BATH AND COUNTIES ARCHAEOLOGICAL SOCIETY

Bath Spa University Newton Park Campus Dog Kennel Wood area Interim Report Geophysics March 2019

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Abstract

Geophysical survey conducted on the mound next to the playing fields in the Dog Kennel Wood area of the Newton Park Campus of Bath Spa University showed it to be encircled by an ovoid stone ring with a break on its southern side. The ring disappeared under the made-up ground of the playing fields. It was of the order of 30 m north-south, with minimum east-west dimensions of 20 m. A rectangular feature, probably a building, some 7 m by 3 m was placed in the break in the ovoid ring. From its position, it is assumed to be later than the ring. On the steep slope of the mound, where it descends to the west, was a very strong signal, apparently from stones placed in a cutting into the hill. There was no dating evidence.

Down by the stream, some 100 m to the west, there were apparently walls representing either a large building or a small enclosure on the western bank. Again, there was no dating evidence.

Bath Spa University, Newton Park Campus.
Dog Kennel Wood area. Interim report – Geophysics

March 2019

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Preface

The survey was carried out by members of the Bath and Counties Archaeological Society (BACAS) and students from the university, working together, using equipment belonging to BACAS. Bath Spa University also provided specialist survey equipment, including drone and high precision GPS.

Material from this report may be used by either party in the production of a final report, or for publicity purposes.

Acknowledgements

The technical side of the survey was organised by John Oswin and Janet Pryke of BACAS and was hosted by Chris Davies and Dr Cassie Newland of Bath Spa University. Dr Andy Skellern of Bath Spa provided drone and GPS expertise. Ian Perkins of BACAS acted as liaison between the two parties.

We would particularly like to thank Bath Spa University for allowing us in and agreeing to this joint survey.

Thank you to all those students and BACAS members who joined in the survey. We hope you all enjoyed it.

1 Introduction

1.1 Location

Dog Kennel Wood lies towards the southern end of Newton Park Campus, above the Corston Brook, just west of the playing fields at the southern end of the campus. The survey took place on a bare hilltop just east of the wood, next to the playing fields. Indeed, the playing fields have been built up and graded such that they overlie a portion of this hilltop. Figure 1.1 shows the hilltop site.

Figure 1.1. The mound site visible, with the hill top contained within an ovoid ring.

Just to the west, at the bottom of the slope, a small area was surveyed in the gap between the woods, straddling the stream. Figure 2 shows the location of the streamside site.

The grid reference for the hilltop is ST 691 638, and for the stream side ST 691 639. The plateau of the hill is about 63 m above Ordnance Datum (OD), the stream about 50 m OD.

Figure 1.2. Looking up from the stream. The mound site is on the hilltop. The gridded area straddled the fence, just between the wooded areas. The first grid continued 20 m up the hill from the stream, the second extended 20 m behind the photographer.

1.2 Dates

The survey took place on Tuesday and Wednesday, 19th and 20th March 2019.

1.3 Personnel

The geophysical survey was led technically by Dr John Oswin of BACAS with guidance from Dr Cassie Newland of Bath Spa University. Dr Andy Skellern and Dr Matt Law of Bath Spa University provided GPS and photogrammetric data. Ian Perkins of BACAS acted as liaison.

The survey was undertaken by members of BACAS and students from Bath Spa University.

1.4 Scope

This report details only the geophysical surveys of March 2019 and their results, with some interpretation. It uses the output from the GPS but does not discuss that survey. It is intended to provide rapid guidance for excavation planning by Bath Spa University. Material stated here may be re-used in any final report on the sites.

2 Method

2.1 Gridding

The hilltop was gridded in 10 m squares, starting from the strainer post under the tree on the hilltop, as illustrated in figure 2.1. The grid baseline went along the fence heading south for its straight portion. It was also continued one square to the north.

Figure 2.1. Post as origin of grid on mound.

2.2 Twin Probe Resistance.

Two twin-probe resistance machines were used, similar in overall appearance, but differing in detail. The Geoscan RM15 (black) was used throughout the survey. It downloaded its data in zig-zag fashion. The TR/CIA device (silver) downloaded data as a series of parallel lines. Both used a frame with 0.5 m probe separation, and on both the remote probes were set a minimum of 15 m away. The two sets were kept 40 m minimum away from each other to avoid crosstalk. A device is shown in figure 2.2.

2.3 Resistivity profiling

The TR/CIA device could also be converted for use for producing profiles, using a line of 32 probes. 1 m spacing was used giving a line length of 31 m in all cases. Heights of probes were measured in using a dumpy level in all cases, although the first two were also measured by GPS, and reference heights were also provided by GPS. Dumpy level measurements are used for all four profiles here for consistency.

Note that the technique used is often referred to as ‘electrical resistance tomography’ or ERT.

