Jigsaw Cambridgeshire Best Practice Users' Guide

Archaeological Landscape Survey: Principles for Measuring Earthworks

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This paper explains the nature of landscape archaeology. To show that the purposes of survey must be worked out carefully, various examples are described. Three kinds of earthwork survey are distinguished. To illustrate the principal methodological questions, three case studies from Huntingdonshire and Cambridgeshire are described.

Commissioned by Oxford Archaeology East for Jigsaw Cambridgeshire, these notes are based on a workshop in Cambridge in November 2013. References in the text are to either the annotated bibliography or the other references listed. Figures 1 and 2-5 are reproduced with the courteous permission of English Heritage and the Cambridge Antiquarian Society, respectively.

1 Landscape Archaeology

The principle of landscape archaeology survey is detection of sequences among features on the ground. Derived from antiquarianism, it is a distinctively British method that crystallised nearly a century ago. There is a similar tradition in Italy. Neither should be confused with the term 'landscape archaeology' for quite a different concept formulated in the USA in the 1990s.

Landscape archaeology includes most techniques for work in the field except excavation. Owing to their grain of detail, the results are often less conclusive than the proofs of digging but they commonly yield implications for excavation. The principles can be applied under water too.

In 1955, WG Hoskins's *The Making of the English Landscape* provided a broader conceptual context. Since then, it has been difficult to distinguish landscape archaeology from landscape history. Hoskins and then, for landscape archaeology in the strict sense, Christopher Taylor, AE Brown, Trevor Rowley, Mick Aston and now others have encouraged public participation. Taylor (1973: 35) urged that, with reduction in the government's programme of research even as "nationwide destruction of archaeological sites" continued, "training more people in the basic techniques of field survey is … vital".

The following notes concentrate on methods of observation and recording but less on applying techniques. They do not cover principles of inference from evidence in any detail. The emphasis is on plans of sites.

2 Purposes

Archaeological surveys are made for various purposes. They normally represent an intermediate form of investigation. The most elementary is 'desk-top' research among libraries or databases such as Historic Environment Records. The most complicated form of investigation is excavation.

Digging is usually preceded by survey of the site. Digging and some forms of survey are followed by storage of finds. Digs and surveys alike should then be reported. Whether published or not, the reports must be made available for 'desk-top' research.

Compared to excavation, most techniques of landscape archaeology are quick and inexpensive. They range from aerial reconnaissance (now including satellite data) to the approximate recording of features with a Global Positioning System (GPS) and from geophysical sensing to collecting

artefacts from the ground (fieldwalking) or from measuring earthworks simply by pacing to planning at scales of 1:500 or even less. Selection of technique depends on purposes, the quality of results needed, and budget.

Purposes should be worked out explicitly and systematically. In an attempt to document Eighteenth Century engineering, Finney *et al*. (1997) surveyed a small district north of Cambridge. With reference to locations, finds scatters, a map of the time and contemporary newspapers, they argued that the sites formed a single system. The next phase of investigation included excavation. At Waltham Abbey, English Heritage's intensely detailed survey provided a record of technical functions at various scales hand in hand with documentary research (Bowden 1999: 152-4). Yet no survey has to be any more detailed or complicated than what its final purpose demands.

Some projects are for discovery and exploration. Until recently, during dry summers in Britain and northern France, aerial surveys were flown to record the crop marks of buried features. Much of Saudi Arabia was explored over a few winters in the 1970s and '80s in order to provide a preliminary sense of what archaeology there was. In Italy, Iraq and Peru, distributions of sites from successive periods have been recorded and analysed to suggest the development of social organization. Likewise, one of the most striking discoveries about the British Bronze Age, made in the late 20th century through work with maps, on the ground and from the air, was the very extensive system of 'co-axial' fields.

Surveys may be designed to assess the extent and condition of archaeological remains as existing resources. That was the task of the Royal Commission on the Historical Monuments of England (1908-99). Some surveys are designed for managing resources. Such was the work at Waltham Abbey. Cambridgeshire County Council surveyed prehistoric and Medieval earthworks in order to quantify them, determine distributions and assess survival.

