BATH & CAMERTON ARCHAEOLOGICAL SOCIETY

Geophysics at Saltford, 2015.

Report prepared by Roger Vaughan and John Oswin

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Abstract

A geophysical survey of a field to the south of Keynsham Manor, Manor Road, Saltford was carried out jointly by the Bath and Camerton Archaeological Society and Saltford Environment Group (SEG) on the 27 and 28 October and 3 and 4 November 2015. SEG are researching and recording the history of the village and were interested to know more about this field as it appeared to be of particular archaeological interest. In all the survey amounted to over 2 ha. The survey was done using two twin-probe resistance meters (a Geoscan RM15D meter and TR/CIA meter) and a Bartington 601-2 magnetometer.

The survey indicated the possible presence of some prehistoric round houses in the northern portion of the field, and signs of what may be a Roman structure on higher ground to the south near to the site where a Roman coffin, complete with the skeleton of a young man, was discovered in 1948. In the north western corner of the field, there is evidence of ground disturbance, but it is possible that this may be modern. The most visible feature is ploughing. A trackway running up the west side of the field is visible over part of its length. There also appears to be a feature, possibly an ancient pond (now filled in), approx 45m within the field on the eastern edge of the area surveyed.

Acknowledgements

We would like to thank the landowner, Adam Stratton, for kindly allowing access to the field, to BACAS for providing the survey equipment and to all the volunteers for their help and enthusiasm: Dick Bateman, Terri Bell, Ray Buchanan, Rick Crowley, Frances Eggbeer, Phil Harding, Mike Headford, John Knapper, Bob Mordle, Janet Pryke, Sue Rhodes, John Richards, Wendy Russ, Andrew Stainer and Alistair Sutherland.

In particular, we would like to thank John Richards for his contributions to the mapping used in this report.

We acknowledge the use of Dorset Explorer in preparing the map for figure 1.1.

Figures 1.2 and 3.5 are based on Ordnance Survey maps, on which there is Crown copyright. We acknowledge this in the use of these maps in compiling this report.

Preface

Bath and Camerton Archaeological Society is an amateur society, which has built a high reputation in geophysics for long term, large area research projects. It has a very full set of geophysics equipment. The survey at Saltford was carried out at the request of, and in conjunction with, Saltford Environment Group (SEG) which is a local community association concerned with environmental and sustainability issues affecting the village. The survey was undertaken by volunteers from both organisations.

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1 Introduction

1.1 Location

The field involved in this project lies to the south of Keynsham Manor, Manor Road, Saltford in the Unitary Authority of Bath and North East Somerset. It is shown as Field 3137 on the 1965 1:2500 scale Ordnance Survey National Grid series map, and on older County series maps as Field 794. The field is centred on ST 673664.

Figure 1.1. Location map showing Saltford and the area of survey between Saltford and Keynsham.

The field is of an irregular shape with hedgerows, interspersed with small trees, delineating its boundaries. It is used for arable farming. At the time of the survey the summer crop had been harvested and the land had yet to be ploughed. There is a small pond hidden amongst undergrowth in the eastern hedgeline. The land rises gently towards the southern boundary.

A study of old Ordnance Survey maps has revealed that the field was once split into two with a boundary hedge, wall or fence and trackway running from north to south approximately 60 metres from, and parallel to, the present western boundary.

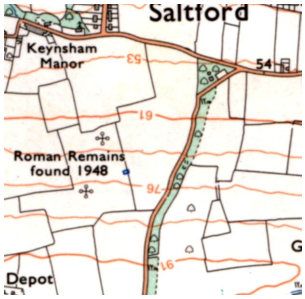

Figure 1.2. Map showing location of the field and of Roman find-spots within it. Courtesy Ordnance Survey, Crown copyright reserved.

1.2 Background

The survey was carried out at the request of the Saltford Environment Group (SEG) who at the time of writing are researching and recording the history of the village. They were interested to know more about this field as it appeared to be of particular archaeological interest.

In 1948 a stone coffin complete with skeleton had been found in the field when the farmer was removing a tree. Buried two feet below the surface it was identified as being of Roman origin. Made from oolitic Bath stone, it was of a similar type and age to other coffins that had been discovered in various locations in and around the City.

The year after the coffin had been found, some trial trenches had been dug to determine whether there was any other evidence of Roman occupation. The excavations had unearthed pottery fragments, coins, nails and utensils as well as 'oyster shells too numerous to record'. There was a suggestion that there may have been a road in this location, but whether this was of Roman origin was unable to be determined.

A detailed report describing the finding of the coffin and the subsequent excavations appears in the Proceedings of the Somerset Archaeological and Natural History Society published in 1950. Ordnance Survey maps published in the 1960s show the locations within the field where the coffin and other Roman materials were found (figure 1.2). There are relevant entries in the Bath and North East Somerset Historic Environment Record (ref MBN 1241, MBN 1242 and MBN 1243).

