Geophysics at Castle Cary

The Castle Site

Authors
John Oswin
Bath and Camerton Archaeological Society
and
Matthew Charlton

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Abstract

A geophysical survey was undertaken by the Bath and Camerton Archaeological Society during March and April 2011, which encompassed the castle site at Castle Cary, Somerset. This report concentrates on the castle site. Others will describe work at Manor Farm and Dimmer. The site was surveyed using fluxgate gradiometry and twin-probe resistance. Resistivity profiling and ground-penetrating radar also augmented the survey. The inner and outer baileys were surveyed on separate grids, but these could be related to each other to a good approximation. Areas of Manor Farm which came within the scheduled area, were also on separate grids. Twin-probe resistance was the more successful method, and this revealed massive masonry structures within the inner bailey. The outer bailey appeared to contain a rectangular structure contained within a curtain wall which did not correspond to the standing earthen ramparts.

Acknowledgements

Sincere thanks go to Mr John Churchouse of Manor Farm for all his support and in providing permission and access to his land.

Special thanks go to Somerset County Archaeologist Bob Croft and Rob Iles of English Heritage for their continued support as well as the granting of a Section 42 license to undertake the geophysical survey.

Thanks also go to the Bath and Camerton Archaeological Society volunteers led by Dr John Oswin and Owen Dicker, as well as those members of the Castle Cary Museum and the local community who took part in the survey over the three day period.

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1 Introductory

1.1 Location and topography

Location

Castle Cary is a small town in south-east Somerset, lying within the Jurassic belt of geology, approximately at the junction of the upper lias and the inferior and upper oolites. Building stone is plentiful, and is orange to yellow in colour. This is the source of the River Cary, which now runs to the Bristol Channel via King's Sedgemoor Drain and the River Parrett, but prior to 1793 petered out within Sedgemoor. The town is centred at ST640322. A location map is shown in figure 1.1.

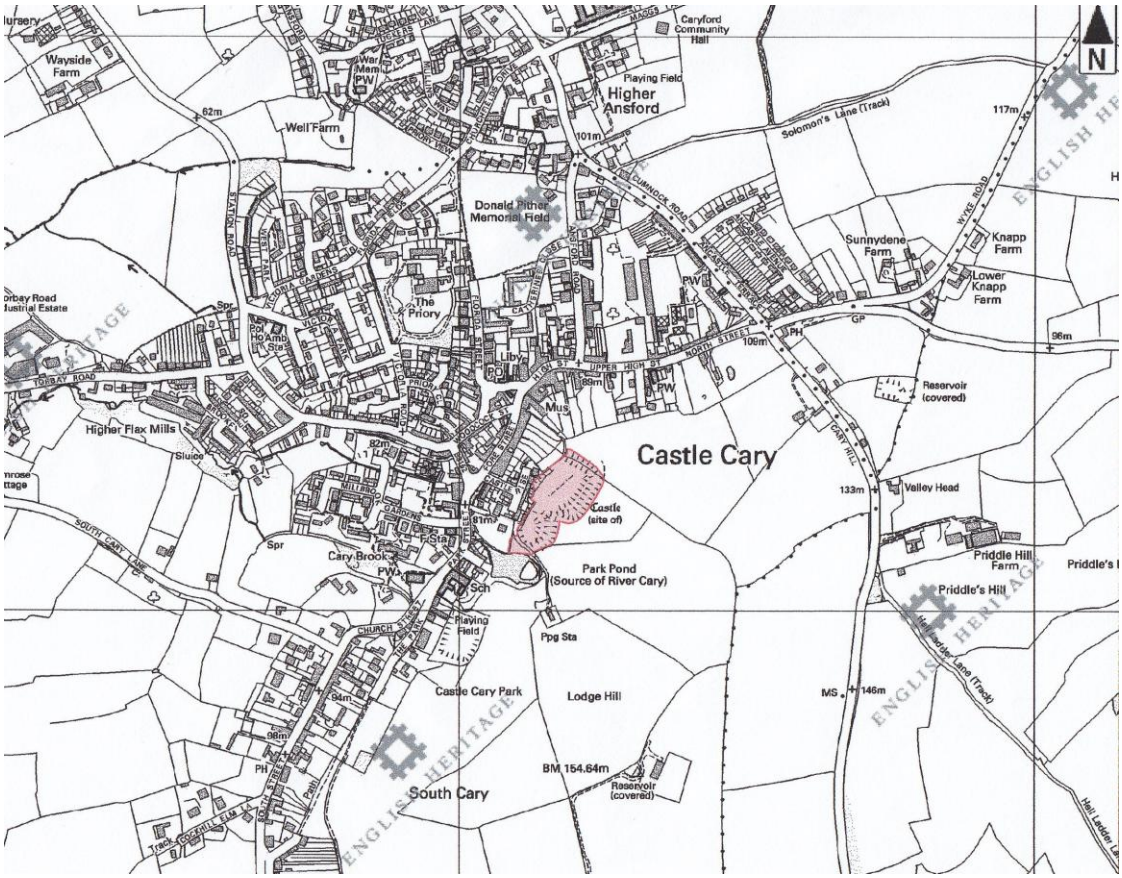

Figure 1.1 showing the location of the town centred at ST640322

Topography

The site occupies a natural spur formed by two conjoining irregularly shaped mounds extending from the north east to the south west. The ground gradually rises to the north and, more steeply, to the east, and falls away to the south. The outer bailey is situated on the larger mound which is located on the north side of the inner bailey.

The outer bailey is defined on the north side by a low broad bank with a shallow external ditch. The east side is enclosed by a central ditch flanked on both sides by

parallel banks between 2.5m and 7m high above the base of the ditch, with an overall width of approximately 42m. The banks form a curve at the south east corner of the outer bailey at its junction with the north east corner of the inner bailey.

The east side of the inner bailey is enclosed by a ditch with an inner bank approximately 12m wide and an outer bank approximately 5m wide. The south side of the inner bailey drops steeply down to Park Pond, a wide marshy area which is fed by springs and is the source of the River Cary.

Modern development now defines the western side of the castle site and an evaluation in 1998, prior to its construction, revealed a continuous ditch of between 10m and 12m wide, which enclosed the inner and outer baileys.

1.2 Background

The site is a Medieval Motte and Bailey castle occupying a natural spur overlooking the source of the River Cary. It has been suggest that the first phase of the castle was an earlier ringwork which was built not long after the Norman Conquest (Leach & Ellis 2010). The positioning of the castle may also have tied into an existing Romano-British or Saxon site, as a common location for the building of these castles was to utilise earlier phases of defence (Creighton and Higham 2003).