Some surveys are designed to provide context for excavations. In its closing stages, the long-running dig of the deserted Medieval village at Wharram Percy surveyed the surrounding parish. The latest investigation of Sutton Hoo included a survey of the local district.

The notes that follow illustrate a pair of fundamental principles. First, all measurements — and, for that matter, nearly all forms of knowledge — are related to controls or reference data. In landscape surveys, the measurements are calibrated against both standards or conventions such as a meter rule or compass north and *ad hoc* base lines and temporary bench marks (TBMs) of altitude. In Britain, the base lines can then be tied to the Ordnance Survey's national grid by means of its maps and the TBMs measured in to the Survey's data points, marked on the larger published maps and on the ground. Secondly, the most basic control is the surveyor himself: if necessary, knowledge of one's own pace may serve to assess the length of a feature. Distances, heights and slopes can be *sensed*. As with any skill, we learn best by practising methods less technologically mediated.

3 Measurements

The two types of survey to be explained here are plans and profiles. **Plans** are maps of features made either by measuring their distances (off-sets) from — depending on the site's size and complexity — one or more base-lines or by using a plane table placed over a known point or points. **Profiles** record slopes as cross-sections of earthworks or other features by use of a levelling instrument, normally related to a bench mark of known altitude or a TBM.

English Heritage distinguishes three 'levels' of survey (Ainsworth *et al*. 2007: 21-4):

- **Level One** comprises an approximately measured and annotated plan supplemented by a map — probably, in Britain, at the Ordnance Survey's 1:10000 scale.
- **Level Two** comprises a fully measured survey accompanied by the same kind of contextual information and an analysis of the forms of features and any sequences among them. Level Two may include mapping of features at 1:1250 or 1:2500.
- **Level Three** is more detailed. Where One and Two are only descriptive, Three entails comprehensive exploration by various methods as well as interpretive research of all sources in order to explain a site fully. Level Three commonly comprises measurements at various scales. Such was the survey at Waltham Abbey.

Bowden (1999: 88-9) illustrates the difference between Levels One and Two by contrasting successive plans by the Royal Commission of the mill mound above Wimpole Hall. The first showed the central depression and encircling ditch, and marked an approximate orientation. When, later, the earthwork was surveyed more carefully, details of form came out differently. It was shown that the mound lies over ridge & furrow (the characteristic corduroy-like earthworks of Medieval or earlier Modern ploughing); and the original estimate of orientation was corrected by some 45°.

Level Three does not necessarily produce results more convincing than work at Level Two. By reference to a Medieval record, the Royal Commission on Historical Monuments (1972: 41-2) interpreted the Castle at Burwell as a fort of King Stephen's in his campaign against Geoffrey de Mandeville. Consider both what the Commission measured and what it did not (**Figure 1**).

It observed the castle's moat and what appears to be a ramp from there to spoil heaps. The heaps were shown to have infringed adjacent house plots as though the plots had been requisitioned (plain too in an aerial photograph that the Commission published with its report). Taking account of distances and lines of sight, the Commission's plan must have been compiled by measuring from at least four base lines. Profiles across the earthworks were measured, showing the width and depth of the moat, the size of the island, and the moat's upcast piled not only onto the island but also outside the west and south ditches.

Why, within miles of an active enemy, was exterior up-cast piled as high as the island that the moat should have defended? The Commission argued that, de Mandeville having been killed earlier than expected, the site was abandoned unfinished. Yet its position below the adjacent churchyard does not look defensive. Another photograph shows as much (Royal Commission 1972: Plate 3, lower photograph). Had the west-east profile (**Figure 1**) been extended up the slope to the yard, the Commission's interpretation would have looked dubious on paper, let alone

standing on the ground. The castle's size and form and its position below a church are like that of a civilian castle in north Essex. Level Two surveys of the two sites together and their local settings could help to dispose of the military interpretation for Burwell.

