The Big Ground Mound

and other archaeological investigations at Quoit Farm, Stanton Drew, 2013

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Bath and Camerton Archaeological Society

BATH & CAMERTON ARCHAEOLOGICAL SOCIETY

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Preface

Members of the Bath and Camerton Archaeological Society (BACAS), in collaboration with the Bath and North East Somerset (BANES) senior archaeological officer, first carried out research at Stanton Drew over one week in July 2009. The results were well-received and it was decided to do sixteen days of follow-up work in 2010. The results from these two seasons have been reported in Oswin et al (2009; 2011) and Richards and Oswin (2010; 2011).

We had carried out detailed surveys of the stone circles and the Cove but we had not looked at the outliers: the Tyning Stones and Hautville's Quoit. Thanks to the agreement and interest of the owners of Quoit Farm, we were able to get access to the latter in 2012 (Richards et al 2012). We returned to Quoit Farm again in 2013 for the subject of this report, the Big Ground Mound.

The research aim and objective was:

- To investigate the Mound and its surroundings using geophysics and EDM surveys to identify whether they have any archaeological significance, especially in relation to the Stanton Drew monuments.

The survey was carried out over the following dates: Friday 21 February to Monday 24 February, and Friday 1 March to Monday 4 March 2013.

Quoit Farm, including Big Ground and its Mound, is private land and cannot be accessed without permission.

Acknowledgements

We are extremely grateful to Mr and Mrs Mark Tibbs for giving us access to their land and putting up with us so nicely.

The surveys were conducted by BACAS volunteers, led by John Richards, with John Oswin as technical lead. Vince Simmonds was responsible for surveys of the river banks.

The BACAS team included: Rick Buettner, Laurence Chadd, Susie Coggles, Jenni Craft, Roger Kergozou, John Knapper, Tim Lunt, Patrick McCarron, Fiona Medland, Janet Pryke, Wendy Russ, Peter Watkins, and Roger Wilkes.

This, and previous work at Stanton Drew, has been undertaken with no external financial or logistical support. BACAS funded the short-term rental of a full licence for the RES2DINV software package to facilitate analysis of the resisitivity profiles results.

This report describes the results of the 2013 surveys and combines this with earlier work on the Stanton Drew landscape.

1 Introduction

1.1 Location and sites

The village of Stanton Drew lies in northern Somerset, within the unitary authority of Bath and North East Somerset (BANES), approximately 10 km south of Bristol city centre and 15 km west of Bath, on the south bank of the River Chew. Within and to the east of the village are three stone circles, two avenues, and a 'cove'. There are also outliers: the Tyning Stones and Hautville's Quoit (ST 6017 6381).

The principal site at Stanton Drew is the Great Circle, which has an avenue leading eastwards from it. Nearby is the North-East Circle, which has an avenue leading south-east from it. The two avenues meet at a short distance from the North-East Circle. The two circles and their avenues are all in one field, which is called 'Stone Close'. In a separate field is the South-South-West Circle. West of this, in the pub garden of the Druids Arms, are the three stones known as the Cove. Well to the west of the monument, 700 m away, there are two stones, the Tyning Stones.

To the north-east of the monument, 500 m away across the River Chew, near the Pensford to Chew Magna road is Hautville's Quoit, a stone that lies very nearly on an alignment through the centres of the Great Circle and the South-South-West Circle (Figure 1–1).

Hautville's Quoit is on Quoit Farm in a field called Home Ground. To the south is the field known as Big Ground which contains the Mound which is the main subject of this report. To the west is a field called West Mead that was also included in the surveys.

The location and sites are shown in Figure 1–2.

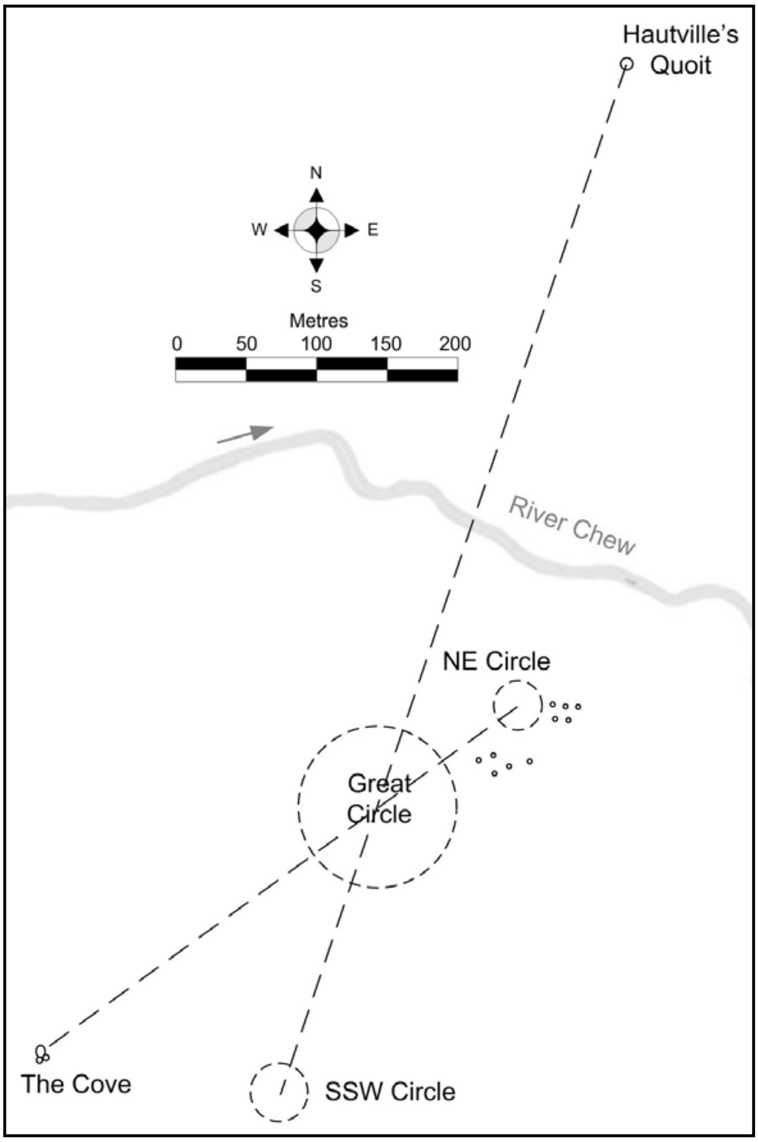


Figure 1–1: Alignments of the Stanton Drew circles and stones

The underlying geology comprises Mercia Mudstone strata of Triassic age, this in turn overlies, unconformably, strata of Supra-Pennant Measures which form part of the Upper Coal Measures of Carboniferous age.

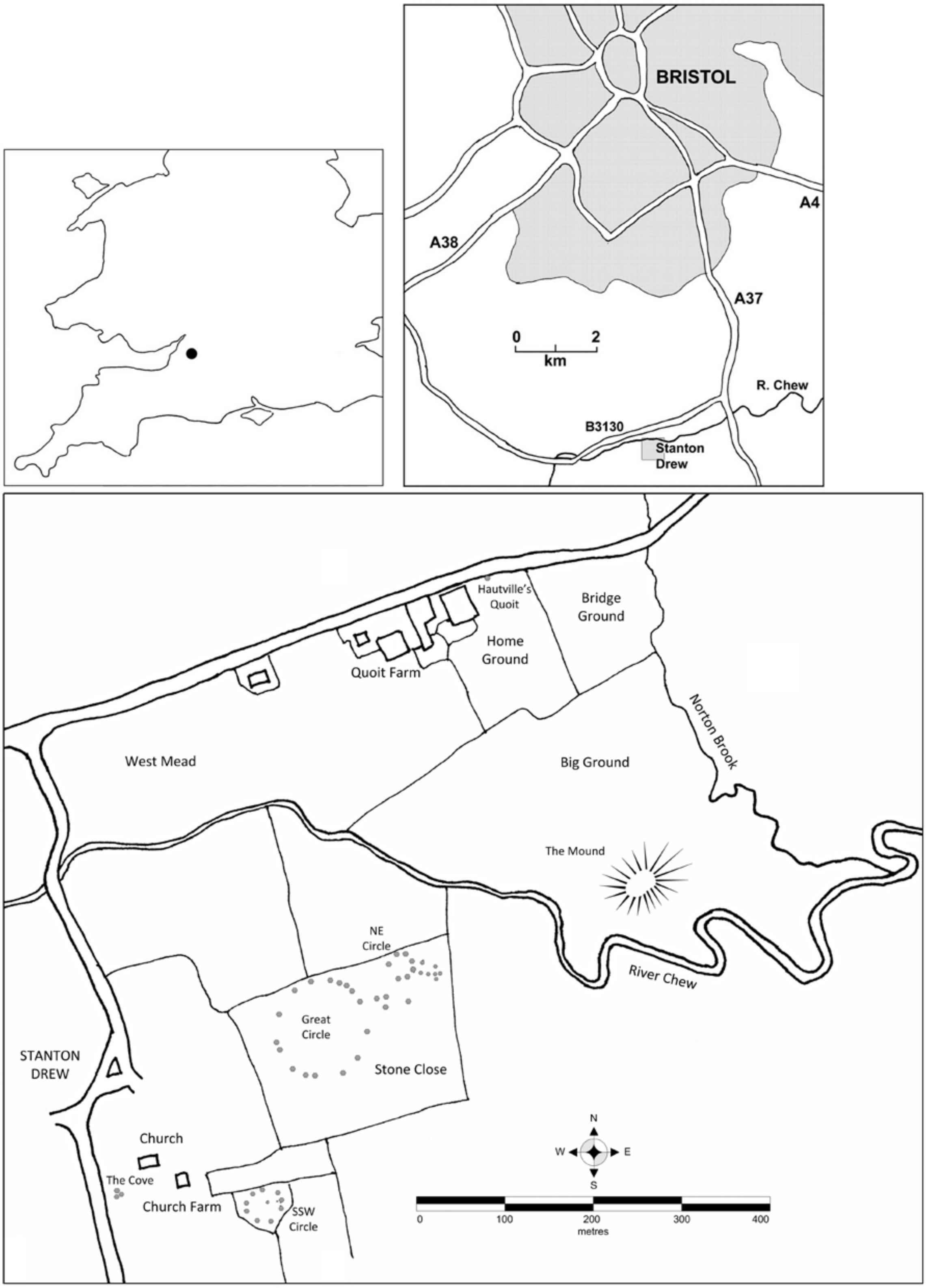


Figure 1–2: Big Ground, the Mound, and West Mead – location map

1.2 The Big Ground Mound

The large field of approximately 10 hectares known as Big Ground lies immediately to the south of Home Ground and Bridge Ground and runs gently downhill to the River Chew. Three-quarters of the way down the field, a long low mound-like hill sits with its long axis across the slope.

Figure 1–3: The Mound in Big Ground, looking northwards

The Mound has a striking appearance. It is elliptical in shape, 125 metres by 90 metres, with its elliptical flat top measuring 40 metres by 25 metres, at a height of 40 metres OD. When approaching on the downhill slope in Big Ground it rises 2 metres, and then falls 4 metres on the far side to re-join the slope running down to the river. The long axis is oriented WSW-ENE, 65^0 from true north.

Figure 1–4: The Mound in Big Ground, looking southwards

From the top of the Mound, there would be a fine view of the stone circles 200 metres away in Stone Close if it were not for the line of trees bordering the River Chew. This led to consideration of whether the hill could have had some significance in the Neolithic landscape.

In 2012, little time was available to investigate the Mound. However, it was decided that an EDM survey would be carried out to establish its size and position. Spot heights were taken in a line from the top of the field, across the long axis of the Mound, down to the river, to produce Figure 15. This shows the Mound appears to rest upon the natural slope.

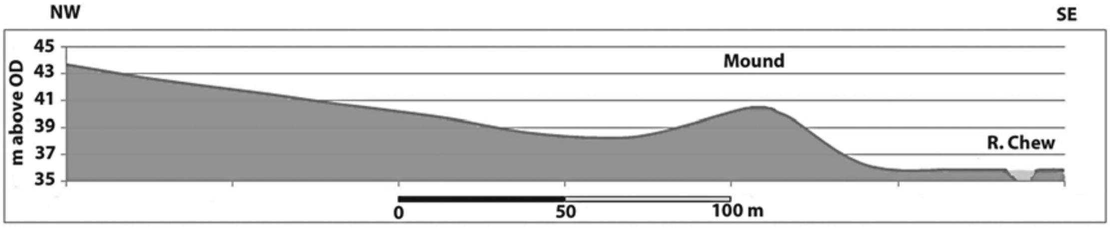


Figure 1–5: Transect from top of Big Ground down to the River Chew

The Mound is situated just over 200 metres away from the NE Circle, and approximately in line with both the NE and Great Circles. The well-known alignment between the Cove and the centres of the two circles would pass to the north of the Mound. However, the Mound does lie aligned with the large gap in the Great Circle's ditch (see Figure 1–6) discovered by the English Heritage magnetometry surveys of 1997 and 2000 (David et al 2004). Indeed, the view from the Mound would have been right through the large gap in the henge, directly into the centre of the main circle.

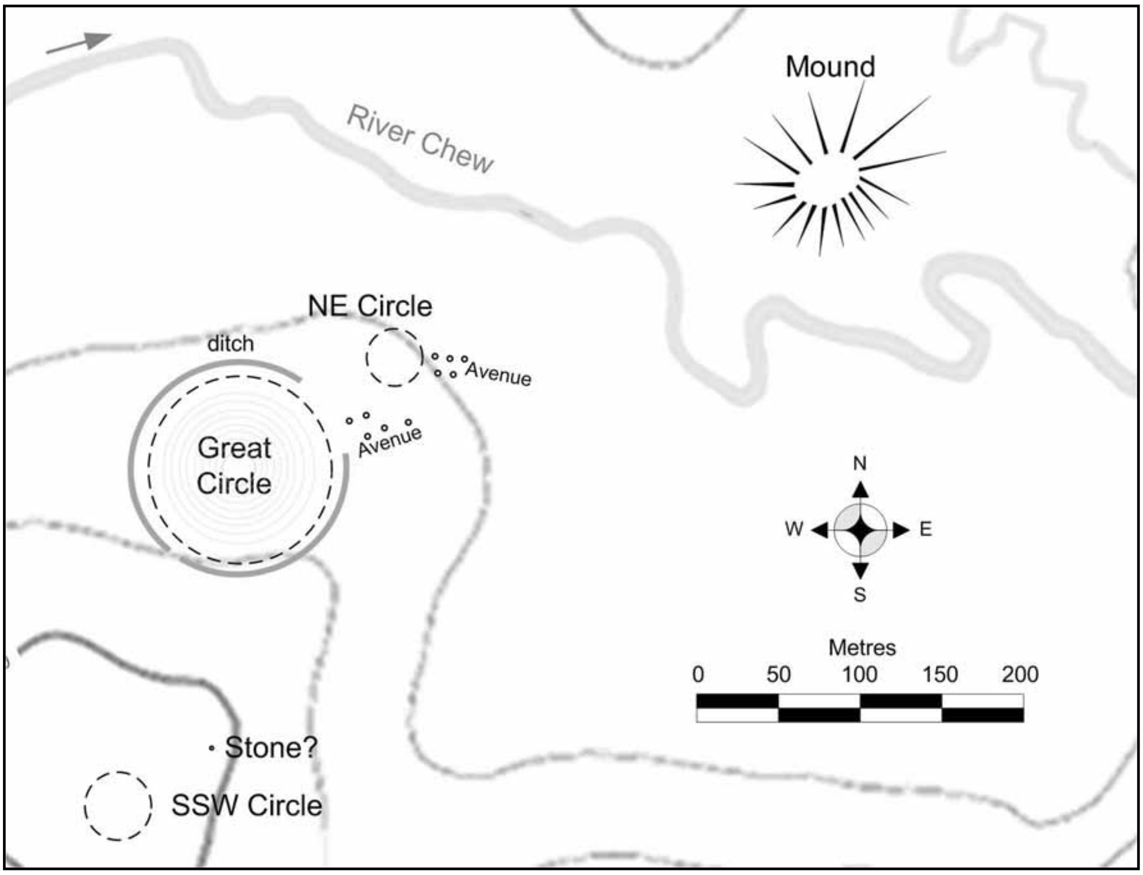


Figure 1–6: The Great Circle ditch in relation to the Mound

1.3 Project Objectives

The research aim and objective was:

- To investigate the Mound and its surroundings using geophysics and EDM surveys to identify whether they have any archaeological significance, especially in relation to the Stanton Drew monuments.

1.4 Scope of Report

This report describes the results of the 2013 surveys and combines them with those from the surveys carried out in 2009, 2010 and 2012 (Oswin et al 2009, 2011; Richards et al 2012) to produce an analysis and interpretation of the site.

1.5 Dates

The surveys were carried out over the following dates:

Session 1: Friday 22 to Monday 25 February 2013 (inclusive)
Session 2: Friday 1 March to Monday 4 March 2013 (inclusive)

In total, eight days were worked.

1.6 Personnel

The project was conducted by BACAS volunteers, led by John Richards, with John Oswin as technical lead. Vince Simmonds was responsible for surveys of the river banks.

