Badminton
a geophysical survey

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Archaeological Report No. 2

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Acknowledgements

We should like to thank His Grace the Duke of Beaufort for permission to undertake this geophysical survey on the Badminton estate. Our thanks go also to Don Watts (Head Forester) who first identified the site and who’s enthusiasm and desire to learn more about it was the main inspiration for this investigation. Don’s help with the field work and his regular supply of cider were much appreciated.

MM. JM. AJ.

The following report provides an interpretation of a geophysical survey. Please note that it is always possible that subsequent excavation might alter this interpretation.
Introduction

The following archaeological investigation was carried out at the request of Mr Don Watts (Head Forester for the Badminton Estate) and with the permission of His Grace the Duke of Beaufort. A geophysical survey (resistance) was undertaken on arable land approximately 3 km north of Badminton House.

Great Badminton (OS ST 807829) is located 19 kilometres north of Bath (Fig. 1).

Figure 1  Location of Survey Site

Background

The decision to survey this site on the Badminton Estate in South Gloucestershire followed on from the successful discovery of two Roman settlements in the near vicinity¹. The elucidation of these other sites and their subsequent excavation strategy was, in part, based upon geophysical (resistance) surveys by Sagascan. Don Watts has held a long interest in the history of the surrounding countryside and, over the years, has collected many artefacts from the plough soil and from ditches on the estate. His attention had been drawn to several stony patches revealed by the plough from which sherds of Roman pottery, broken roof tiles and even tesserae were recovered. Hence the existence of Roman settlements has long been suspected. As an active member of the local history society and after taking part in excavations at Lower Woods and at Springfield Farm, Don Watts invited Sagascan to survey one of his suspected villas in July, 2003.

Methodology

The geophysical survey was undertaken using a twin probe TR/CIA Resistance Meter operating on 1.0 mA at a maximum output voltage of 40V. Weather conditions were on the whole dry and warm with little or no rain throughout the surveying period. The two fields over which the study area fell had been cultivated prior to the survey and remained unsown for most of the surveying period. The fields were put down to oilseed rape in early September. The soils are alkaline and not exceptionally deep and overlie Middle Jurassic oolitic limestone. Though the ground was stony, the soil was un-compacted and of sufficient depth to allow an easy insertion of the probes. The soil moisture content was adequate and gave reasonable and repeatable resistance readings.

The investigation took place at intervals from July to September, 2003. Approximately two hectares (2.08 ha) were surveyed over a period of six days (2,800 data points). The eastern edge of the surveyed area is in part bounded by and in part bisected by an estate road (Fig. 2).

Resistance data were plotted as colour-tinted grey scale bitmap images (Figs. 3 -6).

Figure 2  Badminton Estate – Area Surveyed

County: WILTSHIRE  Date :1889  Grid Ref: 381164,185768

Survey Area

First Edition: 1:10,560 County Series

0 0.25 Km
Results

The combined plots are presented in Figs. 3 and 3a. It was decided that the **blue** plot gave the best depiction of high resistivity (buried walls, shallow/drier soils etc) and the **yellow/green** plot being better for low resistivity (buried ditches, robbed out walls, deeper/wetter soils etc).

**Figure 3** Badminton Resistivity Plots - September 2003 (mean 24.27 ohms)
General Description:

The Resistance Survey plots reveal a complex arrangement of buried ditches (13.85 – 18.55 Ω) and several rectilinear structures (27 - 46 Ω) clearly depicting buildings. The dominant features on the plot are the buried remains of a large building (50m long) and two smaller buildings all contained within a trapezoidal boundary ditch. Separate landscapes appear to underlay or to be superimposed upon this. These include circular and curvilinear structures and long striations extending diagonally across the entire survey area.
Interpretation

The interpretation of features revealed by a resistance survey is always hampered by the absence of stratigraphical information. This knowledge can only be provided by excavation (or by more sophisticated geophysical techniques such as ground penetrating radar). In a two-dimensional presentation it can be said only that features intersect, not that one underlies or cuts through another. Hence to talk about archaeological sequences, say from pre-Roman through to medieval, can only be conjecture. Nevertheless, other information, such as artefacts recovered from the soils surface, styles of construction (rectangular or circular) and orientation (complementary or contradictory) do allow some guesses to be better informed than others.

