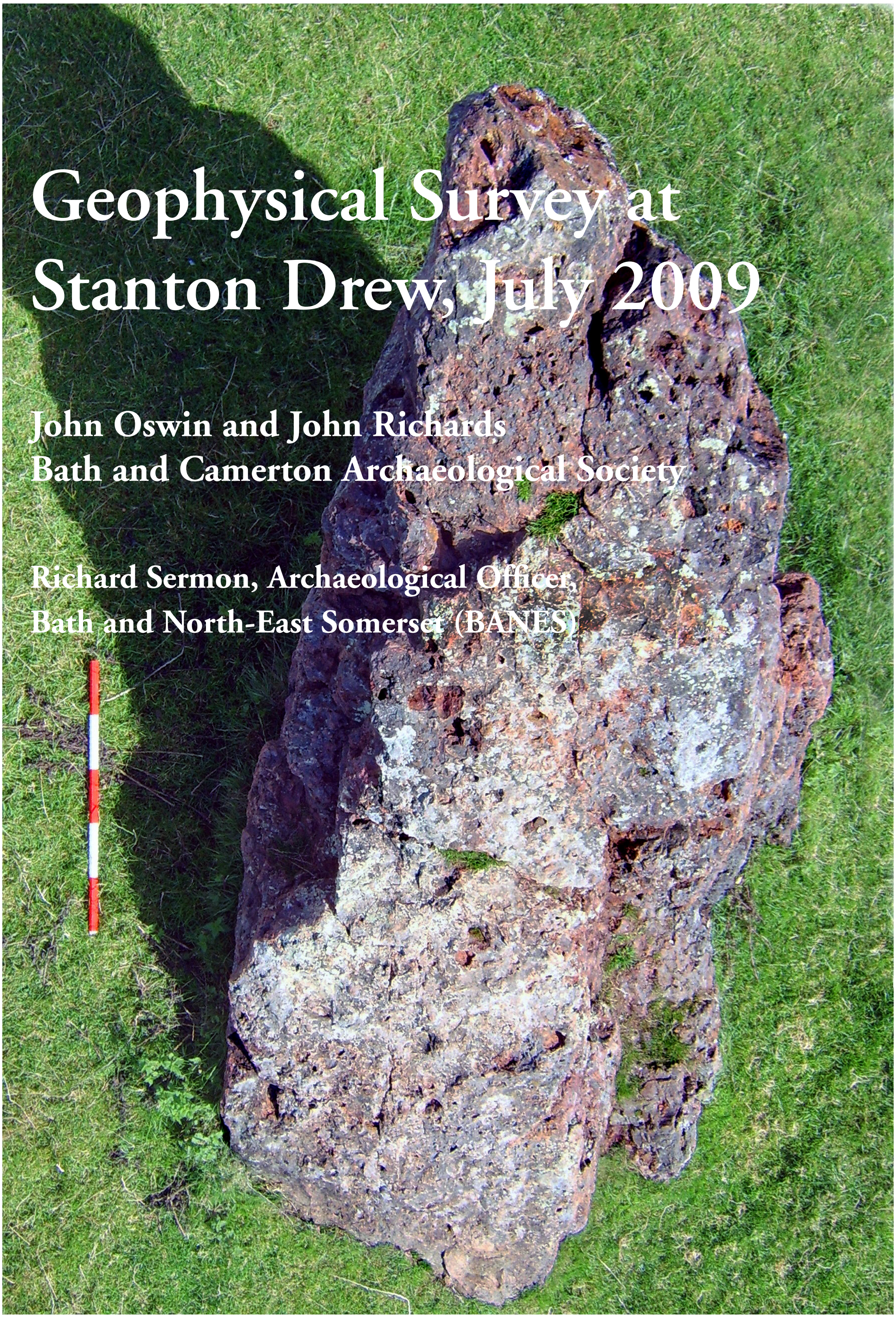
Geophysical Survey at Stanton Drew, July 2009

John Oswin and John Richards
Bath and Camerton Archaeological Society

Richard Sermon, Archaeological Officer,
Bath and North-East Somerset (BANES)



Bath and North-East Somerset (BANES)
www.bathnes.gov.uk
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www.bacas.org.uk

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Report compiled by Jude Harris

Report covers English Heritage section 42 licences:-
SL00000501, SL00000502, SL00000503 (2009)

Abstract

Bath and Camerton Archaeological Society (BACAS), in collaboration with BANES Archaeological Officer, undertook geophysical survey at the stone circles at Stanton Drew, Somerset in July 2009, in the week prior to an open day on the 25th. The survey was limited by time duration, and was intended to enhance the knowledge gained by English Heritage in recent years.

A fluxgate gradiometer survey of a portion of the main circle and an area to its south-west using the most recent fluxgate technology at high density data gathering showed that the ditch and timber circles could be seen as clearly with commercial equipment as with Caesium vapour magnetometry. There was no sign of a further ring ditch to the south west. Twin probe resistance survey of the Main Circle, North-East Circle and avenues gave a clearer pattern of the local geology than had been seen previously and indicated possible empty stone sockets and sites of buried stone. This was enhanced by resistance pseudosection profiles which could give vertical sections through such sockets. Profiles in the South-West Circle showed much stonework under the surface, but soil under that, and the presence of stone beyond the ring. Twin probe resistance, profiling and magnetic susceptibility at the Cove suggested that the two standing and one recumbent stone may originally have been attached to a long barrow which extended to the north. It is recommended that the fluxgate gradiometer survey of the main circle be completed, the resistance survey be extended, particularly by use of profiles, to learn more about potential stone sockets and stone burial, the geology of the locality be better understood, and the Cove explored further by all suitable means to determine whether it is the site of a long barrow, as this would have important implications for the interpretation of the site. Further survey should also extend to the surrounding area, including the sites of the Tyning Stones and Hautville's Quoit.

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Preface

Although I have known the Stanton Drew circles for about half a century, it was early in April 2009 that Richard Sermon 'County Archaeologist' for BANES invited BACAS to become involved in a joint geophysical survey project at Stanton Drew for the BANES Festival of British Archaeology event 2009. Following an initial meeting in Bath with Richard and BACAS chairman Bob Whitaker, we organised a site visit in May to discuss the research objectives and project organisation. Whilst at the Cove Richard suggested that this monument might better be explained as a long barrow, with the upright stones being either the portals or façade of a chambered tomb, which with the known the alignment from the North-East Circle, through the Great Circle to the Cove, would make the it the focus and earliest part of the whole Stanton Drew complex. This was an idea I had also heard Dr George Nash of Bristol University suggest during an earlier field trip to the monument. BACAS now had the opportunity of a week of surveying to provide new material.

Given the short duration and the limited number of helpers available, the research programme was restricted, but we have been able to add to the Stanton Drew story. We discovered that the best work had been published by Dymond in 1896 and the site, despite its size and importance, had been much neglected until a spectacular geophysical survey was carried out in 1997, over a century later (David et al 2004).

This document can only report our geophysics results and interpretation but we hope it will lead to further exploration. We are pleased to acknowledge the recent and continuing work of Dr Jodie Lewis of Worcester University and hope we can continue to work together at this site.

A demonstration of dowsing at the site by Mr Paul Daw in August 2009 was also a benefit to our knowledge.

Thanks are due most, of course, to Mr Richard Young for allowing us on his farmland, to Mr Neil Hare of the Druid's Arms Inn, for his hospitality and enthusiasm and to Richard Sermon, archaeologist for BANES, for inviting BACAS to work on this joint research project, organising access with the landowners, and obtaining the geophysics licences from English Heritage. The geophysics equipment used was that belonging to the BACAS. Some of this equipment was bought through the generosity of its members; for some we are indebted to the Heritage Lottery Fund for purchase grants.

Thanks are due to Bob Whitaker, chairman of BACAS, for his logistic support but most of all to those who actually did the hard work on the ground, in weather less than ideal: John Richards, Jane Oosthuizen, Keith Turner (particularly for overhead photography), John Hare, Jan Dando, Roger Wilkes, Les Hayes, Jenni Craft, Olga Blondel and Gillian Vickery. Thanks also to those who helped on the open day: Owen Dicker, Margaret Nuth and Jude Harris.

Jude Harris compiled this document. Keith Turner, Jane Oosthuizen, and John Richards supplied photographs. Chance of Chippenham supplied figure 5.1. John Richards was principal assistant and co-author, and did much of the desk work.

John Oswin
Geophysics team leader, Bath and Camerton Archaeological Society.

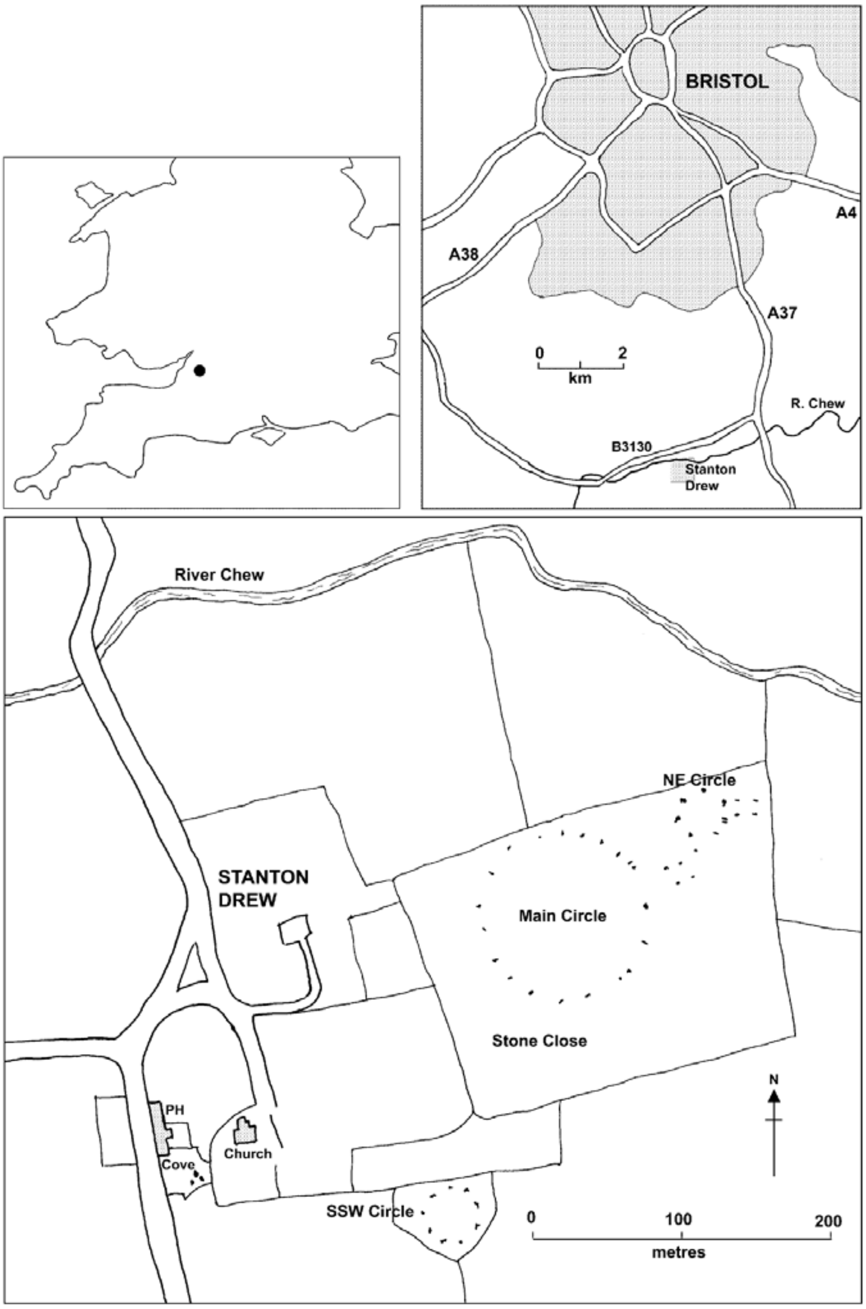

Figure 1.1 **Stanton Drew stone circles - location map**

Figure 1.2 **Stanton Drew seen from Maes Knoll**

1 Introduction

1.1 Location and sites

The village of Stanton Drew lies in northern Somerset, approximately 10 km south of Bristol city centre and approximately 15 km west of Bath, on the south bank of the River Chew. The village comes within the unitary authority of Bath and North East Somerset (BANES). The stone circles lie mainly to the east of the modern village in farmland. Figure 1.1 gives detail of its location.

Figure 1.2 provides a distant view from Maes Knoll hill fort (north of Stanton Drew) and shows the Main and North-East Circles in relation to the village and the church. The Main Circle can also be seen to be sitting on a terrace above the valley of the River Chew.

Within the complex are three stone circles, two avenues, and a 'cove'. There are also outliers, notably Hautville's Quoit. The various parts of the site may be abbreviated in this text, so below are the abbreviations used:

- The principal site is the Main Circle (MC), which has an avenue (AV1) leading eastwards from it.

- Nearby is the North-East Circle (NE), which has an avenue (AV2) leading south-east from it. The two avenues coalesce.

- Geophysics at the Main and North-East Circles, AV1 and AV2 could all be combined into a single site, which we called 'Stone Close' after its historic name.

- In a separate field is the South-South-West Circle (SSW).

- 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, are two stones, the Tyning Stones. The Tyning Stones may have been moved by a previous landowner.

- 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.

The location of these component parts are shown in figure 1.3. This is derived from a plan produced in 1896 by Charles Dymond (1896), a railway surveyor, still the best plan of the complex. Dymond's detailed plan of the stones will be used as the location basis of this report.

Note that the field layout around the stones has changed from time to time and the churchyard has been extended. There has also been ground infill just below the Cove. Changes in field boundaries may affect the description of the site through the various historical accounts.

1.2 Background to work

The work described here was undertaken by members of the Bath and Camerton Archaeological Society (BACAS) in collaboration with BANES Archaeological Officer in July 2009. BACAS had been invited to carry out a geophysical survey project at Stanton Drew, along with public demonstrations and displays, as part of the BANES Festival of British Archaeology event held in the village on Saturday 25th July 2009. However, the majority of the fieldwork work was carried out by BACAS in the week leading up to the event, in order for any provisional results to be presented to the public on the day of the event.

BANES duly obtained section 42 licences SL00000501 for Stone Close (22856), SL00000502 for

SSW Circle (22861) and SL00000503 for the Cove (22862) from English Heritage for such work, based on a draft schedule produced by BACAS. Small amendments were made to the document when it was raised from draft to issue status.

Of the three great stone circle complexes of Wessex, Stanton Drew is the least studied. Whereas Stonehenge had its Gowland, Hawley and Atkinson *(Richards 2004)*, and Avebury had its Alexander Keiller *(Murray 1999),* in the early twentieth century, the stones at Stanton Drew have had no champion to investigate, restore or re-erect them. It was visited by the antiquarians Aubrey *(Aubrey et al 1980)* and Stukeley *(Stukeley 1776)* and the local Reverend John Skinner visited it at least five times in the early nineteenth century. His efforts led to the first detailed plan, produced by Crocker in 1826 for Richard Colt Hoare and included in his 'Modern Wiltshire' *(Hoare 1826)*.

A paper and a better plan in the Archaeological Journal by William Long *(1858)* was the start of a period of interest until the end of the century, with the most useful inputs coming from C. Lloyd Morgan *(1887)* on the origin of the stones and from Charles Dymond *(1896)* in surveying. Dymond's plan of the stones is excellent, and his numbering system for the stones has been used in this work. A copy of his plan is shown in figure 1.3.

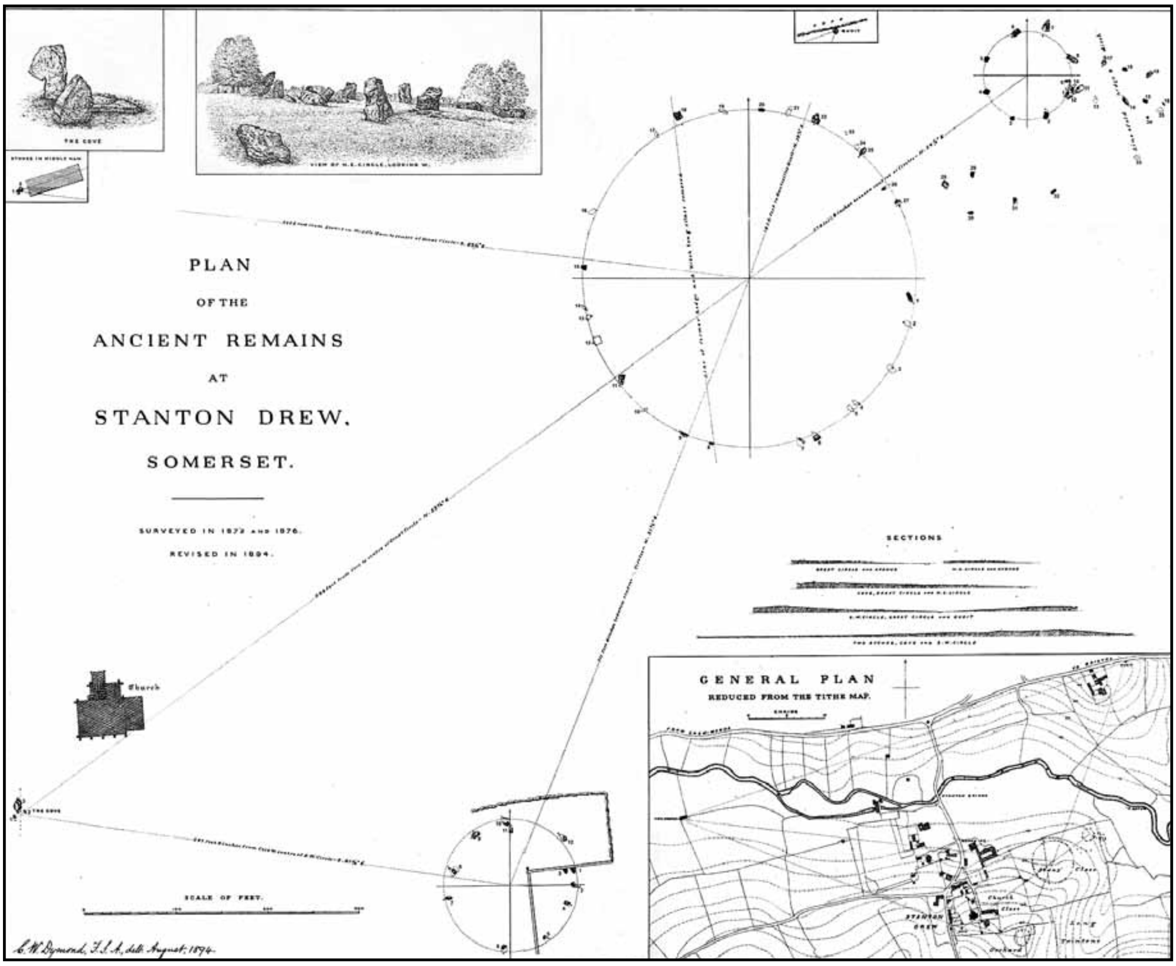

Figure 1.3 **Dymond's plan and stone numbers**

Desultory research was carried out by Grinsell and others *(Grinsell 1956; 1994; Grinsell and Kendal 1958; Tratman 1966)* in the second half of the twentieth century, but interest in the monument was rekindled shortly after Grinsell's death as a result of spectacular geophysical survey results first reported in 1997 and repeated later in more detail by English Heritage *(David et al 2004)*.