2.4 Software

The resistance meters were downloaded to XP computers via serial connectors, using BACAS proprietary download software. The data were mapped and analysed using INSITE v3 software. This may be dated but it is versatile, pictorial and easy to use.

Resistivity profiles were downloaded via TR proprietary software and converted to the format required. They were processed using RES2DINV full professional version, with height data from dumpy level added manually.

Microsoft Word and Excel and Adobe Photoshop were used in preparing material for display.

Figure 2.2. (Black) twin-probe resistance device in use.

3 Results

3.1 Mound site, twin probe resistance.

The resistance plot obtained on the mound is shown both in greyscale and in colour in figure 3.1. Generally, more detail can be seen in the colour plot. The scales had to be set wide in order to encompass resistance values from 30 to 130 Ω. Note that these use a logarithmic scale of resistance which helps to encompass the wide variation but which limits the detail in certain ranges of resistance. A linear plot of resistance is shown below in figure 3.2 for that part of the plot outlined in red.

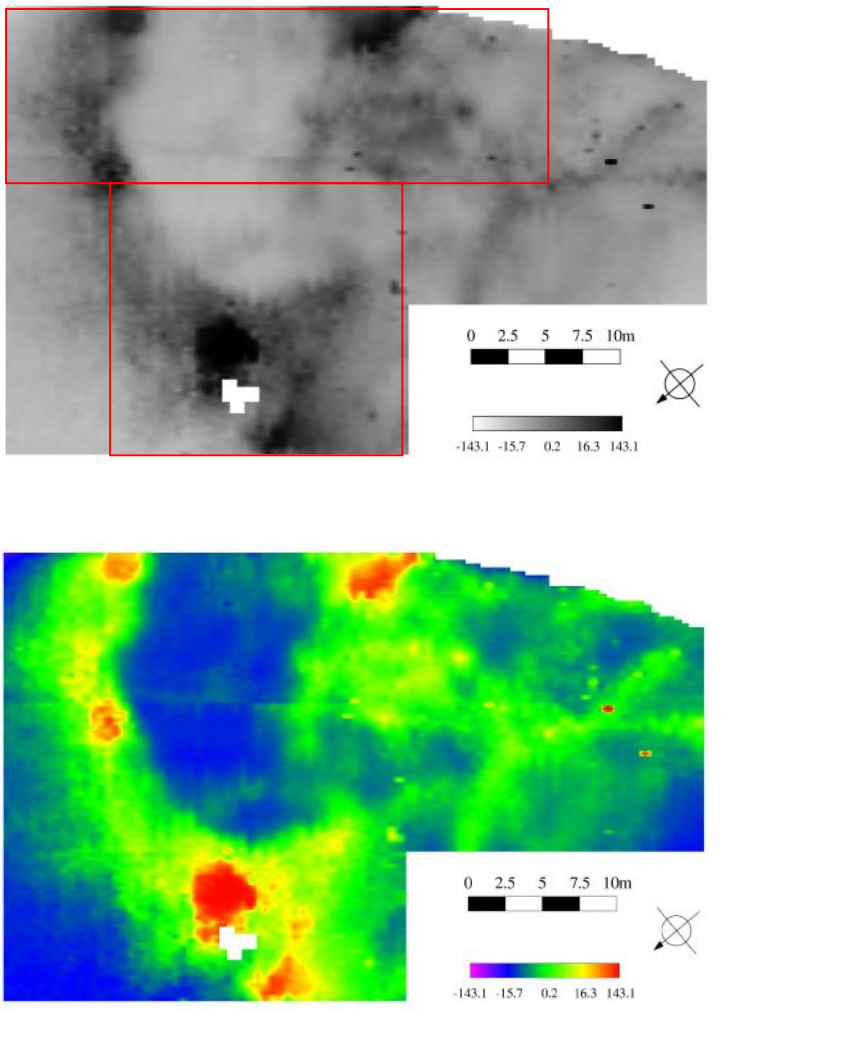

Figure 3.1. Twin probe resistance on the mound. Greyscale and colour plots. The red outline on the greyscale plot indicates the area shown in figure 3.2.

