BATH & CAMERTON ARCHAEOLOGICAL SOCIETY

Henrietta Park, Bath

A report on geophysical surveys by the Bath and Camerton Archaeological Society

October 2015

Janet Pryke, John Knapper and John Oswin

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SUMMARY

A geophysical survey was conducted over Henrietta Park, Bath in October 2015. Archaeological interest in the area had been sparked by excavations by Context One Archaeology in Holburne Place, Bathwick Street in 2012, which had revealed signs of early Roman settlement and a possible routeway heading towards the centre of the city.

The survey disclosed a number of possible routeways, but these did not align well with the excavated road in the Holburne Place, Bathwick Street site. There was good evidence of the kitchen gardens known to occupy the area before the 19th century developments, as well as features established when it became a park. There were also indications of a substantial structural feature in the centre, with high resistivity results a good metre below the present ground surface.

Acknowledgements

The project was supported by Richard Sermon, the B&NES Archaeological Officer, and kind permission for the survey was obtained from the B&NES Parks and Green Spaces Department.

We are very grateful to Context One, including Dr Cheryl Green, for discussion on this work and supplying us with pre-publication information on aspects of their work that are relevant to this project.

We thankfully acknowledge BACAS for supplying the equipment and for the Society's encouragement and support, and particularly all the volunteers for their help: Terri Bell (with thanks to her and John Knapper for the photography), Tom Forsey, Chris Higgs, Tim Lunt (with thanks for additional superimposition of maps using GIS), Bob Mordle, Sharn Pepperell, Ian Perkins, Sue Rhodes, Wendy Russ, John Samways, Bernadette Stanley, Roger Vaughan and Gillian Vickery. Marek Lewcun and Bob Whitaker have given us helpful support and information, and we also thank Marek Lewcun for critical reading of the manuscript.

Thanks are also especially due to Michael Rowe for giving us excellent background on the history of Bathwick and the information on the 19th century market/kitchen gardens, from records in Raby Castle, courtesy of the late Lord Barnard. We also thank Stan Hitt, previously Director of Parks, for helpful comments, Rod Millard for help with information obtained from the Historical Environment Record (HER), Henrietta Mews Garage for further information, and Daniel Brown of Bath in Time for permission to use images from the archive.

Preface

The work in this project followed recent archaeological excavations north of this park at Holburne Place on the south side of Bathwick Street and to the east of Henrietta Street, which were completed by Context One in 2012 prior to building work. These confirmed the presence of considerable development in this area in Roman times[1], and the information on previously known Roman remains[e.g.2] has been extended. Our project used geophysics to study an area to the south of the excavations to see if these or any other developments have extended there. We have used a range of background material, including publications of the Bathwick Local History Society[3,4] and maps and plans of the park and area as background to this work (Bath in Time, Bath Central Library and Bath Record Office), together with the Historical Environment Records (HER).

Table of Contents

SUMMARY i
Acknowledgements ii
Preface ii
Table of Contents iii
1. Introduction 1
1.1 Location 1
1.2 Background 1
1.2.1 Physical environment 1
1.2.2 21st century development 3
1.2.3 20th century developments 4
1.2.4 19th Century developments 5
1.2.6 Earlier development 10
1.3 Programme 12
1.4 Scope 12
2 Method 13
2.1 Gridding 13
2.2 Twin probe resistance 13
2.3 Electrical resistivity pseudosection profiling 13
2.4 Magnetometer 13
2.5 Ground penetrating radar 14
2.6 Software 14
2.7 Constraints 14
3. Results 15
3.1 Resistance survey 15
3.2 Magnetometry survey 16
3.3 Resistivity profiles in specific areas of the Park 17
3.3.1 Areas studied 17
3.3.2 Central area 18
3.3.3 To the east on the other side of the path 18
3.3.4 To the north-west side of the park 19
3.3.5 To the south of the Park 20
3.4 Deeper resistance survey (1 m bar) in the central area, ... 20
3.5 Ground penetrating radar in the central area; 22
4 Discussion 23
4.1 Physical environment 23
4.2 21st century/current 23
4.3 20th century 23
4.5 18th Century 25
4.6 Other development 25
4.7 Possible relationship to Roman developments 27
5 Conclusion 29
References 30
Appendix 1 31
Appendix 2 32

List of Figures

Figure 1.1 Henrietta Park outlined in blue Site of 2012 excavations marked by red arrow... 1
Figure 1.2 Pooling water Henrietta Park, January 2015 2
Figure 1.3 1823 Flood level marks junction of Henrietta Road and Henrietta Street. 2
Figure 1.4 Flooding Henrietta Road 1947. Bath in Time. 3
Figure 1.5 Holburne Place junction of Bathwick Street and Henrietta Road. 3
Figure 1.6 11b Bathwick Street, centre. 3
Figure 1.7 Henrietta Park 2015. 4
Figure 1.8 Henrietta Park, photograph believed to be from 1937. Bath in Time. 4
Figure 1.9 1846 map showing pathway traversing the site. Bath in Time. 5
Figure 1.10 Print from 1860 showing path traversing the site, Henrietta Road and view to Camden Crescent. Bath in Time. 5
Figure 1.11 Early 19th century plan of kitchen gardens. Site indicated by rectangle. 6
Figure 1.12 1793 map showing planned Frances Square indicated by rectangle. Bath in Time... 7
Figure 1.13 Map 1776. New Gaol circled. Arrow indicates path to Claverton. Bath in Time. 7
Figure 1.14 South-east Prospect of the City of Bath" (1734). Bath in Time. 8
Figure 1.15 Bathwick House looking north from Henrietta Road. 8
Figure 1.16 View across the Avon to Bathwick, Bath, 1740 9
Figure 1.17 Part of Bathwick Estate, 1727. Bath in Time. 9
Figure 1.18 Location of medieval and Roman finds in Bathwick based on given OS 6 Figure grid reference and-or address 10
Figure 1.19 Excavations prior to the building of Holburne Place. Looking east, Bathwick Street is to the north (left), the survey area to the south (right) 11
Figure 3.1 Resistance survey over Henrietta Park 15
Figure 3.2 Magnetometry survey 16
Figure 3.3 Map of the resistivity profiling lines over Henrietta Park 17
Figure 3.4 Resistivity profiling over the central area of Henrietta Park 18
Figure 3.5 Resistivity profiling over the eastern central area of Henrietta Park 19
Figure 3.6 Resistivity profiling over the northern area of Henrietta Park 19
Figure 3.7 Resistivity profiling over the northern area of Henrietta Park aligned 20
Figure 3.8 Resistivity profile in the south-western corner of Henrietta Park (Profile11) 20
Figure 3.9 (a) A 0.5 m bar resistance survey over 4 grids in the central area compared with (b) 1.0 m 21
Figure 3.10 (a) A 0.5 m bar resistance survey over 4 grids in the central area compared with (b) 1.0 m expressed in xls 21
Figure 3.11 Profile lengths (1-5) showing lengths at more than 200 ohm.m in the higher resistivity layer positioned over the image from Figure 3.10a 22
Figure 3.12 Levels from the results of the GPR carried out across the central area 22
Figure 4.1 Photograph 1870 showing stone exposed in the grass. Bath in Time. 26
Appendix 1 Summary of HER medieval and Roman records for Bathwick 31
Appendix 2 Arrangement of the grids 32

1. Introduction

1.1 Location

The area involved in this project is Henrietta Park, Bath, a municipal ornamental park: DBN3629; MBN4289; OS map sheet ST76NE. It is situated in Bathwick, to the east side of the River Avon. This is shown in figure 1.1.

Figure 1.1 Henrietta Park outlined in blue Site of 2012 excavations marked by red arrow. Satellite map ©Google Earth with grateful acknowledgement

1.2 Background

This report describes the geophysical survey of Henrietta Park, Bath, in October 2015 by members of the Bath and Camerton Archaeological Society. The purpose of Section 1.2 is to summarise information already known about the park and area which might relate to the interpretation of the geophysical survey. This will be considered in retrograde order.

1.2.1 Physical environment

The Park is situated in the river valley to the east of the River Avon as it starts a curve around the old city of Bath. The area of the Park has been described as resting "on a bed of gravel that in turn rests in a kind of saucer of blue clay"[3]. This is a structure that holds water and is at risk of ground water flooding, and for many years when there was a significant rise in the river water table, water collected in the area was unable to escape. Drainage was provided when the current park was made by means of several catch (cess)-pits each six foot by three[3]. However, following heavy rain water still tends to pool (Figure 1.2).

Figure 1.2 Pooling water Henrietta Park, January 2015.

In addition the area has been and remains at risk of flooding from the river. There is evidence of flooding in Roman times[5]. The water level in this part of the River Avon is dictated by Pulteney Weir. The weirs on the Avon were not developed until Saxon times, and thus water during the Roman period had a free and unimpeded flow as seen over the top of Pulteney Weir. This flow has been seen, e.g. in 1991, during routine maintenance on the floodgate at Twerton, when the gate became jammed in the open position, which meant that the river was drained of all the excess water - all that remained was a channel of shallow water no more than seven or eight feet across, into which some young boys had waded to catch fish in Widcombe[6]. However, water extraction over the last half century may have reduced the water table to a significantly lower level than it was in earlier times.

The flood prevention scheme revealed that the river bed had been deeper in the past. In 'Bath Flood Prevention Scheme'[7], the normal water level above Pulteney Weir is given as 56 feet but the bed level is 45 feet, meaning that the weir adds a full 11 feet depth of water and a very similar situation must therefore exist near Henrietta Park. If mean water depth during the Roman period was no more than two or three feet, water level would be at least 8 feet below what you see today. Fords would have produced more than adequate crossings at that time, though there is likely to have been a bridge somewhere so that it could still have been crossed during periods of high water.

In 1823 there was a significant event, recorded in flood level marks on the New Gaol in what is now Grove Street and at the junction of Henrietta Road and Henrietta Street (Figure 1.3) These marks indicate water levels of 1 m above current pavement level and likely to be deeper in the park .There was a similar event in 1947 as can be seen by photograph from that time (Figure 1.4)[8] and other floods up to the 1960s[3]. This risk of flooding has been mitigated by the recent flood prevention works. However, the Environment Agency[9] identifies this area and the rest of the flood plain as remaining at risk (1%). Interestingly and perhaps of significance is that Bathwick Street, to the north of the park and the area occupied in the past by Bathwick Mill, around the current Pulteney Bridge to the south-west, are at lower risk (0.01%).

Figure 1.3 1823 Flood level marks junction of Henrietta Road and Henrietta Street.

Figure 1.4 Flooding Henrietta Road 1947. Bath in Time.

1.2.2 21st century development

Recent activity in the vicinity has included the redevelopment of sites along Bathwick Street to the north of the site. In particular, there has been the redevelopment of former commercial and residential property and the building of Herschel House, Holburne House and 11b Bathwick Street (Figures 1.5 and 1.6). Required archaeological assessment has provided much valuable information regarding the early occupation and use of the area[5].

Figure 1.5 Holburne Place junction of Bathwick Street and Henrietta Road. The trees in the park can be seen centre far right of the picture.

Figure 1.6 11b Bathwick Street, centre.

The park itself is laid to lawns with mature trees with some younger replacements and tarmac footpaths that follow the pattern as laid out at the end of the 19th century (Figure 1.7).

Figure 1.7 Henrietta Park 2015.

The ground is a mostly level grassed area. There are banks up to the roads around the Park and the raised path along the southern end. Here this bank curves back and disappears into the lawn so possibly may have enclosed some feature in its past. At the northern end next to the path leading along by and to Henrietta Road there is an elongated mound, only just over a metre high. It is now covered by bushes and trees. It is not distinguishable in images we have examined as background to this report.