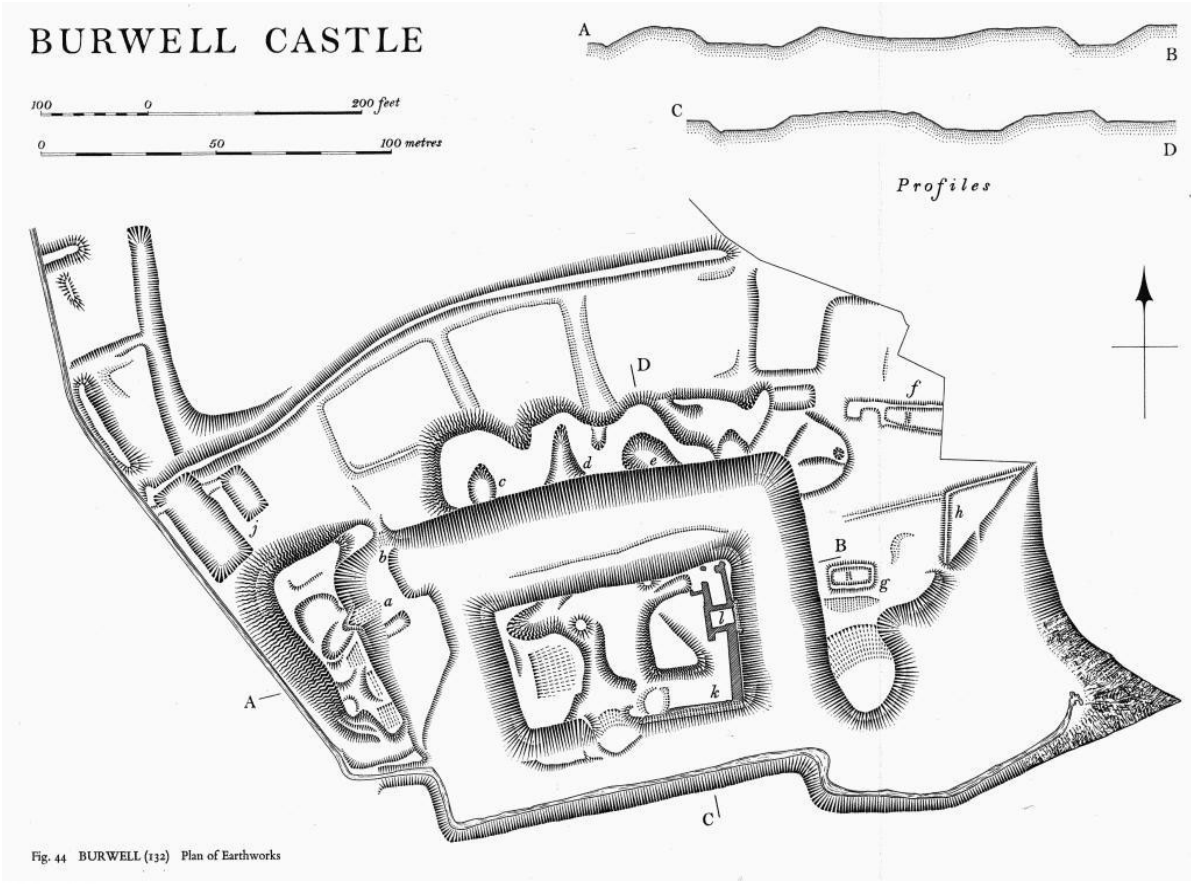

Figure 1: Plan of Burwell Castle, showing profiles in plan and, above (right), section (Royal Commission on Historical Monuments 1972: 40)

For the Commission, the problem was that while the principal task was to record the earthworks as a resource, interpretation of the remains as a record of the past probably exceeded the project's scope. To be sure, no alternative site for King Stephen's castle has been found; but then there is no report of any search.

