RESEARCH DEPARTMENT REPORT SERIES no. 109-2010 ISSN 1749-8775

STONEHENGE WORLD HERITAGE SITE LANDSCAPE PROJECT
STONEHENGE, AMESBURY, WILTSHIRE ARCHAEOLOGICAL SURVEY REPORT

David Field and Trevor Pearson

ARCHAEOLOGICAL
SURVEY AND INVESTIGATION

ENGLISH HERITAGE

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NGR: SU 12244219

ISSN 1749-8775

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SUMMARY

Analytical survey of the ground surface at Stonehenge revealed the presence of a number of interesting earthworks that have a bearing on interpretation and the development of the monument. Chief among these is a low mound that was revealed within the stone settings. Its location focuses attention on that part of the arrangement which is ruinous and supplements former reservations as to whether the monument was ever complete. Survey also revealed that the Y and Z holes are visible as earthworks and that each circuit has a shallow bank within it. The feature known as the North 'Barrow' may have preceded the enclosure and therefore be one of the earliest elements at the site. The South 'Barrow' by contrast is, at least in one of its phases, a later feature. These are clearly not barrows and the more neutral term 'circles' is therefore preferred. An outer bank to the enclosure has been largely truncated by cultivation, while a mis-match of the Avenue at the enclosure entrance indicates that the two may have been mutually exclusive entities. The eastern ditch and bank of the Avenue is revealed to have changed course, perhaps in an attempt to avoid the pre-existing ditch around the Heel Stone.

CONTRIBUTORS

David Field and Trevor Pearson carried out the survey assisted by Deborah Cunliffe, Nicky Smith, Mark Bowden, Andrew Burns and Peter Topping. James Davies photographed many of the 18th and 19th century illustrations of Stonehenge held at the Wiltshire Heritage Museum as well as the monument itself in various light conditions. The plan was penned by Deborah Cunliffe, while computer modelling and technical survey was conducted by Trevor Pearson, historical and documentary research by David Field and historical air photography by Martyn Barber. In addition Mark Bowden and Jonathan Last commented on the manuscript.

ACKNOWLEDGEMENTS

Felicity Gilmour, Diane Sims, Nicky Cryer and Helen Jurga in the NMR library were of tremendous help and assistance. David Dawson at the Wiltshire Heritage Museum, Devizes, kindly allowed part of the collection of illustrations to be photographed, while Jane Ellis-Schön at Salisbury and South Wiltshire Museum similarly provided copies of illustrations of Stonehenge. Peter Carson, Stuart Maugham site manager and the staff at Stonehenge eased access and made us welcome. Mike Allen, Ros Cleal, Tim Darvill, Andrew Lawson, Mike Parker Pearson and Mike Pitts all made helpful comments and participated in discussions regarding the interpretation of aspects of the survey. Andy Payne and Paul Linford commented on earlier geophysical work at the site. Their fresh geophysical work as part of the Stonehenge WHS Landscape Project will be the subject of a separate report.

A number of other individuals assisted at various times and concerning different matters: Justine Bayley, Joanna and David Bird, Emma Carver, Amanda Chadburn, Jon Cotton, Stephen Fisher, Susan Greaney, Nicola Hembrey, Martin Henig, Jonathan Last and David Vaughn, our thanks go to them.

ARCHIVE LOCATION

The survey archive is lodged at the National Monuments Record Centre, Swindon, Wiltshire, SN2 2GZ.

DATE OF SURVEY

Survey was carried out between 23 March – 9 April 2009 and preparation of the plan coupled with analysis and documentary and other research spread over June, July and August 2009 allowing an interim statement of results to be published in spring 2010 (Field *et al* 2010).

CONTACT DETAILS

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1. INTRODUCTION

Stonehenge is probably the best known prehistoric monument in the world. Visited for centuries, tourist numbers steadily increased during the 20th century until now about one million people are thought to visit the site annually, over 900,000 through the English Heritage turnstiles. In terms of numbers the largest event takes place annually on June 21st, midsummer's day; in 2009 an estimated 30,000 attended in order to observe the sunrise over the Heel Stone. As often is the case the clouds did not oblige. Guidebooks are available in five languages and audio guides in ten, but there is an enormous amount of printed literature about the site - the British Library lists over 400 books and over 100 journal articles - while Google lists over 5 million internet entries or references. Everything is here: mystery, magic, secrets, druids, King Arthur, calendars, computers, solar and lunar alignments, while the site had also provided a backdrop to countless novels, films, TV programmes and a huge variety of advertising campaigns. This present report introduces a new dimension - something rarely if ever, considered in popular literature – the earthworks. They have a fresh and important contribution to make.

The monument comprises an earthen bank and ditch forming an almost circular enclosure; open in the north–east where parallel linear earthworks known as the Avenue abut it. Within is a ruinous stone setting, comprising a part circuit of 25 sarsen stones, boulders native to the Wiltshire Downs, many of which are partially dressed, set upright and support lintels and which enclose a further horseshoe arrangement of ten huge sarsens set in pairs each capped with a lintel and referred to as trilithons. A part circuit of 22 'bluestones' and a further horseshoe arrangement of 14 similar stones also lie within the layout, comprising boulders of various types that are not native to the surrounding countryside. Including lintels there are 83 stones in total. Two other stones on the periphery have been described as Station Stones and these figure prominently in astronomical conjectures, while a prone Altar Stone lies partially covered by fallen stones a little south of centre, a prone Slaughter Stone lies within the north-east entrance and, set within the Avenue just to the south of the A344 road is a further large undressed boulder, the Heel Stone. The latter is known, in particular, as that above which the sun rises on midsummer morning when viewed from the centre of the settings.

As might be expected at such a site, there has been a lengthy period of antiquarian study and excavation some of which is extremely poorly recorded. Major excavations during the earlier part of the 20th century provided some chronology (Gowland 1902: Hawley 1921; 1922; 1923; 1924; 1925; 1926; 1928). These confirmed the long-suspected prehistoric date of the site and suggested that the construction phases spanned some 1500 years, from about 3000BC until about 1500BC. Excavation in the 1950s and 1960s led to the identification of three major phases of activity (Atkinson 1956; 1979) and analysis of the 20th century excavations has refined that chronology (Cleal *et al* 1995). In Phase 1(c2950 to 2900 BC) a circular ditch approximately 100m in diameter was cut with internal bank and external counterscarp leaving an enclosed space with an entrance gap in the north-east and a smaller, less well defined one, in the south. The ditch was dug in segments after the fashion of early Neolithic causewayed enclosures and contained deposits of animal remains and artefacts. Within the inner bank lies a circle of pits known as the Aubrey holes, thought by some to have held stones or posts.

During Phase II (c2900 to 2400 BC), the ditch was in part backfilled and re-cut in places, a feature characteristic of causewayed enclosures, while after extraction of stones or posts, cremations were placed into many of the Aubrey holes. Timber buildings or settings of posts were erected in the interior and to the south of the stones, as well as in the north-east entrance where they are thought to have formed a filter or screen. In Phase III (c2550 to 1600 BC), several arrangements of stones, massive sarsens with lintels and smaller 'bluestones' were erected, rearranged and re-set. The Avenue, which is connected to the north-east side of the earthen enclosure, is generally regarded as being of this phase and associated with the solar or lunar alignment of the stone settings.

Relatively little attention has been given to the later use of the site and the phased chronology stops at c1600BC. However, the recovery of much Roman pottery and various other stone and metal items and coins during the excavations indicates an intense interest in the site during that period. Medieval cultural material, though present, is very much sparser, presumably indicating continuing, although perhaps sporadic, use of the site.

Aside from the academic attention of archaeologists and historians, the site has also had a long connection with astronomers, whose interest was kindled in 1720 when Dr Halley, using magnetic deviation and the position of the rising sun to estimate the age of Stonehenge, arrived at a date of 460BC (Stukeley 1740, 65: also Burl & Mortimer 2005, 31). John Wood (1747) and others considered the site to represent a calendar whereby the different colours of the stones were intended to represent symbols of day and night and good and evil, while the position of the stones with respect to that of the moon indicated to Wood that the site was principally a 'Lunar Temple'. He was followed by John Smith who considered that the estimated total of 30 sarsen stones multiplied by 12 astrological signs equalled 360 days of the year while the inner circle represented the lunar month (1771, 64) and that the temple was erected for 'observing the Motions of the Heavenly Bodies'. Norman Lockyer (1901; 1906) continued this line of investigation and conducted work along similar lines to Halley. During the 1960s this aspect of Stonehenge was given added impetus by the early computer analysis of Gerald Hawkins (1966) which indicated that various stone alignments could be matched with certain solar or lunar events and these astronomical aspects were subsequently pursued by Fred Hoyle (1971; 1977) and others. There is also spiritual interest. Following the arguments and discussions of Inigo Jones and his successors as to whether the historical (Iron Age) druids had constructed Stonehenge or whether it was Romans or Danes, modern druids have felt an affinity with the place and have met at the site since at least the late 19th century. Gatherings at the site since the 1970s have been of a different nature, a focus for counter or alternative culture events often attracting large numbers of people (Worthington 2004).

Servicing the enormous interest of these various parties is the ultimate purpose behind the present work and it provides basic data from which to construct hypotheses. The Stonehenge Landscape Project aims to investigate and analytically survey the earthworks and landscape within the World Heritage Site to meet the requirements of the new visitor centre which was to be in operation for summer 2012 (Bowden & Field 2009) but is now scheduled for 2013. It also seeks to complement and support the recent

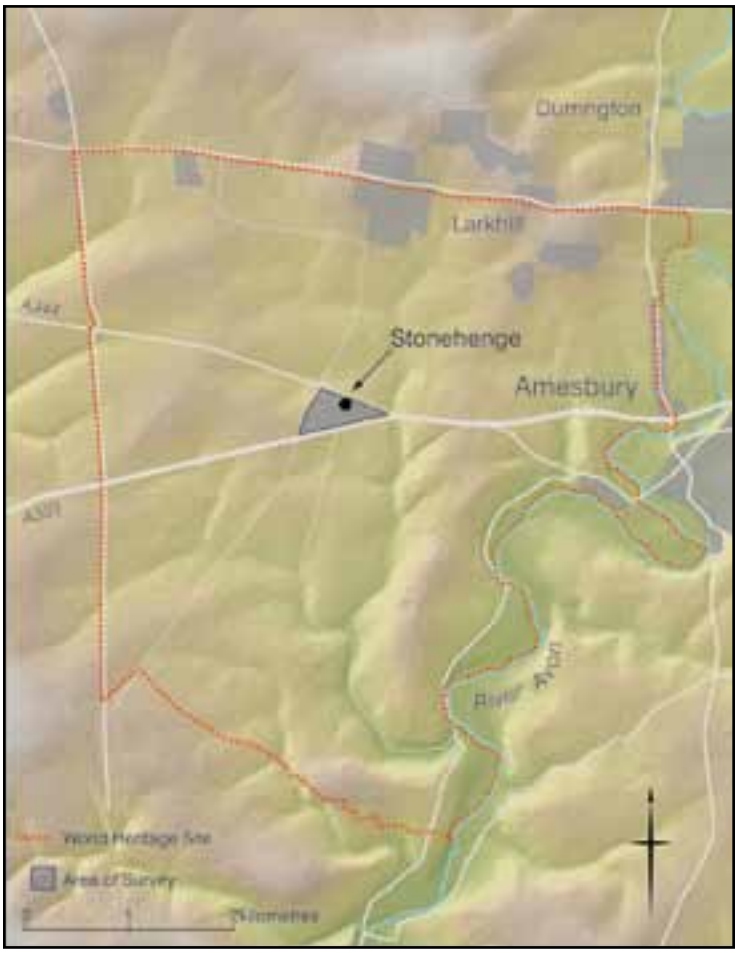

Figure 1. The location of Stonehenge with the area of survey and the boundary of the World Heritage Site.

university field archaeology projects at and around Stonehenge (Parker Pearson 2007; 2009: Tilley *et al* 2007: Darvill and Wainwright 2009) which will have considerable impact on the interpretation of the site and it should assist with discussion and re-interpretation. The stones themselves have been surveyed on a number of occasions, most recently in 1990 by M J Rees and Co. for English Heritage (National Monuments Record). It might be assumed that such a famous group of monuments has been subject to replicated analytical survey but this is not the case. Many of the sites in the area have not been surveyed since Ordnance Survey cartography in the earlier part of the 20th century. Much archaeological knowledge of the area rested upon these earlier surveys which were executed for the purposes of land and topographic record, rather than archaeological purposes. The same is true of Stonehenge itself and it is noteworthy that the excellent and definitive account of 20th century excavations (Cleal *et al* 1995) of necessity utilized a plan of earthworks redrawn from 1919 Ordnance Survey mapping. Therefore the earthworks at Stonehenge were surveyed in spring 2009 and analysis, documentary and historical research and other investigations were undertaken during the months following.

Several excellent accounts of Stonehenge have been published in recent years (Burl 2006: Darvill 2006: Lawson 2007: Johnson 2008: also see Pitts 2000 and Richards 2007) and the reader is warmly pointed in the direction of those. Most have touched on certain

aspects of the historical background and landscape context in one way or another and an attempt to avoid repetition has been made here. Johnson's approach, in particular, is of a field surveyor's perspective and certain chapters of his volume can be read with benefit with regard to the present work. This report is divided into three parts. Findings of the earthwork survey and aerial photograph search are described in part one. Excluded are details of fresh geophysical survey conducted as part of the project which will appear in a separate report and readers are referred to the earlier work by Andy Payne published in Cleal *et al* (1995, 495-510). Investigation of maps and documents relating to the site along with relevant historical data concerning antiquarian activities at Stonehenge follow in part 2, the focus being on landscape development and interpretation particularly where they have a relevance or bearing on the earthworks. The third part discusses the points raised and draws the work to conclusion. While covering all the usual investigative aspects of Research Department analytical survey in order to provide historical depth and landscape perspective, it should be re-emphasised that this report concentrates primarily on the earthworks rather than the stones. Nevertheless, as will be apparent, it is impossible to examine the site in any meaningful way without discussing the stones and consequently a short section has been devoted to them.

Location

The site lies within a triangle of land, which is in English Heritage Guardianship. This is bordered in the south by the A303 road, in the north by the A344 and the area of regulation taken to a public bridleway in the west. It is situated on the undulating chalk downland of Salisbury Plain. To the north lie the extensive military ranges where the extant archaeology has been recorded and analysed by earlier investigative work (McOmish *et al* 2002), while to the south as far as Salisbury, most of the land has been cultivated and many formerly upstanding remains levelled. Stonehenge itself is encompassed by a zone of recognised archaeological importance demarcated as a UNESCO World Heritage Site, which covers an area of some 6km by 5km in extent (Fig 1) and within which lie a large number of other important prehistoric monuments.

Situated in the parish of Amesbury, Stonehenge lies about 12km to the north of Salisbury, at just over 3km from the manorial core and beyond the former medieval arable fields. It is registered in the National Monuments Record as number SU 14 SW 1 and is Scheduled Monument number 10390. Other relevant reference numbers are listed below. The stones themselves were allocated numbers by Flinders Petrie following his survey in the latter part of the 19th century (Petrie 1880); these are widely accepted and are used here.