In more recent years, metal detectorists have reported discovering Roman coins in the field and in 2014 a late bronze age axe blade and a Roman brooch were found (Portable Antiquities Scheme reference ID GLO-F02B7D and ID GLO-F0A334). Oyster shells and pottery fragments can be spotted when field walking.

1.3 Dates

The survey was carried out on Tuesday 27 October, Wednesday 28 October, Tuesday 3 November and Wednesday 4 November 2015. Working hours were from 09.30 to mid afternoon.

1.4 Personnel

The survey was led by Dr John Oswin MA PhD CSci FGS, Geophysics Team Leader for Bath and Camerton Archaeological Society (BACAS), who was assisted by a team of volunteers from both BACAS and SEG.

1.5 Scope

This report describes the geophysical survey undertaken in 2015 as a combined BACAS/SEG project. The report may make references to earlier work, but only in support of this work.

2 Method

2.1 Gridding

The survey area was laid out in 20 m grid squares, as is standard BACAS practice. A starting point (arbitrarily labelled 1000, 1000) was set at the leaning electricity pole in the north hedge, grid reference ST 673664 (figure 2.1) with the grid line extending eastwards under the central electric wire. All subsequent grid squares were set up using tapes and Pythagorean triangles. Grid north was 10 ° east of compass north.

All instruments were walked in north-south traverses working eastwards across the field, starting at the south-west corner. Each grid square was laid out as per Oswin 2009, figure 5.8c page 115.

Figure 2.1. The grid was started at the leaning electricity pole (left) and developed east immediately under the central electricity cable. This formed the basis of the survey gridding of the field.

2.2 Twin probe resistance

BACAS has two twin-probe resistance meters: Geoscan RM15D (black) and TR/CIA (silver). Both look similar and use similar principles, but have significantly different logging sequences. With 0.5 probe separation on the frame, maximum penetration depth was between 0.5 and 1 m.

The RM15-D twin probe resistance meter was set for taking readings at 0.5 m intervals, 1 m lines (800 readings per 20 m square), zigzag data logging, automatic triggering, 0.5 s averaging. It was set to allow readings up to 200 ohm. It was fitted with its transom for 0.5 m probe separation.

The TR/CIA twin probe resistance meter was set to 40 readings per line, 20 lines (800 readings per 20 m square), triggering 'on insert+LCR', 0.5 s averaging. Although a zig-zag pattern was walked, the data were sorted to lines of parallel direction. It was set to allow readings up to 200 ohm (0.1 ohm resolution).

Fig 2.2 The twin probe resistance meters in use at Saltford. Top: Geoscan RM15; bottom: TR/CIA

With twin-probe resistance, there is some risk operating two machines that there may be crosstalk between them if they get too close. Generally, the two machines were kept well separated, but in the late stages, they could come within little over 20 m of each other.

2.3 Magnetometer

The Bartington 601/2 dual fluxgate gradiometer was set to provide 4 readings per traverse, traverses at 1 m intervals (1600 readings per 20 m square), operating pace a sedate 1 m/s. Maximum penetration depth for this instrument is approximately 2m.

A zigzag pattern was walked, but the data logger automatically sorted to series data.

Figure 2.3. Bartington 601-2 magnetometer.

2.4 Software

Results from all instruments were downloaded to laptop and processed in INSITE (v4, 1994). This is now regarded as obsolete, but its grid mapping process is the most versatile available still, and is the only software which allows the input of both parallel and zig-zag grids into the same project for the same instrument and it is this that enables use of both black and silver twin-probe resistance meters, although each has to be input separately. The instruments were downloaded via BACAS-proprietary software and then imported into INSITE.

The magnetometer was downloaded via Bartington-proprietary software and then subject to de-stripe processing (zero-median) using BACAS-proprietary software before the data were imported into INSITE for mapping.

2.5 Constraints

The project used volunteers both from BACAS and from SEG, so used a number with very limited previous experience, although they were able to gain skills rapidly during the survey. The working day was relatively short and was further restricted by poor weather on occasion. Given the limited total survey time, a good coverage, in excess of 2 ha was covered by both forms of instrumentation.

In the first week, the whole width of the field was surveyed. In the second week, only a central 80 m wide portion was surveyed, so that the area covered could be extended as far south as possible towards the top of the field. On the final afternoon, the width coverage was reduced to 40 m to increase southward progress.

The field was stubble at the time of survey. This caused some problems fouling lines, cables and tape measures, and making magnetometer marks difficult to see.

The field was long north-south and the obvious baseline which could be maintained for a few years lay at the far northern end. An electric pole in the north hedge was used, with the grid aligned under the central electric wire heading east. All subsequent gridding was based on this line. As the grid headed further south up the field, errors built up in the gridding over some 200 m, and at the top (south end) of the grid, errors approached 1 m between grid square corners.