The following were involved for various amounts of time:

Rick Buettner, Laurence Chadd, Susie Coggles, Jenni Craft, Roger Kergozou, John Knapper, Tim Lunt, Patrick McCarron, Fiona Medland, Janet Pryke, Wendy Russ, Peter Watkins, and Roger Wilkes.

2 Method

2.1 Gridding

The survey extended over two fields, all private land on Quoit Farm: Big Ground and West Mead. The area is shown in Figure 2–1.

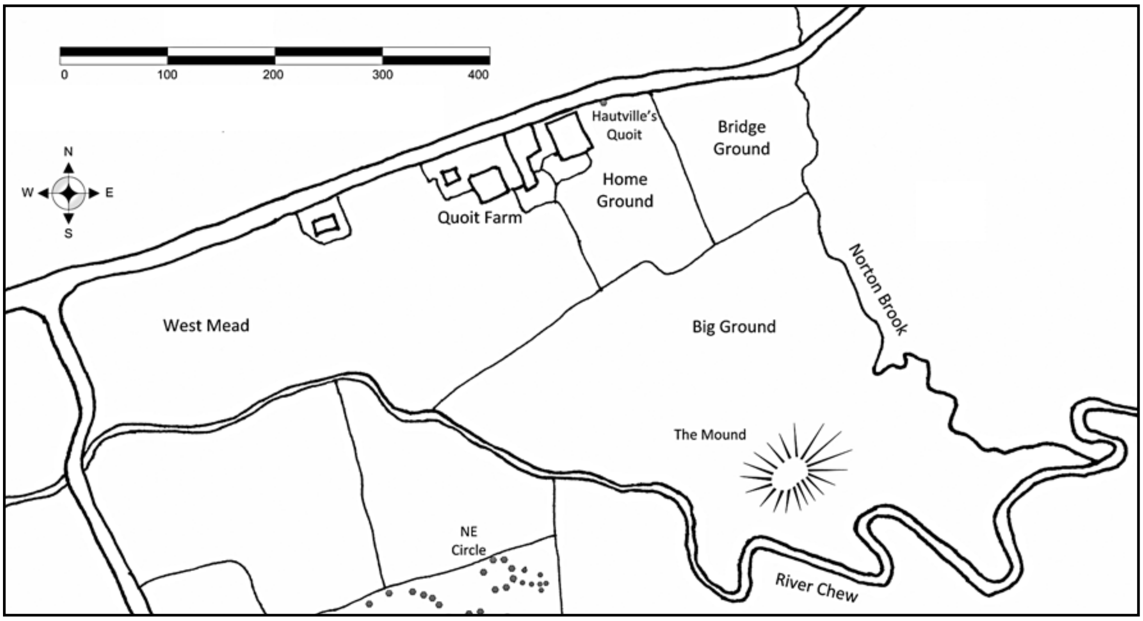


Figure 2–1: The survey area

A grid of 20 metre square cells was set up in Big Ground starting from a point roughly in the centre of the Mound, assigned a grid reference of 1000,1000, and with the east-west baseline along the major axis of the Mound. This resulted in a line of grid north at bearing 333.5^0 to true north. The grid was extended to the south of the baseline until it was close to some fixed points that could be used for reconstruction of the grid at a later date.

Figure 2–2: Fixed point F1: the tree *(left)* and close-up *(right)*

Two trees on the river bank were selected for the fixed points, F1 and F2. The measurement for F1 was taken from the top of a branch as shown in Figure 2–2.

The fixed point, F2, was taken at the end of a stone block lying against the tree trunk, as shown in Figure 2–3.

Figure 2–3: Fixed point F2: the tree *(left)* and close-up *(right)*

Measurements were taken from the grid points (980, 960) and (1000, 960) to F1 and F2 as shown in Figure 24.

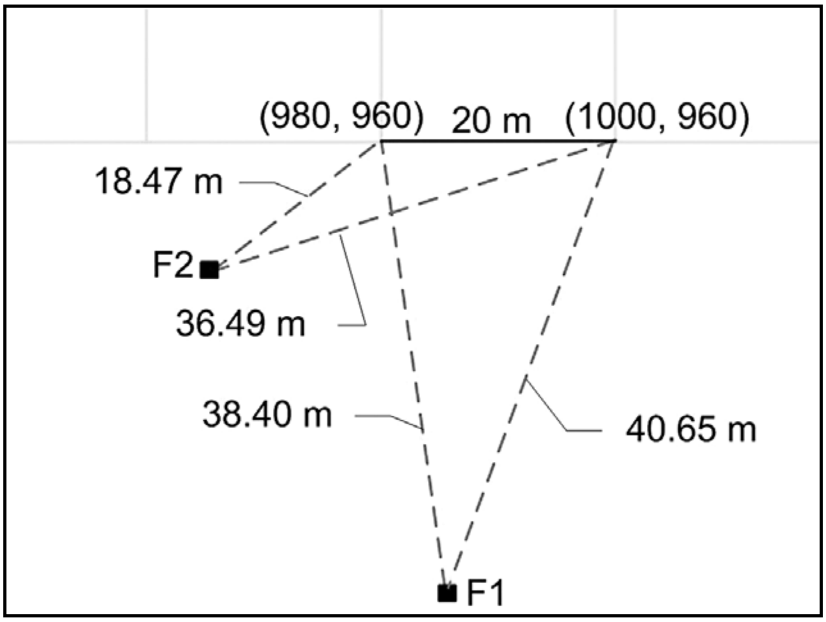


Figure 2–4: Measurements from F1 and F2 to grid

Later, when the grid had been extended to the north, the exercise was repeated with two new fixed points, F3 and F4, so that the grid could be reconstructed from the north side only if required.

The lone tree in the middle of the field was used for F3 (see Figure 2–5).

Figure 2–5: Fixed point F3: the tree ***(left)*** **and close-up** ***(right)***

F4 was assigned to the top hinge on the easternmost gatepost leading to Home Ground (Figure 2–6).

Figure 2–6: Fixed point F4: the gate ***(left)*** **and close-up of top hinge** ***(right)***

Measurements were taken from the grid points (1000, 1140) and (1020, 1140) to F3 and F4 as shown in Figure 2–7.

The BACAS standard grid is 20 metres square. On this occasion, twin-probe resistance surveys were started in the south-east corner of each grid cell with the instrument heading west. Resistance measurements are taken at half metre intervals on lines one metre apart. East and west baselines are made from coloured polypropylene 'washing' lines with markings every metre. Marked ropes are used to guide measurements. The operator walks west along a rope and back east between ropes. The first line is 1 m north of the grid corner, the last line is between grid corners. The first measurement point is ½ m west of the east baseline, the last is on the west baseline; thus all grids fit together without overlap, as shown in Oswin (2009: 115, figure 5–8(c)).

The same grid pattern was used for magnetometry, but the ropes were replaced by small 'flags' placed on the west baseline, five per grid, and tall plastic pegs on the east baseline. The operator has to set his pace right to cover the distance in the right time. Heading west,

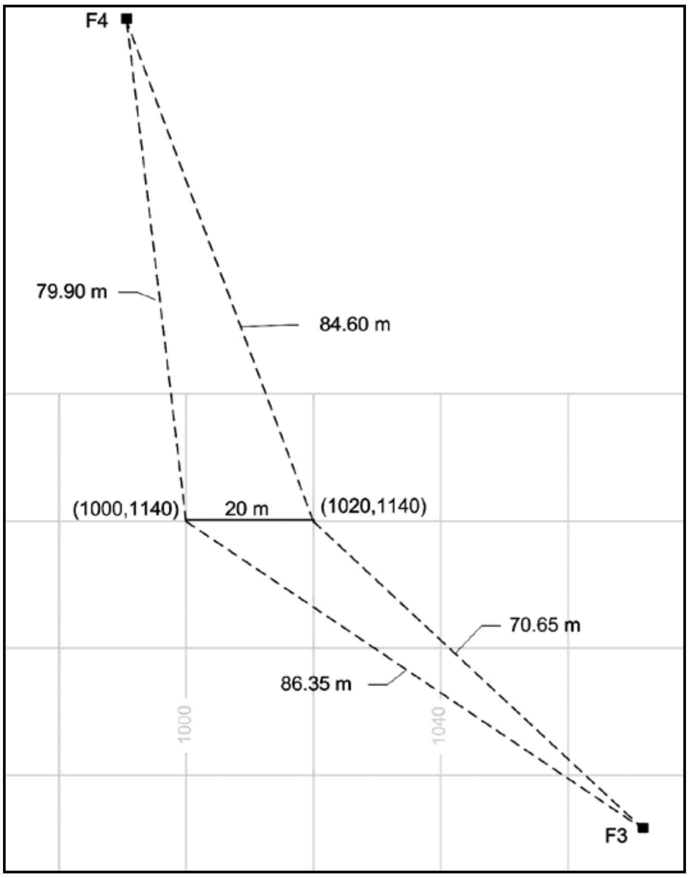


Figure 2–7: Measurements from F3 and F4 to grid

The overlay of the grid in Big Ground is shown in Figure 2–8.

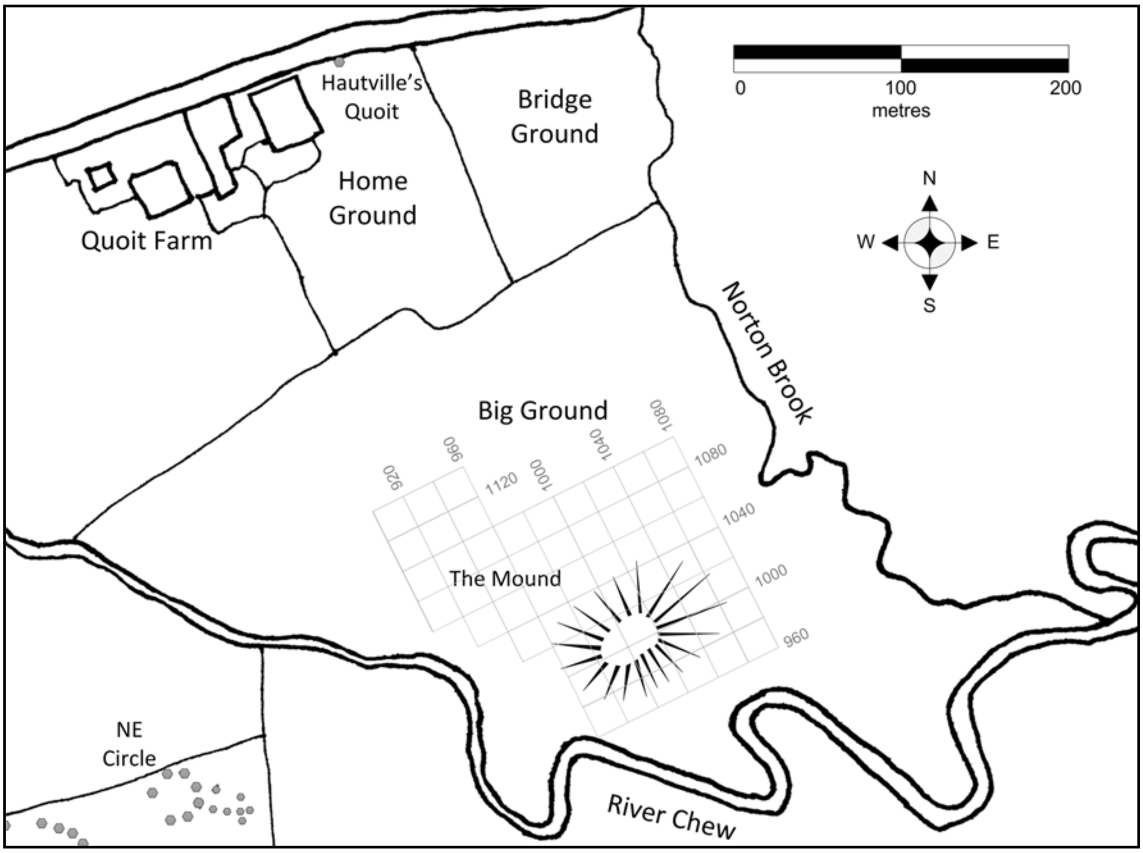


Figure 2–8: Location of the grid in Big Ground

he aims the left tube of the magnetometer either at a flag or the gap between them, and east either at a peg or the gap between. The layout of flags and pegs depends on the instrument used and the number of lines walked.

Details of the grids are given in appendix A.

2.2 EDM Survey

Height above Ordnance Datum was taken from the HQ grid point (1000, 1000) established in the previous year (Richards et al 2012) which had been calculated as 48.91 metres. This had itself been calculated from a benchmark of height 50.72 metres OD on a farm building at ST 6008 6377 (source: OS 1:2500 map, 1962). From this, the height of the point (1000, 1000) on the Big Ground (BG) grid was calculated to be 40.00 metres.

EDM readings were taken from the HQ grid used in 2012. This data, plus data from previous surveys in 2009 and 2010 (Oswin et al 2009; 2010), were used to construct transformations between the Big Ground grid (BG), Stone Close grid (SC), Home Field grid (HQ), and the Ordnance Survey (OS).

If (x_j, y_j) in grid A maps to (x_k, y_k) in grid B, and grid B is rotated θ^0 clockwise from grid A, then to calculate the mapping of (x_a, y_a) in grid A to (x_b, y_b) in grid B:

$$(x_b, y_b) = ((x_a - x_j) \cos\theta - (y_a - y_j) \sin\theta + x_k , (y_a - y_j) \cos\theta + (x_a - x_j) \sin\theta + y_k)$$

To convert from BG grid to HQ grid:

$x_j = 1000, y_j = 1000, x_k = 996.19, y_k = 647.28, \theta = 0.776^0$

To convert from HQ grid to SC grid:

$x_j = 1000, y_j = 1000, x_k = 1276.94, y_k = 1424.09, \theta = 9.403^0$

To convert from HQ grid to OS grid (10 digit reference preceded by 'ST'):

$x_j = 1041.77, y_j = 1034.63, x_k = 60223, y_k = 63814, \theta = 25.485^0$

For example, Hautville's Quoit is at (992, 1050) in the HQ grid; (1261, 1472) in the SC grid; and on the OS grid, ST 60171 63806, all to one metre accuracy.

(1000, 1000) on the BG grid is at (996, 647) on the HQ grid; (1331, 1075) in the SC grid; and on the OS grid, ST 60349 63445, all to one metre accuracy.

2.3 Instruments and Settings

The instruments used were:

- RM15 twin probe resistance meter
- TR/CIA resistance meter and profiler
- Bartington 601/2 twin fluxgate gradiometer
- Bartington MS2 magnetic susceptibility meter
- MALA X3M Ground-penetrating Radar.
- Sokkia SET5W EDM

For details of these instruments see Oswin et al (2011). Note, however, that there were some differences in their operation.

The RM15 and TR/CIA were both used for twin probe resistance surveys with transoms fitted for 0.5 m probe separation. In addition, six grids, in the area (980,980) to (1040, 1020), were surveyed using the RM15 with its transom set to 1 m probe separation.

The MS2 magnetic susceptibility meter was used to take random measurements in conjunction with a hand-held GPS device. The latter gave five-figure national grid references, equivalent to 1 m precision, but only at 5 m accuracy. This is sufficiently good for plotting over large areas, as was done here.

The principle of random measurement is to take readings at various points, noting the position of each measurement with the GPS. If the reading is found to differ significantly from the last taken, then extra measurements are taken around that differing reading to find the extent of the anomalous readings. Results can then be plotted as a contour map. Random readings are taken typically 10 to 25 paces apart, except where anomalous readings are investigated. This may mean that patches of high readings are missed altogether, but the method has been found to be effective in plotting archaeologically interesting sites rapidly.

2.4 Software

BACAS uses INSITE version 3 (1994) as its principal analysis software. This is now somewhat archaic, but still preferred as visual, adaptable and simple. As it no longer communicates with modern instruments, BACAS has produced in-house software to download data from the instruments to a computer and then import the grids into INSITE.

The TR/CIA resistance own software is used for downloading pseudosection profiles from the meter, and these are then processed with the RES2DINV software, semi-demo version 3.59.116 (Geotomo Software 2010). For this project, the full version of the RES2DINV software was hired for a few days in order to process the profiles together with topographical modelling.

The Bartington magnetometer has its own download software which leaves data sorted to parallel lines. These are then put through the de-striper before being mapped in INSITE.

BACAS has developed its own zero-median de-stripe software which will accept downloaded files from the Bartington or from Geoscan FM256. Once files have been through the de-stripe software, they are labelled with a prefix 'd'. The de-stripe software will function with grids of any dimensions. De-striped grids are imported into INSITE, which acts as a mapping program. The data usually needs very little extra processing.

Handwritten data from the EDM and from magnetic susceptibility measurements are transcribed into a Microsoft Excel spreadsheet. If the pattern is regular, contour plots can be drawn in Excel. If spacings are irregular, DPlot or QuikGrid software is used to obtain contour plots.