Site	NMR	SMR	Scheduled Monument No	ViewFinder	EH Property	NBR Index
Stonehenge	SU 14 SW 4	SU14SW1, 10F, 107, 155, 157, 160, 168, 200, 207, 302, 307	WI 290, 10390	NMR 15041/26, P50461, P50331, P50803	317	110724
The Avenue	SU 14 SW 275					

Table 1. Concordance of reference numbers

PART ONE

2. THE EARTHWORKS: DESCRIPTION AND INTERPRETATION

Careful survey and study of the surface within and immediately around the stone settings revealed that despite the depredations of countless visitors, antiquarians and archaeologists over centuries, a good number of surface undulations still survive for study. The shallow earthworks on the ground were meticulously plotted and the results depicted with hachures in the standard manner (Fig 2). Additionally, co-ordinates were taken at small intervals across the site, plotted as contours and digital models constructed (Fig 3).

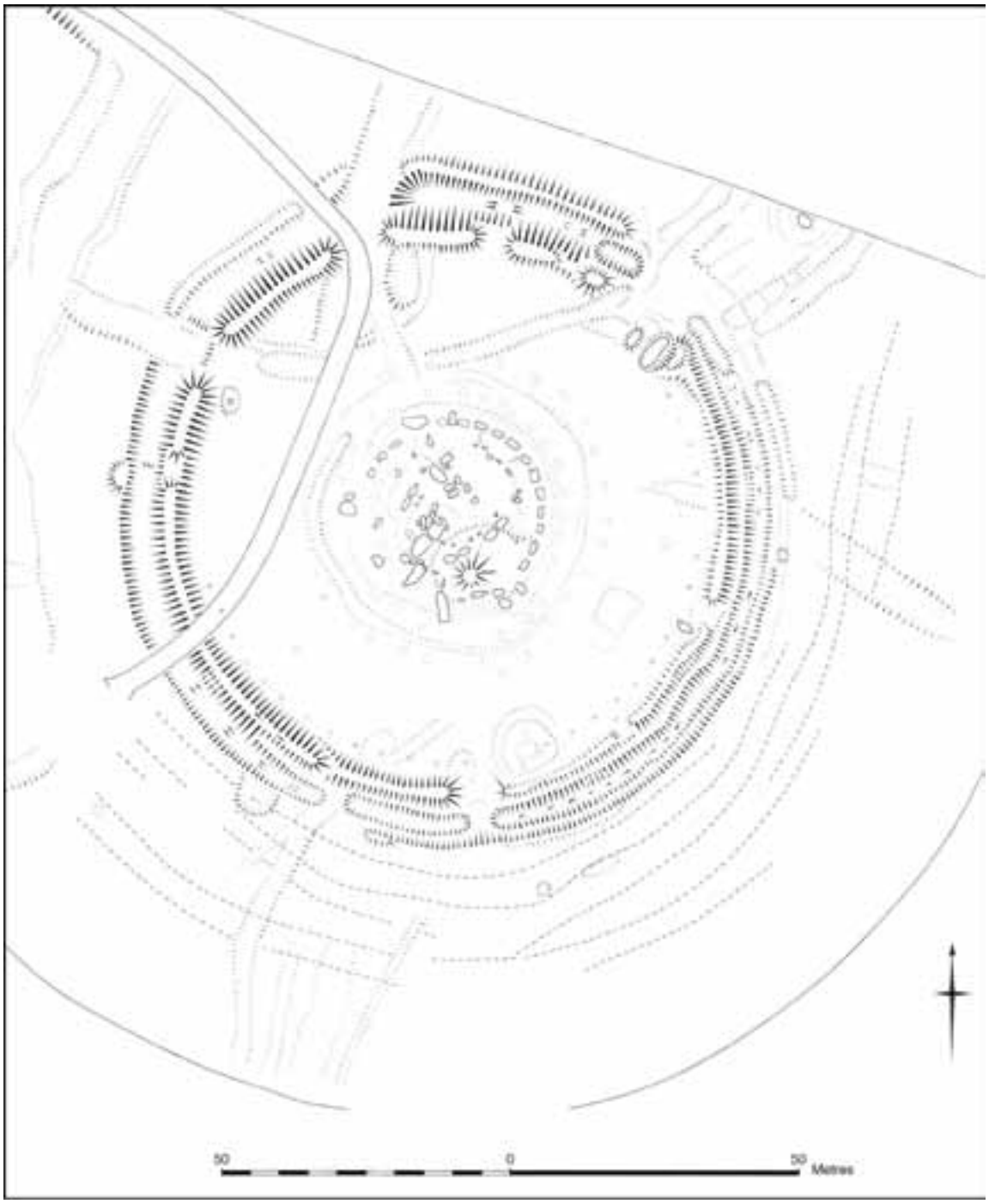

Figure 2. Survey plan of Stonehenge reduced from 1:1000 scale original.

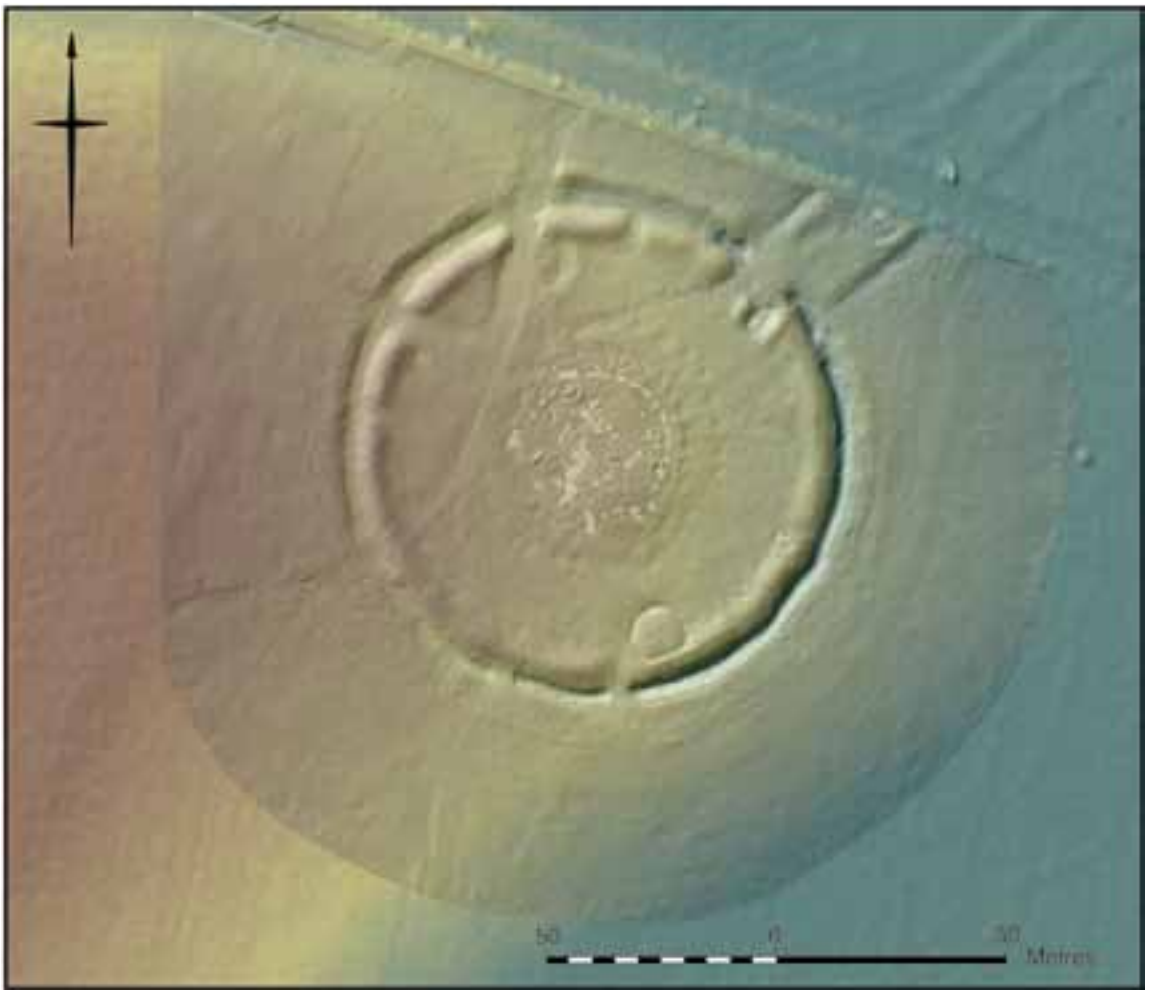

Figure 3. English Heritage ground model of Stonehenge combined with lidar data (Lidar © Environment Agency (December 2001).

The results are described below under a number of headings starting from the centre of the site and working outwards: i) a mound among the stone settings; ii) the X (Aubrey), Y and Z holes and associated earthworks; iii) the North and South 'Barrows'; iv) the enclosure, v) The Avenue and, vi) modern earthworks.

A mound among the stone settings

Placed off-centre towards the south-east of the stone settings is an oval mound some 15m east-west by 13m north-south and which reaches 0.25m in height. It is depicted on the hachured plan (Fig 2), but can also be seen as modelled contours (Figs 4 and 5). It is of shallow profile (Fig 6) and well-weathered and appears to underlie a number of fallen stones. The changing gradient of slopes suggests that it may be of two phases, comprising a lower platform or plinth with a slightly higher mound placed almost centrally on it. Further precision is hard to obtain because of the difficulty in determining exactly where the mound merges in to the natural slope. On the east it appears to spread slightly beyond two of the stones in the outer circle (Petrie numbers 6 and 7 see Figure 19), while in the west there is a clear separation between the mound and the underlying natural slope. The mound has apparently not been commented on before and is discussed in greater detail below (Chapter 5).

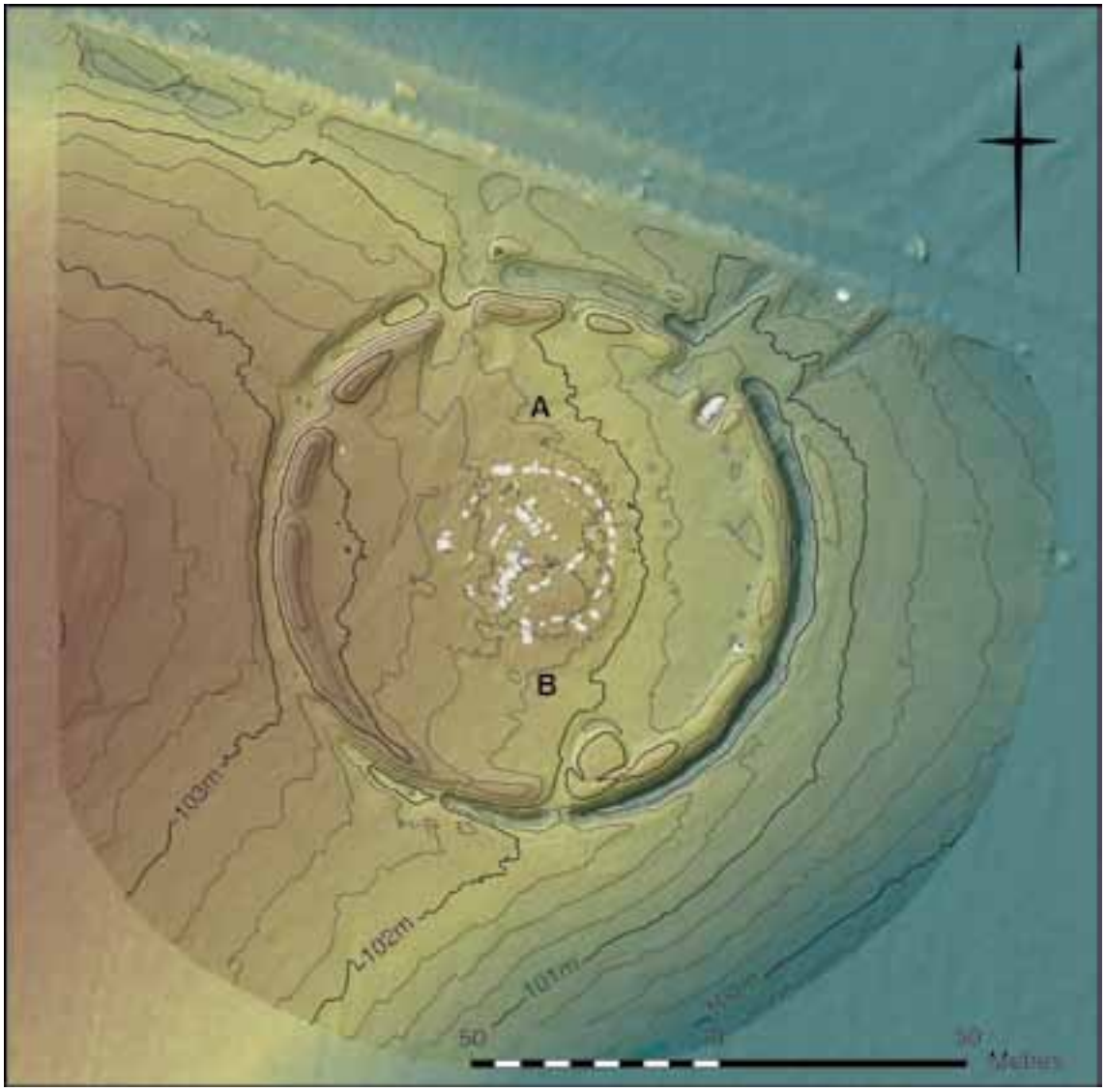

Figure 4. English Heritage ground model of Stonehenge combined with lidar data with contours at 0.25m intervals (Lidar ©Environment Agency (December 2001)). The letters A and B mark a deviation in the natural curvature of the 102.25m contour that may indicate that the ground has been levelled to create a platform or, represent the accumulation of cultural deposits in the vicinity of the stones.