The field sloped upwards from north to south. Over most of the survey, the slope was gentle and uniform, but there was a distinct lynchet at the southern end of the surveyed area. Time did not permit a contour survey, and LIDAR data were not available for generation of contour data either.

3 Results

3.1 Twin Probe Resistance

The twin-probe resistance meter results are shown in greyscale in figure 3.1. Results are shown in colour scale in figure 3.2. The most visible feature is ploughing, but a trackway running up the west side of the plough is visible over part of its length. This track is shown on first edition OS large scale maps.

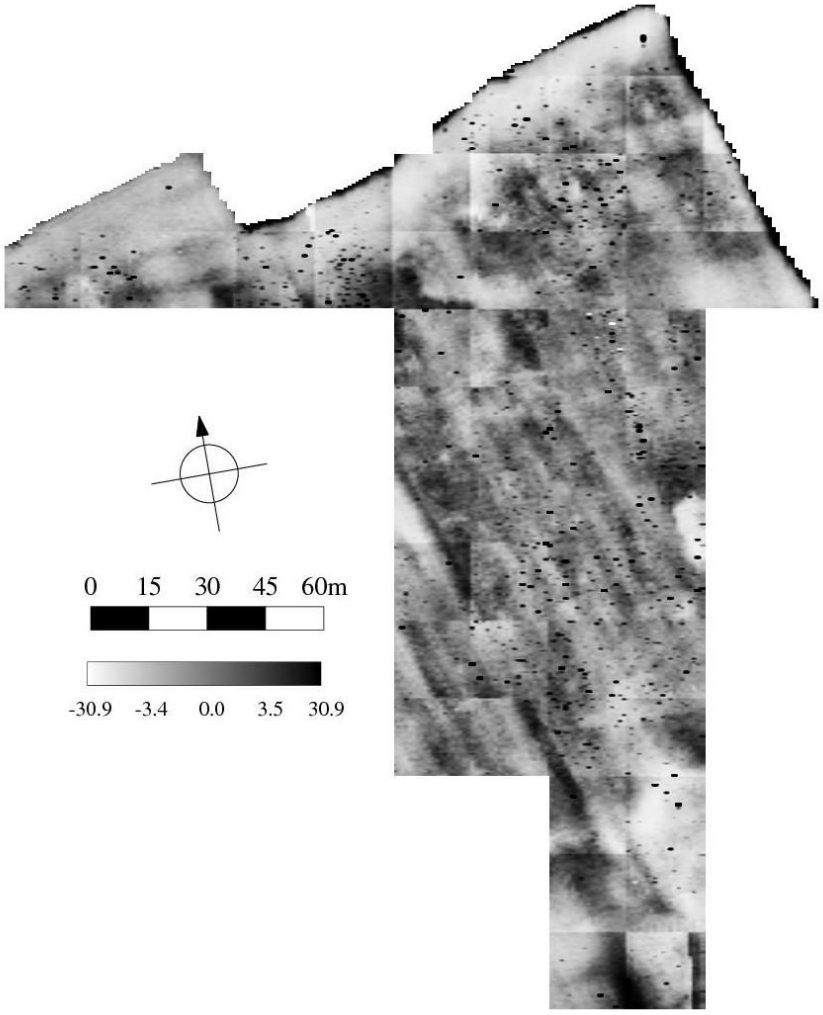

Figure 3.1. Plot of twin-probe resistance, shown in greyscale. Mottled points are false high readings caused by triggering failures.

The area in the far north-west shows signs of disturbance. Although there are lines in this area which look a little building-like, they are perpendicular to the ploughlines, which suggests they may just be marks related to this ploughing. Note that the plough mainly appears as long alternate dark (dry) and light (damp) blocks. These blocks appear to be of the order of 5 m wide, suggesting they are relics of older ploughing techniques, perhaps post-mediaeval 'narrow rig'.

