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Manual survey using an electronic, hydryostatic level (NIVCOMP) at Wemberham Roman Villa

YATTON, CONGRESBURY, CLAVERHAM AND CLEEVE ARCHAEOLOGICAL RESEARCH TEAM (YCCCART)

General Editor: Vince Russett

Team YCCCART surveying Wemberham villa in the rain.

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Abstract

YCCCART has a project to investigate Romano – British remains in the Yatton & Congresbury area. Resistivity surveys at Wemberham (YCCCART 2013/Y8) confirmed the villa site, and revealed a number of unknown features, suggesting additional buildings attached to, or separate from, the known villa. The purpose of this report is to describe a manual survey of the villa, and targeted grids from the RM15 survey (YCCCART 2013/Y8), using an electronic, hydrostatic level (NIVCOMP) and a computer programme (Surfer 10, Golden Software) as described previously (YCCCART 2014/Y19), to produce contour and 3-dimensional images of the features.

Acknowledgements

A Heritage Lottery Grant allowed YCCCART to acquire a Nivcomp, electronic, hydrostatic level which provided the data for the "Surfer10" software program, kindly donated by Golden Software Ltd.

This survey could not have been carried out without the willing permission of the landowner, H M & K I Stowell & Son and English Heritage for issuing a licence to undertake the surveys.

The authors are grateful for the hard work by the members of YCCCART in performing the surveys, and Vince Russett for editing this report.

Introduction

YCCCART is one of a number of Community Archaeology Teams across North Somerset, supported by the North Somerset Council Development Management Team.

The objective of the Community Archaeology Teams is to carry out archaeological fieldwork, for the purpose of recording, and better understanding and management of, the heritage of North Somerset.

Site Location

Fig 1: Site location. The red arrow indicates the field.

Land use and geology

The site lies some 2.2 miles by road from the centre of Yatton. See Appendix for relevant GPS position.

The field is privately owned and used for grazing sheep and cattle.

Geology
Bedrock Geology: Mercia Mudstone group - Mudstone and Halite-stone.
Superficial deposits: Tidal Flat Deposits – Clay and Silt.

Historical & Archaeological Context

See YCCCART report 2013 /Y7 for full details of the historical & archaeological context.

The Roman villa at Wemberham was discovered in March 1884 in the course of draining the field. Drain pipes were being laid at a depth of 2 feet 6 inches (0.76 metres) and in the course of this work the men cut into a tessellated pavement.

Survey objectives

The villa site comprises a partially sunken area in which there are several small 'mounds' or undulations, and occasional exposed stone work. It was decided to survey the villa and surrounding features, determined following a Geoscan Resistivity Meter (RM15) study *(YCCCART 2013/Y8)*, using an electronic, hydrostatic level (NIVCOMP) and a computer programme (Surfer 10, Golden Software) as described previously *(YCCCART 2014/Y19)*, to produce contour and 3-dimensional images of the features.

Surveys were performed:

1 To determine if undulations on the villa site represent recognisable parts of the villa walls.

2 To determine if a grid adjacent to the villa, which had a prominent geophysical profile, had any surface features which might relate to the RM15 survey *(YCCCART 2013/Y8)*.

3 To determine if any surface features could be related to a 'circular' structure observed in the RM15 survey *(YCCCART 2013/Y8)*, situated NE of the villa.

4 To examine a 'bank area' close to the river Yeo, east of the villa.

Methodology

The surveys were undertaken during the period July to November, 2013 by teams from YCCCART. The method was similar to that described previously (*YCCCART 2014/Y15; YCCCART 2014/Y19*). Briefly, in order to show the three-dimensional appearance of the selected features, grid surveys using an electronic, hydrostatic level (Nivcomp), were performed. Tapes were laid relative to baselines established for the RM15 survey *(YCCCART 2013/Y8)*. For each feature, a zero point for the electronic hydrostatic level was established, and the height in millimetres at each point in the grid, above or below the zero point, was recorded on paper. An appropriate interval of recording was selected, for each feature,

which was considered to provide the best representation. The data were entered into an Excel file (Microsoft) and processed using the "Surfer 10" software programme (kindly donated by Golden Software, USA). Paper and electronic copies of the raw data are preserved in the archives. The surveyed sites are shown in Figure 2.