The X (Aubrey), Y and Z holes and associated earthworks

Three circuits of pits between the stone settings and the earthwork enclosure bank were discovered by Colonel Hawley during his programme of excavation during the 1920s (Hawley 1922; 1923; 1925; 1928). The circuits were numbered consecutively X, Y and Z, the X circuit lying just within the enclosure bank and the Z circuit closest to the stones. The X holes were subsequently re-named the 'Aubrey' holes after John Aubrey who was thought to have first observed them in the 17th century (see below). The latter were evidently not visible on the surface but found by probing with an iron bar. A number were excavated and their positions marked with painted concrete. No earthworks marking the position of the Aubrey holes are now evident and in a number of cases turf encroaches on the concrete. Twenty-six of these were noted during the survey spaced

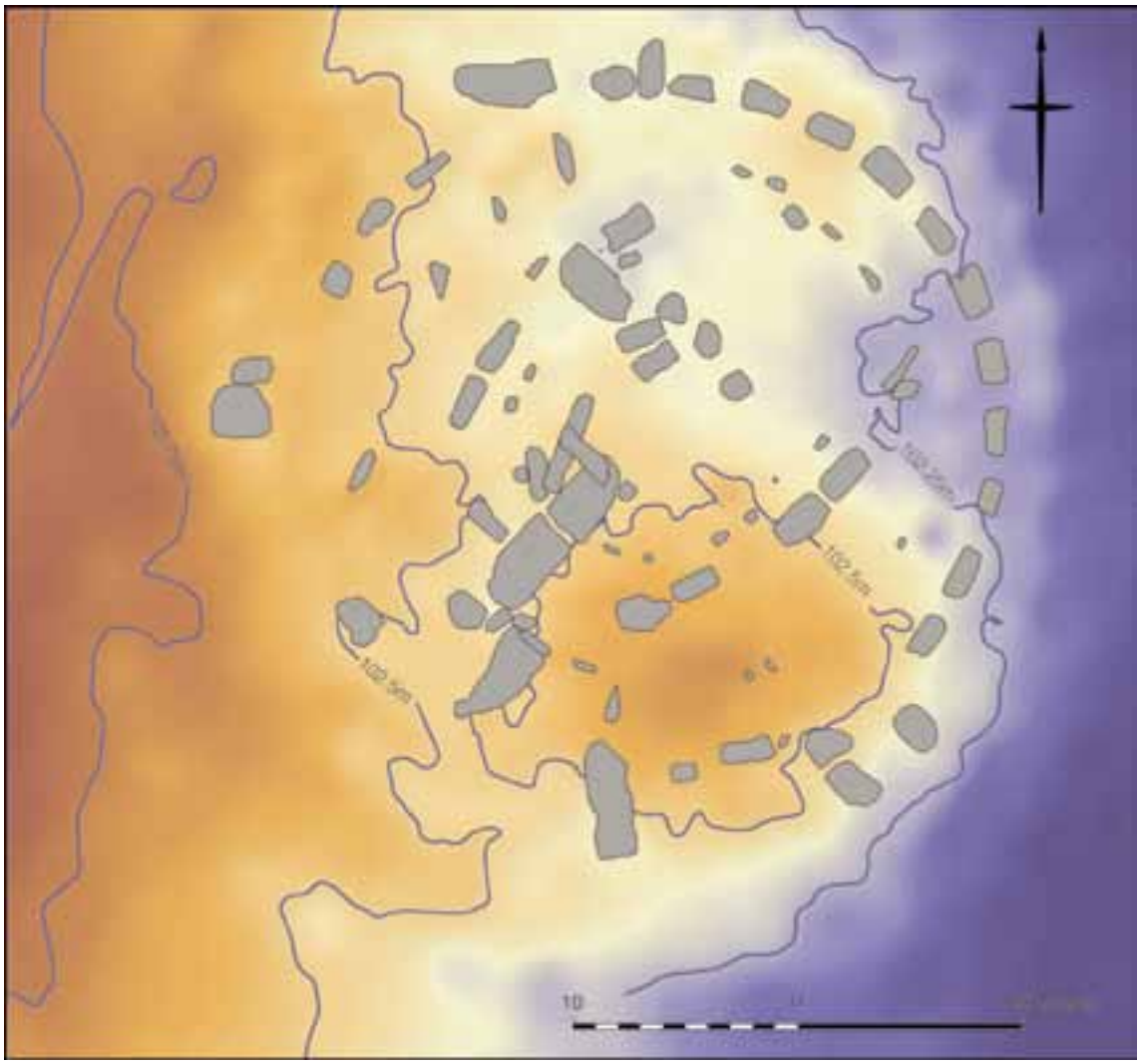

Figure 5. English Heritage ground model of the centre of Stonehenge with contours at 0.25m intervals.

out at intervals of between 8 and 11.5m with most between 9.5 and 10m. No probing or clearing of grass was carried out in order to identify others. Given that the known total is fifty-six and thirty-two had concrete placed on them (Cleal *et al* 1995, 26, 96) a considerable number are not visible.

Shallow surface depressions do, however, exist for circuits that correspond with the Y and Z holes. No more than 0.1m deep, they vary slightly in plan form but are generally oval rather than circular and measure little more than about 2m by 1.5m. The position of twenty-three Y holes was ascertained, but the spacing, which varies from 7m to 13m, suggests that the original total might have reached thirty. There is an apparent gap, of 20m in the south. Additionally a further depression was noted in the south-east as part of the circuit although a little out of alignment with the others. The fact that these holes survive as visible depressions does not appear to be the result of Hawley's excavations, because some of them are found in areas that were not excavated.

Within the circle of Y holes is a shallow bank measuring a maximum of 5m in width (Fig 2: also see Fig 19 and Figs 4 and 5 where it appears as anomalous rebates in the contours

and coloured densities respectively). In some places this is represented by a simple scarp that appears to partly surround or back the Y holes. Only part of this bank is visible on the contour model due to its horizontal axis and plotting interval but its course can be traced on the hachured plan. It is possible to suggest that the scarp is the product of Hawley's excavation trenches and its spoil although there are certain factors (below) that indicate otherwise. While evidently forming a circuit, there is a gap in the north-west where a trackway and the former visitor pathway overlie the earthworks. The rest of the circuit is not precisely circular but comprises a series of sinuous bulges and sharp angles.

The circuit of twenty-two depressions that correspond with the Z holes is of greater irregularity than that of the Y holes. In the north-east, they mirror the position of the extant sarsen uprights. Z holes 1-6 are visible on the surface (see Cleal *et al* 1995, 257 fig 151 for numbering), 7 is missing, 8 and 9 are present though 8 was not encountered in excavation and 9 is south of the area depicted by excavation (unless these are depressions unconnected with the circuit). 10 to 12 are missing on the surface, although there is a depression to the south of where 12 should be, 13 is missing on the surface but both 14 and 15 are present. There is a gap of almost 25m in the south broadly opposite the long gap in the Y holes and several are missing, or at least unobserved, in the south-west part of the circuit. Depressions can be traced where holes are thought not to have been excavated, as in the case of those in the west and north-west of the monument. It is therefore presumed that these are an original feature and not something created by imperfect backfilling after the 20th century excavations.

A further bank lies between the Z holes and the sarsen circle (Fig 2). This reaches a maximum of 5m across and like its partner is extremely slight reaching a mere 0.1m in height. It cannot be traced in the west and in the south-west occurs only as a single scarp. In plan, the north-east part of the arc is crescentic and closely follows the line of the extant part of the sarsen circle, but elsewhere its absence mirrors the lack of stones. In the south there is a trench-like disturbance to the circuit which extends between prone sarsens 9 and 12.

The North and South 'Barrows'

The feature generally called the North 'Barrow' has been largely destroyed by a series of trackways that cut across it. The remaining portion comprises a crescentic bank with an internal ditch that appears to butt up against or underlie the bank of the enclosure. It does not overlie the bank. Whether it underlies is not readily determined from the earthwork association. Similarly, the ditch does not cut into the enclosure bank. The remaining segment of the ditch is 5m wide and a maximum of 0.15m deep and the accompanying bank of rather narrower proportions, 2.5m wide and 0.1m in height. These dimensions contrast with those of the South 'Barrow'. It is not a barrow in any usual sense of the term for despite the damage the interior appears to have been flat, or nearly so, and with an external bank it might better be described as a mini-henge or similar monument.

The feature known as the South 'Barrow' is located just within the inner bank of the enclosure to the south of the sarsen circle (Fig 2). It comprises a narrow and shallow

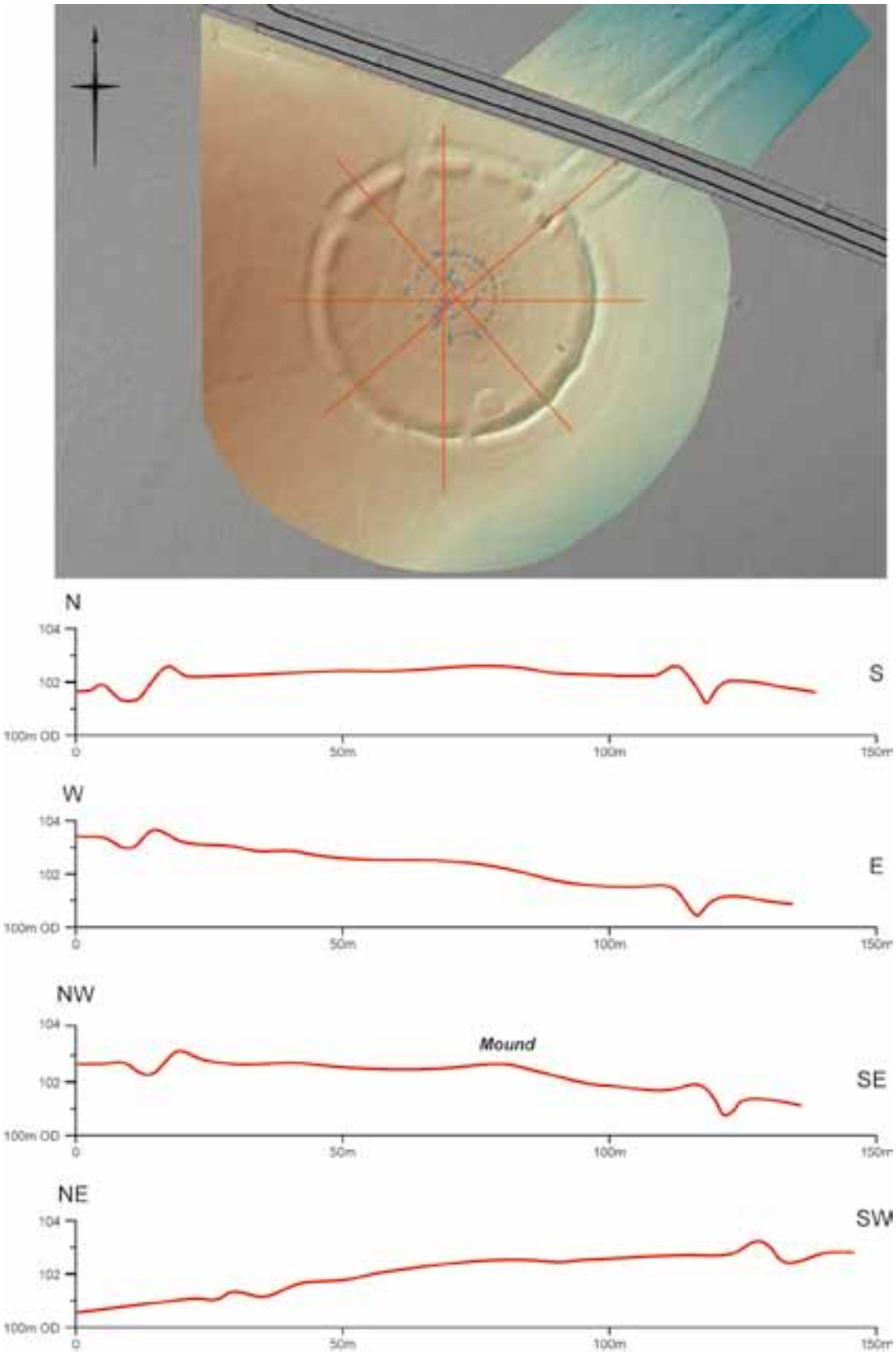

Figure 6. Selected profiles across the Stonehenge enclosure extrapolated from the English Heritage ground model (vertical scale x5 horizontal).

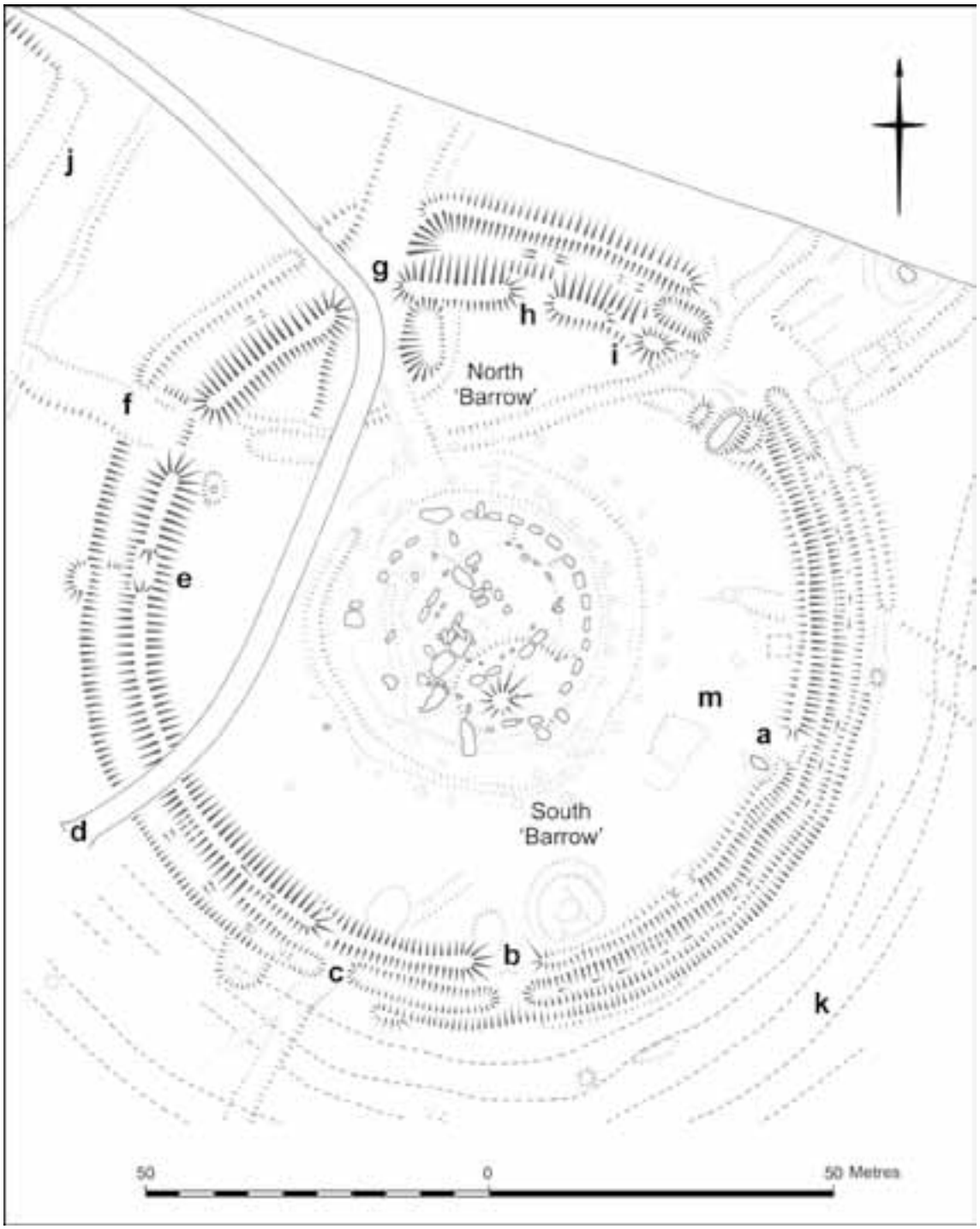

Figure 7. English Heritage survey plan labelled with features referred to in the text.

ditch that encompasses a very low mound, generally circular in plan, but flattened on the southern side where the ditch is squared off respecting the inner bank of the enclosure but also cutting into it. It reaches 0.2m in height and measures 10m by 10m, while the ditch is no more than 0.2m deep. As seen, it is clearly of later date than the enclosure bank.