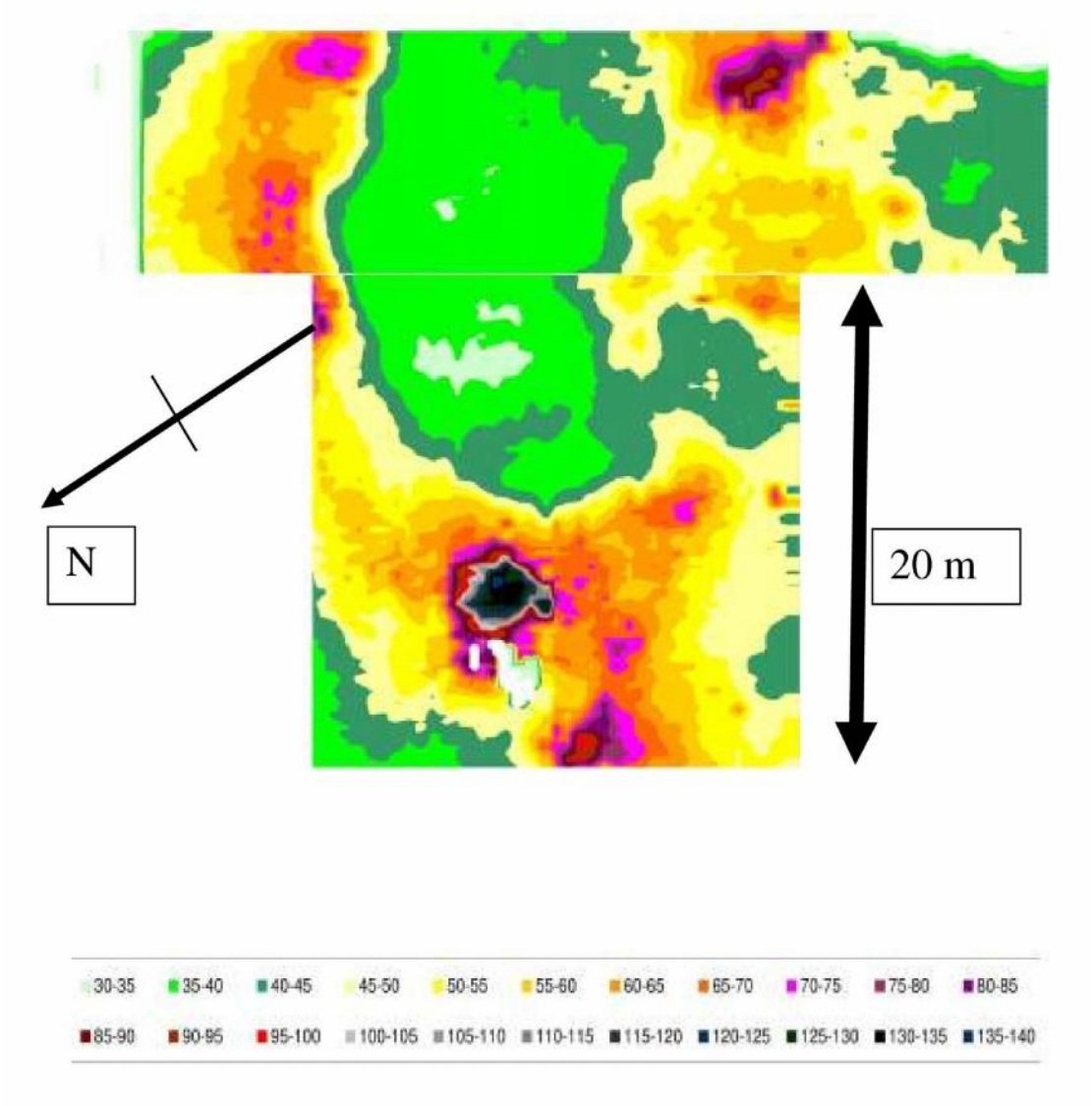

Figure 3.2. Resistance plot of selected squares using a linear resistance scale.

There is an apparent ovoid ring encircling the hilltop, although it is broken on the right side (south). This appears to be stone, and is visible as a raised ridge on the ground. This is raised slightly higher towards the bottom of the plot (west), where it sits just above the steep slope. However, the highest readings are just down below the edge of slope, on the steep portion, just above the bramble bush which is indicated by the small blank space in the plot. Figure 3.2 defines this well, but it appears to be just a pile of stones with no structure. However, there does seem to be a wall just to the west of it continuing down the slope out of the plot. This is not visible on the ground, but may show more clearly on the photogrammetric survey in preparation.

The stone ring continues under the fence at the top (east) of the plot, and can be seen heading under the graded playing field at half a metre or more below present ground surface. This would make it difficult to determine how far the ring extends. Detailed

maps (e.g. OS 1:25000) from 1950 or earlier may show the original ground surface and give some idea of its extent.

The gap on the right side is interrupted by an area of higher resistance which appears in figures 3.1 and 3.2 as a possible small building, some 7 m by 3 m. This only part fills the gap, with low resistance to its south. It is not clear whether a portion of the ring was demolished to insert the building, or whether it was built into an existing gap. Either way, it is probably later than the ring.

A number of high resistance lines extend to the right (south). The lower curved line is on the lip of a steep slope and is probably a small quarry face. The lines continuing off right are probably banks of the inclined plane which continues down to the bottom of the small valley here.

The plan is shown again below in colour as figure 3.3 set out on Ordnance Survey coordinates as determined by high precision GPS.