1.2.3 20th century developments

Over this period there have been small changes in Park layout, including flower beds set in the lawns in the mid-1900s (Figure 1.8)[10]. In 1937 the George V Memorial Garden in the south-west corner of the site was created. Now redesigned as the Sensory Garden, its complexity and hard surfaces meant that the area was excluded from the survey. A meteorological station is identified in the north-west corner of the park on the 1902 OS map but nothing survives of any associated structures above ground

The Park was hit in the 1942 bombing of Bath. Records show the pattern of the bombs that fell in this area[11], one of which was at the end of Daniel Street, and another outside the top fork in the right hand path of the circular path. There is no obvious trace of the crater(s) at the surface but this area is covered by our survey.

The land north-east of the Park was sold for building early in the century and the houses in Henrietta Gardens were built from the 1920s. This development revealed evidence of Roman burials and activity in this area[2,12].

Figure 1.8 Henrietta Park, photograph believed to be from 1937. Bath in Time.

1.2.4 19th Century developments

Henrietta Park was opened in 1897 at the time of Queen Victoria's Jubilee celebrations, the land gifted to the city by Captain F.W. Forester at that time. Many of the trees there now were planted and the current paths laid out. Archives of the costing of the project refer to the creation of the paths, fencing, the need for the removal of an earlier path traversing the site and the creation of the cess pits for drainage. A bandstand had been proposed in the original plans, but the eventual plans did not include it[3].

Prior to the creation of the current park, the area was more open. Although in private ownership it seems to have been used for public activity. There was a wide way extending across the Park from Sunderland Street towards Henrietta Road, with a large flag pole. When the 1897 park plan was being proposed, there was argument about whether this was a right of way[3]. This road is shown on a map[13] (Figure 1.9) from 1846 and in a contemporary print[14] (Figure 1.10).

Figure 1.9 1846 map showing pathway traversing the site. Bath in Time.

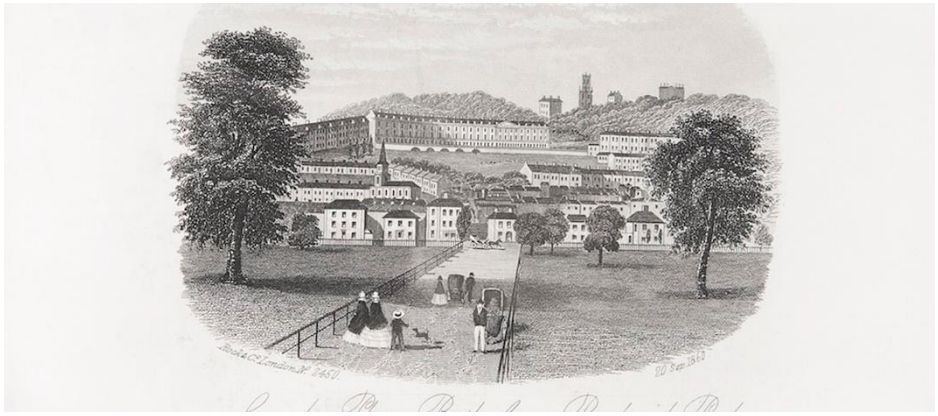


Figure 1.10 Print from 1860 showing path traversing the site, Henrietta Road and view to Camden Crescent. Bath in Time.

It was not deemed to be a right of way and the estimates for the work included funding for it to be removed before the new Park was installed[3]. By this time the Italianate houses on Henrietta Road overlooking the Park were built creating the western boundary of the park and the road network became what it is today.

At the beginning of the century, during a time expected future development, the Park area was devoted to market gardens or "kitchen gardens". This land usage appears on maps and plans from the early 19th century. In particular the plan in Figure 1.11, from the collection of papers relating to the development plans made in the previous century by William Pulteney[15] for his estate, shows the area divided into plots and criss-crossed by a number of pathways.

Figure 1.11 Early 19th century plan of kitchen gardens. Site indicated by rectangle.

In 1837 Cleveland Bridge was opened providing a dry river crossing between Bathwick and Walcot. This required the realignment of Bathwick Street causing it to dog-leg slightly to the north from its junction with Henrietta Road.

1.2.5 18th Century developments

From the mid 1770's there was a major development of the Bathwick estate. Great Pulteney Street, and Bathwick Street all completed by the 1790s still provide the frame to the north and west for the site. This development was not completed as planned. Financial collapse and a change in fashion to sea bathing meant that the development of Frances Square on the site of the current park and this survey were not carried through. However, Frances Square does appear ghosted in on maps of the time[e.g.16] as shown in Figure 1.12 and continued to be so well into the 19th century. Although no groundworks are known to have been completed for this development this could be a consideration for this survey.

Figure 1.12 1793 map showing planned Frances Square indicated by rectangle. Bath in Time.

Prior to this, in 1772 the New Prison in Grove Street had been built. It sits across the river from the main settlement on the New and Correct Plan of the City of Bath 1776[17] (Figure 1.13). The building still exists within the context of later development in what is now Grove Street. Note that this map also shows a trackway to the south of the gaol, labelled as leading to Claverton in a direction that may well have traversed the survey site. The Vauxhall at Spring Gardens, accessed from the city by ferry, was laid out in the 1740's providing a destination for those taking the cure.

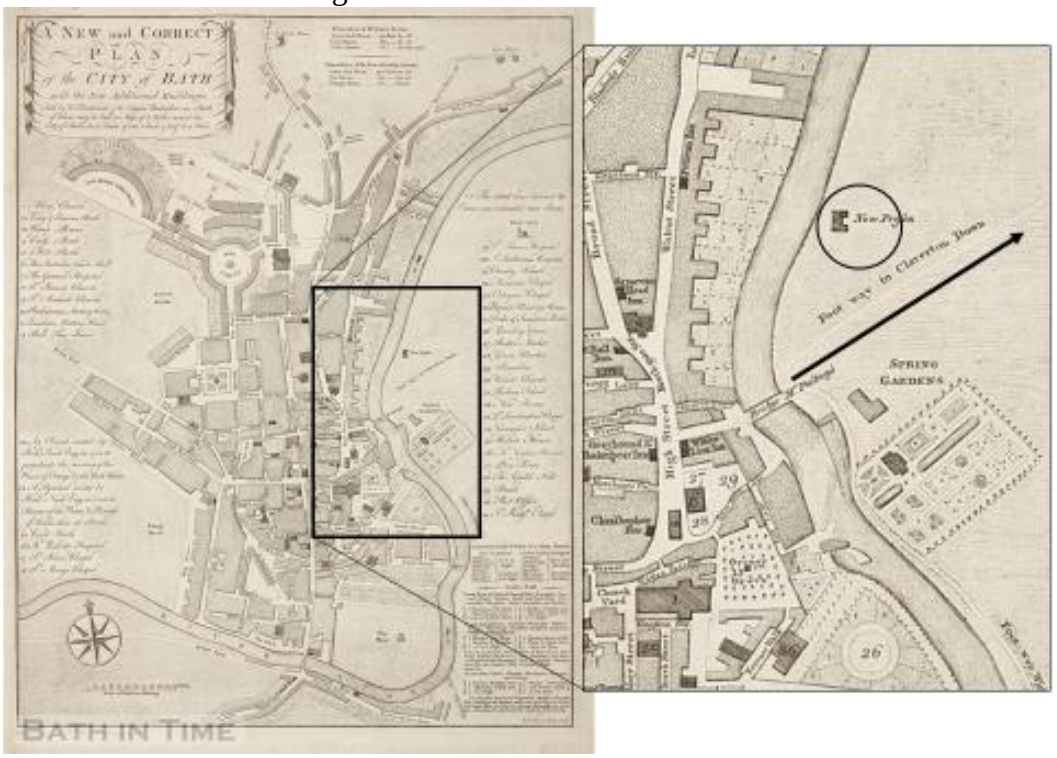


Figure 1.13 Map 1776. New Gaol circled. Arrow indicates path to Claverton. Note Spring Gardens Vauxhall to the south. Bath in Time.

Prior to that it would appear that occupation and activity in the first half of the 18th century seems to have been confined to Bathwick Village and Bathwick Mill seen in pictures of the time eg figure 1.14, "South-east Prospect of the City of Bath" (1734)[18].

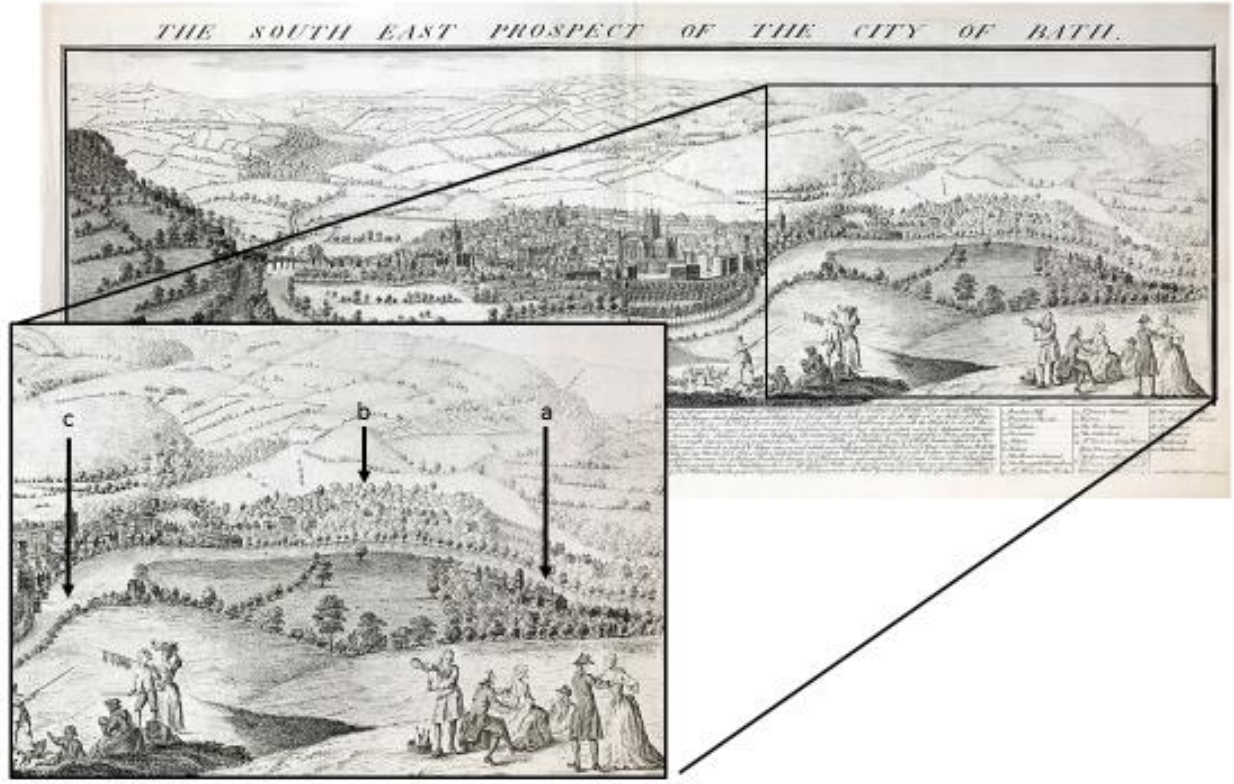


Figure 1.14 South-east Prospect of the City of Bath" (1734). Note Bathwick village (a), Walcot (b) and the weir and mill (c) and the fields in between. Bath in Time.

