BATH & CAMERTON ARCHAEOLOGICAL SOCIETY

Addendum to 2013 Report

Areas near the Royal Crescent, Bath

A report on geophysics surveys by the
Bath and Camerton Archaeological Society
September and December 2013

Janet A. Pryke and John Oswin

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The lawns in the project are part of the Royal Victoria Park in Bath, and are covered by MBN11272 "Royal Victoria Park" and DBN3598 which covers the nationally registered area, now Grade I listed (English Heritage 2013).

Report on geophysical surveys by the

Bath and Camerton Archaeology Society

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Summary

The lawn below the Royal Crescent Ha-ha in Bath had been the site of a geophysics investigation in 2012 by the Bath and Camerton Archaeological Society (BACAS). This project has been extended and added to by this work making further surveys in areas near the Royal Crescent. The work has also reproduced some of the 2006 geophysics surveying carried out by Engineering Archaeological Services for B&NES Council. It has added to previous information with further description of the possible remains of a building structure and prehistoric and other remains in what is seen to have been an active area from prehistoric times through to modern history. Examination of the alignment of observed linear features in the geophysics work led to an extrapolation along the line of a Roman ditch previously discovered in Lower Common allotments to an area to the north west of the Royal Crescent and a short geophysics investigation there. The results do not support any such continuation, but may indicate some archaeological remains in this area. The results from this Addendum have added to the historical description of this area of Bath in the 2013 Report.

Preface

A Time Team investigation had investigated part of this area alongside the area north of the Royal Crescent for their 2003 Channel 4 television programme "Death in a Crescent"[1]. The geophysics work in this was performed by GSB Prospection. On the lawn below the Royal Crescent Ha-ha, Time Team confirmed the continuation route of a Roman road from behind the Royal Crescent, and investigated two nearby burials. They also made two excavations towards the eastern end of the lawn and revealed a Late Bronze Age ditch. In 2006 Engineering Archaeological Services (EAS) was requested by B&NES Council to make a geophysical survey of this lawn, the slope below it and the Bandstand Lawn[2,3], but the report was not promulgated widely. In 2012 BACAS carried out a survey on the lawn below the Ha-ha. This confirmed that the Late Bronze Age ditch was part of a settlement enclosure and gave other results adding to the information about the area[4]. Other work in this area includes the 1980s excavations in the Lower Common allotments, where significant Iron Age and Roman developments were found, including two-metre deep Roman ditches[5], and in the Ring Common allotments[6]. These results have been used as background to this project.

The project was supported by Richard Sermon, the B&NES Archaeological Officer. Kind permission for the survey was obtained from the B&NES Parks Department, with useful discussion with Graham Evans, Parks and Estates Manager, and Simon Memory. Discussions with other members (current and past) from the Parks Department: Stan Hitt and Bill Bailey with Keith Gifford, have given much-appreciated background information to this work.

We are very grateful to Ian Brooks of Engineering Archaeological Services (EAS) who has given us valuable background information in the preparation of this project, and to him for his permission to use the results in this report.

Sincere thanks and acknowledgement are due for advice and information from the other people who have been so helpful with our consultations, and as listed in the Reference section, Mike Chapman, Peter Davenport, Rod Millard, Stephen Clews, Susan Fox, Maurice Tucker, Dirk Booms, Paul Roberts, Clare Baxter and Eve Reverchon. Through the project, we have very much appreciated the support, guidance and advice of Marek Lewcun.

Thanks are due to BACAS for supplying the equipment, for the Society's encouragement and support, and particularly to all the BACAS and other volunteers for their help: Terri Bell, Rick Buettner (as well as for taking the photographs to record our efforts), Sandra Heward, Chris Higgs, John Knapper, Tim Lunt, Bernadette Oliver, Lindsey Peat, Ian Perkins, Catherine Parsons and Emma Pryke.

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1 Introduction

1.1 Location

The lawn areas involved in this project are part of the Royal Victoria Park in Bath. The Royal Crescent looks southwards over these lawns, down an approximately 1 in 20 slope towards the river. In 2012 BACAS carried out geophysics investigations on the lawn immediately below the Royal Crescent Ha-ha[4], shown in purple in Figure 1.1.

Figure 1.1 Map of the area with outlines showing areas studied
Purple: lawn below Royal Crescent Ha-ha
Red: Bandstand Lawn area
Blue: Top of Ring Common and bottom of High Common

All satellite maps acknowledgments © Google Earth

The main work in this project was done below this lawn on the Bandstand Lawn, also known as the Lower Lawn, and on the bank below it above Royal Avenue (red in Figure 1.1). The plan of these, and supplementary investigations in the lawn below the Royal Crescent Ha-ha are drawn in Appendix A1. We had considered carrying out geophysics work on the grassed area to the east, below Brock Street, above the Royal Avenue, in an area where burials and associated pottery have been described[7]. However following description of the evidence that this had been used for quarrying for gravel[6], we decided that geophysics there would not be likely to be productive. Following our observations on the Bandstand Lawn an additional small project was carried out to the north west of the Royal Crescent as shown at the top of Figure 1.1 and in Appendix A2.

1.2 Background

The Bandstand Lawn south of the Royal Avenue, together with the sloped area between that and the continuation of Gravel Walk are part of the original Royal Victoria Park plan of Edward Davis in 1829[8]. In the time since this part of the Park was created in 1830, examination of the maps of the area and discussion with members of the Parks Department[9] show that there has been much reorganising and rebuilding of the orchestra/bandstand, ornaments, walling and ornamental beds and many of these remains have added to the archaeology of the area[2,3]. Unlike the lawn to its north, the Bandstand Lawn was not used for allotments in World War II. It lies above the rest of the Crescent Fields which ran down to the Upper Bristol Road, an area which, following agricultural use was used successively for gardens, nurseries, with housing at the edges and now the Charlotte Street car park[10].

This area was labelled in the 1746 John Wood lease documents for the building of the Royal Crescent "No part to be built on"[11], a label that also is seen in old descriptions of the Commons of Bath to the west.

The High (Upper Common), to the north of Weston Road had been included in the original plans for Royal Victoria Park[8], however this incorporation never happened. It now is part of the public Approach Golf Course. Our additional work took place along the bottom SE edge of this area along Weston Road, as well as across the road at the top of Ring Common allotments.

Mud (Mad, Muddle) Brook ran down through this area from several sources including St Winifred's Well, and is now culverted behind Marlborough Buildings. In the description of the Brook in "The Lost Streams of Bath" [12] there is mention of a possible pond near the current cross roads, which might be associated with the mill mentioned by John Wood[13].

2 Method

2.1 Description

A short description of the methods we used follows. For further details of these, please see the report of the 2012 work. [4]

Gridding
The gridding orientation was the same as that used in the earlier survey, and is on the orientation of the base of the lawn below the Royal Crescent Ha-ha. Extending our saved coordinates, the Bandstand Lawn and the south west area of the lawn above were divided into 20m grid squares as shown in Appendix A1.

Magnetometry
A magnetometry survey was completed over the Bandstand Lawn including the area beyond the path to the east side. For this the instrument used was a Bartington 601-2 dual fluxgate gradiometer. The image of the results shows the changes in the magnetic field measured in nT (nanotesla).

Twin Probe resistance
The resistance survey was carried out with a Geoscan RM15 twin probe resistance meter. It was used at 0.5m probe separation on the Bandstand lawn and 1.0m probe separation on the Approach Gold Course. The image of the results shows levels of resistance measured in ohms.

Electrical pseudosection profiling
A second approach using resistance was to use the TR/CIA resistance meter for electrical resistivity pseudosection profiling. In each case a 31m line of probes 1m apart was set out along the line of the survey and a profile taken using probe separation measurements of 1 to 6m along the length. In several cases overlapping profiles were concatenated to extend the studied length (see Appendices A1&2). The presented images of the results are inverse model resistivity sections measured in ohm.m.

Ground penetrating radar
Areas of interest were further examined using ground penetrating radar. The machine used was a MALA X3M device working at 250 MHz. The image describes the measurement of the reflection of the signal from under the ground.

2.2 Programme

The first part of the geophysics work below the Royal Crescent was completed by the team of volunteers from BACAS over three days in September. The weather was mostly cloudy with some sunshine, with rain showers on the second day. The starting time was at 8.00am to enable work to progress before large numbers of tourists arrived to visit the Royal Crescent. The second part of the work to the north west of the Crescent took place with a small group of volunteers on two days in December. This was completed in relatively mild weather, though there was very heavy rain before and after and over the week between the two days of this work. Our work on the golf course made every effort to avoid the playing area and did not work on the green.

Members of the team took the opportunity during this work to inform the several interested visitors about the work and BACAS.