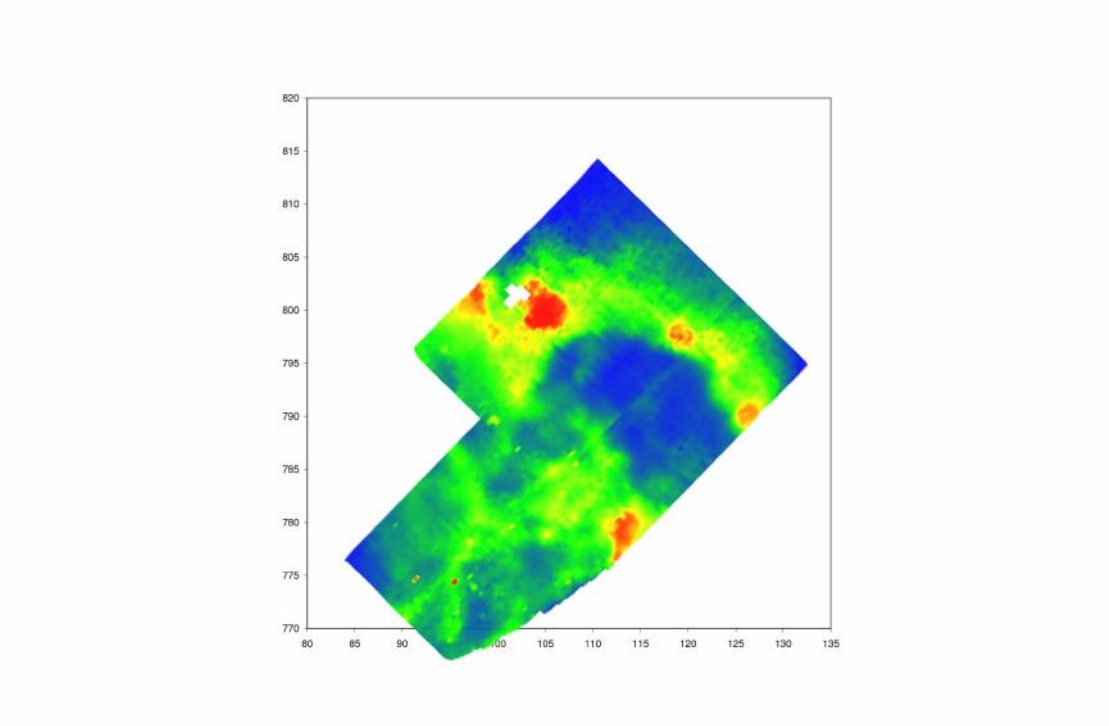

Figure 3.3. Resistance plot shown set on Ordnance Survey grid. X values are the last three digits of the easting, Y values are the last three digits of the northing.

The coordinates are based on Ordnance Survey, and show the last three digits of each of easting and northing, so that for instance, point 120, 780 means ST 69120 63780, otherwise 369120 163780.

3.2 Mound site, resistivity profiles

Three profiles were taken across the mound, each 31 m long with 32 probes at 1 m intervals. The first of these was intended to pass from the stone ring through the apparent building. The second cut the stone ring on the left (north) side and headed through the stone mound at the edge of the high ground before plunging over the steep slope. The third started on the stone ring to the right (south), passed through the apparent building, past the stone mound and plunged over the steep slope. These are shown overlaid on the resistance plot (as shown in figure 3.3) in figure 3.4.