Excel can also be used to display resistance and magnetometer data, but practically is limited to four grids at a time, and for half metre spacings on lines at one metre. It does have the advantage of allowing as many gradations as the colours permit, and of providing a linear scale, which, with a suppressed zero, can allow features to be presented and studied in much greater detail. The sets of four grids can be assembled into a large area composite.

Radar data were analysed using REFLEXW software. Output is normally presented in its 'Rainbow1' format, extending from red for very high positive return, through yellow as 'normal' to purple. This can be presented as a three-dimensional cube or as a two-dimensional slice at a nominal depth. A nominal wave speed of 0.06 m/ns has been assumed but the software has the facility to estimate wave speed from parabola shape given a strong return signal.

2.5 Constraints

The project work had to be carried out in early spring before the cattle were out in the fields. Two long weekends of four days each were used, between 22 and 25 February, and 1 and 4 March 2013. Fortunately, the weather was generally benign, if cold and windy, with the occasional sleet or rain shower, and there were no interruptions to the schedule because of the weather.

The quality of the data is only as good as the precision in setting up the grids. These were generally within 20 cm, 1%, of true. However, it also depended on the operator setting out straight baselines and walking accurately between markers at the right pace.

In general, the best view of the data output is on the computer screen and there is some loss of definition in the printing process, even when the document is printed at a high resolution.

3 An assessment of the soils and sediments of the Big Ground field and the nearby River Chew floodplain

An assessment of the sediments that comprise the floodplain of the River Chew and a tributary, Norton Brook, was undertaken as part of the overall survey of the field known as Big Ground and the surrounding area. The River Chew forms the present southern boundary of the West Mead and Big Ground fields, passing through the floodplain flowing in a west to east direction. Norton Brook forms the present eastern boundary of Big Ground and flows in a northwest to southeast direction from its source at approximately 150 metres OD on East Dundry to where it joins the River Chew at approximately 35 metres OD.

The sediments observed along the banks of the River Chew and in the recorded sections (Table 3–1) comprise an agricultural topsoil/ploughsoil of stiff brown silt/clay with abundant organic content comprising mainly grass and roots, overlying soft pale brownish-red very sandy silt, which in turn overlies firm pale grey-brown sandy silt with some organic content comprising decayed wood to an undetermined depth. The sands and silts are likely to be derived from sandstone bands within the Mercia Mudstone and a local outcrop of sandstone upstream of the area being investigated, these formations are all of Triassic age.

The sediments that were observed in the banks of the tributary, Norton Brook, and in the recorded section (Table 3–2) show a multi-layered stratigraphy comprising agricultural topsoil, silt/clay, clay and gravels; these layers are of varying thickness and mostly of a pale grey-brown colour. These sediments are likely to be derived mainly from the erosion and subsequent transport of material from the Lias strata of Jurassic age that form the high ground to the north of Big Ground. In particular, from a layer consisting of mainly clay and shale, there is a substantial area of landslip on the slopes of East Dundry around the source of the brook and also around the village of Norton Malreward. The strata that comprise the landslip are described as mainly clay with White and Blue Lias, mainly limestone, also of Jurassic age.

To assess the soils underlying the immediate area of the 'Big Ground Mound,' an examination of the sediments exposed in a number of molehills revealed soil comprising variably brown to red-brown, slightly gravelly, silty sand (Table 3–3). The sand is fine to medium and the gravel is medium to coarse, sub-angular of weathered sandstone. The soil appears to be mostly derived from the erosion of sandstone bands or from a local outcrop of more competent sandstone; it is probable that the underlying geology of the Big Ground Mound is comprised of sandstone. These formations are part of the Mercia Mudstone Group of Triassic age.

A subsequent field trip to investigate the floodplain and riverbank sediments downstream in the Bye Mills area (Table 3–4) revealed that the sediments there comprise an agricultural topsoil/ploughsoil of brown sandy silt/clay with abundant organic content comprising mainly grass and roots, overlying red silty sand to an undetermined depth. There was stratigraphic evidence of a flood event in the boundary between the topsoil and sand deposits comprising a ~50mm layer of grey-black sandy silt/clay with abundant organic content overlain in places by a thin layer of red silty sand.

Further investigation of the riverbank and floodplain from the bridge over the River Chew at Stanton Drew down to the narrowing of the river valley at Bye Mills provides evidence that there is a significant depth of sediments. The river valley becomes constricted at Bye Mills and this narrowing continues to the village of Pensford; anecdotal evidence for regular flooding of the area is known. The erodible nature of the strata to the north and south of the river and the depth of sediments within the narrow floodplain suggests that the valley has always been congested; whether this has been accelerated due to the effects of ploughing and agricultural land usage is unclear. There is some evidence that the river course has changed over time both naturally and by human intervention.

Along the south side of the River Chew at Bye Mills is an elongated depression, approximately one metre in depth, running parallel to the river, suggesting this is possibly an ancient river course (see Figure 3–1). The river has been diverted from its original course at Bye Mills where there are a number of constructed features including weirs, sluices and channels.

Figure 3–1: A possible ancient river course on the southern side of the River Chew at Bye Mills; flood water can be seen to lie within the depression.

To determine the depth of sediments within the floodplain area an augering strategy would be required. This might involve hand auger methods along the lower river bank, preferably when water levels are low; alternatively mechanical boreholes could be progressed but this has obvious cost implications.

Location: East facing bank section of the River Chew at Stanton Drew	**NGR**: ST 60305/63359	**Date:** 03/03/2013
Site description: The River Chew forms the present southern boundary of the field known as 'Big Ground'; generally it passes the site flowing in a W → E direction. The description below is of an east facing section to investigate sediment deposition in the river floodplain (see Figure 3–2, Figure 3–3, and Figure 3–4).		
Depth (m):	**Thickness (m):**	**Soil description:**
0.00	0.40	Agricultural topsoil/ploughsoil: stiff brown SILT/CLAY with abundant organic content comprising mainly grass and roots.
0.40	2.60	Soft pale brownish-red very sandy SILT, sand is fine to medium.
3.00	0.20 (depth excavated – full depth unknown)	Firm pale grey-brown sandy SILT with some organic content comprising decayed wood, sand is fine to medium.

Table 3–1: East facing bank section of the River Chew at Stanton Drew

Note: at the time of investigation the river level was approximately 3.00 metres below ground level (mbgl).

Figure 3–2: Agricultural soil (0.00-0.40mbgl) exposed in the east facing bank of the River Chew.

Figure 3–3: Sandy silt (0.40-3.00mbgl) as exposed in east facing section in bank of the River Chew.

Figure 3–4: Varying sandy silts and decayed organic material (~2.00-3.20mbgl) as exposed in east facing section in bank of the River Chew.

Location: East facing bank section of Norton Brook, near Stanton Drew	NGR: ST 60477/63531	Date: 24/02/2013

Site description:
Norton Brook is a tributary of the River Chew and forms the present eastern boundary of the field known as 'Big Ground'. It flows in a NW → SE direction from its source at ~150m AOD on East Dundry to where it joins the River Chew. The description below is of an east facing section to investigate sediment deposition in the river floodplain (see Figure 3–5).

Depth (m):	Thickness (m):	Soil description:
0.00	0.40	Agricultural topsoil/ploughsoil: stiff brown SILT/CLAY with abundant organic content comprising mainly grass and roots.
0.40	0.55	Stiff brown slightly sandy SILT/CLAY with abundant orange-brown flecks, some organic content – roots and rootlets.
0.95	0.70	Very stiff pale brown very slightly sandy SILT/CLAY with frequent orange-brown flecks, some organic content – roots and rootlets.
1.65	0.20	Soft to firm pale brown sandy CLAY with orange- brown flecks, occasional organic content comprising black decayed wood.
1.85	0.10	Soft pale grey-brown sandy CLAY with abundant organic content comprising black and brown decayed wood.
1.95	0.10	Dense sandy clayey GRAVEL, gravel is fine to medium sub-angular to rounded of mudstone and siltstone with frequent iron staining.
2.05	0.10	Soft to firm gravelly CLAY with abundant organic content comprising black and brown decayed wood, gravel is fine to medium sub-angular to rounded of mudstone and siltstone with frequent iron staining.
2.15	0.05	Soft blue-grey CLAY with abundant organic content comprising black and brown decayed wood.
2.20	0.05	Dense sandy clayey GRAVEL, gravel is fine sub-angular to rounded of mudstone and siltstone with frequent iron staining.
2.25	0.10	Stiff pale grey-brown CLAY.
2.35	0.10	Dense sandy clayey GRAVEL, gravel is fine to coarse sub-angular to rounded of mudstone and siltstone with frequent iron staining.
2.45	0.25	Decayed tree root/stump with lenses of blue-grey clay and gravel as described above.
2.70	unknown	Active stream bed comprising medium to coarse gravel overlying sandy silts and clay to an unknown depth, also organic content and waste material – potsherds, clay pipe, metal objects, etc.

Table 3–2: East facing bank section of Norton Brook, near Stanton Drew

Figure 3–5: East facing section of sediments exposed in the bank of Norton Brook as described above (the 2.0 metre ranging pole appears shortened due to the sloping nature of the bank)

Location: Big Ground Mound	**NGR:** ST 60333/63443	**Date: 24/02/2013**
Site description: Description of soil exposed in a number of molehills on the western slope of the 'big mound' in the field known as Big Ground (see Figure 3–6).		
Depth (m):	**Thickness (m):**	**Soil description:**
surface	unknown	Loose variably brown to red-brown, slightly gravelly, silty SAND. Sand is fine to medium; gravel is medium to coarse, sub-angular of weathered sandstone. The soil is likely to be derived from the Sandstone Bands or a local outcrop of more competent sandstone; both formations are part of the Mercia Mudstone Group of Triassic age.

Table 3–3: Description of soil exposed on Big Ground Mound

Figure 3–6: Soil exposed in molehill on western slope of Big Mound (the rock specimen seen in the top left of the picture was found elsewhere).

Location: Bye Mills	**NGR:** ST 60900/63705	**Date:** 07/04/2013
Site description: Description of sediments exposed in scoured north facing riverbank (see Figure 3–7 and Figure 3–8).		
Depth (m):	**Thickness (m):**	**Soil description:**
0.00	0.3	Agricultural topsoil/ploughsoil: stiff brown SILT/CLAY with abundant organic content comprising mainly grass and roots.
0.30	0.05	Grey-black sandy SILT/CLAY with abundant organic content, overlain in places by red silty sand (possible flood event).
0.35	unknown	Medium dense red silty SAND, sand is fine to medium. River level at ~2.0mbgl

Table 3–4: Description of sediments exposed in riverbank at Bye Mills

Figure 3–7: Agricultural soil (0.00-0.30mbgl) exposed in the north facing bank of the River Chew overlying red silty sand, between can be seen a darker grey-black organic sediment representing a possible flood event.

Figure 3–8: Sediments exposed in the scoured north facing bank of the River Chew at Bye Mills.

4 Geophysics Results

4.1 Topographic survey

Big Ground and West Mead were subject to detailed topographic survey using a Sokkia SET5W edm. The results were added to the previous years' surveys on both sides of the river and were sufficiently detailed to allow the drawing of Figure 4–1 with contours at 0.5 metre intervals. Note that the Mound can be seen clearly with these contour intervals, whereas it cannot be seen on Ordnance Survey maps with 5 metre intervals as its height of 4 metres falls between two contour intervals.

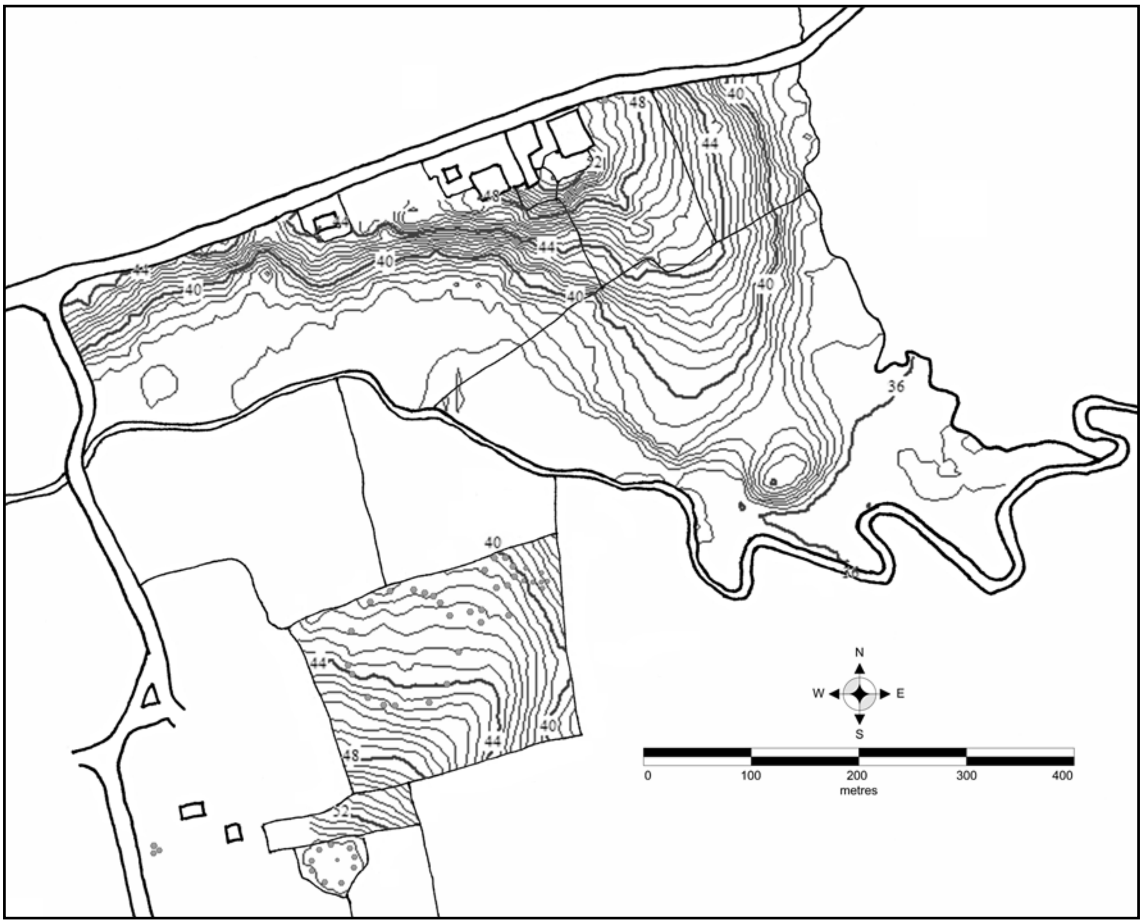


Figure 4–1: Map of Stanton Drew site, with 0.5 metre contours

Eastings and Northings were measured using a grid set at 1000, 1000 on the Mound (as described in Chapter 2), and these were tied in to the previous year's Hautville's Quoit grid, which in turn was related to the Ordnance Survey grid. Heights above Ordnance Datum were obtained by reference to measurements made the previous year.

4.2 Magnetometer

In all, 57 grid squares were completed during the 2013 survey, using the magnetometer at high data density; eight readings per metre along lines at half metre separation, giving 6400 readings per 20 metre square. The magnetometer output is shown in Figure 4–2. Figure 4–3 shows the same plan with the grid squares numbered in survey order, so that a reference in the text to an area can be described by referring to that square. For instance, a point of interest may be referred to as 'in m52', meaning that it is in magnetometer grid square 52.