The work reported here extends the geophysical survey beyond that of English Heritage by demonstrating the capability of newer instruments to detect and investigate more features than have been studied to date.

Other work has also been done recently by Jodie Lewis of Worcester University *(Lewis 2001; 2005)* but the site still lacks a detailed, thorough and comprehensive analysis to bring to it the knowledge and understanding it deserves.

1.3 Project Objectives

Survey by English Heritage using Caesium vapour magnetometer had shown a clearer view of the rings of postholes in the Main Circle than had been obtained by a fluxgate gradiometer in 1997. Could more recent fluxgate technology produce a view as clear as the Caesium vapour magnetometer?

English Heritage had performed limited twin-probe resistance in Stone Close but this indicated that stone sockets could be detected. Would a full survey of the stones using twin-probe resistance and also pseudosection profiling indicate empty stone sockets and buried stones?

The SSW Circle is different in character from the others and appears almost to be detached from the other circles. Is it a cyst circle? Is there stone work under it? English Heritage surveys were ambiguous as to whether it was surrounded by a wall or a ditch. Could pseudosection profiling resolve this?

During project planning the BACAS-BANES team had discussed the possibility that the Cove might be the remains of a long barrow. Is there any physical evidence which would support this?

1.4 Scope of report

This report limits itself to a description of the areas surveyed, the instruments used and the results obtained by BACAS during the course of one week in July 2009 and comments on how these results affect interpretation of the site.

During the course of the survey, BACAS also took a number of overhead photographs using a camera on a five-metre monopod and digital joining techniques, at the Cove, NE, AV1 and AV2. These will not be reported here except where they add extra detail to the survey. These will be issued separately on digital media more suited to pictures and we hope eventually to form a complete photographic library of the stones.

1.5 Dates

The survey was carried out in 2009 on the following days: Monday 20th July, Tuesday 21st July, Thursday 23rd July and Friday 24th July. Twin-probe resistance survey was also carried out at the Main Circle during the Open Day held on Saturday 25th July.

Overhead photographs of the Cove and a contour survey of the pub garden using an electronic distancing meter (EDM) were done on Friday 19th June. The contour survey was extended into the churchyard on Wednesday 8th July.

1.6 Personnel

The operation was organised by Richard Sermon, archaeologist for BANES.

The geophysical survey was conducted by BACAS volunteers, led by John Oswin, who was assisted by John Richards.

The following joined in the survey for varying times: John Hare, Roger Wilkes, Jan Dando, Jane Oosthuizen, Jenni Craft, Olga Blondel, Les Hayes, Gillian Vickery. We are very grateful for all their efforts.

The overhead photographs and EDM surveys were led by Keith Turner.

This report was prepared by John Oswin and John Richards of BACAS with the support of Richard Sermon, archaeological officer for BANES.

1.7 Constraints

The principal limitation was time. Only four days were available before the Open Day, with working hours nominally 0900 to 1700, and shifts to maintain progress through lunchtimes. First priority was given to keeping twin-probe resistance in motion, with gridding kept ahead of this.

The weather during the survey period was miserable but not enough to curtail the geophysics. Ground conditions were benign although there was a little disruption from young cattle in the early part of the week.

The more specialised techniques had to be sacrificed to ensure that twin-probe resistance could be manned effectively and this limited scope for magnetometry and resistance profiling. The magnetometry was further reduced by operator error in setting up for high density data gathering, and grids from the first day had to be repeated on the second day. Use of half-metre line spacing halved the speed of magnetometry.

The grid lines were assumed to be good once right angles had been set up. Where errors were found, they were corrected before surveying. Errors could be caused by slope, obscured sightline and obstructions to the tapes. However, once an error starts, its effects tend to build as more grids are added, so errors tend to be greatest at the end of the survey.

The use of very high density data collection on the magnetometer (8 readings per metre, lines at half metre spacing) assumed the operator started perfectly, walked very precisely to markers, and at an exact pace. In practice, this was not perfect but sufficiently good for the results to be valid.

Higher contrast can be seen on the computer screen than can be recorded on the printed sheet so features referred to in text may not be obvious to the observer of a figure.

2 Method

2.1 Numbering of Stones

The numbering scheme used for the stones is based on that in Dymond's plan *(Dymond 1896)*. Dymond numbered the stones in four sequences:

- Main Circle and Avenue: 1–35
- North-East Circle and Avenue: 1–19
- SSW Circle: 1–12
- Cove: 1–3

For uniqueness, we have added a prefix to each number, M, N, S and C. So M29 is Dymond's stone 29 in the avenue of the Main Circle.

2.2 Gridding

BACAS used its normal twenty-metre grid squares, whereas English Heritage had used thirty-metre grid squares. This meant that the data sets would be incompatible for raw data comparisons, but final results may be compared without difficulty.

Figure 2.1 **Marker by fence post where grid started. A line was created perpendicular to the fence.**

The grid was started from the south-east corner of a distinctive fence post with support struts on the northern side of the Stone Close field roughly in line with the east side of the Main Circle (figure 2.1). The grid was laid out along a baseline running east-west along the fence. A right angle was constructed from this to the south using a triangle of sides 40, 40, 56.56, assuming the fence line to be straight over this distance to the west. The right angle was checked at 20 m and was found to be accurate. The south line was extended by eye further south to 80 m. A central point, 80 m south of the start point, was chosen and given an arbitrary grid reference of 1000, 1000. The post in the north fence was labelled 1000, 1080. This resulted in a line of grid north at bearing 345° to compass north. A right angle was constructed at 1000, 1000 to form an east-west line. All subsequent grids were derived from these lines.

In order to provide a further reference, measurements were taken from 1000, 1000 to corners of two stones. The distance to stone M1 was 5.75 m and to stone M30 was 27.45 m. The construction is shown in figure 2.2 and the corners of the two stones are shown in figures 2.3 and 2.4. The grid is shown in figure 2.5, superimposed on Dymond's *(1896)* plan which was found to be very accurate.

The first grids were set up to the east of line 1000, allowing four rows of four grids plus a partial grid to the eastern fence. This covered the area up to the northern fence and encompassed all of the avenue stones and the NE Circle. This was the top priority with twin-probe resistance and was completed before extending resistance grids to the west. In the meantime, grids had been set out from the centre of the Main Circle to survey the south-east quadrant of this with magnetometer. Magnetometer grids were then extended south-west, almost to the gate to the SSW Circle to look for features outside the Circle. A number of magnetometer grids were also later surveyed with twin-probe resistance and the grid was extended around the circumference of the Main Circle to

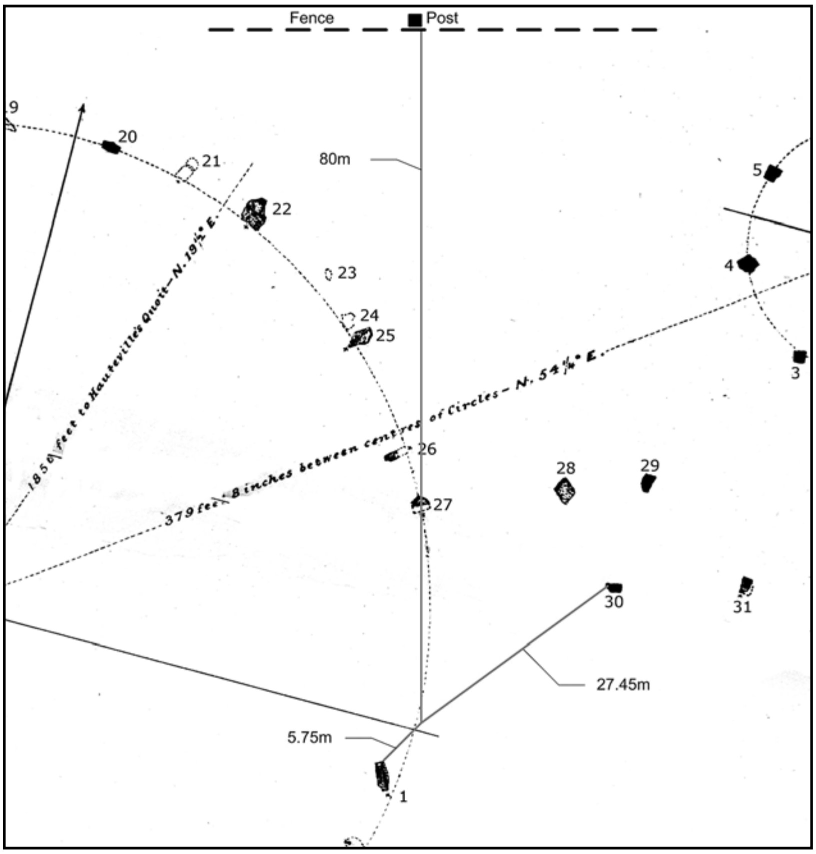

Figure 2.2 **Reconstruction details of the 2009 grid using Dymond's plan**

Figure 2.3 **Measuring in point 1000, 1000 to stone M1**

Figure 2.4 **Measuring in point 1000, 1000 to stone M30**

complete a circuit. Time did not permit twin-probe resistance survey inside this ring.

The grids are shown relative to the stones on an overlay of Dymond's plan in figure 2.6. These are for twin-probe resistance, magnetometer and magnetic susceptibility.

The BACAS standard grid is 20 m square. Normally it starts in the south-west corner with the instrument heading north. Resistance measurements are taken at half metre intervals on lines one metre apart. North and south baselines are made from coloured polypropylene 'washing' lines with markings every metre. Marked ropes are used to guide measurements. The operator walks north along a rope and back south between ropes. The first line is 1m east of the grid corner, the last line is between grid corners. The first measurement point is 0.5 m north of the south baseline, the last is on the north baseline. That way all grids fit together without overlap.

For magnetometry, the same grid pattern is used, but the ropes are replaced by small 'flags' placed on the north baseline, five per grid, and tall plastic pegs on the south baseline. The operator has to

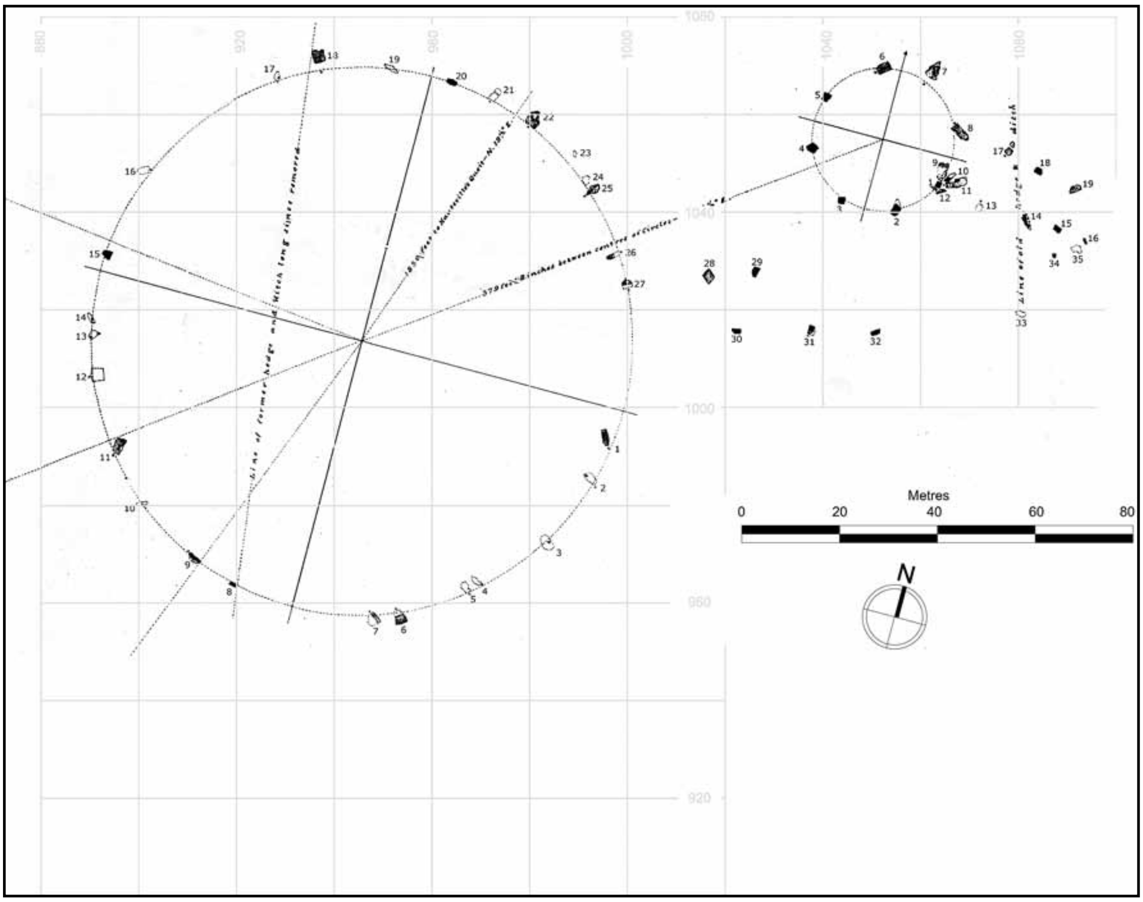

Figure 2.5 **Overlay of 2009 grid on Dymond's plan**

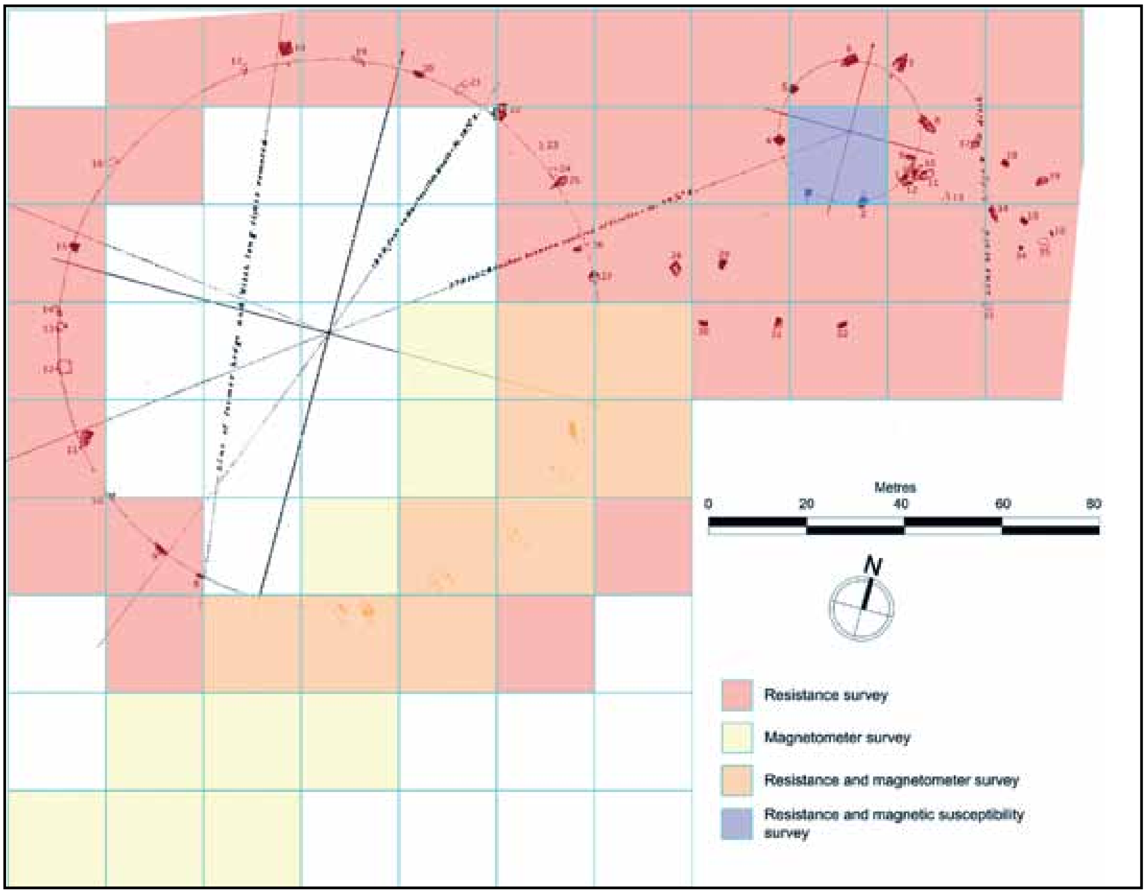

Figure 2.6 **Overlay of resistance, magnetometer and magsus grids on Dymond's plan**

set his pace right to cover the distance in the right time. Heading north, he aims either at a flag or the gap between them, and south 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.