Bathwick village, population 150, centred on what is now Bathwick Street consisted of an irregular street of 45 houses in 1781 mostly destroyed by later development. However, an interesting survivor of this time is Bathwick House (Figure 1.15). With likely 17th century origins it was remodelled in the late 18th century[19]. Situated opposite the junction of Henrietta Road and Bathwick Street, it is of particular interest because it appears in a print from 1740, a view of Bathwick from Walcot[20], as a landmark in the village with a trackway running from the house to the right across the fields (Figure 1.16).

Figure 1.15 Bathwick House looking N from Henrietta Road. Note the five bays on the second floor and three on the top floor. The parapet wall on the top floor is a late 18th century remodelling.

Figure 1.16 View across the Avon to Bathwick, Bath, 1740. Bathwick House is centre right. Note the five bays on the second floor, three dormer windows in gables on the top floor remodelled late 18th century. Note the pathway running across the fields to the right in the foreground. Bath in Time.

The Mill, which was mentioned in the Domesday Book and was working well into the 20th century, was situated at what is now Pulteney weir. It was associated with a ferry that was made redundant with the building of Pulteney Bridge in the 1770s[19]. In the immediate vicinity from 1740 onwards was the Vauxhall at Spring Gardens. Perhaps those taking the cure may have made use of the pathway from the mill to Bathwick village as part of their therapeutic regime.

It would appear that the area of interest prior to development in the late 18th century was essentially open fields with trackways presumably providing a route from the village to the mill and ferry. This is best shown by Figure 1.17, a map of the Bathwick estate from 1727[21].

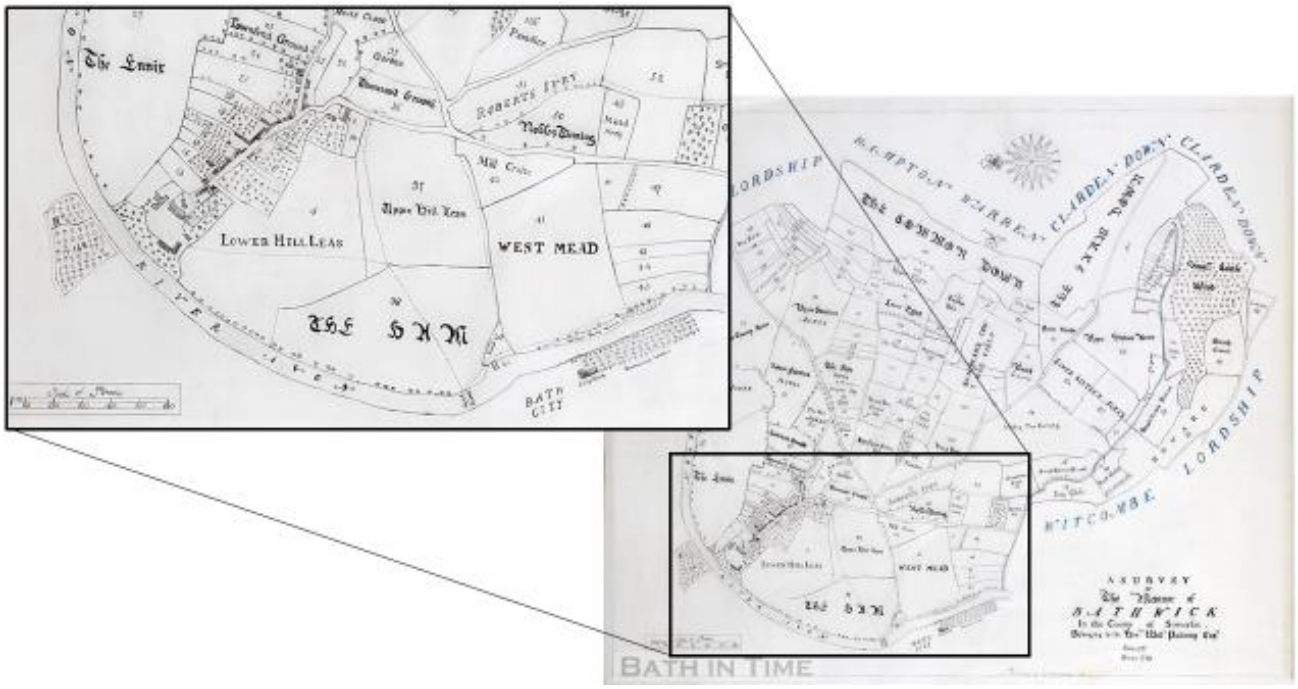


Figure 1.17 Part of Bathwick Estate, 1727. Note, Lower Hill Leas the Ham and the trackways crossing the fields where the park is now. These names show the agricultural use of the fields as Lea would signify grassland and Ham an area of pasture by the river. Bath in Time.

1.2.6 Earlier development

What is now the Park area can be presumed to also have been open fields for some time before this. To the north lay Bathwick Village and to the south, Bathwick Mill. Bathwick was described for the Hearth Tax of 1664, as having just twelve dwellings[3], so only being a very small village. However the village did have a rather grand house in the aforementioned Bathwick House the core of which dates from the 17th century[4,19]. The village and Bathwick Mill are both mentioned in Domesday. How much further back activity during the Saxon period can be traced back on that site is difficult to determine given the development during the 18th century.

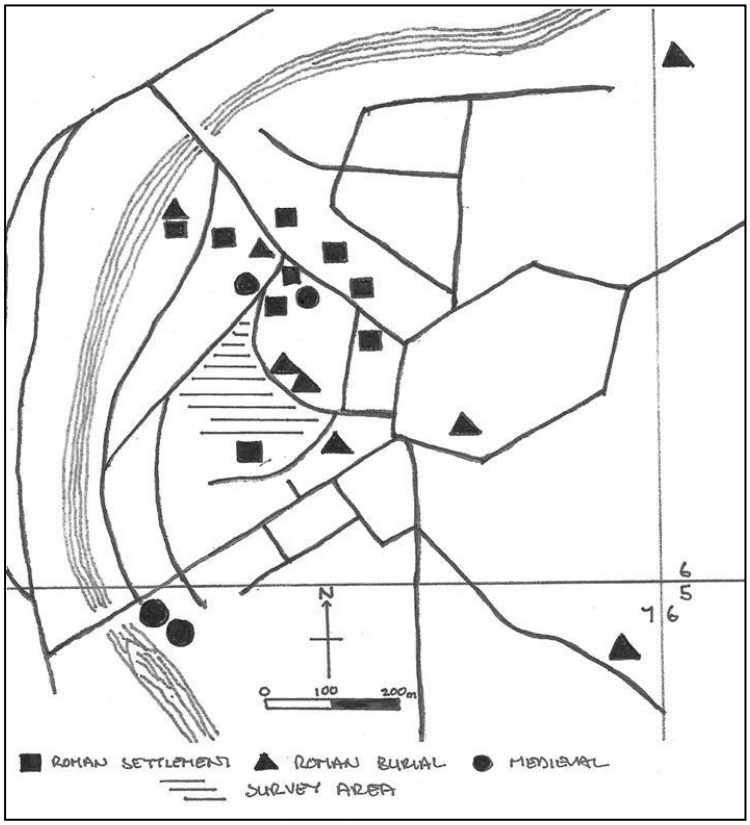


Figure 1.18 Location of medieval and Roman finds in Bathwick based on given OS 6 Figure grid reference and-or address. Refer to Appendix 1 for details

A trawl through the HER (See Appendix 1) for the area revealed entries related to occupation sites, burials and odd finds from the medieval and Roman periods but none earlier. Medieval activity has been found associated with the mill and village. There is also evidence of activity during the Roman period in the current Bathwick Street area and elsewhere in the vicinity of the site. The lack of evidence from an earlier time provides no support for the assertion by John Wood in the 18th century that Bathwick had been the site of the Kaerbadus, the fortress of the Britons[22].

The locations, based on six-figure grid references and addresses where available, of these are displayed in Figure 1.18. Unfortunately, the location of some of the antiquarian discoveries is somewhat vague and requires caution. Similarly there are some records stating probable sites with no direct evidence. What seems to be of significance is the distribution of sites, all but one are outside the survey area. Medieval sites are confined to the village close to what is now Bathwick Street and mill. Roman sites are distributed along Bathwick Street with outliers, burials to the north-east and south-east. The only site within the survey area was a find of one Roman coin of unknown type which may be out of context found within the circular walk in 1964 (MBN30201). This distribution of sites might indicate a lack of activity

other than pasture from these periods within the survey area. However, the discovery of recent and antiquarian sites has tended to be the result of works prior to development. As the survey area would appear to have remained relatively undisturbed this distribution may be misleading.

Of particular interest have been the results of the excavations preceding redevelopment of 11b Bathwick Street[5] (the report refers to 12a, but this does not exist, 11a and 11b do) and that at what is now Holburne Place[1] both to the N of the site. The excavation at 11b revealed that beneath 2 m of 19th, 20th made ground was an early Roman (70-120 AD) building sealed by a layer of oolitic gravel and sandy alluvial clay suggesting a flood event[5]. No further evidence of occupation was found dating before 1750. The report goes on further to suggest that the site is situated on a gravel bank, an ancient eyot on the flood plain, the river to its east and an abandoned channel to the west. This feature may have delineated the extent of activity in the area, presumably providing some protection from flooding and the author suggests that determining its extent would be useful. This seems to correspond to the Environment Agencies current assessment of flood risk in the area and may explain the distribution of Roman sites along Bathwick Street. However, as referred to above, river levels may well have varied historically affecting flood risk and building in the 18th century, and later on may well have destroyed much of subsequent stratigraphy.

The excavations at what is now Holburne Place, on the corner of Bathwick Street and Henrietta Road are more recent[1]. A Roman Street with associated buildings, running north-east, south-west, essentially perpendicular to the current Bathwick Street, was discovered (Figure 1.19)

Figure 1. 19 Excavations prior to the building of Holburne Place. Looking east, Bathwick Street is to the north (left), the survey area to the south (right). In the centre is the roadway flanked on both sides with buildings.

It has been the subject of much debate as to whether or not the settlement in this area is associated with a river crossing during the Roman period. There has been much conjecture as to the route taken by roads through Bath[23,24,25]. One suggestion has been that there was a crossing of the river a little south of the current Cleveland Bridge, marked as the site of a 18th century ferry (OS map of Georgian Bath). Evidence is suggested by the apparent convergence of roads of the period on the opposite side of the river in the vicinity of the old Hat and Feather Pub, now Hudson's restaurant, in Walcot[2]. The numerous burials[2,12] and their likely association with a roadway and the occupation sites on the other side of the river in Bathwick suggestive of possible routes to the south, south-east and north-east, the latter likely heading to the quarries on Bathampton Down, the former linking with the Fosse Way. In addition, the river crossing may have been associated with a fort, especially in the first century, evidence for which however has yet to be found.

A Stone is marked on the border towards the eastern corner of the Park on the 1886 OS map. There is no sign of it now, and we have found no reference to when it could have been erected or what its function was.

The evidence outlined in this description of the settlement at Bathwick over time has shown that is has been present over these centuries and continued its own significance alongside the development of the City and its surroundings.

1.3 Programme

The geophysics work was completed by the team of volunteers from BACAS over three days for two successive weeks in October 2015. The weather was mostly cloudy with sunshine, with rain showers on the fourth day..

1.4 Scope

This survey followed the discovery of the Roman road under what is now Holburne Place. In particular the aim was to investigate whether it or any other developments extended southwards in to Henrietta Park. The area surveyed would also contribute to the knowledge of Bathwick history. The techniques used are non-invasive and non-destructive and provide no direct dating evidence. The geology and current flora, particularly the trees, with more recent as well as past activity might well mask earlier activity. The results we obtained require cautious interpretation, and hopefully this review will help in this.

Any additional information and suggestions that can be added by others will be much appreciated by the authors.