The survey of the top of the Mound itself came out remarkably blank (m7, m8, m12. m13, m17, m18). There are areas of high magnetic response just to the south of this, but they are

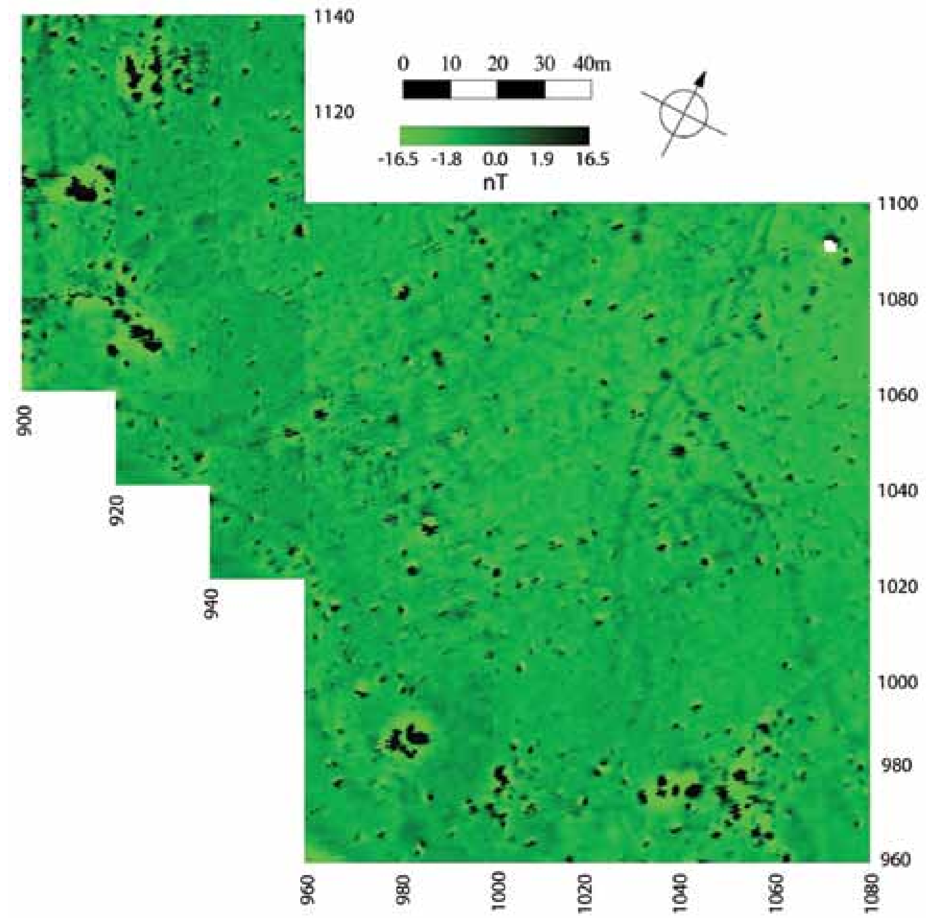


Figure 4–2: Magnetometry results

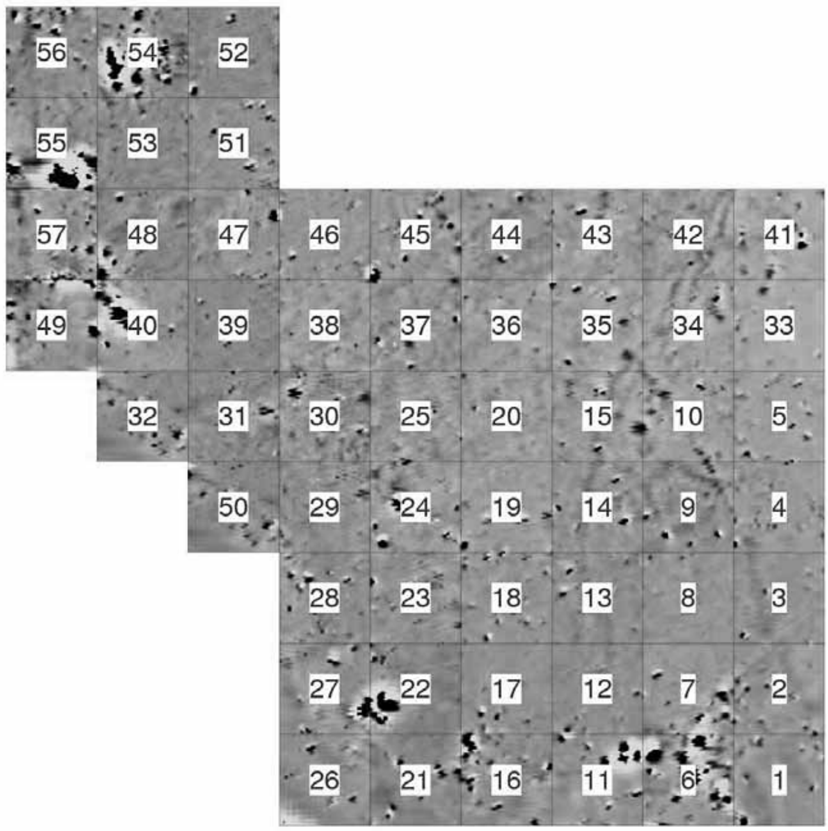


Figure 4–3: Grid numbering for magnetometry survey

most likely ferrous. There was a pond (shown on earlier Ordnance Survey 6" maps) in grids m6 and m11, which has probably been used as a rubbish tip, and there was a small building until the 1980s in m22, on the south-west side of the Mound. Its demolition rubble probably includes nails. There are other areas of ferrous interference in m40, m48 and m55.

Possible old field boundaries curve on the eastern side of the area and intersect in m35, and there is a small polygonal enclosure in m9. The scatter of point signals elsewhere may represent pits of any age, and some may be ferrous spikes.

There does seem to be a rectangular feature on the eastern side of m54 (an area designated as 'Site 2'), but continues only faintly in m52. There are strong signals in the western part of m54 but these may not be metallic as they are lines rather than points. Grid m54 is shown separately using linear scale in Figure 4–4. The feature looks hut-like, some 5 metres square and is of some interest.

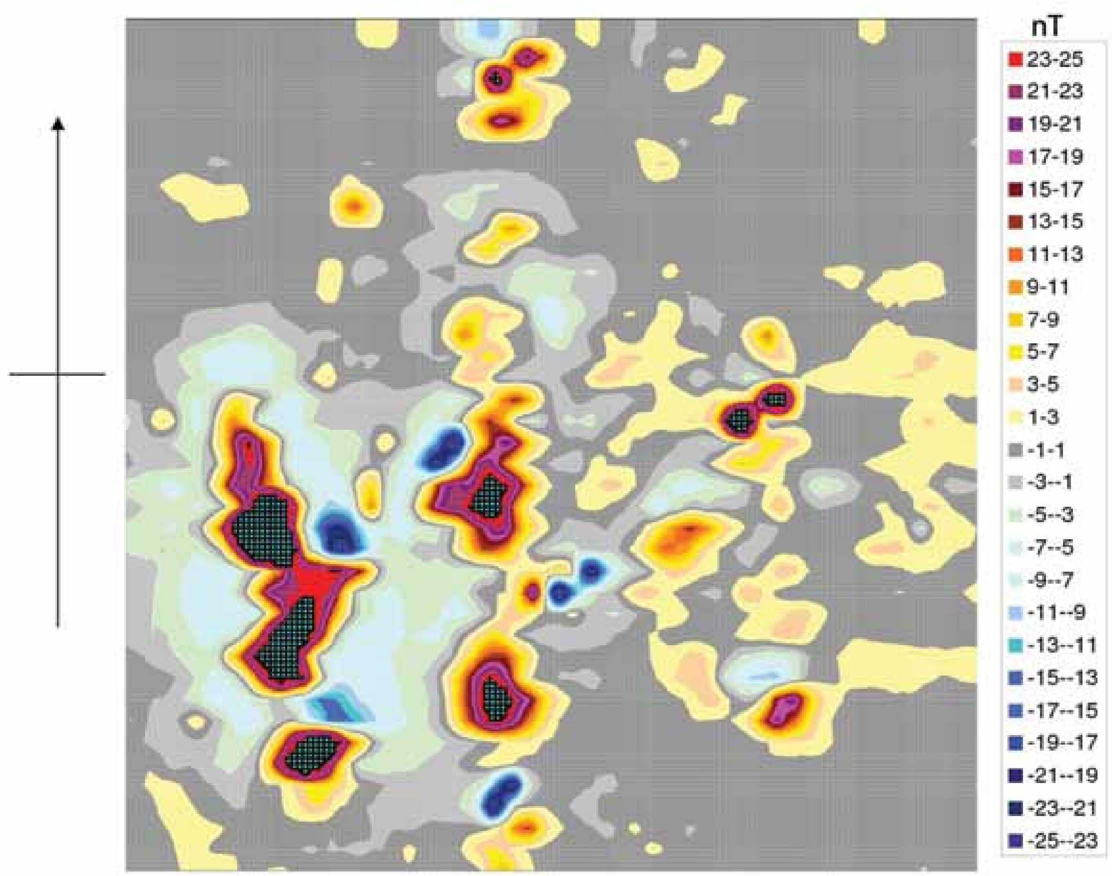


Figure 4–4: Magnetometry results for grid m54, using a linear scale (each side is 20 metres)

4.3 Magnetic susceptibility

It is not feasible to measure magnetic susceptibility on a grid by grid basis without a data logger as this would require readings every 0.5 metres along traverses 0.5 metres apart (1600 readings per 20 metre square) to be called, written and then transcribed. Instead, readings are taken at random intervals, typically approximately every 10 metres and their location recorded by GPS. Where readings increase significantly, the interval is reduced to give finer coverage. This means that some patches of interest may be missed altogether and also means the results are automatically plotted in OS grid coordinates rather than in the local field grid coordinates. The GPS device was accurate to ±5 metres.

Results were combined with those obtained in 2012 for the Home Ground and Bridge Ground fields to produce Figure 4–5 showing the plot for Quoit Farm. Figure 4–6 shows the plot within the area surveyed by resistance and magnetometry in the Big Ground grid, so features can be located in the same set of coordinates and compared. Note that readings were quite sparse in West Mead, and stopped some 100 metres short of the west end of the field, as time ran out. This survey needs to be extended in the future.

Figure 4–5: Magnetic susceptibility plot for Quoit Farm

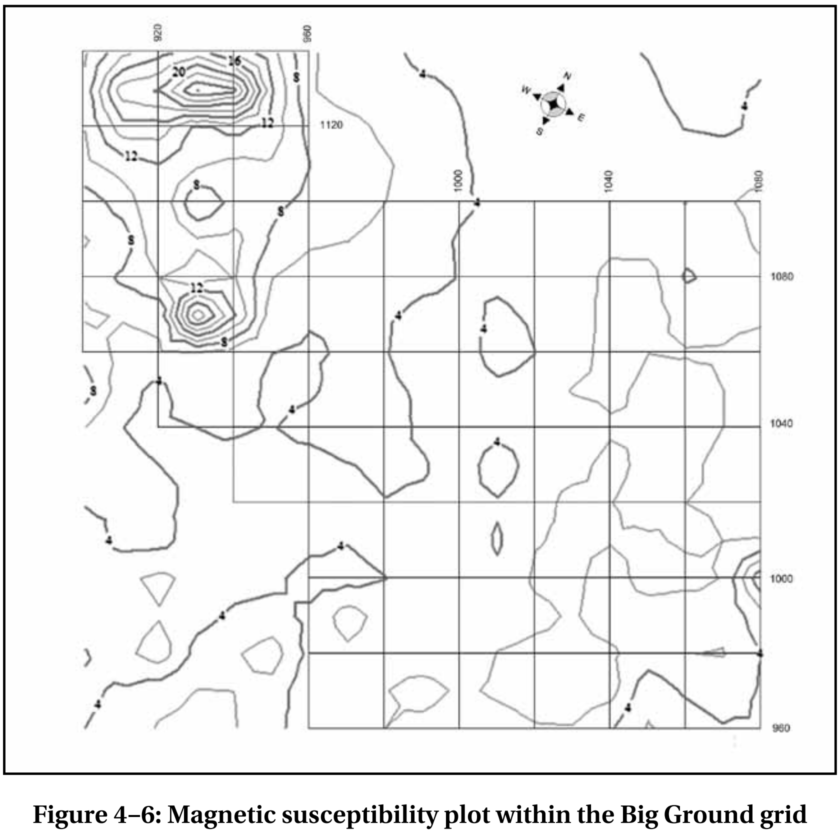


Figure 4–6: Magnetic susceptibility plot within the Big Ground grid

There are some areas of high activity at the north end of the field, and also on the north slopes of West Mead. There is practically no sign of activity on the Mound itself, although there is some signal along the edge of the river terrace. This is not surprising as there seems to have been a wall there, which would act as a repository for minor metal debris.

There is an area of marked activity around (930, 1130). This patch, referred to as 'site 2,' was the motivation for the decision to extend the magnetometer grid on the final day of the survey, and Figure 4-5 shows that the magnetometer survey ought to be extended further north in the future. Grid m54 (Figure 4–4) suggests that the feature found by magnetometry is central to the site 2 activity. A slight mark also shows on the Lidar at this point, and may indicate a slight change in height or slope, although no feature is visible on the ground.

4.4 Twin Probe Resistance

The same 57 grids surveyed in magnetometry were also surveyed by twin-probe resistance, but in a slightly different order. Both TR/CIA and RM15 meters were used and their results combined on a single plot. Figure 4-7 shows the resistance plot for the area. This is shown in multi-colour to give the most visible gradation of levels, and more definition to the features under the Mound.

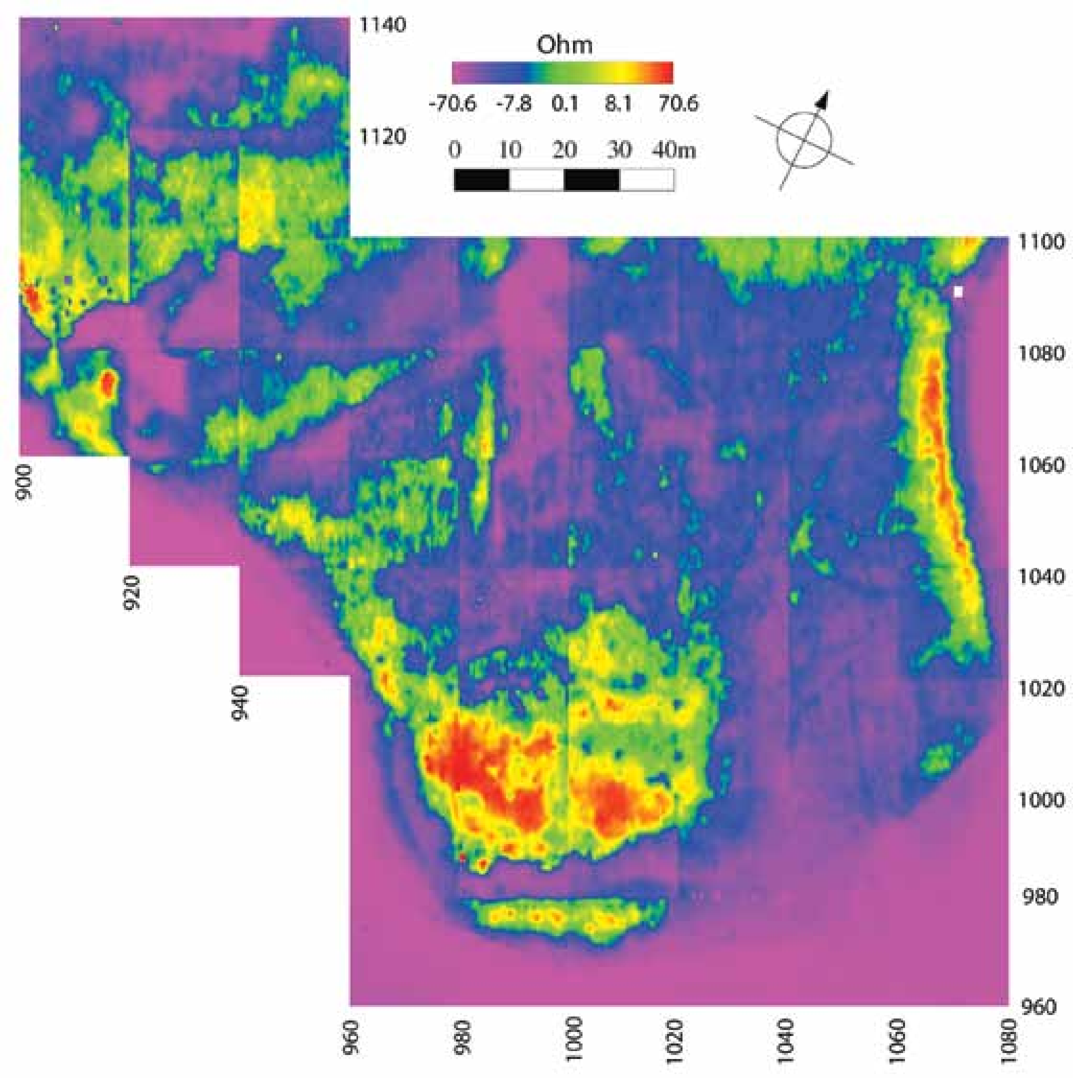


Figure 4–7: Resistance plot

Six grids on the Mound itself were also replotted with the RM15 using 1 metre probe separation to gain extra depth information. These will be discussed in detail later.

Figure 4–8 shows the grid plan, and some features described in the following text refer to their location by a specific grid square, for example r24.

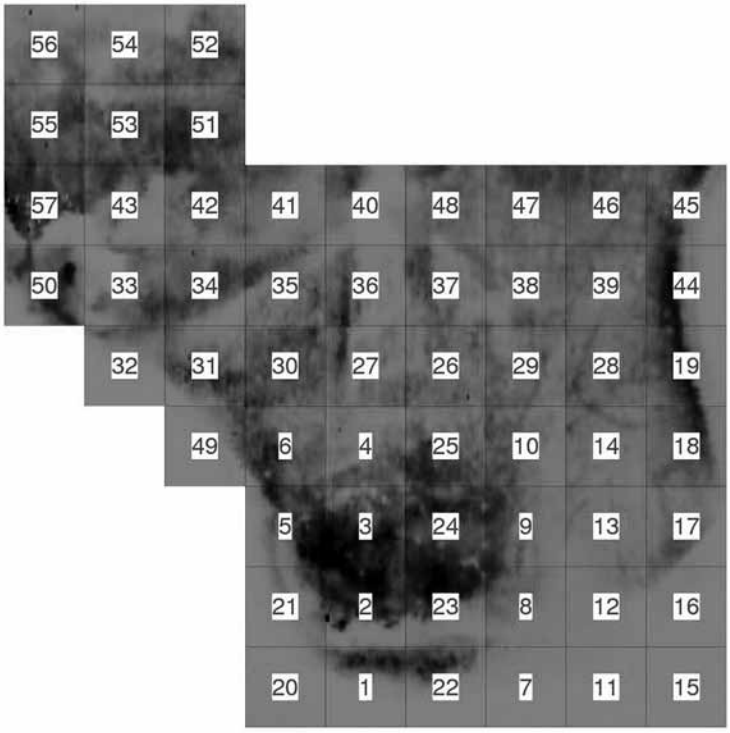


Figure 4–8: Resistance grid plan and numbering

The highest responses are on the western end of the Mound (grids r2, r3, r5, r21), where there seems to be a bifurcation to north and south. There is also a level of relatively high resistance on the eastern portion of the Mound. The Mound will be discussed in more detail later.