Having settled on purpose and methods, the surveyor should consider four main technical questions or sets of questions.

- How are the site's boundaries to be defined? How is its setting to be defined and described?
- Where should the base line run or how much of the site can be covered from it? Are secondary lines needed?
- At what scale or scales should the site be measured?
- Are levels or profiles needed?

The following case studies of Medieval earthworks are intended to illustrate these questions. In

the interest of economy and clarity, the emphasis is on Level Two. The bibliography offers recommendations for further study.

4 Case Studies

In the 1970s and '80s, Christopher Taylor and Tony Brown ran courses on archaeological survey for adult students, using Roman, Medieval and post-Medieval earthworks. The work was partly intended to compensate for government cuts in survey and some of the sites studied were nominated, for various reasons, by the Cambridgeshire County Archaeologist. Results were published by the *Cambridge Antiquarian Society*.

Winwick

At Winwick (near Sawtry), a pattern of about a dozen square or rectangular enclosures was imposed on former plough land (Brown & Taylor 1987: 79-80; **Figure 2**). The site is defined by the village and a lane to the west, a ditch on the east, and lanes to north and south. The westernmost enclosure is a moat of a size and form typical of *c*. 1175-1325.

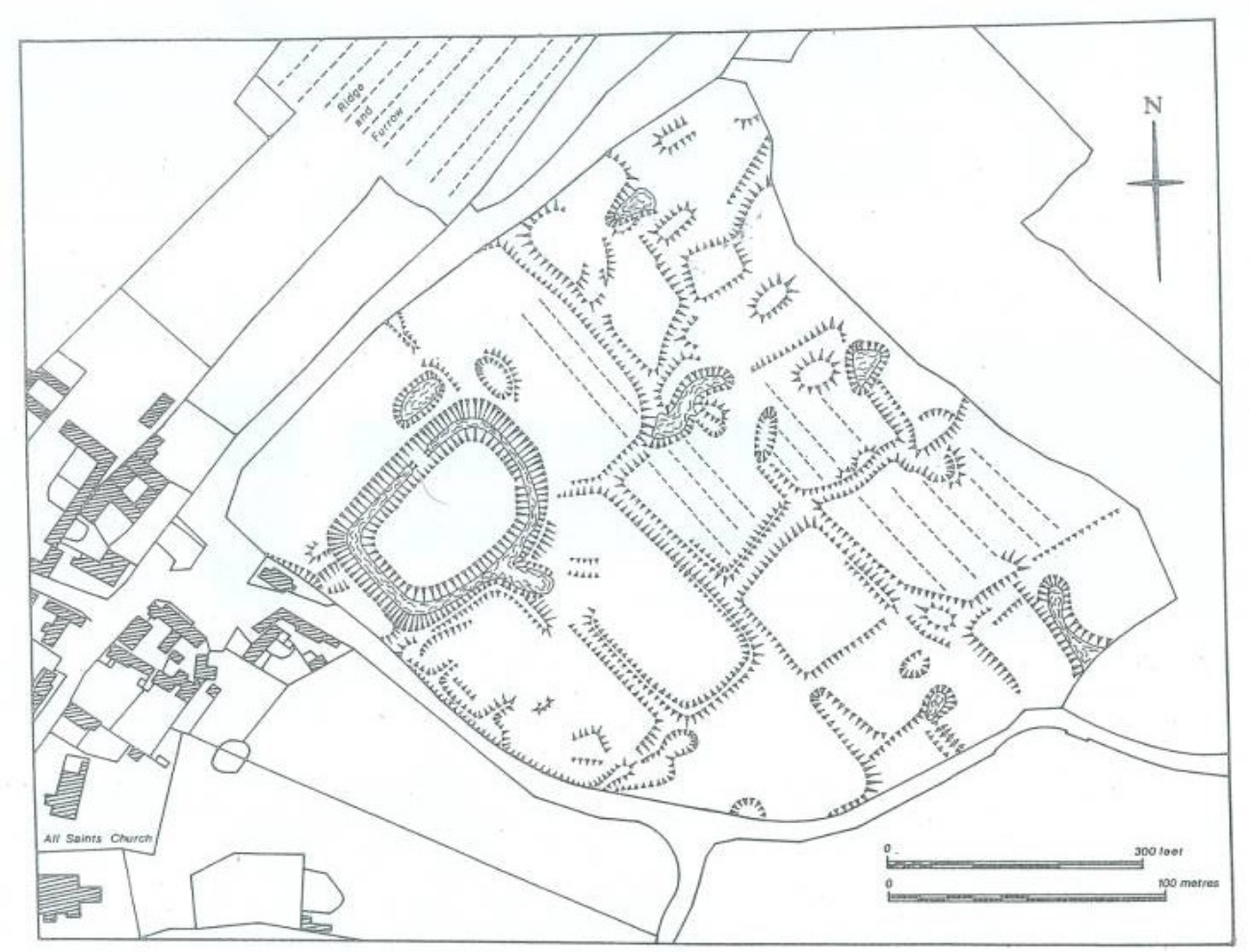

Figure 2: Plan of earthworks at Winwick (Brown & Taylor 1987: 79)

The survey marks all but the moat and one of the enclosures as simple features. The moat was planned carefully. The survey suggests that it was crossed by a causeway on the north-west side.

The northern corner of the site is less regular than the rest. It was planned in enough detail to suggest that it has various small features but the report indicates that there was not time to study them and the plan was published deliberately to beg the question about them.

Parts of the north half of the site are scored by ridge & furrow. That was surveyed cursorily but the record does show that the ridges or furrows vary slightly in width and that, although cut by ditches between four of the enclosures, they are directly aligned in two pairs of them; all of the ridge & furrow conforms to a single pattern. The implication is that the enclosures interrupted the ridge & furrow; the latter was earlier.