2 Method

2.1 Gridding

The survey area was laid out in 20 m grid squares, as is standard BACAS practice. A starting point (0) was set up at the western end of a top line parallel to the 4th and 5th trees along the Henrietta Gardens edge of the park, as in Appendix 2. All subsequent grid squares were set up using tapes and Pythagorean triangles. Grid north was 50° east of compass north.
All instruments were walked in (grid) north-south traverses working eastwards across the field, starting at the south-west corner as described in reference 26.

2.2 Twin probe resistance

BACAS has two twin-probe resistance meters: Geoscan RM15D (black) and TR/CIA (silver). Both look similar and use similar principles, but have significantly different logging sequences. With 0.5 probe separation on the frame, maximum penetration depth was between 0.5 and 1 m. The Geoscan was also used over a small area (grids 21,14,19, 22 in Appendix Figure A) with 1.0 m probe separation, where the maximum penetration depth is doubled.

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

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

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

2.3 Electrical resistivity pseudosection profiling

An additional approach using resistance was to use the TR/CIA resistance meter for resistivity depth profiling. In each case a 31 m line of 32 probes 1 m apart was set out along the line of the survey and a profile taken using probe separation measurements of 1 to 6 m along the length. This provided a vertical profile through the ground, down to 3 m depth.

2.4 Magnetometer

The Geoscan FM256 fluxgate gradiometer, operated by manual logging was used at 0.5 m intervals for this along traverses at 1 m intervals (800 readings per 20 m square). Maximum penetration depth for this instrument is approximately 1.4 m. A zigzag pattern was walked. Manual logging was necessary for maximum control, as the traverses might require crossing paths, avoiding metal furniture or ducking under low tree canopies, operations which would be hazardous to do at a standard operating speed.

2.5 Ground penetrating radar

A part of the central area investigated at greater depth using resistance surveying (grids 21, 14, 19, 22 in Appendix 2 Figure A) and profiling was further examined using ground penetrating radar. The machine used was a MALA X3M device working at 250 MHz. The 15 m by 30 m area between the trees started 17 m along the 0 line of grid 19. Lines were 0.5 m apart.

2.6 Software

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

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

2.7 Constraints

A two-week period used for the survey had been agreed, so the survey had to be completed within this time frame.

The work was not hampered by the weather, which was mainly fine with rain showers only on the fourth day.

One constraint for the project design was the need to remove the stakes marking the grids at the end of each day, so they had is reset on the following days. Use of chalk marks on the pathways assisted with this process, and our results show the necessary consistency for interpretation.

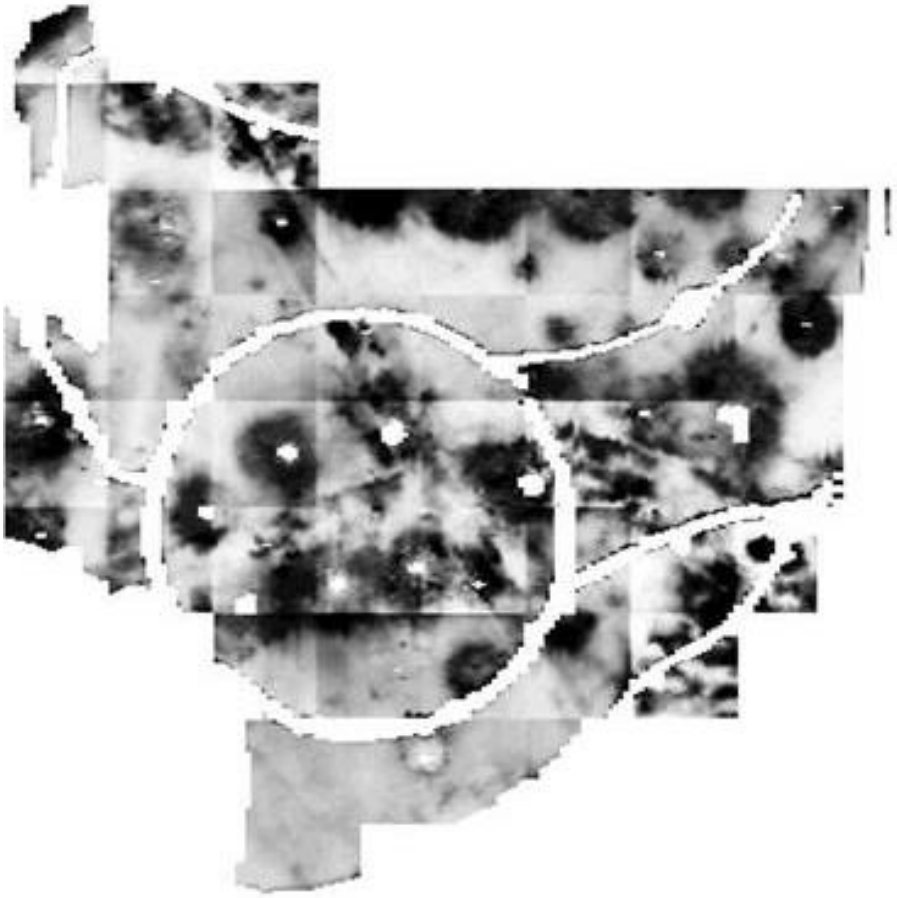
3. Results

3.1 Resistance survey

Figure 3.1a shows the resistance survey completed over the park area with areas marked for reference shown in Figure 3.1b.

Figure 3.1 Resistance survey over Henrietta Park.

Figure 3.1a Resistance survey.



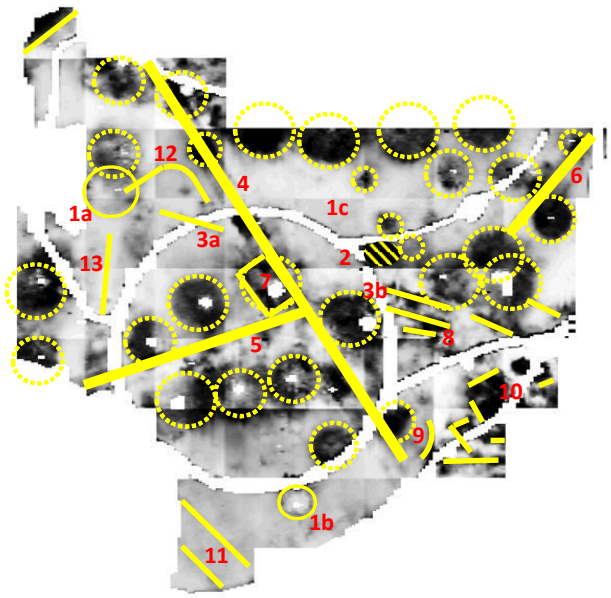


Figure 3.1b Annotation of the survey.

This survey was only over grassed areas, so the pathways are marked by the blank lines. The dotted outlined high resistance areas on Figure 3.1b mark the root systems under the large trees. They take up a considerable area, but around and among these a number of possible features are indicated by the patterns of anomalies, including the following. There are rounded outlines shown as 1a and 1b with an indication at 1c. There is a dark area (hatched) marked 2, coincident with the position of the bomb crater from WWII. Indications of linear features along the line of the wide pathway across the park in the 19th century are marked 3a and b. There are also strong indications of wide routeways across the area which are marked 4, 5 and 6. In the upper half of the area within the circular pathway, under a large tree, a possible rectangular outline shape marked 7 can be distinguished.

These and the other marked areas (8-11) will be considered further in the Discussion.

3.2 Magnetometry survey

Figure 3.2a shows the magnetometry survey carried out over the accessible areas in the park with Figure 3.2b marked for reference. The course of the pathways were not detected using this method, but their course is indicated by the blank areas around the seats alongside them.

Figure 3.2 Magnetometry survey

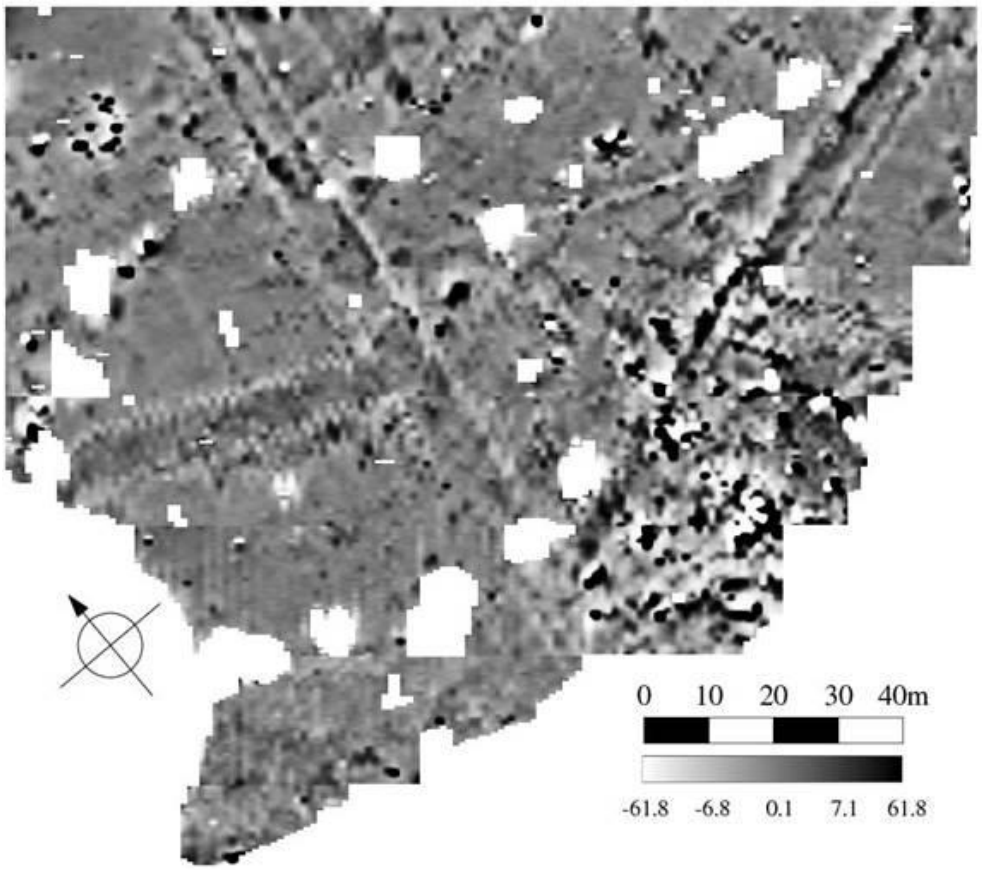


Figure 3.2a Magnetometry survey.

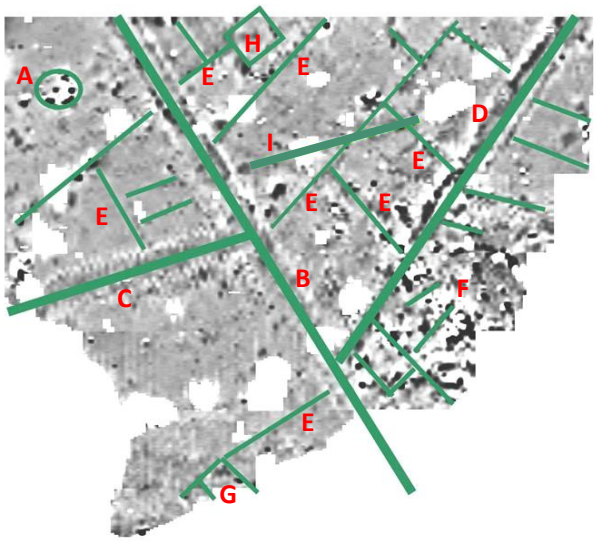


Figure 3.2b Magnetometry survey marked for reference.