Pre-Roman Settlement:

The most pronounced findings recorded by the geophysical survey are the linear and rectilinear features clearly associated with a Roman settlement (see below). However, it was evident that certain curved and sub-circular features (of both low and high resistance, i.e. buried ditches and walls) formed an independent landscape that, in several instances, intersects what are conjectured as Roman walls and ditches (Fig. 4).

In the northeast corner of the surveyed area there are a series of small circles five or so metres across. At first glance these appear to consist of an outer buried wall (26-27 ø) with deeper soils (20-22 ø) within. There was some thought that these rings were natural drainage sinks (e.g. swallets) that are found in limestone topography but this was dismissed as such features are not recorded elsewhere in the locality. They appeared too large to be storage pits and it was surmised that they might be hut circles, the remains of round houses and part of a pre-Roman settlement. However, an examination of the 1889 OS map (see Fig. 2) reveals the past existence of parkland trees in this location and it is now thought that the “hut circles” are no more than the residual effects of tree root removal when the park was converted to arable use.

On the eastern edge of the surveyed area there is a large circle and, just to the south of the middle of the surveyed area, a half-circle. Unlike the smaller tree root pits described above, both are bounded by a buried ditch (15 – 20 ø). Their diameters approximate 26 - 27 metres. It is suggested that these are livestock pens and, if later excavation confirms that they are either cut across by the Roman ditch or underlie a Roman building, then these may be associated with a pre-Roman settlement.

It can be seen there are several other curvilinear features, all of which appear to be buried ditches (14 – 19 ø) that intersect (cut across or are cut across by) the postulated Roman ditches. These also may be associated with ancient stock control.

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² Geophysical surveys do, most certainly, allow the archaeologist to target precisely the point where definitive proof is most likely to be found.
Figure 4  Possible Pre-Roman Settlement (mean 24.27 ohms)

PRE-ROMAN?

As stated in the beginning of this section, without full excavation, neither the features associated with the Roman villa complex can be definitively assigned to any period prior to the post-Roman Roman settlement. However, extensively over almost all of the area examined, there is a series of rough, rectangular structures forming a northeast-southwest alignment parallel to the linear course of the road, and there is evidence that this line of structures has continued to be used. In this alignment, it is suggested that these represent the remains of medieval farm buildings that may well have survived modification and has only vanished (on surface evidence) as the result of cultivation in the past sixty years. They are, however, cut across by the...
Roman Settlement:

The resistivity survey clearly confirms Don Watts' conviction that the site was that of a Roman settlement (Fig. 5). The plot shows a trapezoidal ditch within which lie the main villa building and two smaller outlying buildings. Other features include the possibility of another building in the southern corner and a paddock in the eastern corner.

boundary ditch

The ditch (14 -19 Ω) appears to be approximately 1.5m across and 450m long forming a trapezium pointing west-north-west. (Dimensions 118m x 124m x 85m x 124m). The ditch encloses an area of 1.24 ha. A break in the ditch line on the eastern perimeter may represent the entrance to the enclosure.

main building

The main building is 55m long and 20m wide and faces east-south-east (32 - 46 Ω). The northern end of the building has and apse-like front and appears to have been added onto the main structure. The higher resistance readings were recorded at the southern end and this may indicate the location of a bathhouse.

outbuildings

There are two buildings each approximately 20m by 12m set about 25m east of the main house. The long axes of these out house are in line with the sides of trapezoidal boundary ditch giving a "splayed-out" effect. The internal structures are discernible in both. Their function is unknown, but one at least may have been a stable.

garden features

Between the two outbuildings there are vague patterns of high and low resistance (not annotated) that may indicate the presence of Roman garden features. This suggestion is, of course, speculative.

other building

In the south east corner of the survey area is a rectangular area of high resistivity (77 -135 Ω). It is twenty meters long and ten metres wide and lies across the perimeter ditch. In fact it appears to be bisected by the ditch. No internal structures are discernible. Whether this is a building associated with the Roman settlement is conjectural. It should be noted that it is also aligned with the nineteenth century (at least) road. Further speculation should await an extension of the survey area or exploratory excavation.

paddock

In the eastern corner of the enclosure is a smaller enclosure that parodies the trapezoidal boundary ditch. The buried ditch encloses and area of approximately 300 square metres. Its purpose is unknown.