Only one formal grid of magnetic susceptibility (magsus) was done in Stone Close. 21 lines (0 to 20) were done at 1 metre intervals (0 to 20) as there would be no overlap to consider. This grid was in the centre of the NE Circle.

Four profiles were taken in Stone Close using resistance pseudosections. The first was an east-west line in AV2, the second and third were adjacent north-south lines on the Main Circle and the fourth was a nearby east-west line. Each profile used 22 probes at 1 metre spacing, giving a line 21 m long. Coordinates of these lines are given in table 2.1.

Gridding of the Cove will be described in the chapter devoted to that site.

Profile	Start X	Start Y	End X	End Y
#5 (NE1)	1080.4	1037.5	1060	1042.5
#6 (MC1)	1001	994	1001	1015
#7 (MC2)	1002	994	1002	1015
#8 (MC3)	991	991.18	1011.9	993.2

Table 2.1. **Coordinates of resistance pseudosection profiles.**

2.3 Instruments and settings

2.3.1 RM15 twin probe resistance meter

The RM15-D twin probe resistance meter was bought by BACAS with assistance from the Heritage Lottery Fund in 2008. It was set for taking readings at 0.5 metre intervals, 1 metre lines, zigzag, automatic triggering, 0.5 s averaging. It was set to 1 mA, gain 10, to allow readings above 200 ohm. It was fitted with its transom for 0.5m probe separation.

2.3.2 TR/CIA resistance meter and profiler

BACAS has had a TR/CIA twin probe resistance meter since 2003. It was set to 40 readings per line, 20 lines, triggering 'on insert+LCR', 0.5 s averaging. It was only used in this mode at the Cove. Although a zigzag pattern was walked, its data logger automatically sorted to series data.

In 2008, BACAS obtained a resistance pseudosection profiling set from TR to augment this kit. This allowed a line of 22 probes set up in Wenner mode. BACAS has built its own distribution box to allow selection of appropriate probes. Probes can be selected with 0, 1, 2, 3, 4 and 5 gaps between. With 1 metre spacing used at SSW and Stone Close, this allowed a line of 21 m with spacings of 1, 2, 3, 4, 5 and 6 m, giving depths to 3 m at mid section. The device was set to manual logging, 2.5 s averaging, 200 ohm range for profiling operations.

2.3.3 Bartington 601/2 twin fluxgate gradiometer

BACAS acquired a Bartington 601/2 dual fluxgate gradiometer with assistance from the Heritage Lottery Fund in 2008. This was set to provide 8 readings per traverse, traverses at 0.5 metre intervals, operating pace a sedate 1m/s.

A zigzag pattern was walked, but the data logger automatically sorted to series data.

Different settings were used at the Cove. These will be described in the appropriate chapter.

2.3.4 Bartington MS2 magnetic susceptibility meter

The Bartington MS2 magnetic susceptibility meter was donated to BACAS by Professor Mark Noel of Geoquest Associates in 2009. It is a venerable machine with no data logging capability, so all results had to be written on a clipboard and typed into a spreadsheet for analysis.

It was used randomly in the Main Circle but a formal grid of 21 lines of 21 points 1 metre spacing was recorded in the NE Circle using 2 baselines and a 20 metre tape to mark measurement points. It was also used at the Cove, where measurements were taken at 0.5 metre intervals on lines of 1 m spacing.

Results are quoted as integer numbers, but are in SI units of 10^8 m^3/kg

2.3.5 EDM
BACAS acquired a used Wild Distomat 1600 laser theodolite in 2005. It is of 1980's vintage and has no data logging, so results had to be written on a clipboard and typed into a spreadsheet for analysis. It provides easting, northing and height to a precision of 1mm. Height OD was obtained from a benchmark on the east wall of the chancel of the church. That benchmark is given slightly different values on the 1886 and 1934 Ordnance Survey 6" maps, and the value used in this work was taken from the 2nd edition, 1934 map. This was 171.95 ft, taken to be 52.4 m.

The EDM was only used at the Cove, both in the pub garden and in the churchyard.

2.3.6 Software
BACAS has two field computers. These are of some age in order to have serial and parallel ports as well as USB connection. One (HP) runs Windows 98, the other (IBM), Windows 2000 Professional. Data were downloaded from each instrument into both computers.

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

It is the custom for BACAS to display printouts of resistance with dark representing high resistance, light low resistance. This is the opposite of English Heritage. In the Stone Close cases, it helped to introduce colour so that one can clearly see the difference between low readings and blank spots where the stones are. This helps to identify stone pits. When applying colour, the BACAS standard is to use 'red for resi, green for gradi'.

The downloader will communicate with Geoscan RM15 resistance, Geoscan FM256 magnetometer and TR/CIA resistance. It will allow any size of grid. The TR/CIA resistance own software is used for downloading pseudosection profiles from the meter, and these are then processed on RES2DINV freeware. The Bartington magnetometer has its own download software which leaves data sorted to parallel lines.

BACAS has devised its own zero-median de-stripe software which will accept downloaded files from the Bartington or from Geoscan FM256 (BACAS has a FM256 but it was not used in this project). 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 magsus are transcribed into an Excel spreadsheet. If the pattern is regular, contour plots can be drawn in Excel. If spacings are irregular, DPlot 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.

3 Stone Close

3.1 Twin Probe resistance

As found by the English Heritage team *(David et al 2004)*, the resistivity results in Stone Close were 'rather noisy'. However, there were some anomalies of interest in the results, which are shown in figure 3.1 and an interpretation is given in figure 3.2. In the following, the numbers in parentheses correspond to the circled numbers in figure 3.2.

Some stones have an area of low resistance completely or partially surrounding them (1). These areas are between one and three m in width. The anomalies could represent the remnants of pits dug to contain or erect the stones. They could also represent demolition pits, as there are records from the seventeenth and eighteenth centuries of farmers attempting to break up and bury stones. Alternatively, they could be caused by the action of cattle or sheep sheltering next to the stones.

Other low resistance patches which may represent the pits associated with stones now missing are listed below in table 3.1. Eastings and northings relate to grid north. However, that at 995, 1002 may be associated with a later ditch cutting through the circle. That at 1010, 1018 would appear to block the avenue as it approaches the Main Circle. Those listed below suggest that the Main Circle avenue may once have had an extended north side, possibly demolished early to fit in the NE Circle. These need investigating further, as they have significant impact on the interpretation of the monument.

Easting	**Northing**	**Associated with:**
916	1061	Main Circle
903	1058	Main Circle
894	982	Main Circle
995	1002	Main Circle
996	1015	Main Circle
996	1038	Main Circle
1010	1018	MC avenue?
1025	1033	MC avenue
1040	1033	MC avenue
1053	1033	MC avenue
1065	1035	MC avenue
1077	1032	NE avenue
1065	1017	MC avenue (south)

Table 3.1. **Positions of possible missing stones, as indicated by patches of low resistance.**

In one case there is a stone, N13, which lies flush with the surface (3). This appears as an area of high resistance, surrounded by an area of lower resistance.

A curved area of high resistance about five m wide and sixty m long on the southern side of the Main Circle, just outside the stones, coincides with the magnetic anomaly found by the English Heritage team and interpreted as an external ditch (4). A ditch would be expected to be low resistance, but a high resistance result matches that obtained in the SSW Circle by English Heritage, where a high resistance anomaly also appeared in the position that would be expected for a ditch. There are also indications of the ditch appearing as a low resistance signal to the east and north-east of the Main Circle.

A low resistance anomaly appears on the south west side of the Main Circle, in a line about two to five m wide running north-south (5). This coincides with a positive magnetic anomaly found by English Heritage which runs in a straight line to the edge of the field. It also coincides exactly with the line of an old hedge and ditch marked on Dymond's (1896) plan.

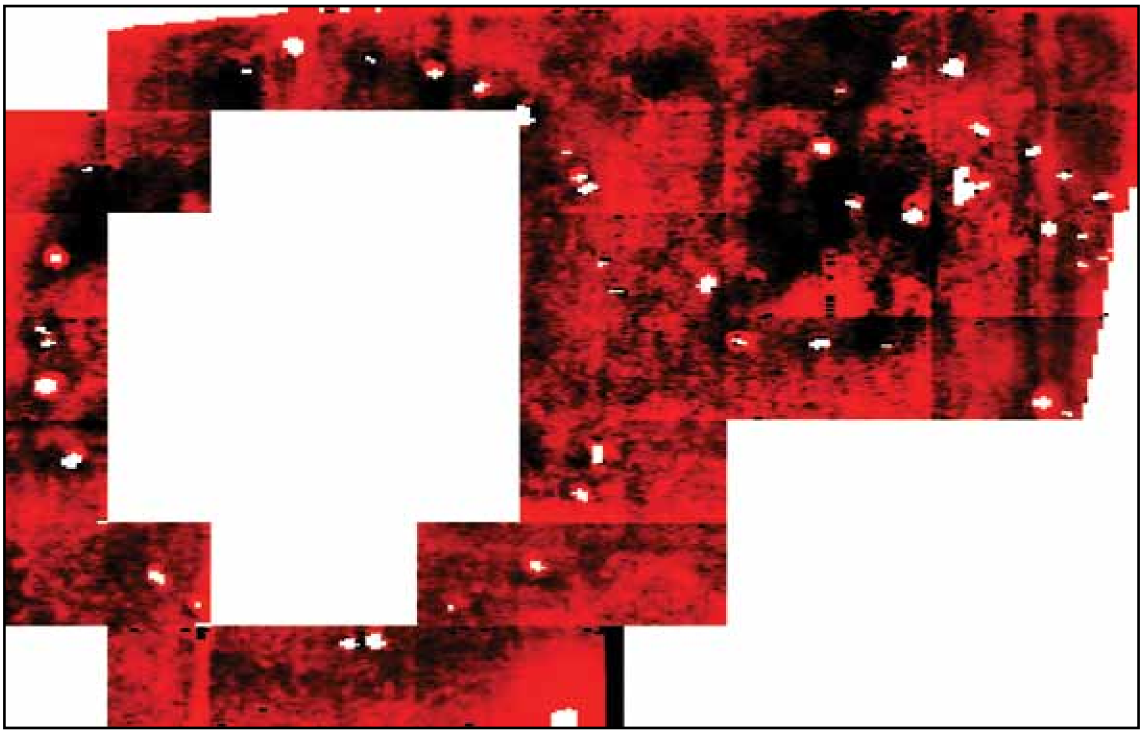

Figure 3.1 **Twin probe resistance plot of Stone Close**

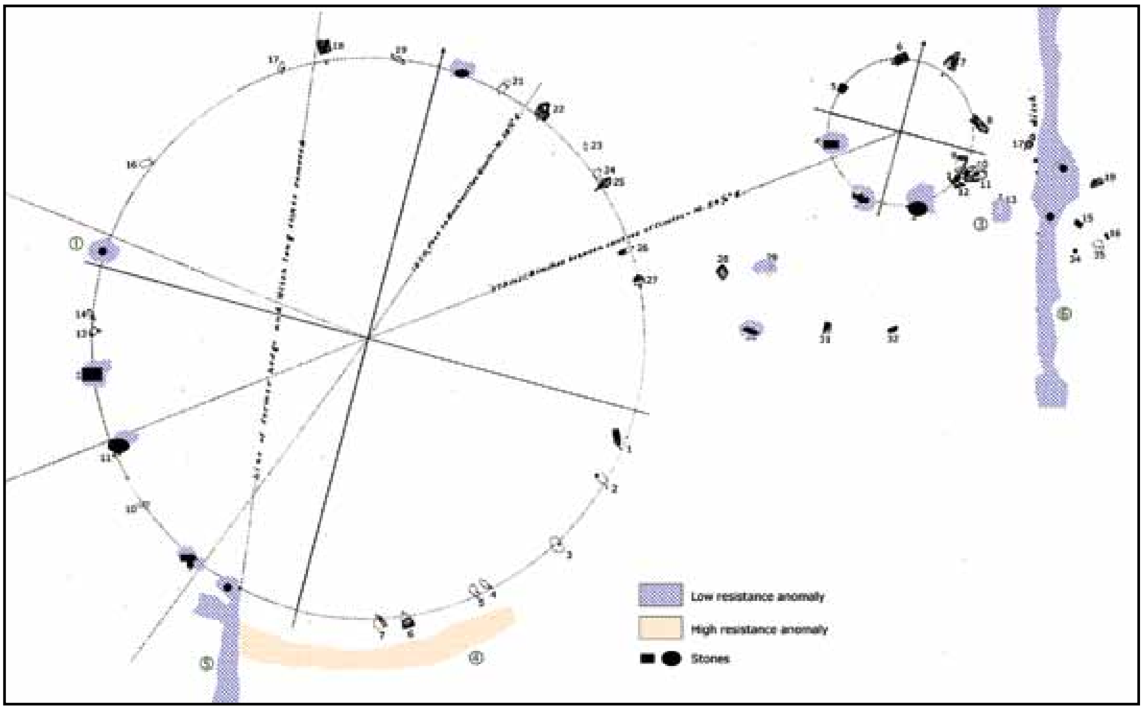

Figure 3.2 **Interpretation of resistance results in Stone Close**

Figure 3.3 Positioning of the probes around the stone N13 almost buried in the NE avenue.

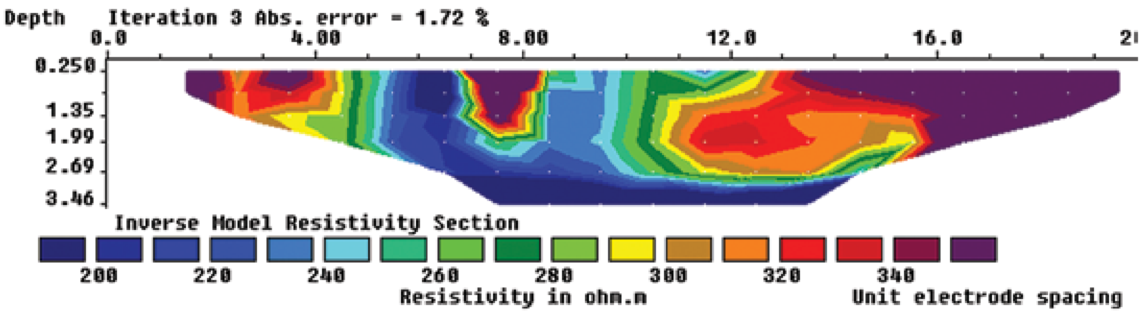

Figure 3.4 Pseudosection profile at stone N13

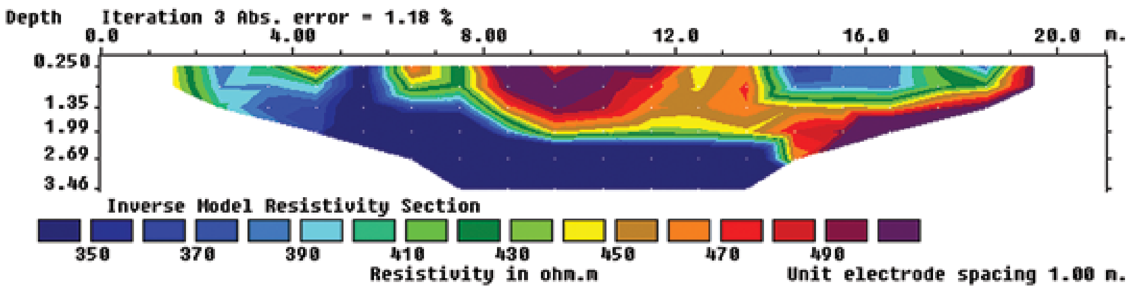

Figure 3.5 Pseudosection profile #6, near stone M1

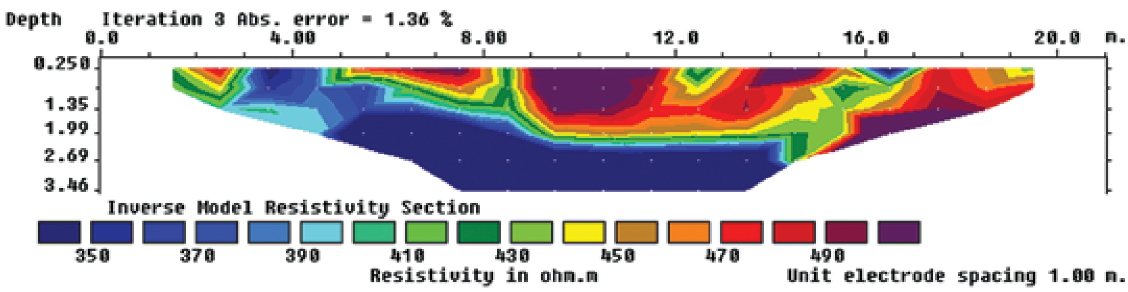

Figure 3.6 Pseudosection profile #7, 1 m east of #6.