The site is more or less flat. To show that the enclosures cut the ridge & furrow, it was evidently decided that it is enough to plan their ditches without measuring the ditches' depth. Brown & Taylor (1987: 80) report that they are about 50cm. deep. The moat's ditches, they state, are up to 2 metres deep (Brown & Taylor 1987: 79). That was not surveyed but the hachures and the draughtsman's interruption to the convention for water suggest that the causeway is shallower than the ditches. All four of the moat's ditches appear to infringe neighbouring enclosures: the moat may have been cut later than the other ditches or perhaps upkeep of the moat's ditches widened them.

The site is about 300 metres in diameter. Both the off-set and plane table techniques of survey are prone to inaccuracy at distances over 50 metres, so simple survey of these earthworks must have required at least three base lines or plane table stations (each permitting up to 50 metres of observation in either direction). They were probably planned at the scale of 1:1250. Further study of the uneven ground in the northern enclosure would entail survey at larger scale, up to 1:500; and perhaps some of the features should be measured by levelling too.

At present, lines of sight are impeded by trees along the moat's ditches. That could entail an additional base line or survey station.

Coppingford

Coppingford (also near Sawtry) is the site of a Medieval village now only occupied by a farm (**Figure 3**). Hemmed in by the remains of ridge & furrow (marked on the plan as broken lines), its earthworks are strung along a wide hollow-way. Brown & Taylor (1978: 61-3) suggest that the hollow-way was part of a main road and Coppingford a 'street village'.

The best preserved earthworks are a double moat between the farmstead and a small platform said to be the site of the village church. Other than the ridge & furrow, most of the earthworks lie along the north side of the hollow-way and to the east of the moat. They are interpreted as the remains of tofts & crofts, the enclosures or platforms for small households, allowing for both dwelling (croft) and yards. The plan marks other features recorded on a map of 1716. The platforms and hollows immediately west of the standing buildings correspond to buildings marked on that map.

