aligned east to west and located roughly 20 metres either side of the pavilion. In this strip it appears that buried soils, banks and levelling deposits of Romano-British date may be preserved, possibly protected by a Medieval headland.

Discussion

Taking the evidence of both areas as a whole it is apparent that there has been a significant amount of activity taking place on the site from Late Iron Age to Early Roman times. The results of the aerial photographic assessment and geophysical survey have largely been confirmed by the evaluation (apart from the latter's putative stone 'ring'). The test trenches have, however, demonstrated that there are also many less robust archaeological features - not detected in the surveys - that evidently attest to settlement *per se* (as opposed to agricultural usage; figure 8).

It is clear that the Playing Fields site represents a large multi-phase enclosure system with associated settlement features. In nature this is similar to the complexes at Edix Hill, Barrington (Malim, 1997), Hinxton (Mortimer and Evans, 1996; Hill *et al.* 1999) and Harston (Malim, 1993), which consisted of enclosures of Iron Age origin with sub-rectangular compounds appended in the early 1st century AD. The tentative identification, at the current site, of an earlier fieldsystem on a north-south axis promotes the possibility that there could be Bronze Age activity in the area. Although dating for this is presently sparse, there was a small amount of worked flint and several sherds of Late Bronze Age and Early Iron Age pottery recovered both from cut features and from unstratified contexts. From this it is worth considering that the presumed Late Iron Age enclosures identified may well have earlier precursors.

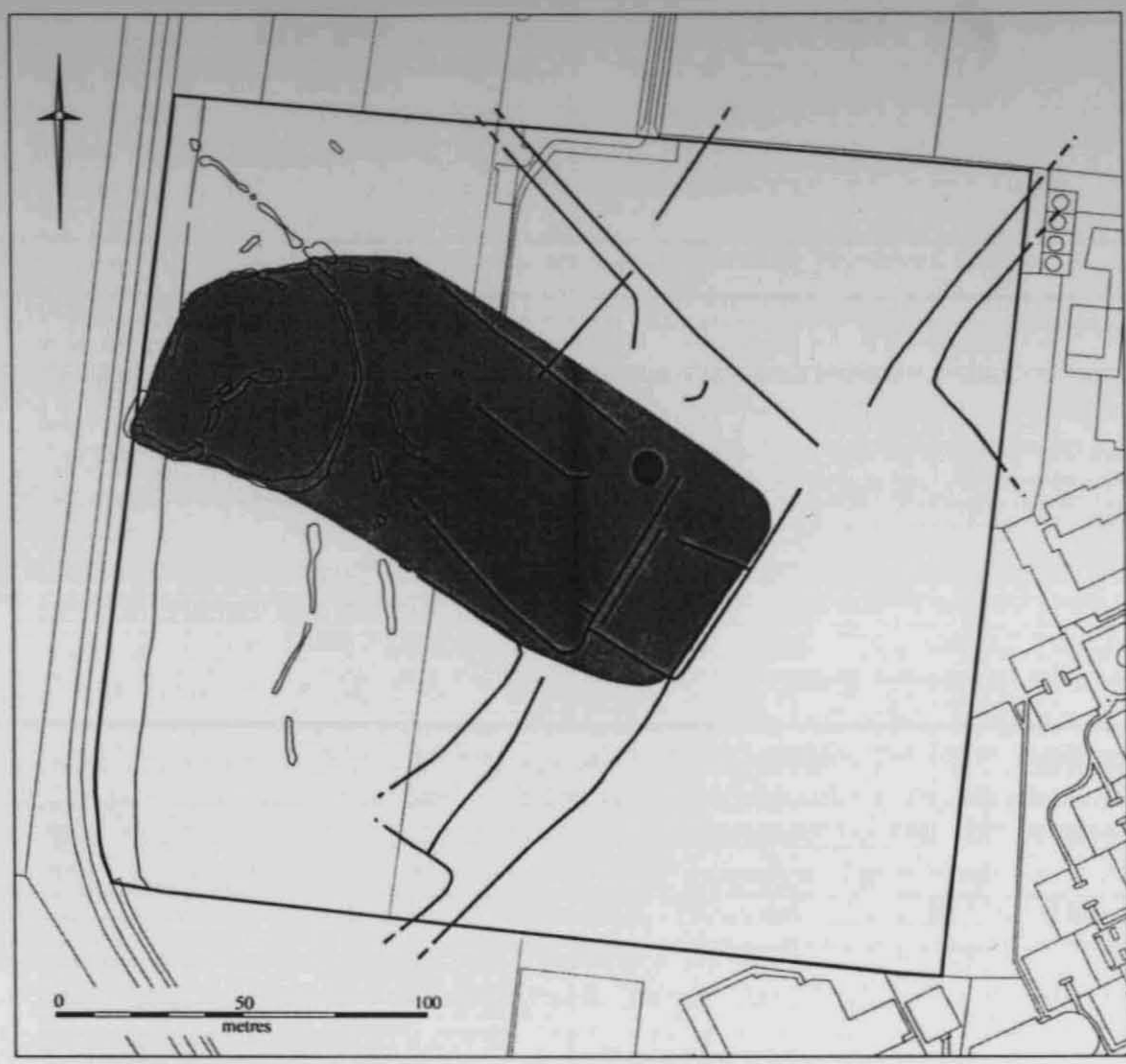


Figure 8 Plan of crop marks and geophysical anomalies with projected settlement (shaded).

The current fieldwork clearly resonates in relationship to Cra'ster's New Addenbrookes site, quickly excavated during the construction of the hospital itself in the 1960s (Cra'ster, 1969). That activity was clearly a part of the contemporary Iron Age system of enclosures with a trackway on its southern side which may link up with the probable route to the south of the current evaluation area (figure 8). The almost complete obliteration of that site during building work leaves little understanding of the settlement associated with its sub-rectangular enclosure, although some evidence for occupation was recorded at the time (including high status La Tene decorated vessels). (More recent fieldwork within the Addenbrookes' grounds have not recorded any other archaeological features and it must be assumed that the site has been largely lost through the hospitals' construction; Wait, 1992; Robinson, 1995; Regan, 1996.) From surrounding cropmarks and the addition of the geophysical survey results there is no doubt that the Playing Fields site represents only one part of a much larger Iron Age and Romano-British landscape. The evaluation has shown that extensive archaeological remains are to be found in often stratified sequences combining elements of enclosure with those of settlement. The latter includes a

possible eavesgully, a well, postholes and metalled surfaces; quantities of burnt clay and daub were also recovered. Much of this evidence comes from the central area of the site suggesting that the primary enclosures contain the main focus of habitation, although this may involve some element cumulative settlement 'shift' and have extended beyond the area of the earlier enclosures.

Where the internal spatial arrangement of Playing Fields complex seems to differ from the Barrington, Hinxton, Harston and the New Addenbrookes sites is in the semi-circular layout of its western enclosures - on the other sites these are essentially sub-rectangular. It seems probable that some other factor must have influenced their plan form. Indeed, from the survey work it appears that the sub-rectangular enclosure system has been added on to the eastern side of the larger semi-circular cropmark enclosure and extended around what may be a smaller enclosure to the east. This would suggest an earlier, probably Middle Iron Age attribution for the western cropmark enclosures; this, however, was not corroborated by the trial excavations.

The provisional dating of the main Playing Fields system appears to be from the late 1st century BC to the start of the 2nd century AD when it seems to have been abandoned. Indeed this appears to be the norm for other similar sites within the region, a number of which were abandoned by the mid 2nd century AD. The site at Trumpington had been abandoned by 150 AD at the latest (Davidson and Curtis, 1973), with those at Barrington and Harston becoming redundant at a similar time, if not earlier. This compares with the Greenhouse Farm excavations (Hinman, 1997; Gibson and Lucas, 2000), where a Middle to Late Iron Age settlement appears to have thrived until the early/mid 1st century AD, thereafter its seems only to have been seasonally used by potters and for stock rearing (Gibson and Lucas 2000).

A change in animal husbandry was noticed between the Iron Age and Romano-British phases of Greenhouse Farm with more cattle kept and younger cattle slaughtered, though with a decrease in the number of sheep and fewer lambs killed. It would be interesting to see if changes in the types of livestock kept were similar between the two sites therefore indicating a shift in economic factors between Iron Age and Romano-British systems. The excavations at Vicars Farm on the western side of Cambridge (Lucas and Whittaker, 2001) are also interesting as a comparison as there appears to be little immediate settlement activity of Iron Age or pre-Conquest date, its founding occurring within the mid to latter half of the 1st century AD. With settlement continuing uninterrupted until the early 5th century AD, the longevity of the Vicars Farm complex contrasts sharply with what appears to be decline and abandonment of the Playing Fields site when in the late second half of the 1st century AD many of the enclosures were considered obsolete and levelled. A new fieldsystem was placed over the former enclosures and this lasted until the first half of the 2nd century AD; similar events occurred at Hinxton suggesting a widespread re-organisation of fieldsystems in the late 1st century. The burial in Trench 13 from