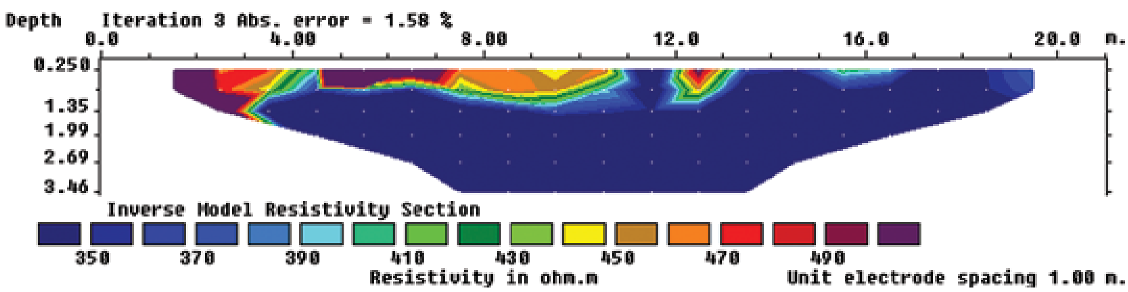

Figure 3.7 Pseudosection profile #8, south of #6 and #7.

Overlaying the pattern of the stones, as indicated by the blanks in figure 3.1, indicates that Dymond's plan was very accurately drawn and is still the best plan of the stones.

'Normal' resistance readings were typically 140 ohms, rising to 180. Values tailed off markedly in the far eastern corner, beyond the NE Circle, falling below 100 around the old field boundary. It appears that the NE Circle is perched on the edge of the terrace before the land falls away into the river valley. The terrace forms an uneven band geologically, as seen in figure 3.1, with irregular patches of denser and less dense underlying stone. These can however be distinguished from any more regular patterns from archaeology. It would be a benefit to know more about the underlying geology of this terrace, and this could provide more information on how the stones were positioned and pulled upright.

Time did not permit measurement of the grids entirely within the Main Circle. Higher priority was given to making measurements around the entire ring.

3.2 Resistance profiling

Profile #5 (NE1) was set up to investigate stone N13, which lies flush with the surface. The line of probes was positioned so that two of the probes (at the 7 and 8 metre positions) straddled the stone at its southern end (see figure 3.3) with the zero point at the eastern end of the line. The profile (see figure 3.4) was very successful in showing the stone at the 7 to 8 metre position with a depth of nearly two m. The stone is surrounded by a large area of low resistance over 6 m wide and extending to the bottom of the profile that could represent a demolition pit. There is an area of high resistance from 1.5 m through to 4.5 m, possibly the natural underlying geology. This could also account for the large area of high resistance from 12.5 m at the surface through to 19.5 m. The high resistance from 3 m to 4 m resembles a stone, but there is no stone visible, previously known or suspected at this location. There is also a possible buried stone between 11 and 14 m at a depth of 1 to 2.5 m.

Profile #6 (MC1; figure 3.5) was positioned to attempt to locate the southernmost of two buried stones in the Main Circle located by Grinsell and Kendal *(1958)*, though both stones were later rejected as illusory by Tratman *(1966)*. An area of high resistance extends from the 8 metre to 12 metre mark, which could represent a stone from near the ground surface to up to two m deep. There is also an area of low resistance from 14 m to 19 m and extending to a depth of 1.35 m. It is tempting to interpret this as a stone socket next to its fallen stone, but it seems unlikely that a stone of such size (4 m long) could lie so close to the surface without its existence being known and confirmed.

Profile #7 (MC2; figure 3.6) was parallel to #6, one metre eastwards, to provide additional information on any features detected in #6. The high resistance anomaly continues, but slightly narrower. The low resistance anomaly has narrowed considerably, but is possibly partly occupied by a stone. In both profiles there is a low resistance area sloping down from the surface at the 5 or 6 metre mark, and running along at a depth of 2 m until the 14 m mark.

Profile #8 (MC3; figure 3.7) was positioned across the end of stone M1, from 5 to 5.8 m (see figure 3.8), across an area where rough grass suggested a possible buried stone, and across the area, from 12 m onwards, where magnetometry suggested the presence of the circle's external ditch. The stone M1 appears at the correct place in the calculated apparent resistivity pseudosection, but becomes a larger feature, from 4.5 to 7.5 m, in the inverse model. There is no sign of any "ditch", but it later transpired that there was more evidence in the resistivity for this feature to the southern edge of the circle; it may be worth trying more profiles in this sector.

3.3 Magnetometer

The prime aim of magnetometry was to find if modern fluxgate technology could detect features associated with the Main Circle as well as English Heritage could with Caesium vapour magnetometer techniques. A secondary aim was to look for any signs of confirmation of a faint circular anomaly visible in the full fluxgate survey between the Main Circle and the SSW Circle.

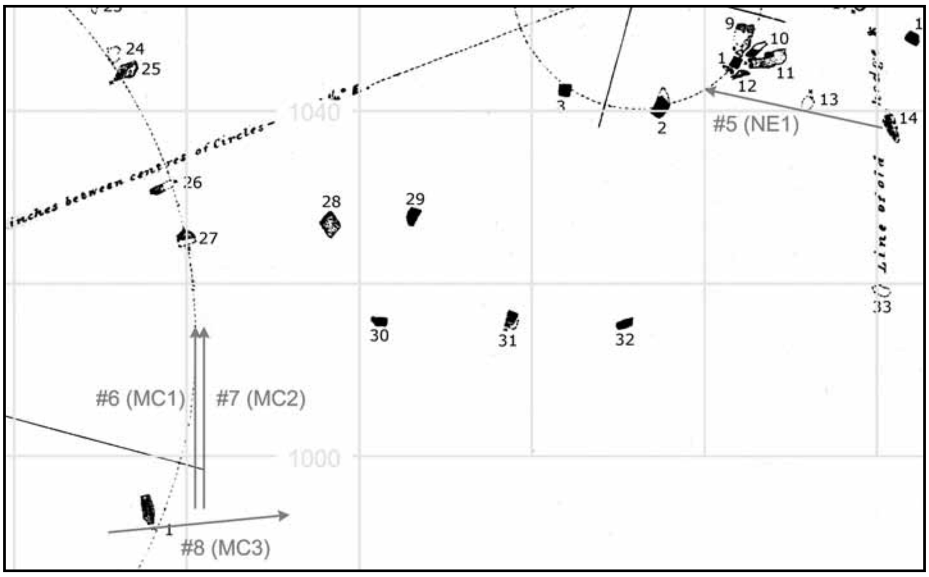

Figure 3.8 **Positions of profiles #5, #6, #7, and #8**

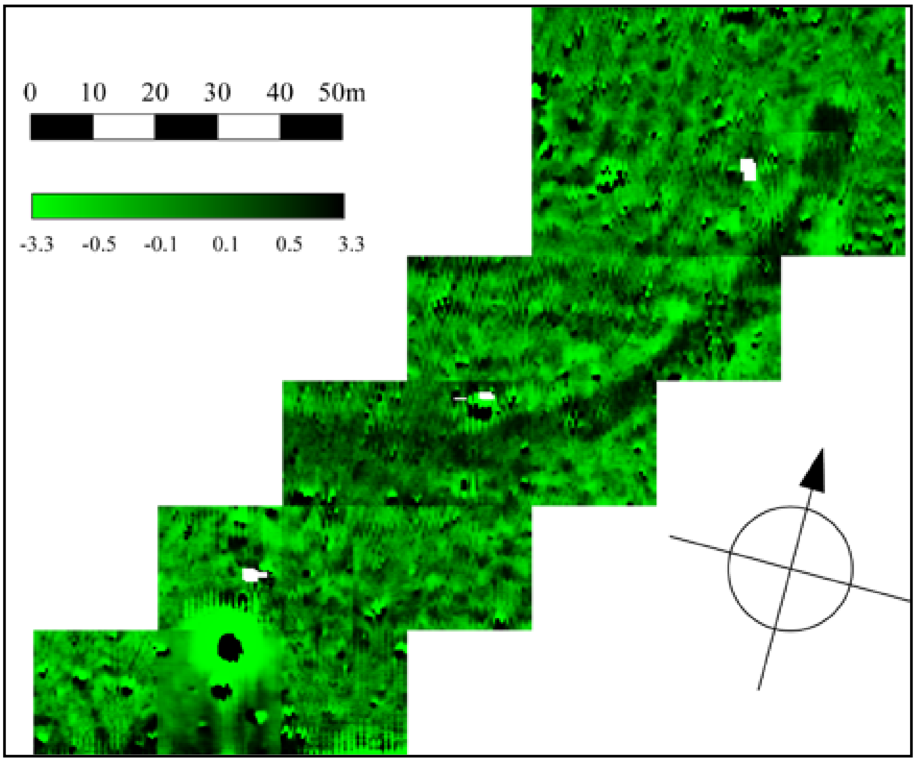

Figure 3.9 **Magnetometer plot of main circle**

Magnetic data were recorded at very high density in order to increase the chances of a detailed picture. The sampling was therefore set at 8 readings per metre, while walking at 1m/s, with lines at 0.5 m intervals, giving 6400 data points per 20 m square. The need for 20 traverses per square halved the rate of progress compared to normal magnetometry. It also required a different marking out and walking strategy. This was set wrongly on the first day, so the first 9 grids were corrupted and had to be re-worked. This limited the total number of 20 m grids completed to 18, there being only one day, with poor weather conditions, in which to obtain results.

Interest in the area between the Main Circle and SSW Circle meant that the limited area surveyed had to be in the southern portion of the ring, where the post hole circles were already known to have been masked by later earthworks. However, sufficient area was covered to test the aims of the study.

The results are seen in figure 3.9. This has been coloured green so that it is easy to distinguish between areas of negative response, indicated by pale green, and areas where dummy readings have been inserted, for instance when a traverse is blocked by a stone. Values of anomalies were typically between -3 and + 3 nT, except for the large iron signal in the southernmost row.

The concentric rings of post holes are clearly visible as dark dots in the top two lines of the response. By the third row, later earthworks tend to obscure the post circles. The outer ditch shows very clearly, as does its termination on the east of the ring. The survey did not extend far enough north to find the re-commencement of the ditch.

Just within the ditch, on the circumference of the stones are a series of patches of negative anomaly typically 4 m across, up to three per 20 m length. These are previously unrecorded except possibly by dowsing. These appear to continue through the area disrupted by later earthworks although the evidence is less clear.

The survey area continued up the slope to the south, with its south-west corner just 10 m north-east of the kissing gate through to the SSW Circle. There is a faint sign of a circular feature centred just east of the dead tree (the area of blanks in row 5), almost touching the Main Circle ditch just west of its southernmost point. Although it might be partly masked by the large iron signal, there is no clear evidence of any circular ditch, and some should have been visible in the area surveyed.

The prime aim of the survey has been met very successfully, in that the post hole rings and the outer ditch have been shown very clearly, at least as well as by Caesium vapour magnetometer. The survey has additionally indicated the possibility of other pits in the line of the stone ring, but these are of a different nature, having negative magnetic polarity.

There is still a slight possibility of there being a ring ditch between the Main Circle and SSW, but the evidence produced here is not good enough to support it.

The area covered was rather small, as a result of limited man hours, but the results were good, and it is recommended that the survey be extended to cover the Main Circle and a substantial area around it when time permits.

3.4 Magnetic Susceptibility

The first use of magnetic susceptibility (magsus) was an informal random walk in the Main Circle to see if it could detect any signs of the postholes by a change in reading. Some tens of readings were tried, but changes of reading were only obtained on the line of a much later ditch which crosses the circle.

The second use was in the NE Circle, where baselines were laid to twin-probe resistance grid 13 (see figures A1 and 2.6) and a 20 m tape laid between them and moved at 1 m intervals. With lines from 0 to 20 in each direction, this gave 21 by 21 points.

The results are shown in figure 3.10 and were initially disappointing. However, extra measurements around one high reading showed that a metre sampling interval could miss a patch of high readings, and would not be adequate for detecting any postholes.

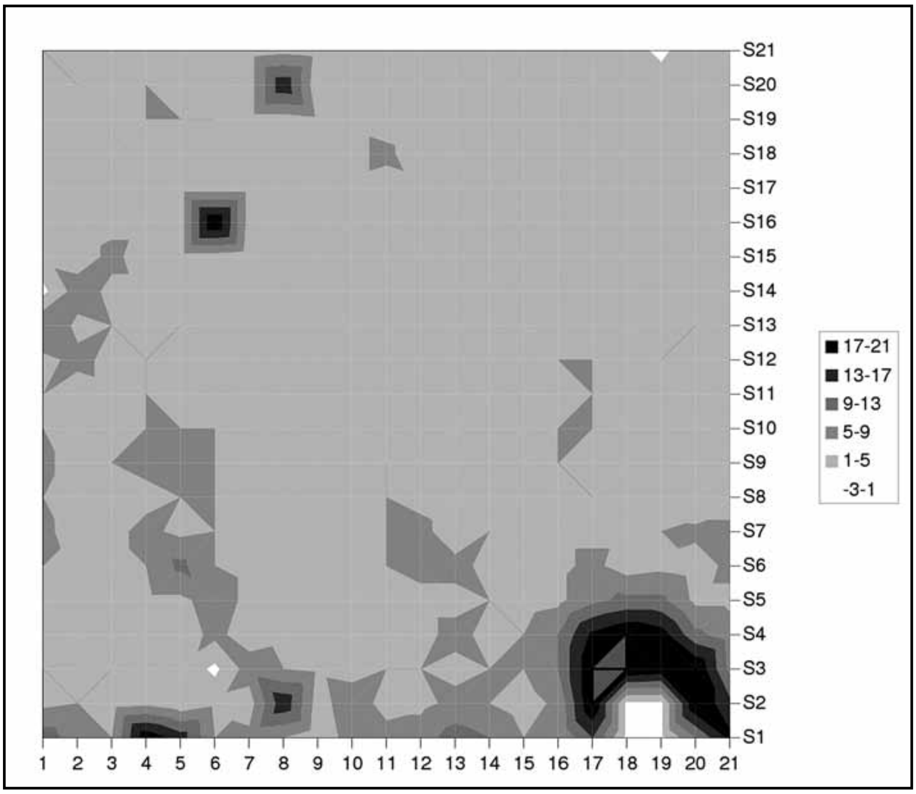

Figure 3.10 **Magnetic susceptibility plot of resistance grid 13**

High readings were obtained over areas immediately next to stones, suggesting that magsus could be used easily to delimit stone pits, although this would not necessarily indicate whether these were the original cuts or whether these were mediaeval enlarged pits to topple the stones. It is also possible that the magnetic enhancement is caused by animals when they shelter by the stones. In this case, buried stones may not give a signal.

Where there are buried or missing stones, the site needs to be established by resistance, both twin probe and profile, as shown in sections 3.1 and 3.2 above, and then probed with magsus to see if this can also detect the site. If this is successful, then further study and mapping of any of the stones would benefit from a detailed magsus survey around each stone, for, say 6 mm by 6 m at 0.5 m intervals.

3.5 The South-South-West Circle

The SSW Circle was not subject to any formal gridding. Both twin-probe resistance and magnetometry had been completed by English Heritage. However, there was ambiguity from those results as to whether the Circle was surrounded by stones or by a ditch. This project therefore limited itself to taking resistance pseudosection profiles across the Circle, extending into the space beyond the Circle up to the hedges. It was also hoped that the profiles would shed some light on the nature of the circle by picking out stone features beneath the soil in its centre. The SSW Circle is different in nature from the circles in Stone Close and almost seems to point away from them to the south. It also occupies the highest point of land around the circles. The possibility was considered that it might be a cyst circle.

Two transects were laid out, each starting on the ring edge at the south or south-east, and extending through the centre of the circle to beyond the circumference of the circle opposite, to the hedge.

Our kit allowed profiles of only 21m each and time was limited to one morning. Two profiles were done on each transect with an overlap of 1 m, total length 41 m. This meant starting a profile well within the ring to encompass the centre and overlapping a second profile which continued through the circumference, and for sufficient distance to detect any stone ring or ditch beyond the circle. Note that these were profiles #1 to #4 in the sequence for the whole site.

The transects are shown in figure 3.11. The first was approximately SE-NW, compass bearing 294. zero metres was on the circle circumference, with the first transect starting at 8 m and continuing to 49 m. It crossed the second transect at 18.5 m.

The second transect was approximately S-N, compass bearing 4. The second transect started at 6 m and continued to 47 m. It crossed the first transect at 20m. Figure 3.12 shows the north transect under survey.

Figure 3.13 shows the SE-NW transect. Note that distance starts from the first probe, and the second profile has been overlaid to show the overall picture. The positions of the stone ring and centre are

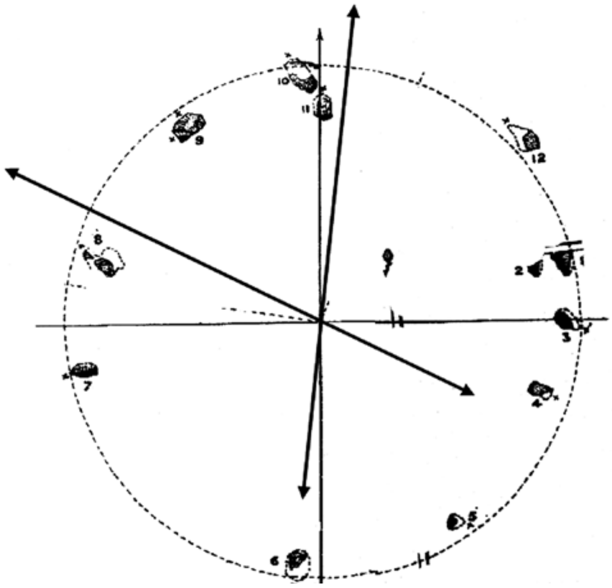

Figure 3.11 **The transects across the SSW circle, based on Dymond's plan. Each transect is 40m.**

indicated. Note that although the probes overlapped one metre, there is a gap between profiles.

There appears to be stone starting 5 m SE of the centre. The density of stone increases to the NW, particularly from 10 m NW of the centre. The strong stone signals continue some 6m beyond the stone ring. There is a possible indication of a ditch 4 m beyond the ring, but it appears to be very stony.