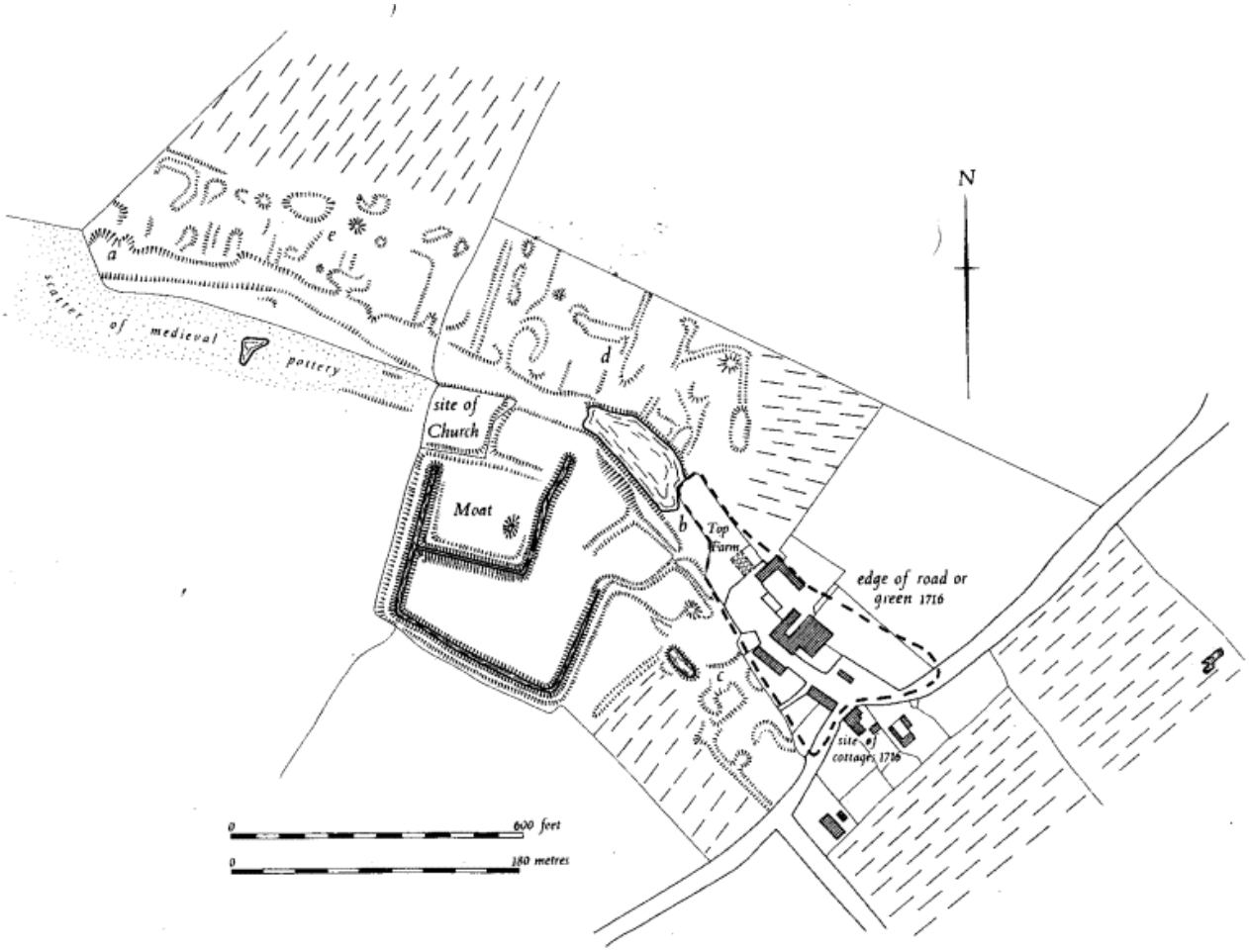

Figure 3: Plan of earthworks at Coppingford (Brown & Taylor 1978: 60)

There were probably also tofts immediately west of the moat and putative church but that ground must have been ploughed almost flat to reveal the Medieval potsherds collected by field walking. The sherds are probably debris from houses or yards once standing there. That, at the west end of the site, the sherds were found across the line of the former road as well as along that of the putative tofts probably shows the plough's disturbance. The ground north of the farmstead has probably been ploughed flat as well. Brown & Taylor show that almost a hectare of ridge & furrow remained there but most of that is now covered by sheds (does any trace of the ridge & furrow remain, as at Winwick?).