The Enclosure

An enclosing earthwork, more or less circular in plan, comprising a ditch with external and internal banks surrounds the sarsen settings leaving a relatively level open space between it and the stone arrangements of some 30m. The enclosure ditch, up to *c*6m wide in the west where its internal slope merges with the bank, is generally *c*4 m wide in the east by a maximum of 0.6m deep and describes a circle of close to 102m diameter measured between respective internal lips. There are minor variations of up to 1m, but it is slightly flattened in the north and north-west and these straight sections are emphasised in the outer bank where each can be traced for a distance of *c*75m.

A sinuous indentation in the inner face of the ditch in the south-east, just 15m south of the Station Stone, is reflected by the inner bank and it is conceivable that it marks or respects some pre-existing feature.

Internal and external banks both reach *c*5m in width but the external bank has been almost levelled by cultivation leaving just small portions extant. It is best preserved in the north where it reaches 0.4m in height. Here the proximity of the highway may have discouraged cultivation. With care, however, it can still be traced for most of its circuit but its outer limit is now marked by a plough furrow and the slope of the bank grades almost imperceptibly into the plough ridge. The digital terrain model (Fig 3) probably best illustrates this. The inner bank reaches a similar height of 0.4m measured internally on the north-west, but in contrast it maintains a similar height around most of the circuit.

There are a number of breaks in the enclosure, notably in the north-east at the junction with the Avenue where there is a gap of 11m between ditch terminals and 14m between the ends of the bank. There is a gap of 3m in the east, immediately north of the Station Stone (Fig 7, a). A slight plinth remains and coupled with the fact that there is no causeway across the ditch at this point indicates that it represents wear from traffic and does not mark an original entrance. In the south-east, a similar gap occurs.

In the south, a 5m wide gap in the bank is matched by a causeway across the ditch (Fig 7, b) and it is this that has been thought to represent an original entrance (Cleal *et al* 1995, 110-111). A slight scarp between bank terminals can be traced facing the ditch. There is some indication of a terminal in the outer bank here also, at least on the east side, however, the inner scarp appears to continue and bears little evidence of traffic entering across it and through the gap. It should be noted, however, that Cleal *et al* (1995, 110) suggest that the gap was modified during the 20th century.

By contrast, a causeway in the ditch 25m to the west does bear evidence of traffic (Fig 7, c) in that a shallow hollow way can be seen approaching and continuing into the interior. While the outer bank is not present at this point, there is no wear on the inner bank and no conservation measures or reconstruction is known to have taken place (although see Chapter 3). Instead the bank continues to the west with increased height. It could be that material from the outer bank was used to fill the ditch and allow access, but the causeway appears quite solid and may be original.

West of this point and indeed for the rest of the western part of the circuit, the ditch and inner bank take on a different character. A number of subtle raised areas on the ditch floor may indicate the presence of further formerly unrecorded causeways, while at c6.5m wide compared to 4m in the east, the ditch itself appears to be broader and shallower (Figs 6 & 7). The bank, c5.5m wide in the west and 4m in the east is also more substantial both in height and width. The modern walkway cuts through the earthworks in the south-east but, judging by a shallow trackway approaching from the south-west (Fig 7, d), appears to follow the line of an earlier break.

In the west, a 2m wide gap through the inner bank is matched by a rise in level of the bottom of the ditch coupled with a 6m stretch of surviving outer bank (Fig 7, e). The three features are not, however, precisely opposite each other, but create an oblique alignment and there are no trackways that can be seen to approach so other explanations are necessary here. The material on the ditch floor might be accounted for by the bank having been pushed into the ditch but it is difficult to account for the survival of an isolated portion of the outer bank.

Just 20m to the north, is a substantial break, almost 5m wide, through the bank (Fig 7, f). There is no corresponding causeway and the hollowed trackway that approaches from the west makes it clear that the break is unlikely to have been original. The trackway can be traced internally across the north-west part of the enclosure exiting into the western ditch of the Avenue. For part of the way it is flanked on the north by a low bank *c*7m wide.

A major break in the earthwork occurs in the north-west (Fig 7, g). Here separate tracks have conspired to erase and obscure subtle earthwork detail. One, some 7m wide, with a 2m wide bank on its east, approaches from the north and dramatically cuts through ditch and both outer and inner enclosure banks. It may once have continued to exit to the south-west of the earthwork somewhere on the line of the present visitor pathway, but cannot be traced that far and it is curtailed by the aforementioned trackway entering the enclosure from the west (Fig 7, f). The earthwork of a former visitor path that appears to have once continued towards the central stone settings also enters at this point.

In the north, a 3m wide break through the inner bank is not matched in the outer bank (Fig 7, h). There is a rise in level of the floor of the ditch at this point as though some of the bank material has been pushed in, but there is no evidence of trackways creating a thoroughfare. Finally, there is a degree of wear in the inner bank just 15m west of its terminal at the Avenue (Fig 7, i). No engraving or attrition of the interior surface is visible but it is conceivable that the wear represents traffic across the bank taking a shortcut into the trackway along the Avenue ditch. The deeper and proud profile of the ditch at this point, and indeed for much of the eastern part of the circuit, marks the portions excavated by Colonel Hawley during the 1920s (Hawley 1924). Fluctuating levels on the ditch floor may mark the position of causeways shown to have been present by the excavation.

The Avenue

Parallel ditches set almost 20m apart extend in the north-east from a gap in the enclosure circuit towards the A344 road and beyond for over 550m into Stonehenge Bottom where they turn sharply eastwards to climb the King Barrow ridge before turning south to reach the River Avon at West Amesbury. The portion described here lies to the south of the A344 and extends for 30m from the enclosure ditch. Both Avenue ditches exhibit the wear of trackways, but as can be seen from the profiles (Fig 8), the north-west has suffered the most. Inside each ditch is a corresponding bank no more than 3m wide and 0.2m high. The south-east bank and ditch appears to change direction 5m south of the roadside fence. From the gap in the enclosure, the south-eastern Avenue ditch fans outward towards the A344 where a custodians' hut once existed, beyond which it rejoins the general alignment of the rest of the Avenue. This mis-alignment can also be seen on an aerial photograph taken in 1906 (Fig 10). It may result from an attempted avoidance of the Heel Stone ditch which lies adjacent at that point. This narrow and shallow ditch, just over 1.5m wide, can be traced for part of a circuit about the Heel Stone. In form it is similar to that around the South 'Barrow' although the extent to which this is the result of excavation is difficult to know.

Modern earthworks

As noted above, a number of trackways cut across the enclosure earthwork and lead towards the stone settings. In some cases the excavation trenches of the 20th century have destroyed details of their ultimate destination, which can in any case be guessed at. While the area was open downland there was no restriction to the directions from which the monument could be accessed, although fencing of the area in 1901 by Sir Edmund Antrobus changed that. Several of these tracks enter the monument from the south and west (see separate forthcoming English Heritage Research Department Report on the earthworks of Stonehenge Down and the area of English Heritage Guardianship) having effect on the enclosure earthwork en route. The most prominent occurs to the west of the enclosure earthwork (Fig 7j). Unlike others, this was not aligned on the stone settings, but took a north to south course that by-passed the site. It is depicted on early mapping (and aerial photographs). A further trackway (Fig 7, d – g) through the western arc of the enclosure passes relatively close to the stones. The northern component of this leads across the North 'Barrow' and exits via a prominent cut in the enclosure. The present English Heritage visitor path overlies at this point, but two shallow banks flank an earlier extension of the Ministry pathway that once took visitors to within metres of, or perhaps in to, the sarsen circle. A second enters from the west, where a 5m wide incision through the enclosure has been made at some time in the past (Fig 7f). This cuts across the north-west flank of the stone circle to exit towards the north-east using the westernmost of the flanking ditches of the Stonehenge Avenue. The route is curious. Casual traffic en-route to elsewhere could have economically by-passed the enclosure but the slighting of the enclosure bank implies a route for vehicular traffic with a need to specifically visit the stones.

Plough ridges were recorded in the area immediately around the enclosure (Fig 7, k). In contrast to ploughing in the wider area, it was carried out in an orbital fashion some time after the trackway in the west was moved, as the circuit of the

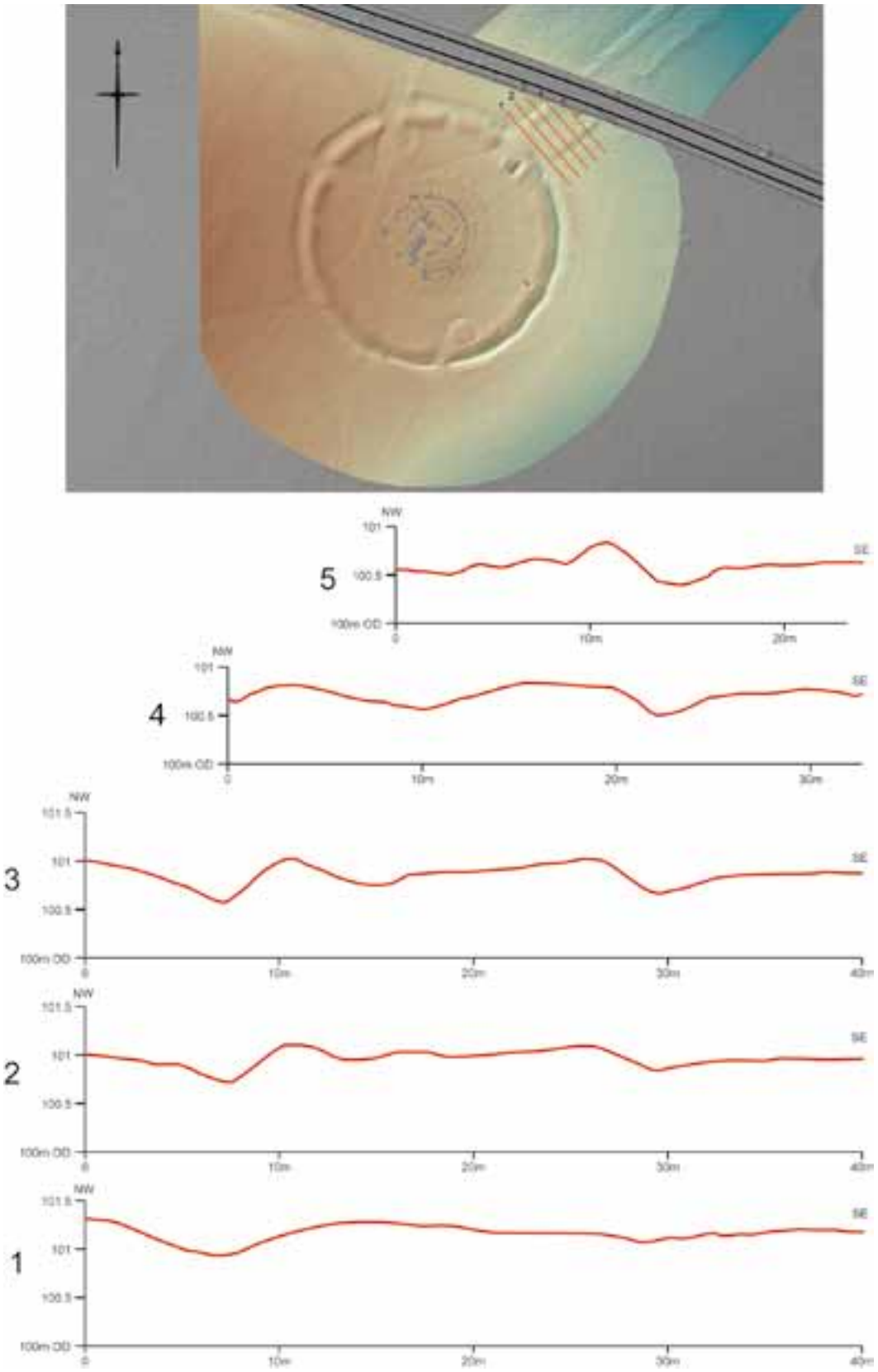

Figure 8. Selected profiles across the Avenue extrapolated from the English Heritage ground model (vertical scale x5 horizontal)

plough has cut into and across this. It is distinct from the circuitous grass cutting and vehicle marks depicted on some aerial photographs though it should be noted that the grass may have been re-laid at some point. Cultivation is known to have taken place during the 19th century and it is likely that there were episodes during the 20th century. According to William Long (1876, 186, 236) the land immediately adjacent was under cultivation such that by the 1870s he was unable to locate the barrows formerly recorded in the area. The purpose of later cultivation may have been quite deliberate; namely to level the earthworks left by the RAF camp and to obscure the trackways around the Stonehenge enclosure.

The outline of what appear to be excavation trenches can be traced to the east of the sarsen circle between the Y holes and the inner bank of the enclosure (Fig 7, m). They appear to mark interventions by Hawley. However, his trenching was more extensive and it is not clear why the backfilling of these particular trenches has left them visible.

3. HISTORIC AERIAL PHOTOGRAPHS

A study of early aerial photographs sheds further light on some of the ground observations. The earliest of these are two probably taken late in September (after the 15th) 1906 by 2nd Lt Philip Henry Sharpe, RE (original published in *Archaeologia* (Capper 1907); this copy courtesy of Society of Antiquaries). This is particularly valuable as it depicts the site at a time prior to Hawley's extensive excavations. The series of photographs taken from a Royal Engineers' tethered balloon in 1906 attracted little contemporary comment beyond remarks about the novel viewpoint (see Barber 2006 for more details about Sharpe's photographs). However, more than a century on there is much of archaeological interest to be picked out.

Taken following a lengthy dry spell, the grass over negative or cut features such as the ditch is much darker in tone than surrounding areas, which are notably parched, while positive features such as the banks are much lighter in appearance. There are a number of circular and rectangular patches which seem to represent areas which had recently been fenced off, perhaps to allow repair or re-growth on areas that had suffered some wear and tear. Note for instance the area around the Station Stone on the west side which still had a fence around it (although it lies beyond Sir Edmund Antrobus' then-recently erected fence, so may have simply been deemed worthy of additional protection).

Figure 9. Sharpe's 1906 vertical photograph of Stonehenge with north to the top. This is from the original print as reproduced in Archaeologia *(Capper1907: courtesy Society of Antiquaries).*

Key features on the vertical (Fig 9) are:

- The outer bank – the parching has caused a clear contrast between the lighter, whiter tones over the chalky bank and the darker, presumably thicker and taller grass growth over the ditch. The bank shows as a whiter band outside the ditch. Its apparent width varies considerably around the circuit, and seems to be more noticeably irregular in the north-west sector. The internal bank appears more substantial in the west half of the enclosure. The easternmost terminals of the enclosure ditch and internal bank are visible as an earthwork that extends beyond the line of the easternmost Avenue ditch.

- A possible oval feature occurs on the eastern side between Station Stone 91 and the South 'Barrow'. It appears as a vaguely oval negative feature, the grass defining it being markedly darker than the surrounding area. There appears to be a gap or causeway close to the adjacent break in the internal enclosure bank. Estimated dimensions for this feature are c20m long by 10m wide. All sides appear gently curved rather than straight. Judging by the published excavation plans of this area, there should be around four or perhaps five Aubrey holes in this area, almost all falling within or very close to the apparently 'negative' eastern side of this feature. This whole general area was trial-trenched by Hawley in the 1920s, with no published record of any feature being observed here apart from the Aubrey holes. It is noteworthy that while the feature corresponds with the position of the sinuous indentation in the enclosure ditch mentioned above, the notch noted on the 2009 plan is not visible.