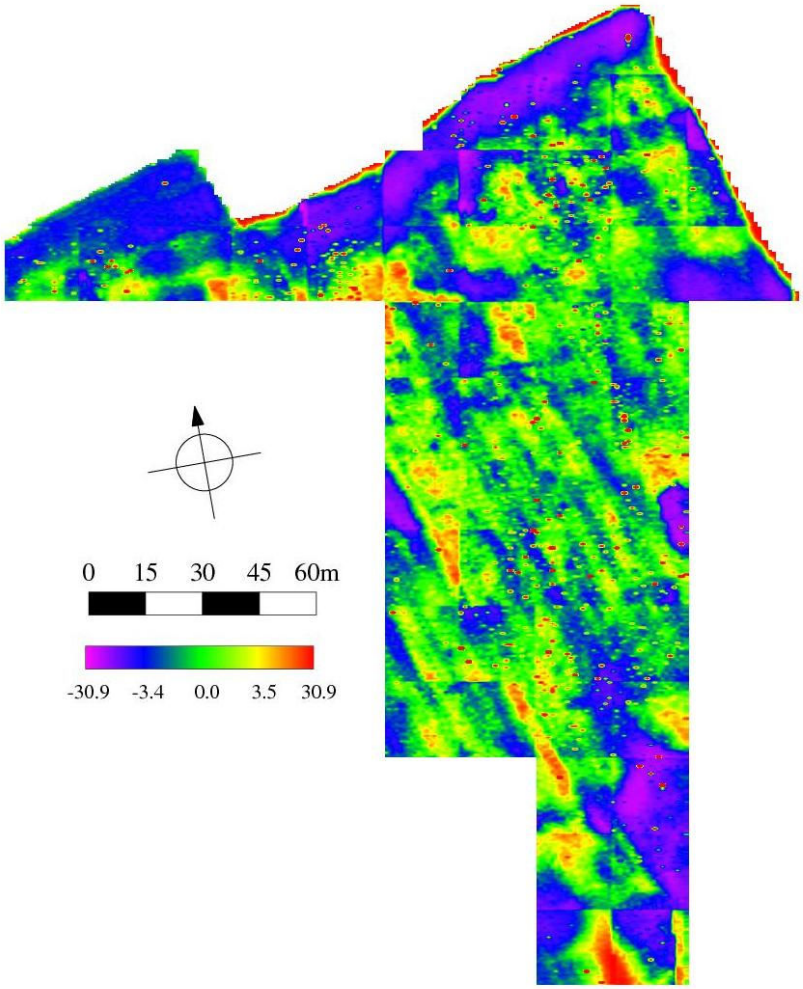

Figure 3.2. Twin-probe resistance plot shown with colour scale to improve detail.

A low-resistance patch on the eastern edge of the plot marks a possible ancient pond.

There are lines which could represent structure in the two furthest southern grids, but these are also aligned with or across the plough, suggesting that they are related to that feature. The dark band on the far east of the southernmost grid on the east is probably caused by electrical contact failure rather than by a feature in the ground.

3.2 Magnetometer

The plot from the magnetometer is shown in figure 3.3. The most evident response is from ploughing, and it is probable from the fineness that this represents modern ploughing. However, there is significantly more information showing as well. On the western side of the plot, the ploughing also shows a strong but incomplete line which may be a track. This also showed in resistance.

The far north-western corner shows much ground disturbance, but it is unclear what has caused this, and when time permits, survey of this area should be expanded to see if a more coherent pattern can be obtained. Until such time, this is assumed to be modern disturbance.

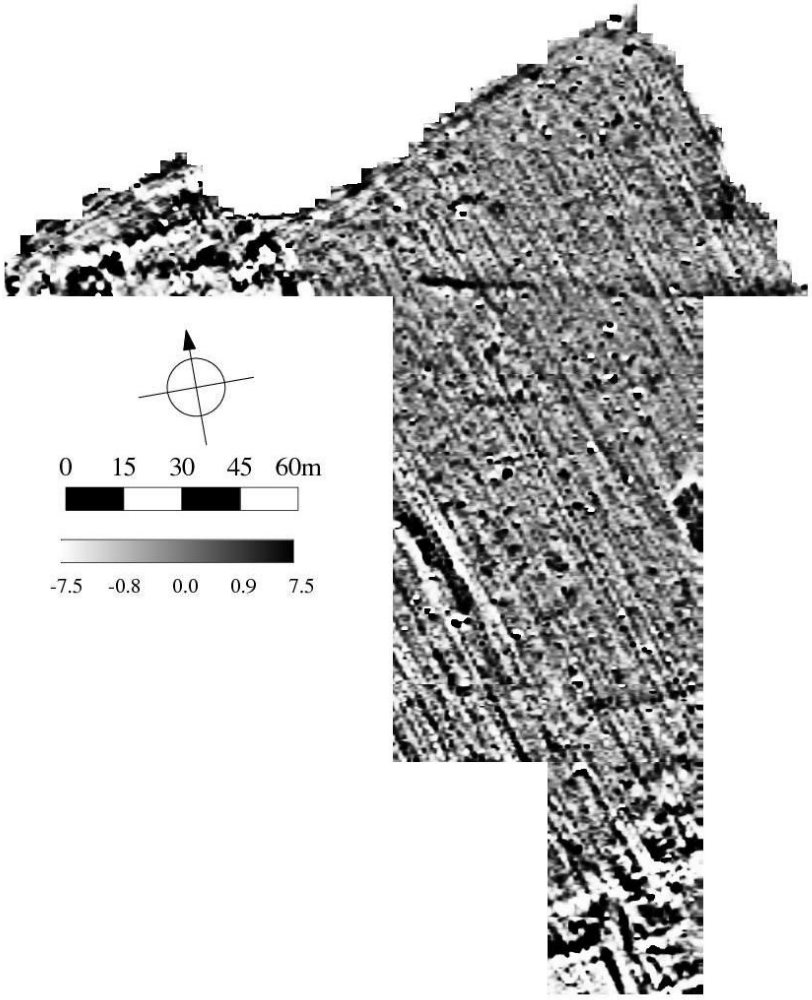

Figure 3.3. Magnetometer survey plot.