Figure 3.14 shows the S-N transect. Again, distances are measured from first probe position and two profiles are overlaid, with the stone ring positions indicated. There are signs of stone at the centre, but it is more dense 2 m either side. There appear to be more stones below the surface to the north of the centre and very dense stone from the ring northward. No signs of a ditch were detected.

The profiles suggest that there is earth, or some low-resistance material, continuing to some depth below the surface, with stone recorded just below the surface only. There is stone within the circle, and also extending beyond the circle to the north and north-west.

The results do not give a clear cut picture but suggest that there could be more stones below the surface, particularly to the north of centre, and there may be some structure below the centre. If the ring has a ditch, it is stone-filled. A fuller survey doing a number of parallel profiles at 0.5 m probe

Figure 3.12 **Profiling the north transect**

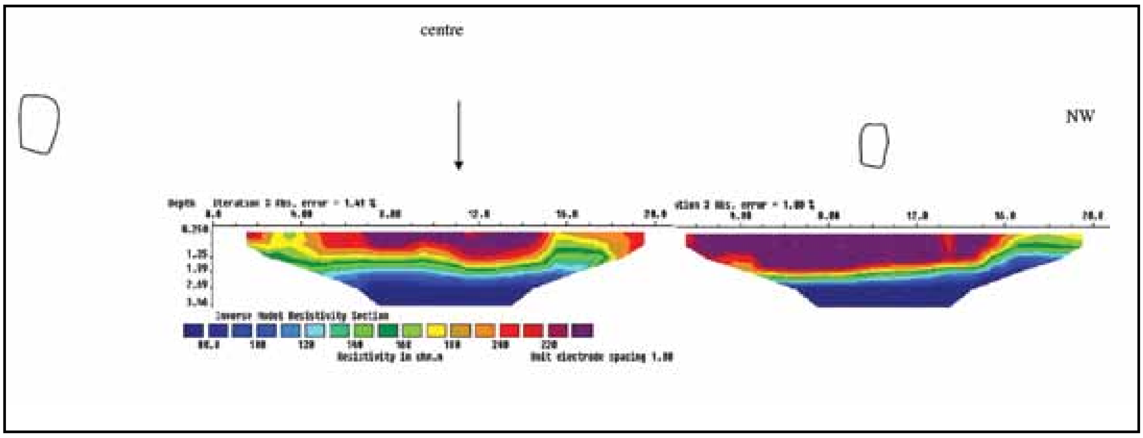

Figure 3.13 **North-west transect**

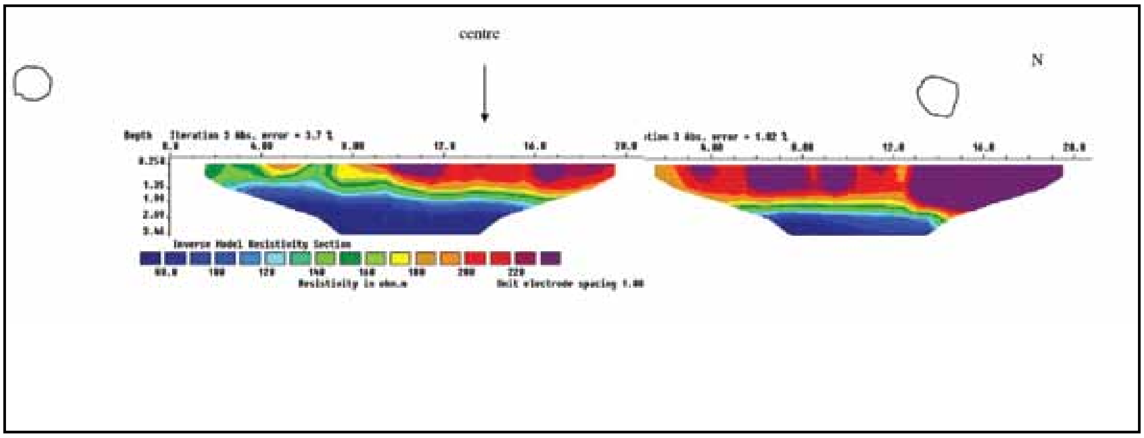

Figure 3.14 **North transect**

separation and forming depth slices is possible, but would be very time-consuming. Certainly, a more systematic survey of this circle would give a clearer understanding, but that will require more time than the one morning spent here during this survey.

3.6 Comment

The magnetometer survey added little new archaeological information to Stone Close, but demonstrated that high quality results, as good as those by English Heritage with a Caesium vapour magnetometer, could be obtained with a modern commercial fluxgate device collecting data at high density. In that aim, the exercise was entirely successful. It would be worth completing the circuit of the Main Circle at least in this mode, and extending the survey to the south-west to look for signs of further activity. There have been suggestions of an avenue extending south-west in the direction of the Cove and it would be a benefit either to substantiate or dispel this suggestion.

Magnetic susceptibility (magsus) has shown that it can produce useful results if plots are made at high enough density, and it is a useful tool for exploring possible empty stone sockets.

The principal gains have been made by using resistance techniques. Small areas were covered by English Heritage, but insufficient to provide useful patterns for interpretation. The ability to do profiles adds greatly to the potential for gaining new knowledge. In particular, possible empty stone sockets can be explored, and from their size it may be possible to say whether they were never filled or whether they have been deliberately expanded for destructive or burial intent. Now that the resistance survey of the ring is complete, along with the avenues and NE Circle, a series of profiles could be positioned with precision to investigate these possible sockets. It could also be beneficial to complete the survey inside the ring and extend the survey area to the south-west in search of further Neolithic activity. Increasing the area of survey may also give a better understanding of the underlying geology, and this in turn could provide better insight into the original construction of the monument.

It would also be a big benefit to do test pits on the terrace, not necessarily within the circles, in order to understand better the underlying geology. This would make both the twin-probe and profile resistance plots easier to interpret and would also benefit the general understanding of the site. However, this would need a separate licence, and would need to be a well-controlled activity.

Figure 4.1 **North end of cove grid**

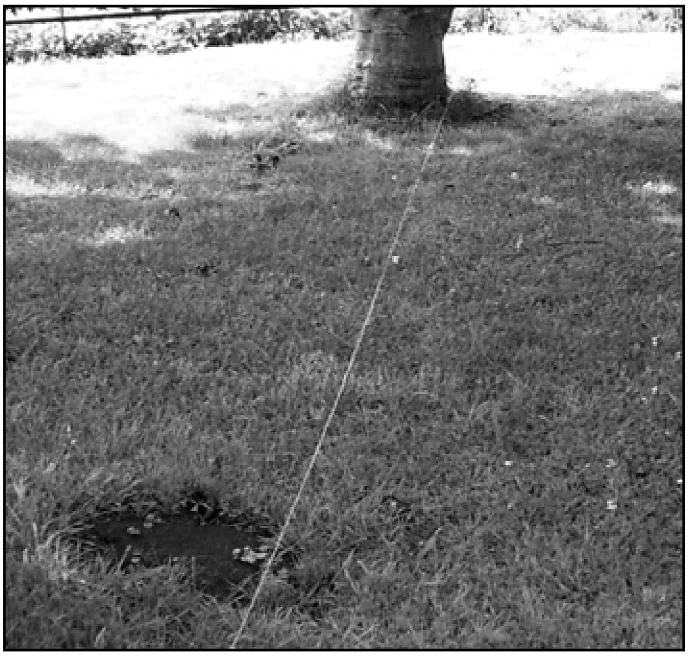

Figure 4.2 **South end of cove grid**

Figure 4.3 **Sightlines disrupted in the churchyard**

4 The Cove

4.1 Gridding

Work at the Cove also used grids of 20 m square but their layout was constrained by the small space. The Cove is at the south end of the garden of The Druids Arms, ST 598631. Reference to nineteenth century maps shows the ground originally sloped steeply to the west down to the road, so much of the present lawn is on made-up ground behind the retaining wall of the car park.
It was assumed that the easternmost 'step' in the level of the lawn marked a transition from made up to original ground and this was taken as the baseline. The survey was conducted only to the east of this line. This left the baseline running north-south (6) instead of our usual east-west.

The north edge was set at the southern edge of the flower bed against the pub private garden fence, just west of the entrance through the fence. The line ran along the ridge, just west of the cherry tree to a post of the iron fence. In 2009, that fence post is marked with blue twine. The baseline was at a bearing of 345°. Figure 4.1 shows the north end of the baseline, figure 4.2 shows the south end. The line was 29 m long, so it contained two grids.

The 'length' of the grid never reached 20 m, generally being 12 to 15 m to the wall with the churchyard. A second set of walking ropes were used at the Cove, so that work at the Main Circle was not compromised. However, these ropes were known to have shrunk by 5%. We made all measurements at the 0.5 m marks on the ropes, so the 'length' of plots displayed here have been reduced by 5% to match the real dimensions.

4.2 Photography and EDM

Interest in the Cove had been sparked by the suggestion during project planning that the Cove may originally have been part of a long barrow, and a suggestion that a detailed survey using EDM might reveal minute signs of it. In June 2009, we took overhead photographs using our 5 metre monopod to see if that revealed any hidden detail. We also conducted a detailed EDM survey of the upper part of the pub garden. As this suggested a slight rise towards the churchyard, the churchyard was also subject to EDM survey in July. The churchyard proved very flat, apart from sunken pathways shown on the 1934 second edition 6" Ordnance Survey map.

The churchyard survey did however prove a useful experience as it demonstrated how easy it is to disrupt sightlines by having posts even of moderate height between. This is shown in figure 4.3, where it was difficult to site the target to the EDM. Any timber rings within the stone circles would certainly have had a similar effect in blocking sightlines if they were contemporary. Figure 4.4 shows the result of the contour survey, with no obvious contour pattern showing.

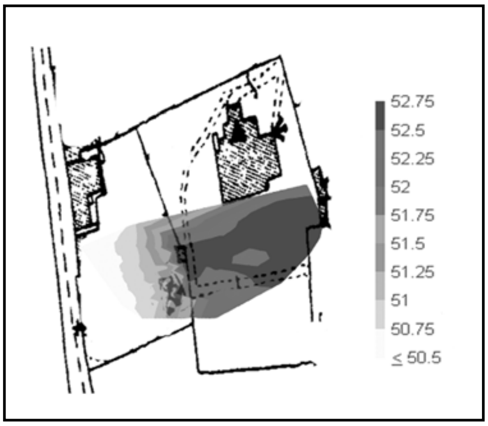

Figure 4.4 **Contour survey of churchyard and pub garden**

The overhead photograph of the stones is shown in figure 4.5 with north towards the top. It shows clearly the fracture in the recumbent slab (C3). The fracture lines form a pattern similar to the shape of the tall standing stone (C1). However, that may be just a result of the geological formation of that stone. It does appear that the recumbent has fractured at its base and the stub is still in the ground. It is canted at an angle, suggesting the stone was partly lifted towards vertical when it cracked and the unsupported portion fell to earth. This fall may have caused the fracture.

4.3 Twin Probe resistance

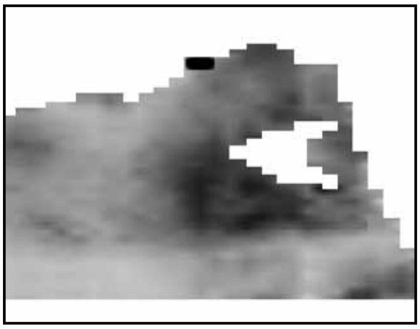

Figure 4.6 **Twin probe resistance plot of Cove - INSITE software**

The two grids were surveyed using the TR/CIA resistance meter. The frame has half-metre separation of the probes. The remote probes were set as near the western retaining wall as possible. The results are shown in figure 4.6. This gave a remarkable picture, apparently showing an increase in resistance starting abruptly a couple of metres east of the baseline at the north (start) end. The churchyard wall masked measurements at the eastern end of the line, but there is a faint suggestion of a return to lower readings.

As the survey continued south, the high resistance area seemed to increase to higher values of resistance, and the area slowly became wider. Once close to the Cove, there is a large area of very high resistance, continuing to the fence. A more refined, linear scale plot (figure 4.7) suggests that the area of highest resistance is just north of the stones, and detail suggests a chamber west of the fallen stone. The area south of the stones shows less high resistance.

Even at the north end, there are patches of higher resistance, suggesting features within the area. There is also a patch of very low resistance in the north-west corner.

The resistance pattern is consistent with a long barrow, oriented approximately north-south. The Cove is at the southern end of this, and it is not clear whether it would have been part of the structure or free-standing in a courtyard. The northern extent of the ‘barrow’ is not known as it extends into the private garden of the pub. The patch of very low resistance may represent a ‘ditch’ or scoop on its western side.

4.4 Resistance profiling

The resistance pseudosection profile kit was attached to the TR/CIA meter. The 22 probes were set at half metre spacing so that they could fit east-west in the space available. This gave a line 10.5 m long, so it did not fill the entire width of the space. Maximum depth of section would therefore be 1.5 m, with .25 m depth resolution, 0.5 m horizontal resolution. Five sections were taken, at five metre intervals. The locations of these are shown overlain on the detailed resistance plot, in figure 4.8.

The first profile was taken on the 22m line from the north edge of the baseline. It was started 3m east of the baseline and extended to 13.5m. This just enabled it to be threaded between the standing stones and the recumbent. This produced a remarkable section, shown in figure 4.9. There appears to be a large stone band some half metre thick, probably on top of earth, sitting about 0.75 to 1.25m below the surface. A shallow dip indicates where the standing stones are, and suggests only shallow foundations.

A second profile, shown in figure 4.10 was taken at 17m, just north of the recumbent. This again shows the stone band clearly.

Figure 4.5 Overhead photograph of the Cove

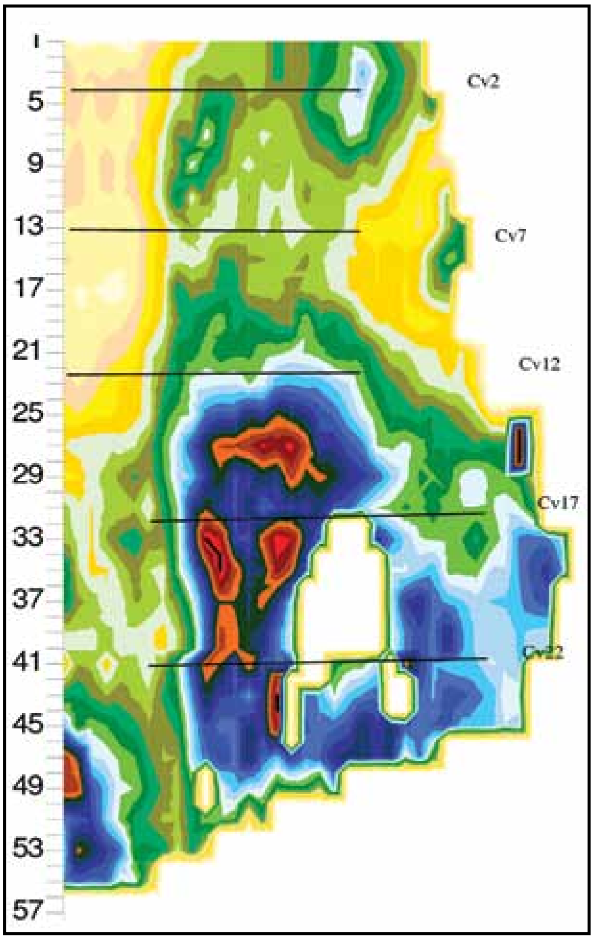

Figure 4.8 The five pseudoection profile positions relative to figure 4.7

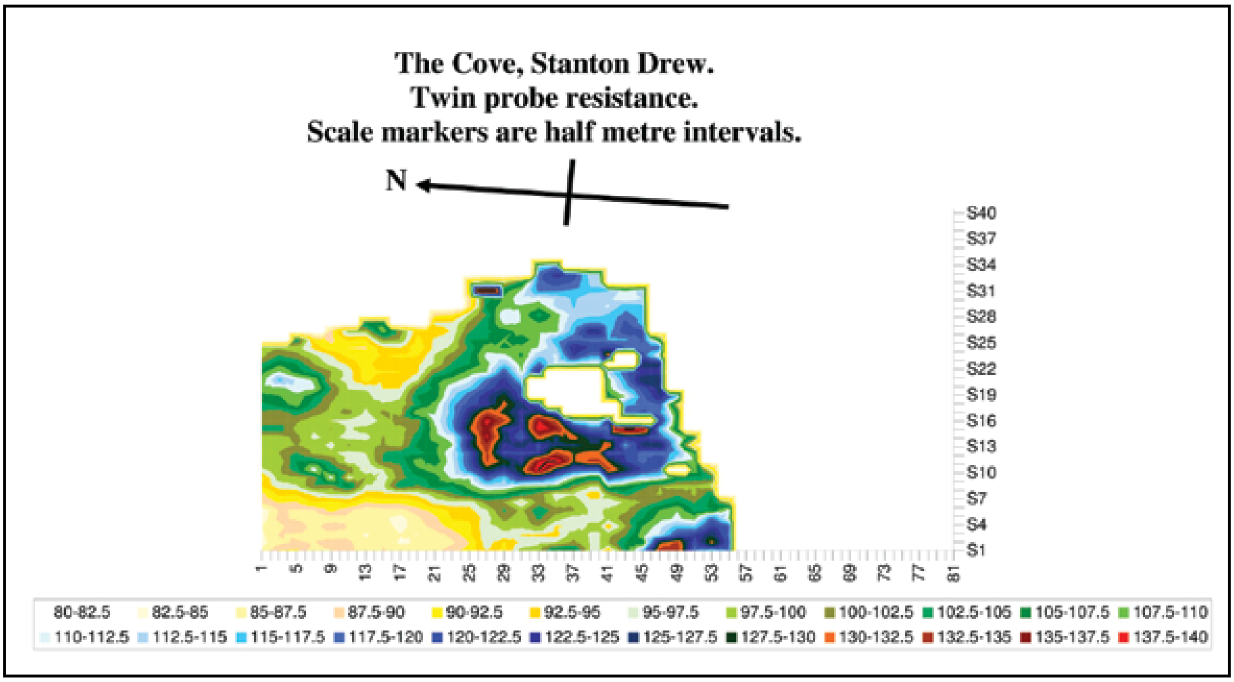

Figure 4.7 Twin probe resistance, high resolution linear scale.