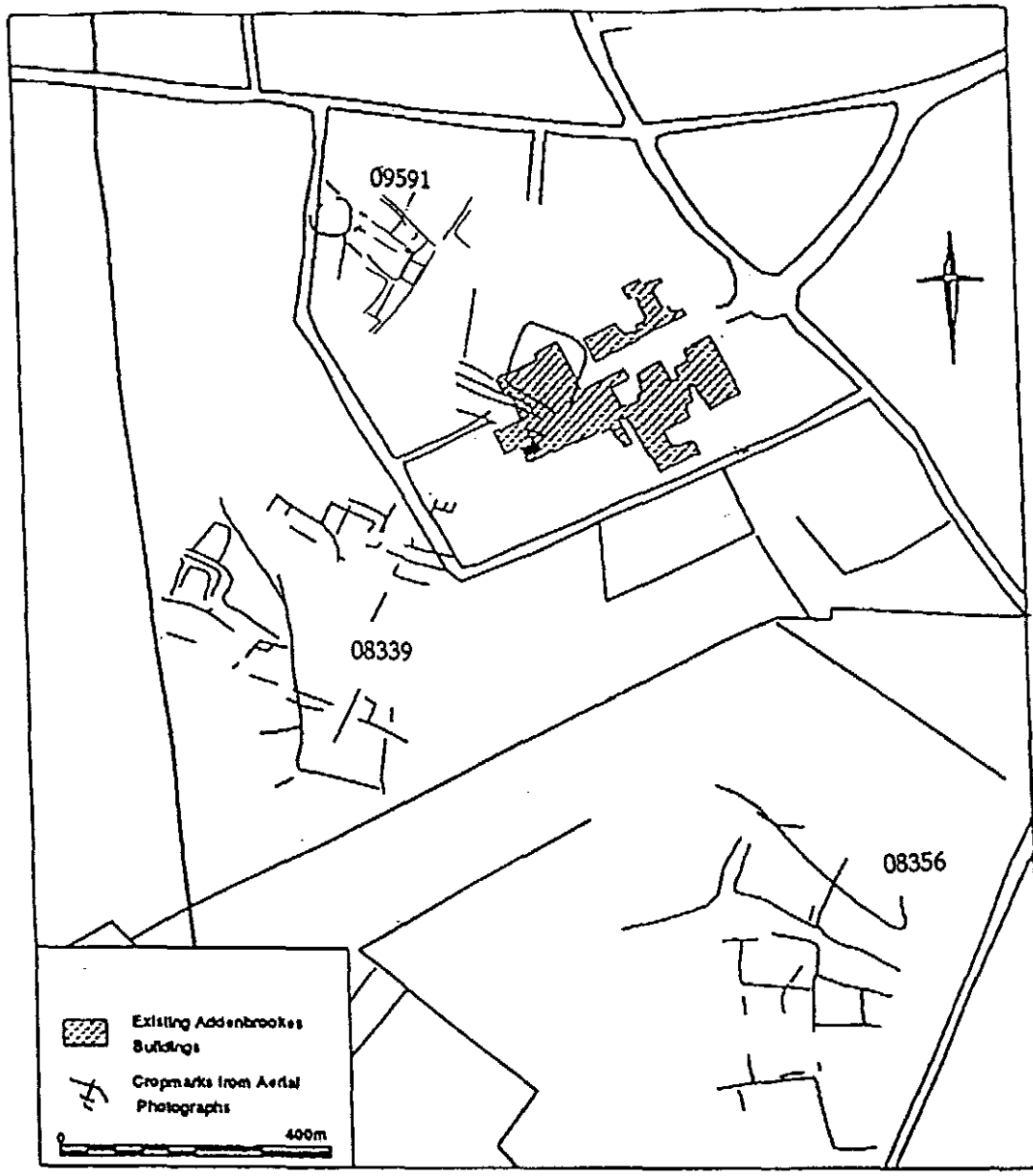


Figure 9 Other nearby cropmarks with the geophysical survey added

this later phase may be from an adjacent occupation site related to the new layout.

Comparison of the environmental data from Vicars Farm and Greenhouse Farm excavations with the present evaluation site shows that each was processing crops from the very close vicinity as soil-specific plant types are well represented. However it seems that the Playing Fields site was importing fenland plants such as Spikerush and Sedge, probably as fuel for fires or possibly for roofing material. These need not have travelled far, however, as the appropriate type of habitat for these plants can be found within five miles of the site.

It is worth making two conjectural suppositions; firstly, that the system of sub-rectangular enclosures at the Playing Fields site were aligned on the Roman Road that may have run to the south, in which case it may have had its origins in an Iron Age trackway. Second is that the settlement was abandoned as the Roman town of Cambridge began to expand leading to a new focus of local settlement and a reorganisation of the local economy.

References

Beedham, G.E. 1972. Identification *of the British Mollusca*. Amersham: Hulton Educational Publications Ltd.

Cra'ster M. D. 1969. New Addenbrookes Iron Age Site, Long Road, Cambridge. *Proceedings of the Cambridge Antiquarian Society*, Vol. LXII.

Davidson, I. and Curtis G. 1973. An Iron Age Site at Trumpington. *Proceedings of the Cambridge Antiquarian Society*, Vol. LXIV

Evans, C. 2001. *Former Downing College Sports Field and Addenbrookes Car Park, Long Road Cambridge - Project Specification for Archaeological Evaluation.* Cambridge Archaeological Unit, Unpublished Specification Document.

Getty, R. 1975. In Sisson & Grossman's *The Anatomy of Domestic Animals.* London W.B. Saunders Company.

Gibson D. and Lucas G. 2000. *Archaeological Excavations at The North Field, Greenhouse Farm, Cambridge*. Cambridge Archaeological Unit, Report No. 354

Grant, A. 1982. The Use of Tooth as a Guide to the Age of Domestic Ungulates. In Wilson, B., Grigson, C., & Payne, S. (eds) *Ageing and Sexing of Animal Bones from Archaeological Sites*. BAR British Series, 109: 91-108.

Hall, A. 2001. *An Archaeological Desk Based Assessment of Downing College Sports Field, Long Road, Cambridge*. Cambridge Archaeological Unit, Report No. 418.

Hill J. D. *et al.* 1995. Hinxton Rings Late Iron Age Cemetery, Cambridgeshire. *Proceedings of the Prehistoric Society*, Vol. 65.

Johnson, A.E. 2001. *Downing College Sports Field: Magnetometer (Gradiometer) Survey*. Oxford Archaeotechnics Limited (Appendix 7).

Kerney M.P. and Cameron, R.A.D. 1996 Land *Snails of Britain and North-West Europe*. London: HarperCollins Publishers.

Lucas, G. & Whittaker, P. 2001. *Vicars Farm, Cambridge. Post-excavation assessment report.* Cambridge Archaeological Unit Report No. 425: unpublished.

Malim, T. 1993. Cropmarks at Manor Farm, Harston. *Proceedings of the Cambridge Antiquarian Society*, Vol. LXXXIV.

Malim, T. 1995. Prehistoric and Roman Remains at Edix Hill, Barrington. *Proceedings of the Cambridge Antiquarian Society*, Vol. LXXXVI.

Mortimer, R. and C. Evans 1996. *Archaeological Excavations at Hinxton Quarry, Cambridgeshire: The North Field.* Cambridge: Cambridge Archaeological Unit Report no. 168.

Palmer, R. 2001. *Downing College Sports Ground, TL462553 Cambridgeshire - Aerial Photographic Assessment.* Air Photo Services, Report No. 2001/08. Published in Hall, 2001, (Appendix 6).

Regan, R. 1996. *An Archaeological Evaluation for Smith Kline Beecham, Addenbrookes Hospital.* Cambridge Archaeological Unit, Report No. 189.

Regan, R. and Mortimer, R.W. 2001. *Chesterton Lane Corner, Cambridge.* Cambridge Archaeological Unit Report No. 420 .

Robinson, M. 1995. *Addenbrookes Island - An Archaeological Evaluation.* Cambridge Archaeological Unit, Report No. 148.

Schmid, E. 1972. *Atlas of Animal Bones: For Prehistorians, Archaeologists and Quaternary Geologists.* Elsevier: Amsterdam, London, New York.

Spence, C. 1990. *Archaeological Site Manual.* London: Museum of London.

Stace, C. 1997. *New Flora of the British Isles.* Cambridge: Cambridge University Press.

Wait, G. 1992. *Archaeological Investigations at New Addenbrookes Centre for Brain Repair.* Cambridge Archaeological Unit, Report No. 74.

Appendix 1

The Worked Flint: Chantal Conneller

A very small assemblage consisting of 20 pieces of worked flint and three of burnt flint were recovered. With the exception of a fine, patinated blade from [302], dating to the Mesolithic or Neolithic, the material is all Late Bronze Age/Early Iron Age in date. This consists of broad squat flakes, which lack preparation, and were detached from multi-platform cores, using a hard hammer. Two of these flakes bear additional retouch. The raw material employed was a black, good quality flint, with a cortex indicative of a gravel source. Two flakes of yellow flint from [903] appear to derive from the same raw material unit.

Two pieces from the assemblage derive from a LBA/EIA context [204]. The remainder were recovered from later features or the ploughsoil. The material from the prehistoric context is indistinguishable from the rest of the lithic collection. The assemblage is too small to justify further statements regarding the nature of the activities undertaken at the site.

Category	No
Retouched Flake	2
Blade	1
Flake/fragment	16
Shatter fragment	1
Total	20

Table 2 Worked Flint

Appendix 2

Pottery: Gavin Lucas

A small but significant assemblage of Late Iron Age and Early Roman pottery was recovered from the evaluation with a total of 324 sherds weighing 3134 grams. Although most of the sherds were fairly small and abraded, the overall composition exhibited some interesting features. Primarily, the date range of the group is almost all consistently pre-Flavian (AD 43-70), with some late Iron Age or Conquest period groups and one early 2nd century group. Vessel forms include mostly jars, many combed but also some local imitation Gallo-Belgic finewares such as platters and beakers. Given the known extent of the archaeology from cropmarks, the importance of this group takes on added significance suggesting a possibly major Conquest period site. Added to this, many of the fabrics (particularly the finewares) are, perhaps unsurprisingly, closely matched by those produced at Greenhouse Farm, a cluster of pre-Flavian

Pottery Catalogue

Context No.	Catalogue No.	Description
100	1	1-2nd c. Romano-British, 1 GRE 17th/18th c.
104	5	1-2nd c. Romano-British
110	7	GRE Slipware - 17th/18th c.
200	9	BA/EIA flint-gritted
204	10	BA/EIA flint-gritted
216	14	pre-Flavian, including various jars
300	18	pre-Flavian, including jar
302	20	1 BA/EIA flint-gritted, pre-Flavian jar and storage jars
308	23	pre-Flavian, including cordoned jar and other jars (large sherds)
310	24	1st c. LIA/Romano-British grog-tempered combed jar
404	25	1st c. LIA/Romano-British including grog-tempered combed jar and other jar
408	27	pre-Flavian
410	29	Pre-Flavian, including collared platter, beaded beaker/jar, various other jars, grog-tempered combed jar
901	34	1 cream ware, 1 pearl ware shell-edge, 1 blue willow, 1 Staff. slipware, 1 Black Basalt, 1 brown salt-glazed stoneware jug, 3 URE - late 18th/early 19th c.; 3 Romano-British (residual)
903	39	pre-Flavian including combed jar, cordoned carinated bowl
905	43	1-2nd c. Romano-British
906	45	1-2nd c. Romano-British
907	47	pre-Flavian, including collared platter, grog-tempered jar, various other jars
1001	51	17th/18th c. Staff. Slipware, mottled ware and URE
1003	55	1 BA/EIA flint-gritted
1305	58	pre-Flavian, including carinated cordoned bowl, barbotine dot beaker
1312	63	1-2nd c. Romano-British
Trench 1 Unstratified	65	6 post-med GRE, 1 GG whiteware, 1 Staff slipware – all 17th/18th c.; 7 Romano-British including Combed storage jar, early flanged bowl – 2nd cent.
Trench 2 Unstratified	70	1 BA/EIA flint-gritted
Trench 3 Unstratified	72	1st c. LIA/Romano-British storage jar
Trench 5 Posthole	74	1-2nd c. Romano-British
Trench 5 Unstratified	76	pre-Flavian, including combed jar/beaker
Trench 8 Unstratified	79	1-2nd c. Romano-British
Trench 12 Unstratified	83	1 BA/EIA flint-gritted, 1 Romano-British, 3 Post-med GRE
Trench 13 Unstratified	86	1 Romano-British

kilns close by. In terms of regional importance then, the assemblage - or rather potential assemblage - from the site is highly significant for understanding transitional/early Roman ceramic consumption in the Cambridge area, indeed may be the best to date given the level of disturbance in the Roman town itself.