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3 This part of the building was later excavated – see discussion.
Post-Roman Settlement:

As stated at the beginning of this section, without full excavation, features that appear dissociated with the Roman villa complex cannot be definitively ascribed to any period prior to or post-dating Roman settlement. However, extending over almost all of the surveyed area is a pattern of high/low resistance striations running northwest to southeast and more or less in line with each other (Fig. 6). Peaks of high resistance (24 - 29 Ω) are on average three to four metres apart. It is suggested that these represent the remains of medieval ridge and furrow that may well have survived emparkation and has only vanished (as surface features) as the result of cultivations in the past sixty years. They are, however, cut across by the
estate road that was certainly in existence at the end of the nineteenth century. It is of note that they are absent in the vicinity of the main villa building which might imply that a ruin still existed during the medieval period. A more likely explanation, however, is that the ridge and furrow across the shallower soils that overlay the villa site have been entirely ploughed out in recent years.

Figure 6 Possible Post-Roman activity (medieval ridge & furrow?)
(mean 24.27 ohms)
Conclusion

The resistance survey has uncovered a late-Roman villa complex with characteristic features that include a south-east facing aspect, a trapezoidal boundary ditch and “splayed” out-buildings. A subsequent excavation of the northern end of the main building suggests that that part of the villa was indeed late third to fourth century. It also revealed that the building had been destroyed by fire. The trapezoidal ditch-line is all that survives of what was originally a boundary fence or hedge. Apart from an abundant surface scattering of Roman pottery, broken roof tiles, the odd roofing nail and tesserae, worked flint was also recovered. Several tanged flint arrowheads were discovered in the close vicinity. The presence of these artefacts, taken together with the larger circular structures revealed by the resistance survey, indicate that villa sits on top of an older settlement. Any continuity between pre-Roman and Roman occupation, however, remains uncertain. It is probable that all trace of the villa had disappeared by the time the medieval ridge and furrow was laid down.

Such was the interest in the survey results that a metre square test pit was excavated at the northern end of the villa. At approximately half a metre below the plough soil the mosaic floor of a corridor was revealed. Under the direction of local government archaeologist Richard Osgood theapsoidal northern end of the villa was subsequently uncovered exposing a further largely intact mosaic floor of unusual design. These and other findings will be reported elsewhere.

Don Watts has identified several other potential villa sites on the Estate and elsewhere in the vicinity. It is hoped that geophysical surveys can be carried out at these sites in the future and add to the ever growing number of Roman settlements that are presently being uncovered in South Gloucestershire.

Mike Martin
Jill Martin
Andrew Jackson

2003
The First Badminton House: discovery of a Late Roman mosaic in South Gloucestershire

By RICHARD OSGOOD

Thomas Pigot (1657–1686)
He haz some pieces of opus tessellatum found at or near Badmanton (the duke of Beauford’s) not long before his death.

Introduction

In the later 17th century the antiquary John Aubrey (d. 1697) in the entry for Thomas Pigot in his Brief Lives gave a tantalising hint of the presence of a Roman mosaic on the duke of Beaufort’s estate of Badminton. The Sites and Monuments Record contains this reference and one other relating to excavations on the estate by the duchess of Beaufort and Lord Albert Conyngham in 1846 ‘in the park at Badminton, on the site of a Roman building’. Finds included much pottery, ‘coins of the lower empire’, a bronze statuette of a female figure and three intaglios ‘evidently late’ (South Gloucestershire SMR 2140).