A circle of high response points is marked as A, the site of the meteorological station present in the 1900s. The image shows the clear course of the three straight intersecting routeways across the park (B, C, D) that were identified in Figure 3.1. There are also several other possible structural and linear features indicated in the magnetometry image marked by E-H, and consideration of these will be included in the Discussion.

3.3 Resistivity profiles in specific areas of the Park

3.3.1 Areas studied

Our further investigation of areas of interest identified in the resistance and magnetometry surveys used resistivity profiling to extend the observations at a greater depth. The map of all the profiles we completed is shown in Figure 3.3.

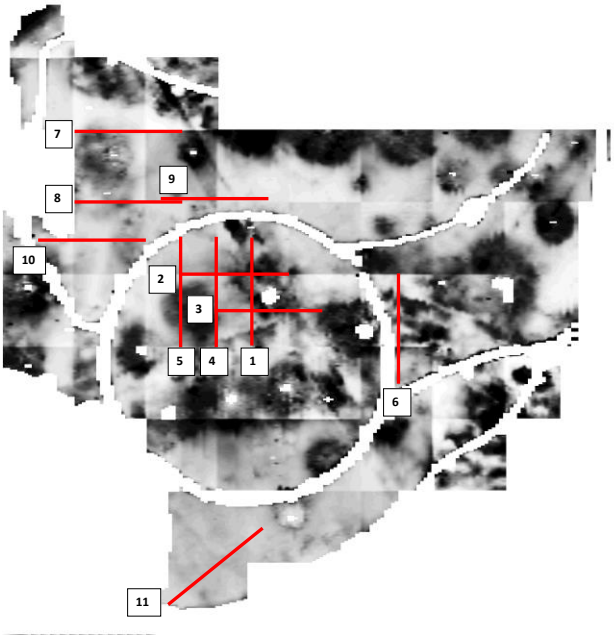
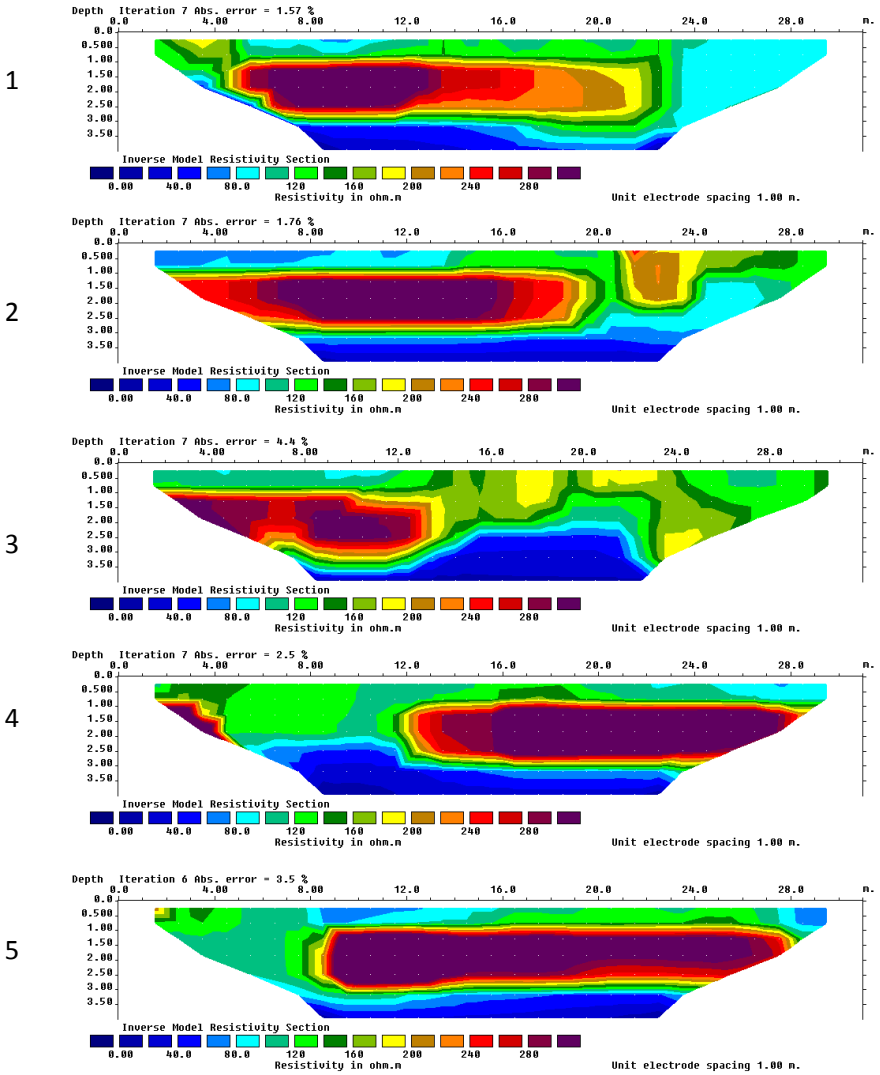


Figure 3.3 Map of the resistivity profiling lines over Henrietta Park.

3.3.2 Central area

The initial area we investigated using this technique was where we had observed the possibly rectangular higher-resistant outline within the round pathway (7 in Figure 3.1b). The profile images obtained over this area are shown in Figure 3.4 (1-5).

Figure 3.4 Resistivity profiling over the central area of Henrietta Park (Profiles number 1-5).



The results in profile 1 show higher resistivity results to 1 m depth in the area of the possible rectangular feature. Those in profiles 2 and 3 show a similar pattern, with higher resistivity volumes extending to deeper levels. However these profiles also show a high resistivity layer below 1.5 m that extends over a large area (20 m across in profile 5). These results were not indicated by the resistance survey, and will be examined further in Section 3.3.2.

3.3.3 To the east on the other side of the path

A further area to the south-east of this, across the path, was also investigated with profiling to cross the anomalies marked 3b and 8 in Figure 3.1b. This is profile no 6 and shown in Figure 3.5. It crosses the course of the wide pathway that traversed the park from Sunderland Street in the 19th century.

6

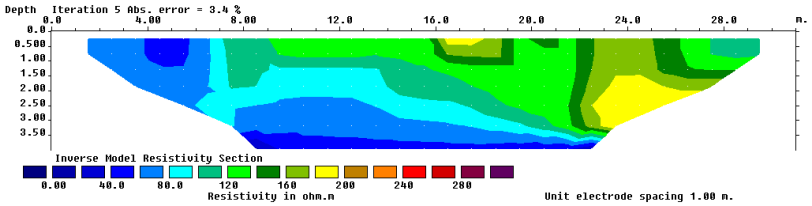


Figure 3.5 Resistivity profiling over the eastern central area of Henrietta Park (Profile number 6).

Patterns of higher resistivity leading to the observed patterns of higher resistance results are indicated in this cross section. There is no clear evidence for any remains of the course of the 5 m wide pathway.

3.3.4 To the north-west side of the park

The Roman road revealed in the Holburne Place, Bathwick Street excavations[1] pointed in the approximate direction of this area if it had continued for this distance. The area was profiled as shown in Figure 3.3 to provide the results shown in Figure 3.6.

7

8

9

10

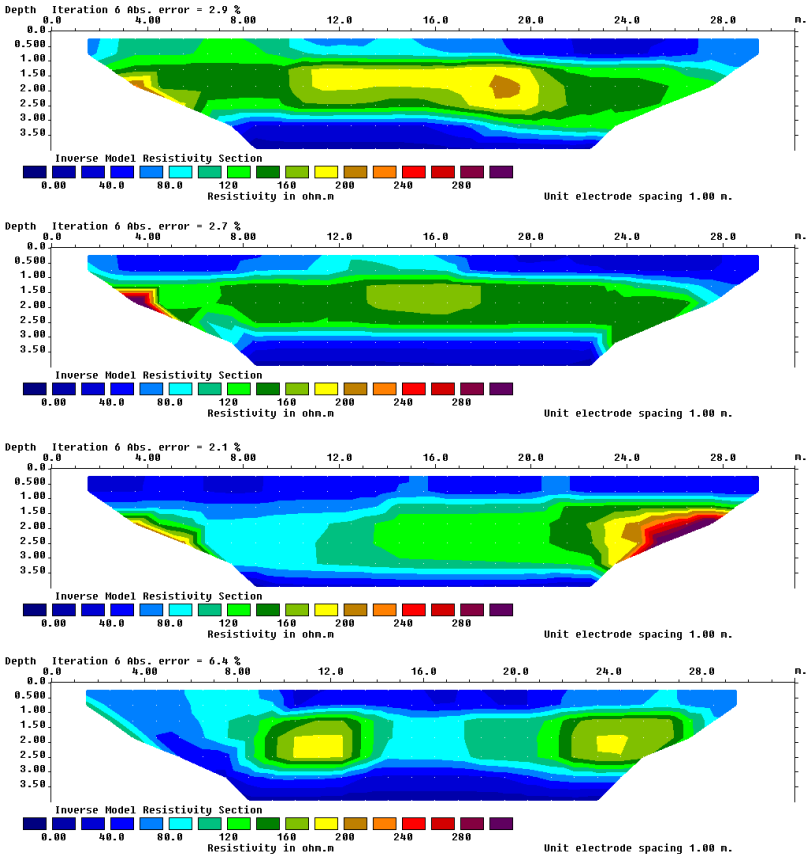
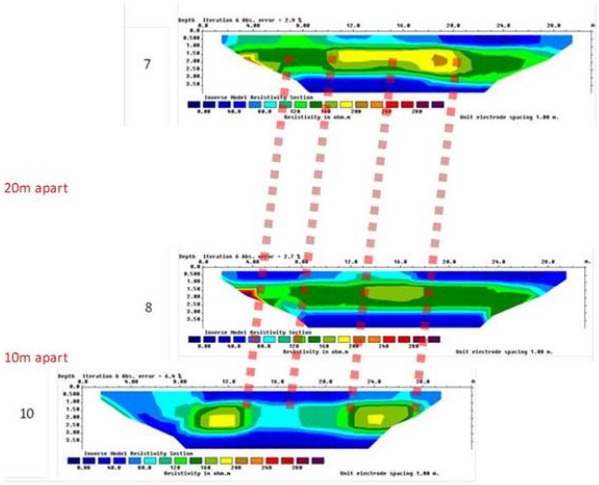


Figure 3.6 Resistivity profiling over the north-western area of Henrietta Park (Profiles number 7-10).

The possible routeway indicated as crossing this area (4 in Figure 3.1.b and B in Figure 3.2.b) was crossed by profile number 9. The indications of its boundaries are shown in this profile at 15 and 21 m, in the top metre of the ground.

Deeper high resistance volumes starting at 1.5 m depth can be seen across most of these profiles. There is a higher resistivity volume in profiles 7, 8 and 10 along an approximate north-east, south-west. This has been summarised in Figure 3.7, arranged with their relative separation. However these responses show different levels of resistivity, so this may be only coincidence.

Figure 3.7 Resistivity profiling over north-western area of Henrietta Park, profiles 7, 8 and 10 aligned.



3.3.5 To the south of the Park

The resistance survey indicated two higher resistant lines parallel to the north-south trackway in the south west corner of the park (11 in Figure 3.1b). They were crossed by profile number 11 and the image is shown in Figure 3.8. The results making up this profile show lower resistance presumably due to the relative wetness of the area. In this case too there is a two metre deep layer of higher resistance material below 1.5 m, not distinguished in our resistance survey. The different resistivity patterns resulting in the two observed lines in the resistance survey can be distinguished at 8 and 20 m.