Period	No. of Sherds	Total weight (g)
Bronze Age/Early Iron Age	4	12
1st c. Late Iron Age/Romano-British	9	108
pre-Flavian	268	2749
1-2nd c. Romano-British	23	183
Post-Medieval	20	82

Table 3 Potsherds from excavated features

Apart from these ceramics, a few sherds in flint-tempered fabric dating to the Late Bronze Age or Early Iron Age occurred and also some later post-Medieval groups, primarily 18th century.

Appendix 3

The Faunal Remains: A. Clarke

A small assemblage of animal bone numbering 95 fragments was recovered by hand from various features spread across the site, dating from the Late Iron Age to the Early Roman Occupation. Due to its size it was possible to inspect the entire assemblage. This was carried out in order to identify the species present within the assemblage and to highlight any patterns evident in element distribution, age profiles, butchery and spatial distribution. All the bone was identified using Schmid (1972) and the Cambridge Archaeological Unit reference collection. Age estimations were undertaken using the criteria established by Getty (1975) and Grant (1982). No attempt was made at this time to distinguish between the bones of sheep and goats. These bones are quoted as sheep/goat. Also, where it was clear that a group of fragments originated from a single bone, they were grouped together and counted as a single element (i.e. 100 fragments from a broken skull were counted as 1 bone).

Condition of Material

The bone fragments contained within the assemblage are, on the whole in a very good state of preservation. However, it is clear from the absence of fresh breaks on the bone, that the assemblage was already in a fragmentary state upon deposition. Further to this there is clear evidence that the bone has been subjected to the attentions of gnawing animals such as dogs. The combination of these two factors has resulted in 60% (57 fragments) being unidentifiable.

Results

Understandably there is very little useful interpretative information that can be gleaned from such a small data set. As can be seen in Table 1 above, the identifiable assemblage consists of a broad range of domestic animals, with a slight indication of a preference for sheep/goat. The species present are mostly represented by those elements from the extremities of the skeleton (i.e. the lower leg and feet) which, as they are the least economically useful bones, could be taken to mean that the assemblage represents waste from primary butchery. However, as the assemblage is so small and was recovered from trenches spread over a wide area, it would be rash to make any such inferences at this time.

Species	NISP
Cattle	9
Sheep/goat	15
Pig	4
Horse	6
Dog	1
Domestic Hen.	1
Unidentifiable	57
Total	**95**

Table 4: Number of identifiable specimens per species (NISP)

Of note were some sheep/goat skull fragments recovered from Trench 13, context [1312], which were found in association with several human bones, indicating the possibility of human burial at the site.

Statement of Potential

As has been stated above, there is sparse information that can be extracted from such a small number of bones and there is very little more data that this assemblage can provide, other than that which has been stated in this report. There is simply not enough bone to make any firm interpretations

However having said that, considering the preservational state of the bone, it is highly likely that a much bigger and equally well preserved assemblage will be recovered should the site proceed to a full excavation. If such a scenario occurs then this site will make an ideal comparison to the contemporary site of Greenhouse Farm, which showed evidence of the exploitation of a similar suite of domestic species (see Higbee in Gibson and Lucas, 2000).

Appendix 4

Environmental Bulk Samples: R.M.Ballantyne

One context contains a quantity of well-preserved charred cereal and fenland plant remains and two separate sources of plant material may be represented. The major cereal at the site is spelt wheat with a little barley. From the weed taxa cereal cultivation seems to have been upon the nearby chalk downland. The molluscan assemblage indicates an open and dry, probably grassland local environment although some localised flooding occurred within the ditch features.

The very limited charred plant remains within the other two sampled contexts suggests that such material is context specific, and that sampling should be targeted during any later excavation phase.

Three samples from ditch contexts were submitted for analysis. All were processed by hand using bucket-flotation. The flots were collected using a 300μm sieve, and the heavy residue washed over a 1mm mesh. The flots were dried prior to examination under a low-power binocular microscope. Plant remains were identified using the reference collection of the Pitt-Rivers Laboratory, Department of Archaeology, University of Cambridge. Plant nomenclature follows Stace (1997), and for molluscs Beedham (1972) and Kerney and Cameron (1996). The heavy residues have not been examined. The contents of the flots are summarised in table form at the end of this report.

Preservation

Only charred archaeological plant remains have been recovered, which is consistent with the well-drained nature of the site. The very little uncharred plant material appears to be intrusive and of modern origin.

The quality of preservation varies between the samples, and may well be context specific. Both ditch fills [214] and [408] contain a low amount of carbonised material with numerous vitrified fragments, which suggests the charring conditions were extreme. The other sampled context, [907], includes numerous carbonised cereal and wild taxa remains. The physical preservation is generally very good; there is limited fragmentation although surface quality is sometimes poor.

Results

Ditch lens [214], Trench 2

Very few charred plant remains are present. There are three glume bases, of which one was identifiable to spelt wheat (*Triticum spelta*), and one emmer or

spelt spikelet fork (*T. dicoccum/spelta*). The small number of wild taxa represents possible arable weeds such as brome grass or oat (*Bromus/ Avena* sp.), and a small-seeded dock type (*Rumex conglomeratus/obstutifolius/sanguineus*). Due to the limited number of remains it is difficult to infer much, other than that some charred cereal processing debris is present within this context.

A small number of snails characteristic of open and dry land environments are also present, including *Vallonia exentrica/pulchella* and *Trichia* sp.

Ditch backfill [408], Trench 4

Low amounts of charred plant remains are again present within this context. Three grains of spelt or emmer wheat accompanied by ten glume bases (also of either spelt or emmer) form the majority of the assemblage. There is also one large-seeded grass, and a probable seed of Italian rye-grass (*Lolium* c.f. *multiflorum*). A similar interpretation to that for [214] may therefore be suggested.

The snail taxa within [408] are also very similar to those from [214], with shells of *Vallonia exentrica/pulchella,* and *Pupilla muscorum,* which characterise open, dry locations. There are also a number of *Helicella itala,* a taxon commonly found on calcareous grassland. One shell of the water snail *Valvata cristata* indicates that occasional flooding may have occurred in this ditch.

Basal silts [907], Trench 9

The one good charred plant assemblage was recovered from this context. There are numerous wheat grains, many of which are comparable to spelt wheat (*Triticum* c.f. *spelta*), or to either spelt or emmer wheat. A low number of barley grains are also present, which from the one hulled and twisted grain, may represent the hulled six-row variety (*Hordeum vulgare*). No barley rachis internodes have been recovered to confirm this interpretation.

Numerous glume bases that are clearly identifiable as spelt wheat accompany the probable spelt wheat grain. The chaff to grain ratio for charred components either of emmer or spelt wheat is approximately one glume base to grain. Such a ratio suggests that intact spikelets may have been charred. The accompanying wild taxa include many large or grain-sized seeds, and indicate that some processing for removal of smaller components had already occurred.

The wild taxa fall into two clear groups. Many are clearly associated with arable or disturbed soils and may be interpreted as weeds of the charred cereal crop. Two taxa of note are the numerous seeds of field gromwell (*Lithospermum arvense*) and the one seed of common knapweed (*Centaurea nigra*). Both types suggest cultivation upon lighter soils such as the chalky downland to the south.

sample number		<1>	<2>	<3>
context		[214]	[408]	[907]
description		sandy lens	?backfill	basal silts
feature type		large ditch	ditch	ditch
trench number		2	4	9
phase/date		?RB	Pre-Flav.	Pre-Flav.
sample volume/ litres		6	14	6
flot fraction examined		1/1	1/1	1/1
hulled, twisted *Hordeum* sp. grain	6-row hulled barley grain			1
hulled, straight *Hordeum* sp. grain	hulled barley grain			2
Hordeum sp. grain	barley grain			3
Triticum c.f. *spelta* grain	spelt wheat grain			63
Triticum spelta/dicoccum grain	spelt/emmer wheat grain		3	31
Triticum sp. grain	wheat grain			11
Triticum/Hordeum sp. grain	wheat/barley grain			6
cereal grain indet.			1	28
Triticum spelta glume base	spelt wheat chaff	1		23
Triticum c.f. *dicoccum* spikelet fork	emmer wheat chaff			1
Triticum spelta/dicoccum spikelet fork	spelt/emmer chaff	1		4
Triticum spelta dicoccum glume base	spelt/emmer chaff	2	10	81
Triticum sp. rachis internode	wheat chaff			5
Triticum sp. awn fragment	wheat 'hairs'			1
Avena sp. awn fragment	oat 'hairs'			4
rachis internode indet.	cereal chaff			1
cereal indet. culm node	straw joint			1
Atriplex patula/prostrata	common/spear-leaved orache			3
Chenopodiaceae indet.	goosefoot type		1	
Montia fontana ssp. *chondrosperma*	blinks			1
c.f. *Polygonum aviculare*	knotgrass			1
Rumex acetosella	sheep's sorrel			1
Rumex sanguineus/conglomeratus/obstutifolius	small-seeded dock	1		
large legumes indet. (>4mm)	c.f. celtic bean/pea			5 frags.
Medicago sativa ssp. *falcata* medick	sickle medick			2
medium *Trifolium/Medicago* spp. (2-3mm)	medium-seeded clover/medick			1
small Apiaceae indet. kernel	small Carrot Family seed			1
Lithospermum arvense	field gromwell			26
Plantago c.f. *lanceolata*	ribwort plantain			1
Odontites vernus	red bartsia			1
Centaurea nigra	common knapweed			1
Sonchus asper	prickly sow-thistle	- u		
Luzula sp.	wood-rush			1
Eleocharis palustris	common spike-rush			1
Schoenus nigricans	black bog-rush			2
Cladium mariscus	great fen sedge			2
Carex viridula type	yellow sedge type			6
medium trilete Carex sp.	sedge			1
small trilete *Carex* sp.	sedge			3
Festuca c.f. *arundinacea*	tall fescue			10
Lolium c.f. *multiflorum*	Italian rye-grass		1	
Poa spp.	meadow-grass	- u		
Avena sp.	wild/cultivated oat			1
Phleum bertolonii	lesser cat's-tail			1
Bromus spp.	brome			8
Bromus/Avena sp.	brome/oat	1		5
large Poaceae indet. (>4mm)	large Grass Family seed	1	1	4
medium Poaceae indet. (c. 4mm)	medium Grass Family seed			2
Poaceae culm node	grass stem joint			1
Poaceae culm fragment	grass stem			2
small seed indet.				2
Charophyte oogonium	green algae 'seed'			2u
charcoal fragments				
small charcoal (<2mm)		++	++	+++
med. charcoal (2-4mm)		+	+	++
large charcoal (>4mm)		-	-	+
- vitrified charcoal		++	++	-
charred concretion		+	+	
fly ash / slag			+	
unburnt bone frags.		+	+	
small bone, 'u'				-
Anuran bone 'u'	amphibian bone			-
intrusive roots		++	+	+
Bithynia tentaculata	quiet rivers & still but large waters			- u
Valvata cristata	slow, muddy water with vegetation		- u	1 & + u
Lymnaea truncularia	shallow waters & flooded pastures			1 & + u
Carychium minimum/tridentatum	generally well vegetated; wet/damp			5 & - u
Cochlicopa lubrica/lubricella	cathotic			2
Vertigo pusilla	dry, shady places			- u
Vertigo c.f. *pygmaea*	dry, grassy places; occ. marshes			6 & - u
Pupilla muscorum	dry, exposed places	- u	+ u	+ u
Vallonia costata	dry, open places			1
Vallonia exentrica/pulchella	open, damp and/or dry habitats	+ u	+ u	3 & + u
Aegopinella sp.	moist & shady places			1
Helicella itala	dry, open grassland	- u	+ u	+ u
Trichia sp.	cathotic	+ u		- u

Table 5 Environmental Results

KEY: 'u' uncharred, all other items are charred unless other wise indicated.
'-' 1 or 2 items, '+' <10 items, '++' 10-50 items, '+++' >50 items

Other taxa present include brome grass (*Bromus* sp.), common or spear-leaved orache (*Atriplex patula/prostrata*), tall fescue (*Festuca* c.f. *arundinacea*) and sickle medick (*Medicago sativa* ssp. *falcata*).