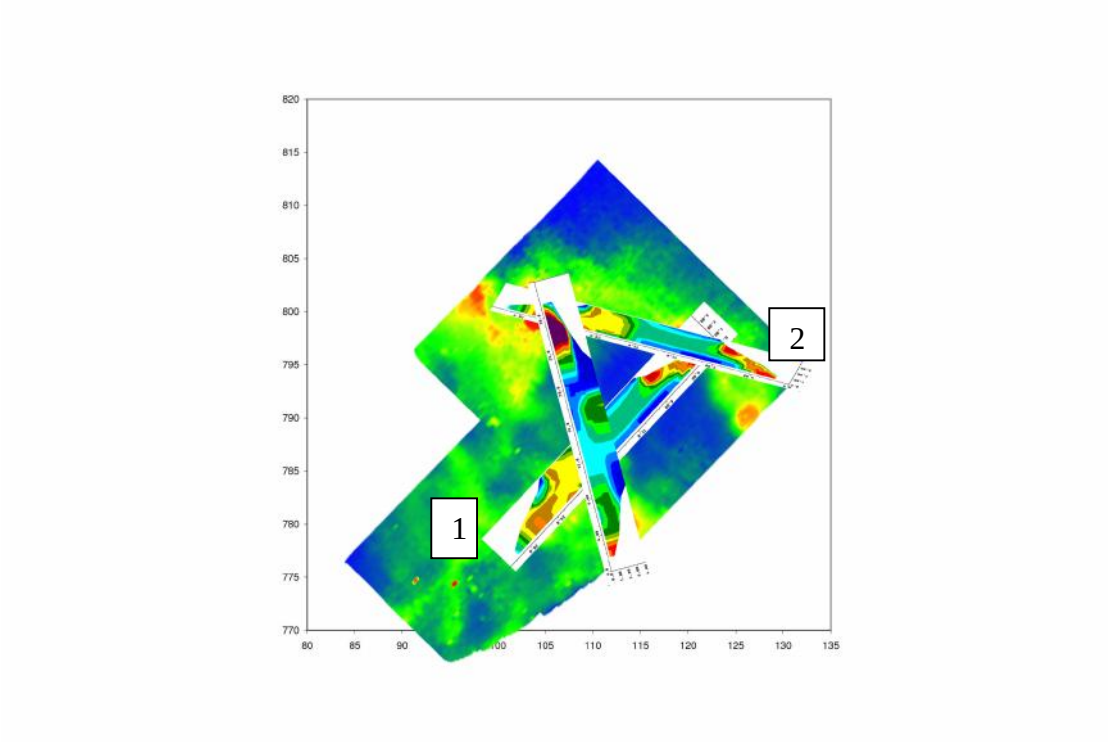

Figure 3.4 Profiles shown overlaid on resistance plot.

Note that the resistivity scale of all three has initially been set to the same linear values for ease of comparison, but other scales can be introduced if they add more clarity.

Profile 1 is shown in figure 3.5 below. Surface topography has been included, but this area of the mound was quite flat with only small undulations. The edge of the stone ring can be seen at 3 m. It goes down a metre or so, but is truncated by the shape of the profile. The building can be seen from 20 to 27 m, with high readings surrounding it, presumably marking out rubble, or a firm area. Its presence can be seen down to a depth of nearly 2 m, so substantial footings may remain. Apart from these, the mound appears to be moist soil.

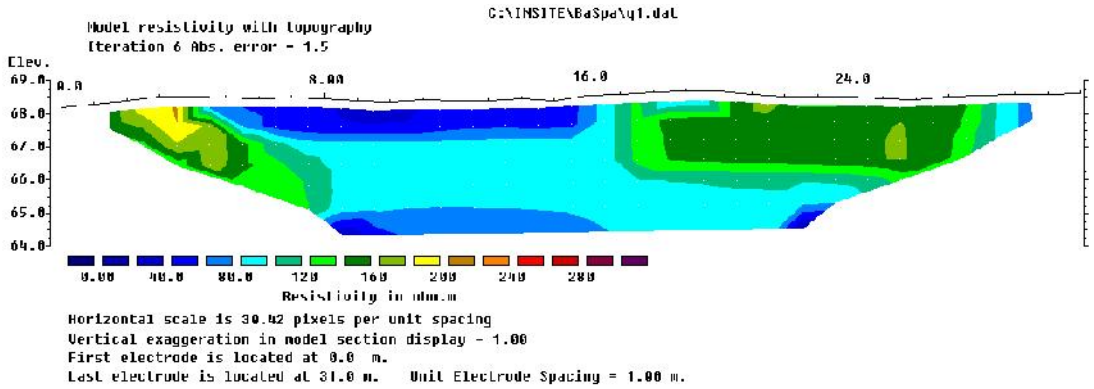

Figure 3.5. Profile 1.

Profiles 2 and 3 cross each other at 26.45 m on profile 2, 25.85 m on profile 3. Both start at the fence which marks the top of the resistance survey, cross near the stone mound and end on the steep slope. Profile 2 started at -5.40 m with respect to the origin of the grid, as shown in figure 2.1 (i.e. north of that point). Profile 3 started at 20 m (south) on the grid corner, and passed through 10, -20 grid post. The profiles are shown below as figures 3.6 and 3.7 respectively.

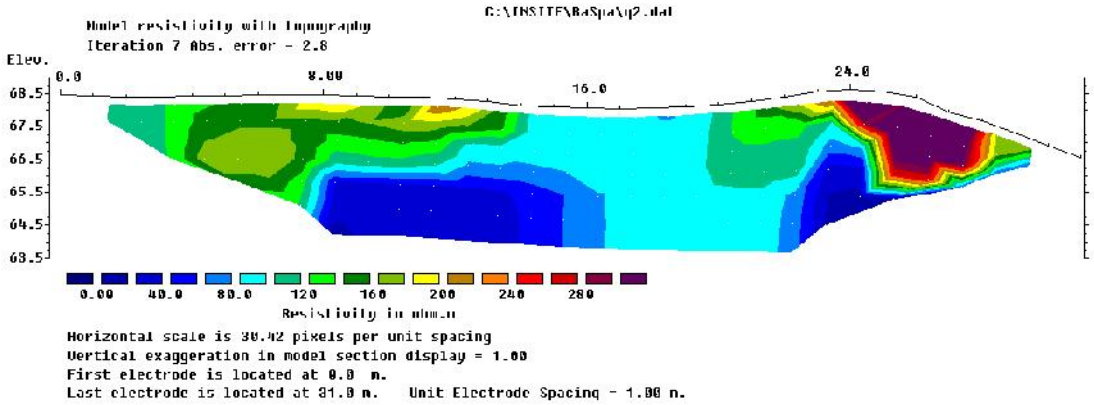

Figure 3.6. Profile 2

A diagonal section through the ovoid ring can be seen from 7 m to 14 m, although there seem to be buried footings of some sort before it, at 6 m. The very stony area at the top of the steep slope is clearly evident, and it does include the crest of the hill, but it appears to be dug into the hill as it goes downslope. It could be massive footings, but the resistance plot just shows an isolated round area, more suggestive of a small quarry which has been filled in.