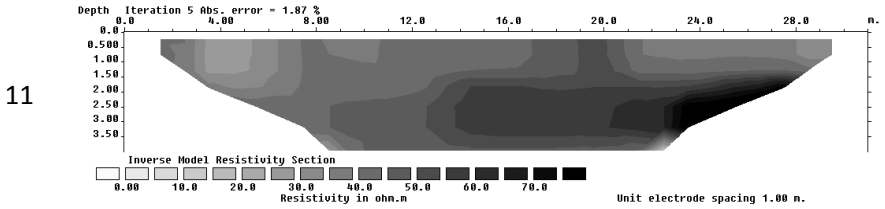
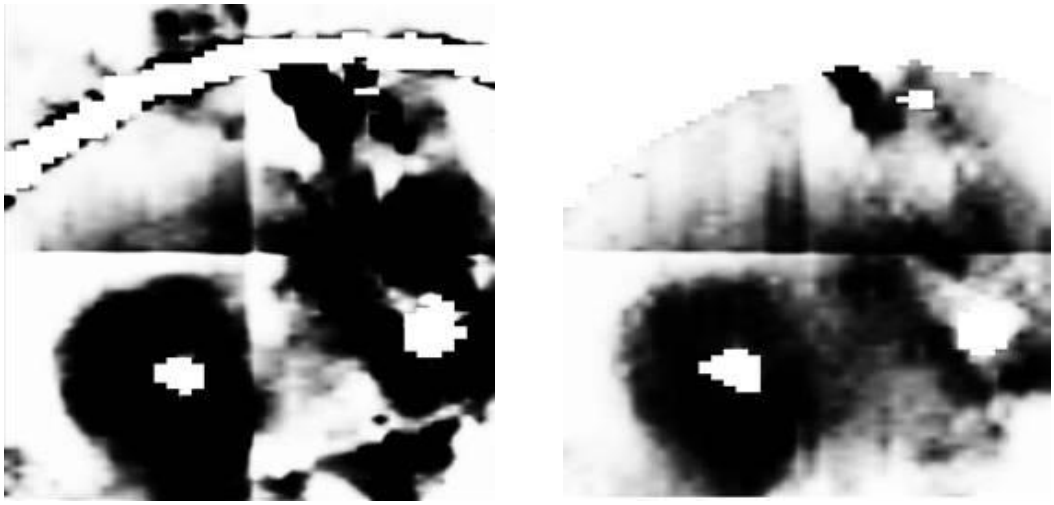


Figure 3.8 Resistivity profile in the south-western corner of Henrietta Park (Profile11).

3.4 Deeper resistance survey (1 m bar) in the central area,

In order to investigate the area around the possibly rectangular outline in the centre of the park at greater depth, a resistance survey was carried out within four grids using a 1 m bar (grids 21, 14, 19, 22 in Appendix 2 Figure A). This spacing doubles the depth registered under the soil compared with the 0.5 m bar to around 1 m. The image of the 0.5 m resistance survey over this area is shown in Figure 3.9a, and can be compared with Figure 3.9b (1.0 m separation). The positions of the trunks of the two large trees in this area are shown clearly, and we are aware that our results may well be complicated by these trees growing through the investigated area.



a b

Figure 3.9 (a) A 0.5 m bar resistance survey over 4 grids in the central area compared with (b) 1.0 m.

These same results are expressed as a linear scale using an Excel spreadsheet analysis which in this case gives very good detail and the images are shown in Figure 3.10

.

a b

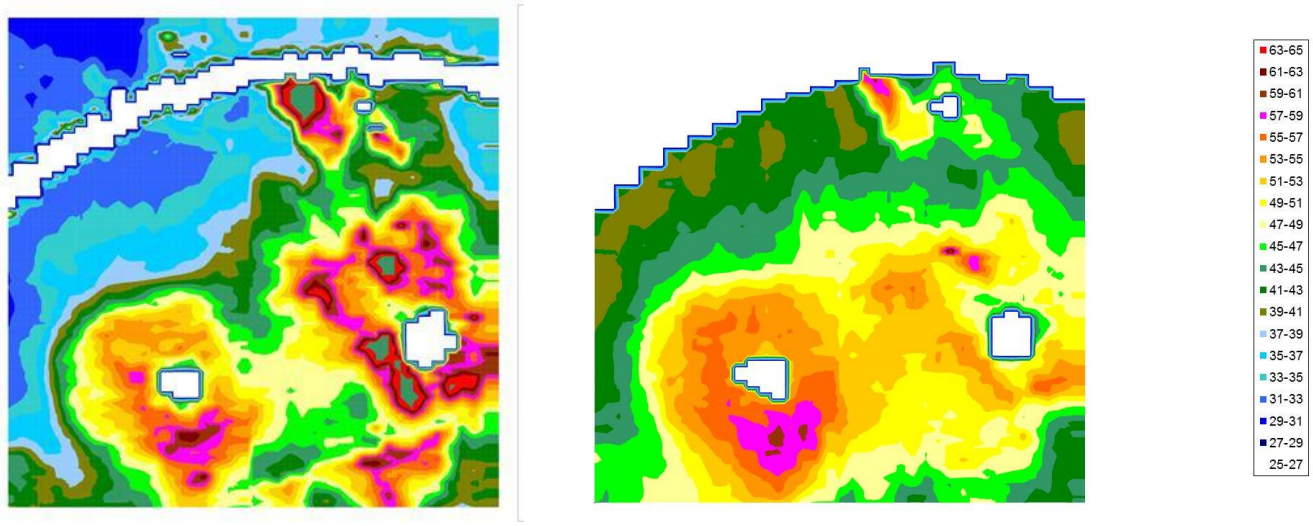


Figure 3.10 (a) A 0.5 m bar resistance survey over 4 grids in the central area compared with (b) 1.0 m expressed in xls.

The 10 m by 15 m possibly rectangular high resistance outline seen in the resistance survey in Figure 3.1 can be clearly observed in the image in Figure 3.10a, but not to the same extent in 3.10b, at half a metre deeper. The latter results do however show the indication of a larger high resistance area about 35 m by 25 m (possibly rectangular) extending over much of the lower two grid areas. However we do note that this also coincides with the area of the root systems of the two large trees, so any indication of right angles might be due to chance.

Whatever the case, only the edges of this area indicate the extent of the deeper much higher resistance layer indicated by the resistivity profiles described in Figure 3.4. The description of this is shown in Figure 3.11 where the lengths along the profiles showing resistivity of more than 200 ohm.m in the deep layer are shown in position. No clear interrelationship between our observed patterns is obvious from this. It may be that this represents a separate structure too deep to be detected by the other instruments used.

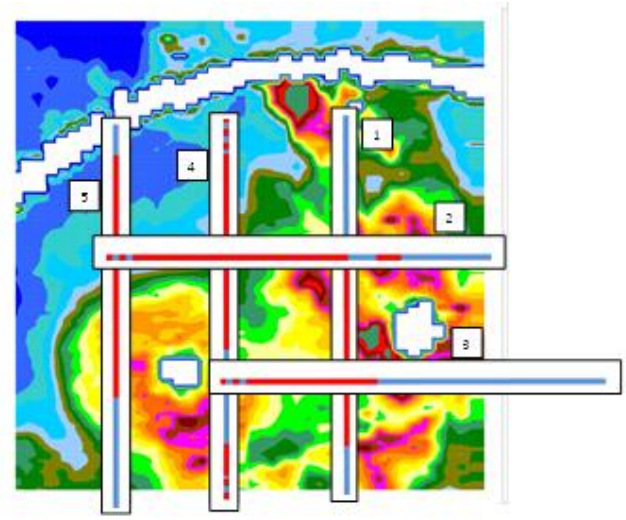


Figure 3.11 Profiles 1-5 positioned over the image from Figure 3.10a, marked red to show results more than 200 ohm.m in the higher resistivity layer (red dotted where the high results may continue beyond end of profile).

3.5 Ground penetrating radar in the central area;

A further technique to investigate this central area was ground penetrating radar (GPR). The areas used the same 0 line as those in Figures 3.9 and 3.10, starting 17 m along to fit between the two large trees. Results of this at 0.4 m, 0.8 m and 1.6 m nominal depth are shown in Figure 3.12.

a b c

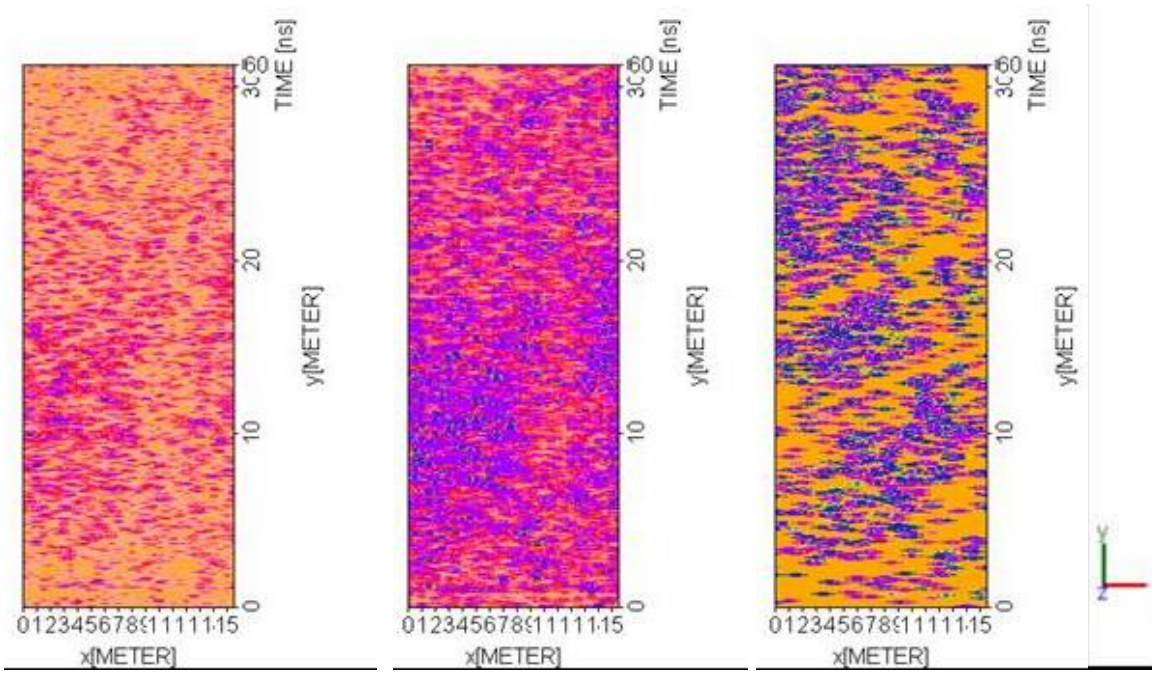


Figure 3.12 Levels from the results of the GPR carried out across the central area (a) 0.4 m (b) 0.8 m (c)1.6 m.

The area covered could not include the area of the large trees so was not optimised for displaying the area, and the results do not add much to our information. In these images the differential pattern across the 0.4 m level image (3.12a) shows similarities to the pattern shown in Figure 3.10a, and the angled diagonal lines across Figure 3.12c may give very faint indications of possible linear structures or edge(s) at 1.6 m depth.

4 Discussion

In this section our results will be discussed in relation to the sections in the Introduction. In our work we found evidence for many of the different stages of the development in the park over the years as well as providing some additional information. The discussion will be done in retrogressive order.

4.1 Physical environment

The park is on low laying land close to the river. A wet layer is indicated under the ground below about 2.50-3.00 m depth in most of the resistivity profiles we measured. Above this the resistance varies and in many of our profiles there is an intermittent layer consisting of 1.5-2.0 m of higher resistivity material starting at 1-1.5 m below the ground. This would correlate with the gravel layer described in the Introduction.