The other group of wild taxa is clearly associated with a wetland, probably fen, environment. Some types could be from wetter areas on the margins of arable fields; this includes common spikerush (*Eleocharis palustris*) and the true sedges (*Carex* spp.). However several other types present would be very unlikely to grow outside a fen setting. The great fen sedge (*Cladium mariscus*) has an extensive rhizomatous system that is unsuited to ploughed soils. Black bog-rush (*Schoenus nigricans*) is also found on wet, peaty soils in similar places to the great fen sedge. The range of wetland taxa suggests that a source of charred remains other than cereal crop material was present. This may have been a collected resource like sedges, although evidence such as vegetative remains of great fen sedge is not present, and so the nature of this material cannot be specified.

Two sources of molluscan remains also occur in the sample. There are uncharred shells which represent the local environment during the formation of the fill context. Other charred shells were presumably associated with the carbonised plants themselves or the setting in which they were burnt. Several of the uncharred snail taxa are of stagnant or slow waters, most notably *Valvata cristata* and *Lymnaea trunculata*, which are associated with the vegetation in such waters. Other uncharred snails are similar to those in the other two sampled contexts, and suggest open and dry land conditions. Presumably the water snails represent periodic times of wetness within the feature itself, whilst the land snails may be more characteristic of the surrounding environment and/or summer conditions. Two oogonia of algae (Charophytes) are also present in this context, which further suggests standing water.

The charred shells are of similar taxa to the uncharred, but there are far fewer of the dry, open land snails and relatively greater numbers of damp vegetation or water-associated types. It seems likely, therefore, that these snails may have been associated with the charred fenland plant taxa identified, rather than the arable assemblage.

Conclusions and Recommendations

The one rich context [907] indicates that spelt wheat dominated the cereals present at site during the Pre-Flavian phase. The importance of spelt wheat in Cambridge throughout the Roman period has been demonstrated at several sites, including the 1st and 2nd century AD contexts from Chesterton Lane Corner (Reagan and Mortimer 2001) and the later 3rd to 4th century AD site of Vicars Farm (Lucas and Whittaker 2001). The Downing Playing Field site should provide good contrast between the northern and southern areas of Cambridge during the Roman period.

From the three contexts examined it is clear that good charred plant remains and snail assemblages are present at the site, but only within certain contexts. It is suggested on this basis that sampling is carefully undertaken. Contexts targeted should either contain artefactual or charred material, or be of clear interpretive value to the site. Within such contexts there is good potential for reconstruction both of the types of cereal and other plant material brought to the site, and the setting for cereal cultivation. The molluscan assemblage will be of use for understanding the environment at the site itself.

Appendix 5

Context Descriptions

Context	Tr.	Type	Description	Interpretation	Above	Finds	Dating
100	1	F	Firm mid brown to dark gray clay silt with frequent angular and rounded stones, some burnt. Rare charcoal.	Backfill	101	Pottery & animal bone	R-B & 17th/18th
101	1	C	Linear in plan, aligned NE-SW, sides convex becoming steeper towards a rounded base with imperceptible breaks of slope.	Large boundary ditch	Nat	\	
102	1	F	Mid brown to dark gray clay silt fill with angular, sub-angular and rounded stones, occasional charcoal.	Backfill	103	Animal bone	
103	1	C	Linear in plan, aligned NE-SW, sides shallow and concave leading to a flat base with imperceptible breaks of slope.	Small ditch, possible re-cut of [105]	104?	\	
104	1	F	Mid brown to dark gray clay silt fill with angular, sub-angular and rounded stones, common charcoal.	Backfill	105	Pottery & animal bone	R-B
105	1	C	Linear in plan, aligned NE-SW, with shallow slightly convex sides leading to a rounded base with gradual breaks of slope.	Boundary ditch	Nat	\	
106	1	F	Pale gray brown silt	Fill	107	None	Prob P.Med
107	1	C	Shallow sided and flat based linear cut aligned NE-SW.	Plough furrow	Nat	\	
108	1	F	Pale gray brown silt	Fill	109	None	Prob P.Med
109	1	C	Shallow sided and irregular based linear cut aligned NE-SW.	Plough furrow	Nat	\	
110	1	F	Mid grayish brown silt with occasional coarse sub-angular pebbles	Fill	111	Pottery & animal bone	R-B & 17th/18th
111	1	C	Linear in plan, aligned NE-SW, with steep concave western side and steep convex eastern side leading to a rounded base with imperceptible breaks of slope.	Boundary / enclosure ditch	112	\	
112	1	F	Mid brown silt.	Fill	113	None	
113	1	C	Much-truncated linear cut with shallow concave side leading to flat base through gradual breaks of slope.	Small ditch, possibly re-cut by [111]	Nat	\	
114	1	F	Dark gray sandy silt.	Fill	115	None	

115	1	C	Circular in plan with steep concave sides leading to a rounded base with gradual breaks of slope.	Posthole	Nat	\	
116	1	L	Compacted small rounded stones and pebbles with a dark grayish brown clay silt soil matrix.	Metalled surface	Nat		
200	2	F	Mid grayish brown sandy silt	Fill	201	Pottery	Bronze Age EIA
201	2	C	Linear in plan, aligned N-S, with shallow concave sides leading to a rounded base through imperceptible breaks of slope.	Ditch	Nat	\	
202	2	F	Mid grayish brown sandy silt	Fill	203	None	
203	2	C	Linear in plan, aligned N-S, with shallow concave sides leading to a rounded base through imperceptible breaks of slope.	Ditch	Nat	\	
204	2	F	Dark brown gray loamy sandy silt.	Fill	205	Pottery, Animal bone & worked flint.	Bronze Age EIA
205	2	C	Linear in plan, aligned SW-NE, with steep concave sides leading to a flat base through gradual breaks of slope.	Ditch	208/210	\	
206	2	F	Mid brown gray sandy silt.	Fill	207	Animal bone	
207	2	C	Linear in plan, aligned SW-NE, with concave sides leading to a flat base through gradual breaks of slope.	Ditch	208/210	\	
208	2	F	Mixed yellowish brown sandy silt.	Fill	209	None	
209	2	C	Linear in plan, aligned E-W, with concave sides leading to a rounded base through gradual breaks of slope.	Ditch	202	\	
210	2	F	Mid brown orange silty sand.	Fill	211	None	
211	2	C	Linear in plan, aligned E-W, with concave sides leading to a flat base through gradual breaks of slope.	Ditch	202	\	
212	2	F	Light brown sandy silt with frequent plant/root bioturbation. Occasional small angular and sub angular stones.	Fill	213	None	
213	2	C	Linear in plan, aligned N-S, with concave sides leading to a flat base through gradual breaks of slope.	Ditch	Nat	\	
214	2	F	Light to mid grayish brown silt with occasional lenses of coarse orange yellow sand.	Fill	215	None	

215	2	C	Linear in plan, aligned E-W, with steep straight sides leading to a rounded base through gradual breaks of slope.	Large boundary ditch	216	\	
216	2	F	Predominantly mid grayish brown silt with occasional lenses of yellow silty sand and a primary layer of orange brown silty sand.	Fill with primary weathering and occasional side collapse.	217	Pottery, Animal bone.	R-B (Pre-Flav)
217	2	C	A large cut partly obscured beneath trench side but oval in plan. Steep concave sides lead to rounded base through gradual breaks of slope.	Large pit or terminal end of a large enclosure ditch.	218	\	
218	2	F	Mid gray brown silt.	Fill	219	None	
219	2	C	Cut largely obscured by trench edges	Needs further excavation. Ditch terminal?	220	\	
220	2	F	Mid gray brown silt.	Fill	221	None	
221	2	C	Linear cut aligned E-W with shallow concave sides leading to a flat base through sharp breaks of slope.	Gully	Nat	\	
300	3	F	Mid brown sandy silt with occasional angular stones.	Fill	301	Pottery	R-B (Pre-Flav)
301	3	C	Linear in plan, aligned E-W, with shallow irregular sides leading to a flat base through gradual breaks of slope.	Possible ring gully	Nat	\	
302	3	F	Brown silt with occasional rounded stones.	Fill	303	Pottery and Animal bone	BA/EIA and R-B (Pre-Flav)
303	3	C	Large linear feature with steep flat sides leading to a flat base through gradual breaks of slope.	Boundary ditch	Nat	\	
304	3	F	Mid brown sandy silt with small sub-angular and angular stones.	Fill	303/305	None	
305	3	C	Linear in plan, aligned E-W, with steep straight sides leading to a rounded base through gradual breaks of slope.	Boundary ditch?	Nat	\	
306	3	F	Orangey brown sandy silt with orange mottles and frequent small angular and sub-angular stones and gravel.	Fill	305/307	None	
307	3	C	Roughly circular in plan with concave sides leading to an irregular base through gradual breaks of slope.	Probable pit	Nat	\	
308	3	F	Compact light brown clay silt with frequent small rounded, sub-rounded, angular and sub-angular	Fill	309	Pottery	R-B (Pre-Flav)

			stones and grit.				
309	3	C	Linear in plan with steep flat sides leading to a flat base through sharp breaks of slope.	Ring gully?	303/311	\	
310	3	F	Soft mid grayish brown silt with occasional medium sub-angular pebbles.	Fill	311	Pottery	1stC LIA/R-B
311	3	C	Large linear feature with steep flat sides leading to a flat base through gradual breaks of slope.	Boundary ditch, same as [303]	Nat	\	
312	3	F	Soft mid grayish brown silt.	Fill	313	None	
313	3	C	Irregular shaped cut with indeterminable edges.	Probable natural bole, possible remnant of hedge on western edge of ditch [311]].	310	\	
400	4	F	Mid orange sandy silt	Natural bioturbation?	401	None	
401	4	C	Linear in plan, aligned E-W, with steep concave sides leading to a rounded base through gradual breaks of slope.	Possible ditch	Nat	\	
402	4	F	Mottled gray brown and orange sandy silt	Fill possibly natural	403	None	
403	4	C	Semi-circular in plan with vertical sides leading to a flat base through sharp breaks of slope.	Possible pit	Nat	\	
404	4	F	Light brown gray sandy silt fill with rare stone inclusions	Fill	405	Pottery and animal bone	1stC LIA/R-B
405	4	C	Linear in plan, aligned E-W, with shallow sides leading to a rounded base through gradual breaks of slope.	Shallow ditch	Nat	\	
406	4	F	Light brown /gray sandy silt	Layer or spread	407	None	
407	4	C	Not really a cut	Slight depression where spread gathered	Nat	\	
408	4	F	Dark brown sandy silt	Ditch fill, almost certainly backfill	409	Pottery and animal bone	R-B (Pre-Flav)
409	4	C	Linear in plan with steep convex sides leading to a rounded base through gradual breaks of slope.	Ditch	Nat	\	