The site is more or less flat and the earthworks are shallow except for the moat's ditches. There was no obvious call for measuring levels. Except (today) around the moat, where there are trees, lines of sight were probably easy. However, the site is more than 500 meters long, so that it was impossible to produce a single plan of the village at small scale. Both that length and the trees probably entailed two base lines, end to end but at a slight angle for following the hollow-way's curve.

Evidently, the aim of the plan was to provide a view of the site as a whole. That must have been

achieved by surveying at large scale, probably 1:2500. That, in turn, explains why the earthworks north of the hollow-way are marked so indistinctly. The survey has produced an impression of the former village.

As at Winwick, were further study of the smaller features north of the hollow-way needed, survey at smaller scale would be required, perhaps at 1:500 if they are well preserved; and, again, levelling some of the features to show their profiles at smaller scale could help to explain what they were for. The moat was not necessarily a double enclosure from the start: its outer enclosure may have been added in the Modern period; but Brown & Taylor (1978: 61) consider that that could not be ascertained by survey alone.

Castle Camps

Originally Norman, Castle Camps Castle comprises a motte (the platform for a keep, typically Norman), an inner bailey and an outer bailey (**Figure 4**; Taylor 1973: 38-43; Taylor 1974: 65). Unusually broad, the motte may have been reduced in height. In the outer bailey stands the parish church, built or rebuilt in the 1400s (with some evidence for origins in the 1200s). In front of the site spread remains of a Medieval village, both potsherds in arable fields and, in pasture, the disturbed earthworks of a hollow-way, one or two possible tofts and a low bank. Neither the north entries to the outer bailey nor the north-west causeway onto the motte are necessarily original (to judge by the latter's asymmetry, it has been altered).

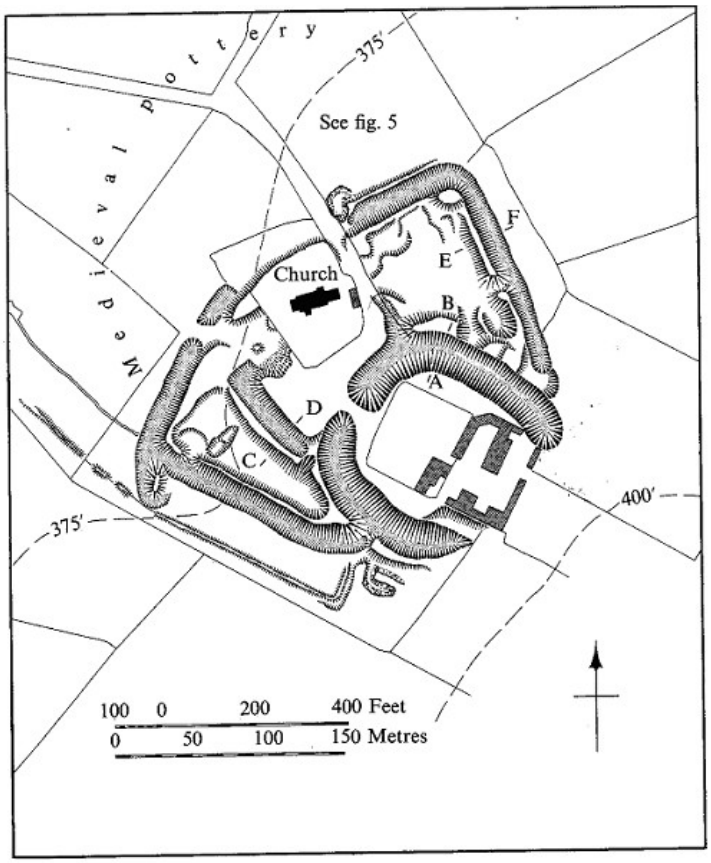

Figure 4: Plan of Castle Camps Castle (Taylor 1973: 39). The contours are marked in feet.