The ploughing part masks a number of possible round house drip gullies, suggesting Iron Age settlement in the area. These seem to be dispersed across the area surveyed and do not form an organised pattern. There appears to be a larger feature on the eastern edge of the surveyed area midway up its length but only part of it has been surveyed. The feature also showed in the resistance plot. It is most likely a small pond.

The far south of the survey area shows features which may relate to Roman structures. The lines are quite sharp, of limited length and are set at right angles to each other, although they are still on the same alignment as the plough lines. Curiously, these features do not show in the resistance plots. Any Roman structure of this nature in this part of the country would most likely be built of stone. Either the structures are too deep to be seen by resistance, which is unlikely towards the hill

top, or stonework has been robbed out, leaving only footing trenches. Immediately east of the most visible feature is a long narrow disturbance which may also be part of a Roman structure. However, it is on the same alignment as the trackway, and may just be related to this. To the north-east of this is a sub-circular feature which appears too strong to be another round house, and is assumed to be part of the Roman complex.

Figure 3.4 shows the features marked up on the magnetometer plot.

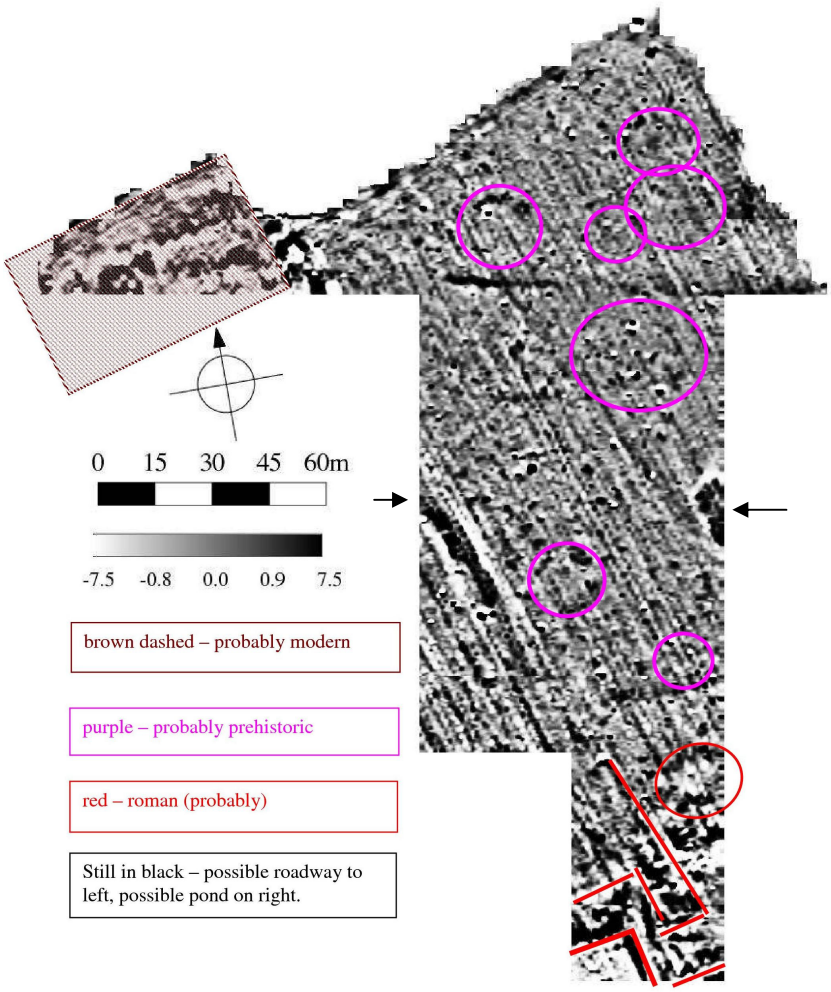

Figure 3.4. Magnetometer plot with principal features annotated.

An overlay of the magnetometry and resistance plots is at figure 3.5. This has been superimposed on the Ordnance Survey map used in figure 1.2. In this particular project, no extra features can be made out from the overlay of the plots as the results are dominated by the magnetometry, although the pond-like feature on the eastern edge is confirmed by identical placing in both plots.