410	4	F	Mottled orange/brown sandy silt	Wear into natural by passage of feet/wheels/hooves	411	None	
411	4	C	Shallow linear interface with natural, aligned E-W, rounded base and irregular breaks of slope.	Not so much a cut as a wear interface.	Nat	\	
412	4	L	Small to medium sized rounded cobbles and irregular flint fragments, common charcoal.	Rough cobbling	410	None	
413	4	F	Mid grayish brown sandy silt with occa small rounded stones and common medium irregular cobbles, common charcoal.	Backfill and silting	412	Pottery and animal bone	R-B (Pre-Flav)
501	5	F	Loose orange brown sandy silt with moderate coarse sub-angular pebbles.	Probably caused by root disturbance.	502	None	
502	5	C	Irregular edges with indefinable limits.	Hedge line.	Nat	\	
600	6	F	Pale brown silty clay with occasional sub-angular coarse pebbles.	Fill	601	None	
601	6	C	Linear in plan, aligned NE-SW, with shallow concave sides leading to a flat base through gradual breaks of slope.	Ditch truncated by post-Medieval ploughing.	Nat	\	
700	7	L	Dark brownish gray silty sand	Topsoil	701	None	
701	7	L	Compacted light yellowish gray silty sand with common small stones.	Subsoil	Nat	None	
800	8	F	Mottled light brown, yellow and white chalk marl with occasional small stones and charcoal flecks.	Redeposited natural?	801	None	
801	8	C	Circular in plan with steep irregular sides leading to an irregular base with gradual breaks of slope.	Posthole?	Nat	\	
901	9	L	Dark gray brown silt	Topsoil	902	None	
902	9	L	Light gray loam	Levelling deposit, probably quite recent	903	Pottery	18th/19th
903	9	F	Mixed dark brown to mid gray silty loam	Redeposited fill of field drain	904	Pottery and clay pipe	R-B (Pre-Flav)
904	9	C	Narrow steep sided cut, linear in plan, aligned N-S.	Field drain	905	\	
905	9	L	Compact mid yellowish brown silty loam with frequent flint pebbles and occasional charcoal flecks	Deliberate backfilling	906	Pottery and Fe Brooch	1stC LIA/R-B & 18th

906	9	L	Dark brown silty clay loam	Silting	907	Pottery and animal bone	1stC LIA/R-B
907	9	L	Dark gray clayey silt with lenses of charcoal clunch and probable cess.	Primary silting and disuse phase	Nat	Pottery and animal bone	R-B (Pre-Flav)
1001	10	L	Dark gray silty loam	Topsoil	1002	Pottery	17th/18th
1002	10	L	Mid yellow brown silty loam	Subsoil	1003	None	
1003	10	F	Mottled reddish brown and mid yellowish brown silt with occasional charcoal flecks.	Fill	1004	Pottery	BA/EIA
1004	10	C	E-W aligned linear in plan with steep sides leading to a possibly rounded base. Obscured by trench edge.	Ditch	Nat	\	
1100	11	F	Pale orange brown sandy silt	Fill	1101	None	
1101	11	C	Linear in plan, aligned N-S, with steep straight sides leading to a flat base through gradual breaks of slope.	Ditch, probable re-cut	1102/1104	\	
1102	11	F	Mid gray brown silty clay	Fill	1103	None	
1103	11	C	Much truncated by [1101]. Linear in plan, aligned N-S, with concave sides leading to a rounded base through gradual breaks of slope.	Ditch	Nat	\	
1104	11	F	Pale gray brown silty clay	Fill	1105	None	
1105	11	C	Much truncated by [1101]. Linear in plan, aligned N-S, with concave sides leading to a flat base through gradual breaks of slope.	Ditch	Nat	\	
1301	13	F	Mid yellowish brown sandy silt with rare charcoal and occasional small angular pebbles.	Homogenous fill	1302	Pottery animal bone and worked flint	
1302	13	C	Curving linear in plan with shallow convex sides becoming steeper leading to a flat base through gradual breaks of slope. SE side largely obscured by trench edge.	Fairly large enclosure ditch.	1303	\	
1303	13	F	Mid to dark yellowish brown sandy silt with occasional small charcoal flecks and small rounded stones.	Fill	1304	None	
1304	13	C	Curving linear in plan with shallow concave sides leading to a flat base through gradual breaks of slope.	Ring gully?	1305	\	

1305	13	F	Mid yellowish brown sandy silt with occasional charcoal flecks and small rounded and angular stones.	Fill	1306	Pottery, animal bone and worked flint	R-B (Pre-Flav)
1306	13	F	Light to mid yellowish brown silty sand with common small rounded grit and pebbles. A thin layer of charcoal was located at the base of the fill.	Primary fill of 1307. Mostly wash and tumble.	1307	None	
1307	13	C	Linear in plan, aligned WNW to ESE. Northern edge shallow and straight, northern edge steep and convex. Both sides lead to a flat trenched base through sharp breaks of slope.	Large defensive enclosure ditch	1308	\	
1308	13	F	Light yellowish gray silty sand with common small angular flints.	Fill	1309	None	
1309	13	C	Linear in plan with steep concave sides leading to to a flat base through gradual breaks of slope.	Early? Ditch	Nat	\	
1310	13	F	Moderately compacted mid gray brown silt with occasional medium subangular pebbles.	Fill	1311	None	
1311	13	C	Linear in plan, aligned N-S, sides near vertical leading to a flat base through gradual breaks of slope.	Enclosure/boundary ditch	1312	\	
1312	13	F	Moderately compacted mid gray brown silt with occasional coarse rounded pebbles.	Fill	1313	Pottery and animal bone	1st-2nd C
1313	13	S	Partially exposed articulated prone inhumation. See text for fuller description.	Skeleton	1314	No associated grave goods identified	
1314	13	C	Probably linear in plan but not fully excavated due to skeletal impediment.	Probable ditch	Nat	\	
1315	13	F	Light grayish brown silty chalk loam	Backfill	1316	None	
1316	13	C	Shallow concave sides leading to a rounded base through gradual breaks of slope. Aligned ESE-WNW	Early enclosure ditch	Nat	\	

AIR PHOTO SERVICES
21 GUNHILD WAY
CAMBRIDGE
CB1 8QZ
PHONE/FAX 01223 572063

DOWNING COLLEGE SPORTS GROUND, TL462553 CAMBRIDGESHIRE

AERIAL PHOTOGRAPHIC ASSESSMENT

REPORT No: 2001/08

FEBRUARY 2001

COMMISSIONED BY

CAMBRIDGE ARCHAEOLOGICAL UNIT
DEPARTMENT OF ARCHAEOLOGY
DOWNING STREET
CAMBRIDGE CB2 3DZ

ASSOCIATES: ROG PALMER MA MIFA CHRIS COX MA MIFA

Archaeological consultants for aerial photographic interpretation, accurate mapping and oblique aerial photography

DOWNING COLLEGE SPORTS GROUND,

TL462553

CAMBRIDGESHIRE

AERIAL PHOTOGRAPHIC ASSESSMENT

DOTT.SSA Cinzia Bacilieri and Rog Palmer MA MIFA

INTRODUCTION

This assessment of aerial photographs was commissioned to examine an area of some 5 hectares (centred TL462553) in order to identify and accurately map archaeological and natural features and thus provide a guide for field evaluation. The level of interpretation and mapping was to be at 1:2500.

PHOTO INTERPRETATION AND MAPPING

Photographs examined

A cover search was obtained from the Cambridge University Collection of Aerial Photographs (CUCAP). Photographs included those resulting from specialist archaeological reconnaissance and routine vertical surveys.

Photographs consulted are listed in the Appendix to this report.

Base maps

A base map at a scale of 1: 2500 was provided by the client.

Study area

Photographs were examined in detail for an area extending one modern field beyond the assessment area.

Photo interpretation and mapping

All photographs were examined by eye and under slight (1.5x) magnification, viewing them as stereoscopic pairs when possible. Interpretation, made at 1:2500 level, was marked on an overlay to the most informative print following procedures described by Palmer and Cox (1993). This overlay was then scanned and transformed to match a 1:2500 base map using Irwin Scollar's AirPhoto program (Scollar 1998). The transformed file was set as a background layers in AutoCAD Map, where features were overdrawn using standard conventions. Layers from this final drawing have been used to prepare the figure.

Accuracy

AirPhoto computes values for mismatches of control points on the photograph and map. In the transformation prepared for this assessment the mean mismatches were less than ±2.0m.

COMMENTARY

Soils

The Soil Survey of England and Wales (SSEW 1983) shows the area as unsurveyed, mainly urban and industrial, and the closest soil to the area is chalk (soil association 342d).

Archaeological features

The only archaeological features recorded are in the field centred TL46155535. These include a D-shaped enclosure with internal and external ditches. Part of the enclosure, especially the S side, has broad ditches that may show recutting. An arc of ditch, cut by the field's E boundary, may form an enclosure which extends into the sports field (TL46255535) where it would lie mostly under the pavilion. Some of the linear ditches may also extend into the sports field.

Non-archaeological features

In the field centred TL46155535 is evidence of periglacial activity in the form of bands of slightly deeper soil aligned roughly E to W.
A number of narrow bands cross the field parallel to its N and S boundaries and may show recent land divisions. These have not been mapped.

Land use

Field centred TL46155535 has been in arable use on all photographs examined. The sports field (TL46255535) has been well-maintained grass and has been uninformative from the air.

REFERENCES

Palmer, R., 2000. *Cambridge Rapid Transit System, TL445545 to TL458563, Cambridgeshire: aerial photographic assessment. Air Photo Services Report* **2000/06**.

Palmer, R. and Cox, C., 1993. *Uses of aerial photography in archaeological evaluations. IFA Technical Paper* **12**.

SSEW, 1983. *Soils of England and Wales: sheet 4: Eastern England (1:250,000)*. Soil Survey of England and Wales, Harpenden.