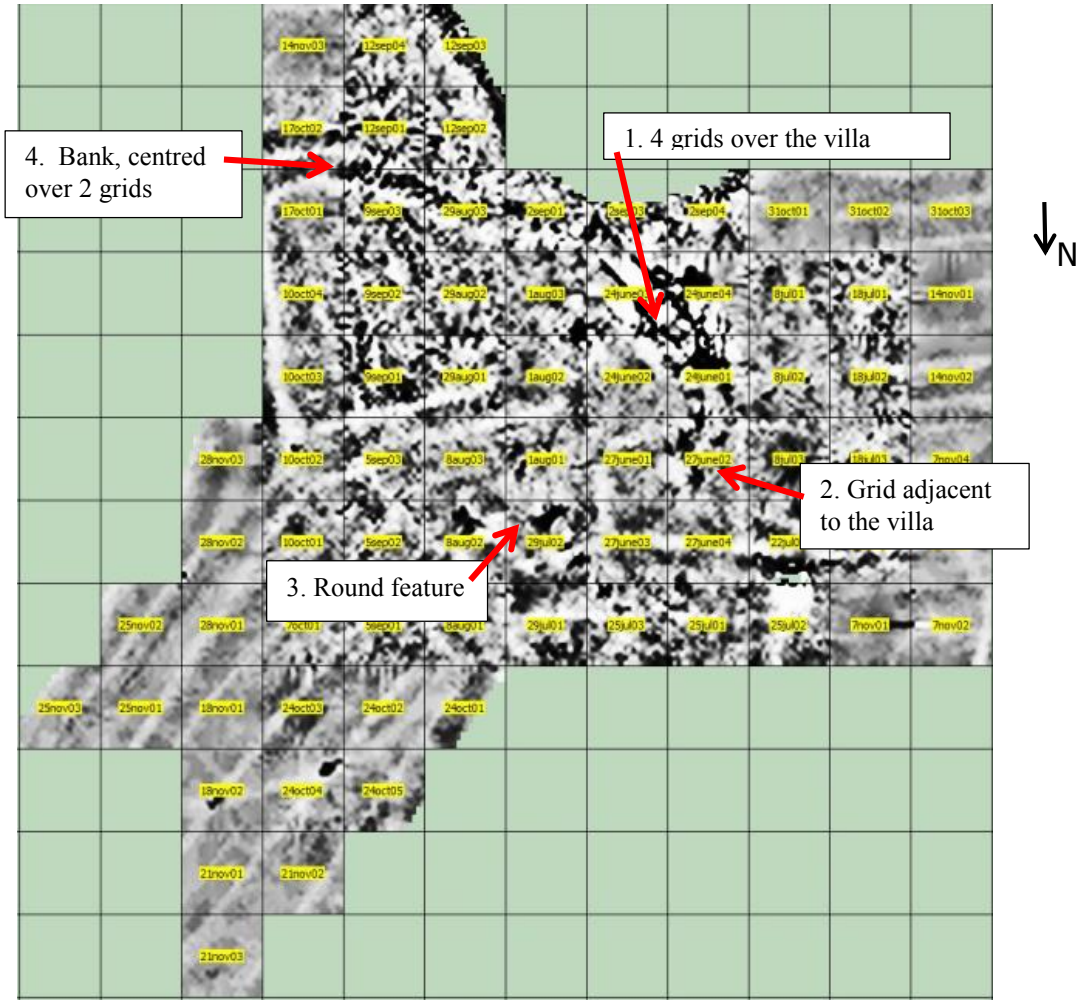

Fig 2: TerraSurveyor file names. Grids are 20m square.