The site lies close to the main Roman road between Cirencester (Corinium) and Bath (Aquae Sulis). ‘From Whitewater cottages or Lansborough Park lodge for 5½ miles the road runs (as widened for traffic in the 18th and 19th centuries) pretty direct by Badminton past the Dunkirk to Sodbury camp, and on to Old Sodbury’ (St Clair Baddeley 1930, 162–3). The same author noted (ibid. 163, note 24) that ‘Aubrey under 1686 (Monumenta Britannica: Bodleian) records a mosaic pavement having been found here, i.e., villa; a very interesting fact (cf. O.S. LXIX). Its exact site is not certain now, but is probably much nearer the road than the villa (v) on our map’. This was the totality of our understanding of Romanitas on the estate until the summer of 2003.

The excavation of the Roman buildings at nearby Lower Woods, Hawkesbury, in 2003 (Cosh 2004, 4–6 and fig.1) revealed the presence of the remains of a mosaic. This pavement subsequently proved to have an inscription within its border; the first such mosaic in Britain – REG[ ]S (ibid. 5 and fig. 2). The excavation was visited by the duke of Beaufort who gave his permission for a geophysical survey to be undertaken on the Badminton estate. One area had been earmarked for such work by the estate’s head forester, Mr Donald Watts. Over the years he had recovered a spread of Roman material from a specific site; limestone roof tiles, pot sherds and the occasional tessera. Aerial photographs of this area held by South Gloucestershire Council (AP Run 38/204) show possible trackways leading to this location and nearby traces of ridge and furrow. Grumbald’s Ash Archaeology Group, the team that had excavated Lower Woods, carried out a resistivity survey in the summer of 2003 with astonishing results (Fig. 1).

The Site

The survey of the area with the spread of Roman material mentioned above, centred on OS Nat. Grid ST 81028584 (Fig. 2), revealed a large building, some 65 m in length, with at least two smaller buildings just to the east possibly surrounding a garden or water feature (Bryn Walters pers. comm.). All of the structures seemed to be enclosed by the walls in an area trapezoidal in shape (Fig. 3). Of particular interest was the room on the northern end of the largest building as the survey showed it to be, on its east side, apsidal in form. A sample trench in that area showed that limestone walls of a structure remained in situ. All of the walls exposed were still covered by remnants of the original Roman wall plaster. This was coloured salmon pink with splashes of purple but many other fragments of colour were also present. On extension of the trench, it soon became apparent that the walls lay adjacent to a phenomenal mosaic, some 60 m², covering the floor of the apsidal room and the corridor that led to it.

The building had caught fire and collapsed. Patches of timber scorching were present on the mosaic and one patch of linear burning (presumably an individual timber) was especially clear over

Fig. 1. Resistivity survey of the area of the Badminton villa undertaken by Grumbald’s Ash Archaeological Group in 2003 (© A.W. Jackson, M.H. and J. Martin, Sagascan).
the rays of colour emanating from the central roundel within the apse. Large fragments of oak charcoal were recovered from this layer – the last remnants of these timbers. The collapse had covered the floor with building detritus, in particular pennant roof slabs that had, ironically, afforded the floor some protection from subsequent ploughing and ensured its preservation. Almost none of the stones that made up the walls of the apse-ended room survived. The only surviving
walls seen were those mentioned above, covered with painted wall plaster and demarcating the area of the corridor. The site was covered and then re-opened in the summer of 2004. The carefully worked stones of an arch, that would have been present in the apse region of the room, were found within the collapse layers and the respond of this arch was located at the edge of the mosaic floor (Osgood 2004, 29).
The Photography of the Mosaic

Following consultations with English Heritage Photogrammetric Unit (Survey Team), it was decided that, alongside the preparation of a coloured scale drawing on site by David Neal, the most accurate and versatile methodology for recording the Badminton mosaic would be through the production of a rectified photograph in a fashion similar to that of the Lopen pavement in Somerset (URL cited in bibliography). Thus in 2004 a photograph of the mosaic in the apse-ended room and the corridor was taken by Downland Survey and Measurement. Downland used site photography with control measurements, the images rectified using Rollei MSR software. The resulting photograph (Fig. 4) ensures that researchers will be able to take accurate measurements of the pavement from the scaled image. The remit of this article is to report the result of this survey and to draw together some expert opinions on the mosaic. A full report on the excavation work of 2003 and 2004 will be produced at a later date.