Excavations by Leach and Ellis on Manor farm between 1999-2001 discovered a primary phase of Roman-British activity and the discovery of a lime-burning kiln, 150 sherds of Romano-British pottery, as well as a finely modelled bronze figurine of a *lar* which may have come from a nearby villa site (Leach 2010).

It was thought that after the second siege in 1153, the castle was demolished as a result of the destruction on baronial strongholds following the uprising, and some of the stone used in the construction of the new manorial centre immediately to the west, overlaying the former castle ditch. The new practicable position of the manorial site may also have been more accessible and easily integrated with the new urban development (Prior 2004).

The foundations of the Norman keep were excavated in the 1890's, and it was suggested that the lower mound had been built up after the construction of the Keep in the late 11th or early 12th century, and remained in use until around 1153. The castle was besieged by King Stephen in 1138, and again in 1153.

The earliest visible remains at Castle Cary are those of the Castle and its constituent earthworks (SMR 53640), sited to the east of the town. Excavations in the area of Manor Farm (SMR 11632, 11639, 11640) located further baileys of the castle suggesting that the inner and outer baileys were of one phase. A section of the ditches showed evidence of what appeared to have been deliberate backfilling, possibly as early as the 12th century. One of these ditches was later re-dug to provide one side of a moat around the later Manor House (SMR 11641). It was thought that after the

second siege in 1153, the castle was possibly demolished as a result of the destruction of baronial strongholds following the uprising, and some of the stone was used in the construction of the new manorial centre immediately to the west, overlaying the former castle ditch.

In March 2011 a license was obtained from English Heritage to undertake a geophysical survey on the scheduled monument (no. 33722) at Castle Cary in South Somerset (see figure 1.2). The survey was carried out under licence from English Heritage (case no. SL00001078) and with permission from the local landowner, Mr John Churchouse.

The survey was carried out on behalf of Castle Cary museum by the Bath & Camerton Archaeological Society under the nominated representatives Dr John Oswin and Matthew Charlton and took place over a three day period with participation from Castle Cary museum, as well as members of the local community.

The geophysical survey formed part of a wider project concerned with improving interpretation of historic sites in and around Castle Cary.

1.3 Dates of Survey

The survey was conducted in two sessions. The first was three days, Monday to Wednesday 28th to 30th March 2011.

The second session was on Monday and Tuesday, 11th and 12th of April.

1.4 Personnel

The project was organised by Matthew Charlton of Enthuseit Ltd on behalf of Castle Cary Museum.

The Geophysical survey was undertaken by BACAS volunteers led by John Oswin and Owen Dicker. Assistance was given by members of the Castle Cary Museum including, Anne Brittain (Chairperson), Annette Bedford (Secretary), Anne Webster (Treasurer) and Paul Clothier (Collections).

Members of the local community also contributed towards the survey.

Graphics were kindly produced by BACAS member Keith Turner.

1.5 Scope of this report

This report concentrates on survey work within the scheduled area of the castle site. Details from the survey at Manor Farm within the scheduled area will be included,

and any information from the unscheduled area will be mentioned if it is relevant to understanding the site.

The education activities planned within the survey will not be included in this document. This document will not report on work at Manor Farm beyond the scheduled area or on work at Dimmer. Those surveys will be covered in separate documents.

It is hoped that the involvement of the local museum, school and members of the community that this project will help to increase interpretation of the castle site and widen its interpretation as part of the Strategic Themes of the South West Archaeological Research Framework 2011.

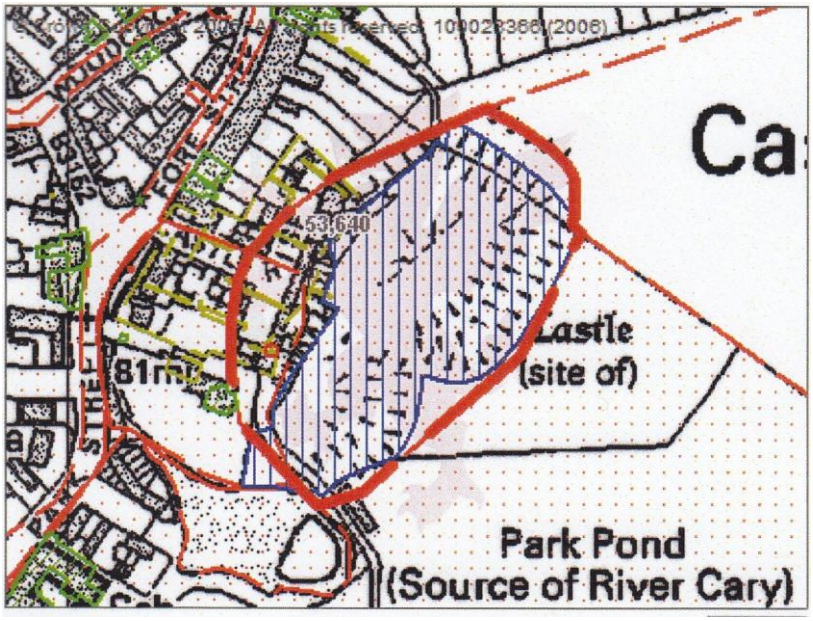

Figure 1.2 Showing the scheduled area

2 Equipment used

2.1 Grids

The areas to be surveyed were divided into 20 m squares. The inner and outer bailey sites were on separate grids, offset by approximately 5 m (grid) north-south and also a similar amount east-west. Grid north was at -95 ° to magnetic north, such that the east-west grid line followed the direction of the paling fence along the edge of the monument.

Separate grids were needed for Manor Farm, inner and outer baileys. The very restricted space of the inner bailey and the steepness of the earthen ramparts meant that its grid arrangement had to make best use of the relatively flat central space, while in the outer bailey, it was easier to take a fence line for a starting point so that the grid could easily be reinstated later if need be. The garden of Manor Farm was not directly accessible from the castle site and was much lower, so it was easier to start a grid arrangement which followed the garden layout.

In common with Bath and Camerton Archaeological Society (bacas) normal practice, each grid square was started at the (grid) south-west corner, heading north on the first traverse. Traverses were 1 m apart, starting 1 m in from grid west, finishing on the eastern line of the square. Traverses were started one mark up from the grid south baseline, finishing on the grid north baseline. This way, grid squares can be meshed together without any overlap or gap. One grid in the twin-probe resistance survey of the outer bailey was started at the north-west because of a misunderstanding. However, the processing software could cope with that.