A wall (or revetment) line appears to follow the first terrace level, heading south in a slight curve from the north-east corner (grids r45, r44, r19, r18) before turning south-west and then west to pass south of the Mound (grids r22, r1) before turning north-west (grids r21, r5, r6, r31, r50, r57).

There are some lines, one straight, one turning a right angle (grids r29, r28), which may represent old field boundaries, and there are signs of a possible rectangular structure in grids r10 and r25.

Site 2 seems to show lines of lower resistance set in a higher resistance background. The function of these is not immediately obvious, but they form a trapezoidal pattern (grids r53, r55, r57). The area of the possible structure found by magnetometry (grid r54 and grid m54) appears as a blank area of low resistance.

The Mound is shown in more detail in Figure 4–9, which shows a plot of 16 squares centred on 1000, 1000. This is printed out as four blocks of four grid squares analysed in Microsoft Excel and given a linear resistance scale to maximise detail. Contours are also shown plotted at 0.2 metre intervals. Note that the colour scale of resistance here is not related to that used in Figure 47.

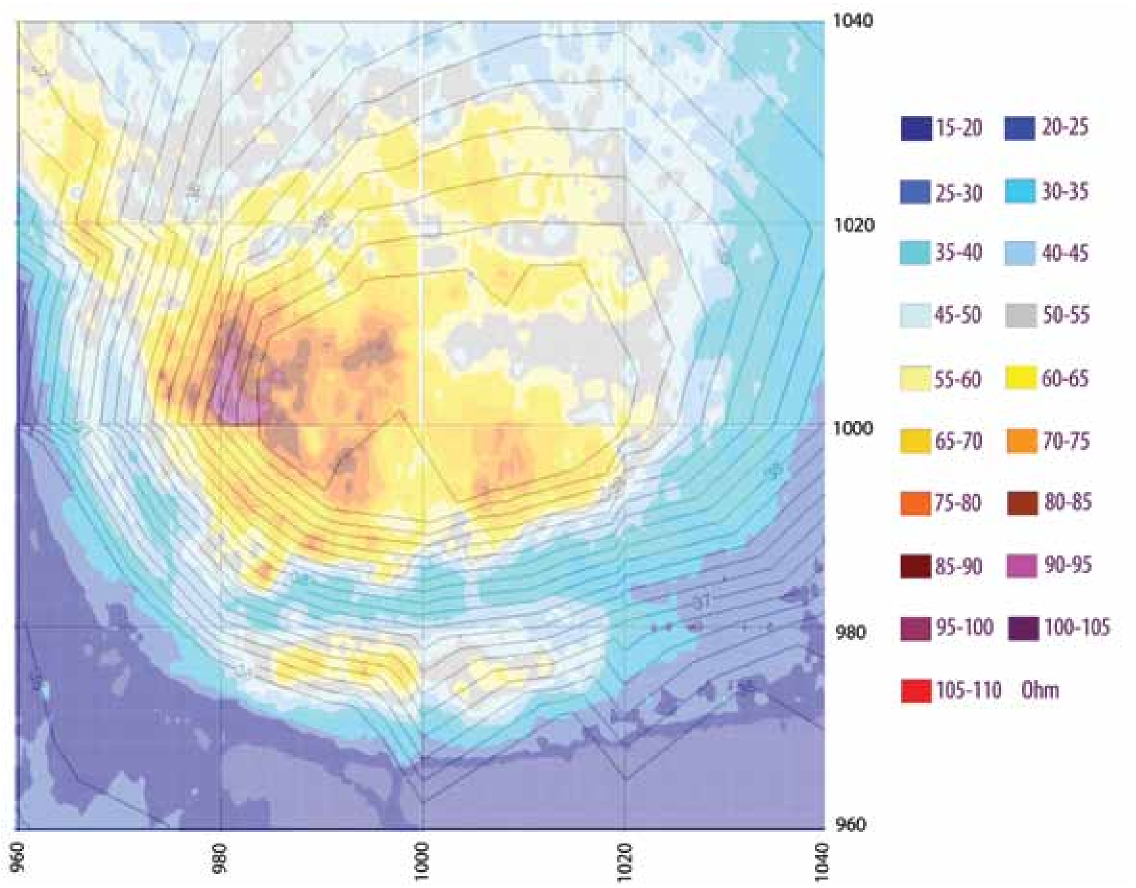


Figure 4–9: Mound resistance plot

The contours show that the Mound is remarkably flat on top. Although this appearance is accentuated by capping contours at 39.6 metres, while a few points were measured at up to 40 metres even this would mean that it is flat to within 0.4 metres over an area some 35 metres by 20 metres. The flatness is comparable with that of the South South-west Circle across the river (Oswin et al 2011: 29-32) and suggests that it may have been engineered.

The very highest resistances are found at the west end of the Mound. By this point it is sloping rapidly down to the west, so that the buried stone feature may be much nearer the surface. The stone feature itself is 18 to 20 metres long, aligned approximately (compass) east-west, 10 metres wide at the west end, 15 metres wide at the east end.

Further east, there appear to be two stony baulks (grids r23, r24) separated by about 20 metres of low resistance material. Amongst the stony areas are a number of low resistance features, typically 3 metres across. These could represent post holes or tree throws. The latter is more likely as they have left no magnetometer trace barring one exception.

To the north of the Mound, the resistance level remains relatively high, while to the south and west, contours and resistance plunge down to the flood plain. Levels tail off more gently to the east.

The wall line described above can be seen to the south and west of the Mound. The high resistance protrusion on the south-west side of the Mound is now known to be a shed built into the side of the Mound and demolished within living memory.

Figure 4–10 shows a comparison of the resistance plot for the six grid squares which cover the top of the Mound (r8, r9, r22, r23, r1, r2) which were plotted with both 0.5 and 1 metre frame probe spacings. The measured values of resistance differ by a factor of approximately 2, but the stone features show very similar patterns. Unsurprisingly, the 1 metre spacing gives a more 'blurred' picture, as each reading encompasses a larger volume of soil, but the similar patterns suggest that the feature is steep sided and goes to a depth of over a metre: it is not just a surface deposit.

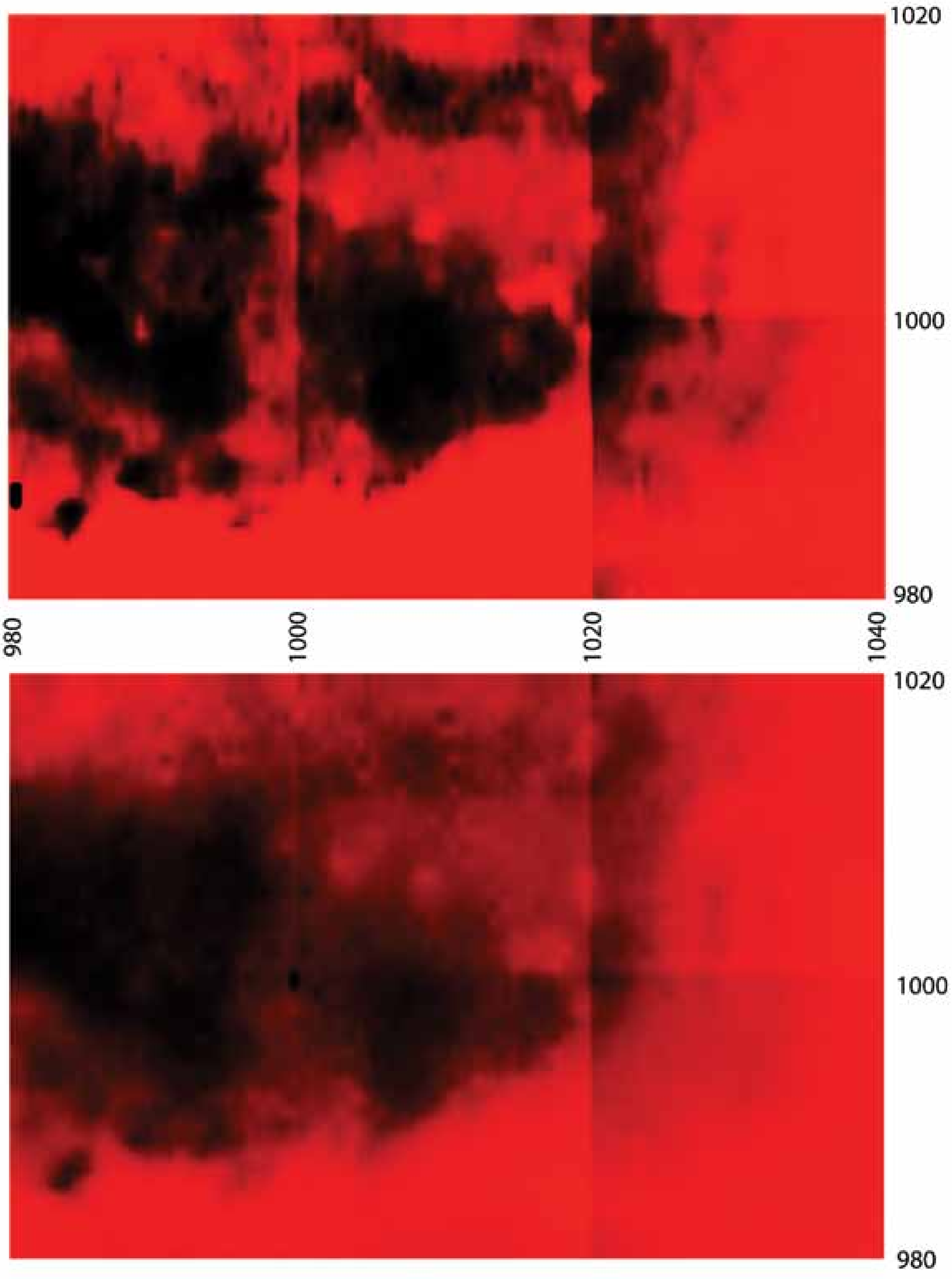


Figure 4–10: Resistance plots for six grids on top of Mound: 0.5 metre spacing (top) and 1 metre spacing (bottom)

4.5 Electrical pseudosection profiling

In all, 25 profiles were taken using lines of 32 probes at 1 metre spacing. These formed a diagonal transect, two short south-north transects, one long west-east transect, and a block 31 metres east-west by 14 metres south-north. The positions of these profiles relative to the Mound are shown in Figure 4–11 (arrows indicate the direction of the profile with the zero metre point at the arrow's tail). Details of the profiles are given in Appendix B.

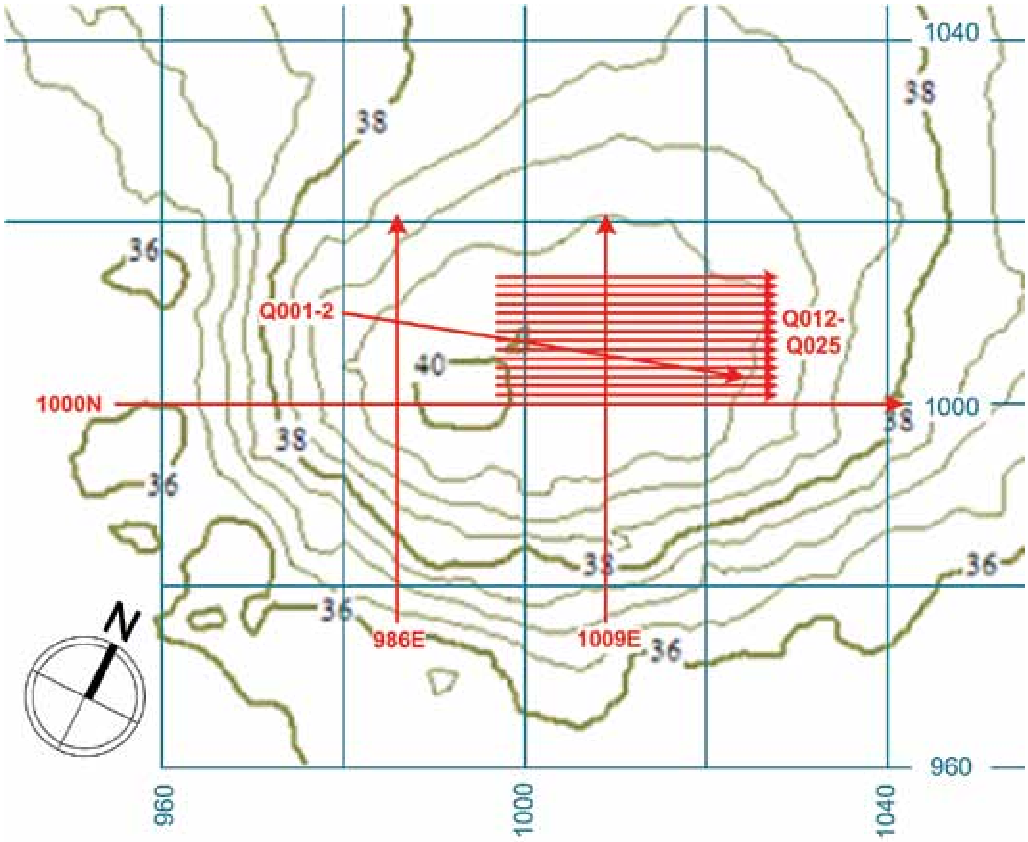


Figure 4–11: Location of profiles overlaid on contours at 0.5 m intervals

The output of the diagonal transect (Q001-2) can be seen in Figure 4–12. The western end runs along the northern edge of the main stone feature and this shows clearly in profile, extending for the first 20 metres or so. It shows massive stonework extending down to about 2 metres depth, with apparently undisturbed soil below that. Further to the east, there is some stonework but it is less massive, and still sits on natural. A number of pits extend down about 1 metre from the surface.

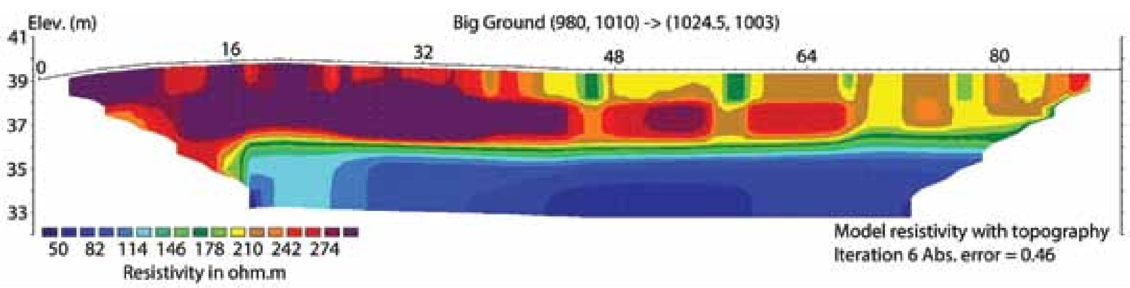


Figure 4–12: Profile Q001–2, from (980, 1010) -> (1024.5, 1003)

The long west-east profile (1000N) is shown in Figure 4–13. It is obvious that the stonework is concentrated at the west end, and the very high readings obtained by twin-probe resistance correspond to the upper part of the steep slope, where the stone is closest to the surface. The stonework is seen again to sit on an approximately flat ground surface, with the Mound built up. The stonework continues east on this particular transect.

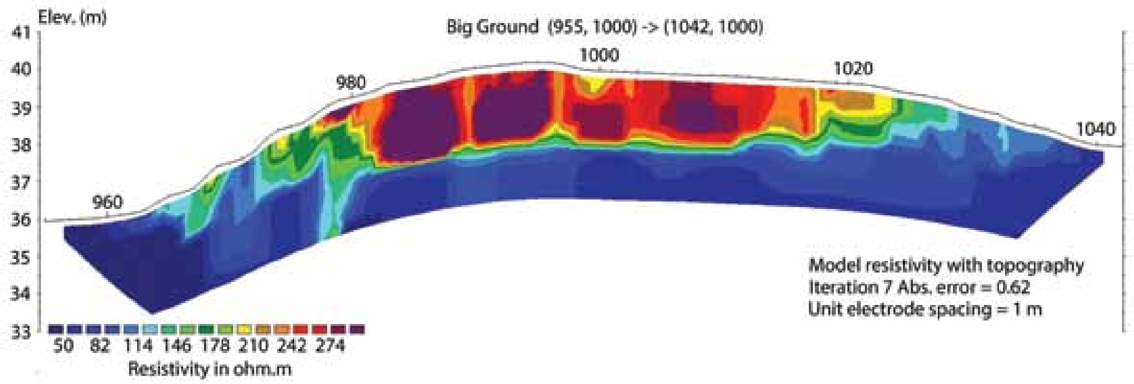


Figure 4–13: Profile 1000N, (955, 1000) -> (1042, 1000)

The western south-north transect (986E) is shown in Figure 4–14. The principal body of high resistivity is seen to be split by a narrow gap. Again, the stone work is seen to sit on top of natural. At the far south end of the profile (left), the wall which encompasses the terrace can just be seen.