The rest of the hilltop is very low resistance, suggesting wet clay, either natural soil or ground made up a long time ago.

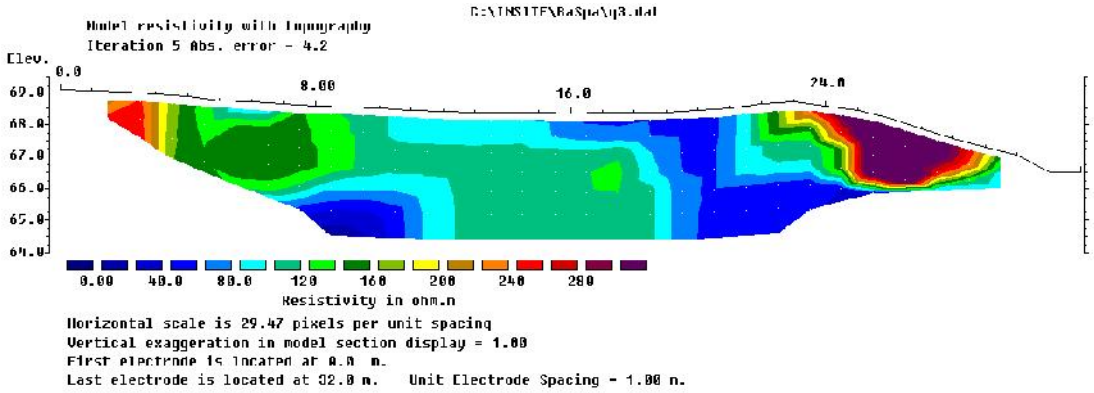

Figure 3.7. Profile 3.

Profile 3 shows the edge of the (southern) ovoid ring and then the building, cut through at an angle, at 5 m – 8 m. The stones from the crest of the hill over the steep slope are evident again, and again appear to be cut into the hillside. The edge of the whole feature here looks very square (21 m), so looks man-made.

The gap between the two features is low resistance, but not as low as the wet clay seen in the centre of figure 3.6. This suggests firmer soil in the gap, but there is no clear indication that the ovoid wall was here and has been removed. It could represent firm material being put down across the entrance.

3.3 Streamside, twin-probe resistance survey.

The resistance survey by the stream is shown in figure 3.8

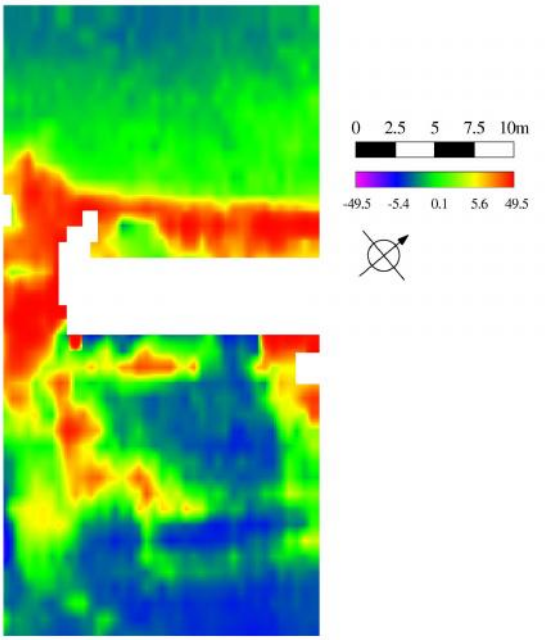

Figure 3.8. Resistance survey by the stream.

The blank area shows where the stream was, while the high resistance area far left shows readings taken on the bridge, so they only add continuity of plot without good description of the underlying ground conditions. The high resistance band beyond the stream is the revetment wall alongside it.

Of greater interest is the pattern of high readings below the stream on the plot. This is the same side of the stream as the mound. There is a possible sub-rectangular structure 7 m by 15 m, with an extension to the side. This would be on the terrace just above the stream. It could be a building or it could just be an enclosure. As the ground rises here, it would be above most flooding.

If it is the remains of a mill, it is certainly not the latest, as structure from this remains on the far side of the stream just to the south. Indeed, had time permitted, a third grid to the south-west along the far bank of the stream could have been beneficial. One profile was put across the structure discovered, and this is located by figure 3.9. It will be described in the following section.