2.2 Magnetometry

The magnetometer used was a Bartington 601-2 twin fluxgate gradiometer. This has two separated detectors 1m apart, so allows two traverses to be done at once. It is illustrated in figure 2.1. It was set to take readings at 4 per metre at a pace of 1.0 m/s on lines 1 m apart. Top and bottom baselines had markers (flags and pegs respectively) set as aiming points for the operator. As with other sensitive magnetic detectors, the operator has to be magnetically clean, so the instrument is not suitable for general public use.

The small portion of the scheduled area in Manor Farm garden proved to have such high levels of iron interference that magnetic survey here was impossible.

Figure 2.1 Bartington 601-2 twin fluxgate gradiometer.

2.3 Twin probe resistance

Two twin-probe resistance meters were used, a TR/CIA and a Geoscan RM15. These are of similar appearance, although there are some differences in logging the data. A twin-probe resistance meter is shown in figure 2.2. When used simultaneously, the instruments were kept a minimum of 60 m apart to avoid any risk of cross-talk. Both devices were set to take 2 readings per metre along traverses 1 m apart and triggered by making good electrical contact with the ground as they were moved between readings. They were moved along guide ropes with ½ metre marks sown into them, and the guide ropes were moved in turn along baselines with metre markings.

Figure 2.2 twin-probe resistance meter

2.4 Resistivity profiling

The TR/CIA resistance meter has attachments which allow it to take readings in sequence along a line of 30 probes, so that high resistance objects such as masonry can be detected at different depths below the surface, and this can produce a 'section' through the ground, or 'worm's eye view' electronically. The set-up is illustrated in figure 2.3.

All profiles were done with 1 m probe spacing, giving a nominal section length of 29 m and depth information to 3 m.

Figure 2.3 The TR/CIA resistance meter

2.5 Ground-penetrating radar

The radar is a MALA X3M, with 250 MHz and 500 MHz antennae. Only the 250 MHz antenna was used at Castle Cary. The radar is illustrated in figure 2.4. It is pulled like a sled, while the wheel at the rear measures distance along any traverse and provides this information to the processor to provide real-time display of signal vs. depth. A set of 4 traverses 1 m apart were conducted over a length of 25 m on the concrete driveway between the inner bailey and Manor Farm. Wave speed was not measured, but a figure of 100 mm/ns was assumed through the concrete.

2.6 Software

Magnetometer and twin-probe resistance data were processed using INSITE. This may be regarded generally as obsolete, but bacas prefers it for its very versatile grid mapping function. Data from the resistance meters were downloaded via bacas proprietary software and imported into INSITE. Data from the Bartington were downloaded by Bartington proprietary software and processed by a bacas proprietary de-stripe software before being imported into INSITE.

Data from profiling was downloaded by TR proprietary software and converted for processing in RES2DINV freeware.

Radar data were processed using REFLEXW software.

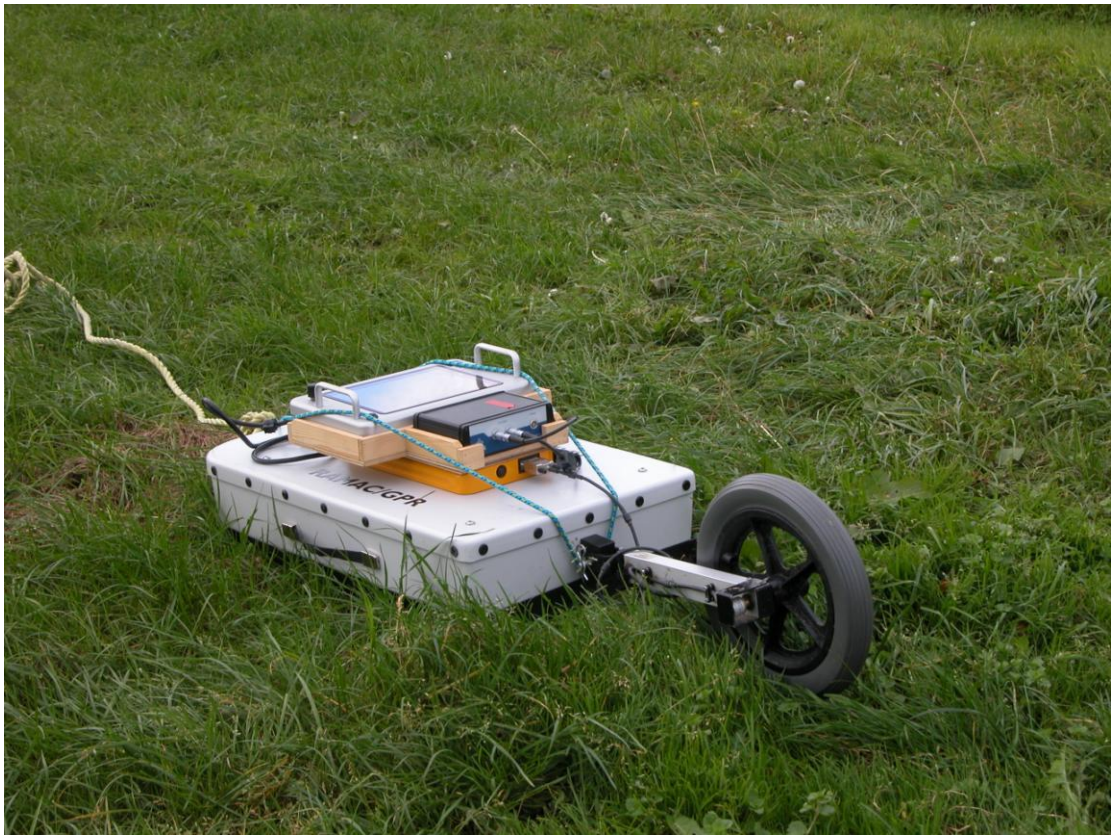

Figure 2.4 Ground-penetrating radar

3 Survey results

3.1 Magnetometer

Survey in the inner bailey was constrained by the very steep slopes, so only one incomplete grid was done. There was a further problem that a tree in the middle of the grid had a wire fence around it, so there was also a blank in the centre. The signal showed areas of high reading but these showed no useful pattern.

The rampart between inner and outer baileys has been disturbed by the insertion of a large iron tank, and this caused magnetic disturbance over some distance. There was also a fenced off area with metal wire, and the paling fence at (grid) north of the site contained iron which restricted the survey area. At the top end of the inner bailey, the hedge had a wire fence and there was an iron gate which just intruded magnetically as the grids stopped some 5 m short of the hedge. However, gridding was extended through the gate into the field beyond and a number of grids were surveyed there, with a gap left to allow for any iron interference. The magnetometer could not be used up the steeper slopes of the outer bailey rampart, but the survey continued a short way up, to a height of about 1 m over inner bailey.