- The earthwork known as the South 'Barrow' is barely noticeable in this view. It appears to underlie the enclosure bank but clarity is masked by darker features, perhaps vegetation, on the enclosure bank.

- The ditch associated with the North 'Barrow' perhaps inevitably more closely resembles the 1919 survey rather than the 2009 one, i.e. more of the circle is visible, although only the eastern half of the feature can be easily picked out. In the photo there is a clear disjunction between the white material of the enclosure bank on either side of the north to south fence line. A plausible explanation is that the bank has been pushed out into the ditch by the trackway that cuts through it, in the process revealing the course of the 'barrow' ditch beneath it.

- It is not possible to pick out the bank/scarp between the sarsen circle and the Z holes with any certainty. It is unfortunate that only a single vertical exists – an overlapping pair would have allowed a three-dimensional view when seen through a stereoscope, making the identification of even relatively slight variations in topography a possibility. The bank/scarp between the Y and Z holes does, however, appear as a slight feature, picked out by minor colour variation, around the north and east sides; otherwise its course is either obscured by tracks or is indistinct/invisible from this particular viewpoint. Note that the larch poles supporting sarsens of the outer circle are set in the ground very close to this feature.

There are plenty of other markings of potential interest, although none maybe of archaeological origin and some occur in areas which have been covered by geophysical survey (e.g. the markings just outside the bank and ditch on the south-east side). Otherwise it is impossible to make judgements on the basis of this photograph alone.

In Sharpe's second published view (Fig 10), Stonehenge is observed from a relatively low elevation from the south-west. Another oblique view, taken by Sharpe on the same occasion but unpublished at the time, offers little in addition to this oblique and the vertical. Features of interest include:

The counterscarp bank is visible in the same areas as noted for the vertical photograph, but note the clearer impression of height provided by the more oblique view. The eastern enclosure ditch and bank terminals clearly impinge on the course of the Avenue, while the change in alignment in the course of the eastern ditch of the Avenue noted above is clearly visible on either side of the A344.

The scarp or bank between the Z holes and the sarsen circle is, in contrast to the vertical image, possible to pick out. It is most clear in the south-east quadrant as a slightly

Figure 10. Oblique view of Stonehenge taken by Sharpe in 1906 from his Royal Engineers' balloon. This is a copy of the plate as published in Archaeologia *(Capper 1907: courtesy Society of Antiquaries). No original print appears to survive.*

Figure 11. RAF vertical view of Stonehenge on 10th February 1922, collected by OGS Crawford, and now in the National Monuments' Record, Swindon. North to right. NMR (SU 1242/14 CCC8651/73 10 Feb 1922).

darker line. The scarp or bank between the Y and Z holes is visible most clearly from the point where the two paths merge at an angle in the north-east quadrant around to a point in the southeast quadrant where it gets lost among the remains of other tracks and paths.

As with the vertical image, there are other features of possible interest outside the Stonehenge earthworks. Again, few resolve themselves into distinct shapes or patterns and none could be regarded as archaeological on the basis of this photograph. Those features visible to the north of the A344 will be discussed in a separate report.

A vertical image (Fig 11) was taken by the RAF in 1922 (NMR CCC 8561/173 10th February 1922), a few years into Hawley's excavation campaign, but a year or so before Crawford's recognition of the full course of the Avenue on aerial photographs. Hawley had actually requested aerial photographic cover from the RAF the previous year (1921), but seems not to have received any photographs until 1923. However, the images containing traces of the Avenue from King Barrow Ridge towards the River Avon had already been taken as early as the summer of 1921. It is not entirely clear why any of these photographs were being taken by the RAF other than that Stonehenge and its surroundings was clearly an irresistible photographic target to pilots engaged on training or practice flights. In addition, Crawford himself had a rather ad hoc agreement with the RAF (Crawford 1955, 168-9, 189) and was clearly only collecting or managing to collect an unknown proportion of the photographs being taken.

Figure 12. Stonehenge viewed from the north-east, 12 July 1928, showing various tracks associated with Hawley's excavations, the huts provided for him by the Ministry of Works, and the remains of the World War I airfield. (NMR SU 1242/89 CCC 11796/4519 12 July 1928)

Features of interest beyond the limits of the Stonehenge enclosure will be discussed in a separate report. Relevant here is the enclosure ditch terminal which can be seen as an earthwork cutting across the line of the Avenue at the entrance before Hawley excavated it.

Features associated with Hawley's excavations include excavation trenches within the monument itself. The Aubrey holes appear to have been marked out with white chalk. The gently curving line running from top to bottom, just left of centre, would appear to be a defect in the original negative/plate. The scarp or bank between the Y and Z holes is clearly visible. The scarp or bank between the Z holes and the sarsen circle is less clear, but when the image is enlarged hints of its presence can be seen.

An oblique view from the north-east (Fig 12) was taken by the RAF towards the end of Hawley's lengthy excavation campaign on 12th July 1928 (NMR CCC 11796/4519 12 July 1928). Features of interest include the tracks created by the activities of Hawley and his workmen which appear more prominent than many of the longer-established tracks that had fallen out of use once Antrobus enclosed Stonehenge in the early years of the century.

A vertical photograph taken in 1962 and published by the Royal Commission on the Historical Monuments of England (RCHM 1979 pl 3) depicts a circular feature to the east of the North 'Barrow' comprising concentric circles of closely set pits (this was kindly

Figure 13. Vertical view of Stonehenge taken in the summer of 1965. North to left. (HSLUK/65/378/45 17 June 1965)

brought to our attention by Stephen Fisher). The feature is apparently cut by the North 'Barrow' ditch and appears to be marginally overlain by the enclosure bank. In addition it appears to have been cut by a trackway cutting obliquely across the monument from the west to exit via the Avenue. Part of this feature can be made out as solid lines on a vertical image taken on 17 June 1965 (Fig 13 HSL/UK/65/378) but it doesn't occur on aerial photographs before the 1960s and alongside consideration that it forms an early component of the monument the possibility must be entertained that it relates to the 1950s excavations.

Notable features in the 1965 image include the presence of a fence around the earthworks on the southern and eastern sides that in places clearly impinges on the counterscarp bank and in some places appears to get very close to the outer edge of the ditch. Vehicle tracks are also prominent on the outer side of this fence. Also, some

of the former trackways closest to the Stonehenge earthworks, particularly those on the monuments southern side, give the appearance of having been filled in rather than ploughed out. The centre of the monument, the area of the stone settings, appears to have been cleared and laid with clinker and gravel (Richards 2004, 88) although curiously only part of the mound recorded as an earthwork (above) has been covered.

PART TWO

4. GEOLOGY, TOPOGRAPHY AND HISTORIC LANDSCAPE DEVELOPMENT

The site is located at the east end of a broad spur with relatively shallow re-entrants in the north-east and south, both of which lead into Stonehenge Bottom, the deeply incised and more dramatic valley to the east. The underlying geology (Geological Survey of Great Britain Salisbury sheet 1903 reprinted 1976) is uniformly deposited Upper Chalk, although compared to the height of the landform to the east of Stonehenge Bottom, that is King Barrow Ridge, the deposit around Stonehenge must have been considerably truncated and denuded presumably by earlier erosion and peri-glacial processes. The chalk is very easily weathered resulting locally in rounded hills and an undulating landscape. This weathering can be quite severe: indeed Atkinson (1957) considered that up to 0.3m of the surface had been truncated at Stonehenge during 4000 years as a result of dissipation of the chalk sub-soil, although others (Groube & Bowden 1982, 17) considered such decay to be accelerated by cultivation where surfaces are unprotected. Seams of hard flint occur throughout the deposit at intervals and can retard weathering and provide temporary water tables and spring lines. The chalk supports Icknield soils in the immediate vicinity of the site, but Andover 1 soils immediately north of the A344 road. These are light, well-drained and easily tilled but contain surface flint, although not in sufficient quantities to cause serious damage to ploughshares. The differences are slight, but it is noteworthy that Andover soils tend to occur over striped soil patterns (Soil Survey England & Wales 1983).

The natural ground surface

The survey demonstrates that ground encompassed by the enclosure is not level (Fig 4) but falls from the west to east side of the enclosure by around 1.7m. The ground model in particular emphasises that neither enclosure nor stones are set precisely on the summit or central spine of the spur and gives the impression that the western half of the stone settings is founded upon a shallow platform protruding from the spur. This observation is shown clearly by the alignment of the 102.25m contour line (Figs 4 and 5) which turns sharply eastwards at the point where it meets the north and south limits of the stone settings. This could be interpreted as evidence that this part of the landform was artificially levelled. Why this particular location was chosen is not clear but the answer is likely to lie in the nature of the land and prior use rather than any celestial alignment which during the first phase of the monument can only have been very general. Should it have been required better visibility this could be achieved by constructing the enclosure further to the west, or if it was really important, on the King Barrow Ridge in the east. It is worth noting the potential traces of pre-enclosure activity indicated by the relationship of the enclosure with the 'North 'Barrow' and the bank anomaly in the east.

Sarsen boulders occur naturally within the area as remnants of a crust of siliceous sandstone formed in the Eocene (55-38 m years) that once overlay the chalk but which has long since broken up, eroded, weathered and many drifted into valleys (Green 1997, 260). Like flint, where present they might retard local weathering of the chalk. Compared to the Marlborough Downs, however, remnants are fewer on Salisbury Plain and what little remained following periglacial processes appears for the most part to have been long cleared.

The source of the stones

Ideas of the movement of the stones across great distances have prevailed in part perhaps because of the tales of Merlin transporting the rocks from Ireland that was recounted by Inigo Jones (1665) and others. Having been identified as 'foreign' to Wiltshire at an early stage, the bluestones, in reality a suite of non-local rocks, have been the result of much controversy and extended investigation. They have been identified as deriving from rock types not found in South Wiltshire, but discussion has focussed on exactly how they arrived. In essence there are two views: first that the stones were erratics left in Wiltshire after an early glaciation and secondly that human agency was involved. There is a tendency (not exclusive) for the former view to be supported by geologists and the latter by archaeologists. The discussion has not played itself out and disagreement persists. Recently, Thorpe *et al* (1991) and Johns (2008) have provided evidence to support a glacial transport claim, while Green (1997) and Scourse (1997) have argued the opposite. But Tim Darvill and Geoffrey Wainwright have carried out field work in the Prescelly Hills and believe that they have found the locality on Carn Meini from which the stones derive (Darvill & Wainwright 2009). In part, discussion focuses on the nature of the bluestone boulder from Bolesbarrow, a long barrow which is likely to be earlier in date than Stonehenge. This, however, is a rounded boulder appropriate to having been moved by glaciation, whereas many of the Stonehenge bluestones are pillar-like and similar to the natural rocks found at Carn Meini. Not all of the Stonehenge bluestones are like this however, and there are some that indeed have rounded edges.

Inigo Jones was the first to point out that the stones incorporated in the monument need not have come from Ireland but that building stone was available locally, for example at Chilmark. Even so he was inclined to believe that the sarsen derived from quarries on the Marlborough Downs where sarsen boulders were plentiful. More recently, while recognising the lack of *large* sarsen available on the Marlborough Downs, Green (1997) assumed that the Stonehenge examples must nevertheless have come from that area as it is the place of the greatest accumulation and choice. Heavy mineral analysis on samples from Stonehenge and the Marlborough Downs (Howard 1982), however, indicated that there was a considerable degree of variation between them.

Essentially, sarsen is present in greater or lesser numbers right across central southern England (Bowen and Smith 1977). Within Wiltshire and south of the Marlborough Downs it is widely present in the Vale of Pewsey and there remains a veneer on Salisbury Plain, though early agriculture in both of these areas may have contributed to the thin distribution. A boulder neatly broken into at least three pieces occurred in Late Bronze Age-Early Iron Age contexts in the East Chisenbury midden (McOmish *et al* 2010, 82) and this may have been the fate of a great many that proved an obstacle to the widespread establishment of 'Celtic' fields on Salisbury Plain to the north of Stonehenge.

William Long (1876, 142) quoted John Aubrey regarding the King Barrows. 'At the end of these graves were stones, which the people of late years, sc. Since 1640, have fetcht away…' and Stukeley appears to have repeated this (Burl & Mortimer 2005, 29). In addition he noted that there was a large stone in Durrington Field, one in the river at Milford and another in the field to the west of Figheldean c3 miles from Stonehenge. (Stukeley 1740, 37: Burl & Mortimer 2005, 31).

William Cunnington (Cunnington Mss Devizes Book 9) described how, in the early years of the 19th century, farmers ploughed up sarsen in the vicinity of Stonehenge and there is sufficient evidence remaining to indicate that he was not mistaken. Cunnington wrote that sarsen is found 'upon the Downs, a foot or two under the ground their supefices are rounded by attrition' while 'others ploughed up near Stonehenge appear to have been bored through by the Toredo' (Cunnington MSS Book 9 Devizes Museum). Sarsen was used at Boles Barrow, Arn Hill and elsewhere on Salisbury Plain in long barrow construction, while six large extant boulders lie to the north of Stonehenge at Robin Hoods Ball and three more in the ditch of the Figheldean 31 long barrow (McOmish *et al* 2002, 151-2). Others were noted on early Ordnance Survey maps.

Hoare wavered and considered on one hand that the Marlborough Downs was a potential source but also that the origin of the sarsens at Stonehenge could be local, 'the plains adjoining Stonehenge might very probably have furnished stones sufficiently large' (Hoare 1812, 149, 152). The Rev E Duke (1846, 170) questioned the assumption that the sarsens had been brought from the Marlborough Downs and noted that none are now to be found of that size there. Instead, he suggested that the boulders were 'quarried from a continuous stratum' and indeed such seams are thought to exist around Avebury (Barker 1985, 21). Petrie noted that there were few or no sarsens of the required size to be found elsewhere, that is on the Marlborough Downs, and considered whether the very position of Stonehenge was determined by the presence of a quantity of sarsens that had derived from denuded beds formerly lying over the chalk and on balance thought that they had been collected from the immediate vicinity. Gowland similarly considered them brought from 'within a radius of not many miles' and 'probably at no great distance from the spot where the structure stands' (Gowland 1902, 75, 115) rather than from a distant locality, while the geologist Prof J W Judd (1901, 115-6) thought likewise and that they had moved 'only a few hundred yards'. H H Thomas (1923, 242) considered that they may have come from 'the site of Stonehenge itself'. It was a good point made by Johnson (2008, 121) that the Heel Stone is too awkward and bulky a shape to move on rollers and it, at least, is unlikely to have travelled far. Equally the much smaller undressed Station Stones may be quite local. It is after all possible to find larger stones on Salisbury Plain without having to travel to the Marlborough Downs for them. If these points are accepted it becomes easier to acknowledge that the sarsen group as a whole may not have been the product of a heroic journey.

The difficulty in working sarsen is well-known (Fig 14) and while weathered sarsen lying on the surface has an exceedingly tough crust, Isobel Geddes crucially pointed out that in contrast buried sarsen is soft and can be easily worked (Geddes 2000: also Bowen & Smith 1977, 189). This was something also noted by Cunnington: 'when first dug out of the ground they are soft like freestone just quarried….if broken you may crumble the inside pieces between your fingers like Lump Sugar' (Cunnington MSS Book 4, 34). Geddes also pointed out that the only place where sarsen boulders large enough for Stonehenge monoliths have been found in recent times is below the surface in swallow holes where they have been protected from weathering (Bowen & Smith 1977, 189 refer to this also). It is worth noting that there are at least two such holes, potentially more, in the Stonehenge landscape.