3. Results and discussion

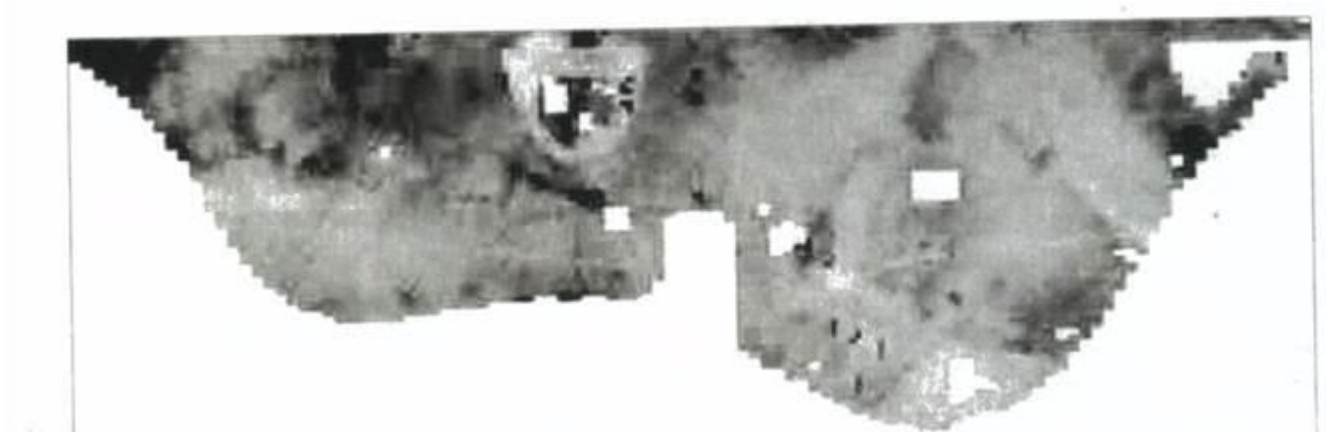
3.1 Bandstand Lawn

3.1.1 Results from Engineering Archaeological Services report[3]

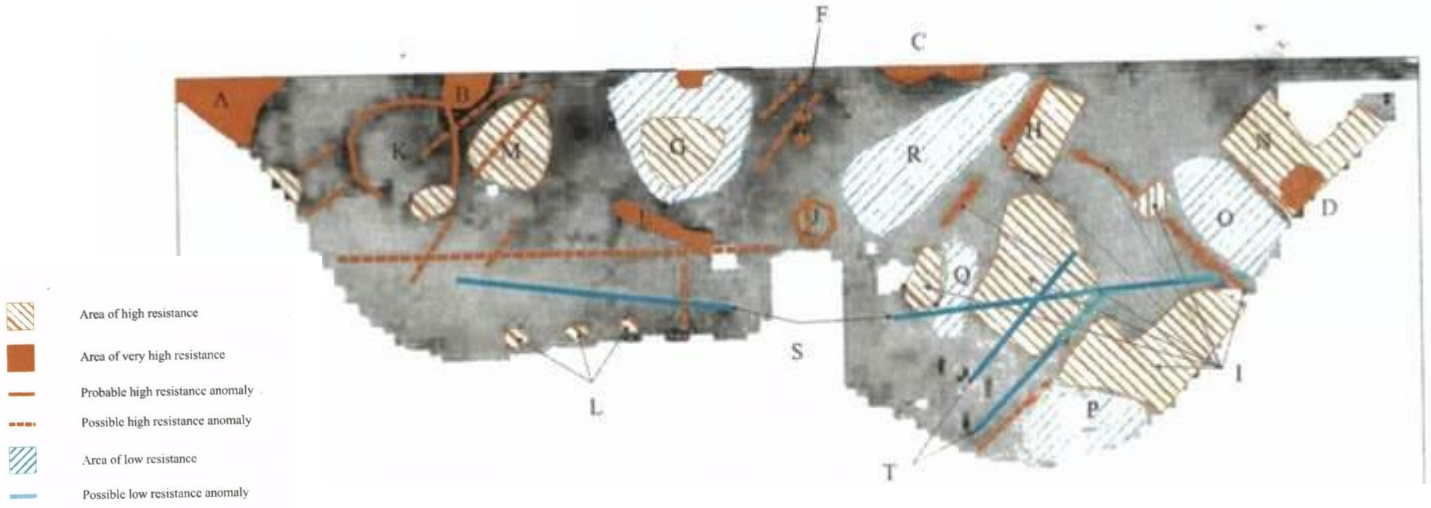
With our great thanks to Ian Brooks for permission to use their results in this report, the plot of their resistance survey of this lawn are shown in Figures 3.1 a, with their interpretation in 3.1 b.

Figure 3.1 From Figure 5 in EAS Client Report[3] 2005/10

a Resistance survey



b Interpretation

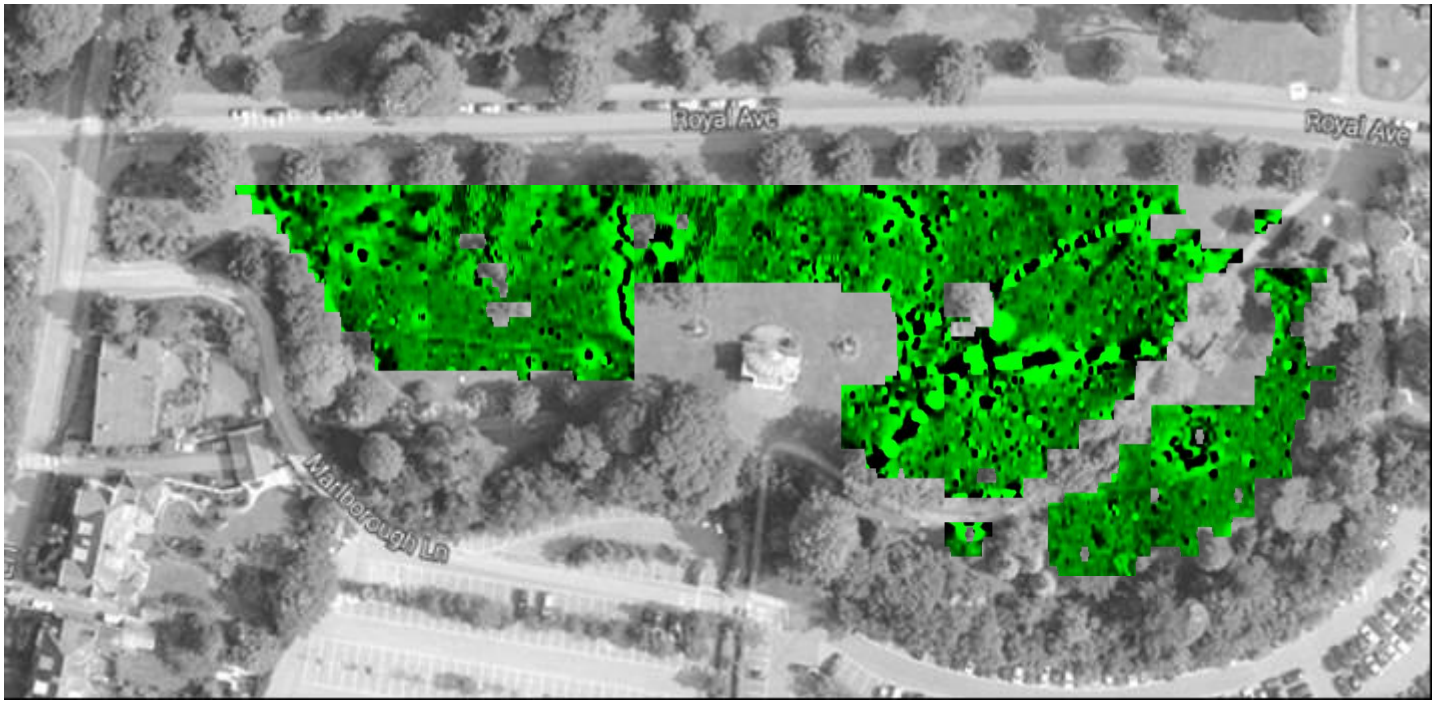


A complicated interpretive picture resulting from the results in the lawn is clear and shows the large numbers of patterns of anomalies. This report will refer further to some of these in the relevant sections.

3.1.2 Magnetometry

As a starting point in our project a magnetometry survey was completed over the lawn. The image of this is shown in Figure 3.2.

Figure 3.2 Magnetometry survey of Bandstand Lawn



The area that could be surveyed was limited by the many trees, buildings, ornamental urns and flower beds, many of which have railings around. The EAS report had noted within their resistance results "a mixture of potential archaeological features, modern land use and anomalies associated with the Park development and management", and this survey also involves the same complications of analysis and interpretation.

There are several wide large dark/light blocked linear traces to the eastern side of the bandstand and the west side of the wooden shelter, which are typical of iron pipework. We have been told that the water supply to this lawn runs round its periphery[9] but with the restrictions in the possible survey area we cannot see where the pipes originate.

A NS possibly-linear trace can be seen running down the lawn on the west side of the central bandstand area. We compared this pattern with the magnetometry results obtained from the lawn above this[4] and there is a faint trace visible there along this line as well. This feature is also co-linear with resistance anomalies that can be seen in the Time Team[1] and our results[4] and noted in Appendix A1. The line is not coincident with the strong grass mark that shows up in dry weather running down the lawn just to the right of the centre of the Crescent, as described in our earlier report[4]. We know that the lease for the Royal Crescent shows that John Wood had the rights to create a drain or common sewer through any part of the fields below the Crescent[11], though there is no information on where one may have been made.

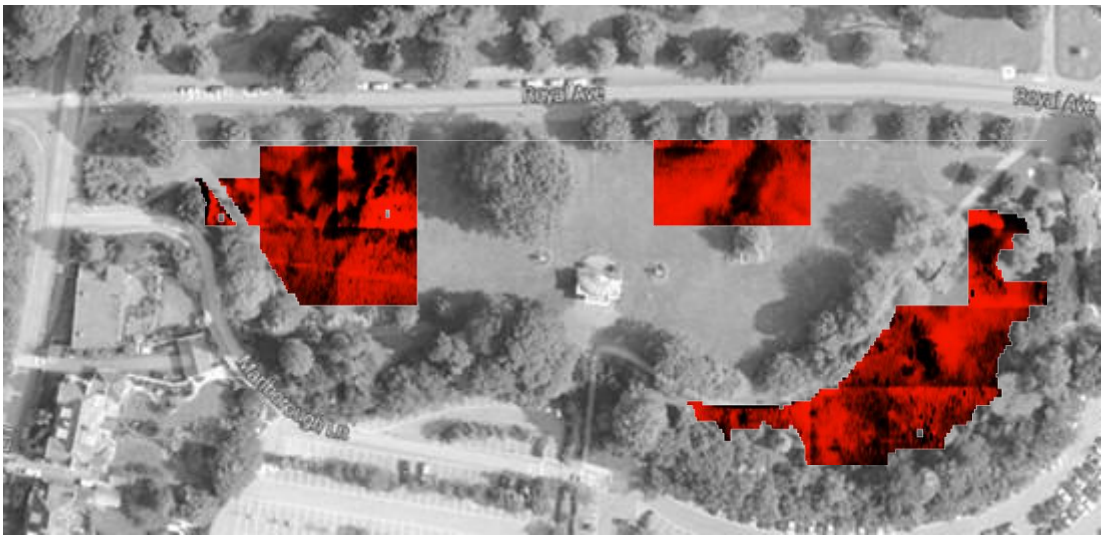
Toward the north west corner there is an indication of a curved formation coinciding with the rounded resistance anomaly that had been noted in the EAS survey (K in Figure 3.1b). This area was investigated further in this work (3.1.3.2).