The survey of inner and outer bailey is shown in figure 3.1, with results overlaid on a map. Strong negative signals were detected towards grid north, but these provided no

detail of archaeology. There appeared to be a lot of iron interference, but a number of the signals in the outer bailey may represent pits or post holes.

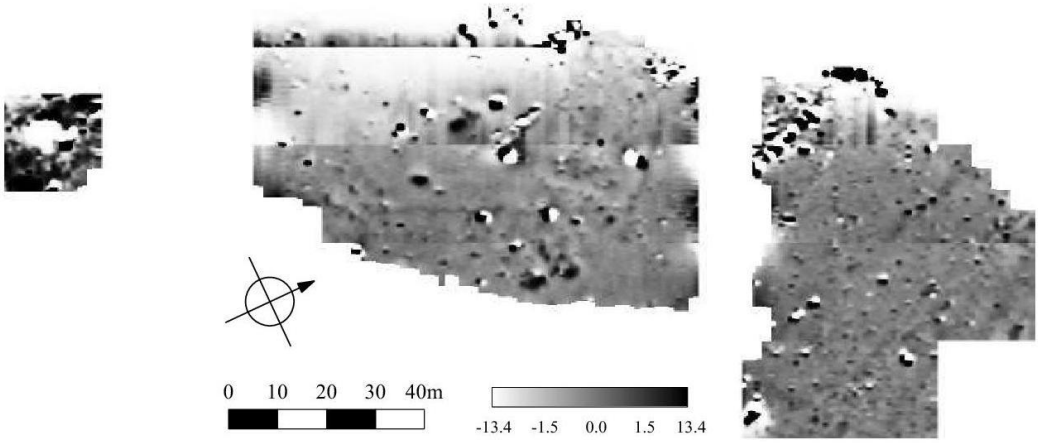

Figure 3.1 Magnetometer results - survey of the inner and outer bailey

3.2 Twin-probe resistance

A full grid was surveyed within the inner bailey, and partial grids around it were also surveyed. The outer bailey was surveyed on a different grid. No survey was carried out beyond the gate at the top end. All full grids were surveyed. Partial grids were surveyed at grid south, continuing as far up the slope of the rampart as was safe. The partial grids at grid north were not surveyed as time was not available.

The results are shown in figure 3.2. Note that the placing of grids in the inner and outer baileys is not exact, but is within about 1 m. The inner bailey shows a massive foundation, not quite square, approximately 20 m across. There are outer projections which could be buttresses. This has been truncated at the top of the grids, where our survey was stopped by the paling fence. Given that beyond the fence the ground falls precipitately so 5 m into gardens, it is surprising that such massive stonework has not been observed, even casually, either during erection of the earlier farm buildings or during the forming of the new gardens.

A second strong feature starts within the building and heads grid west. This is now the steep slope down to the driveway at manor farm. This is most likely some form of metalled trackway, but could be part of a second building.

In the outer bailey, there is some indication of stonework under the ramparts in the (grid) south-east, but this was the only part of the rampart surveyed. This may be laid masonry or just dumped stone. The principal feature appears to be a curtain wall, some 3 – 5 m thick at an angle to the grids. There is a possible entrance in it midway along the grid north side. It is possible that there is a fourth side to it, which may be showing on the edge of the inner bailey plot. Within it is at least one, possibly two structures. The structure to grid west is somewhat amorphous and may possibly be

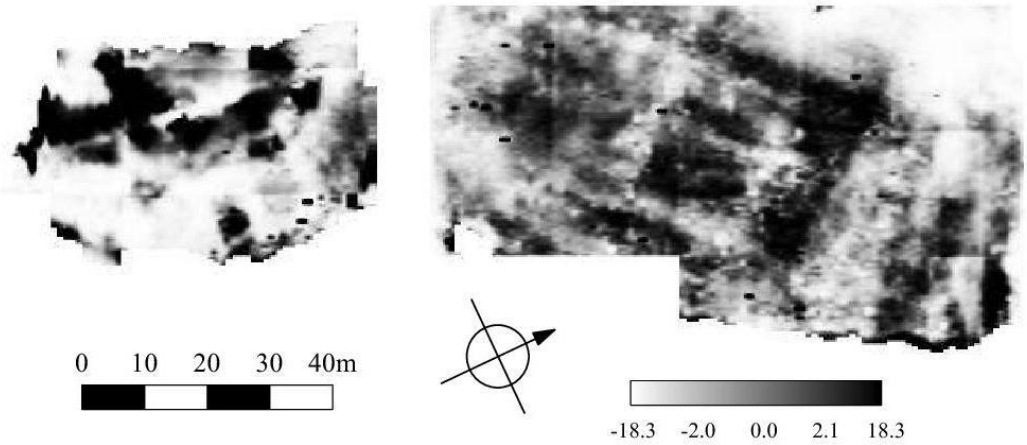

Figure 3.2 Resitivity Results- survey of the inner and outer bailey

natural outcropping of stone. That to grid east forms a strong rectangular pattern. A line of low resistance through it may be modern disturbance. This feature is visible as a raised platform in the grass.

The survey at Manor Farm is shown in figure 3.3. Note that the axis are very different, so location cannot be compared at this stage. Only the small, incomplete grid detached to the left is within the scheduled area. The location of this grid is not exact, but it is positioned within about 1 m of true. In this small area, there appears to be a wall line heading across it. Note that it is parallel to a wall line at the other end of the garden.

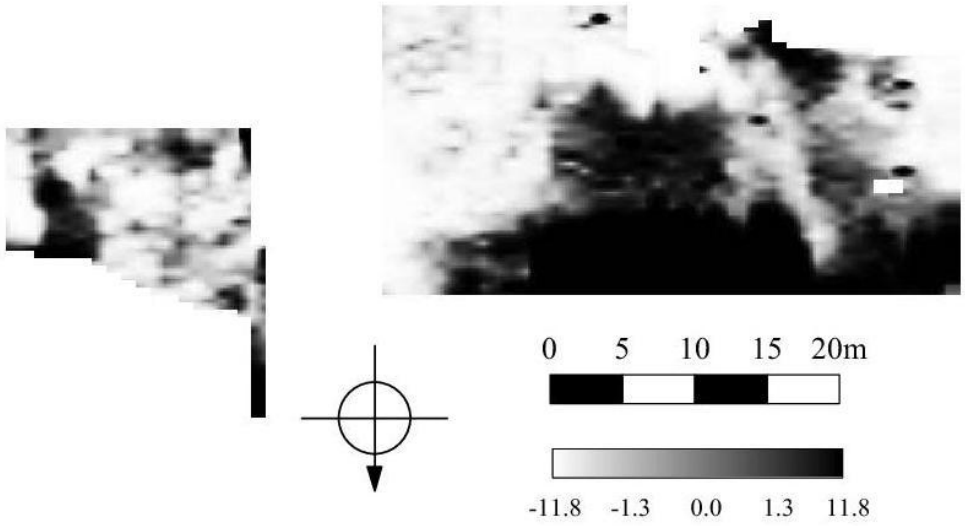

Figure 3.3 Resitivity Results Manor Farm

3.3 Resistivity profiles

Seven profiles in all were done following inspection of the resistance survey. Numbers 1, 2 and 3 were in the inner bailey and 4, 5, 6 and 7 in the outer bailey. Those in the outer bailey were done in two long lines and pairs of files were concatenated to form 50 m long profiles. These will be referred to as 45 and 67. Figure 3.4 shows the placing of these profiles with respect to the resistance grids and features.