Figure 14. Unfinished stone 59, showing the method of dressing. In an unweathered condition the sarsen can be easily pecked and ground into shape. Here the grinding has been carried out in narrow strips the length of the stone leaving arrises standing proud which could then be ground down in the next stage of the operation. Grinding in this fashion must have been carried out when the stone was flat on the ground, but this stone was broken when it fell so must have been erected in this state. Gaffer Hunt kept a cellar containing 'liquors to entertain the traveller' beneath the stone during the eighteenth century.

Medieval and later landscape history

Lack of ground water on the permeable chalk downland has resulted in villages in this part of Wiltshire being spaced along the rivers and streams and the accompanying parish boundaries incorporating strip-like estates that in each case extend away from the valley onto the higher downland. Thus a string of settlements, Maddington, Shrewton, Rolleston, Winterbourne Stoke, Berwick St James and Stapleford occur along the River Till to the west, while Figheldean, Durrington, Bulford, Amesbury, Wilsford and Lake occupy similar positions along the River Avon in the east. In most cases the higher downland on the interfluves, set at a distance from the settlement centres, has been used throughout the historic period as sheep walks and has often escaped cultivation until the later 18th to 19th century (McOmish *et al* 2002, 2-4). This rather than any affection for antiquity is likely to be one of the chief reasons why Stonehenge has survived.

There is no mention of Stonehenge in the Domesday Book. Two entries for the settlement at Amesbury were made, the major one of which indicated that before the Conquest it was a Royal holding and therefore not assessed for taxation. It was evidently

a large centre, larger than Old Sarum (Salisbury), with 85 villagers and 56 smallholders and where the king had 55 slaves; evidently a place of considerable importance. There was arable land for 40 ploughs and extensive woodland nearby (presumably mostly in the ancient Bentley Wood to the north-east of the parish rather than around Stonehenge), with a slightly smaller expanse of pasture measured at 4 leagues long by 3 leagues wide (Thorn & Thorn 1979, 1-3, 24-16). The latter might be expected to be open downland which could have included the area around Stonehenge. A second entry indicates that a small estate at Amesbury amounting to 3 virgates, on which there were 2 cottages and three slaves, was let to an individual by the name of Osmund. It may be that this settlement became West Amesbury which lay to the west of the town and was situated alongside the bank of the River Avon below the western slopes of the hillfort known as Vespasian's Camp. Whether or not this is so, it is this latter settlement that during the Medieval period encompassed the south-east end of the Stonehenge Avenue and incorporated Stonehenge within its manor.

Early records are few and, set at the limits of the parish in an area unlikely to encounter territorial or agricultural friction there was little occasion for manorial dispute or need for documentation. A croft and toft 'under the hill of Richard Panysfote on the west side….. beyond the way leading to Stonehenge' was mentioned in a claim for access rights in 1379 (Pugh 1947, 12). The same document mentions 'Whytdechforlang', i.e. white ditch furlong, as in the immediate vicinity and it is tempting to think that this referred to one of the Avenue ditches that was in the process of being levelled. It also allowed for 31 sheep to feed on the 'common pasture' and it seems likely that this referred to the downland beyond the open fields i.e. the area later known as Stonehenge Down. By 1621, the manor of West Amesbury held with it the right to pasture 150 sheep in 'the common fields and upon Stonehenge Down' (*ibid* 110).

A map schedule thought to date to 1726 (Wiltshire History Centre 944/ 2MS) which describes the lands belonging to the Duke of Queensbury, refers to the area as Stonehenge Sheep Down, but questions whether the land 'belongs entirely to Mr Haywood, or if his Grace has any other Right than being Lord of the mannor' (known owners of the site are listed in Table 3). The same schedule indicates that two farms, the Westward Farm and Homeward Farm, had an interest in the area. A part of Stonehenge Down was to be ploughed, although the part referred to specifically as Stonehenge Sheep Down would not be. Both were tenanted by Mr Philip Fleetwood, but it is not clear whether he carried out the proposal to cultivate. A Field Book referring to a *Plan of the Manors of Ambresbury Earls and Ambresbury Priory* surveyed in 1774 by James Crow (Wiltshire History Centre 944/3) mentions Stonehenge Down as amongst land farmed from West Amesbury Farm but unfortunately the map to which it refers cannot be traced.

Further information can be obtained from the schedule accompanying a map of *Amesbury Estate* of c1824 (Wiltshire History Centre 283/2190) which describes the area as far west as the parish boundary incorporating the ground immediately north of the Shrewton Road (A344) as Stonehenge Down. South of the London Road (A303) lay Abbey Down and Sheep Down. An area alongside the Shrewton Road reaching to within c100m of Stonehenge was separately enclosed (or at least so marked on the map). At this time

Stonehenge formed part of West Amesbury Farm and was let to Mr Robert Pinkney on a year to year basis. It was still farmed by him over 20 years later when the Tithe Map for Amesbury was prepared in 1846 (Wiltshire History Centre TA Amesbury). In contrast, the land alongside the Shrewton Road (the A344) immediately west of Stonehenge that had been marked out on the earlier map and called *Burnbake* had been converted to arable. This map depicts Stonehenge itself as being situated on what was now called West Amesbury Down and still in pasture.

Certainly pressure on the Downs increased throughout the 19th century (McOmish *et al* 2002, 158) such that in 1876 William Long commented that 'Cultivation of the down adjoining Stonehenge is gradually closing in on it and on the west side has already resulted in the obliteration of the group of barrows' (1876, 186). He went on that the 'smaller barrows in the Stonehenge Group' had been 'nearly obliterated by a farmer who had ploughed up part of the down nearly to the stone circles…All traces of the group adjoining Stonehenge have disappeared…' (Long 1876, 198 footnote) and again 'It is to be hoped that our grand-children will not have to look for Stonehenge in a field of turnips' (Long 1876, 236). There may also have been episodes of cultivation during the 20th century specifically to erase the evidence of the RAF and wartime paraphernalia. Cultivation was evidently carried out in an orbital fashion immediately around the monument some time after the trackway to the west of the enclosure was moved in the 1960s perhaps in an attempt to clean up the site of extraneous earthworks. Aerial photograph SU1242/43 1965-7 depicts marks perhaps representative of these features though it is not clear whether they are of cultivation or the result of hay making.

Beyond use as a sheep down, there is little evidence of other land-use activity at Stonehenge during the historic period. Cultivation, if and when it occurred, is likely to have been of short duration and specifically in response to economic or military catalysts. The historic picture can be contrasted with archaeological evidence of the presence of field systems nearby in antiquity. These are generally taken to be of Bronze Age or Romano-British date but could have remained in use into the Saxon period and longer, perhaps until local landowners introduced sheep in a major way in the 13th century. Such a scenario would fit with the recent evidence obtained at Stonehenge itself of nearby cultivation in the Saxon period (Darvill and Wainwright 2009).

5. HISTORY OF ARCHAEOLOGICAL WORK

Of all the ancient monuments in the British Isles, perhaps unsurprisingly Stonehenge received the earliest mention, being specifically described by Henry of Huntingdon in about AD1130 (Chippindale 1983, 20) and Geoffrey of Monmouth some six years later (Piggott 1941, 270: Legg 1986, 55-61). It is these accounts in which the term 'Stanenges' appears for the first time. There are early documentary references to Stanhenge and Stonhenge around 1200 and 1250, Stonheng in1297, the stone hengles by Hardyng in 1470 and finally Stonehenge in 1610 (all quoted in Gover *et al* 1939). The first element of the name is undoubtedly 'stone' but the second in one way or another seems to refer to the lintels; either as 'hinge' or as a structure for hanging (Gover *et al* 1939, 360-1). In his edition of William Camden's *Britannia*, Gibson (1695, 110) emphasised that the Saxon name appears to have been Stonehenge. In contrast, other early commentators, including Camden himself, refer to the site as Chorea Gigantum, a name that was said to derive from the 'old histories'. Inigo Jones quoted lengthy passages of Giraldus Cambrensis who appeared to use the terms almost interchangeably; Chorea Gigantum or the Giants Dance being the name of the pile of stones magically transported to Britain from Ireland by Merlin. Both John Wood (1747) and John Smith (1771) use a variation 'Choir Gaur' with a similar meaning and indicated that 'Stonehenge' was a 'vulgar' (i.e. popular) term. Consequently it is the latter that has survived.

Three medieval depictions survive: an almost abstract illustration of a square setting of lintelled stones, another of Merlin prising off a lintel prior to transporting the stones from Ireland, both in 14th century manuscripts (Chippindale 1983, pl 15) and a recently discovered drawing of four trilithons with lintels found in a copy of the Scala Mundi in Drouau Municipal Library in France and dated to 1440-1 (Heck 2007). Other than these the earliest illustration appears to be that by Lucas de Heere, a Flemish artist (Bakker 1979) which is thought to date to about 1575. This is considered to have been one of three copies all derived from an unknown original, potentially that of Joris Hoefnagel (Stone 1924: Bakker 1979: also see Chippindale 1983, 33-38 and plates 21, 22, 23, colour plates I and II: Johnson 2008, 59-61: see also Webb 1725, 14). Probably the best known of these was that published in various editions of Camden's *Britannia* (1588, 1607 in latin, 1610 in English), but Gibson's version of the text (1695, 95) substituted an amended version of the illustration by Kip that made it difficult to relate detail in the illustration to features on the ground. Gough (1789; 1806, 135, 154 and 155) provided that and a version closer to the original marked RF and dated 1575. It depicts the stones from the west with what appears to be Amesbury Abbey or perhaps Old Sarum in the distance. There are two well-defined paths in the interior as though it was already a focus of tourist interest. The stones are depicted in a slightly fluid manner as though engaged in a dance and labelled A (sarsen), B crunetto (lintel). Beyond the ditch, evidently in the north-west is what appeared to be a quarried or well-dug and disturbed location C, 'where great bones of men are found'. In the case of the last, two men are shown digging outside the ditch in the west [note the area of digging visible to the north-west of the north – south trackway in Fig 11]. On the de Heere version of the illustration, two mounds, evidently barrows encircled by ditches, are depicted at this point.

Camden himself described the site as a 'huge and monstrous piece of Work'. He advised of 'three Ranks or Courses' of stones 'erected in Manner of a Crown' all set 'within the Circuit of a Ditch'. Having mentioned the size of the stones he described the 'overthwart Pieces, [which] do bear and rest cross-wise, with a small Tenon and Mortaise, so as the whole Frame seemeth to hang; whereof we call it Stone-Heng, like as our old Historians termed it the Greatness of the Giants dance'(Gough 1806, 134-5). His description of stones supplemented by an illustration demonstrated the uncertainty of geometric form and the early accounts simply describe settings of stones arranged in arcs within each other. From the 17th century antiquarian reports described these as forming circles, or in one case hexagons and since then the site has generally been referred to as a stone circle. Camden recorded three entrances 'at each of which was raised, on the outside of the trench [i.e. the ditch], two huge stones gate-wise; parallel whereunto, on the inside, were two others [undoubtedly the Station stones] of less proportion'. He went on to refer to the discovery of what appears to be an inscribed pewter plate found during the time of Henry VIII, 'neere this place', although the characters on it were considered indecipherable. This was considered to be of vital importance as it could provide a clue to the date and origins of the site. Gibson (1695, 98) simply referred to it in a footnote 'I have heard, that in the time of K.Hen.8. there was found near this place a table of metal, as it had been tinn and lead commix'd, inscribed with many Letters, but inso strange a Character, that Sir Th. Eliot nor Mr Lily Schoolmaster could read it and therefore neglected it. Had it been preserved, some which happily might have been discovered as concerning Stonehenge which now lieth obscured'.' This artefact became the object of much discussion by later writers including both Aubrey (Fowles and Legg 1980, 92) and Stukeley (1740, 31). Inigo Jones, however, sought to disassociate the find from Stonehenge and emphasised that the 'table of metal' was found 'not far from this antiquity' rather than at the site itself (Jones 1655, 107). Indeed evidence of excavation at this stage is confined to the illustration of men digging to the west of the enclosure rather than within Stonehenge.

While staying at Wilton in 1620, King James was taken by his host William Herbert, Lord Pembroke, to Stonehenge and as a result of their discussion two lines of enquiry were initiated. First, George Villiers ordered that a trench be dug within the stone settings (reported by Aubrey, see Fowles & Legg 1980, 33, 76) and secondly, as Surveyor General of His Majesty's Works, Inigo Jones was asked to find out what he could about the monument and he subsequently prepared a plan and from it a number of reconstruction drawings along with what appears to be the first memorandum on Stonehenge. The precise date on which this was carried out is unclear but it is presumed to have been in the years immediately following.

Little else is known of George Villiers' trench. As a favourite of James I, Villiers was given his title, Duke of Buckingham, in 1623 soon after the discussion at Stonehenge, but he was assassinated five years later in 1628 aged just 35 and his unexpected death may explain why no account or note appears to have survived.

Writing between 40 and 70 years after the event, John Aubrey, who had been familiar with Stonehenge from an early age because he passed close by on his travels between family estates at Easton Grey and Broad Chalk in Wiltshire, recorded that it was still

possible to observe a cavity or pit in the middle of the site the size of 'two sawe-pitts' i.e. in the region of 1.2m wide by 2 to 3m long and perhaps up to 2m deep and he marked the position of the excavation on one of his plans. Mrs Trotman, evidently a local woman, informed Aubrey that the excavation had undermined one of the large sarsens, measured by Aubrey as 'twenty-one foote long' [6.4m], making it lean and thus allowing him to later assert that it had fallen and was 'now out of the earth' (Fowles & Legg 1980, 76, 93).

Inigo Jones, meanwhile, appears to have been the first to investigate the site in any detail. Born in 1572, he is said to have possessed particular skill in Landskip, then a fashionable Dutch school of painting and with his eye for detail and interest in architecture he was employed both by James I and subsequently Charles I. His description 'anciently environed with a deep Trench, still appearing about thirty foot broad' suggests that in addition to the stone settings he had investigated the enclosure earthwork and indicated that three entrances through this were visible, 'the most conspicuous thereof lying North-East'. At this entrance, beyond the ditch lay two stones 'gatewise' and parallel were two smaller stones that lay on the inside of the ditch. He considered that the main stone settings formed a hexagonal figure with a second hexagonal arrangement of stones within it all 'sited on commanding Ground, eminent, and higher by much, than any of the Plain lying without, and, in the midst thereof, upon a Foundation of hard Chalk, the work itself was placed' (Jones 1655, 55-6).