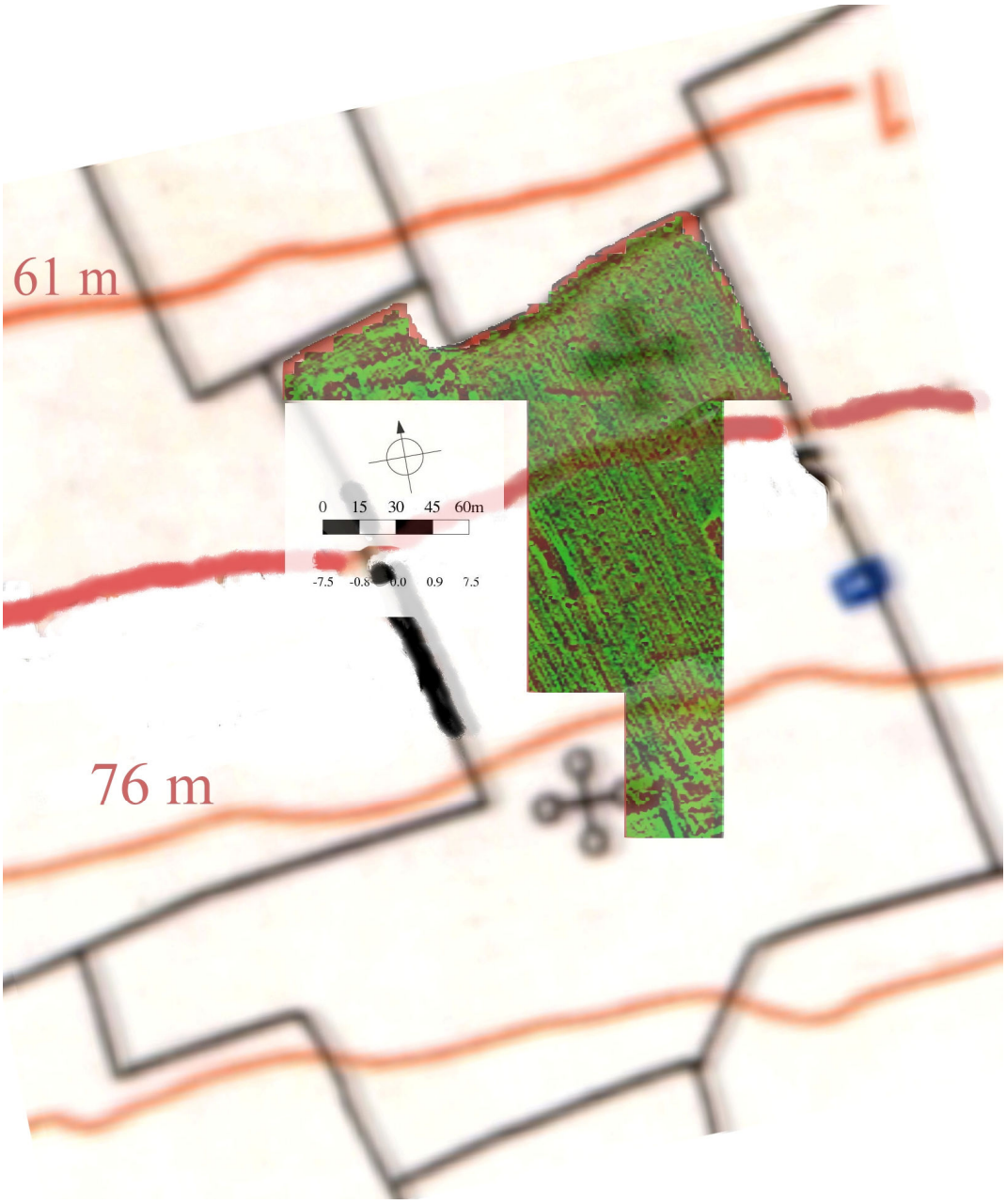

Figure 3.5. Resistance and magnetometry plots overlain on map of field (Courtesy Ordnance Survey, Crown copyright reserved).

The contours show the general slope of the field towards the north, although not with sufficiently fine detail to identify the lynchet at the south end of the area surveyed. The northern find spot (pottery etc) was covered in the survey, but no structures other than possible prehistoric round houses were identified. The survey just missed the southern find spot of the Roman coffin, but this was very close to the area where possible Roman structures were detected in the magnetometry, lending weight to the evidence for a 'villa' site here.

4 Comment

An area of over 2 ha was surveyed by both twin-probe resistance and magnetometry over the course of four days in late autumn on a stubble field. However, time was the major constraint, and a large portion of this field was left untouched and will need further work when it is next available.

The survey started at the lower (northern) end of the field as there is a small platform there and it is one of the two finds spots identified in Ordnance Survey maps published in the 1960s (figure 1.2). Despite this, the detailed survey failed to identify any hidden Roman features in this part of the field and showed only signs of some possible round houses and an area of disturbance in the north west corner, presumed modern. The survey then had to be extended rapidly southwards across a narrow swathe to reach the southern portion of the field, which is on higher ground and above a slight lynchet. The final portion of the survey showed signs in magnetometery which could be considered to be parts of a Roman structure, and this was very close to the southern find spot indicated on the Ordnance Survey maps, where the coffin was found.