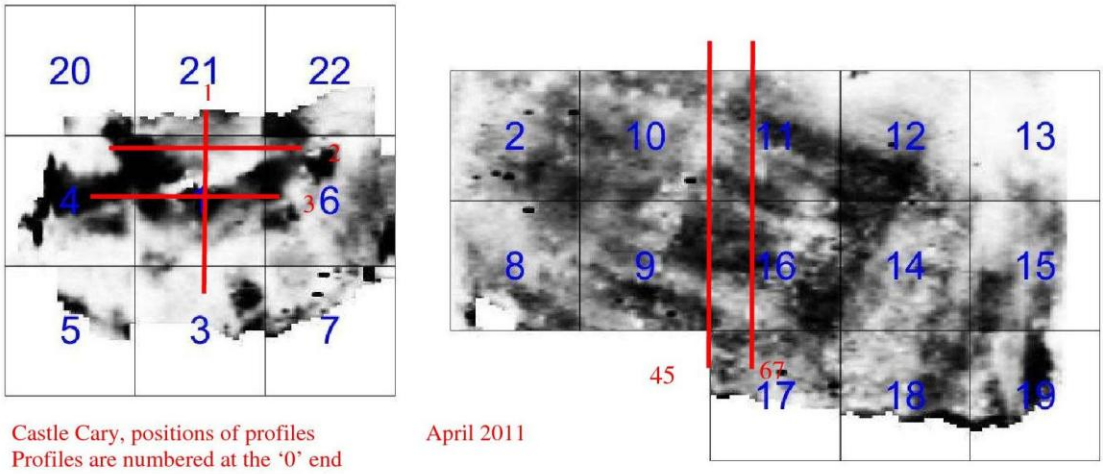

Figure 3.4 placing of these profiles with respect to the resistance grids and features.

With RES2DINV freeware, there is no facility to introduce slopes into the readings, so profiles should ideally be on a flat surface. Profiles 1, 2 and 3 were constrained within the inner bailey, with profile 1 in particular sloping steeply up the rampart beyond probe number 20. However, that was an area expected to contain little information. Note that the 30 probes are labelled 0 to 29.

Profile 1 (figure 3.5) started against the paling fence and headed grid south, to cross the massive structure. Some stone can be seen at the start of the section, but this may come from ground disturbance where the ground has been cut away. The other wall of the structure can be seen plainly between 12 and 16 m, going down nearly 2 m.

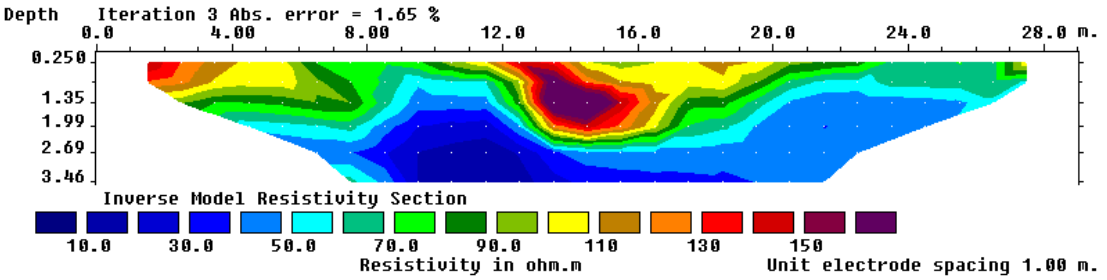

Figure 3.5 Profile 1

Profiles 2 and 3 were taken perpendicular to profile 1, crossing at 6.5 and 12.5 m. Profile 1 crossed profile 2 at 14.5 m, but profile 3 was displaced 4 m to grid west, so

profile 1 crossed at 10.5 m. Note that for convenience of operation, these profiles started at grid east, heading west, so they are shown in reverse. Profiles 2 and 3 are shown in figure 3.6.

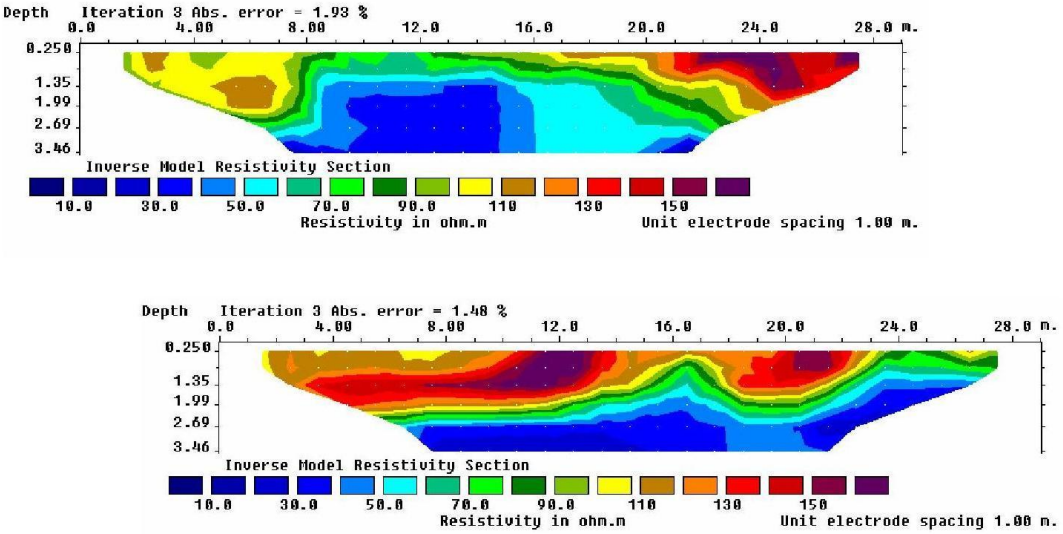

Figure 3.6 Profiled 2 and 3

Some possible stonework can be seen at the start of profile 2, but it is not a strong signal, and this is shown as a gap in the resistance plot (figure 3.2). Beyond 20 m, massive stonework of the wall is visible. Profile 3 picks up the grid south wall of the structure and shows massive masonry to a depth of nearly 2 m. Beyond 25 m, a lesser, near surface signal looks more like a metalled trackway than another building.