Jones' plan of the stones appears, for the time, to be a reasonably accurate depiction 'as the Ruin thereof now appears' (Fig 15) and a fair record of the stones that were visible in 1620 although he clearly used a standard depiction of the stones and positioned those fallen as erect. Thus stones 8, 13, 16, 16, 19, 20 and 21 of the outer sarsen setting were not mapped as present. The plan bore letters to describe features and must be considered the earliest archaeological site plan, something also recently pointed out by Johnson (2008, 54). It depicts twenty-three sarsens forming a near circle with pairs of sarsens (the trilithons) set in a hexagonal arrangement open or with a pair missing in the north-east. Sixteen bluestones form an almost circular arrangement with a further eight forming an arrangement within the hexagon. A further plan (accessibly republished in Johnson 2008, 52) depicts the ditch with entrances in the north-west, north-east and south. Each has a 'gateway' of two stones marking the exterior and interior of the entrance. If the Altar Stone is in the correct position, the entrance depicted at bottom must be the north-east. A second plan of the stone settings (Jones' plan 6) shows 23 stones in the outer circle, 16 stones in an inner circuit. Within this lie horseshoes or hexagons with the sixth side missing. Plan 7, a perspective view of the stones that then existed, was drawn from the north-east (the latter also re-published in Johnson 2008, 52). However, Jones', architectural influences conspired to produce an interpretation based on geometric figures with two concentric circles and two inner hexagons. His reconstruction drawing of the monument, that is his *interpretation* of how it originally looked, is widely depicted and he also prepared profile and perspective views of this.

With regard to Stonehenge, Jones constructed a well-argued case that the Druids played no part in the construction of the monument. He also carefully assessed and rejected the accounts of Geoffrey of Monmouth and Giraldus Cambrensis and their stories of Arthur,

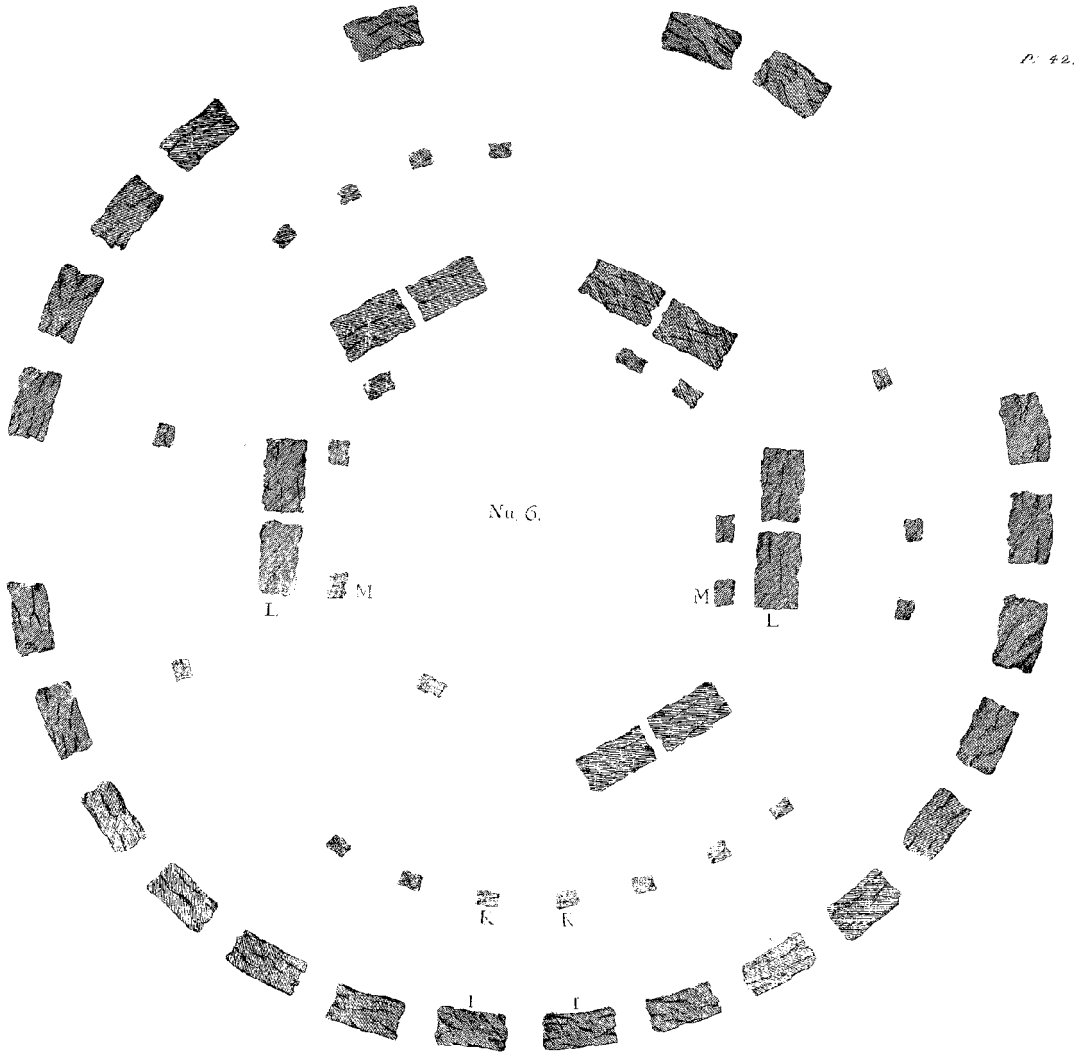

Figure 15. Plan of the stone settings at Stonehenge prepared by Inigo Jones (from Jones 1655) with north to bottom.

Merlin and how the stones were magically transported from Ireland. Similarly, while accepting the account of the murder of the British nobility at Amesbury by the Saxons, he pointed out that there was no mention of Stonehenge in the histories that connected these events with the site. He pointed out that being Christian, and allegedly being buried in the churchyard at Amesbury, Arthur was unlikely to be interested in erecting what was evidently a pagan monument. Instead, at a time when little was known of prehistory, he concluded that it must be of Roman construction (Jones 1655, 1-16). Jones died in 1652, at which time his treatise had not been published. It finally saw publication three years later but unfortunately few copies survived the Great Fire of London. A second edition that incorporated the responses of Walter Charleton and John Webb was published in 1725. Surprisingly, these accounts fail to mention the Duke of Buckingham's excavation, the finds from which would have been of great interest at court and might have added significantly to his interpretation. They do, however, mention the searches of others and indicate that Jones carried out some digging himself. He stated that the foundations were 'diligently searched…….Within the Cell…. there hath been the Heads of Bulls,

or Oxen, of Harts, and others such Beasts digged, or in, or near this Antiquity (as divers living can now testify)……together with which also were heaped up great Quantities of Charcoal…..and when I caused the Foundations of the Stones to be searched, my self found, and yet have by me to shew the cover of a Thuribulum, or some such like vase….lying about three Foot within the Ground, near one of the Stones of the greater Hexagon'. And later 'Now that there hath oftentimes been digged out of the Ground at Stone-Heng, the heads of such beasts [oxen]…..' (Jones 155, 75-6, 100, 105). John Aubrey, however, was critical of Jones and believed that the thuribulum lid came from the Duke of Buckingham's trench (Fowles and Legg 1980, 92) although it should be noted that his depiction of the location of that trench and Jones description of the findspot do not correspond.

Equally critical was Dr Walter Charleton who attacked Jones' work in an essay entitled *Chorea Gigantum* published in 1663. Aware of the presence of megalithic monuments in Scandinavia, Charleton believed that Stonehenge was neither Druidic, nor Roman, but Danish in origin. He used the metal plate with the characters on it mentioned by Camden as supporting evidence and suggested that the characters on it were runes or gothic inscriptions (Charleton, 1725 second edition, 23). His comparanda, however, were of megalithic tombs and barrows with stone circles around them. Charleton sought to correct Jones in every respect and suggested that the ruined nature of the monument was not the effect of weathering over time, but of people deliberately pulling down the lintels, removing some of the smaller stones and 'converting them to private Uses in Buildings, Land-marks, etc as appears by some yet to be seen in the neighbouring Villages and Fields' (Charleton 1725, 44). The observation is not without interest and a point taken up by later writers, but Charleton was not to know that sarsen occurs naturally in the locality.

As a result of Charleton's work, John Webb, who had married Jones's niece, responded and vigorously supported Jones's treatise. His work is mainly diatribe and it contains little of use in the way of original description. However, in discussing sacrifices and the ox and deer skulls that were reported to have been found, he provides further details and mentions that 'in several Parts of the Court surrounding Stone-heng it self, and near about it; for, besides the abundance of them which were digged up by Dr Harvey, formerly mentioned, Gilbert North Esquire, Brother to the Right Honourable the Lord North, Mr Jones, and divers other Persons, at several other Times; when the Right Noble George, late Duke of Buckingham, out of his real Affection to Antiquity, was at the Charge in King James his days, of searching and digging there, great Numbers were found also. And as at all the former Time, so in like manner in this same Time, were great quantities of burnt Coals, or Charcoals digged up likewise; here, lying promiscuously together with the Heads, there, in Pits by themselves apart, here more, there less.' Clearly, interest in the monument had resulted in an extensive series of poorly described diggings. He went on to describe the vessel found in the excavations by Jones: ' the Cover, highly probable of a Thuribulum, or some such like Vase, wherein the old Romans used to carry Wine, incense, or Holy-water for Service in their Sacrifices……..This cover I had lying by me since Mr Jones's Death, until Mr Selden, our late famous Antiquary, (nominated before) got it out of my Hands, from whom I could never recover it again; yet for your better Satisfaction, I have caused the Form of it to be engraven in Bigness

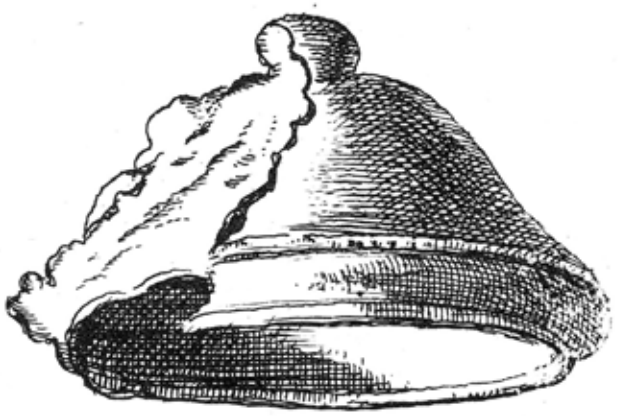

Figure 16.
The earliest recorded find from Stonehenge; a lid or cover from a small vase found by Inigo Jones (from Webb 1725).

justly as it was, being found about three foot within the Ground near one of the Stones of the greater Hexagon: and this I affirm upon my own Knowledge; for I was present on the place when the same was found. It was of Stone, light in comparison, the more being hollow, and extream hard; but, of what kind, unless an heliotropian, as some were of Opinion, could not certainly be imagined. At the same Time with the Cover, and not far from the same hexagon, was found also an huge old Nail, in Shape somewhat like those which we call commonly double Tens, or Spikes, such that we used in Scaffolding…..The draught of the Cover follows.'

Given that, as Jones indicated the metal plate mentioned by Camden was recovered from nearby rather than from the monument, this is of some importance as it appears to be the first artefact discovered at Stonehenge of which we have a description and illustration. Jones clearly considered it to be an incense burner after the fashion of those used in ceremonies in Rome. Reference to the 'Bigness' as reproduced (Webb 1725, 124) would suggest that it was in the region of 55mm in diameter and 29mm in height. Webb depicted what appeared to be a lid with some kind of encrustation on one side and at just under a metre depth, it is likely that it was found in a pit rather than being placed or lost on the surface (perhaps context 3438 situated adjacent to fallen stone 60 which according to Cleal *et al* is unphased, or more likely 3418 in front of the stonehole noted as post phase 3 (Cleal *et al* 1995, 265 and end pocket). Attribution and purpose of this is a little uncertain and it could indeed be of Roman origin as Webb suggested but it could equally of medieval date. Similar uncertainty concerns its function and it might be noted that the lack of holes in it negates its use as an incense burner (thanks to David and Joanna Bird; Nicola Hembrey; Martin Henig; Justine Bayley and Jon Cotton for very usefully commenting on this).

John Aubrey appears to have relied heavily on Jones' plan for his work *Templa Druidicum*. He appears to have copied Jones' *reconstruction* drawing rather than his *measured plan* checked off the stones that were missing, i.e. the same as Jones, and set his own plan, 'that which I took myself from the place' alongside it. His 'birds eye' view is also thought to have been based on that of Jones (Piggott 1978, 13). While criticising Jones' view of the inner Cell, he thought that it was '..neither a Hexagon, or heptagon: nor can all the angles be forced to touch a circle'. Unlike his astute observation and plane table survey at Avebury (Welfare 1989), here he simply accepted the depiction of the sarsen setting.

Edmund Gibson's edition of Camden's *Britannia* literally put Stonehenge on the map by incorporating Robert Morden's Map of Wiltshire which used a symbol of three trilithons encompassed by an enclosure to depict the position of the site. He referred to a stone at the centre of the settings 'which is now gone…..appearing not much above the surface of the earth and lying towards the east, 4 foot broad and sixteen foot long' (1695, 107). This was presumably the Altar Stone simply no longer visible rather than an unrecorded stone.

William Stukeley, a medical doctor and later clergyman from Lincolnshire, wrote extensively about the site, though in copying out Aubrey's *Templa Druidicum* manuscript in his Commonplace Book (Burl 1998), he was also indirectly influenced by Inigo Jones' reconstruction. Like Jones, Stukeley considered that the stone settings formed a circle – eleven monoliths of an expected thirty of the outer circle were standing (Jones depicted twenty-three though included fallen examples) with five lintels surviving and from this he believed that they 'give us nearly as good a notion of the whole, as we can at this day expect' (Stukeley 1740, 35: also Burl & Mortimer 2005, 46). He pointed out that, joined together by mortise and tenon they were braced against each other and thus provided a secure structure that would withstand severe weathering (Burl & Mortimer 2005, 45). He was extremely critical of both Jones and Webb and considered that the monument had been defaced rather than constructed during the Roman period and following the views of Charleton assumed that some of the 'missing' stones had been taken away to construct bridges across the Avon (Burl & Mortimer 2005, 46). Despite this he was equally clear that no stones had actually been removed since Jones carried out his survey 100 years previously (Burl and Mortimer 2005, 55).

In order to investigate the Altar Stone he excavated the ground adjacent to it. On 5th July 1723, 'By Lord Pembroke's direction, I dug on the inside of the altar about the middle: 4 foot along the edge of the stone, 6 foot forward toward the middle of the adytum. At a foot deep, we came to the solid chalk mix'd with flints, which had never been stir'd. The altar was exactly a cubit thick, 20 inches and 4/5; but broken in two or three pieces by the ponderous masses of the impost, and one upright stone of that trilithon which stood at the upper end of the adytum, being fallen upon it' (Stukeley 1740, 32: also Burl & Mortimer 2005, 67).

He recorded a further episode of digging. 'Thomas Hayward, late owner of Stonehenge, dug about it, as he acquainted Lord Winchelsea and myself. He found heads of oxen and other beasts bones, and nothing else. In 1724. when I was there, Richard Hayns an old man of Ambresbury, whom I employed to dig for me in the barrows, found some little worn-out Roman coins at Stonehenge, among the earth rooted up by the rabbets' (Stukeley 1740, 31: also Burl & Mortimer 2005, 83). But Stukeley was cautious and wondered whether they had been planted in order to fool him.