Results

1 Villa site (Grids 1 -4, Jun 24)

The location of this feature, (Appendix 1, A-D) (Fig 3A), is shown in Figure 2. It was surveyed using 4 separate grids (Grids 1 – 4, June 24th). These were then combined, making the final grid 40 x 40m (Appendix 1E). For each individual grid, a tape grid, 20 x 20m, was laid out using the RM15 survey baseline. Heights were measured (Fig 3B) at 1m intervals along the X axis, southerly (21 columns), and the Y axis, easterly (21 columns). The zero point for Grids 1 and 2 was 10m along the eastern edge of Grid 1; for Grids 3 and 4 it was at 10m along the eastern edge of Grid 4. The reading was zero for both points. The Z axis for both grids was the height above, (+), or below, (-), the zero point in mm. The results were recorded on paper. Maximum heights above or below the zero point were 507 to -395 mm (Grid 1), 984 to -218 mm (Grid 2), 925 to -168 mm (Grid 3), and 710 to -216 mm (Grid 4). The raw data were processed electronically as described previously, and a 3-dimensional image, including contours (Fig 4), was produced. Within the area, occasional, exposed, stone courses corresponded to exposed walls. The results demonstrated that some, at

least, of the irregularities surveyed using the electronic elevation device, appeared to correspond to raised walls.

Fig. 3. A, The villa site looking west, river bank (arrow); B, Grid 4, taking measurements, looking south, river bank (arrow).

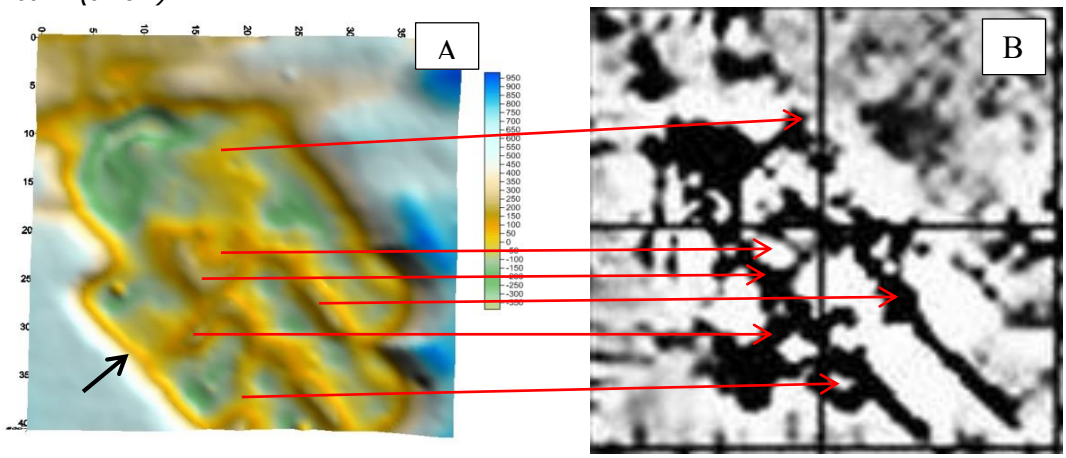

Fig. 4. A, 3-dimensional representation of the villa. A 'rim', possibly corresponding to the edge of the original excavation, can be seen (black arrow). B, RM15 survey of the same area. Several features of the 3D image correspond to the geophysics survey (red arrows)

2 Grid adjacent to the villa (Grid 2 Jun 27)

The location of this feature, (Appendix 2) (Fig 5), is shown in Figure 2. It was surveyed using a tape grid, 20 x 20m, laid out using the RM15 survey baseline. Along the western edge of the grid was a shallow ditch, with an eastern extension towards its southern edge. The edge of a ditch along the northern side can also be seen. However, the remaining area appeared flat with no obvious features. Heights were measured at 1m intervals along the X axis, southerly (21 columns), and the Y axis, easterly (21 columns). The zero point was 10m along the eastern edge of the grid. The Z axis was the height above, (+), or below, (-), the zero point in mm. The results were recorded on paper. Maximum heights above or below the zero point were 178 to -549 mm. The raw data were processed electronically as described previously, and a 3-dimensional, contoured image, (Fig 6A), was produced. The western ditch area (red arrow), and the edge of the northern ditch were clearly demonstrated. In addition, a slightly depressed area (Fig 6A, open arrow) could be seen in the easterly part of the grid, angled north westerly. When the contour image (Fig 6A) was compared with the RM15 results, this latter feature corresponded to the vertical, dark line running south to north westerly in the RM15 survey (Fig. 6B, open arrow). Furthermore, in the vertical feature in the RM15 survey, a slightly crescent shaped area (Fig 6B, black arrow) was seen at its north easterly tip. A similar appearance, though apparently slightly

larger, could be seen in the contour image (Fig. 6A black arrow).