Profiles 4 and 5 were taken in the outer bailey, 40 m east of the grid western baseline. The two were concatenated into profile 45, which started 5 m grid south of the full grid and continued 50 m to 5 m north of the upper full grid, as shown in figure 3.4.

Profile 45 is shown in figure 3.7. 0 is at the southern end. There are strong features at 5, 16 and 42 m, but they are shallow, extending down less than 1 m. These would seem to correspond to the curtain walls and the gap in the rectangular structure. Note that there is an area of medium resistance from 14 to 30 m extending to 3 m depth, corresponding to the rectangular structure.

Profile 67 (figure 3.8) was parallel to profile 45, 6 m further to grid east. Signals at 10 m and 40 m correspond to the curtain wall, again shallow. Signals from 13 to 32 m correspond to the rectangular structure. Again, there is an area of medium resistance at greater depths below this region.

These profiles suggest much less substantial structure than in the inner bailey, although it may be that higher levels have been removed.

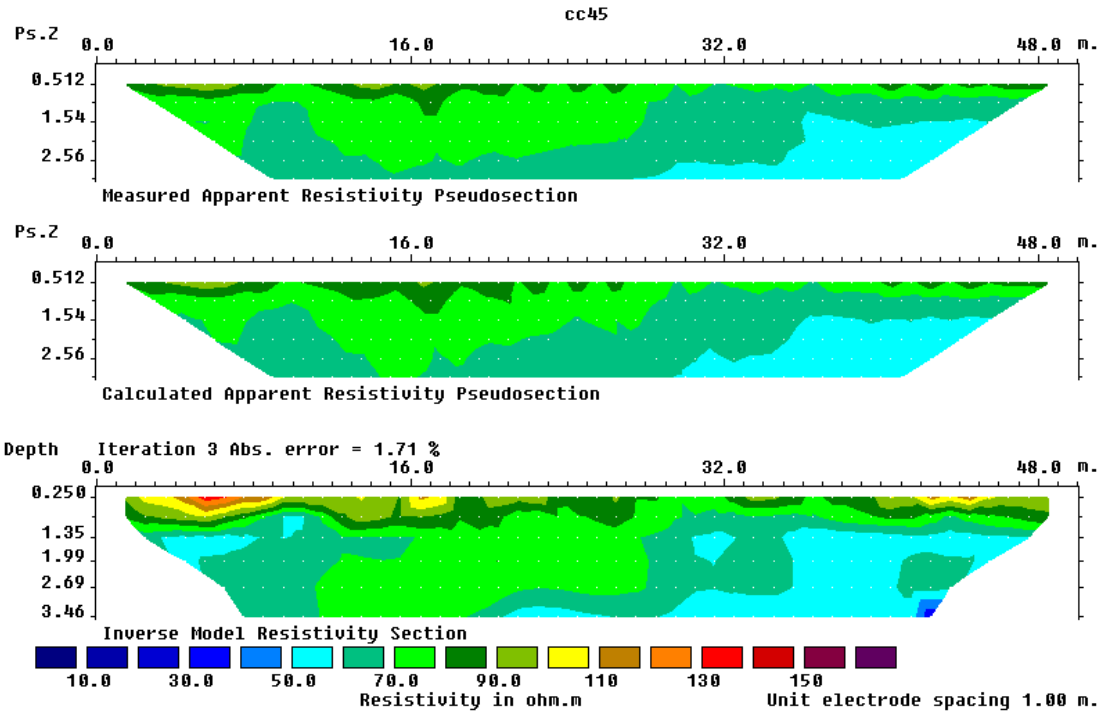

Figure 3.7 Profile 45

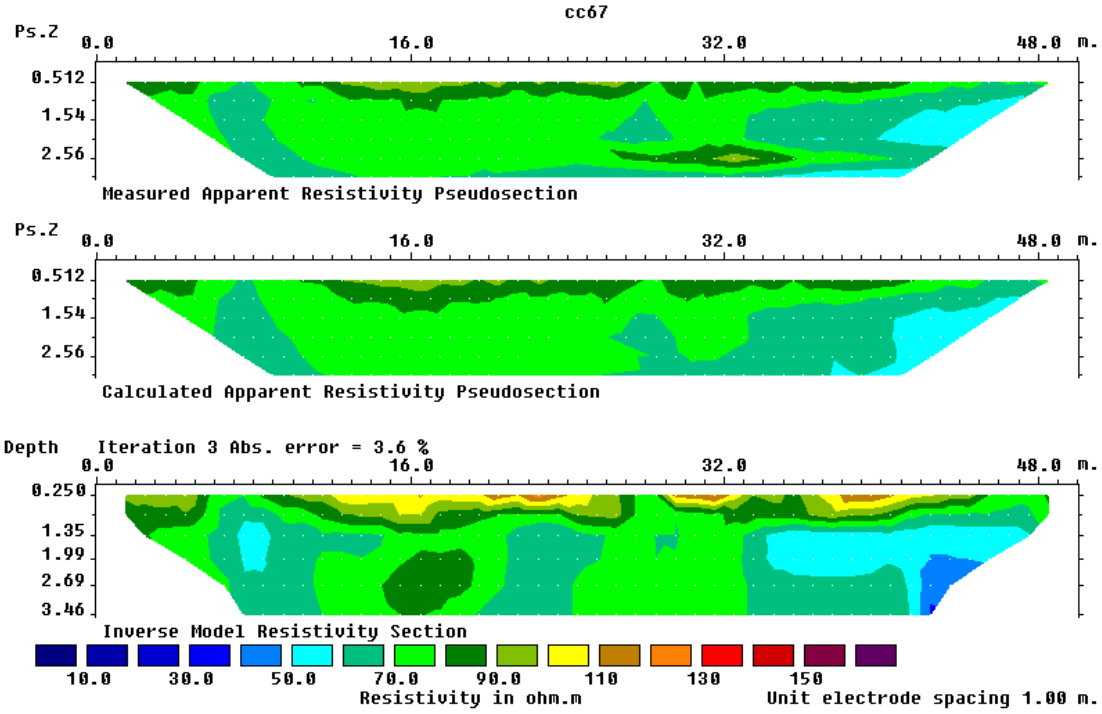

Figure 3.8 Profile 67

3.4 Ground-penetrating radar

Radar was tried on the concrete surface of the driveway between the inner bailey and Manor Farm, within the scheduled area. It was only possible to find an area 25 m long by 3 m wide which was unobstructed and fitted within the curve of the driveway. It was difficult to tie this area into the grid of the inner bailey, but the start and end of the traverses are shown in figures 3.9 and 3.10 respectively. This has been placed on a Google Earth photograph as closely as possible to that position and the radar response is shown located between Manor Farm (left) and inner bailey (right) in figure 3.11.