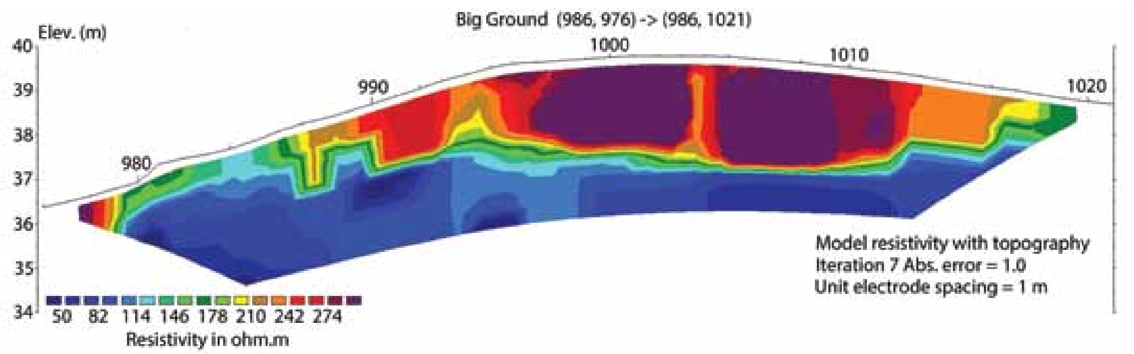


Figure 4–14: Profile 986E, (986, 976) -> (986, 1021)

The eastern south-north transect (1009E) is shown in Figure 4–15. The main stone object is now seen to be much narrower, with a second stone object smaller still towards the far north of the plot, suggesting two retaining walls with soil between. This can also be seen in the horizontal slices in Figure 4–17. Again, part of the wall which encompasses the terrace can be seen at the far south of the plot, but resistivity levels are lower.

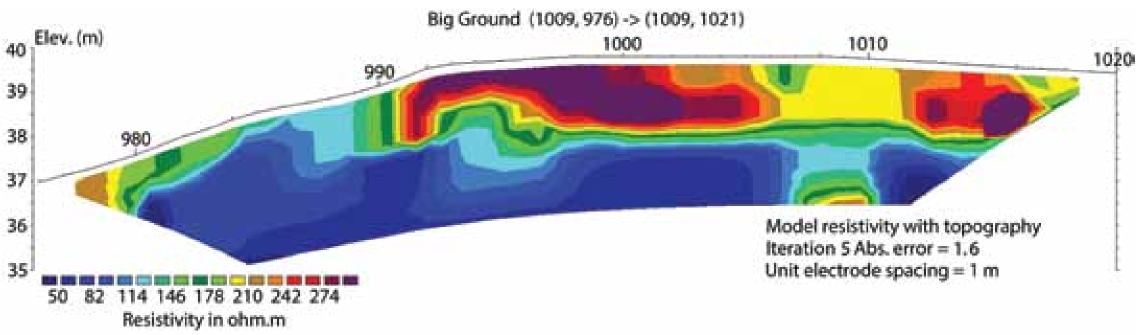


Figure 4–15: Profile 1009E, (1009, 976) -> (1009, 1021)

The main block of profiles is shown as a series of individual profiles in Figure 4–16. This covers an area to the east of the strong stonework, but this appears at the far western end (left) of some of these profiles. The area can be seen to comprise a south wall (along line

1000 n) which gradually gives way to a soil fill before a more substantial stone wall reappears towards the north (1012 n onwards). There are a number of apparent holes extending down typically 1 metre below the surface. These are most likely to represent tree throws.

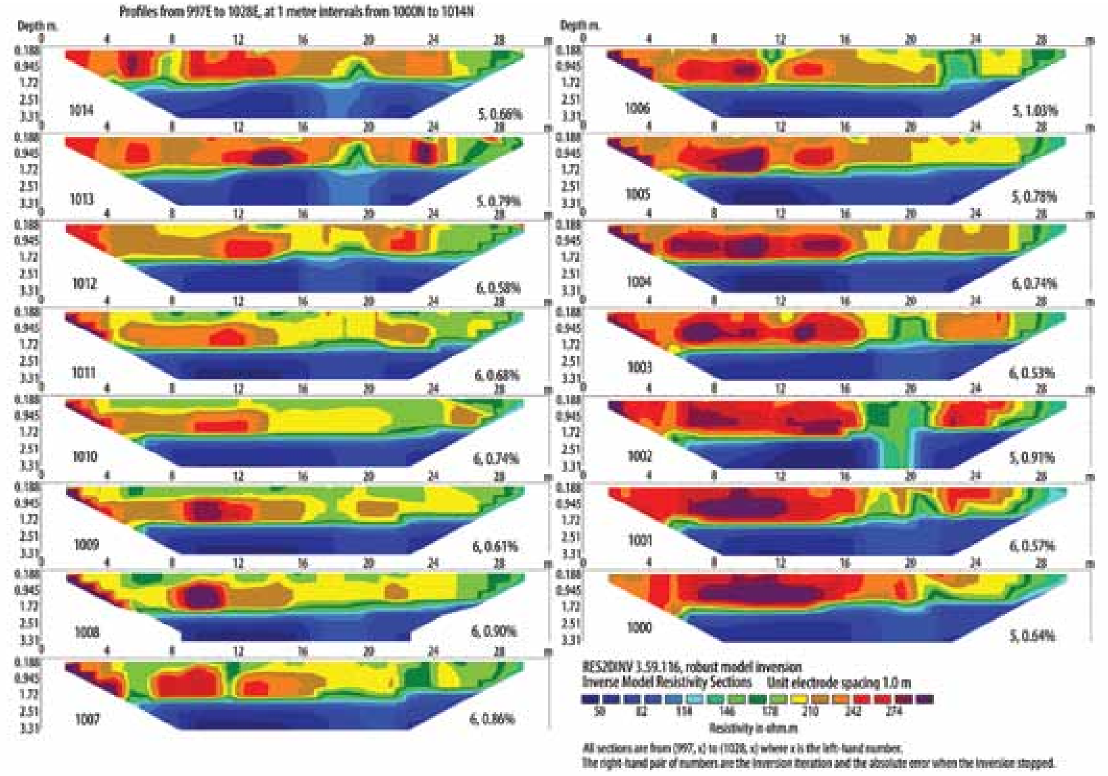


Figure 4–16: Profiles from 997E to 1028E, at 1 metre intervals from 1000N to 1014N

Horizontal cross-sections through the profiles at various depths are shown in Figure 4–17. Ideally more profiles could have been done through the main stone structure to try to elucidate it, but time was limited and priority could only be dictated by rapid inspection of twin-probe resistance plots prior to any detailed analysis. There would be benefit in covering this portion of the Mound with more profiles.

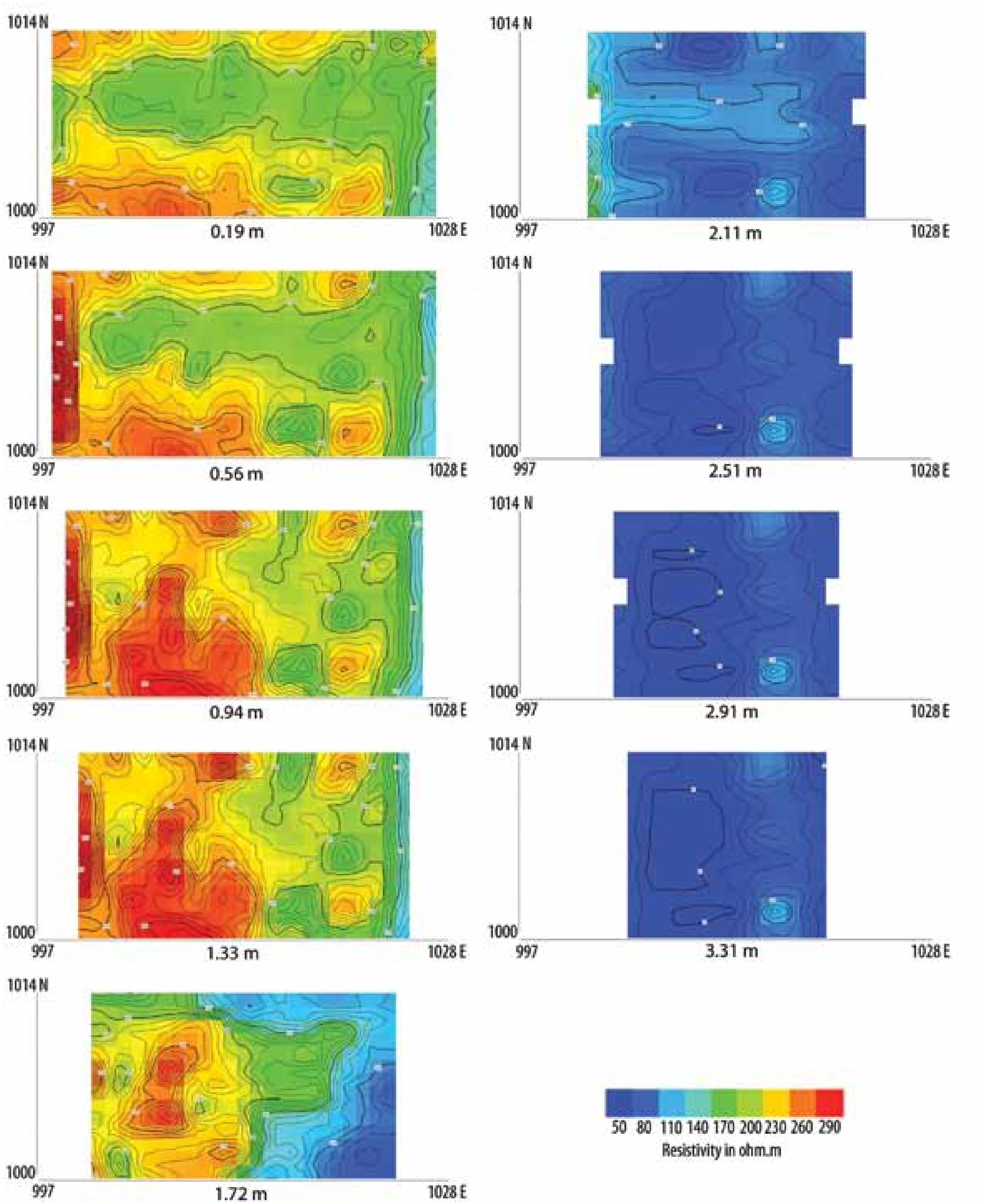


Figure 4–17: Cross-sections through profiles at various depths

4.6 Radar

Three areas were surveyed by radar: MALA X3M operating at 250 MHz. These are shown overlaid on the resistance plot in Figure 4–18.

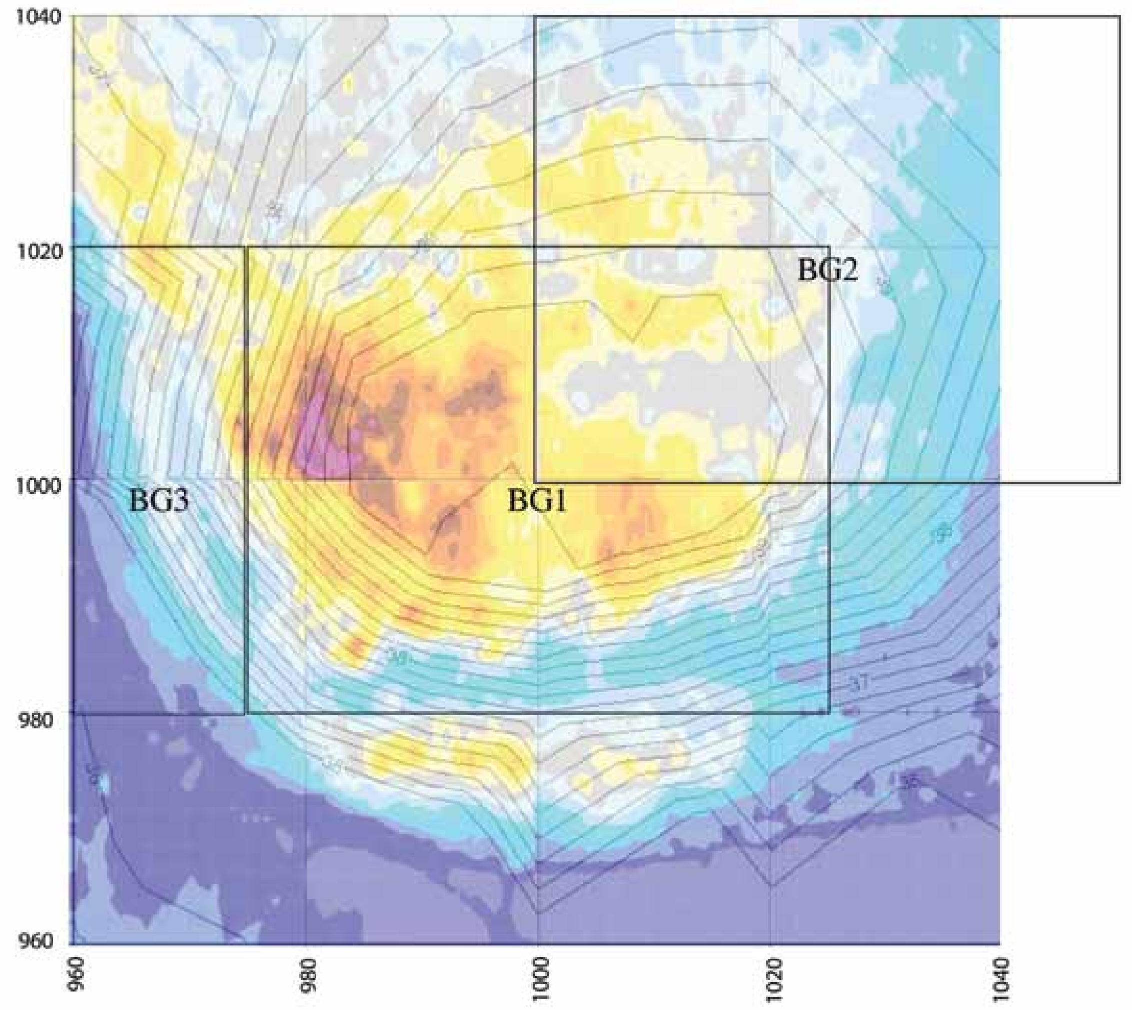


Figure 4–18: Radar survey areas overlaid on resistance plot

The BG1 area comprised 50 lines at 1 metre separation covering the bulk of the Mound. No allowance for the Mound's profile has been used with the results shown here, but it should be noted that the central part of the Y axis is at a higher altitude than the extremes. The area started 5 metres west of the 980 E grid line so as to encompass the stone feature. Figure 419, Figure 4–20, and Figure 4–21 show depth slices at 0.7, 0.8 and 1.0 metres, respectively, assuming a wave speed of 0.6 m/ns. Two objects can be seen with some definition on the western side of the plot, The lower of these is the shed which was demolished some twenty to thirty years ago, the upper is the stone feature, and this does seem to have two lines of stone trailing east from it, and so it accords well with the resistance plot and also shows the features extending to some depth.