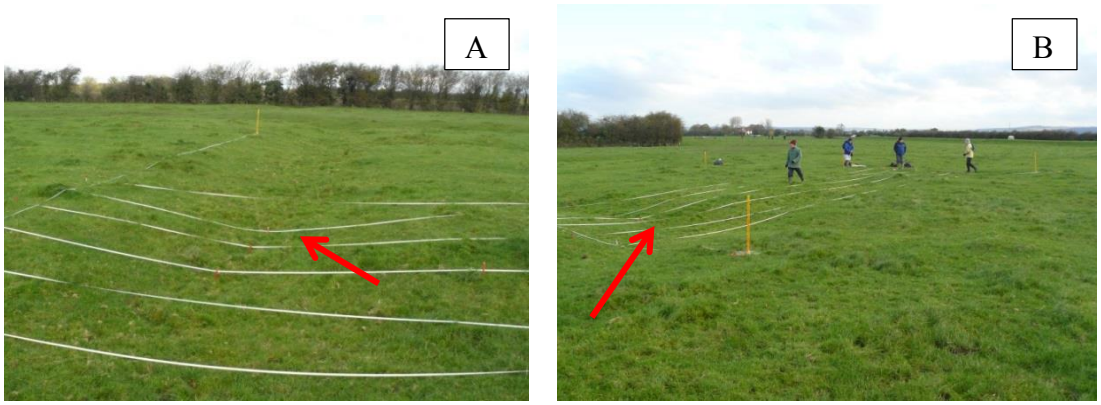

Fig. 5. Grid 2 Jun 27. A, looking north, along the shallow, westerly ditch (arrow); B, looking north easterly. The westerly 'ditch' (arrows) can be seen clearly.

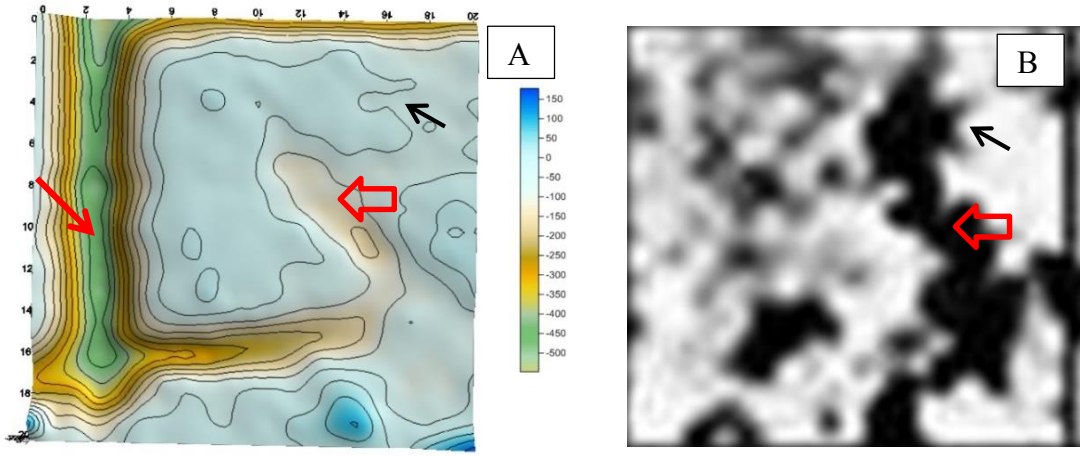

Fig.6. *Grid 2 Jun 27. A, 3-dimensional representation of the surveyed area. The ditch at the western edge is clearly defined (red arrow); the south easterly 'branch' extends north westerly (open red arrow). Scale in mm. B, RM15 survey of the same area. Some features of the 3D image correspond to the RM15 survey (open red arrow and black arrow, see text). (North is towards the top of each image).*

3 *Survey related to a 'circular' structure observed in the RM15 survey (Grid 2 Jul 29)*