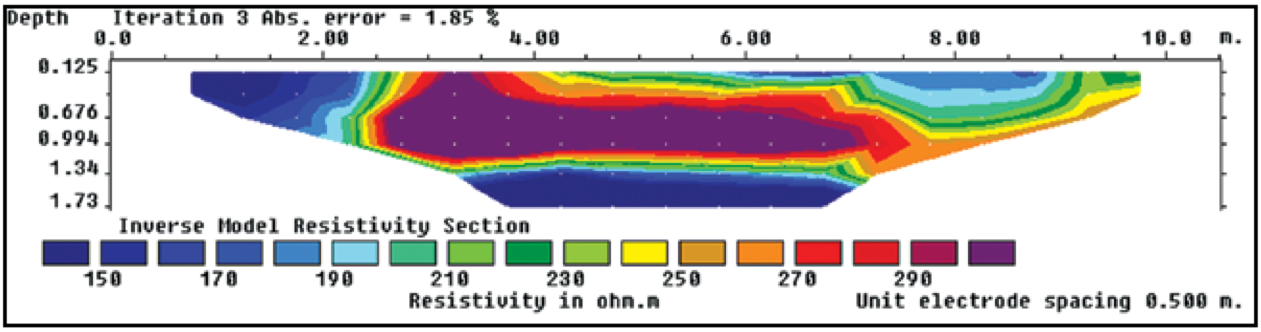

Figure 4.9 Pseudosection profile cv22, taken between the stones

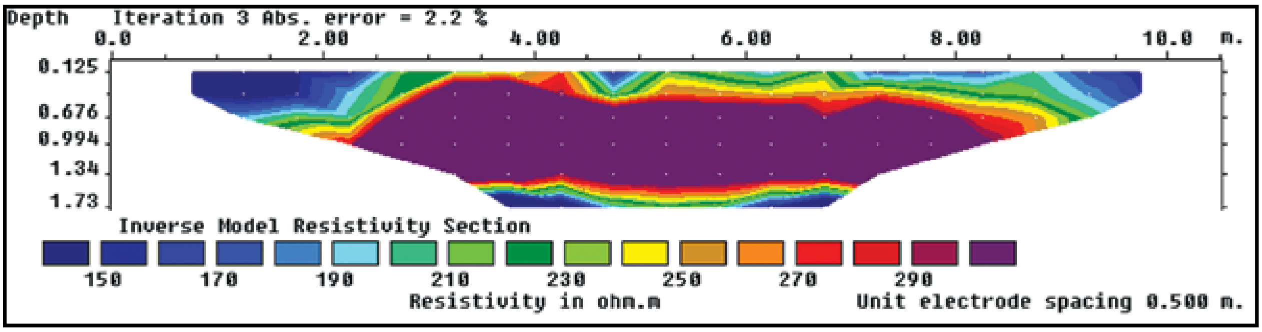

Figure 4.10 Pseudosection profile cv17, taken just north of the stones

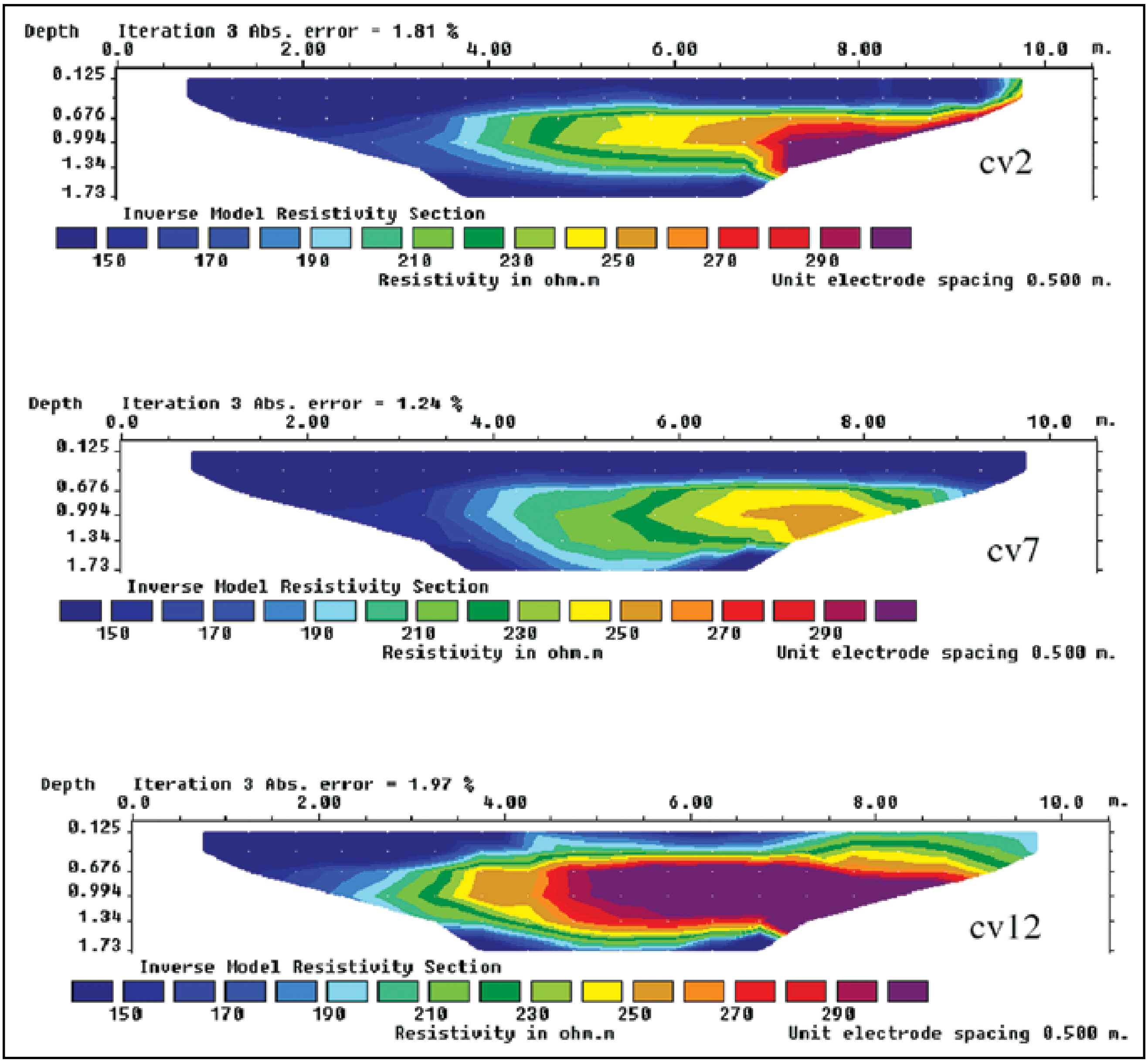

Figure 4.11 Pseudosection profiles cv2, cv7 and cv 12

Three more profiles were taken in the time available, at 12, 7 and 2m from the northern end. These three all started on the baseline, so are displaced 3m west of those at 22 and 17m. These are shown in sequence in figure 4.11. The stone band can be seen continuing, but becoming narrower and less dense as the profiles moved northwards.

These profiles all give extra useful supporting data to the twin-probe resistance survey, suggesting the presence of a stone structure running north-south.

4.5 Magnetic susceptibility and magnetometer

An attempt was made to use the Bartington magnetometer, one probe only switched on, two readings per metre with lines at 1m spacing, manually triggering readings. However, there was still too much iron clutter to give any credible results in this confined space.

Magnetic susceptibility did however produce very good results. Measurements were taken in the same pattern as twin-probe resistance at half metre intervals on lines one m apart. Values were logged manually and transcribed to spreadsheet for graphing. This is shown in figure 4.12. The pattern produced by twin-probe resistance was in general reproduced, except as a negative, with low values of magsus corresponding to high values of resistance.

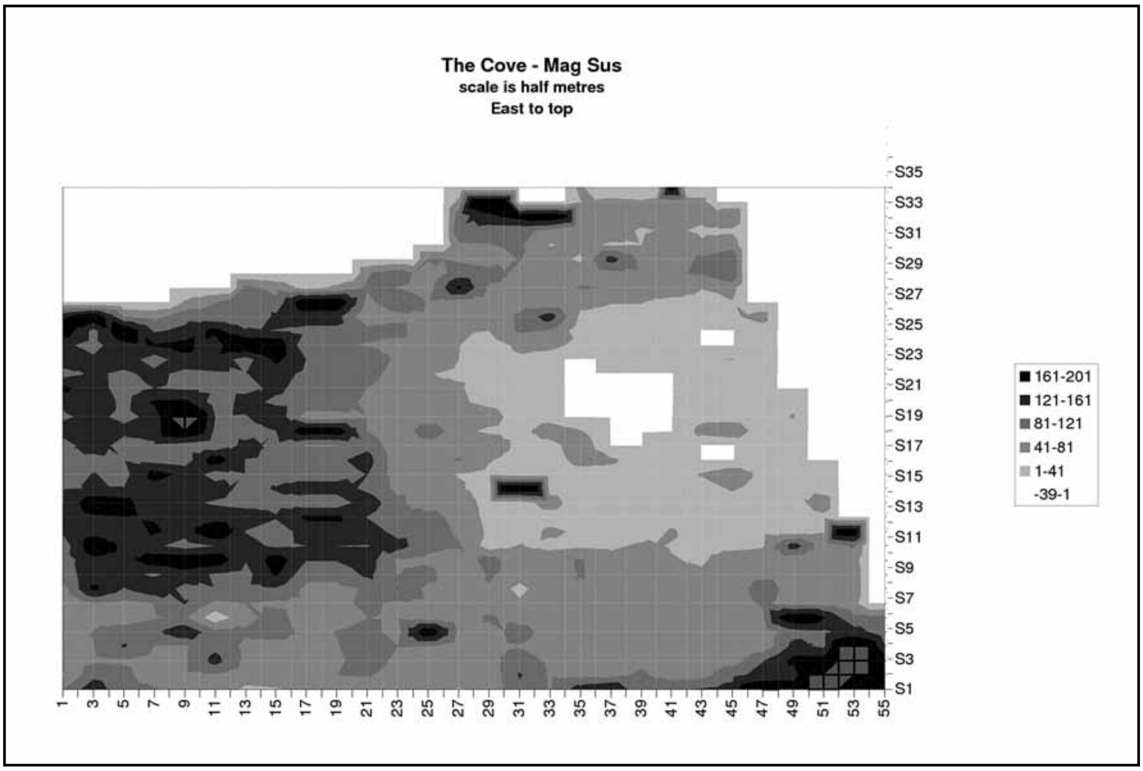

Figure 4.12 **Magnetic susceptibility plot at the Cove**

These measurements were thus further useful corroboration of a possible north-south structure extending along the garden.

4.6 Comment

The interest in surveying the Cove stems from a 'wishful thought' that the Cove was all that remains of a long barrow, this would help interpretation as it would put back the age of the Cove to several hundred years before the stone circles. It could also explain why there may be long barrows in the general vicinity but none is known in the immediate vicinity of the circles. Such a conjunction of stone circle and long barrow is common.

The bias towards a long barrow is accepted, but the geophysics was conducted in an independent spirit.

The results do not absolutely confirm the presence formerly of a long barrow, and what was found was not on the expected axis, but they are supportive of any theory based on there being a long barrow here.
The possibility of a long barrow is further enhanced by the similarity between the resistance map and those reported by Marshall for Cotswold long barrows *(Marshall, 1998)*. This applies both to the basic structure of the barrow, and also to the possibility of a ditch beside it.

Its full outline is obscured to the east by the wall to the churchyard, but the orientation of the barrow would be approximately south-south-east. This is within the known range of alignments, but is not common *(Lewis 2005, 68)*. If the barrow extends northwards into the private garden of the pub then it could be anything up to 50 m long, with a width up to 20 m. This is well within the parameters for known long barrows in northern Somerset, which have an average length of 40.5 m and average width of 20.5 m *(Lewis 2005, 56-58)*.

BACAS geophysics techniques could only add to the detail by using the pseudosection profiler more intensively to build up a three-dimensional picture of the subsurface stone. This could possibly be done on a north-south axis as well as east-west, and taking many more sections. Beyond that, ground-penetrating radar may add to the picture.

Further work could be considered in the private garden of the pub, to the north of the area surveyed. As this is beyond the scheduled area, it could include test pitting as well as geophysics. Note that this would require the active cooperation of the landlord as the present arrangement and use of the garden would make archaeological work very difficult.

There would also be benefit in studying the recumbent stone in greater detail to see if the stub still in the ground matches the edge of the stone next to it. This would require specialist laser measurement. However, even measurement such as this would have to take into account the effects of weathering over hundreds or thousands of years.

It may be possible to do engineering calculations to see if the stone is likely to have sheared while being raised, but these can only be based on the relative cross section of the wide portion of the stone to that of the break point. Assumptions would have to be made about the shear strength of that particular stone.

Dymond reported in 1894 that he had cut test pits around the Cove and these had hit stone at nearly a metre depth. This would be consistent with the geophysics. He also reported finding church roof tile at some depth, but the suggestion is that was in the soil above any stone layer, so this does not negate arguments.

Ideally, test pits are needed around the Cove, and extending north, but these would require special licence. Without detailed information that they could produce, we can support the theory of a long barrow here, but cannot say what part the stones played in that structure, or even whether they were outside it, or a later addition.

5 Archaeology at Stanton Drew

5.1 Previous knowledge

The first mention of an archaeological find at Stanton Drew is by an anonymous source writing in 1666 or later: "... (a stone) being newly fallen, in the Pitt, in which it stood, were found the crumbes of a man's bones, and a large horse-bell, with a skrew as the stemme of it" *(Hearne 1725, 507)*. There is a similarity to the discovery of the barber-surgeon's remains at Avebury *(Smith 1965, 177-8)*.

There have been changes to the stone circles in the last few centuries. Aubrey *(Aubrey et al 1980, 47)* wrote in 1664 that the villagers break the stones with sledges to get them out of the way, and he was told they were much diminished in the last few years. Later, the villagers would tell Seyer *(1821)* that a century earlier many stones were broken up to mend the roads. However, the villagers then seem to have decided to leave the stones alone, and Long *(1858)* said it did not appear that any stones had vanished since Stukeley's visit in 1723.

Some stones were toppled deliberately. It seems this was done at Avebury in medieval times and the stones left lying on the surface; other stones were buried in pits. The purpose cannot have been simply to clear the land for cultivation as it was not particularly effective, and it is assumed there was a superstitious motive *(Smith 1965, 176, 179-80)*.

Very few of the stones stand erect, and some stones have fallen within the last 300 years. At the time of Musgrave's visit in 1718 there were seven stones standing in the North-East Circle, but three had fallen by 1740 *(Dymond 1896, 6)*. Dymond *(1896, 15)* claims that none of the stones seem to have been packed into place with rubble, sitting merely in holes dug in the natural soil, so it is no surprise that so many lie prostrate. However, it is quite possible that some of the stones, for example M12, were never erect but were originally placed lying flat. This stone is directly opposite the point where the avenue meets the main circle. Animals digging burrows in the soft earth may have caused some stones to topple. In 2009, there was a large burrow under stone N8; fortunately not one of the erect stones.

There have been several attempts to find buried stones at Stanton Drew. When William Stukeley visited with John Strachey in 1723, he remarked that some buried stones were easy to detect because grass would not grow on top for lack of earth. Some might be found by stamping or by thrusting an iron rod into the ground *(Stukeley 1776)*. Strachey managed to find buried stones using his sword *(Burl 1999, 52)*. Seyer *(1821, 93)* and Long *(1858)* also maintained that buried stones could be detected by parch marks. Seyer *(1821, 93-94)* must have probed for stones because he claimed some were underground, "but certainly there". Dymond *(1896, 11)* did some digging as well as probing: "the positions of several stones which had been buried for generations were ascertained, and their outlines traced with a probe, where they could not easily be exposed by the spade". Six were recorded: M4, M23, M24, M33, M35, and N13 (of these, all but M4 and M33 were visible at the surface in 2009).

The Reverend John Skinner is known from his writings to have visited Stanton Drew at least five times, but it appears that his only active contribution to the archaeology of the place was in persuading Sir Richard Colt-Hoare to let his surveyor prepare a plan of the site, which appears in the Stonehenge section of his work *(Hoare, 1826)*.

Grinsell and Kendall *(1958)* carried out some systematic probing and auguring in 1954. They covered an area from the lowest known stones in each avenue, eastwards towards the river. They found no stones. Some very soft mud was found 2 feet down in various places east of the old hedge line, and they speculated that any stones that may be there may have sunk downwards through the river alluvium. They did find two stones in the Main Circle. One of them was approximately 7.5 feet by 3.75 feet, 68 feet from the next stone eastwards and 27 feet from the north end of the avenue. This was a stone noted by Seyer, but later rejected as non-existent by Dymond. The second stone was found southwards, towards stone M1.

Tratman *(1966)* probed for Grinsell and Kendall's two buried stones and thought initially he had found them. He tried plausible spots in gaps between other stones and found a hard layer at a depth between six inches and two feet, but he was not able to trace stone outlines, except for where there were prone stones, partly visible. He then tried probing extensively between stones M18 and M20, and found the hard layer everywhere, Applying more pressure, he found he could break through to softer soil below. It seems there is a hard layer across a large area, though he could not detect it on the south side of the avenue. Returning to Grinsell's buried stones, he was able to break through the hard layer, except for one area about two feet square, so he concluded the stones did not really exist. The hard layer could be an iron pan, two to six inches thick, about 1 foot down on average.