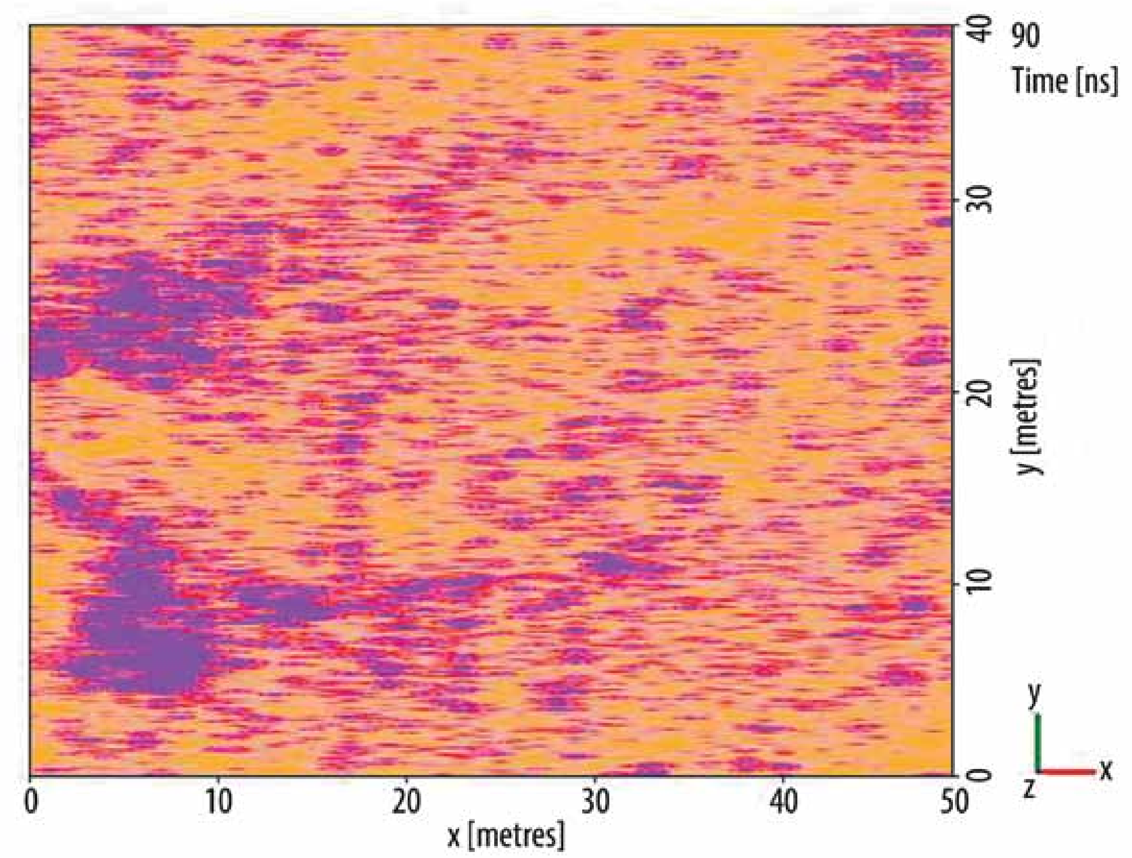


Figure 4–19: Radar survey for area BG1 at depth of 0.7 metres

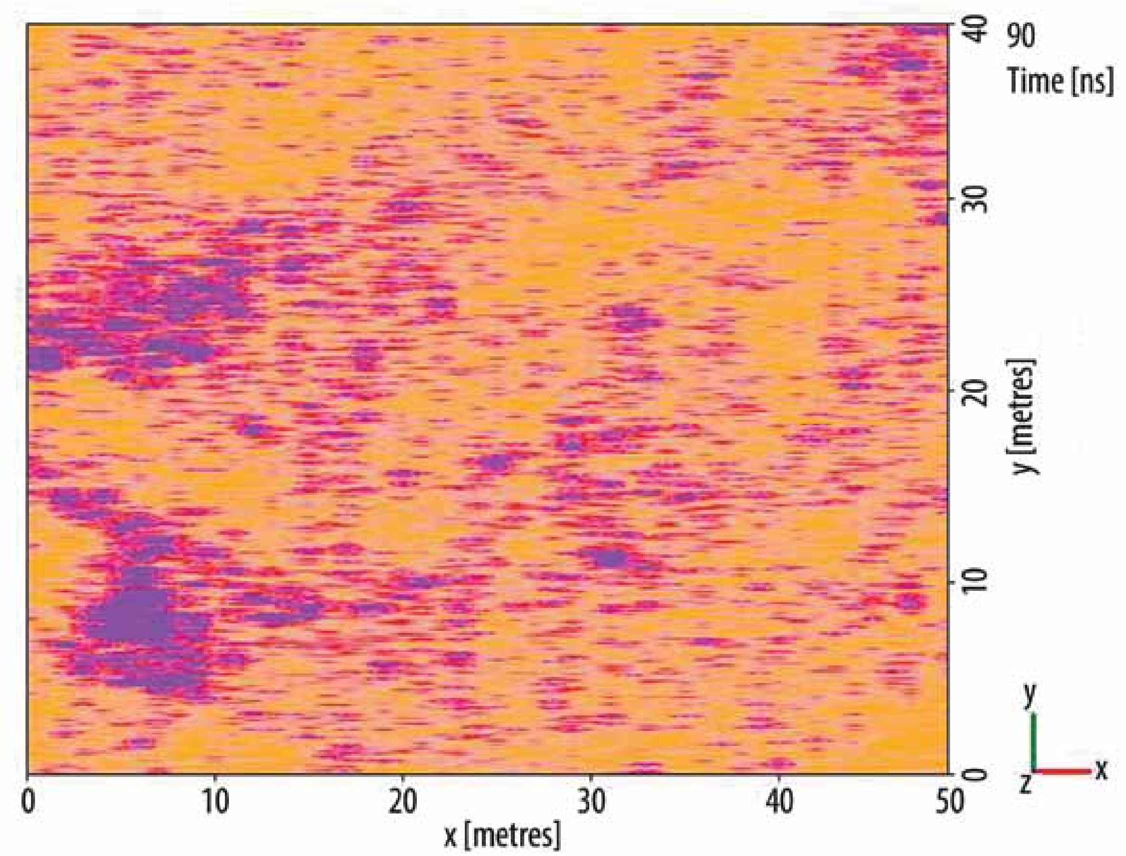


Figure 4–20: Radar survey for area BG1 at depth of 0.8 metres

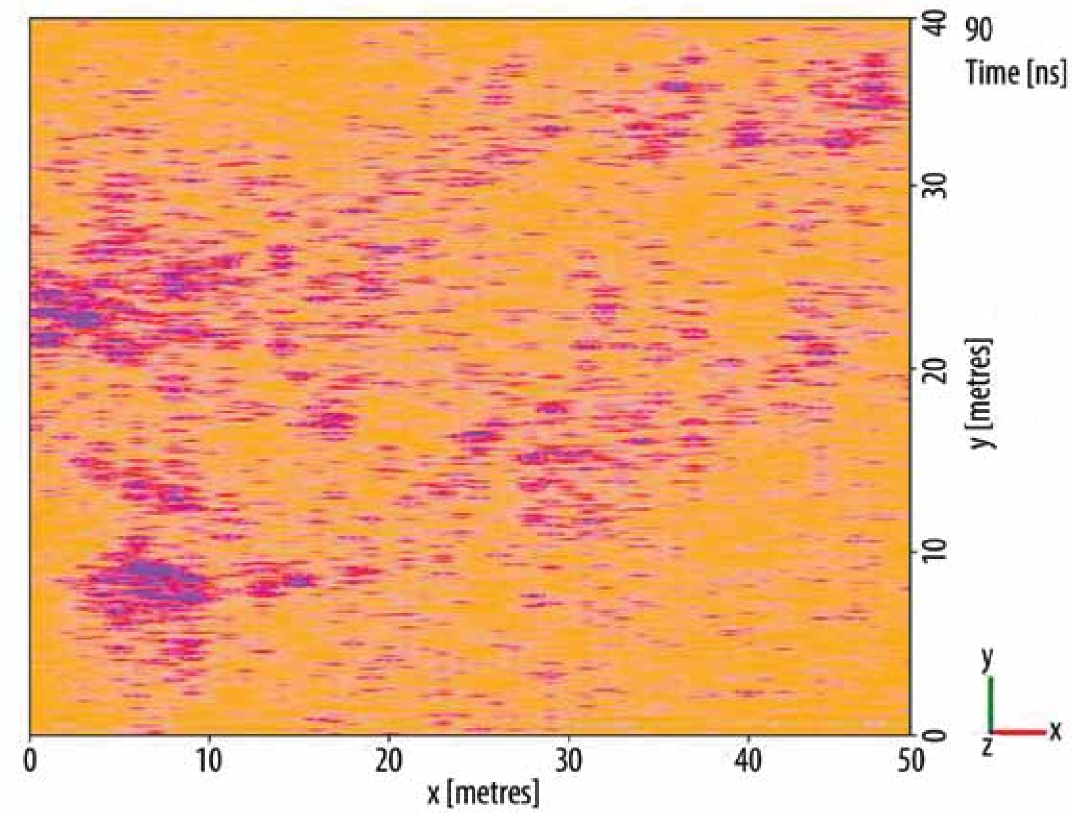


Figure 4–21: Radar survey for area BG1 at depth of 1 metre

The area BG2 yielded no worthwhile targets.

The area BG3 extended BG1 to the west, to the edge of the gridded area. There are slight signs of the stone feature high up at the eastern end, but the principal visible feature is the wall around the terrace, seen in Figure 4–22 curving round in the 0.65 metres depth slice.

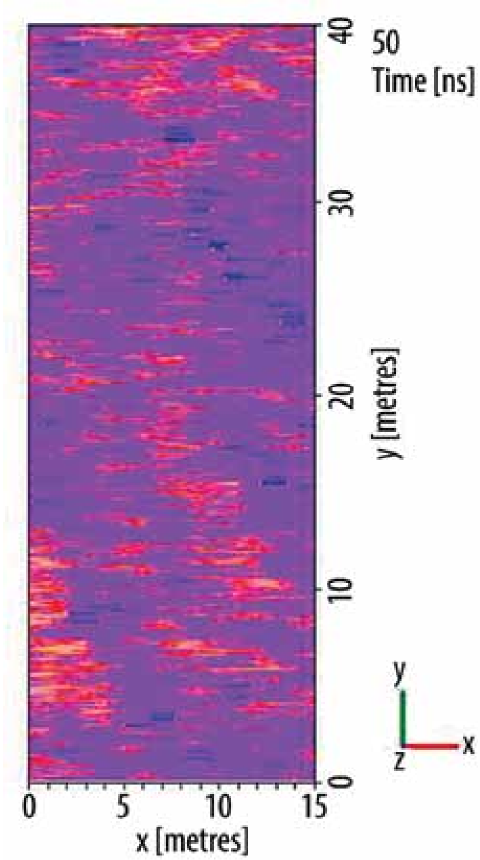


Figure 4–22: Radar survey for area BG3 at depth of 0.65 metres

5 Discussion and Conclusions

5.1 Discussion

The only known part of the Stanton Drew monument on the north side of the River Chew is Hautville's Quoit, so unsurprisingly nearly all archaeological investigation has been to the south of the Chew. But there will have been human activity on both sides of the river when the monument was in use and it makes sense to ask whether any trace can be found.

In our report on the Quoit (Richards et al 2012), we described the anomalous appearance of the Mound, the way it appeared to rest on the hillside, and its position relative to the stone circles. We also noted that at times of flood, the Mound would form a peninsula jutting out into a wide body of water. We suggested that floods may have been more common in the past, especially prior to the construction of the Chew Valley Lake reservoir. The Chew's source is within the Mendip Carboniferous Limestone, which rises to over 290 m O.D. The mean annual rainfall is 1050 mm of which 530 mm becomes runoff. Since the creation of the Chew Valley Lake and dam, flood discharges below the dam are considerably reduced. In fact the decreased flow has resulted in the channel capacity being reduced to 40% of the original value in the first kilometre below the dam. Sediment introduced by the Strode Brook tributary can no longer be transported and the channel width and depth have been reduced (Petts 1979: 345; Petts and Thoms 1986: 306-7). Reservoir construction at other locations has been cited as responsible for reductions of between 20% and 75% in flood peaks (Petts 1979: 331). The draw-down of the lake level during the summer provides capacity for flood runoff; the runoff from the great Mendip flood of July 1968 was safely contained by the dam and must have ameliorated the still considerable and destructive flooding downstream (Petts and Thoms 1986: 306). However, soon after the publication of the Quoit report it was demonstrated that significant flooding is still possible when 2012 proved to be the second wettest year ever on record in the UK. The end of November was particularly bad in the area: Mrs Young (pers. comm.) of Church Farm said that the flood was the worst she had ever known - just lapping Stone Close, but not up to the stones. This would mean the flood also reached to the foot of the Mound.

The climate in 4500 BP is believed to have been wetter than today. Recent work by Whitehead and Edmunds (2012) on the Silbury Hill area has used a model developed at the Hadley Centre for Climate Prediction and Research, which is part of the UK Meteorological Office, to estimate rainfall changes for the Silbury Hill grid square. Their results suggested an 8% higher rainfall in 4000BP to 4500BP compared to the present. There is unlikely to be any significant difference between the Silbury Hill grid square and the square immediately to the west: Stanton Drew and Silbury Hill are only 50 kilometres apart and both sites are in the same 'coherent precipitation variability area', i.e. their climates have responded in a uniform manner to fluctuations in temperature and precipitation over the instrumental record (Gregory et al 1991). Hence, it is highly likely that Stanton Drew would have been also relatively wetter. Neolithic water tables were similar, or perhaps higher, than today (Leary and Field 2011) and groundwater levels at Silbury may have been significantly higher, anything between 2 and 5 metres (Marshall 2013). If a similar situation applied at Stanton Drew flooding would have been commonplace. Also, three episodes of increased flooding occurrence across Britain have been identified in the Late Neolithic to Early Bronze Age at c. 4840, 4520, and 3540 BP (Macklin et al 2005). The flood plain of the River Chew is at its widest at Stanton Drew until it reaches the Avon at Keynsham. After passing Stanton Drew, the Chew is constricted by a narrow valley at Bye Mills. Floods could have created a large body of water sweeping past the stone circles, with the Mound jutting out as a promontory into the waters. The stone circles stand just above the flood plain and the view from them would have been of water to the north and to the east, with the Mound conspicuously standing on the far bank. The Great Circle's ditch may also have held water for some or much of the time. Given the suggested higher water levels in prehistory it is likely that greater erosion and transportation of sediment would have occurred throughout the river course, particularly in the higher reaches, resulting in an increasing deposition of the sediment within the floodplain.

The association of henges with flowing water has attracted increasing attention in recent times. The symbolism of water in proximity to Neolithic monuments, particularly henges and stone avenues, has been commented on by various authors (e.g. Brophy 2000; Leary and Field 2011; Richards 1996). Henges are frequently close to the confluence of two rivers, and here the Norton Brook flows southwards from the direction of Dundry to join the Chew in Big Ground. Avenues seem to connect stone circles to water, at Stanton Drew, Stonehenge, Callanish and others. Silbury Hill is close to the Kennet and numerous springs. If there were some ritual purpose in this then of course it is not possible to say what it could be, but it has been suggested that purification or fertility rituals could be involved (e.g. Burl 1993: 72).

Another, not mutually exclusive, theory is that henges were placed close to navigable rivers and so were important for communication purposes and networks of exchange (Bradley 2007: 134). Lewis and Mullin (2012), citing Allen (2010), claim the Chew was once navigable from the Avon at Keynsham as far as Chew Magna, three kilometres west of Stanton Drew. However, the Chew has a great variability in flow: before the 1950s between 3 million and 250 million gallons a day at the place the dam was built (Rahtz and Greenfield 1977) and this could restrict the navigability at certain times of the year as the water would be too shallow. In the medieval period onwards, a number of mill-weirs were constructed and this resulted in more constant water levels but stopped boats passing through. Williams (1992), writing about the theory that the Chew was used to transport Roman lead from Mendip, notes the Chew has a large fall of 43 metres over the 16 kilometres upstream from Keynsham and argues it would not have been navigable for Roman barges transporting lead. If so, then it would probably not have been navigable for Neolithic boats transporting stones for the circles either, but lighter transport may have fared better.

Our investigations of the river bank were aided by the November 2012 floods as the banks of the Chew and the Norton Brook had been scoured of vegetation, making it easier to study in section. The depth of visible sediment at the water's edge was about three metres. The actual depth of sediment is somewhat greater: in a field on the opposite bank, Lewis and Mullin (2012) reached a depth of four metres by hand augering before it became too difficult to go any deeper. They suggest that, by analogy with other areas, the sediment may not have begun to form until the later prehistoric, so the flood plain would have been several metres lower in the Late Neolithic. The stone avenues from the Great and North East Circles which are arranged to meet at the edge of the flood plain may have ended at a "river cliff", a steep drop down to the flood plain similar to one found at Durrington Walls. If this is so, then the Mound would also have risen up more steeply from the flood plain, its current rise of four metres would have been more than doubled. The Mound would have been more physically imposing and the sight lines to the stone circles would have been much less likely to have been impeded by any trees along the river banks, as they are today.

The rest of this discussion will centre on the Mound itself. This was curiously blank in magnetometry (hence the informal rapid but inconclusive survey in 2012) but the resistance has shown a lot of interesting detail, supplemented by resistivity profiles.

Resistance survey has shown stone structures under the Mound. In particular, there may be a large trapezoidal block, slightly bifurcated, under the western end of the Mound, even as it slopes down. This is the end facing the Great Circle. Profiling revealed this to be of the order of two metres in thickness and sitting on low resistance earth. The block bears the signature of a small long barrow or chambered tomb (Marshall 1998) although without apparent side ditches. The block shape is analogous with Stoney Littleton (Darvill 1982: 118) but shorter. The wide end points approximately east.

We have suggested previously that the Cove may also be based on a long barrow or chambered tomb (Oswin et al 2009: 23-28). The Cove and the Mound are on opposite sides of the river valley, and there are other examples of long barrows in close proximity in the same region only a little further to the west (Lewis 2005: 23-24). Stone circles and chambered tombs can be close together, for instance at the Rollright Stones and Whispering Knights (Lambrick 1988).

Wall lines appear to extend east from both north and south wings of the stone block, and it is as if these had been retaining walls or revetments, with the area between infilled with soil and built up to a very level platform. The soil may have been drawn locally from the flood plain, and this would account for its low magnetic signature, but it would still represent a major logistic and engineering task.