The location of this feature, (Appendix 3) (Fig 7), is shown in Figure 2. A tape grid, 20 x 10m, using the RM15 survey baseline, was positioned to include the 'circular' feature. The area appeared flat with a shallow depression (arrow, Fig.7), at the southern edge of the grid. Heights were measured at 1m intervals along the X axis, southerly (11 columns), and the Y axis, easterly (21 columns). The zero point was positioned in the NW corner of the surveyed area. The Z axis was the height above, (+), or below, (-), the zero point in mm. The results were recorded on paper. Maximum heights above or below the zero point were 444 to -40 mm. The raw data were processed electronically as described previously. Three-dimensional (Fig. 8), and contour (Fig. 9A) images were produced. In the 3-dimensional figure the shallow depression was clearly seen (Fig. 8, open arrow) and in the south west corner, an oval, slightly elevated area (approx. 40 cm above the zero point) was detected (Fig. 8 arrow). The contour image (Fig. 9A) was compared with the previous RM15 survey *(YCCCART 2013/Y8)* (Fig. 9B). The shallow depression was not seen in the RM15 survey. However, the slightly elevated area (Fig. 8) corresponded with the south west area of the

circular structure seen in the RM15 survey (Fig. 9, green arrow), and the middle area corresponded with contours projecting into the centre, from the southerly and northerly edges of the grid (Fig. 9, red arrows).

Fig. 7. Part of Grid 2 Jul 29. The area surveyed is shown between the small plastic peg, (arrow), and the figure in the middle distance. The shallow depression is also seen (open arrow). Looking west.

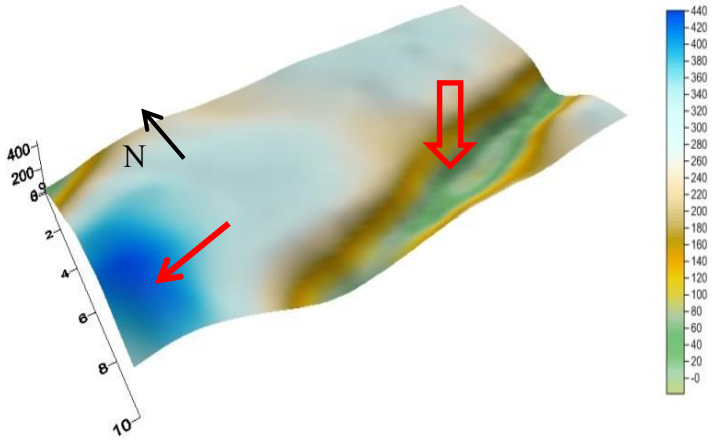

Fig.8. 3-dimensional image of the surveyed area. The shallow depression (open arrow), was identified and a slightly elevated area (arrow) can be seen. N, north.

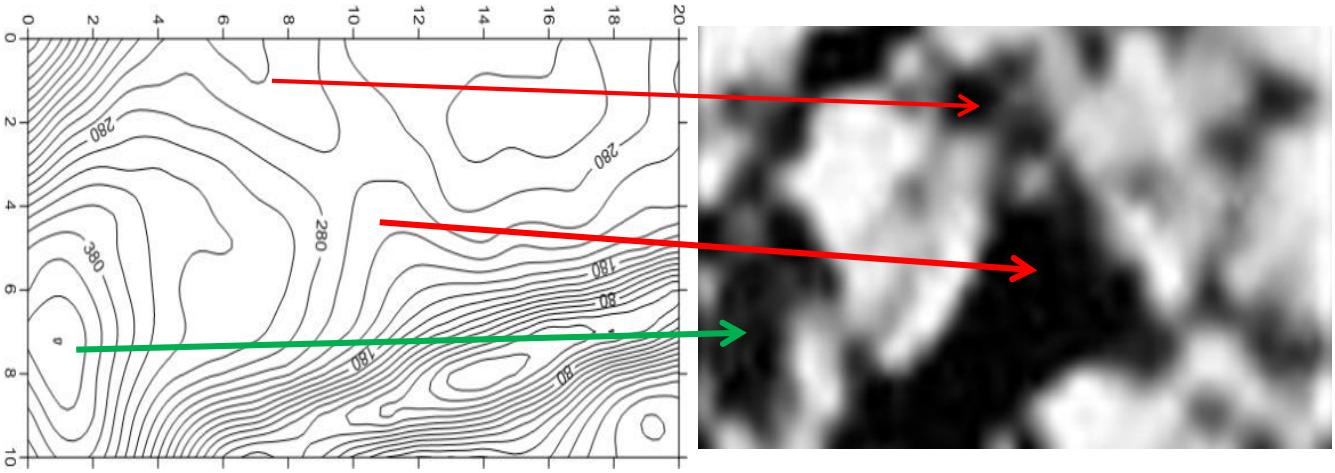

Fig.9. A, Contour grid; B, RM15 survey result, of the same area. The contours appear to have some similarity with the resistivity result (arrows) (see text). (North is towards the top of each image).