APPENDIX

Aerial photographs examined

Source: Cambridge University Collection of Aerial Photographs

Oblique photographs

EW 5-6

Vertical photographs

As listed in report number: 2000/06 (Palmer 2000)

Downing College Sports Ground, Long Road, Cambridge
Features interpreted from aerial photographs

Ditch
Deep Soil
Area

100 0 100
metres

Original mapping at 1:2500 level
Air Photo Services: February 2001:0108-dow.dwg

Specialist Archaeological Field Evaluation

OXFORD ARCHAEOTECHNICS
Noke
Oxford OX3 9TX

Tel / Fax 01865 375536
Mobile 0831 383295
Email: survey@archaeotechnics.co.uk
http://www.archaeotechnics.co.uk

CONTENTS

SUMMARY

A geophysical evaluation programme comprising magnetometer (gradiometer) survey was carried out upon the Downing College Sports Field, south of Long Road, on the southern outskirts of Cambridge in advance of proposed development (centred on NGR 546250 255350).

An area of 3 ha was investigated, covering almost all of the playing field, excluding only areas occupied by the pavilion, cricket nets, and storage facilities.

Despite relatively weak topsoil magnetic properties, the survey revealed a complex of ditches whose geometry suggests a probable occupation site of Romano-British date, together with at least one side ditch of a known Roman road. A possible (15 m diameter) stone-built circular structure, and a number of former pits or hollows were also identified. Traces of parallel ditches on an alignment dissimilar to the main group suggest a further distinct phase of activity.

1. INTRODUCTION

1.1 Geophysical survey was commissioned by the Cambridge Archaeology Unit on behalf of Cambridge University Estates Management Services on the Downing College Sports Field, south of Long Road, on the southern outskirts of Cambridge in advance of proposed development. The location is shown on Fig. 1. The fieldwork was carried out in August 2001.

1.2 The survey area (centred on NGR 546250 255350) covered almost the whole of the sports field (a total area of some 3 ha) apart from the pavilion and cricket practice areas alongside the northwestern edge. The field is bounded on the north by properties fronting Long Road, on the east and south by a complex of buildings associated with Addenbrookes Hospital, and on the west by a tarmac car park.

1.3 The geology is reported as Middle Chalk. The land lies at c.15 m AOD, sloping gradually from northwest to southeast. The field was mown grass at the time of survey.

1.4 A recent archaeological desk-top assessment by the Cambridge Archaeology Unit has highlighted the archaeological potential of the area. Cropmarks observed on adjacent land to the west revealed an irregular rounded enclosure with outlying linears and areas of possible pitting, which from its morphology may indicate a later prehistoric settlement site (Fig. 1). Roman pottery has been recorded from both this cropmark site and from the survey area itself, and the southern edge of the site is crossed by a Roman road; part of the embankment *(agger)* has been incorporated and preserved within an old field boundary further west. A prehistoric settlement site was discovered and partially excavated in the 1960s during the construction of Addenbrookes Hospital less than 150 m to the east of the survey area (Hall 2001).

1.5 The geophysical survey comprised magnetometer (gradiometer) survey with limited topsoil magnetic susceptibility measurements. An explanation of the techniques used, and the rationale behind their selection, is included in an Appendix to the present report.

2. MAGNETIC SURVEY DESIGN

2.1 Following the AML 1995 guidelines, the geophysical grid is internally accurate to ± 10 cm, and locatable on the OS 1:2500 map to the nearest metre (AML 1995:Part I, 3.2) (Fig. 5).

2.2 Random dispersed *in situ* topsoil magnetic susceptibility measurements were taken in order to provide background information regarding topsoil magnetic susceptibility contrasts using a Bartington Instruments MS2 meter with an 18.5 cm loop.

2.3 An area totalling 3 ha was investigated by detailed gridded magnetometer (gradiometer) survey with a Geoscan Research FM 36 Fluxgate Gradiometer (sampling 4 readings per metre at 1 metre traverse intervals in the 0.1 nT range). The nanotesla (nT) is the standard unit of magnetic flux (expressed as the current density), here used to indicate positive and negative deviations from the Earth's normal magnetic field.

2.4 Magnetometer data have been presented as grey scale, interpretative (Figs. 2 & 3) and stacked trace (raw data) plots (Fig. 4), with an overview of results on Fig. 1.

3. SURVEY RESULTS

TOPSOIL MAGNETIC SUSCEPTIBILITY MEASUREMENTS

3.1 20 random *in situ* magnetic susceptibility readings were recorded to assess the general magnetic susceptibility of the sports field soils. Susceptibility is reported in SI: volume susceptibility units (x 10^{-5}), a dimensionless measure of the relative ease with which a sample can be magnetized in a given magnetic field. The measurements proved moderate to low, ranging between 13 and 15 (x 10^{-5}) SI units, a range which would not normally prove conducive to good magnetometer (gradiometer) survey (to detect the less substantial underlying features values of 40 - 50 SI would normally be anticipated). However, the results of subsequent gradiometer survey on this site tend to suggest that the fills of silted 'cut' features and natural hollows here are likely to contain fills with significantly higher magnetic susceptibility than the local topsoils.

MAGNETOMETER (GRADIOMETER) SURVEY

3.2 Despite the low magnetic values, the sports field produced a reasonably graphic gradiometer plot showing a number of linear anomalies indicative of underlying 'cut' features forming a broadly orthogonal pattern which lie for the most part on a northwest-southeast / southwest-northeast trend. Some curvilinear elements are also present, together with a number of intrusive features which are interpreted as pit forms or in some cases pockets of more highly magnetically susceptible material within otherwise magnetically weaker ditch fills. There are suggestions of at least two distinct phases of activity represented by the orthogonal pattern mentioned above, and a series (at least four) of generally weaker parallel linear anomalies (ditches) which run on a roughly north-south trend at approximately 10 - 15 m separation.

3.3 A further linear anomaly (possibly a pair at 10 - 12 m spacing) crossing the southern extremity of the site on an east-west alignment may represent one of the side ditches of the previously known Roman road (Hall 2001).

3.4 Centred approximately 30 m east of the southern side of the sports pavilion is a circular area some 15 m in diameter with the appearance of a broad shallow depression with what may conceivably be an outer structural element which is represented most obviously on the north side by a weak semi-circular negative anomaly; in the absence of any obvious modern interpretation, this may tentatively be interpreted as a circular stone building.

3.5 There are numerous strong ferrous anomalies present due to the presence of goal posts, tennis net sockets etc. which are clearly evident and, for the most, part self-explanatory. In addition a light litter of buried ferrous material was also recorded within the topsoil.

3.6 The survey area was inset several metres along the north, east and southern boundaries to avoid as far as possible gross magnetic interference from wire fencing

and the proximity of the modern buildings, nevertheless the magnetic effects from these sources are still visible in places, particularly along the eastern edge and east of centre along the southern boundary of the site.

4. CONCLUSIONS

4.1 Despite the relatively low magnetic properties of the local soils, the survey area proved responsive to magnetometer (gradiometer) survey, and a significant number of magnetic anomalies have been recorded. The geometry and relationship of the majority of these, together with previously recorded evidence for Roman surface finds both on the sports field and in the vicinity, tend to suggest that the orthogonal pattern of linear anomalies represents a series of features of Romano-British date. With the exception of the north-south linears, there is little indication of inter-cutting relationships within the main group of anomalies, indicating a relatively extensive site, possibly of a single-period, rather than a palimpsest, which appears quite distinct from the strongly curvilinear features identified as cropmarks on the land immediately to the west.

4.2 The ability of the gradiometer to detect these features despite low topsoil magnetic susceptibility shows that the ditches contain sufficiently magnetically enhanced material such as burnt and other magnetically enhanced deposits which are most likely to be associated with occupation debris.

4.3 The circular feature is rather enigmatic, and could conceivably be an anomaly from a structure contemporary with the construction of the enclosures. It is possible that further structural elements, such as smaller post settings or insubstantial wall footings, are present which would not be visible due to the relatively low overall magnetic contrasts on the site.

4.4 Some of the magnetic anomalies may be visible because they are relatively close to the surface, some truncation having taken place (levelling for the sports field): local infilling of any minor hollows would equally be capable of masking less strong magnetic signals.

REFERENCES

CLARK, A.J. 1990. *Seeing Beneath the Soil.* B.T. Batsford Ltd: London.

GALE, S.J. & HOARE, P.G. 1991. *Quaternary Sediments: petrographic methods for the study of unlithified rocks.* Belhaven Press: London (see Section 4.7, pp.201-229, "The magnetic susceptibility of regolith materials").

HALL, A. 2001. *An Archaeological Desk Based Assessment of Downing College Sports Field, Long Road, Cambridge.* Report prepared by Cambridge Archaeological Unit, No. 418, February 2001.

SCOLLAR, I., TABBAGH, A., HESSE, A. & HERZOG, I. 1990. *Archaeological Prospecting and Remote Sensing.* Cambridge University Press.

THOMPSON, R. & OLDFIELD, F. 1986. *Environmental Magnetism.* Allen & Unwin: London.

Geophysical survey by Oxford Archaeotechnics Limited under the direction of A.E. Johnson *BA*, with J. Walford & F. Andriantah. The project was co-ordinated by A.P. Johnson *BA, PhD, MIFA.*

APPENDIX 1 - MAGNETIC TECHNIQUES: GENERAL PRINCIPLES

A1.1 It is possible to define areas of human activity (particularly soils spread from occupation sites and the fills of cut features such as pits or ditches) by means of *magnetic survey* (Clark 1990; Scollar et al. 1990). The results will vary, according to the local geology and soils (Thompson & Oldfield 1986; Gale & Hoare 1991), as modified by past and present agricultural practices. Under favourable conditions, areas of suspected archaeological activity can be accurately located and targeted for further investigative work (if required) without the necessity for extensive random exploratory trenching. Magnetic survey has the added advantages of enabling large areas to be assessed relatively quickly, and is non-destructive.

A1.2 Topsoil is normally more magnetic than the subsoil or bedrock from which it is derived. Human activity further locally enhances the magnetic properties of soils, and amplifies the contrast with the geological background. The main enhancement effect is the increase of *magnetic susceptibility*, by fire and, to a lesser extent, by the bacterial activity associated with rubbish decomposition; the introduction of materials such as fired clay and ceramics - and, of course, iron and many industrial residues - may also be important in some cases. Other agencies include the addition and redistribution of naturally magnetic rock such as basalt or ironstone, either locally derived or imported.

A1.3 The tendency of most human activity is to increase soil magnetic susceptibility locally. In some cases, however, features such as traces of former mounds or banks, or imported soil/subsoil or non-magnetic bedrock (such as most limestones), will show as zones of lower susceptibility in comparison with the surrounding topsoil.

A1.4 Archaeologically magnetically enhanced soils are therefore a response of the parent geological material to a series of events which make up the total domestic, agricultural and industrial history of a site, usually over a prolonged period. Climatic factors may subsequently further modify the susceptibility of soils but, in the absence of strong chemical alteration (e.g. during the process of podzolisation or extreme reduction), magnetic characteristics may persist over millions of years.

A1.5 Both the magnetic contrast between archaeological features and the subsoil into which they are dug, and the magnetic susceptibility of topsoil spreads associated with occupation horizons, can be measured in the field.