On this raised area in the southern portion of the field, the view extends north-west to the former Keynsham chocolate factory, now known to be the site of the Roman town of Trajectus, and west to Durley Hill, the site of the Roman 'villa' under Keynsham Cemetery. The field is elevated, slightly sheltered from the south-west and in a prominent position, so well-placed for a villa. It is possible that there may have been a fresh water spring near to the site providing a ready supply of drinking water; there is an existing well to the east of the field at the edge of Long Wood. A pond on the field edge and a possible ancient pond within the survey area also indicate possible water sources.

As mentioned above, there are areas of the field which still need exploration, but work should concentrate next on the southern portion, and given the better detection capability of magnetometry on this field, the aim should be to explore the entire top portion of the field with magnetometry, then adding a resistance survey over any possible buildings or other structures that may be detected. This could be beneficial in particular to determine whether walls are still upstanding or whether they have been robbed, leaving only foundation trenches. Resistivity profiling over particular features may also add useful extra information.

There may also be benefit in carrying out a detailed contour survey. This could be easily derived from LIDAR data, but unfortunately, this portion of the Avon Valley has not yet been flown over. BACAS has equipment suitable for surveying in contours.

5 Bibliography

Oswin, J, 2009. A field guide to geophysics in archaeology. London and Berlin.

Oswin, John, 2013. Geophysical Survey for Saltford Golf Club. Bath and Camerton Archaeological Society, also available through BANES, Planning Division.

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Portable Antiquities Scheme: ID Ref GLO-F02B7D and GLO-F0A334

Appendix A Grid Sequence and numbers

A1 Twin Probe resistance

The layout of grids as surveyed by twin-probe resistance is shown in figure A1. Blue arrows indicate data sorted in parallel lines, i.e. from the TR/CIA meter. Red barred arrows indicate data in zig-zag fashion, i.e. the RM15 meter.