4 *Bank area, close to the river yeo*

The location of this feature (Appendix 4) (Fig 10) is shown in Figure 2. The bank was surveyed using a tape grid, 20 x 4m, laid out using the RM15 survey baseline. Heights were measured at 1m intervals along the Y axis, northerly (21 columns), and 2m intervals along the X axis, easterly (3 columns). The zero point was 6m easterly from the south west edge of the grid. The Z axis was the height above, (+), or below, (-), the zero point in mm. The results were recorded on paper. Maximum heights above or below the zero point were 472 to -581 mm. The raw data were processed electronically as described previously. Three-dimensional, (Fig.11), and contour (Fig. 12, inset A) images were produced. The latter was compared with the previous RM15 survey *(YCCCART 2013/Y8)* (Fig. 12).

Fig.10 The bank, looking west. The tape separating grids 1 and 2 (arrow), runs along the top of the bank. A slight depression (open arrow) can be seen at its southerly edge.

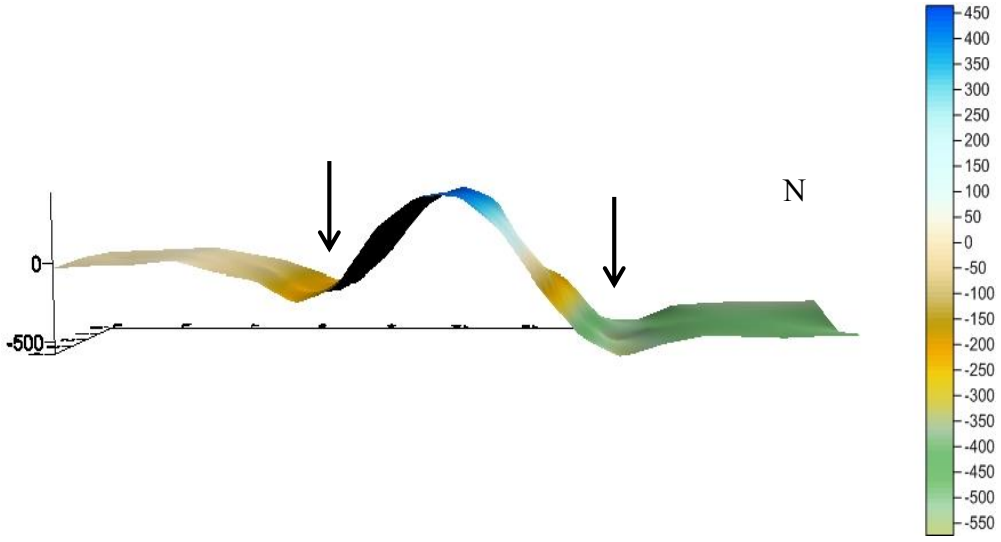

Fig. 11. The bank, 3-dimensional profile. The ground to the south of the bank is slightly raised compared to the northern side, and shallow depressions can be seen at either side of the bank (arrows). N, north.