A1.6 There are several highly sensitive instruments available which can be used to measure these magnetic variations. Some are capable, under favourable conditions, of producing extraordinarily detailed plots of subsurface features. The detection of these features is usually by means of a *magnetometer* (normally a fluxgate gradiometer). These are defined as passive instruments which respond to the magnetic anomalies produced by buried features in the presence of the Earth's magnetic field. The gradiometer uses two sensors mounted vertically, often 50 cm apart. The bottom sensor is carried some 30 cm above the ground, and registers local magnetic anomalies with respect to the top sensor. As both sensors are

affected equally by gross magnetic effects these are cancelled out. In order to produce good results, the magnetic susceptibility contrast between features and their surroundings must be reasonably high, thereby creating good local anomalies; a generally raised background, even if due to human occupation within a settlement context, will sometimes preclude meaningful magnetometer results. The sensitive nature of magnetometers makes them suitable for detailed work, logging measurements at a closely spaced (less than 1 metre) sample interval, particularly in areas where an archaeological site is already suspected. Magnetometers may also be used for rapid 'prospecting' ('scanning') of larger areas (where the operator directly monitors the changing magnetic field and pinpoints specific anomalies).

A1.7 *Magnetic susceptibility measuring systems*, whilst responding to basically the same magnetic component in the soil, are 'active' instruments which subject the sample area being measured (according to the size of the sensor used) to a low intensity alternating magnetic field. Magnetically susceptible material within the influence of this field can be measured by means of changes which are induced in oscillator frequency. For general work, measuring topsoil susceptibility *in situ*, a sensor loop of around 20 cm diameter is convenient, and responds to the concentration of magnetic (especially ferrimagnetic) minerals mostly in the top 10 cm of the soil. Magnetically enhanced horizons which have been reached by the plough, and even those from which material has been transported by soil biological activity, can thus be recognised.

A1.8 Whilst only rarely encountering anomalies as graphically defined as those detected by magnetometers, magnetic susceptibility systems are ideal for detecting magnetic spreads and thin archaeological horizons not seen by magnetometers. Using a 10 m interval grid, large areas of landscape can be covered relatively quickly. The resulting plot can frequently determine the general pattern of activity and define the nuclei of any occupation or industrial areas. As the intervals between susceptibility readings generally exceed the parameters of most individual archaeological features (but not of the general spread of enhancement around features), the resulting plots should be used as a guide to areas of archaeological potential and to suggest the general form of major activity areas; further refinement is possible using a finer mesh grid or, more usually, by detailing underlying features using a gradiometer.

A1.9 Magnetic survey is not successful on all geological and pedological substrates. As a rule of thumb, in the lowland zone of Britain, the more sandy/stony a deposit, the less magnetic material is likely to be present, so that a greater magnetic contrast in soil materials will be needed to locate archaeological features; in practice, this means that only stronger magnetic anomalies (e.g. larger accumulations of burnt material) will be visible, with weaker signals (e.g. from the fillings of simple agricultural ditches) disappearing into the background. Similar problems can arise when the natural background itself is very high or very variable (e.g. in the presence of sediments partially derived from magnetic volcanic rocks).

A1.10 The precise physical and chemical processes of changing soil magnetism are extremely complex and subject to innumerable variations. In general terms,

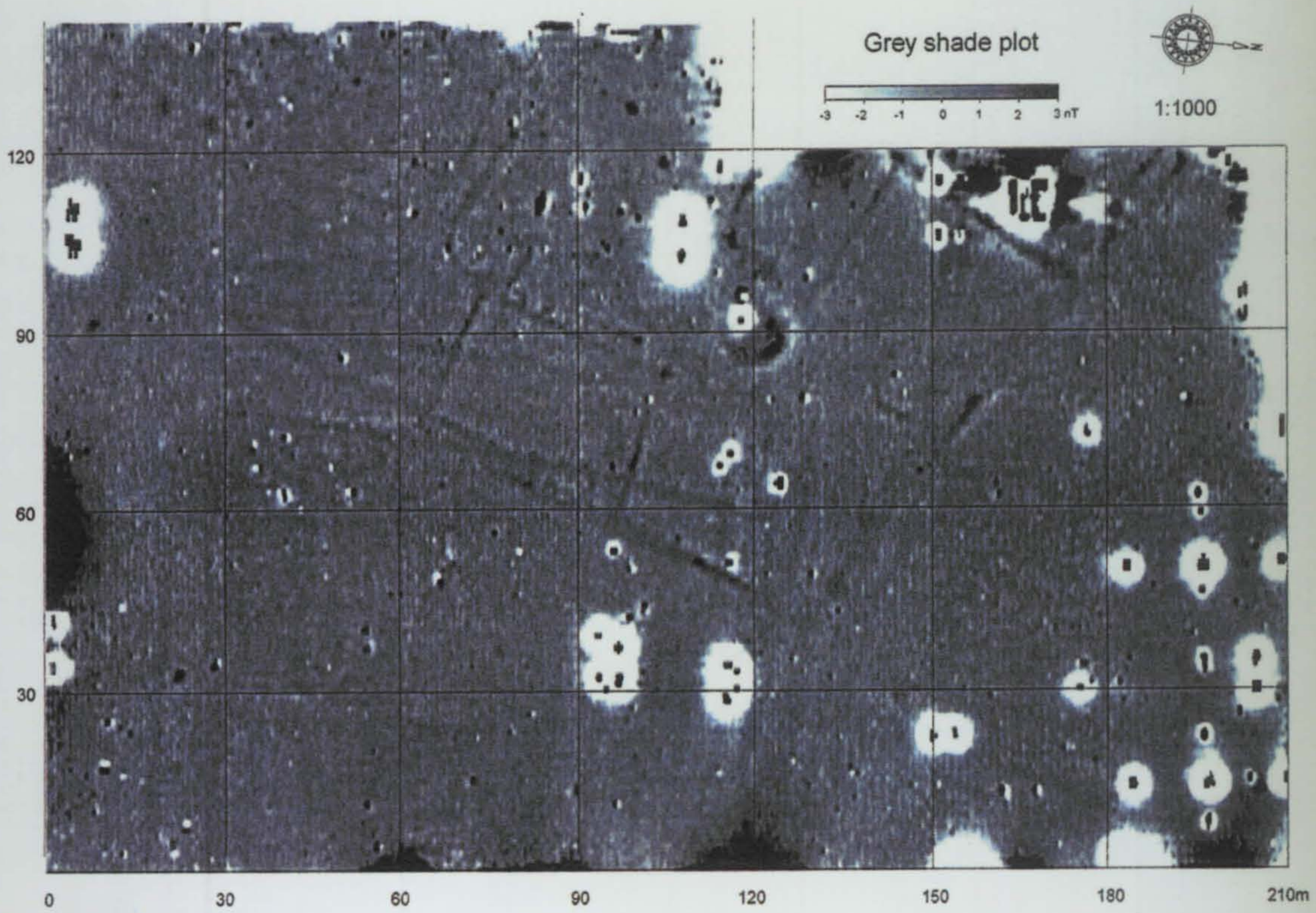
however, there is no doubt that magnetic enhancement of soils by human activity provides valuable archaeological information.

A1.11 As well as locating specific sites, topsoil magnetic susceptibility survey frequently provides information relating to former landuse. Variations in the soils and subsoils, both natural and those enhanced by anthropogenic agencies, when modified by agriculture, give rise to distinctive patterns of topsoil susceptibility. The containment of these spreads by either natural or man-made features (streams, hedgerows, etc.) gives rise to a characteristic chequerboard or strip pattern of varying enhancement, often showing the location of former field systems, which persist even after the physical barriers have been removed. These patterns are often further amplified in fields containing underlying archaeological features within reach of the plough. More subtle landuse boundaries and indications of former cultivation regimes are often suggested by topsoil magnetic susceptibility plots.

A1.12 Where a general spread of magnetically enhanced soils contained within a long-established boundary becomes admixed over a long period by constant ploughing, it can be diffused to such a point that the original source is masked altogether. Magnetically enhanced material may also be moved or masked by natural agencies such as colluviation or alluviation. Generally, it appears that the longer a parcel of land has been under arable cultivation, the greater is the tendency for topsoil susceptibility to increase; at the same time there is increasing homogeneity of the magnetic signal within the soils owing to continuous agricultural mixing of the material. Some patterns of soil enhancement derived from underlying archaeological features are, however, apparently capable of resisting agricultural dispersal for thousands of years (Clark 1990).