Figure 3.9. Start of grid

Figure 3.10 End of grid

A high wavespeed of 100 mm/ns was assumed through the concrete. The only pattern obtained was around 32 ns, corresponding to a depth of 1.6 m, where a small portion of the return was found to have zero return (yellow), whereas most of the area had a high return (purple). It is possible that the yellow represents a ditch or moat. The high return area could be part of the motte or could relate to a wall-like feature in Manor Farm garden.

Figure 3.11 Between Manor Farm (left) and inner bailey (right)

4 Discussion

The magnetometry provided little information on the castle site, but resistance and resistivity profiles were very useful. Radar also added some data. Figure 4.1 shows the resistance plots and the radar strip laid out on a Google Earth map so that the special relationship all features can be seen. Figure 4.2 shows this plan marked up with an interpretation of what could be the important features. Ideally, these plans should also be overlaid on an earthwork survey, but that was beyond this survey remit and timescale.

There appears to be a large structure, some 20 m across with foundations up to 4 m thick and 2 m deep in the inner bailey. It seems to have a rounded end and may have turrets or buttresses. It has been severely truncated where ground in the bailey was cut away for farmyard use. There is another strong feature running from inside this building downhill towards Manor Farm. This could be part of a second building not

contemporary with the first, but resistivity profiling suggested it was more of a surface feature, perhaps a metalled trackway

Figure 4.1 Resistance plots and radar strip laid out.

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The outer bailey showed signs of there being stonework under the edges of the rampart, but the edge was not systematically followed as there was time only to concentrate on the central area. This central area seemed to show a possible curtain wall forming three sides of a rectangle, with a possible entrance midway along the side facing the town. There may be a return wall just showing in the plot of the inner bailey, but it would be necessary to fill in the gap in the survey to ascertain this. This would be difficult to do not just because the ramparts are steep but also a large iron tank and small shed have been inserted into the monument in this area.

Within this possible curtain wall is an amorphous feature to the (grid) west, which may be natural rock, and to the east a regular rectangular feature possible cut by a later pipe trench. Resistivity profiling has shown the stone structure of this to be shallow, although the soil below it may also have rock fill. It also corresponds to a noticeable raised flat platform on the ground. It could be that this is the remains of a rabbit warren, as has been suggested before, but it is difficult to see why that should be enclosed within a large walled area.

There are also signs of activity at far (grid) east, possibly with a small rectangular building, but this is also the area of a modern metalled track, and there may also be the footings of a modern field wall under the hedge.

Figure 4.2 Showing the plan marked up.

It would be worth continuing the twin-probe resistance survey to include the areas not covered in this survey, going as far up ramparts as is practicable. The survey should also be continued through the top gate and some 50m into the field beyond to see if footings of a return rampart can be found. More sets of resistivity profiles judiciously placed might help to elucidate the structures further.

Below the castle, the radar suggested the edge of a ditch or mote, but space here is too confined to learn more, especially as it is under concrete. There are also wall-like features both at the near end and far end of Manor Farm garden which may be related to the early history of the site.

Appendix A Grid and survey data

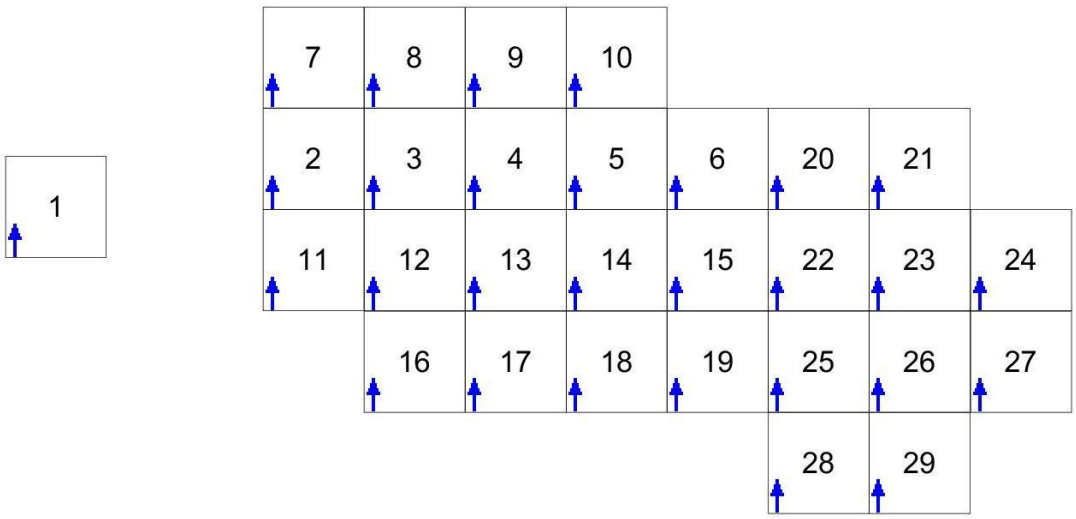
The digital data from the survey can be made available. The INSITE file can be made available, also the data downloaded directly from the instruments.

Figure A1 shows the grid data for the castle site magnetometer survey, and Figure A2 shows that from manor farm. The arrows represent the start point of each grid and the direction of the first traverse. Readings are 4 per metre along lines 1 m apart, giving 1600 points per grid square. Data downloaded from Bartington are automatically sorted to parallel. Grids prefixed 'm' are raw data, those prefixed 'd' are de-striped data, which is the set to be used.

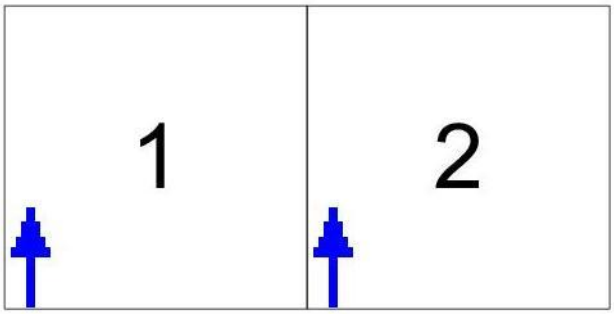
Figure A3 shows the castle site twin-probe resistance grid, and figure A4 shows that for Manor Farm. Data were taken at 2 points per metre along lines 1 m apart, giving 800 points per grid. The TR data, indicated by blue arrows, are automatically sorted to parallel, but the RM15 are not. They are zig-zag data, and are grids are indicated by a red arrow.