To the north-east of the bandstand much larger rounded indications can be made out in the image. Figure 3.1a shows no coincident anomalies in the resistance survey in this area. There are several further patterns in the magnetometry image. Though many of them cannot be interpreted, some can be related to items in earlier maps e.g. those on the east side of the path south of the wooden shelter area can be identified with a vase with railings in the 1886 large scale Ordnance Survey map, and the area to the NW of the bandstand area coincides with what was been a large circular ornamental bed at that time.

3.1.3 Resistance surveys of the Bandstand Lawn

The survey done by EAS had been carried out at 1m reading intervals using 0.5m probe separation. Discussion with Ian Brooks of EAS[14] led to us repeating some of this work with 0.5m intervals. Over the three days we surveyed the areas shown in Figure 3.3 to do this and also to extend the earlier work over the path to the east. The results from these areas are discussed in the following subsections.

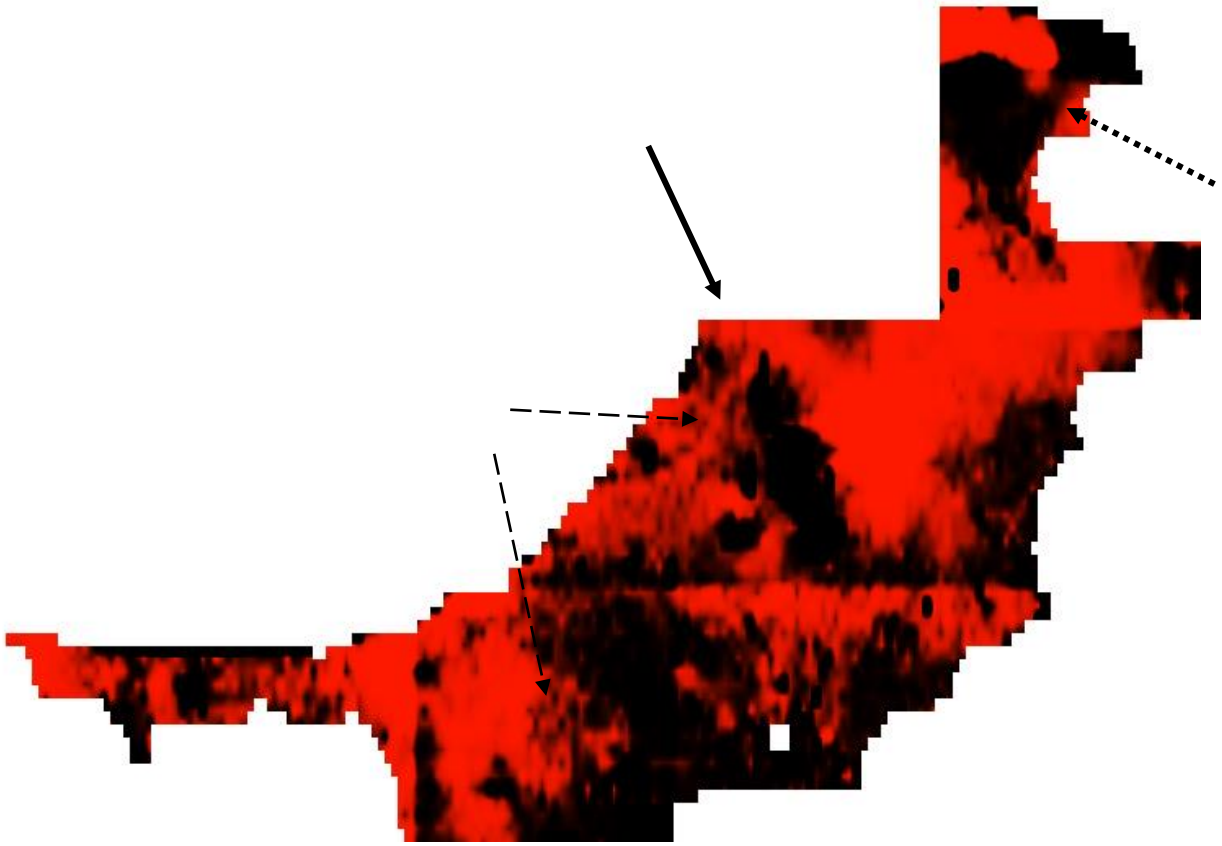
Figure 3.3 Resistance survey of parts of the Bandstand Lawn



3.1.3.1 The area on the eastern side of the path

The Bandstand Lawn had been surveyed by EAS in 2006 as far as the curved path. This survey was carried out to extend the results beyond the path to the east end of the lawn grids and the results are shown in Figure 3.4.

Figure 3.4 East side of lawned area, on far side of path
↑N



In the NW grid an approximate NE/SW wide high linear resistance anomaly can be seen (marked by dotted arrow). There appears to be some other approximately parallel anomalies in the resistance images elsewhere (see Figure 3.1b) and in this image there is a linear high/low/high pattern toward the path (dashed arrows). A wide high resistance possibly-linear anomaly is indicated by the arrow in in Figure 3.4.

There may be patterns of anomalies in places in the southern part of the image. However all these outer edge areas extend to the heavy surrounding growth of trees, and their influence will complicate the results.

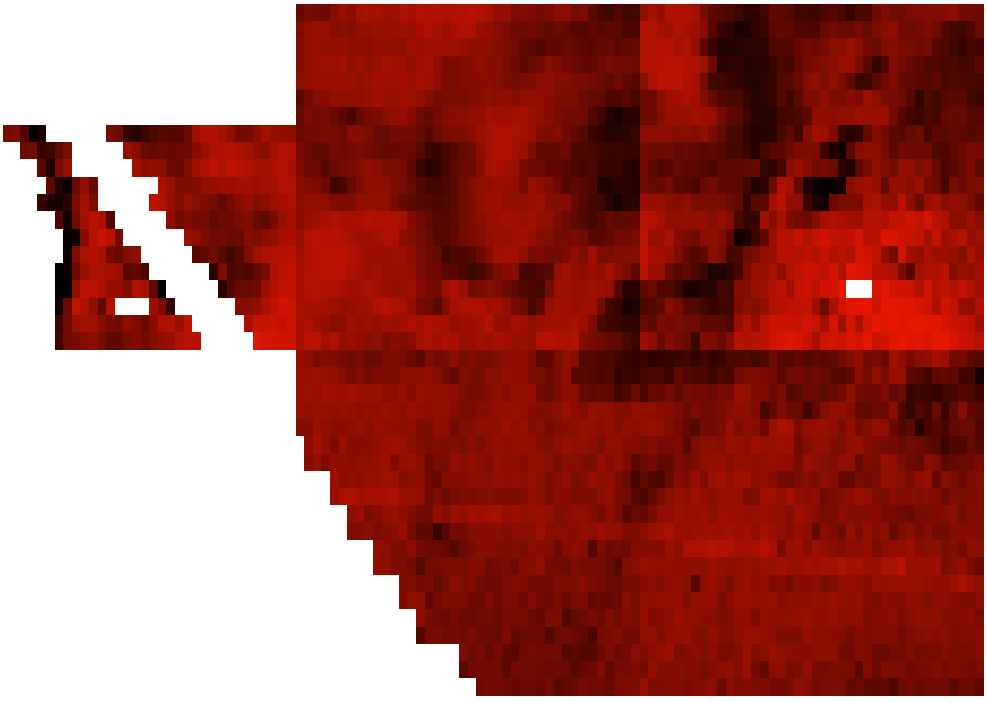
It can be noted here that the southern part of the area we worked on is nearby the areas outlined by Barry Cunliffe in 1986[15] and Peter Davenport in 2000[16] indicating Roman settlement area. These descriptions followed investigations before the extension of Charlotte Street Car Park[17], as well as the area having been marked X? in Francis Haverfield's 1906 description of Roman Bath[18] in the Victoria History of Somerset (X = Miscellaneous and ?= site not exactly known).

In this last publication reference was made to the pottery from Bath in the Roman Pottery collection of Alnwick Castle Museum. Only one of these pieces was specifically described as being found in Crescent Fields (the fields including this area): "a long-necked bottle-shaped vase, grey in colour with indented spiral lines running round its bulged part"[19]. Enquiry has shown this to be Roman, "but not a type one really finds after the middle of the 1st century BC, 30-20 BC at the latest"[20]. This predates any possible Roman settlement, but this information may add to what is known about the people who were living in this area.

3.1.3.2 The north west section of the Bandstand Lawn

Our resistance survey work repeated the EAS survey in this area using 0.5m reading intervals and the results are shown in the following figure.

Figure 3.5 Resistance survey of NW corner of Bandstand Lawn
↑N



The EAS results had described the high resistance anomalies indicating a large 20m diameter rounded area extending over the upper part of these grids (K in Figure 3.1b). They suggested that it is possible that this may be a position of a prehistoric (possible Iron Age) enclosure. Differences in the soil conditions account for some differences in details of the observations between our surveys, but results in Figure 3.5 also indicate the rounded part of their description, with a high resistance area in the middle, and complex area at the bottom. This might indicate a possible entrance area, and if so it points down towards the river. In this area we do know there had been a rose flower bed in the past[9], but this was to the east of this (see M in Figure 3.1b).