4.2 21st century/current

This parkland contains many large trees, many of which have been there for most of the past century. The tree-populated areas, with the non-accessibility of the pathways (resistance) and metal furniture such as the seats around the park (magnetometry) occupy a lot of the area, but we were able to carry out relatively comprehensive surveys. The area of the Sensory Garden was not surveyed.

Figure 3.1b shows the higher resistance areas around the tree root systems delineated by the dotted lines. There are also three rounded outlines seen in the resistance survey labelled 1a, b and c. 1a and b now have small tree growths in the middle, and we know that 1c was the site of a tree in the past from photographic evidence[27]. Although ring 1a coincides with a few stronger signals in the magnetometry survey, these patterns may well reflect the remains of old trees now removed, replaced or regrown, rather than giving evidence for the remains of any other feature.

4.3 20th century

The park had continued as a leisure facility in the current arrangement thought this century, with the introduction of the George V Memorial Garden in 1937.

During WWII the park was hit by a bombing raid on Bath in 1942. The dark higher resistance area in Figure 3.1b hatched and marked 2 is the site of the crater shown in the mapping of these in 1946[11]. This higher resistance results on this site could well be due to the infilling of the crater. There is a small tree in position there now, but in earlier times, as described above, and possibly before the raid, there had been a tree on the other side of the path[27].

Henrietta Park was opened in 1897. The work on creating the current arrangement of paths was completed in the previous year as the estimates for the work can be seen in the Minutes of Bath Corporation Pleasure Gardens Committee in February 1896[28].

A drinking fountain was installed in the park, as shown on the OS map of 1902 but this is on the southern wall of the park area, and outside the area we were working in. Apart from the catch-pits mentioned in the Introduction, the sites of which are not known, there is no knowledge of any water or drainage piping across the park[29]. So there is no information on any linear features that might account for some of our results.

In the 1902 OS map there was a small meteorological station shown to the north of the circular path. It is no longer there but its position is coincident with the circular pattern of dots shown as A in Figure 3.2b which would mark the remains of its base.

The wide straight pathway with iron railings that existed across the park from Sunderland Street during earlier years in this century was described in the Introduction (Figure 1.9). The Sunderland Street entrance is to the north of the route followed by the pathway across the field in the map of Bathwick Manor (Figure 2.17), which would have entered the park area at about the level of William Street. However these approach the same area on the Henrietta Road side, which leads to another way in the 1846 map (Figure 1.9). This wide pathway was required to be removed in the creation of the current park. The line of this pathway may possibly just be traced in anomalies in the resistance survey Figure 3.1b (marked 3a) but there is no indication in the magnetometry survey (Figure 3.2). This indicates the very thorough job that was made of its removal at that time, including its iron railings. Further to the east the course of the pathway runs through higher resistant linear anomalies (3b in Figure 3.1b). There is a possibility that part of these may include its unremoved remains, but no distinct trace of the edges in resistance measurements (Figure 3.1) or differential response to any remains of the iron railings in the magnetometry survey (Figure 3.2) were observed. Those high resistance areas observed in this area will be discussed further in section 4.6.

A major feature seen in the surveyed images of the park are the linear patterns indicating path-, track- or road-ways across the area (4, 5 and 6 in Figure 3.1b and B, C and D in Figure 3.2b). They show strong edging and are over 5 m wide. They follow the courses of the trackways through the kitchen gardens plan so were there at the start of the 19th century. The characteristics of a resistivity profile cross section across a the way shown in Figure 3.5 (profile 9) shows changes in resistivity at 15 m and 21 m which indicate the structural edges of the way. They provide very pronounced images in our surveys in an area that we understand was only a temporary gardens at the start of the 1800s, and we will consider later whether these ways may have been present earlier.

Many other linear responses indicating boundaries are apparent in the magnetometry survey. Those that are marked E in Figure 3.2b. coincide with the outlines of the garden plots seen in the plan, though there are others that do not. A more detailed analysis has not been made. The arrangement of the gardens may have been altered, as the map of 1808[30] which shows gardens on the section of the park to the north-east of the diagonal north-south path seems to show different plot arrangement. However, our observations add to a more complex history of this area and further consideration and investigation is needed for a full analysis of this.

It was noted from the superimposition of the plan of the kitchen gardens on the map of the areas around the park that the line of the other pathway from the fork to the north of our work is coincident with the line of Henrietta Road. This way with its continuation runs towards the river at a point just across from the market area by Walcot Street. This way is drawn and described as the footpath to Bathwick in the 1808 map[30]. Towards Bathwick this way joins the north-south routeway to become the end of what is now Henrietta Road leading into Bathwick Street.

4.5 18th Century

In the drawing of the area from 1740, this north-south routeway may have already been present in the previous century as a pathway across the fields (see Figure1.16). However there is no indication of this in the 1727 map of this path. The direction of the north-south routeway, if it were to have continued to the river. would point more towards the position of the Mill a short way downstream of the Pulteney Bridge site.

The course of the routeway, labelled 6/D in Figure 3.1b and 3.2b, which joins it from the east, appears to lie along the border between Upper and Lower Hill Leas as shown in the 1727 map. In this map a pathway then continues on down to the ferry just upstream of the site of Pulteney Bridge which would follow a route down the eastern side of the park. Evidence for any such path was not seen in our results.

This century was the time of the creation of major developments in the Bathwick area, including Great Pulteney Street, and Bathwick Street which were completed by the 1790s. Plans were made to develop the Frances Square area (Figure 1.12), but the only part that was eventually completed later was the Daniel Street area (1810). Our results from the park area showed no evidence of any pre-development works for the Frances Square project.

4.6 Other development

We can see indications of several other possible features in our results for which we can find no historical evidence and these are discussed in this section.

In our resistance survey we observed a strong pattern of a possible rectangular outline towards the north of the circular lawn (7 in Figure 3.1.b), under a large tree. We investigated this area further using both profiling and deeper resistance surveying shown in Figures 3.4 (1-5), 3.8 and 3.9. There is a much narrower rectangular enclosure in a similar position alongside the trackway in the kitchen garden plan (Figure 1.11), but it shows no sign of being a built structure, though it may contain a possible shed.

This high resistance 10 m by 15 m outline is seen clearly in the Excel analysis of the resistance pattern shown in Figure 3.8b. Our results comparing the results from the 0.5 and 1.0 m probe spacing indicate that its observed high resistance response for this seems to be less than 1 m deep. In the investigation, we found evidence for a larger quasi rectangular area about 35 m by 24 m overlapping this at a lower level. In the profiling carried out over this area (profiles 1-5 Figure 3.4) there was an area giving a further very high resistivity response at a deeper level

still, below 1.0 m to 3.0 m in-depth. However the results shown in Figure 3.9 indicate that this is not coincident with the possible larger rectangular area apparent in Figure 3.8 but extends beyond it to under a large part of the western part of the grids we resurveyed. The area to the east at these levels indicate pattern of high resistivity that might indicate stone in the ground (eg 16-26 m in profile 3 Figure 3.4). Along with this we are very aware that these results may also be affected by the area being under the two very large trees with their large root systems. However we suggest these results do suggest the presence of possible structural remains in this area, but they appear to have a complex geophysical description.

Around this area there are other high resistance responses under the ground. Figure 3.4 profile 3 shows high resistivity results at 17-19 and 20-23 m, to the north of the area of the area described above. High resistance anomalies are also present to the east of this, which appear as strong linear structures in the resistance survey (3b and 8 in Figure 3.1b). We have commented previously that this pathway area was crossed by the straight wide pathway crossing the park, but we found no indication of this and these results extend beyond the area that would relate to this. This area was crossed with a resistivity profile shown in Figure 3.4 profile 6, where high resistivity volumes are shown across the area between 7-28 m, and higher resistivity readings at 16-18 m, 20-21 m and 26-28 m across the width, indicating the presence of stone in the ground.

Two photographs, possibly of this area, taken in the mid-19th century in the Bath in Time collection[31,32] (see Figure 4.1), and show stone exposed in the park landscape each side of the wide pathway. It is difficult to estimate the precise position of these from the photographs. However it appears to be in a position at a considerable distance from the buildings if it had been the result of any dumping relating to their development. The stone is not visible now, so it must presumably have been turfed over. When the park was made the only turf removal and excavation to 8 inches described in the estimates seemed to have been relating to making the pathways[28]. There was also a description in this that gravel was dug on the site to make the pathway surfaces, though we have no further information about the location of this.

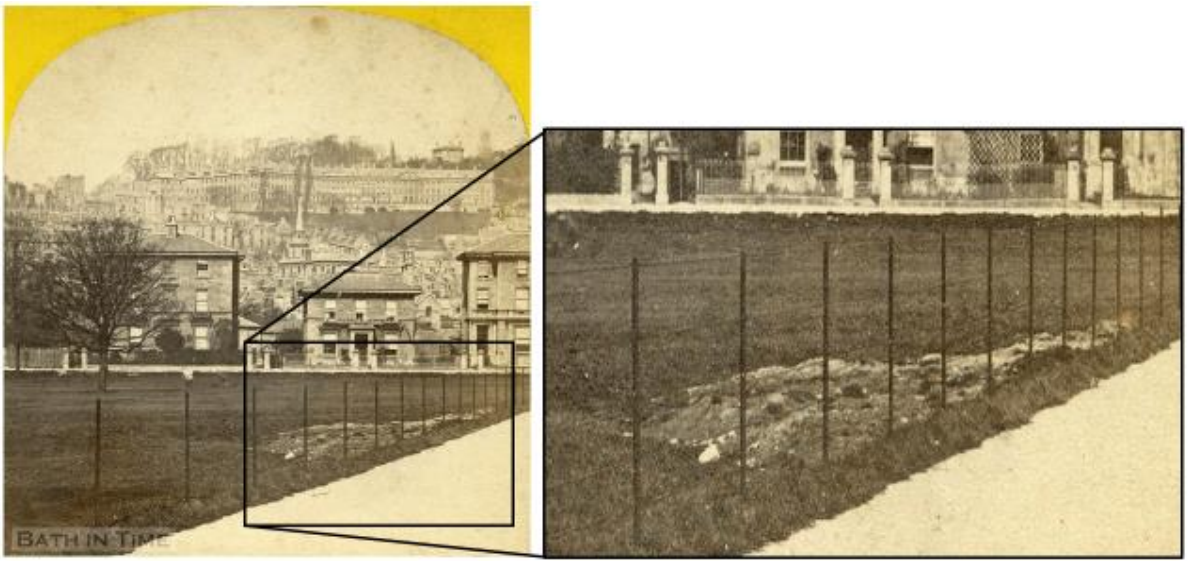


Figure 20 Figure 4.1 Photograph 1870 showing stone exposed in the grass. Bath in Time.

Another feature seen now in the park is the curved bank that continues the banking across the south of the park and extends a short distance to the north-east. Our surveying covered this area but it does not show up in our results in either the resistance or the magnetometry survey except as a hint of high resistance where our equipment approaches the pathway (9 in Figure 3.1b). There is nothing to indicate why it has its formation.

To the outside of this bank there is an area of complexity in the results in both the resistance survey and the magnetometry survey (10 and F in Figure 3.1b and 3.2b). In the plan of the kitchen gardens in Figure 1.11 on the Pulteney Street side of the pathway D there are two larger areas outlined. We have no information to provide any reason that may have resulted for this high resistance and alterations in magnetic field. We are aware that areas of the park could have been used for a range of activities relating to the buildings and construction work surrounding it. The park area was also popular for leisure activities, with its consequent depositing of litter. This possibly included the presence of visiting attractions eg the "Grand Menagerie of Living Curiosities" that was exhibited in five caravans in 1797 at the bottom of Henrietta Street[4].