The profiles are labelled cc1, cc2, cc3, cc45 and cc67. These are converted ready for RES2DINV format and all have 1 m spacing.

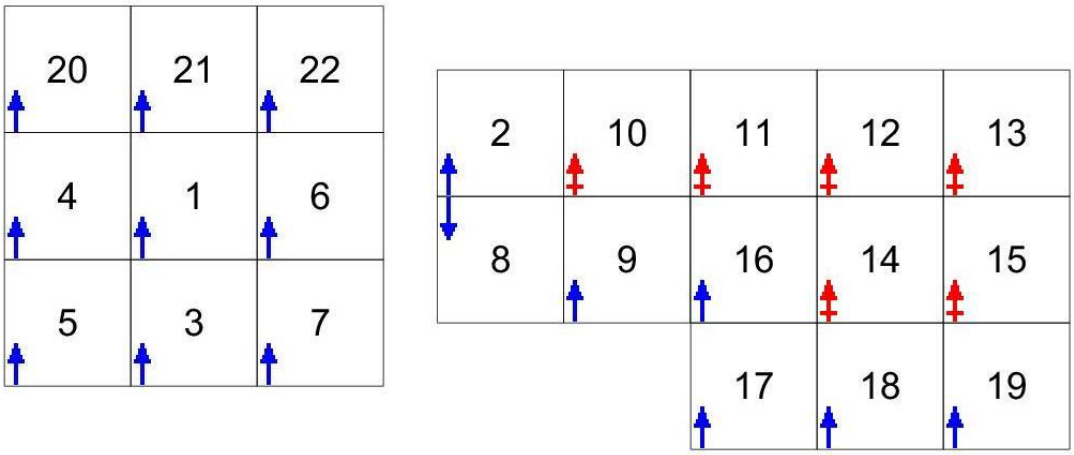
The block of radar data comprises 4 lines of 25 m length spaced 1 m apart. They were done in zig-zag fashion, so lines 2 and 4 need to be reversed. The block starts in the southern end, by the five-bar gate to Manor Farm garden. A 250 MHz antenna was used, taking readings every 0.1 m. The lines are ccg20001, ccg20002, ccg20003 and ccg20004.



A.1 Grid data for the castle site magnetometer survey



A.2 Grid data for the manor farm magnetometer survey



A.3 Castle site twin-probe resistance grid

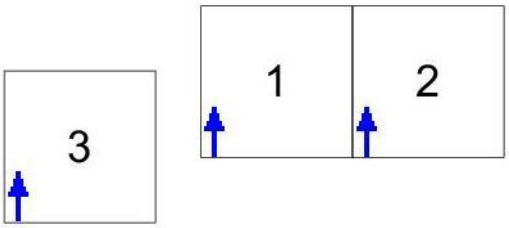


Figure A.4 shows the Manor Farm site twin-probe resistance grid

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Observation on the geophysical survey results.

By Mark Corney

Archaeological and historical background summary

The settlement of *Cari* had been established by the time of Domesday (Richardson 2003). The castle was built in the late 11th or early 12th century and was in use for a comparatively short period. It was besieged in 1138 and 1153. Following the siege of 1153 the castle rapidly declined and was abandoned in favour of a new manorial centre immediately to the west which was later became a moated site and subsequently Manor Farm.

Investigations in 1890 recorded a stone built keep of trapezoidal plan, measuring 23m x 24m with dressed blocks of Ham and Doulting stone. Trenching in the outer bailey failed to locate any remains of a curtain wall (Gregory, 1890). Modern archaeological investigation of the castle has been restricted to developer related works on the western periphery of the site (Aston and Murless 1978, Leach and Ellis 2003, Minnitt and Murless 1978).

The geophysical survey

A major geophysical investigation of the site in Spring 2011 has produced much new data on the internal arrangements of the castle (Oswin and Charlton 2011). The site was surveyed using fluxgate gradiometry and twin-probe resistance augmented with resistivity profiling and ground-penetrating radar.

The magnetometry results revealed little of significance due largely to ferrous interference although a small number of anomalies in the outer bailey may be of archaeological origin, possibly pits or large post-holes.

The resistance survey was highly informative revealing a number of substantial stone structures in both baileys. In the inner bailey a massive foundation was revealed. This is not quite square, approximately 20 m across and correlates closely with the dimensions and description of the remains of the keep investigated in 1890 (Gregory 1890). There are also indications of external projections which could be buttresses. Resistivity profiling suggests the walls may be up to 4m thick and 2m in depth. This feature has an overall ground plan with strong similarities to the contemporary stone keep/fortified hall at Castle Rising in Norfolk. Like Castle Cary, Castle Rising is set within massive earthworks defining an inner and outer bailey (Plates 1 and 2).

Plate 1. Air photograph of Castle Rising, Norfolk showing the 12th century keep within the massive earthworks of the inner bailey. A possible parallel for the appearance of Castle Cary?

Plate 2. The keep of Castle Rising, Norfolk. South-east elevation

The walls located in the outer bailey demonstrate the presence of substantial structures although their function and date remain uncertain. The plan suggests one or more rectangular structures, aligned south-west – north east, which correspond with the earthworks within the outer bailey. These are set within a larger, walled rectangular enclosure with a gap along the north-west side interpreted as a curtain wall. The alignment of this enclosure and the rectangular structure does not coincide with that of the earthworks defining the south-east side of the outer bailey defences and they may not be contemporary. The location of the enclosure wall, set to the rear of the bailey bank, would also argue against this feature being a curtain wall contemporary with the castle. Resistance profiling suggests these walls are less substantial than the keep.

Observations and further work

The geophysical survey has added considerable new data on the internal layout of Castle Cary castle. The structure within the inner bailey can be confidently identified as the keep/fortified hall investigated in 1890 (Gregory 1890). The structures within the outer bailey are more problematic. Their alignment and location in relation to the bailey earthworks strongly argue against them being contemporary; it is worth noting in this respect that despite excavation across the outer bailey bank, Gregory failed to find evidence for a curtain wall (*ibid*.). It is possible they represent a stone successor to the main castle structure prior to the construction of the Manorial complex to the west.

In the light of the geophysical survey results the following further works are proposed:

- Further geophysical prospection to the north and east of the castle, beyond the earthwork defences to test for extra-mural activity
- A full analytical earthwork survey at 1:500 scale as per RCHME/English Heritage survey specifications
- Carefully selected small scale excavations within the outer bailey to test the character and date of the stone structures located by the geophysical survey and further investigation of the outer bailey bank to establish whether a curtain wall ever existed here.

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