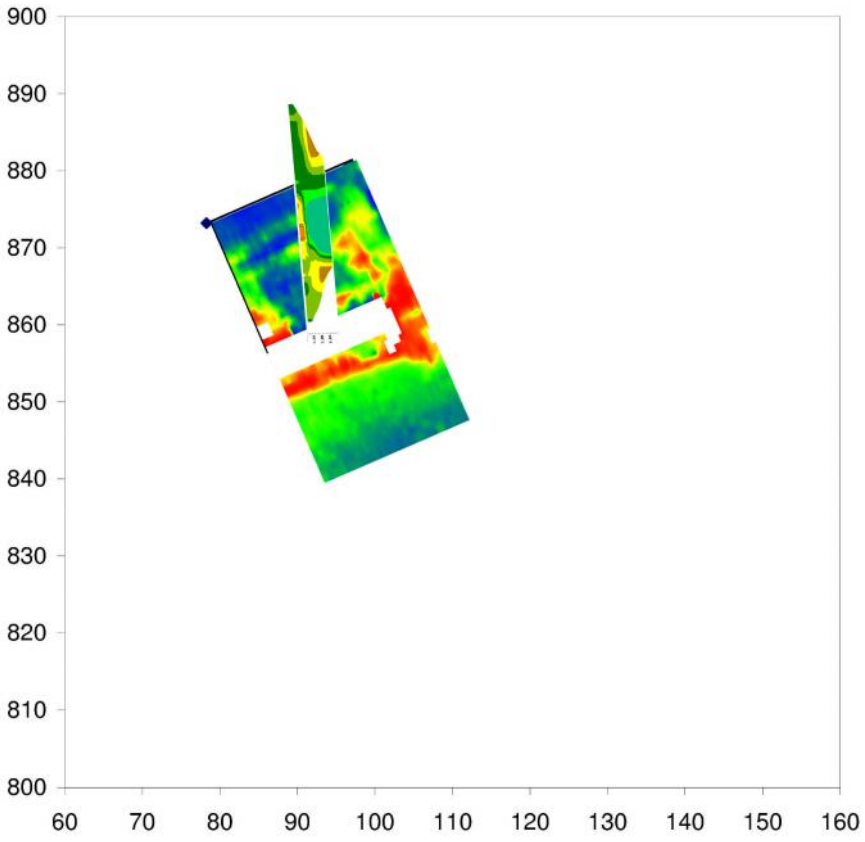

Figure 3.9. Streamside resistance plot shown with profile position overlaid. Note that the plot has been overlaid on Ordnance Survey coordinates, so, for instance, point 100, 850 should be read as ST 69100, 63850, or 369100, 163850.

3.4 Streamside resistivity profile

The profile taken across the resistance plot is shown in figure 3.10. It started right at the water's edge, continuing upslope. In order to maintain the same angle of view as before, the profile has been reversed, apparently starting uphill and continuing down to the stream.

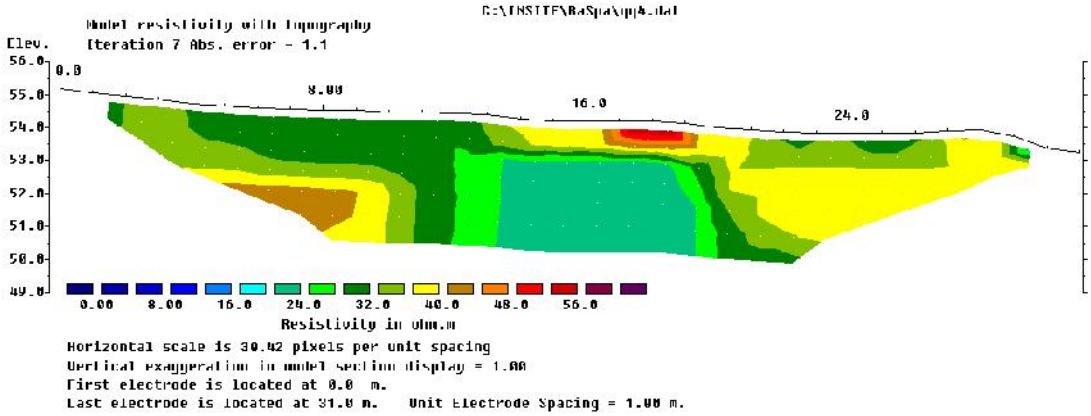

Figure 3.10. Profile 4, shown descending to the stream edge.

Breaks in slope can be seen at 14 m, 19 m and 28 m. The edge of the stream is at 31 m. Some form of structure is visible at 17 m-19 m, probably wall footings. There may be more on the edge of the terrace at 28 m, defining the pattern seen in figure 3.8. However, this has low resistance inside it, so may represent a soil interior. Similar resistivity is seen on the grassy bank up to 14 m, continuing up the slope towards the mound. This low resistance seems to be set as a shallow layer on top of drier, probably alluvial, soil extending across these terraces and down to the stream.