Field boundaries have changed over the years. At one time, the Main Circle lay in three fields; the North East Circle had a ditch and hedge running across one side; and the SSW Circle was divided into two: an apple orchard and pasture *(Stukeley 1776; Seyer 1821)*. The North East Circle has also been in an orchard *(Scarth 1867)*. Stone Close has been ploughed in the past: when Aubrey visited, it was under corn *(Aubrey et al 1980)*. In addition to the orchards, large trees also grew in the area and these will have destroyed most of the archaeology where they stood: a very large old elm tree was removed from near the centre of the Main Circle in 1963 *(Tratman 1966)*.

The Cove also stood in an orchard *(Stukeley 1776; Collinson 1791)*. The eastern half of this orchard was used to extend the churchyard in 1903 and the remainder, containing the Cove, was extended northwards by adding some land behind the Druid's Arms pub. Comparison of the Ordnance Survey 1:2500 maps for 1885 and 1962 shows the change in field and churchyard boundaries, and a plaque in the church says: "On Octr. 20th 1903 an addition to the Churchyard of 1 Rood 12 Perch was consecrated. The cost amounting to £246 : 2 : 5 was defrayed by Parishioners and Friends.".

Traces of a sunken stone, to the southern side of the Cove's fallen stone, were found by Dymond (1896, 12-13), who thought it might be the root of the fallen stone. Dymond and the Reverend Perfect also dug a few holes, two to three feet in depth, in the area, and between the southern edges of the standing stones. In all of them he found pieces of breccia and white sandstone in the soil towards the bottom of the holes. In one of them he found a fragment of a medieval church tile about two feet from the surface. There was no charcoal, or any sign of a fourth stone on the southern side. Burl (1999, 52) thinks Dymond and Perfect found holes that had been dug by treasure seekers.

Dymond *(1896, 30)* considered whether the Cove was a ruined dolmen and decided it was unlikely. Grinsell *(1956)* did not believe it could be part of a chambered long barrow, on the basis the space between the standing stones was too large. Presumably he was considering the Cove as a possible chamber; as a forecourt there would be no such limitation.

The three stones of the Cove are Dolomitic breccia; only two other stones, M2 and S12, are the same type *(Lloyd Morgan 1887)*.

Hautville's Quoit is described by Aubrey as being 10 feet 16 inches (sic) long, 6 feet 6 inches broad, and 1 foot 10 inches thick *(Aubrey et al 1980)*. Stukeley *(1776)* said there were two quoits, half a mile either side of the bridge. He gives the size of the Quoit as thirteen feet by eight feet by four feet. As it could not possibly have grown in size, the most likely explanation is that he got the two stones confused *(Burl 1999, 55)*. Part of the stone was broken off in 1836, and it is now about 2.2 m long *(Grinsell 1994)*. Roger Mercer *(1969)* carried out a resistivity survey and excavation to try and find the original location of the Quoit, but failed to find any stone socket. Note that geophysical equipment at that time was quite primitive, and a more intensive survey with modern equipment might yield more information.

Jodie Lewis (2001, 137) has named Stukeley's second quoit, the Tollhouse Stone. It no longer exists, but she thinks it was once about 500 m north-west of the Main Circle.

Lewis *(2001, 187-188)* carried out fieldwalking in the field to the north of Stanton Drew. She found flints dating from the Late Mesolithic or Early Neolithic through to the Early Bronze Age. A geophysical survey of the field opposite the Druids Arms by Andrew Young of Avon Archaeology Unit *(A geophysical survey of the field opposite the Druids Arms 1996)* is said to have found a settlement site, but of Iron Age/Romano-British date. This year a geophysical survey and evaluation, again by Andrew Young, has revealed further evidence of Roman-British occupation on a proposed new dairy site to the south-west of the village near Tyning Lane.

The first geophysical survey at Stanton Drew was one of resistivity started by Professor L S Palmer in 1961. He was unable to complete owing to ill-health, and after his death the University of Bristol Physics department declared the results "essentially negative" *(Tratman 1966)*. After Mercer's unsuccessful resistivity survey at Hautville's Quoit, the next attempt was in 1997 when two sample areas were surveyed in Stone Close *(David et al 2004)*. The results were considered disappointing and had no correlation with the surprising and spectacular magnetometry results that showed the nine concentric rings of probable post-holes and an encircling ditch.

The first magnetometry survey was in the Main Circle using Geoscan fluxgate gradiometers. This was the first to show the timber rings, but these were obscured in the southern portion. Part of the area was resurveyed with a Scintrex Smartmag SM4 Caesium magnetometer, which is fifty times more sensitive. This allowed resolution of the rings into individual anomalies.

Four pit-like anomalies were found in the North East Circle. There were occasional large anomalies caused by magnetic debris. One of these lay 20 m south west of the Main Circle centre, and could be where the old elm was removed in 1963. Nothing of interest was found in the fields to the north and east of Stone Close.

In 2000, magnetometry and resistivity surveys were carried out in the SSW Circle. The high resolution fluxgate gradiometer survey revealed three concentric rings of anomalies. The resistivity survey showed a partial circuit of raised resistance, with both 0.5 m and 1 m probe spacings. The anomaly was three to five m wide, just outside the stones on the southern side. As this *ought* to be a ditch, an explanation was needed. It was suggested that there might be a relatively coarse ditch filling, or an unusual link between seasonality, capillary action and texture.

A resistivity survey was also carried out in 2000 over the western perimeter of the Main Circle, using both 0.5 m and 1 m probe spacings and a narrower sampling interval. The results were again disappointing, showing neither ditch nor pit circles. Within the Main Circle, the resistance response was 'rather noisy'.

There were suggestions from the magnetometer survey that the main entrance to the Main Circle was in the north-east sector of the ring.

Ground-penetrating radar was trialled in both circles in Stone Close. It was only successful in the Main Circle where it succeeded in detecting the pits.

5.2 New ideas

The possibility of the Cove being the remnants of a long barrow is intriguing. It would extend the active life of the Stanton Drew complex by about 1000 years. It would imply that the Cove was an old and disused barrow by the time that the stone circles were constructed, and that the Main Circle and North East Circle were aligned on the Cove. The geophysics results are similar to those of Marshall's on geophysics of long barrows in the Cotswold region *(Marshall, 1998)*.

Although the barrow may have been a small one, it is not outside the known range: the Nympsfield barrow is 27 m by 14 m *(Darvill 2004, 73)*, the Priddy barrow is 26 m by 12 m *(Lewis 2005, 58)* and the Stoney Littleton barrow at Wellow is 30 m by 15 m. However, the barrow may extend beyond the study area into the pub's private garden, which could potentially increase the length towards 50 m and put it within the range of the Fairy Toot long barrow at Nempnett Thrubwell which measures 60 meters by 25 m. The orientation, with the proximal end pointing between SE and SSE, occurs in nearly a fifth of Cotswold Long Barrows *(Darvill 2004, 98)*.

The Cove stands on a promontory with ground falling away to the west and the south, so a long barrow would have been well positioned for visibility from those directions.

The stones of the Cove could have been a false portal at the rear of the barrow forecourt, with the now fallen stone placed erect behind the two standing stones. Similar configurations exist at Belas Knap and West Tump in Gloucestershire, and Lugbury and the Giant's Caves at Luckington in Wiltshire. Often the right-hand stones are different heights and shapes *(Darvill 2004, 115-116)*. The false portal at Lugbury bears a strong resemblance to the Cove *(see figure 5.1 and the overhead photograph of the Cove in figure 4.5)*, with two upright stones of different heights and a slab positioned behind them. It is possible that the high resistance patches on the flanks of the barrow are lateral chambers. There are many Cotswold Long Barrows with lateral chambers, including all those mentioned above as having false portals *(Darvill 2004, 104, fig 39)*.

Figure 5.1 The false portal of Lugbury Long Barrow

An objection to the barrow theory is the complete absence of visible evidence for a mound. The ground near the Cove has been altered, and field boundaries have changed. At one time the Cove stood in an orchard, and there may be disturbance caused by tree roots.

Although the most intriguing new ideas relate to the Cove, there are other areas where this study has been beneficial. Only very limited time was spent at the SSW circle, but profiling here suggests there is more stone beneath the surface. Given that there appears to be low resistance at depth, this would suggest it is not natural stone. The SSW Circle is very different in appearance and well isolated from the Main Circle, so may have a different purpose and time span. English Heritage *(David et al 2004, 351)* report post holes, and if they carried a structure, it would be aligned on where the avenues emerge from the flood plain. The SSW Circle is certainly worthy of more systematic study than the half day spent in this survey.

The surveys in Stone Close have been sufficiently large in area to bring forward the archaeological detail from the background. This has been particularly so with resistance techniques, although the limited magnetometer work has demonstrated its potential in this field. The surveys have shown the possibilities of finding empty stone sockets, although there is a need for further refinement, so it is possible that more stones were intended than are now seen. There may be differences between pits intended for stones and demolition pits deliberately dug large to topple stones in. Further geophysics work, particularly pseudosections, around standing stones could provide extra evidence on how the stones were erected and in places demolished. The henge monument around the Great Circle, first identified in the 1997 survey, warrants further discussion in relation both national and local examples including a possible henge at Durley Hill, and a recently found henge-like structure at Peasedown St John.

Astronomical alignments have not figured greatly *(Burl 2005, 76-80)*. Lloyd-Morgan first identified the two 'recognised' alignments *(Lloyd-Morgan. 1888, 37-50)*: (a) from the centre of the NE Circle through the centre of the Great Circle to the Cove, and (b) from the centre of the SW Circle through the centre of the Great Circle to Hautville's Quoit. Dymond confirmed these alignments in his detailed survey of the monuments *(Dymond, 1896)*, along with an alignment (c) along the southern edge of the three stone circles, which it has been suggested aligns with the major southern moonset *(Thom, 1967)*. The most obvious alignment (a), though not exact, is with the winter solstice sunset *(Lockyer, 1909, 167-78)*. Indeed even now, a former village resident reported 'going down to the stones mid December to see the sun set'. If the Cove were much earlier than the circles, the alignment would explain the position of the NE Circle, perched on the edge of the terrace.

The idea of a 'space for the dead, not the living' *(Pollard and Reynolds 2002, 121-2)* or a 'separate sacred space' *(Card 2005)* has yet to be applied to Stanton Drew, although Jodie Lewis *(Lewis 2005, 154-5)* does not concur with this. These concepts are growing out of the Stonehenge Riverside Project, just finishing, where work by Pollard and Parker Pearson has yet to be formally reported. The circles occupy a natural river terrace, but it is circumscribed by the higher ground of the SSW circle and the Cove to the south and west, and by the River Chew to the north and east. The Tyning Stones and other outliers may also be part of this landscape. With current knowledge, these ideas can only be suggested, but there is much scope for exploring the whole Stanton Drew landscape further.

6 Conclusions and Recommendations

The survey has continued the work done by Young and English Heritage *(David et al, 2004)*. In some respects it has duplicated that earlier work, but that has been to allow developments into the future. For instance, the magnetometer survey of the Main Circle covered only part of the English Heritage survey, but it has shown that by using high data acquisition rates, it can produce a picture as clear as that generated by English Heritage using a Caesium vapour magnetometer. This means that the survey can be completed and extended in due course using commercially available equipment by an amateur workforce without recourse to special, expensive, resources.

The twin-probe resistance work in Stone Close has gone beyond that by English Heritage, who surveyed two small discrete areas. By covering the whole area of the stones, we have been able to identify possible features such as empty or enlarged stone sockets and by covering the larger area, it has been possible to identify the range of response which constitutes the natural substratum. The results include the external "ditch" identified in the English Heritage magnetometry, but as an area of high resistance, suggesting either that it is not a ditch, or perhaps its filling consists of stony material. Time did not permit survey of those grids entirely within the Main Circle, and although it would lead to a more complete picture if these were surveyed, it is not likely to add greatly to the understanding of the monument. That is therefore lower in priorities than extending the survey out from the stones or surveying other areas in the local landscape.

The addition of pseudosection profiles has been a significant benefit beyond earlier work as these enable us to study particular features in the third dimension too. This is a localised and intensive technique so it cannot be used over the whole area, but the results obtained so far show that it can add significant new knowledge if it is targeted. It gives some idea of the substratum, but it would benefit interpretation if more was known of the underlying geology, either by test pitting or by auguring in areas away from the sensitive parts of the monument but on the terrace that the stones occupy.

The pseudosection profiles of the SSW Circle seem to suggest much stone underlying the area of the ring *(but with soil below)*, suggesting that the ring may be more complex than initial appearance suggests. However, limitations of time restricted the study, and this work could benefit from a more systematic approach, with more than one morning spent on it.

The most spectacular results were obtained at the Cove, both in twin-probe resistance and pseudosection profiling. Magnetometry was of little benefit here as there was too much metalwork in the close vicinity, but magsus proved a useful complement to the resistance results. A tentative suggestion that it could be the remains of a long barrow seem to have been vindicated, with results commensurate with earlier studies *(Marshall, 1998)*, and supported to a very high degree by pseudosection profiles. The high resistance areas are intriguing and may represent the existence of tomb chambers. There is scope for more profiling here, although lines have to be chosen so that the stones do not disrupt the probes. It may be better to form lines in a north-south alignment. The site may also benefit from ground-penetrating radar survey, and excavations in the garden beyond the scheduled area.

A parallel activity of photographing the stones from 6 m overhead was started, and the Cove, NE Circle and avenues completed. It is intended to include the Main Circle and SSW Circle in continuing activities.

This study has added to the understanding of the immediate vicinity of the stones, but as yet work beyond this has been very limited. It is known that Dr Jodie Lewis of Worcester University has worked on the ground beyond the scheduled area and that a survey has been done on a field by the village, yielding signs of a later settlement, but there is no real understanding of the Neolithic hinterland, and how the monument used that landscape. The principal alignment through the NE

Circle, the Main Circle to the Cove appears to be midwinter sunset. If the Cove was already an old structure when the circles were laid out, then the rings have been carefully sited on the terrace just above the flood plain of the River Chew, the NE Circle particularly so, as it just perches on the edge of the solid substratum. There is another alignment, from the SSW Circle through the Main Circle to Hautville's Quoit, a now fallen stone some 1 km distant, but this has no obvious astronomical significance. Indeed, the SSW Circle seems somewhat detached from Stone Close, as it sits on the highest point of the hill. How Hautville's Quoit and the now moved Tyning Stones fit into the Neolithic landscape is unknown.

Stanton Drew was neglected for over a century and it is hoped that this and recent studies will rekindle academic interest in the monument, in particular its use of the landscape. It is assumed that the River Chew has meandered across the flood plain in the intervening thousands of years, but its course contemporary with the stone circles is not known. Unfortunately, Stanton Drew was just outside the LIDAR survey of the Mendip Hills, as this technique could have benefited any such study.

Laser techniques on a smaller scale could benefit understanding of the Cove. It appears the flat stone snapped, possibly while it was being hauled upright, as there is still a stump in the ground, lying at an angle. The stones are now well weathered, but it may be possible to find how the stump and recumbent fitted.

No work on biological sampling of the general area has been reported. We assume it was well wooded from the ability to construct the timber circles, but the immediate vicinity of the stone circles must have been cleared to allow the sightlines. We know the area to be fertile, and that Stone Close was cultivated for cereals in the early modern period. We know nothing of the prehistoric period.

There is work for academic archaeologists, and also for professional and amateur archaeologists to do around here and we need to allocate work within the competence and budget of each type, without overlap, if more is to be known about this site. This report can only declare what work BACAS could contribute to understanding the site, by means of geophysical survey.

It is not wise at this stage to set up a detailed schedule of further work, but here we outline those tasks which are within our capability. A schedule such as that shown in Appendix B can be produced once a time and duration for a further survey is set. Suggestions for further work are listed below.

Complete magnetometer survey of the Main Circle at high data density would provide a clear picture of the timber circles which only survive in the northern portion of the ring, and extending the survey area outside the ring, particularly to the south-west, would show the form of the ditch clearly, and see if there is any sign of an avenue indicated by dowsing.

There may also be benefits in surveying the river valley area to the east of the NE Circle and avenues, where dowsing has suggested an extension to the avenues. However, work (as yet unpublished) by Jodie Lewis of Worcester University is said to have found only deep sediment. Survey here may just pick up signs of trial excavations and field drains.

Surveys in the vicinity of the Tyning Stone site may help to understand how these stones arrived; whether that was their planned position or whether they were left without design. This could also apply to the Hautville's Quoit site.

Magnetic susceptibility profiles may be useful in the immediate vicinity of the stones, but high data density (minimum half metre spacing) is needed to give any confidence.

The work at the Tyning Stone and Hautville's Quoit sites could also be replicated with twin-probe resistance, as this has been seen now to show stone sockets. However, different underlying geology at these sites may alter the significance of the surveys. The area within the Main Circle could also be completed, but this may not add much extra detail, so is regarded as lower priority.

Obtaining real geological data of the substrata around the stones, either by test pitting or auguring, at some points where there is no threat to the stones, would help understanding of any resistance surveys and of the placing of the stones.

The resistance pseudosection profiles have been found very beneficial in this work. Much more work could be done with this technique, both in Stone Close and at the Cove. It would also be better to do a systematic survey of the SSW Circle with this technique, rather than just the two radial profiles tried. However, the profiler is relatively slow, and a budget of no more than eight profiles per day should be set. This would certainly limit its use to a carefully chosen set of profiles. It would also be beneficial if a ground penetrating radar survey could be done at the Cove.

The task of photographing the stones, both from side and from overhead should be continued, and may be assembled into a virtual tour.