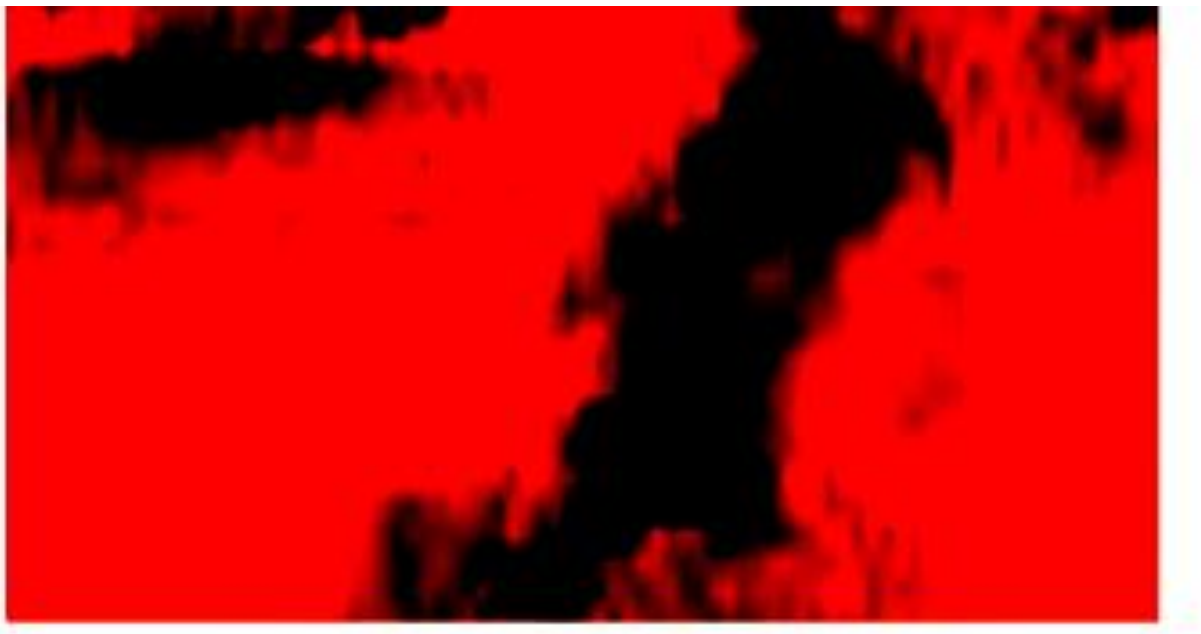
In Figure 3.5 there are also indications of parallel NNE/SSW alignments south of the rounded pattern, about 15m apart. These follow the alignment of the possible course of the known Roman road[1], and we investigated these further with resistivity profiling (see 3.1.4).

3.1.3.3 The area of the possible building remains two thirds across the lawn

The EAS survey report[3] had described indications of what they suggested could possibly be a possible building structure about two thirds of the way across the top of the Bandstand Lawn, as marked by a rectangular area (H) in Figure 3.1b. This was described by them as a "remarkably

rectilinear anomaly" whose "alignment does not correspond to the modern land divisions", at "a slight angle to the linear anomalies in the same area". Resistance surveying at 0.5m probe spacing was used to look by us at this area in more detail. The image of the results from this work over two 20m grids is shown in the following figure with a high contrast setting.

Figure 3.6 Resistance survey over grids 7&8
↑N



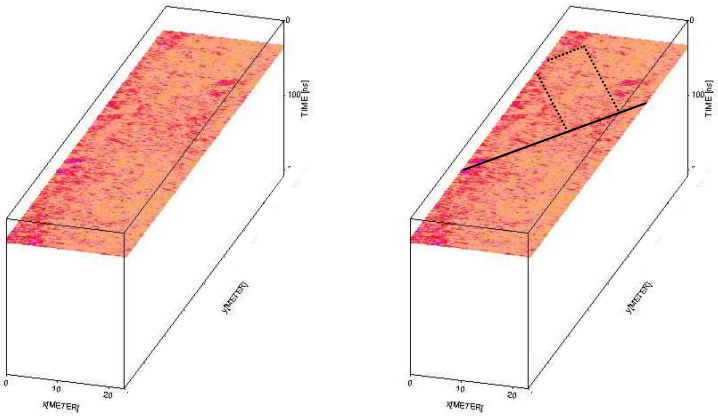
The rectangular anomaly indications seen in the EAS survey are repeated, however at this contrast the image appears more complex, possibly being made up of two rectangular areas at different angles. There is an indication of a linear anomaly observed to run separated at a different angle to part of as seen in the EAS results (Figure 3.1b), and the sides of the top area in Figure 3.6 appears to be parallel to this.

This area was then investigated further using two other geophysical techniques.

3.1.3.3.1 Further investigation with ground penetrating radar

Ground penetrating radar was used to survey the same two grids, extending 3m N towards the road. A layer from these results is shown in Figure 3.7. In this (0.9m depth) a faint linear feature can be distinguished diagonal across the grids. Examination of the magnetometry image in Figure 3.2 may indicate a possible linear pattern in this area that might coincide with part of this possible pipe-like feature, though that appears more discontinuous. In the ground penetrating radar results in Figure 3.7 this linear feature seems to be abutted by a very faint rectangular outline, whose area overlaps part of the high-resistance area indicated in Figure 3.6.

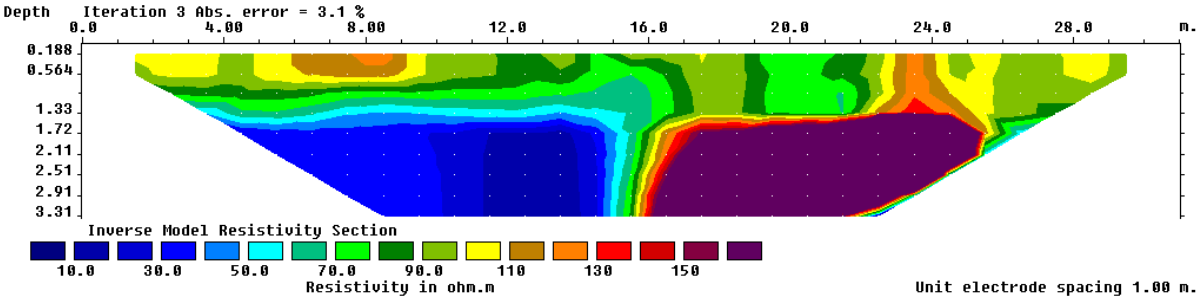
Figure 3.7 Ground penetrating radar across grids 8 & 9
← N



3.1.3.3.2 Further investigation using resistivity profiling

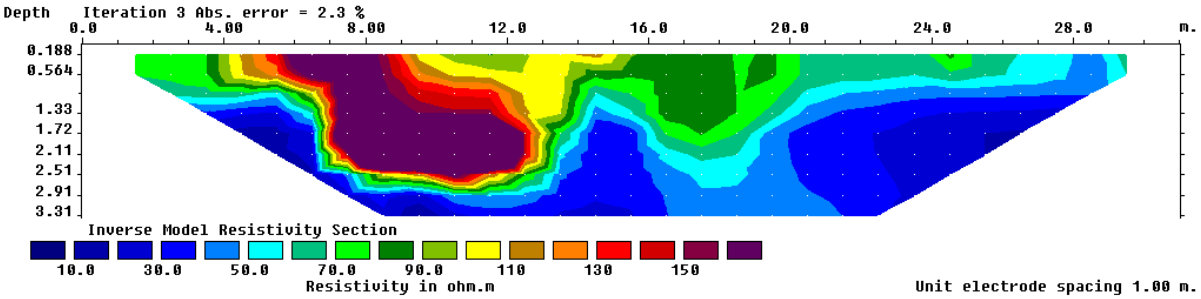
This area was also investigated with resistivity profiling. The first profile was set along a south to north line on the centre of the eastern grid, extending 5m beyond the northern and 5m beyond the southern border of the grid (D in Appendix A1). In the section in Figure 3.8 a high resistivity volume is apparent in the north part of the grid, about 10m across, starting at a depth of about 1.72m, and extending more than 3.31m below the ground. Above this level there are indications of possibly regular remains.

Figure 3.8 Profile across midpoint of grid 8
→N



Two profiles were then across this line at right angles and centred on it. The first was at 15m from the 0 point, at about a third up the dense image seen in Figure 3.6. Its image is shown in Figure 3.9.

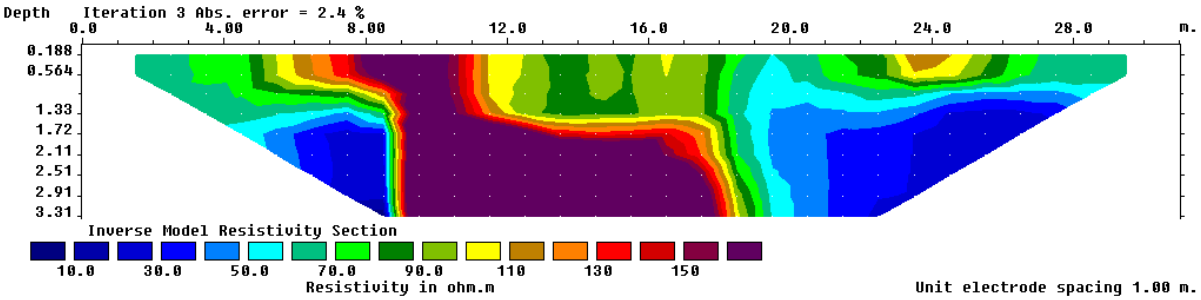
Figure 3.9 Profile across same area 15m from 0
→E



There is a tiered high resistivity response in the western side of the image, part of its profile having a depth over a metre thick at about 1.72m under the ground.

A second profile at 5m further north is shown below in Figure 3.10 and this shows a tiered high-resistivity profile. This is the other section of the block type volume distinguished in Figure 3.8. The regular images in this could again be consistent with remains of a possibly building structure. Over its greater part these are more than 1.5m in depth, but the full depth of the lower part was not detected by the survey.

Figure 3.10 Profile across same area 20m from 0 →E



From these results, if this high resistance is not of natural origin, the possibility that there are remains of stone building structures, at least part of which are on more than one level, appears to be a most reasonable suggestion for these images.

Research and consultation have revealed no recorded information on any possible building in this part of the Park at any time. However it does fit with the suggestion that there could possibly be Roman military remains in the area (Janet A Pryke, unpublished observations) as it is within the conjectured site of the main administrative building of the possible wooden fortification. The findings in these results of possible remains on more than one level, with a linear feature that might correlate with a water supply, does not subtract from this possibility. Future work may give further information.