Downing College Sports Field, Cambridge

Magnetometer (gradiometer) survey

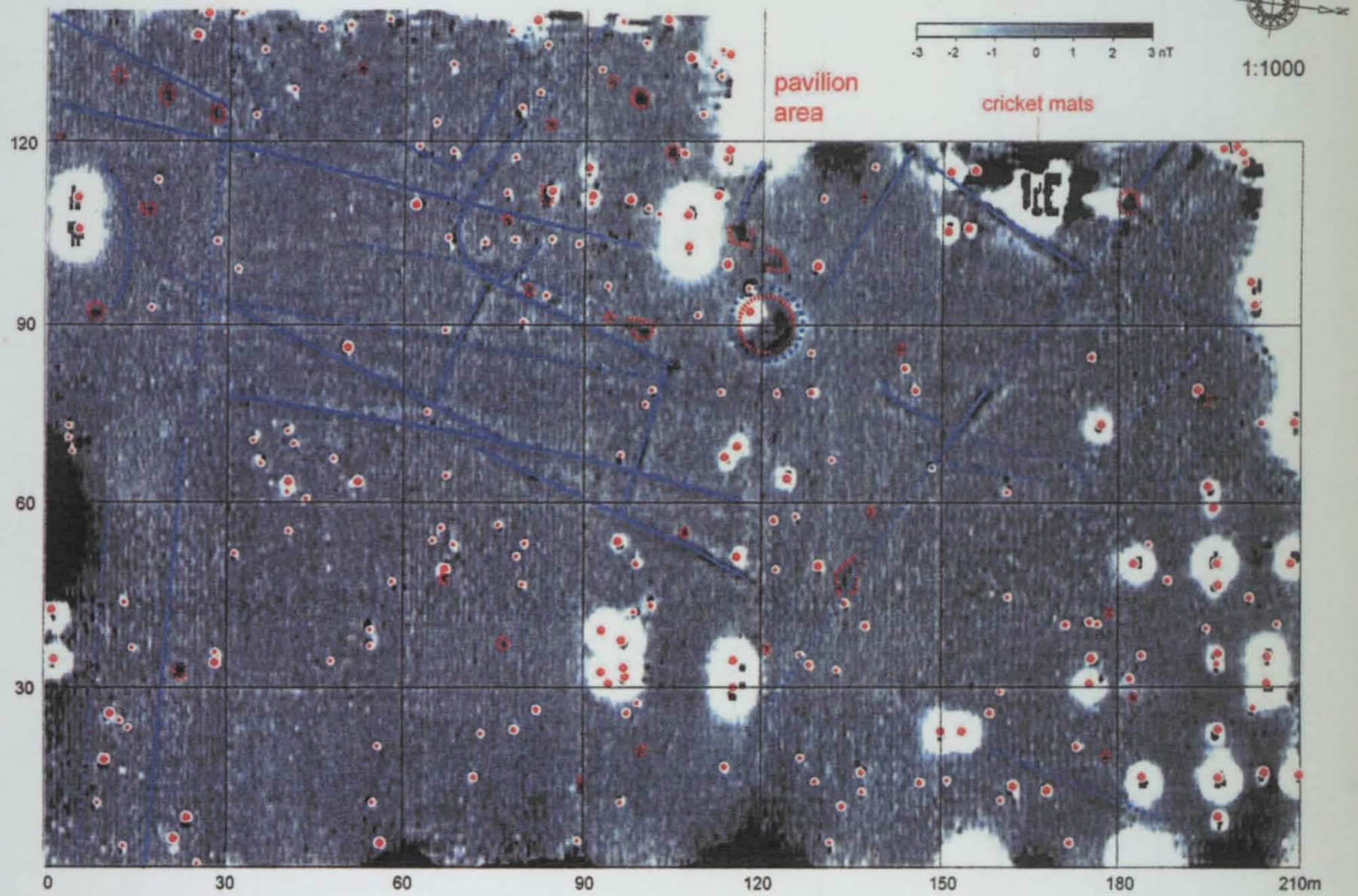


OXFORD ARCHAEOTECHNICS

Fig. 2

Downing College Sports Field, Cambridge

Magnetometer (gradiometer) survey



Interpretation


Linear and curvilinear features


Possible liinear and curvilinear features


Possible pits


Ferrous material

OXFORD ARCHAEOTECHNICS

Fig. 3

FIGURE CAPTIONS

Figure 1.	Location and overview. Scale 1:50,000 and 1:2500. Based upon OS 1:50,000 Landranger Map 154 and 1:2500 Site Plan.
Figure 2.	Magnetometer (gradiometer) survey: grey shade plot. Scale 1:1000.
Figure 3.	Magnetometer (gradiometer) survey: interpretative plot. Scale 1:1000.
Figure 4.	Magnetometer (gradiometer) survey: stacked trace (raw data) plot. Scale 1:1000.
Figure 5.	Total Station re-section data for the re-creation of the gradiometer survey grid. Scale 1:1250.

Downing College Sports Field, Cambridge

Magnetometer (gradiometer) survey

Location and Overview

OXFORD ARCHAEOTECHNICS

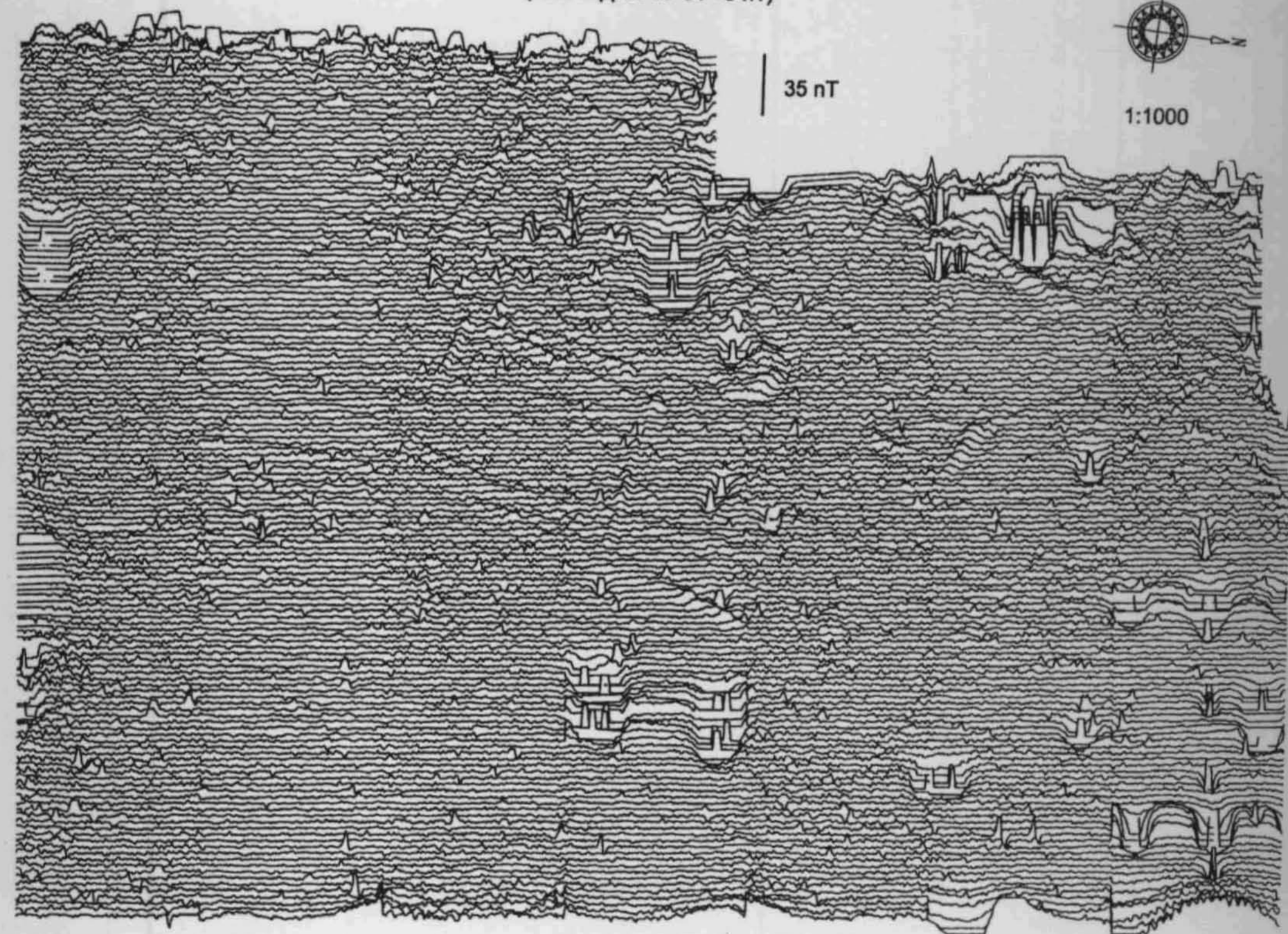
Fig. 1

Downing College Sports Field, Cambridge

Magnetometer (gradiometer) survey

Stacked trace plot (raw data)

(data clipped at -5 / +5 nT)



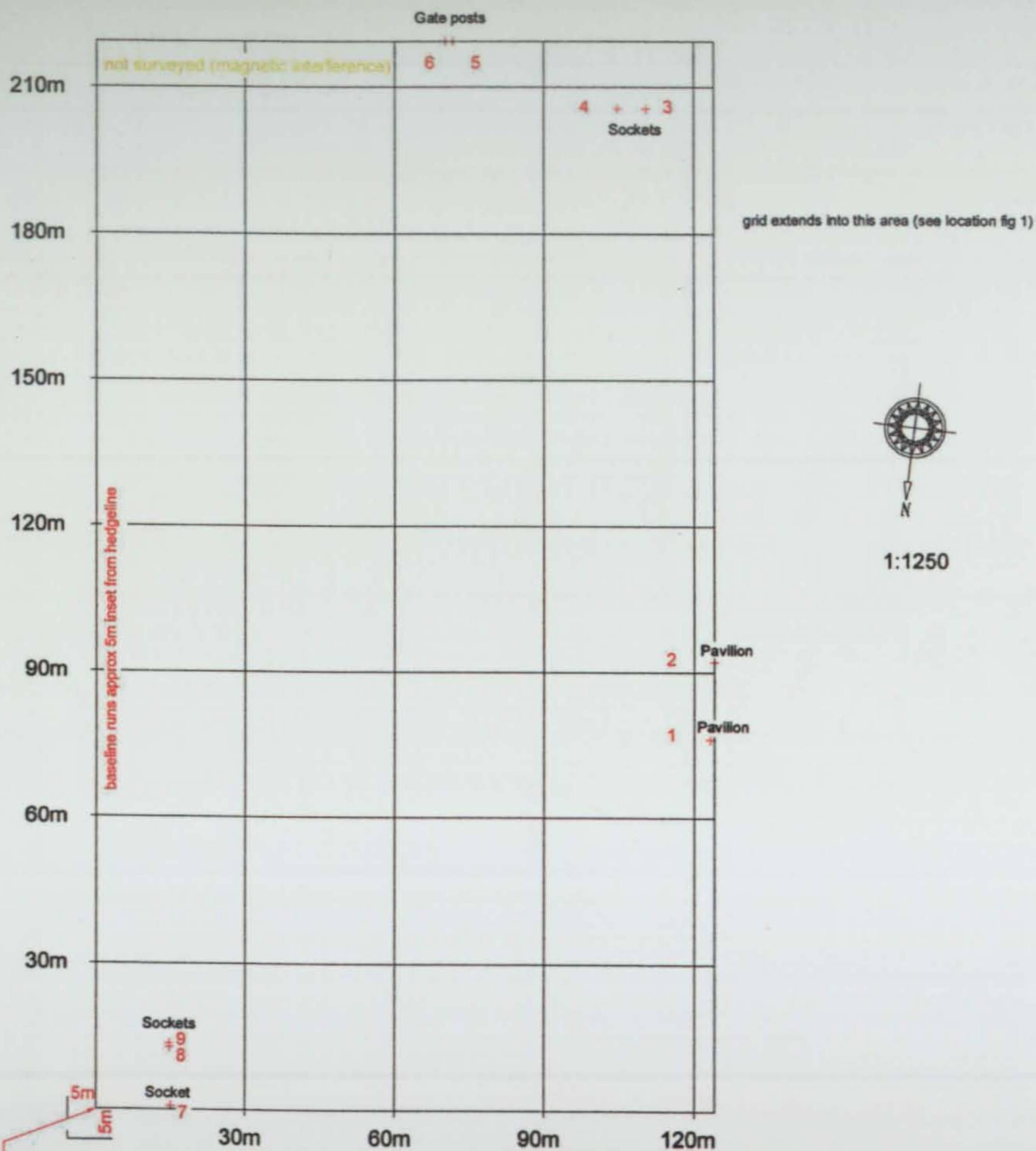
OXFORD ARCHAEOTECHNICS

Fig. 4

Downing College Sports Field, Cambridge

Magnetometer (gradiometer) survey

total station re-section data for gradiometer grid



00 origin is 5m inset from corner of sports field

1	123.21	76.27	Pavilion (concrete corner)
2	123.97	92.18	Pavilion (concrete corner)
3	110.5	205.56	Socket
4	104.78	205.59	Socket
5	71.73	219.32	Gatepost
6	70.14	219.29	Gatepost
7	15.40	0.06	Socket
8	14.89	12.79	Socket
9	14.88	13.55	Socket

OXFORD ARCHAEOTECHNICS

Fig. 5