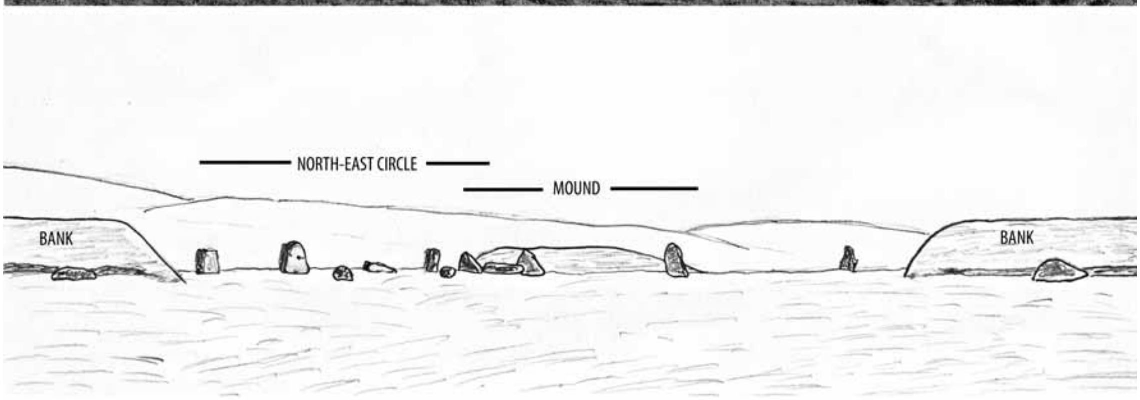
The resistance also seems to show a number of holes or pits on the Mound, but only one of these has any magnetic signature. It is most likely that these are tree throws and may be modern, as a January 1946 RAF aerial photograph (RAF 1946) shows the Mound to have trees on it as well as on the river banks and the bank round the first terrace.

Henges and mounds are regularly in close conjunction. The most famous example is at Silbury Hill and Avebury. Indeed, Silbury Hill now appears to be built over an earlier monument (Leary and Field 2010). Ringlemere in Kent provides an example of a henge later covered by a large (40 metres) but low barrow (Parfitt and Needham 2012). Salt Knowe near the Ring of Brodgar (Historic Scotland 2008) is another likely example, measuring 40 metres by 33 metres and about six metres high, but the other large mounds close by are considered to be Bronze Age (Card 2013, pers. comm.), see Figure 5–1. It has been suggested that Salt Knowe's profile reflects that of Cringlafiold Hill in the distance beyond it (Orkneyjar, n.d.) as if it were a miniature imitation (Tilley 1994), and it is possible that the Big Ground Mound has a similar relationship to Settle Hill beyond it to the north-east.

Figure 5–1: Salt Knowe, at the Ring of Brodgar

More similar apparently is the Setter Mound recently discovered under Stenness Loch (Bates et al 2012). The Great Barrow at Knowlton (RCHME 1975; Burrow and Gale, 1995) may well be another case, but the mound has not been investigated at all (Darvill 2013, pers. comm.). English Heritage describes it as Late Neolithic or Early Bronze Age, but Gale (2003) and Stoertz (Barber et al 2010: 155-157) are content that it could be Neolithic. A full publication of surveys 1993 to 1997 is awaited, but Field (1962) includes work on the mound's ditch. The relationship of the Great Barrow to one henge is shown in Figure 5–3. Gib Hill, just outside Arbor Low, appears to have a later monument on top of earlier monuments (Radley 1968). Large mounds are also known within great henges at Mount Pleasant, the Conquer Barrow which also has a flat top (Wainwright 1979), and at Marden the Hatfield Barrow (Barber et al 2010: 163-169).

It has been suggested that large mounds found in association with henges may have served as raised platforms for the performance of ritual acts, such as funeral pyres (Barrett et al 1991:128; Needham and Woodward 2008:6). The use of fire would only increase the distance over which they were conspicuous. The top of the Mound itself is remarkably flat, a feature it shares with the hill on which the South South-West Circle stands, so they may be related. According to viewshed analysis, the Mound is visible from all three circles (but the centre of the Great Circle is not visible from the centre of the South South-West Circle). Figure 5–2 is the view from the centre of the Great Circle with the addition of the banks that could have encircled the henge. It shows how the banks (assumed here to be about three metres high) would frame a sightline directly to the Mound.



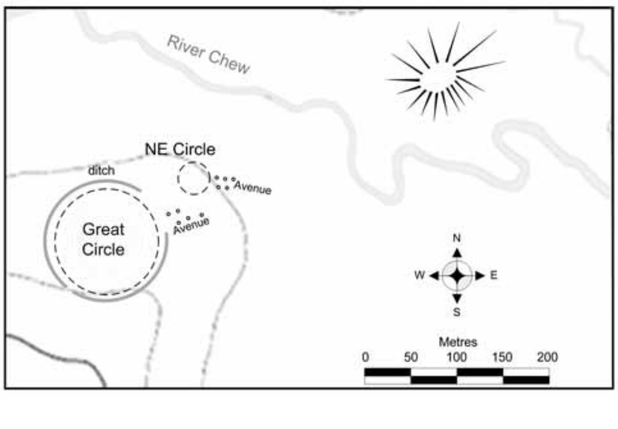


Figure 5–2: View north-east from centre of Great Circle: today (top); an impression of the view in the Neolithic showing the postulated "henge banks" 60m away and the Mound 200m away (middle); with a plan showing the entrance in the Great Circle in relation to the Mound (bottom)

As well as looking towards the Mound, one should consider looking away from it. Mounds could have functioned as viewing platforms, into an accompanying henge or to other features (Barber et al 2010: 162-163). The top of the Big Ground Mound is at 40 metres O.D. On the opposite bank, the closest part of the NE Circle is at the same height, and then there is a gentle rise to the far side of the Great Circle at 45 metres O.D. The tilt of the slope provides a viewer on the Mound with an excellent view of the ground within the two circles.

Figure 5–3: Knowlton Church Henge with Great Barrow in background

The Big Ground Mound does not fit the shape criteria of Leary, Darvill and Field (2010) in one crucial respect: it is not round; but then, if it were, it would almost certainly already be well known and documented. One possibility is that it was constructed as round, and later augmented. There is some support for this idea in that the high resistance values from the twin probe resistance survey are concentrated towards one end of the Mound. However, there is no visible sign of any discontinuities in the physical appearance that one might expect to see in a mound constructed in stages. It is today lower in height than many of the mounds but, as discussed above, this may not have always been the case as the flood plain has filled with several metres of sediment.

The magnetometry and resistance plots have shown a number of features which cover a wide span of time. The latest are probably a shed built on the side of the Mound and a pond just below it, and both of these features are visible on the 1962 Ordnance Survey 1:2500 map. The shed was demolished within recent memory, and demolition rubble can still be seen dumped at the nearest section of river bank. Other field boundaries, enclosures and possible structures to the north of the Mound are probably mediaeval or post-mediaeval.

One area of particular interest was only noticed in the magnetic susceptibility results at a very late stage in the survey, about 100 metres to the north-west of the Mound. The resistance and magnetometry surveys were extended on the final day to encompass as much of this area as possible but there remains a part beyond this survey. This has been referred to as Site 2. The resistance survey showed some trenching in the southern part of this area and a number of cavities were visible, probably tree throws. The magnetometer observed interesting features near the northern extent of its survey (grid m54, figure 4–3) and these have been amplified in Excel in figure 4–4. To the east of the two short linear features is a rectangular structure some 7 metres by 9 metres with internal detail. Curiously it is truncated at the grid edge on the east, so it may indeed be longer. There are no clues as to its date, and it could indeed be modern, but the survey needs to be extended to the north over the whole area of high susceptibility to see if there are other similar structures here.

5.2 Conclusions

The Big Ground Mound's remarkably flat top makes it of interest and we need to know more about it. Our work so far has been inconclusive. There is still some geophysics which can be done: resistivity profiles could be used to try to find the edge of the original valley, and a large number of profiles need to be done over the stone block area: these would need to be analysed using the full version of the RES2DINV software so that topography can be included, and so that the data extracted can be assembled in three dimensions. Test pitting on the Mound would be an option and could provide an answer as to whether or not it is purely natural. Only excavation could provide a full picture and date for the structure, but on the basis of the geophysical evidence, it could be part of the Neolithic complex of Stanton Drew.

'Site 2' was unexpected: it seems there may be some type of building there, but it could be of any age. Further geophysical investigation of 'Site 2' and the surrounding area should be carried out to try to identify whether there is any trace of a building or other archaeological features.

Appendix A – Details of grids

A.1 Magnetometer

The magnetometer survey was completed in 20 m squares at 6400 data points per square. 57 grids were surveyed. Traverses were 0.5 m apart, with 8 readings per metre taken along traverses. The traverses were started in the south-east corner, the first traverse heading west. The first traverse was 0.5 m north of the south edge, starting 0.125 m from the east edge and finishing on the west edge, in accordance with type c in figure 5–8 (Oswin 2009: 115). The data are sorted to parallel. In the folder, grids prefixed 'd' have been de-striped using a BACAS proprietary zero-median routine. Grids prefixed 'm' have not been processed.

The order in which the grids were surveyed can be read from Figure A–1, as can the direction of first traverse.

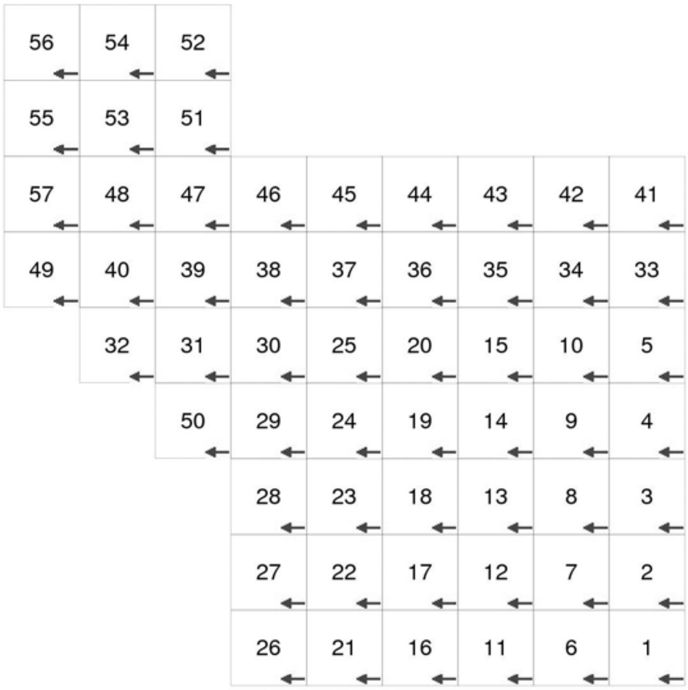


Figure A–1: Numbering of magnetometer grids

A.2. Twin probe resistance

Both TR/CIA and RM15 meters were used in the survey. For general surveying, the RM15 was fitted with 0.5 m probe setting transom, although for some specialised grids on the mound the 1 m probe separation transom was used.

The resistance survey was completed in 20 m squares at 800 points per square. 57 grids were surveyed. Traverses were 1 m apart, with 2 readings per metre taken along traverses. The traverses were started in the south-east corner, the first traverse heading west. The first traverse was 1 m north of the south edge, starting 0.5 m from the east edge and finishing on the west edge, in accordance with type c in figure 5–8 (Oswin 2009: 115). Resistance grids in the folder are prefixed 'r'.

The TR data were sorted to parallel (straight arrows in Figure A–2), the RM15 data were still in zig-zag formation (barred arrows in Figure A–2).

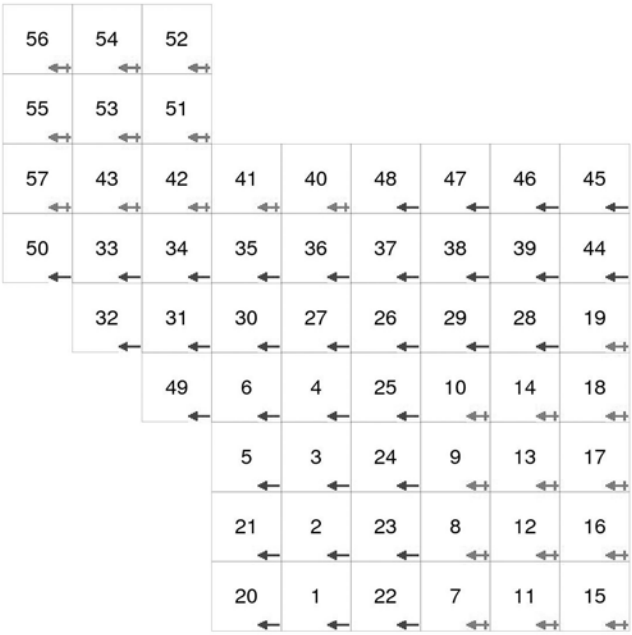


Figure A−2: Numbering of resistance grids

The six grids surveyed using the 1 m transom are shown in Figure A–3. They are the bottom six grid block. The top block shows the grid numbers for the same six squares plotted using the 0.5 m transom.

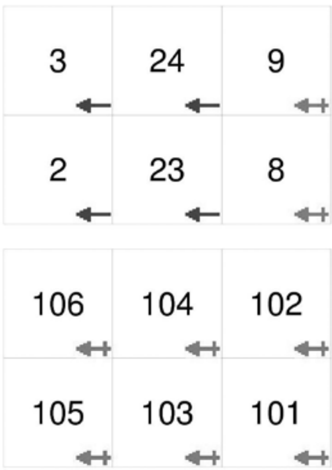


Figure A-3: Grid numbering for surveys using 1 metre transom

The TR device was also used for profiling. Details of the profiles are given separately in Appendix B.

A3 Radar

The three radar areas, BG1, BG2 and BG3, were all surveyed using a MALA X3M radar operating at 250 MHz. The areas are shown relative to resistance survey in Figure 4–18. All traverses were 40 m long. They were recorded in zig-zag formation, so every second traverse needs to be flipped. Traverses were 1 m apart. A few lines failed to record properly and appear as blank in the survey.

Data were processed using REFLEXW software.

Note that BG3 was a westwards continuation of BG1, so the sets could be conjoined and traverses in BG1 re-numbered, providing there is sufficient computer power to cope with the data sets.

Appendix B – Electrical Resistivity Profiles

A total of 25 profiles were taken between 2 and 4 March 2013, all of 32 probes with probe spacings of 1 metre. The profiles were performed at the locations shown in Figure 4–11. Table B–1 lists the profiles, with their start (probe zero) and finish points.

Description	**Id**	**Start E**	**Start N**	**End E**	**End N**
Towards (1024,1003)	q001	980	1010	1010.5	1005
Towards (1024,1003)	q002	994	1007.5	1024.5	1003
Profile across mound long axis at 1000N	q003	955	1000	986	1000
Profile across mound long axis at 1000N	q004	969	1000	1000	1000
Profile across mound long axis at 1000N	q005	983	1000	1014	1000
Profile across mound long axis at 1000N	q006	997	1000	1028	1000
Profile across mound long axis at 1000N	q007	1011	1000	1042	1000
Profile across mound short axis at 1009E	q008	1009	976	1009	1007
Profile across mound short axis at 1009E	q009	1009	990	1009	1021
Profile across west end of mound at 986E	q010	986	976	986	1007
Profile across west end of mound at 986E	q011	986	990	986	1021
Profiles in rectangle on mound	q012	997	1001	1028	1001
Profiles in rectangle on mound	q013	997	1002	1028	1002
Profiles in rectangle on mound	q014	997	1003	1028	1003
Profiles in rectangle on mound	q015	997	1004	1028	1004
Profiles in rectangle on mound	q016	997	1005	1028	1005
Profiles in rectangle on mound	q017	997	1006	1028	1006
Profiles in rectangle on mound	q018	997	1007	1028	1007
Profiles in rectangle on mound	q019	997	1008	1028	1008
Profiles in rectangle on mound	q020	997	1009	1028	1009
Profiles in rectangle on mound	q021	997	1010	1028	1010
Profiles in rectangle on mound	q022	997	1011	1028	1011
Profiles in rectangle on mound	q023	997	1012	1028	1012
Profiles in rectangle on mound	q024	997	1013	1028	1013
Profiles in rectangle on mound	q025	997	1014	1028	1014

Table B–1: Profiles taken at Big Ground

The profiles were processed using the full version of the RES2DINV software package (version 3.59.16) (Geotomo Software 2010).

Where profiles had been arranged to overlap, RES2DINV was used to concatenate them. Topographical information was used in RES2DINV with each of the four concatenated profiles to obtain better modelling on the slopes of the Mound.

Table B–2 lists the concatenated profiles, with their start (probe zero) and finish points.

Id	Description	Start E	Start N	End E	End N	Effective Probes
q001-002	q001 and q002	980	1010	1024.5	1003	46
1000N	Profile across mound long axis at 1000N (q003 – q007)	955	1000	1042	1000	88
1009E	Profile across mound short axis at 1009E (q008 – q009)	1009	976	1009	1021	46
986E	Profile across mound short axis at 986E (q010 – q011)	986	976	986	1021	46

Table B–2: Concatenated profiles

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