There are several other indications of possible features with no known history in the results in the surveys. Linear anomalies can be seen in the resistance survey at the bottom of the Figures 3.1b&2b (G and 11). The profile shown in Figure 3.6 shows the origin of the lines. There are borders in the kitchen gardens plan that cross this area on a similar alignment but any coincidence is not clear. There is the linear anomaly making a curved corner outlined and labelled 12 in Figure 3.1b, alongside the north-south pathway line. Another is the possibly rectilinear area shown as H in Figure 3.2b. There is also a very strong linear response at least 80 m long right across the central area as shown in the magnetometry survey: I in Figure 3.2b. As with the others this does not have a cause relating to anything we have seen in the background information we have studied.

4.7 Possible relationship to Roman developments

The area in which we were working starts about 150 m south of the excavation site at Holburne Place Bathwick Street as shown in Figure 1.1. Their excavation of the Roman road (see Figure 1.19) shows that it runs parallel to the top of Henrietta Road, with its centre line at about 15 m from the middle of that road. This line if continued at length would progress through the park, crossing the river slightly upstream of Pulteney Bridge, towards the middle of the city. This line is on a similar alignment to the known Fosse Way direction road crossing the Royal Crescent, and other known Roman developments, including the early Roman road that is under the Temple complex[24]. It is also approximately at right angles to the road approaching the river from behind Hudson's (the Hat and Feather site) on the Walcot side of the river[2,6]. However, none of our results indicate that this excavated road line continues into the pattern of routeways that were shown by our results across the park area. It is the line of a parallel road (top of Henrietta Road) to the west that would do this. The possible building structure indicated in the centre of our work appears to be aligned with the north-south way, though any relationship between them is not clear. As discussed in section 4.5 there is evidence that at least part of the routeways we observed was present before the kitchen gardens were made but there is no evidence to point to the timing of their creation.

The photographs of the excavated Roman road (Figure 1.19) shows it to be at a considerable depth below Bathwick Street. This was made by the building up of the road alongside the bottom storey of the houses when the Georgian developments were made, so any possible continuous road lines continued onto the park area would be expected to be nearer to the surface. In Figure 3.5 profile 8 the changes in resistivity related to the trackway are to a depth to about 1.0 m. If there is any possibility that the origin of this way could have originally been Roman, the similar depth of higher resistivity pattern observed when we profiled over the route of the known Roman road below the Royal Crescent[33] may be relevant.

We did observe a linear anomaly in our resistance survey results that does lie approximately along the orientation of the excavated Roman road. This is a low resistance linear anomaly shown as 13 in Figure 3.1b. This low resistance area may be very near the surface as it is not obvious in profiles across it (Figure 3.5 profiles 9&10). Examination of the profiles across it and to the north (profile 7) show gaps in the higher resistivity layer below 1.5 m that may possibly be arranged in a line, indicating the possibility of activity e.g. ditching along this direction (see Figure 3.6). However if such activity occurred we have no evidence on its timing.

Considering the information we have obtained, our results point to the routeways in the park being linked to the westerly of two parallel but relatively close roads with courses pointing towards the park area. The lack of evidence for a track on the course of the excavated Roman road in the park appears to indicate that it must have ended between the end of the excavation and our work. These two parallel roads may well have been present sequentially, but whether or not they were there at the same time they would have both been part of the settlement that continued in the area of Bathwick Street.

5 Conclusion

This collection of results has added to and confirmed aspects of the history of the Henrietta Park area, and raised few questions about features that may have been here at other times. Our evidence includes information about the kitchen gardens and wide trackways across the area, and also the possibility of a structural feature present within the central circular path. These results will be related to other investigations in the area as they continue to show the significance of Bathwick in the history of Bath.

References

1. Lecture by ContextOne (BACAS programme 2015) and personal communication (Report in preparation)
2. Davenport P 2000 Aquae Sulis, the origins and development of a Roman Town, in Bath History Vol VIII pp7-26
3. Bathwick Echoes of the Past, Bathwick Local History Society 2008
4. Bathwick a Forgotten Village, Bathwick Local History Society 2004.
5. 12a Bathwick Street, Bath. Archaeological Assessment. B&NES 07/01126/FUL, BATRM 2008:2:1, MJ Heaton 2008
6. Marek Lewcun Personal communication
7. Greenhalgh F 1974 Bath Flood Prevention Scheme
8. The flooded Henrietta Villas, Henrietta Road, Bath 1947. Bath in Time. Image reference 53271
9. http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&topic=floodmap&utm_source=Poster&utm_medium=FloodRisk&utm_campaign=FloodMonth13#x=375643&y=165076&lg=1,2,10,&scale=10
10. Flowers in Henrietta Park, Bath, spring 1937? Bath in Time. Image reference 34090
11. 1932 OS map marked to show bomb damage, Somerset sheet XIV, (1946), Bath Record Office
12. Norton A B 1969 Burials in Roman Bath in Cunliffe B, Roman Bath
13. Plan of the City of Bath 1846. Bath in Time. Image reference 50757,
14. Camden Place, Bath from Bathwick Park 1860. Bath in Time. Image reference 42896
15. Michael Rowe personal communication, and plan from papers at Raby Castle, courtesy of Lord Barnard
16. From the New and Accurate Plan of the City of Bath to the present year 1793. Bath in Time. Image reference 27431
17. A New and Correct Plan of the City of Bath 1776. Bath in Time. Image reference 51131
18. The South East Prospect of the City of Bath, 1734. Bath in Time. Image reference 26901
19. Forsyth M 2007, Pevsner Architectural Guides, Bath, Yale University Press.
20. View across the Avon to Bathwick, Bath c.1740-1770. Bath in Time. Image reference 13062
21. A survey of the manor of Bathwick taken 1727, drawn 1735 and traced 1965. Bath in Time. Image reference 27360
22. Wood J A description of Bath 2nd edition 1769
23. Bird S 1994 Fosse Way: The early military road through Bath Bath History Vol V
24. Cunliffe B 2000 Roman Bath Discovered
25. Davenport P 1994 Town and country: Roman bath and its hinterland Bath History V 7-23
26. Oswin J A 2009 Field Guide to Geophysics in Archaeology
27. Henrietta Park c1890 photograph W G Lewis Bath in Time Image reference 12963
28. The estimates for building of Henrietta Park, Minute book of Bath Corporation Pleasure Gardens Committee February 1896, Bath Record Office
29. Stan Hitt personal communication
30. The City of Bath by Charles Harcourt Masters 1808 Bath in Time Image reference 18241
31. Camden Crescent from Henrietta Park c 1865 J&J Dutton Bath in Time no 53887
32. New building at the end of Camden Crescent 1870 Hunt Vol 2 p 134 Bath in Time ref 41458
33. Pryke J and Oswin J, Addendum to 2013 Report Areas near the Royal Crescent, Bath, A report on geophysics surveys by the Bath and Camerton Archaeological Society 2013

Appendix 1

Summary of HER medieval and Roman records for Bathwick.

Obtained via Heritage gateway at
http://www.heritagegateway.org.uk/Gateway/ using the search term Bathwick.

HER number	Description	Grid Ref	Comments
MBN10176	Probable Roman Road	ST753656	Not mapped, conjectural
MBN10091	Bathwick Mill, medieval	ST752649	See MBN11383 continuity of use into modern period
MBN4621	Roman stone coffin, found 1794	ST750650	Not mapped, 4 figure grid reference
MBN11724	Bathwick village, medieval	ST754654	Mapped
MBN11595	Bathwick Ferry, medieval	ST751654	Mapped
MBN30333	Butchered animal remains, pottery, Roman	ST754654	Mapped
MBN30175	Settlement, burial, Roman	ST753655	Mapped
MBN30434	Building, Roman	ST755654	Mapped, 11b Bathwick Street
MBN2452	Roman burials, 1861	ST749649	Mapped
MBN1862	Roman coffin and cover, 1923	ST754655	Mapped
MBN1865	Roman tessellated pavement	ST756654	Mapped
MBN1861	Roman building, drain	ST756655	Mapped
MBN30174	Roman pottery, 1983	ST754653	Mapped
MBN1863	Roman stone coffin, red Roman pottery, 1931, 1933	ST755653	Mapped
MBN11253	Medieval, Saxon village	ST755654	Mapped
MBN1941	Uninscribed Roman altar and other finds	ST755655	Mapped
MBN30201	Roman coin of unknown type	ST753652	Mapped. Within survey area
MBN30193	Bathwick Roman cemetery	ST755652	Record refers to a number of sites

Appendix 2

Arrangement of the grids

Initial point 0 is marked by the red dot (ST 75371 65315)

All grids were 20 by 20 m, with 40 points per traverse, traverses 1 m apart, giving 800 readings per grid square. Each grid started at the point marked by the arrow, which also shows direction of the first traverse. Red arrows indicate zig-zag data, blue arrows indicate parallel data.

Figure A Pattern of resistance survey grids

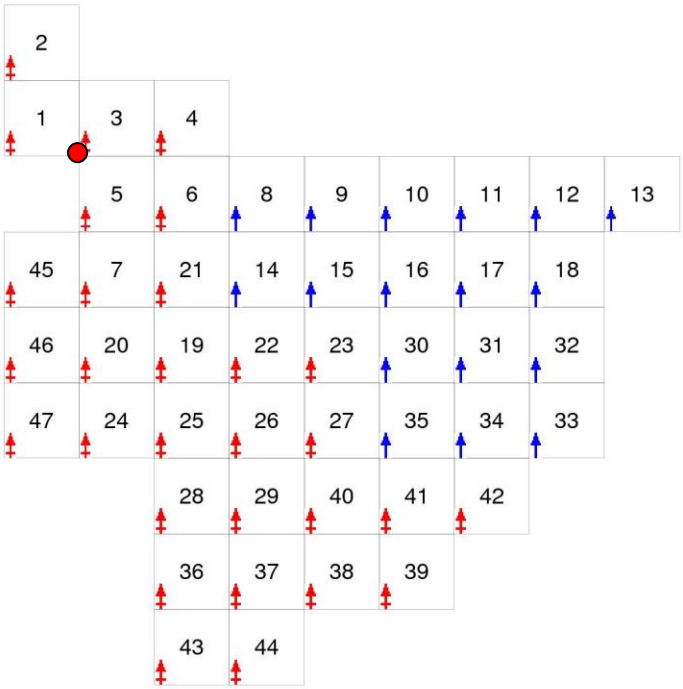
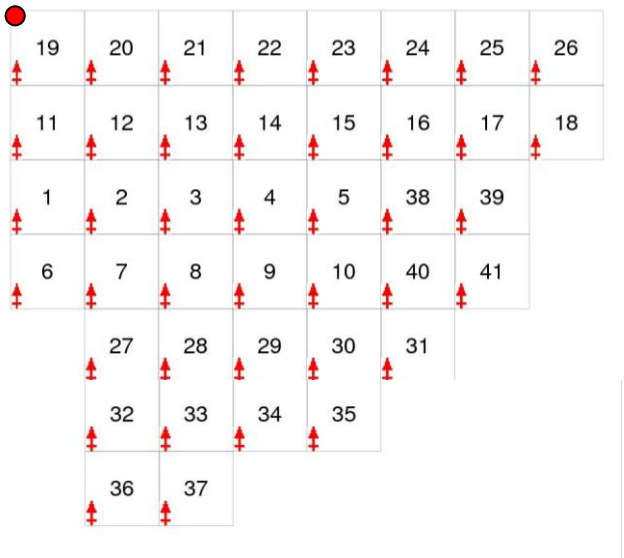



Figure B Pattern of magnetometry survey grids