The castle overlooks a gentle downhill slope. The castle itself occupies ground falling about 8 metres (see **Figure 4**'s contours). The motte is surrounded by a substantial ditch. The motte has been largely levelled and is now occupied by a residential complex. The rear arc of the ditch has been filled and the space partly occupied by the buildings.

The inner bailey is defined by a ditch. The survey of the ditch's awkward western junction with the motte's ditch implies that the bailey was added after the motte was completed.

The outer bailey too is ditched; and, again, the junctions of its termini with the motte's ditch imply that this bailey was added later. There is no direct relationship between the two bailey ditches but the plan suggests that the churchyard and the east end of church itself infringe one stretch of the inner bailey's ditch. The inner bailey has been levelled; and, apart from the churchyard, there are substantial but irregular disturbances in the outer bailey.

The castle earthworks are about 250 metres across. The forms and relief of the earthworks, the standing buildings and the slope alike would make it comparatively difficult to survey the site with the off-set technique. Plane table survey would require several stations, not only on account of the distances but also because complementary lines of sight would be needed for the sake of obtaining consistent measurements of the two bailey ditches and — unless it were decided to ignore it — for measuring the outer bailey's irregular relief. Many trees by the ditches would interfere with lines of sight. Base lines or plane table stations would have been helpful outside the earthworks as well as within.

C.C.Taylor and his students probably surveyed the site at a scale of 1:1250. That was quite adequate for showing the telling junctions of the bailey ditches with the motte's.

Three cross-sections or profiles of the ditches were measured for the same reason that the profiles at Burwell were surveyed: both sites were either military or constructed in a military idiom. They were evidently selected to represent the ditches' sizes and forms (**Figure 5**). The profiles at Castle Camps could have been obtained with simple levelling equipment but the combined dimensions of ditches and banks (greater than Burwell Castle's) would have demanded many positions for the levelling instrument, so that would have been transferred from one to the next with foresights and backsights. The profiles were evidently drawn at 1:500. This site probably does not need a TBM since there is a bench mark on the church's north-west buttress.

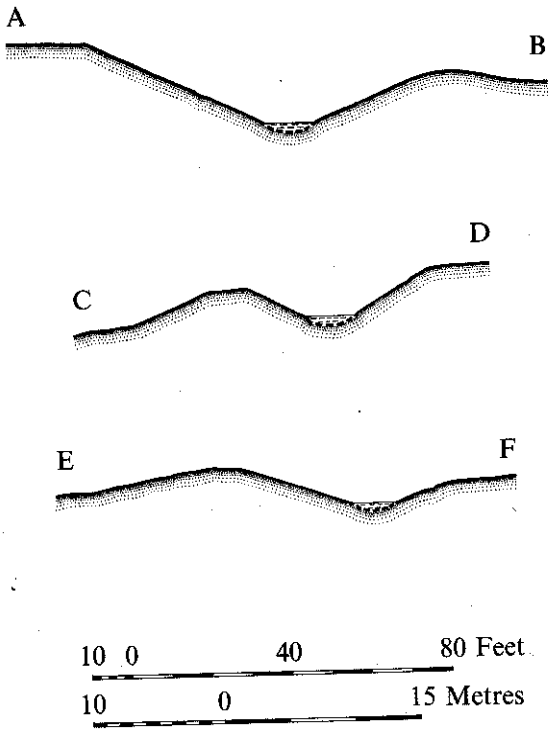

Figure 5: Profiles at Castle Camps Castle (Taylor 1973: 40). For letters A-F, see Fig. 4

Annotated Bibliography

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