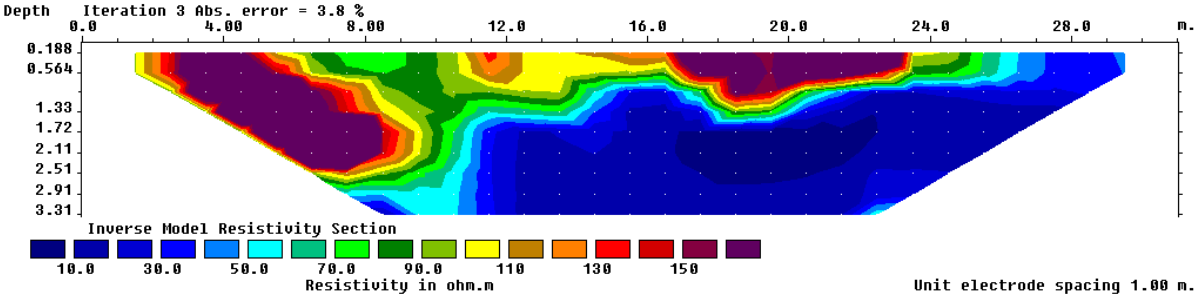
3.1.4 Investigation of the projected line of the previously excavated Roman road from behind the Royal Crescent

Crossing this lawn is the projected line of the "Fosse Way" direction Roman road from behind the Royal Crescent that was excavated by Time Team in the lawn below the Ha-ha[1] as drawn in Appendix A1. A resistivity profile was set up diagonally across a grid on its continued route to investigate it close to the path, but results could not be obtained there and the attempt was abandoned.

A further profile was set up further north east, crossing the same road line and centred 4m to the NW of the grid crossing (E in Appendix A1). This time the technique was successful and the results are shown in the following figure. This indicates some possible structural arrangement

mostly less than 1m below ground towards the right half of the image, centred at 18-20m. There are non-continuous patterns at 11.5m and 24.0m consistent with the linear anomalies observed in the resistance image shown in Figure 3.5. If this provides evidence for the continued course of this road it continues towards the line of the boundary behind the houses that heads towards the river beyond the end of Marlborough Lane (Figure 1.1).

Figure 3.11 Profile across projected line of Roman road from behind Royal Crescent
→SE



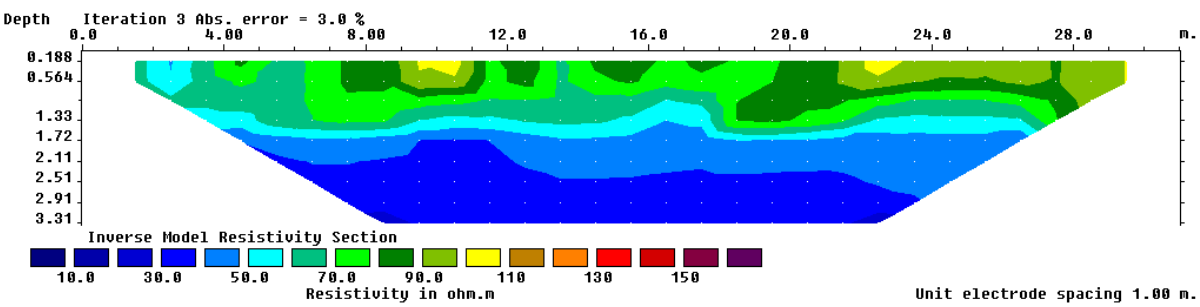
The profile in Figure 3.11 also overlaps with the high resistance area that continues the possible rounded feature to the NW of the lawn (K in Figure 3.1b). This is clearly shown in the high resistivity response at the left hand end of the image, a volume extending down to over 2.5m below the ground.

3.1.5 Investigation of the projected line of linear indications from the lawn below the Royal Crescent

In the geophysics work in the lawn below the Royal Crescent Ha-ha possible linear anomalies approximately parallel to the orientation of Marlborough Buildings could been observed[1,2,4] (purple line in Appendix A1). These are also along the line of the north-south possible pipe-like feature referred to in 3.1.2, and the vertical line to the left of the bandstand in Figure 3.1b. A resistivity profile was made across this line near the path (F in Appendix A1).

The image of the results in Figure 3.12 shows little evidence of any clear pattern in the resistivity showing any pronounced linear feature extending to this area. However if the results from remains are as close to the surface as was indicated in Figure 3.11, the pattern observed in the central part of this image would not preclude a continuing NS feature continuing from higher up the slope. The results are also coincident with the linear anomaly in this direction seen in the EAS results, marked in Figure 3.1b.

Figure 3.12 Profile across southern edge of lawn (grids 13-14) on line continued S from indications in previous results
→E



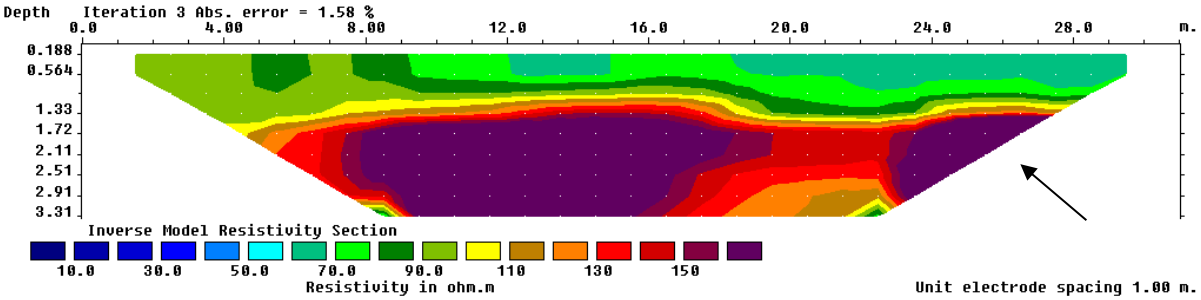
3.2 The lawn below the Royal Crescent Ha-ha

3.2.1 Further investigation of the area near the known void

In the work in 2012 on the lawn below the Royal Crescent Ha-ha we had investigated the site of a known void under the lawn[4]. This was a hole that had first appeared following the subsidence of a lorry into the ground at the time of a concert in 2002. About 40m to the east, there was a second hole that appeared slightly further down the bank above the Royal Avenue. Both holes have subsequently been filled.

In examination of our 2012 profile and ground penetrating radar results, there was an indication of a third similar looking area under the ground towards the western end of the images. In this project a profile was made to look at this area (A in Appendix A1) as shown in the following figure. The known void (now filled) is arrowed to the east of the image. To the left of this and making up the main part of this profile, a purple high resistivity area is seen. This appears similar to the known void, but it is larger than that, being at least 6m across. Its depth was not measurable using this method.

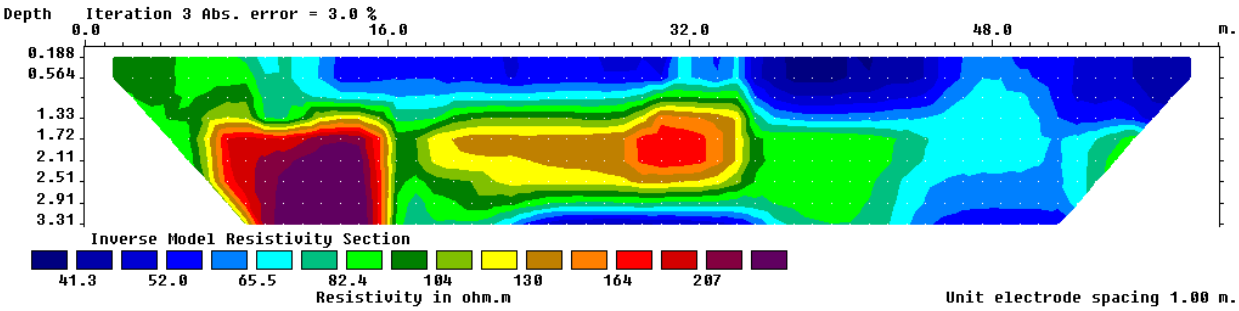
Figure 3.13 Profile along 0 line of area, to west of known void (shown at RH edge of image) →E



From the results in Figure 3.13 it is not clear if this feature is another void, either empty or filled, or a high density volume from another cause. However further analysis of the results using a range of different scales of presentation of the resistivity indicated that this feature has very high resistivity and indicates that it might be a likely further void. It is shown again in the concatenated profile including the results from 2012 and 2013 and presented on a log scale in Figure 3.14.

In this the large volume is centred about 12m along, with the previously known void (filled) in the middle of the image. This area is now under further investigation by the Parks Department.

Figure 3.14 Profile along 0 line of area, above results concatenated with the results from the 2013 report →E



Following discussion about our work in 2012 in the area and the original discovery of the holes, we had been given information on underground tunnels observed to be leading from these[6,9]. These holes are presumably related and might even be part of the same complex, but there is no obviously apparent cause for them[6, 14, 21]. There are other holes in the Bath area known as gull caves, which were formed following earth movement[22]. However these caves seem considerably further up the slopes than the height of these (40m). An additional indication of the complexity of the geology in Bath in this region might also be indicated by the following statement in John Wood's "Description of Bath"[13] where he says in relation to digging wells "sunk since 1728" about a quarter of a mile to the North-westward of the hot baths "workmen met with several veins of marcasite, with beds of gravel and into the sinking of one well in particular with a small vein of coal lying about fifteen feet under the surface of the earth". In further consideration of this, we can also be reminded of the "No part to be built on" statement in the Royal Crescent lease[11].

3.2.2 Further investigation of a high resistance area observed on the western side of the lawn

In our work completed in 2012[4] and in the Time Team results[1], a rectangular-looking high resistance anomaly, outlined in red in Figure 3.15, can be distinguished in the image of the south west area of the lawn below the Royal Crescent Ha-ha. It was decided to investigate this area further in this project (area B in Appendix A1) using resistivity profiling.