Opinions on the Mosaic

Since the discovery of the pavement, much debate has raged over its quality. Was it constructed by craftsmen with little skill, attempting to copy floors which they had seen but without the requisite competencies to accomplish the task, or was the mosaic fashioned by an expert team that felt unfettered by the normal restraints that encumbered the mosaicist and thus able to apply more artistic touches? In passages worth quoting at length, the arguments of the two schools of thought are put forward below.

On the subject of the mosaic floors in both the corridor and apsidal room, Stephen Cosh, co-author with David Neal of the ambitious and sumptuous corpus of Roman mosaics in Britain, wrote (2004, 4):

Two mosaics were exposed. One, paving a passage is relatively simple, comprising a coarse purplish-brown pennant stone border with a band of white about 0.60 m wide running down its centre and relieved by blue double fillets at the margins. The neighbouring room with an apse has a large well-preserved mosaic, which, although ambitious in concept, is relatively crude in execution, although the geometry, while unusual is accurate….The centrepiece is a guilloche knot with excrescences. Between the responds, and flanked by squares of guilloche containing knots, is a medallion with an unusual flower comprising bifurcating stems terminating in pairs of inward-pointing heart-shaped petals….Its style and associated finds possibly indicate a late fourth-century date.

Another expert on Roman mosaics, Anthony Beeson (forthcoming), took a differing view of the skills of the artisans involved:

The new work shows how colourful and artistically impressive the floor is. Geometric mosaics were common in Roman Britain and the same designs and devices were employed and copied by mosaicists throughout the province. What is remarkable about the large pavement at Badminton Park, particularly the apsed area, is that it employs motifs so far unique in mosaic anywhere. It is obvious that the room was designed to hold a stibadium, a curved dining couch. The design in the apse is surrounded by a broad band of plain tessellation affording plenty of room for an impressive ‘C’-shaped couch to be placed on it and yet still leave room for about half of the fan-shaped radiant design to be seen by the diners. A guilloche-bordered roundel shows where the circular table would have stood for their convenience…

It is the device found in this roundel that is the most exciting feature of the floor. One is used to the petalled rosettes used in this manner as on the new mosaic from Bradford-on-Avon. What is remarkable here is that the normal petals have been turned into double leaves on shared ‘Y’-shaped stems. A variant of the same device appears in the lunettes at each end of the main rectangular section of the mosaic. This
part of the floor also has an unusual design. The mosaicist has based the pattern on a conventional scheme of interlaced squares, but has tilted those in the corners and thereby enlivened the design. Bright patterned areas of blue and white chequer work vie for attention with diamond-shaped panels containing another stylized and unique device extremely reminiscent of Jupiter’s thunderbolt. The whole floor is remarkable. It is as though the mosaicist (who was obviously perfectly au-fait with conventional geometric designs) decided to completely break from the slavish tradition and re-interpret motifs using the artist’s eye rather than the ruler. Artistically this is the most exciting geometric floor to have been discovered in Britain for many years).

Whatever the truth, the pavement is of such a size and of such preservation as to render it one of the most important Roman discoveries of recent years in the region. It may also go some way to filling a clear gap in our understanding of Roman South Gloucestershire – the distribution map of Roman sites within the former county of Avon (Aston and Iles 1987) being radically altered in recent years and hence the conclusions that authors are able to draw.

The Construction of the Mosaic

Once the walls of the apsidal room were built, the mosaic was added, and then the walls were plastered and painted – there were clear patches of plaster that covered the floor. The project was fortunate enough to draw upon the expertise of someone who was examining a series of mosaics within the Roman world. As part of his D.Phil. thesis at Queen’s College, Oxford, William Wootton studied the construction techniques employed on the Badminton mosaic. The border tesserae were pennant stone, purples, blues and greens. The patterns were picked out in white and blue lias limestones, with orange/red tesserae of terracotta.