4 Comment and Conclusions

Two small separate sites have produced intriguing results. These could possibly be amplified by further geophysics, but not explained. It will require targeted excavation to understand what is there more fully.

Starting on the mound, there needs to be established the date of the ovoid ring and its construction, and whether the break in its southern side is as designed or whether it has been broken through later. Its use also needs to be ascertained as this cannot even be implied from the geophysics.

The break in the ring seems to contain a small building. The nature of this and its date of use needs to be established. From its position, it is assumed to be later than the ring but whether by years, decades or centuries is not obvious.

Over the edge of the mound, there is a small area of very high resistance, but it is not clear whether there is any connection between this and the ring, and whether it is a structure or a quarry which has been filled with stone. There also appears to be a wall line continuing downhill behind this. Although this could be traced further by geophysics, its nature and date could only be determined by excavation and this could be combined with investigation of the high resistance feature.

Possible areas of investigation are indicated in figure 4.1 below. There are other areas which could benefit from excavation, such as the ramp heading down to the south into the valley, but ovoid ring, building and stone pile with wall are considered to be the highest priority in understanding the site.

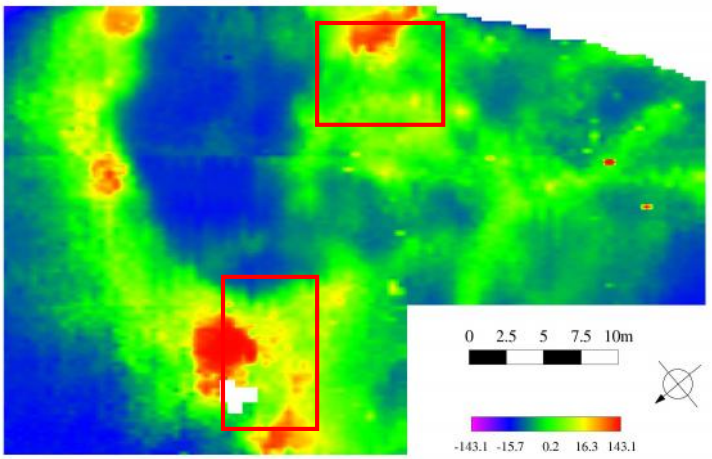

Figure 4.1. Resistance plot of mound. Red boxes mark profitable areas for gaining further detail by excavation.

There is also more detail to be determined down by the stream. Continuing geophysics survey to the south along the valley on the far side of the stream might be beneficial in understanding the mill site which is evident from upstanding features by the stream, but more detail might be gleaned from excavation of the site within the wood. As that is beyond the geophysical survey area, that is outside the scope of this document. Geophysical survey within woodland is very difficult and is not suitable here, so targeted excavation would yield better results.

There is certainly scope for excavation on the eastern bank of the stream, extending up through the terraces to see if the high resistance lines represent a building or a small enclosure. It is also possible that some dating evidence may be uncovered as well as some indication of use.

Figure 4.2 indicates the area most likely to provide useful evidence.

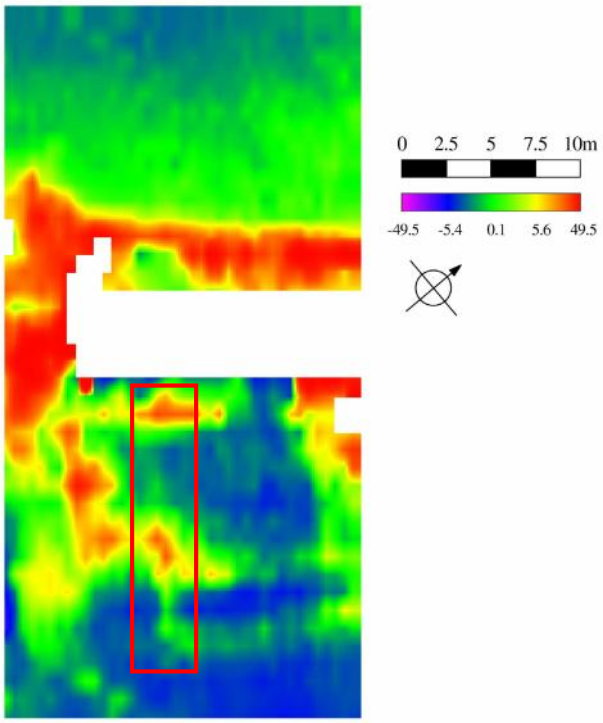

Figure 4.2. Resistance plot streamside, with red box indicating area of most profitable excavation

Note that suggestions given here are based purely on geophysics interpretation, and may be overridden by other requirements of time or logistics. More detailed investigation of these areas is needed to understand the monuments and excavation is to be recommended.