Stanton Drew is patently lacking a modern integrated analysis and synthesis, and the aim should be to see such a book produced. It is beyond the scope of BACAS to undertake such a complex task, but any geophysics work succeeding this should be aimed at adding coherent information to what is known, and encouraging and coordinating such a study of the monument and its setting.

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Appendix A Grid numbers and layout

The raw data can be provided to enable others to construct the geophysics, possibly using other processing suites. This appendix provides sufficient information to allow that reconstruction.

A1 Twin Probe Resistance

The survey in Stone Close was conducted using a Geoscan RM15 meter with mobile probes set at 0.5m. Each grid was started at the south-west corner with the device initially heading north. Data were collected and stored in zig-zag mode. The meter was set to take readings every 0.5m along lines 1m apart. The data files thus contain 800 points each and need to be set in 20 lines of 40 points.

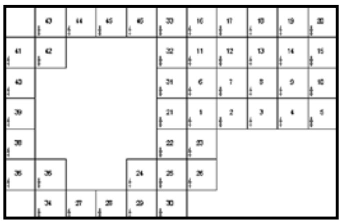

Figure A1 **Grid layout in Stone Close for twin-probe resistance**

It is BACAS' custom to start a grid 1 m east and 0.5 m north of the SW corner of each grid to ensure that they all mesh together with no gap or overlap.

The grid layout is shown in figure A1. The arrow indicates the start point of each grid. Missing points are indicated by 'NUL'. Note that grid 30 contains a malfunction. However, this grid adds nothing to the information and may be excluded. The blank patch in this grid is a tree, not stone.

Grids measured by twin probe resistance have a number prefixed by 'r'.

A2 Magnetometer

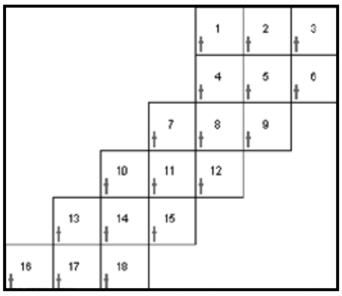

Figure A2 **Grid layout in Stone Close for magnetometer**

The survey was conducted using a Bartington 601-2 fluxgate twin gradiometer. Although a zig-zag pattern was used to collect the data, its download software automatically sorts the data to parallel. The device was operated in auto-triggering mode, so position accuracy is only as good as the constancy of pace of the operator. The ground was not rough, so pacing was good, but some inaccuracy can be detected because of the very high data density.

Readings were taken at a rate of 8 per metre (0.125m separation) along lines 0.5m apart. This gave 40 lines of 160 points, 6400 per grid square.

The nature of Bartington operation generates a 'stripy' effect automatically, so the data are passed through an in-house destriping program before being taken into the processing software. Files with prefix 'm' are the raw data, those with prefix 'd' are the destriped data (zero median).

The grid layout is shown in figure A2. The arrow indicates the start point of each grid. Missing points in the 'm' files are indicated in the standard Bartington code '37782' while in the 'd' files, this is converted to 'NUL'.

In line with BACAS custom, grids were started 0.5m east and 0.125m north of the SW corner in order to ensure all grids matched up.

A3 The Cove

The grids were laid out coincidentally on the same axis (345 °) but at the Cove, walking lines were laid east-west as this best befitted the space. Both resistance and magnetometry used the same walking lines and spacings. However, the guide ropes used had shrunk 5%, so 0.5m markers were actually spaced 0.45m. Any plots produced need reducing in height by 5%. This also applies to magsus data.

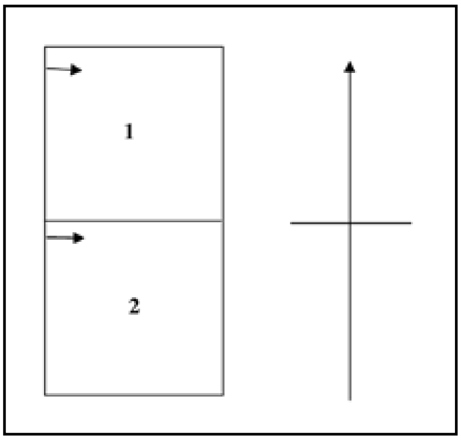

Figure A3 **Grid layout at the Cove for twin-probe resistance and magnetometer.**

Resistance was measured by the TR/CIA meter. A zig-zag pattern was walked, but its download software automatically sorted to parallel data. Readings were taken at nominal 0.5m intervals along lines 1m apart, giving 800 data points per grid square. Blanks are represented by 'NUL'.

Figure A3 shows the grid layout. Note that geographically, grid 1 is north of grid 2. The grids were started this time in the NW corner, with lines heading east. The first reading was 1m south and 0.5m east of the NW corner of the grid.

Twin probe resistance grids are prefixed 'r', magnetometer raw data prefixed 'm' and destriped magnetometer data 'd'.

The same layout also applies exactly to the magnetometer readings, which was set to 0.5m reading interval on lines 1m apart. In this exercise it was manually triggered using the same line marks as used in resistance. The Bartington was set to read with one sensor only, to try to give more isolation from high magnetic anomalies, but this was a very confined space with much ironwork around it.

A4 Resistance Pseudosections

The data available are in form ready to be applied to RES2DINV processing. In all cases, 22 probes were used, with spacings of 0, 1, 2, 3, 4 and 5 for the 6 lines.

SSW1 and SSW2 are on the NW line of the SSW Circle, SSW3 and SSW4 are on the N line. SSW1 and SSW3 cover the centre of the circle.

NE1 is in the avenue of the North-East Circle and is an east-west traverse. MC1 and MC2 are north-south traverses, with MC3 an east-west traverse just south of MC1 and MC2.

All the above used 1m spacing between probes.

5 sections were taken at the Cove. These were all east-west traverses. These were all done with 22 probes at 0.5m spacing, with lines representing spacings of 0, 1, 2, 3, 4 and 5 probes, i.e. 0.5 to 3m.

Sections were taken at 22, 17, 12, 7 and 2 m from the northern edge of the north grid, and labelled cv22, cv17, cv12, cv7 and cv2 respectively. Note that cv22 and cv17 started with the first probe 3 m east of the baseline, and cv12, cv7 and cv2 started on the baseline.

Appendix B Copy of proposal for geophysical survey work at Stanton Drew, Somerset, 2009

Background
There are three great stone circle complexes in Wessex, Avebury, Stanton Drew and Stonehenge. Whilst the other two have received vast amounts of attention, Stanton Drew has been somewhat neglected. The publication of spectacular geophysics results in 1997 prompted a large survey by English Heritage (EH) and has led to more interest in the complex.

As part of the 2009 Festival of Archaeology, Bath and North East Somerset (BANES) is proposing to hold a public event in the village. This will take place on 25th July, 2009. The Bath and Camerton Archaeological Society (BACAS) has been asked to do geophysics demonstrations, and has in return requested that it perform geophysics research at the complex in the week prior to the event.
The site is a scheduled ancient monument, and a section 42 licence will be needed from EH to undertake any geophysics work. BANES will obtain the licence on behalf of BACAS.

Scope
This document deals only with the geophysics research to be done in the week before the festival. Details of public events will be covered in other documents.

Dates
The geophysics research will take place on Monday, 20th July, Tuesday 21st July, Thursday 23rd July and Friday 24th July. There will be no work here on Wednesday 22nd July because of commitments elsewhere. The public event will be on Saturday 25th July, 11 am to 4 pm.

Sites within the complex
The principal site is the main Circle (MC), which has an avenue (AV1) leading eastwards from it. Nearby is the north-east Circle (NE), which has an avenue (AV2) leading south-east from it. The two avenues clash. In a separate field is the south-south-west Circle (SSW). West of this, in the pub garden of the Druids Arms, is the Cove (CV). Well to the west of the monument, 700 m away are two stones, the Tyning Stones (TY). 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 (HV).

Personnel
This is a provisional list of the personnel involved in the research. Many more will be needed from BANES and BACAS to host the public event.

BANES: Richard Sermon (BANES archaeologist)

BACAS: Dr John Oswin (Geophysics Team Leader), John Richards, Jan Dando (part time). Bob Whitaker (Chairman) and Tavis Walker (Education Officer) will provide logistic support. Keith Turner (software, overhead photography) will contribute, but will not be available in the week when research is done.

Safety and Security
The circles and avenues are on private land used for grazing, but there is open public access to these during the day. Ideally, the grass should be grazed short in advance. During the research week and the public event, it would be better if only sheep were grazing. BANES will request this of the farmer.

The geophysics work will require a grid of 20m squares. These will be set up on Monday and need to remain in place throughout. They are potentially a trip hazard. We hope the grid squares will not be subject to vandalism, but the grid will be started from a known point so that it can be rebuilt.

Resistance survey will require lines to be laid within each grid. These are a trip hazard. BACAS has two warning signs which will be put up in the vicinity of any survey.

Resistance profiling requires a line of steel electrodes and these are connected to the meter by two large cable looms. This is a trip hazard for any close enough to work it. The public will be warned verbally to keep a safe distance. The warning signs will also be put up.

Magnetometer requires pegs to be put in the ground. These are trip hazards. The public will be warned verbally to keep a safe distance, but this is necessary anyway for the good working of the magnetometer.

Overhead photography makes use of a six-metre pole with a camera attached. The pole can be controlled by the operator quite simply and safely, but the public will be warned verbally to keep a safe distance.

Apart from grid posts, no equipment will be left on site overnight. BANES will supply a gazebo for use by BACAS while working at NE. This is the remotest corner of the site, so it is requested that the gazebo be available as an emergency shelter from Monday 20th. We trust it will not be vandalised. There may be a need to leave equipment there during the festival day, so BACAS needs to ensure that it is permanently manned.

4by4 access to the circles during the week and on the festival day would be beneficial. BANES must check with the farmer whether this is possible.

The state of knowledge
Plans of the circles have been produced from the nineteenth century onwards. There does not appear to be a formal photographic record of the stones, although there have been written records about individual stones for over a hundred years.

Work in the 1960s with primitive resistance equipment at the site and HV using equipment of that age, very primitive by today's standards, produced disappointing results. Probing for buried stones produced mixed results.

A magnetometer survey in 1996 in the field opposite the Druid's Arms revealed ditches and showed that magnetometry would work here. It has not been possible yet to locate a copy of the report on this survey.

A magnetometer survey published in 1997 spectacularly showed concentric rings of post holes within MC.

Surveys using Caesium magnetometer, ground-penetrating radar and a small amount of twin-probe resistance were published by EH in 2004.

No work has been published on CV. There are modern suggestions that it may have originally been a chambered tomb, although Grinsell (1956) did not think so.

Trial trenching at the end of AV2 is in the process of publication (Jodie Lewis, Worcester University).

No work has been done at TS.

Proposed Research
Re-survey the interior of MC using Bartington twin gradiometer, at 4 readings per metre, line 0.5m separation. This is a half-way state between the original survey with an FM36 and the EH survey

with Caesium. Its aim is purely scientific, to provide another level of comparison. It is not expected to produce new archaeological data. At the same time, the area will be surveyed randomly with Bartington MS2 magnetic susceptibility (magsus) to see if the post holes can be detected that way. If successful, magsus can be done with the public on the open day.

Continued twin-probe resistance survey, particularly in the areas where AV1 and AV2 meet. Results not published by EH but provided, seem to show stone sockets (low resistance) and also high resistance anomalies around NE. These could bear further investigation, and may provide further data on the relationship of AV1 to AV2.

Resistance profiling supplements the twin-probe resistance. It is for looking at lines rather than big areas, although 'depth slices' can be obtained by surveying adjacent lines. Its primary use here will be to study any pits found in the twin-probe resistance survey of the area around NE, AV1 and AV2. It will also be used around SSE to elucidate the feature which in the EH survey appears ambiguously as either footings or a ditch. It may also be used at CV.

An EDM (electronic distancing meter) survey may be carried out around CV if the machine is available.

Overhead photography may show extra information not visible from ground level, and will be used around CV, NE and AV1, AV2.

Equipment availability
The schedule has assumed availability of BACAS equipment as follows. Note that BACAS' training dig will be under way then and must have priority.

Monday 20th July
TR/CIA twin probe resistance and profiler. Bartington magnetometer and magsus. FM256 magnetometer.
Tuesday 21st July
TR/CIA twin probe resistance and profiler. Bartington magnetometer and magsus. FM256 magnetometer.
Thursday 23rd July
TR/CIA twin probe resistance and profiler. Bartington magnetometer and magsus. FM256 magnetometer. RM15 twin probe resistance.
Friday 24th July
TR/CIA twin probe resistance and profiler. Bartington magnetometer and magsus. FM256 magnetometer. RM15 twin probe resistance.
Saturday 25th July
TR/CIA twin probe resistance and profiler. Bartington magnetometer and magsus. FM256 magnetometer. RM15 twin probe resistance. EDM. Overhead camera kit.

Provisional Schedule
This assumes that equipment and operators are available on the days quoted and that there is no interruption by adverse weather.

Prior to 20th July
Overhead photograph at CV. Photograph specialist not available 20-24 July.
Monday 20th July.
Set up grid. Layout grid posts. Start twin probe resistance survey in area of NE, AV1 and AV2. Download day 1 results for inspection.
Tuesday 21st July
Continue twin probe resistance survey. Change to resistance profile at places determined by twin probe survey. Magnetometer survey in MC, followed by magsus probing. Download day 2 results.

Thursday 23rd July
Finish any twin probe work around NE, AV1, AV2. Carry out resistance profiles at SSE. These will be done as a series of radial profiles. Download day 3 results.
Friday 24th July
Concentrate on CV, with magnetometer survey, magsus, twin probe, and if results are encouraging, resistance profiling. Download day 4 results.
Saturday 25th July
Overhead photography at NE, AV1, AV2.
Demonstrations of geophysics at CV, MC and NE, AV1, AV2. Details to be determined as results become available. Public participation in twin-probe and magsus will be encouraged.
If time permits, EDM survey at CV before public events start, with demonstration/public participation at CV.

Results publication
It is anticipated that EH will require a report within three months of July 25th as a condition of licence. This will be prepared by BACAS in consultation with BANES.

Continuing to the future
Geophysics research for the festival is to be concentrated in the areas of public access, but there are sites in the vicinity which could benefit understanding of the complex, and there is scope for further work in the public areas when particular equipment becomes available.

Future work is considered here. However, it is suggested that a section 42 licence be obtained to do only the scheduled work, and if another licence is required for future research, that is obtained separately.

A complete formal photographic record of each stone, both from side and overhead, in all circles, avenues, with the stones planned in by EDM, to produce a 'virtual tour' of the visible stones.

The area around HV could be subject to geophysical survey to see if the stone has any context in the landscape. Magnetometry would be the preferred technique. Resistance techniques may prove a bonus. Separate landowner/tenant permission would need to be sought.

TY needs to be investigated, although access is not easy. Do these stones have any archaeological context which could be detected by geophysics? Separate landowner/tenant permission may need to be sought.

The field opposite the Druids Arms was subject to magnetometry when a portion was separated off as a sports field, and it is reported that there was sufficient there to encourage the study which led to the major discoveries. Results of this original survey are lost. A full magnetometer survey of the field may yield useful data on the Stanton Drew landscape.

There have been suggestions of the existence of a small stone circle, now lost, on Leigh Down, about 5 km to the west, and this area is cited as one of the areas of origin of the stones. A targeted survey in this area may yield signs of that circle, or of other stones similar to those at Stanton Drew. Separate landowner/tenant permission would be required. Note also, this is outside BANES, and would require cooperation with North Somerset District and any local archaeological societies there.

Schedule prepared by Dr John Oswin, Geophysics Team Leader, 32 Connaught Mansions, Great Pulteney Street, BATH BA2 4BP, JohnOswin@aol.com, 01225 462966 and Bath and Camerton Archaeological Society (www.BACAS.org.uk) May 2009

Appendix C Short Notes

1 The alignment of NE Circle, the Main Circle and Cove has been noticed previously, but the important factor is that the alignment is midwinter sunset. In theory it could be the other way round, but that would look downhill with a distant hill blocking the horizon, so midsummer sunrise is unlikely to be the case.

2 A former resident spoke of always going down to the stones mid December to see the sunset.

3 Note that any alignment through the Main Circle must assume the centre of the circle is marked. It is too big for this to be estimated. Also, if it were filled with timber posts, these would also obscure sightlines.

4 This also applies to the alignment through the Main Circle from SSW Circle to Hautville's Quoit. Note that this need not be important astronomically. SSW is perched on the highest point and that could be its chief significance, but Hautville's Quoit could then only have been placed after the Main Circle and SSW. The sightline is now obscured by a modern cow barn.

5 English Heritage report a timber four post structure on SSW Circle. If this has any alignment of importance at all, it is to where the avenues meet.

6 On 8th August 2009, BACAS surveyors met Dr Jodie Lewis of Worcester University and dowsers led by Mr Paul Daw. Mr Daw has produced a detailed map of the site indicating many extra stone positions around the ring of the Main Circle and an extension of the avenues to the river. During the morning, he indicated signals around the Cove, and a colleague using rods appeared to confirm areas of buried stone indicated by the resistance survey. Mr Daw also indicated a possible break in the ditch of the Main Circle to the south-west, and possibly an avenue running from it, although this appeared directed to the farmhouse. This area was not covered by magnetometry during the week.

7 Mr Daw also gave the whereabouts of a stone circle on Leigh Down (see appendix B). This appears very clean and orderly as if restored. There is a quarry below the site. There does need to be a comparison between these stones and Stanton Drew, although the former are much smaller.

8 A Stanton Drew resident has reported a deep shaft in the garden of his cottage just north of the church. He also mentioned deep shafts, one right next to the church, one just in the farm driveway immediately east of the church.

9 The stone M12 is recumbent, square and flat. From its shape it looks as if it could only have ever been in this position, and not toppled. Its surface is now badly weathered, and is well pock-marked. These could have started as cup marks, but the weathering is too intense to support such a suggestion.