As mentioned above, the roof of the room crashed down in a fire damaging the mosaic in places. Where tesserae were dislodged or loosened by this event, the make-up of the floor was revealed. Following removal of the covering layers of roof slabs and charred material it was possible to investigate the structure of the floor. It was found that the individual tesserae were set down into wet mortar – where an individual tessera was missing, its ‘ghost’ could still be seen in the remaining mortar. This mortar, grey-white in colour and flecked with small fragments of terracotta utilised as an aggregate (the nucleus), was itself laid over a footing of rammed sand. This sand lay on top of the natural subsoil clay and was thus perhaps a slighter foundation than that afforded many other mosaics, certainly well below the blueprint prescribed by the architect Vitruvius (30–20 BC – see Ling 1998, 11).

The mosaic had also undergone at least one element of repair before the destruction of the room; in the second band of the rays within the apse, on the northern side of the pavement, tesserae of what had originally been white and blue lias and pennant, had been replaced with no care as to the colour chosen. Other, single, tesserae had also been replaced in ‘incorrect’ colours. One reason for believing that these are evidence for repairs is that the Badminton Park mosaicists had been aware of the importance of precise use of colour. This is born out by the fifth ‘ray’ of the fan-shaped design (starting from the left in a clockwise direction). Here, the upper colour-band is blue lias with a lower band of purple pennant – this is a reversal of the design of the first four ‘rays’ and would have ensured that the final ‘ray’ would close with the required blue band to correctly seal the guilloche knot. Another oddity in terms of colouration was the large pennant square located in the central white panel of the corridor that led to the apsed room. It appeared to have been placed deliberately rather than to have been a replacement of damaged or missing tesserae.
Fig. 4. Rectified photograph of the Badminton pavement taken by Downland Survey and Measurement and revealing its lack of symmetry and areas of damage to it.
What happened to the pavement?

From the geophysical survey Bryn Walters hypothesised that the scan shows much about the form of the building with the apse being an attempt to maintain the symmetry of the building – a bath building added to one side and the apse-ended room to the other. The apsidal room certainly appears to have been added to the original structure and was aligned east–west with the apse at the east end. Although there were no stratified coins and little by way of small finds within the stratigraphy of the room, the pottery seems to indicate that this room was late, possibly constructed in the mid 4th century. Perhaps the attempt to maintain the symmetry of the site might indicate that this was an important family seat over several generations and thus an important precursor of the current Badminton House.

As mentioned, this room at least appears to have been subject to a major fire – either the cause of abandonment or its immediate precursor. The floor was covered by the remains of pennant roof slabs which had crashed onto the mosaic. The vast majority of finds from levels within the room were iron nails which were connected with the roof structure. Unlike the mosaic at Hawkesbury, there was no evidence for later use of the pavement as a surface, there being neither obvious postholes cut through the mosaic nor evidence of the clearance of the collapsed debris from it. At some stage most of the stones of the walls had been robbed.

Conclusion

This was far from being an ordinary villa. It was probably akin to a vast country residence. With two villas potentially in a courtyard (perhaps linked by corridor) and a trapezoidal enclosure it has elements of a continental layout to it – perhaps like Seeb in Switzerland (Bryn Walter pers. comm.).

As Ling has pointed out (1998, 134–5), the motives which inspired a patron to commission a particular mosaic were as many and varied as our current appreciation of the pavements. Whatever the skills of the mosaicists involved in the construction of the Badminton mosaic and whatever ‘school’ of work they based their designs on, the Badminton mosaic survives as an exceptional find. Following the photography of the pavement, the site was carefully backfilled to ensure it will last for many future generations.

Acknowledgements

The mosaic would not have been discovered had it not been for the kind permission of His Grace the duke of Beaufort for work to proceed and the persistence of Donald Watts in researching all the archaeological sites of the estate. The survey of the site and most of the backbreaking work was carried out by Michael and Jill Martin, Andrew Jackson and Rebecca Ireland, ably assisted by many volunteers. My thanks are due to the following individuals who visited the site and made comments on the mosaic and other elements of the archaeology – Mark Corney, Bryn Walters, Anthony Beeson, Graham Soffe, Pat Witts and Michael Stone. David Neal and Stephen Cosh also lent their expertise on matters concerning mosaics. As ever, my friend Martin Henig was generous with his invaluable advice and thoughts as was William Wootton. David Evans, Historic Environment Record Officer of South Gloucestershire Council, traced all known elements connected to the site and examined the small amount of pottery recovered.

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