N

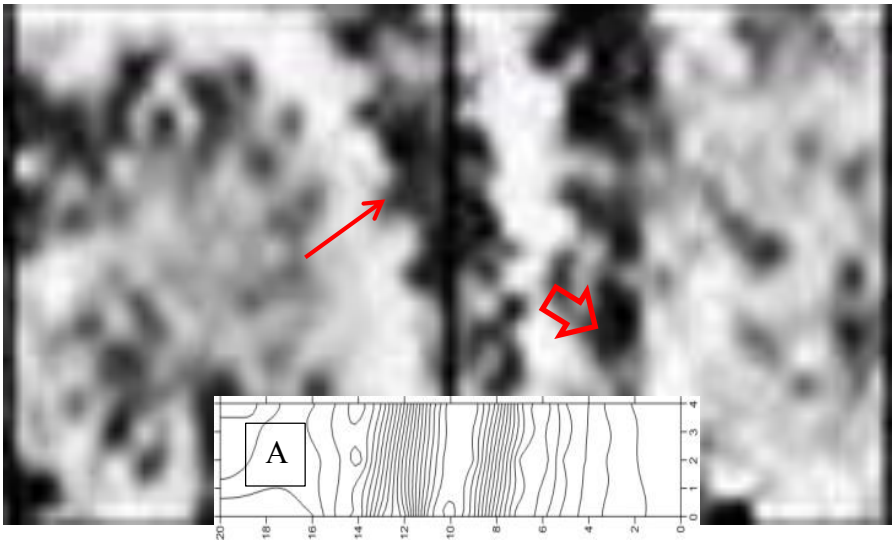

Fig. 12. RM15 survey result. The bank contour image is seen at the westerly edge of the grid (inset, A). The northerly line (arrow) of the RM15 survey corresponds with the bank, shown by the close contours of the contour image. The southern line of the RM15 image (open arrow) corresponds to the slightly raised ground seen in in the 3-dimensional profile (Fig. 11).

Comments

From the geophysics survey using the Geoscan Resistivity Meter (RM15) *(YCCCART 2013/Y8),* the villa area was clearly identified, and the original 1884-85 excavation plan *(Somerset Archaeological & Natural History Society, 1886)* was confirmed. Although some stone representing the villa walls was exposed, other undulations, within the excavation area, could not be definitely identified, or easily related to the outline of the villa. With the electronic, hydrostatic level, however, and the three-dimensional contoured images, derived from the survey, the undulations could be seen to correspond with the plan of some of the previously excavated walls, and the RM15 survey. Therefore its use has demonstrated, perhaps for the first time, that in favourable circumstances, it is possible that some geophysical results and surface features, can be accurately correlated. Furthermore, the results indicated the extent of the villa vulnerable to potential, further erosion. One of the aims of the resistivity survey, *(YCCCART 2013/Y8),* was to assess the current state of the villa walls; the findings of the present study have, therefore, clearly complemented the earlier survey.

In the earlier resistivity survey, it was suggested that 'a wing to the villa appears evident in grid D7', corresponding to Grid 2, Jun 27. A clear 'ditch system' was identified along the northern, and western edges of the grid in the present study, with a shallow extension easterly near the southern edge, into the centre of the grid, and extending in a north westerly direction (Fig 6A). This latter extension corresponded to the RM15 survey, possibly representing a wall, and may be an example of a further correlation between the two surveys. In addition, an unusual profile, with a slightly crescent shape, was identified in the RM15 survey (Fig 6B). This corresponded with a similar profile in the three-dimensional contoured image (Fig 6A). Whilst it is possible that this similarity is coincidental, nevertheless, it is tempting to suggest that since these surveys were carried out independently, and objectively, there may be a correlation between the two surveys. It would be interesting to see, possibly from excavation, whether the subtle surface features, (Fig 6A), correspond with the earlier RM15 survey.

The survey of a grid away from the villa, Grid 2 Jul 29, indicated a possible correlation between the RM15 survey and the three dimensional image. A circular feature could be seen in both surveys, with a slight mound, corresponding to the RM15 survey, observed in the 3-dimensional image, but not obvious on the ground.

The findings related to the bank, using the electronic, hydrostatic level, complemented the RM15 results. The bank corresponded with a northerly, RM15 positive line running east-west (Fig. 12). The ground to the south of the bank was seen to be elevated, relative to the northerly side, (Fig. 11), suggesting a possible correlation with the more southerly, RM15 positive line running parallel to the bank. At either side of the bank was a shallow 'ditch'. These features taken together are not inconsistent with a double bank feature as suggested in the previous Geophysics report *(YCCCART, 2013/Y8).*

This report has demonstrated, perhaps for the first time, that in favourable circumstances, it is possible that some geophysical results and surface features, can be accurately correlated. Furthermore, by demonstrating a 3-dimensional, surface image of an 'underground' feature, it should allow potential monitoring, over time, to assess any potential damage, similar to findings reported earlier for a round, platform feature on Cadbury-Congresbury Hill Fort *(YCCCART, 2014/Y19).*

Recommendations

Selected excavation, away from the scheduled area, may help to elucidate any potential correlations between the geophysical survey (in this case using the RM15) and a manual survey using an electronic, hydrostatic level.

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