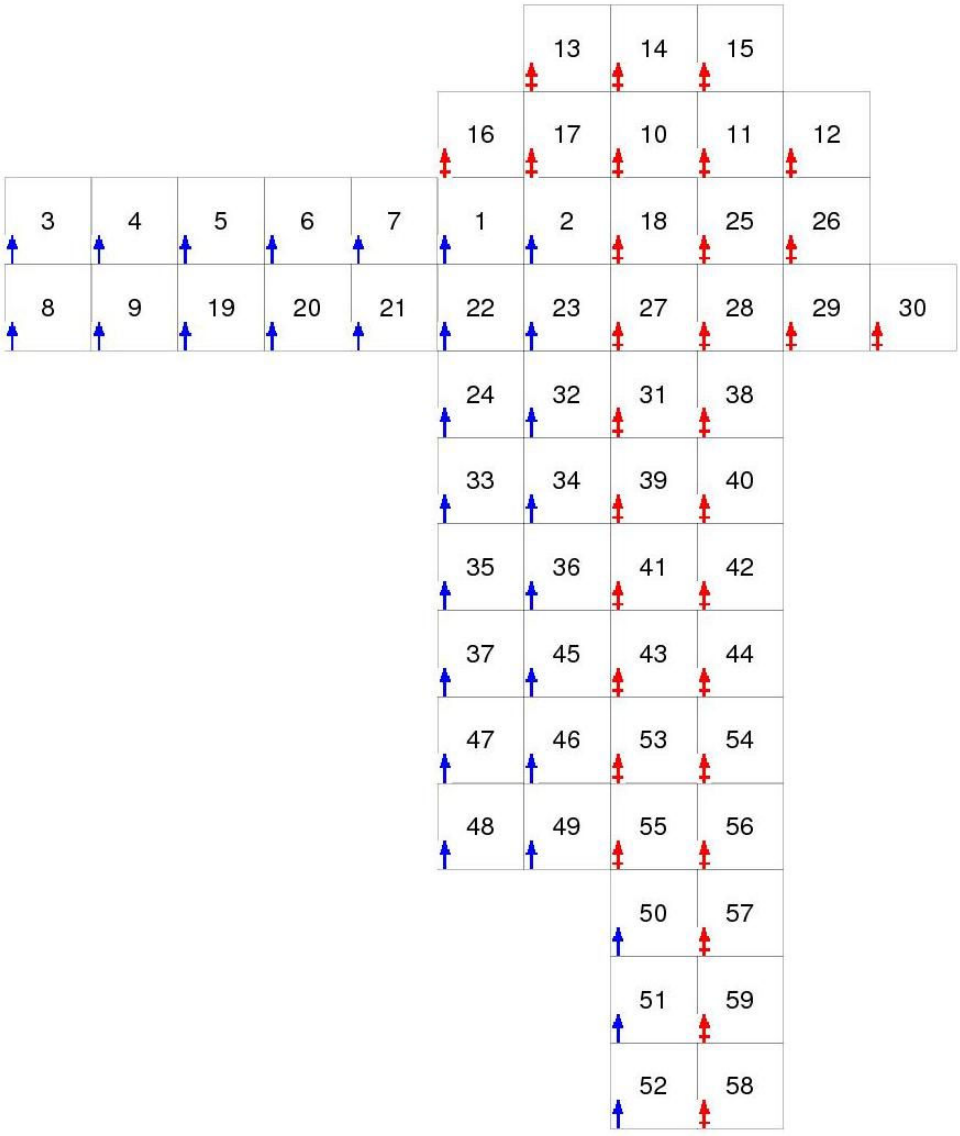

Figure A1. Grid sequence for twin-probe resistance survey. Blue arrows indicate use TR/CIA providing parallel data, crossed red arrows indicate use of RM15, providing zig-zag data. Arrow positions indicate start point and initial traverse.

Both instruments took measurements at 0.5 m along lines 1 m apart, giving 800 readings per 20 m square. The arrows indicate the starting point, and the direction of the arrow, the direction of the first traverse.

The raw data from this survey can be made available, but will require software which can cope with both forms of data together. The grids have a prefix 'R'.

A2 Magnetometer

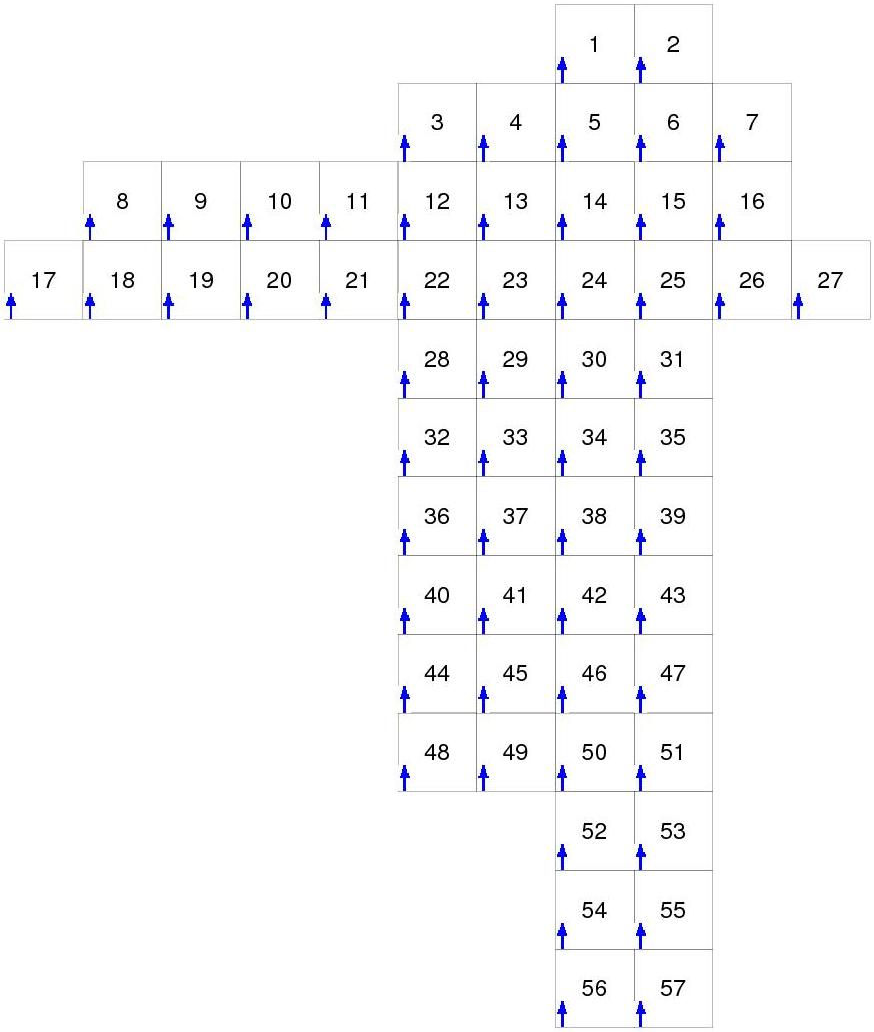

Figure A2. Survey grid sequence for magnetometer. Arrows indicate start position and direction of initial traverse

The layout of magnetometer grids is shown in figure A2. Although a zig-zag pattern was walked, the download software automatically sorted the data to parallel lines.

Readings were taken at 0.25 m intervals along lines 1 m apart, giving 1600 readings per 20 m square.

The raw data can be made available. Grids have a prefix 'M' for the raw data, and the prefix 'D' for data processed by zero-median de-stripe.