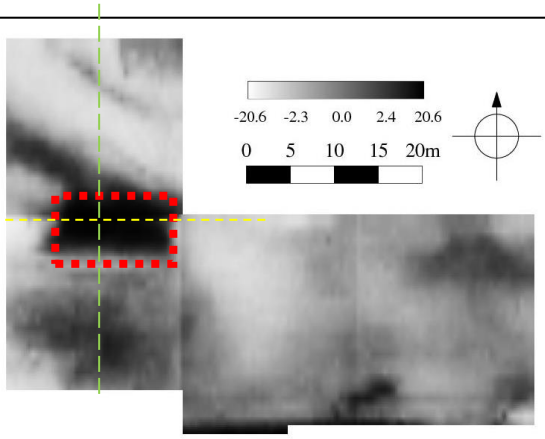
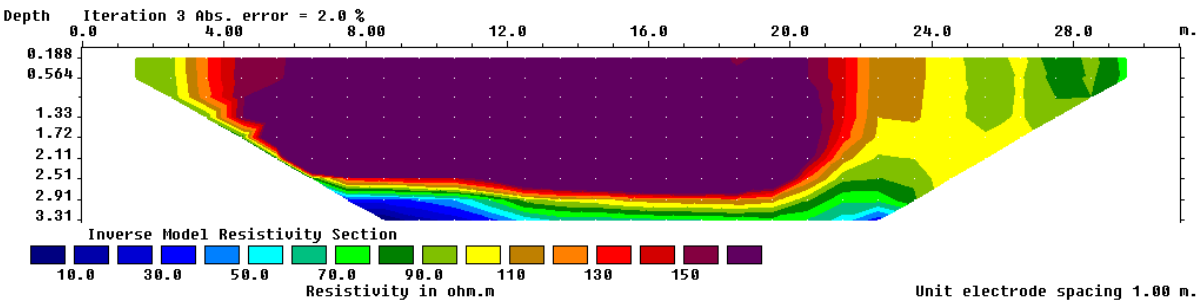


Fig 3.15 Resistance image from 2012 work

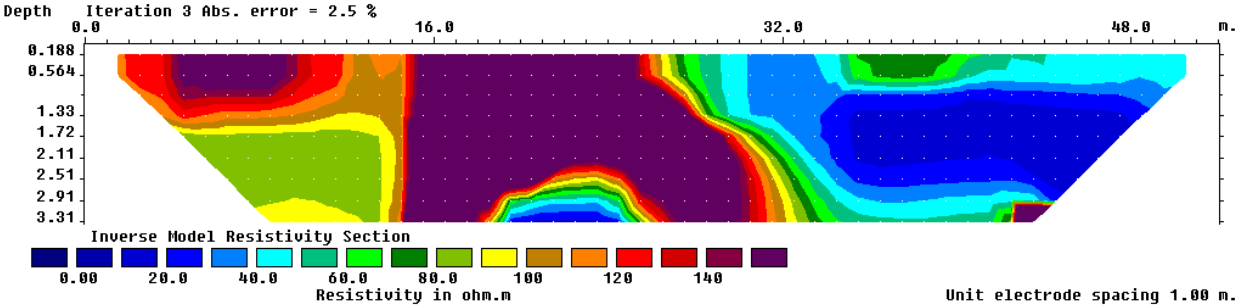
A profile was set up across the high resistance area WE starting at 0 as shown in the yellow line in Figure 3.15, as shown in Figure 3.16. This shows a high resistivity volume extending over 2.5m below the soil with a WE dimension of approx. 17m.

Figure 3.16 Profile across high resistance anomaly observed toward SW corner of lawn →E

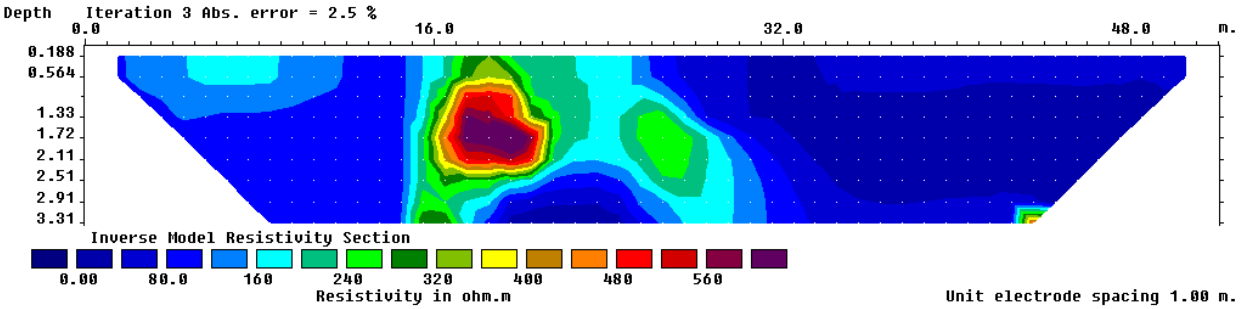


Two overlapping profiles were then set up south to north on the orientation of the grids, across this. These were concatenated and shown in Figure 3.17a. These indicate a high resistivity volume from about 5m from the 0 line, approximately 5m across, which can be distinguished in Figure 3.15. This is next to the high resistivity feature profiled in Figure 3.16. The profile in this direction appears to be less regular but is likely to be complicated by the high resistivity measurements deeper under the ground as emphasised in Figure 3.17b at higher scale. These smaller high resistivity volumes under the ground, compared to Figure 3.14, may indicate some further voids in this area too. It can be noted that the right hand higher resistivity volume in Figure 3.17b is co-linear with the diagonal linear resistance anomalies crossing into the possible rectangular anomaly in Figure 3.15, but whether they are due to the same feature is not clear.

Figure 3.17 Overlapping profiles south- north across the same anomaly
→N
a Lower scale



b Higher scale

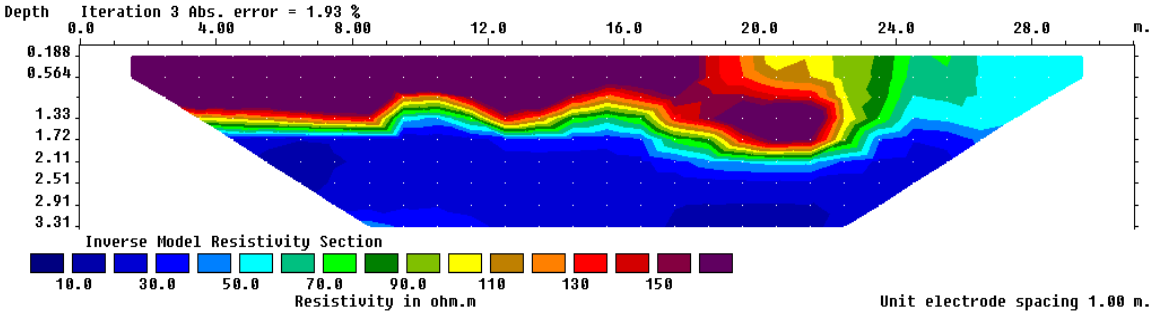


Considering the possible rectangular area, which might indicate the remains of a structure, no buildings or developments on this large scale in this part of the lawn area are known at any time. There is a much smaller structure present a little further north on the OS map of 1886. Then in WWII the area was used as allotments [23] set on a north-south orientation, so there may have been small sheds present in the area then, but there is no indication in the aerial photographs of the time of anything of larger size.

3.2.3 Profiling across a similar-looking high-resistance area in the Bandstand Lawn

Examination of the resistance results from the EAS survey showed a linear-edged high resistant shape in the north-west corner of the Bandstand Lawn (A in Figure 3.1b), that can be seen to show similarities to the area outlined in Figure 3.15. A profile was set up across this along the 0 line of the grid starting at point 0 (C in Appendix A1). The results are shown in Figure 3.18.

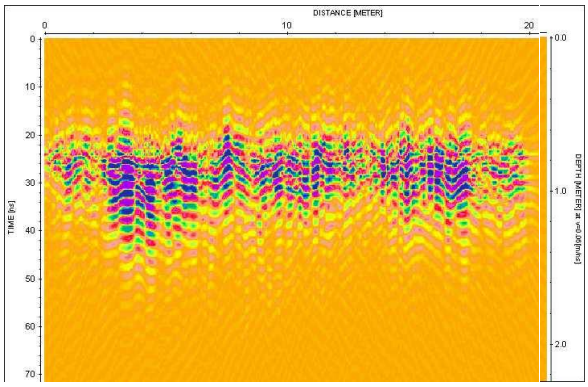
Figure 3.18 Profile across a high resistance anomaly in western point of Bandstand Lawn
→E



This shows that the high resistance is due to a high resistivity volume at least 17m across. Its depth is less than the feature described in Figure 3.16, reaching to only 1.0-1.3m below the ground surface.

This could not be profiled by the same method across it in the north-south direction as it is below the paths, so ground penetrating radar was used to do this. A 20m scan was made to the edge of the road (V in Appendix A1). The image from this is shown in Figure 3.19, and shows a regular high-resistance volume. The width of this feature is approximately 16 m with a depth similar to that seen in Figure 3.18.

Figure 3.19 Ground penetrating radar across the high resistance feature on the Bandstand Lawn
→N



Discussion and examination of maps of this area show there had been a public toilet and Parks Department activity in this area of the Park[9], but this was on the other side of the paths from this feature. In the map of 1886 this section is separated from the rest of the lawn. This high resistance feature may be related to these developments, but no obvious explanation is apparent.

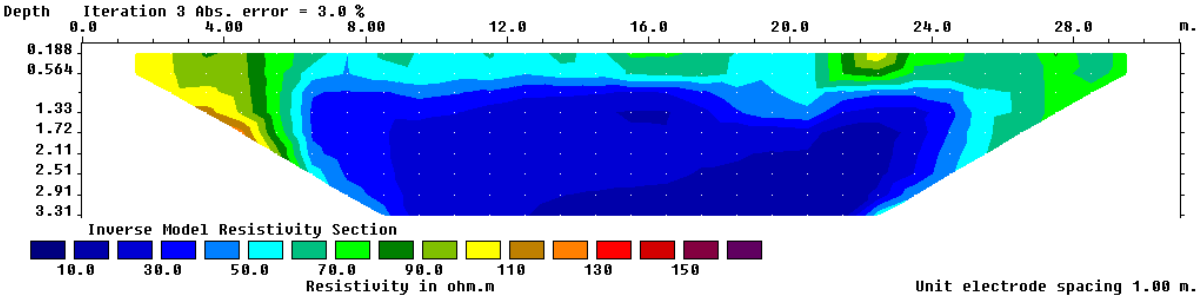
3.3 The banked area above the Royal Avenue

3.3.1 Investigation of the possible continuation of the large underground ditch-like feature that runs diagonally across the lawn below the Royal Crescent Ha-ha

In the 2012 project we completed two resistivity profiles which indicated the continued course of the underground ditch-like feature running diagonally from the top NW area of the lawn in both the GSB Prospection[1] and EAS surveys[2]. It is not visible near the southern lawn edge or onward

in either of these surveys or ours[3,4]. A position to look at this with resistivity profiling further down its possible course was chosen on the bank above Royal Avenue on the line north of a grid boundary on the Bandstand Lawn (G in Appendix A). The results of this are shown in Figure 3.20.

Figure 3.20 Diagonal profile across the projected continuation of the ditch-like feature →NE



This image shows a wide low-resistivity pattern outline, similar to that seen in the profile across the ditch-like feature at the bottom of the lawn above in the previous project[4]. It is a little wider than it (about 18m compared with 15m). As before its depth is not detectable by this method. If it does demonstrate the continuing progress of this feature, its direction would seem to continue towards the area of the park now used as the crazy golf course and the bowls and tennis courts area, an area which has been remodelled and may also have included gravel quarrying[6, 9,10].

In discussion with members of the parks staff[9] information was given how in very wet weather water wells out of the ground by the tree in the bank below the western end of the Royal Crescent just above the NW start of the observed resistance image of this ditch-like feature. Whether this has any relationship to this feature is not known.

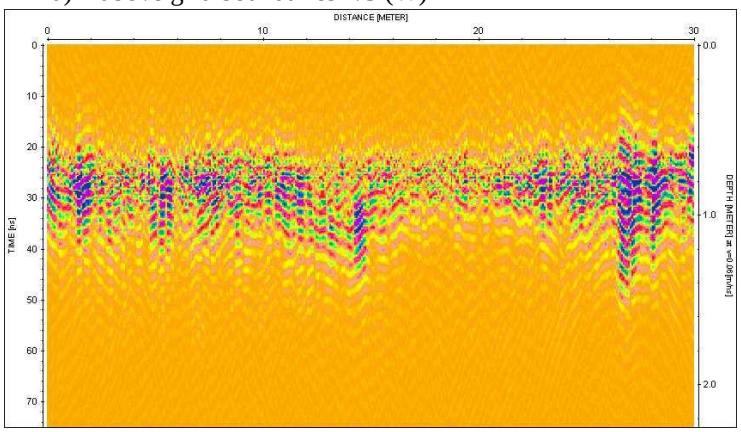
3.3.2 Ground penetrating radar profiles across the bank above the Royal Avenue

There is a photograph of the bottom of the lawn below the Royal Crescent Ha-ha from about 1860 that shows an interesting wall feature below and just in front of the path with its iron railings[24]. Examination of the pictures from the collection of Bath in Time shows that before and after this time until now this area was banked. The current path still has the stone edge with the remains of iron railing running along its southern side.

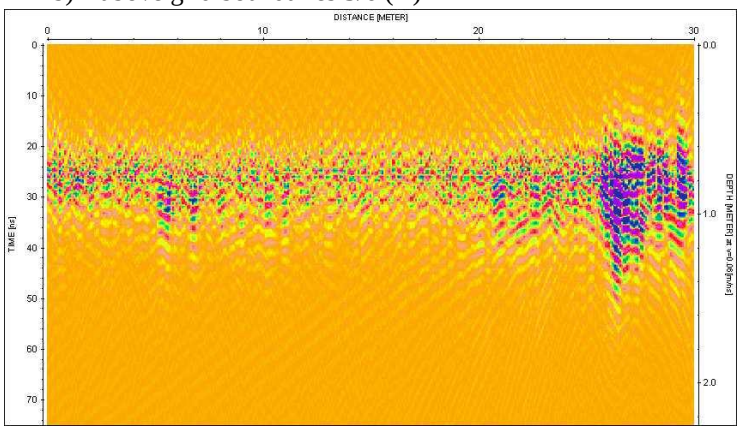
Ground penetrating radar was used to see if any evidence for the continued existence of this wall feature could be detected along the bank and if any extent and position could be measured. There are not many gaps in the vegetation, so four positions along the bank were chosen opposite to the borders between the second and third, fifth and sixth, eighth and ninth grids and one next to the path (W-Z in Appendix A1). Profiles using a single passage of ground penetrating radar were made up the bank and over the path. The results are shown in Figures 3.21a-d.

Figures 3.21 Ground penetrating radar profiles up the bank above the Royal Avenue →N

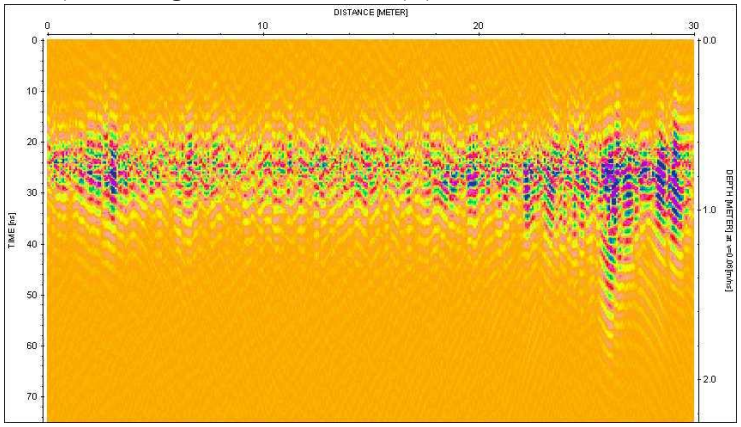
a) above grid boundaries 2/3 (W)



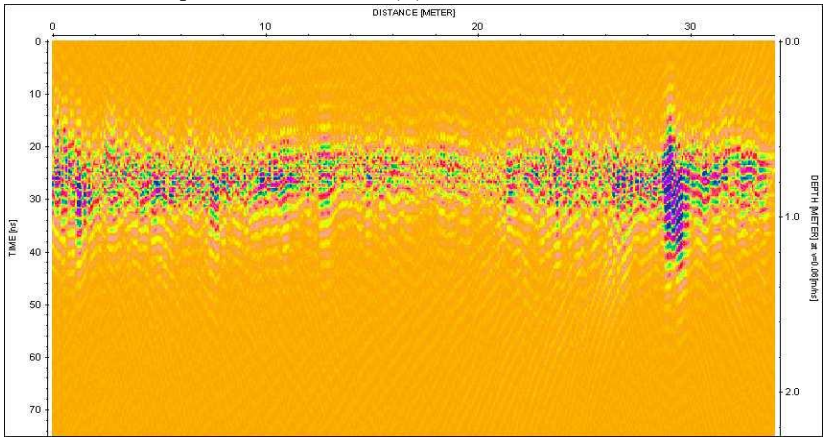
b) above grid boundaries 5/6 (X)



c) above grid boundaries 8/9 *(Y)



d) next to path at end of bank (Z)



The slope of the bank averages about 6° up to the level area of the path, so the image line can be imagined at this angle on the page. In Figures 3.21 a-c there are differential responses recorded for the 3m wide path at the top of the slope. Figure 3.21 d extends into the crossroads of the path continuing Gravel Walk with the path down from Church Street. Figure 3.21 b is nearest to the line of the view in the old photograph, which was taken towards the first triple-windowed house in the Crescent, no 17. In this the stronger blue response next to the path may indicate this wall if it still exists in its place less than a metre from the iron railings. However any corresponding linear pattern is not obvious elsewhere along this series of profiles, so no further information about this wall feature can be added from these results.

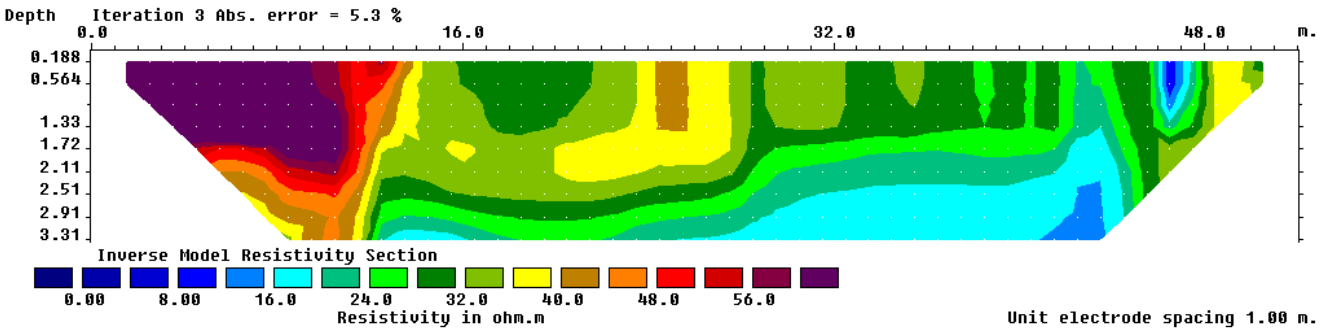
3.4 Further consideration of the above results

The results we have described from this project have added to the information indicating the continued occupation of this area. Besides the developments in the immediate area, described in the Background section, there are also the Iron Age and Roman remains that were investigated further up the slope on the High Common[25] and by the Bath Spa University site[26]. Reference has also been made to the suggestion that there may be Roman military remains in the area (Janet A. Pryke unpublished observations). This latter suggestion is based on a fortification alignment on approximately that of Marlborough Buildings. Other linear alignments have been observed in our and other geophysics results (see Figure 3.1b, 3.5, 3.6,). Several are approximately parallel to those of the known Roman road and also the orientation of the 2m ditches under the Roman remains in the Lower Common allotments[5]. This coincidence led to an extrapolation of the westerly ditch line from Lower Common in a Roman-fortress-sized projection to give an upper left hand corner in a geophysics-accessible area to the north west of the Royal Crescent, at the bottom of the High Common. A further short project in this area was set up as shown in Figure 1.1 and Appendix A2 and gave the following results.

3.5 Ring Common Allotments

Two resistivity profiles were run along the top of the left hand side of the Ring Common allotments, below Weston Road, as shown in Appendix A2. The results are shown in Figure 3.22. The first 45m of this area was along quite level ground, then the eastern end of this slopes down between the allotments towards Marlborough Buildings. The line was used was set 7.0m from the fence, following by the path along by the allotments as they are laid out now (not as seen in the current Google Earth map).

Figure3.22 Profiles across the western end of the north side of Ring Common Allotments
→E



At the western end of this image, extending from the bushed area is a high density volume, possibly indicating a rectangular cross section, which could indicate possible building remains. If there had been a mill on Mud (Mad/Muddle) Brook[13] any mill buildings would probably have been closer to the watercourse and pond further to the east[12], but there may have been other developments in its surrounding area. There may be some other possible structural patterns along this profile, but there are no clear indications of any ditch course from these results. In addition nothing can be added to them from the results of the excavations further down the Ring Common allotments carried out by Marek Lewcun in 1989[6].

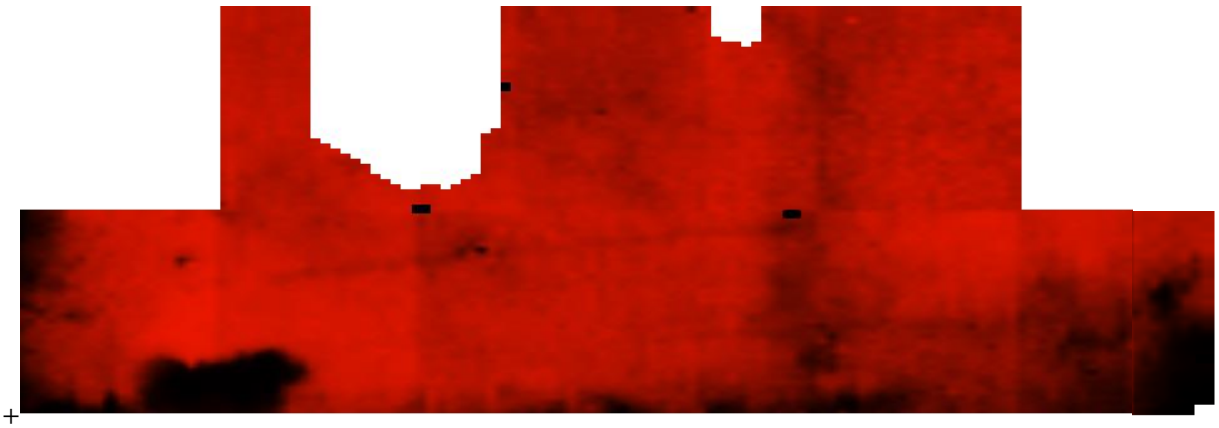
3.6 Approach Golf Course

3.6.1 Resistance survey along the bottom of the golf course

Resistance surveying was carried out across the road at the bottom of the golf course. This used a 1m bar which gives a deeper (up to about 1m) set of readings than using the 0.5m bar. This survey started 5m in from the wall and above the tree line. This area had been used for allotments in World War II[23]. We were also informed that when this part of the golf course was created there was considerable land movement using machinery to make the greens, bunkers etc[9].

The results of the resistance survey are shown in Figure 3.23. These show a possibly rectangular high-resistance area in the south-western part of the area. We took a further series of individual readings to see whether any southern edge of this could be distinguished before the wall-associated results, but the lack of definition meant this was not pursued further. There are two faint linear anomalies running across several grids in the image. It is clear that there are no negative ditch-type anomaly patterns seen in this image.

Figure 3.23 Resistance survey of grids across the bottom of the end of the golf course
→E



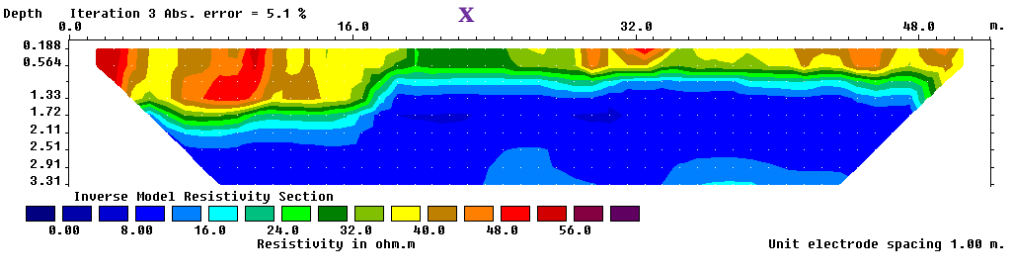
+

3.6.2 Profiles along the bottom of the golf course

This area was investigated further using profiles across and up the area as shown in Appendix A2. The first series are along the bottom 0 line of the grids on the bottom of the golf course, below the higher ground at the west end of the area.

Figure 3.24 shows the concatenation of the two profiles across the area. These cross the high resistance area observed in the resistance survey, and show what could be regular edges possibly indicating building remains. There is a further low resistance area approximately 6m wide 20-25m along the profile and other anomalies to the east, all close to the surface. A further profile series was made 10m to the north of this, but this did not overlap the high resistance area and showed no significant results so is not shown here. All the profiles made in this area, whether presented or not, were observed to be above a wet layer lower down in the earth, dark blue in the images.

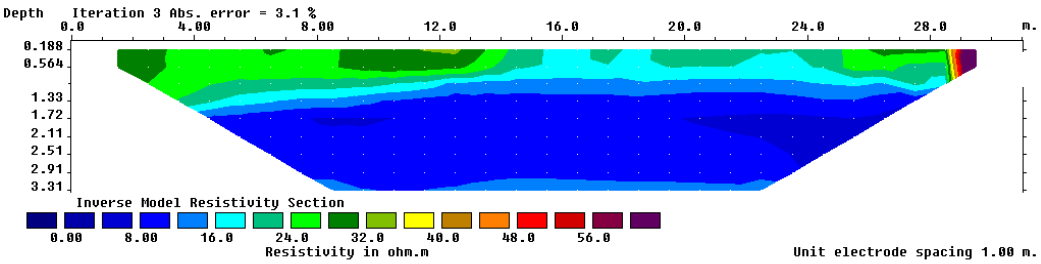
Figure 3.24 Profiles across the 0 line at bottom of the golf course starting at 10m →E



This December work followed heavy rain and the southern part of the approach golf course was waterlogged on the second day of work, with standing water by several of the trees along the wall and in the south eastern corner. A stream had appeared and was running down the paths by the office of the golf course toward the road. Luckily most of our work had been planned for further up the slope that day.

Further profiles were made on the eastern side of the bottom of the Approach Golf Course to see if any ditch areas might be distinguished running across that area towards the southeast. It can be observed on the Google Earth map in Appendix A2 that there is a lighter area observed in the grass down from the tree clump in this direction. A profile was set up the border between the two right hand grids across this area (D in Appendix A2) and the results are shown in Figure 3.25. The grass marking may be indicated by the lower resistivity pattern near the surface toward the right hand side of the profile.

Figure 3.25 Profile from 0 line up boundary between the two easterly grids on golf course →N



No additional results were seen in the other profile made in this area and so it is not presented here.

Consideration of all the results from this area show no evidence for continuation of any Roman ditches from down the slope. There are however indications that there may be other archaeological remains at the bottom of this lawn and at the top of the allotments.

4 Comment

We have extended our geophysics work into further areas near the Royal Crescent, including the Bandstand Lawn. We have used a range of techniques to survey these, though much of this work has had to be constrained by the recreational developments of the Park. The work has followed both this previous work and other investigations in the area.

Our surveys of the Bandstand Lawn has added to the complicated interpretive picture of it already reported[2]. Circular and linear patterns of anomalies were distinguished, as well as those indicating a possible building structure. This was further investigated and if a structure, our results indicate it appears to be complicated and may extend to a lower level underground. We also investigated the further course of the known Roman road that runs down from behind the Royal Crescent. On the lawn below the Royal Crescent Ha-ha, we distinguished high resistivity volumes under the ground, which may indicate at least one further void, though our techniques cannot definitively distinguish between very high resistance material and a hole in the ground. We also examined a high resistance area on the western side of the lawn, and another on the Bandstand Lawn, which may have been part of some structural arrangements. In the bank above Royal Avenue, below the lawn below the Royal Crescent Ha-ha our results confirmed the continuing course of the large ditch-like feature towards the south east. Ground penetrating radar carried out at intervals along this bank could add no further information about the wall like structure that was visible for a short while about 1860[24]. Our short piece of work to the north west of Royal Crescent did not indicate continuation that far of any Roman ditches, however some indications of structural remains were detected in the area.

The results in this Addendum with those in the preceding Report[4] have added to the history of the Royal Victoria Park area and also provided information which will hopefully act as useful background for future work.

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Appendix A1

Key
Resistivity profiles:

A	**Area near known void under the lawn**
B	**High resistance area on lawn below Ha-ha**
C	**High resistance area on Bandstand Lawn**
D	**Area of possible building**
E	**Projected line of Roman road**
F	**Projected line of linear indications in 2012 work**
G	**Line of large ditch like feature**

Ground penetrating radar profiles:

V	**High resistance area on Bandstand Lawn**
W,X,Y,Z	**Across bank above Royal Avenue**

The arrangement of the grids was 5m from the road, with the 0 point ST 74237 65304 next to the diagonal path and 4.5m from the closest tree trunk, and the zero line running along the lawn with the point grids 4/5 at 4.41m from the closest tree, and 10/11 4.60 and 9.29m from the closest two trees. The remainder of the grids can be triangulated from these points.

Appendix A2

Key

Resistance survey carried out over blue shaded grids

Profiling
A at top of Ring Common allotments
B, C, D & E at bottom of golf course

At the top of the Ring Common allotments, the 0 point (ST 74158 65590) was within the bushes, 7m from the fence and 10m from the first tree.

On the golf course the 0 point (ST 74170 65611) is 4.1m from the wall, and 5.8m and 19.3 m from the nearest trees, and the comer 40m north of this is 3.1m and 10.2m from the closest trees.