In the same year that Stukeley's work was published (Stukeley 1740) a further survey was carried out by John Wood, architect and designer of a number of buildings in Bath, famously the Circus. Using measuring rods and a network of stakes over a period of three days, he measured and proved angles and distances across the entire monument. This was the most detailed survey yet and he commendably published a version of his

plan with details of his measurements so that they could be checked by others and additionally left his stakes in the ground so that they could use his stations. He was the first to number the stones, 1- 76. He described them as the remains of 'two double Rows or Curved lines of Pillars (1747, 34). His original plan was evidently produced in colour and was published under the title *Choir Gaure* in 1747 and it accurately depicted the stones, evidently to a precision of half an inch (see also Johnson 2008, 68-9 where the plan was recently republished). Stukeley criticised the survey (Burl & Mortimer 2005, 5). Perhaps it was to be expected as, in time honoured fashion, Wood had drawn attention to the fact that some of Stukeley's measurements were inaccurate and that he had not in fact carried out a measured survey (Wood 1747, 27-31). Wood appears to have been first to draw attention to an outer bank to the enclosure and, following Stukeley, one of the first to mention the presence of the features that later became known as the North and South 'Barrows'.

Wood's work was commendable and his observations astute, though they today remain largely overlooked, perhaps in part because his interpretations of the site as a lunar temple and calendrical device distracted from the archaeological value. Nevertheless his survey description aimed at objectivity and any influence by earlier writers was kept quite separate from his interpretation and discussion of an intended design. Wood considered that concentric circles with two horseshoe features was intended but not completed.

A further survey was carried out by John Smith and published in 1771 under the title *Choir Gaur, the grand orrery of the Ancient Druids, commonly called Stonehenge on Salisbury Plain.* Smith was a medical doctor who had set up a practice at nearby Boscombe to inoculate against smallpox but was hounded by disapproving locals (1771, v). He turned to Stonehenge although acknowledged that his plan was made without instruments and, it appears, was less meticulous in preparation than that of Wood. He also recognised the North and South 'Barrows' as depressions (1771, 52). He assigned signs of the zodiac to the stones and asserted that the sun passes through one of these each month. He named the trilithons after solar bodies, Venus, Jupiter, Saturn, Mars and the Sun. Like Wood he believed that the various stone alignments represent a calendar.

Around the turn of the 18-19th century, William Cunnington, later part of Richard Colt Hoare's team, excavated at several locations within the monument. His first account was of an inspection of the hole created when Stone 57 of the south-western trilithon fell in 1797 (see Fig 19 for stone numbers). The fall itself was recorded by W G Maton (1797) and published in *Archaeologia*. Cunnington later wrote that 'Soon after the fall of the great Trilithon I dug out some of the Earth that had fallen into the excavation, and found a piece of fine black Roman pottery – since I have found another piece in the same excavation – but I never had an idea that this pottery lay beneath the Stone but conceived it might have been lying in the Earth surrounding the Trilithon - & after the fall of the latter, to have fallen with the mouldering earth into the excavation. But the finding of Roman pottery here only proves that this was in existence, at periods when that species of pottery was used in the island' (Devizes Museum Cunnington MSS Book 4, 38).

Cunnington conducted some excavations at the site in 1802 (see R H Cunnington 1975, 164). This time at the centre of the settings close to the Altar Stone where Stukeley had earlier encountered solid chalk at one foot depth. He recalled this some years later in 1807 in a letter to Hoare: 'I dug in the same place to the depth of nearly six feet, and found the Chalk had been moved to that depth, and at about the depth of three feet I found some Roman pottery, and at the depth of six feet some pieces of Sarsen Stones, three pieces of coarse half-baked pottery and some charred Wood. After what Stukeley says of finding the Marle solid at the depth of one foot - the above discoveries would naturally lead us to suppose that some persons since Stukeley's time had dug into the same spot, yet after getting down about two feet, there was less and less vegetable mould till we reached the solid Chalk, and there Stephen [Parker] and myself thought it had every appearance of the floor of a Barrow, - there were some pieces of Bones, and as remarked before some little charred wood and coarse pottery' (Cunnington MSS Book 4, 36). The description suggests it likely that Stukeley had not recognised the true nature of the deposit or that Stukeley and Cunnington had not in fact dug in exactly the same place. John Britton tried to elicit further details from Cunnington for his volume on the Beauties of Wiltshire and asked Cunnington whether there was any sign of fire or whether the Altar Stone ever stood erect or was 'carefully fixt in the present position' (Devizes Museum Cunnington MSS letters Britton to Cunnington 10 Dec 1802).

Cunnington may have dug beneath the Slaughter Stone at the same time and considered that it originally stood upright, for a decade later he was able to assure the Rev James Douglas that the underside of the stone had been dressed and that he had encountered its stonehole. 'This I can clearly prove from having dug beneath it & found that the underpart had been chipped to its butt end like unto the other stones composing the Work, besides finding the hole in which it stood which is dug to fit its forked end….' (Devizes Museum Cunnington MSS Book 4, 58 letter to Mr Douglas March 1810). Douglas appears to have questioned the evidence, for later that year Cunnington wrote again to say that 'I have spent a day and a half at Stonehenge, chiefly with S. R Hoare – having just received your favour I made the men dig under the prostrate Stone so as to examine it thoroughly, and I have now Sir R Hoare, Mr Crocker and an Irish gentleman to attest the fact, that the aforementioned Stone was originally placed in an erect position – that part of the Stone which stood in the ground was rough, but those parts which were exposed were chipped like the others…..The hollow in which the stone now lies was occasioned by digging often to see what was under….' (Devizes Museum Cunnington MSS Book 4).

Cunnington also excavated elsewhere on site though the locations are not recorded, but 'within the area found parts of the heads and horns of Deer and other Animals, & a large barbed Arrowhead of Iron – and in digging into the Ditch which surrounds the whole I found both Roman, British pottery, and Animal bones. In digging & also in the Waggon tracks you frequently meet with chippings of the Stones, particularly of those uprights brought from the neighbourhood of Froome' [the latter is crossed through and 'the west' inserted] (Devizes Museum Cunnington MSS Book 4, 38). Crocker having indicated that the stones in the Orchardly long barrow were similar, Cunnington initially believed the Bluestones derived from the Frome area.

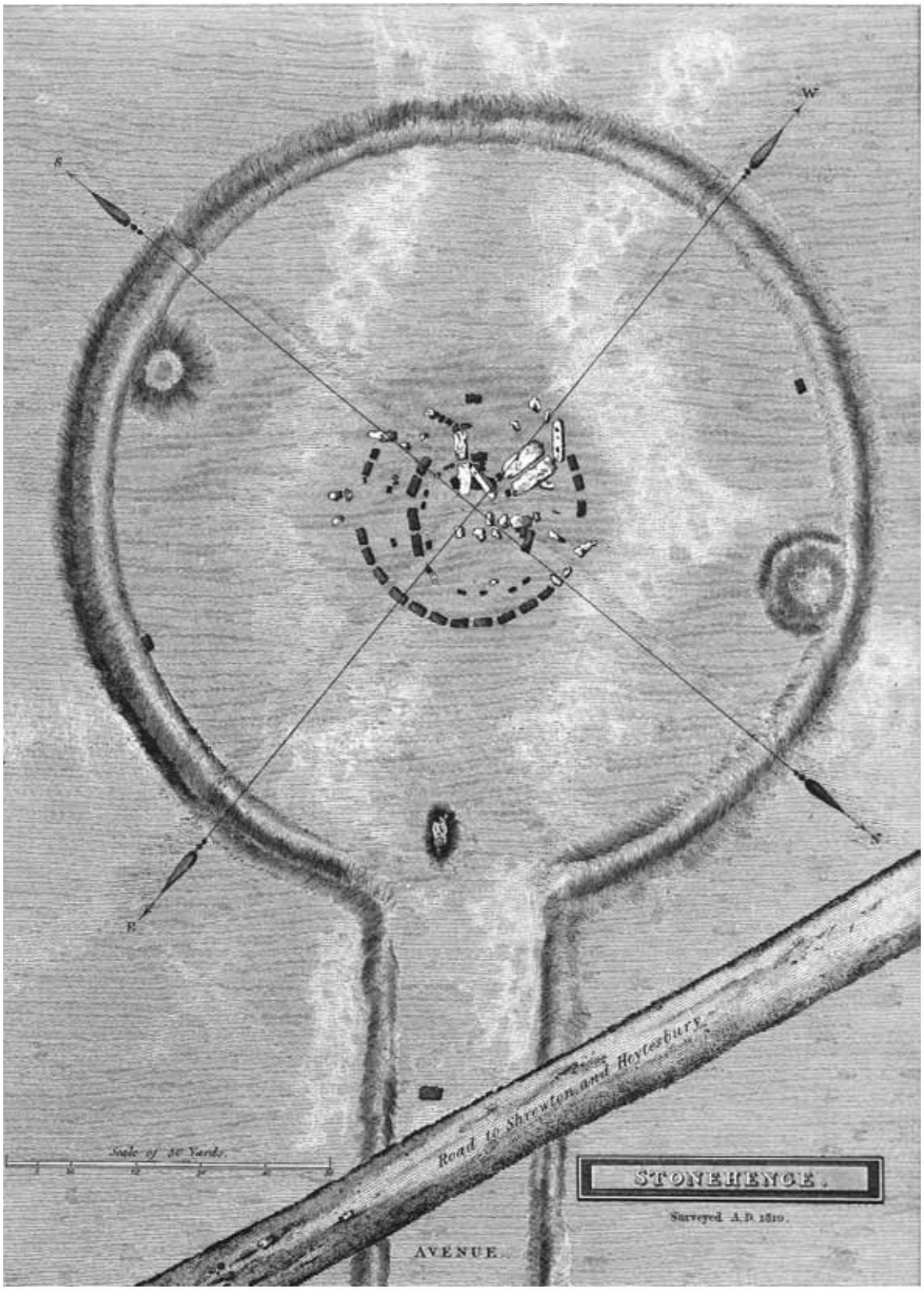

Figure 17. Plan of Stonehenge by Philip Crocker prepared for publication in R C Hoare's Ancient Wiltshire (Hoare 1812, fp143).

Subsequently, Sir Richard Hoare assessed the work of previous authorities and published the new work in the first volume of *Ancient Wiltshire* in 1812, the first fascicule of which was published in 1810. For its time the archaeological fieldwork carried out by his team was innovatory, giving full weight to earthwork mapping and analysis, as well as excavation and finds description. His team helped place Stonehenge within its wider context and as part of this work plans of the wider landscape and Stonehenge itself were prepared by Philip Crocker. Crocker was from a family of surveyors based in Frome, Somerset and had been employed by the Ordnance Survey on the 1st edition map of Wiltshire, but was engaged by Hoare to illustrate his work on *Ancient Wiltshire*. Crocker prepared two survey drawings of the site, one of the entire monument that included the enclosure earthworks (Fig 17) and a larger scale version of the stone settings on their own. For the first time the North and South 'Barrows' were depicted, each of contrasting form, the southern as a mound truncated by the enclosure bank, the northern as a circular bank and ditch with level interior but with a further external ditch that was truncated by the enclosure bank. Like others before him he set Crocker's survey alongside the *reconstruction* drawings of earlier workers. At Cunnington's prompting (Devizes Museum Cunnington MSS Book 4, 36) he identified the different kind of stones in his plan (Hoare 1812, 150 and fp 145).

Thirty years later a Captain Beamish from Devonport excavated in front of the Altar Stone in order to ascertain whether there was a central burial. Presumably the trench, some 2.2 by 2.4m and 1.8m deep, was close to or in the same place as that of Stukeley and Cunnington before him. Like them he ventured beneath the Altar Stone 'through chalk rubble and rock' but only a few pieces of charcoal and a number of rabbit bones came to light (Long 1876, 86-7).

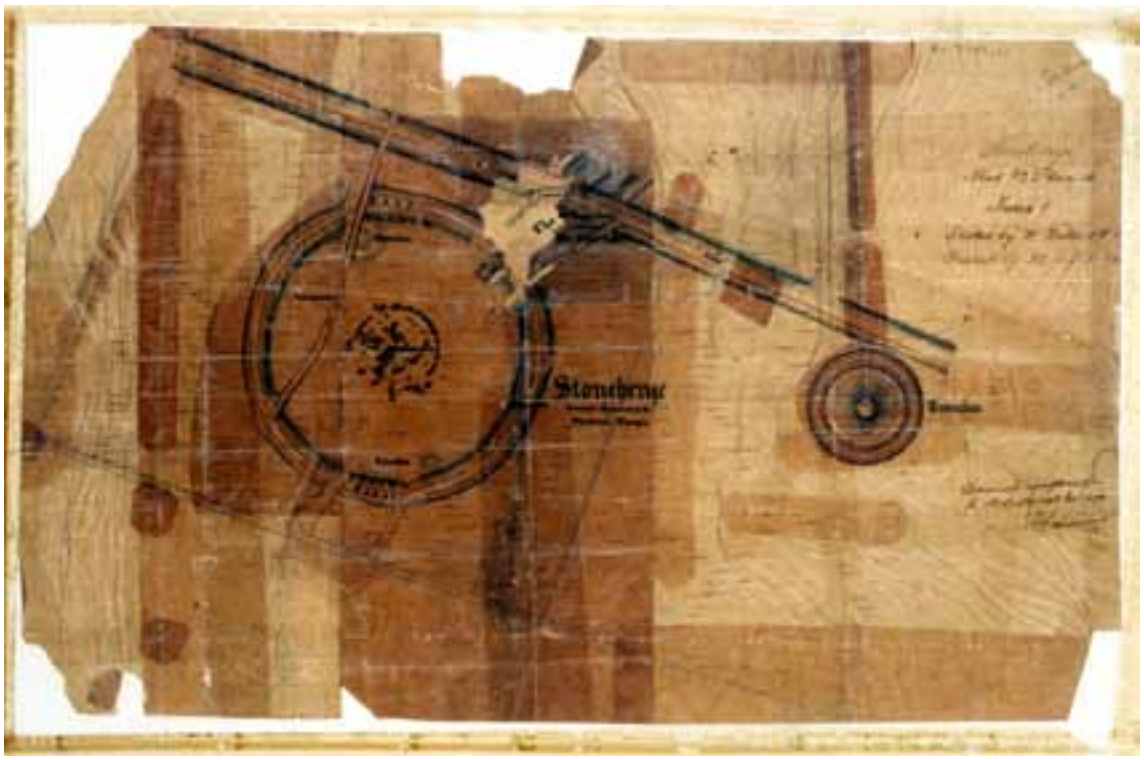

Figure 18. Survey trace from the 1873 survey of Stonehenge (Photo: NMR: OS survey1873 bb95 03448).

During the 1870s Ordnance Survey field staff were preparing the 25-inch map of Wiltshire and as part of this work prepared a larger scale plan of Stonehenge. This was carried out and plotted at 1:500 scale in 1873. A copy of the survey trace is archived in the NMR (Fig 18: Beagrie 1996). It depicts the damage to the enclosure by tracks entering from the south and the cart track that ran north to south through the monument just metres west of the stone settings i.e. creating the gap in the enclosure bank recorded on the earthwork plan (Fig 7, g). This also dramatically cut through the North 'Barrow' and disfigured the enclosure bank at that point, though it is noticeable that the surveyors had difficulty with the course of the ditch at this point.

The following year Flinders Petrie began surveying the site and in contrast to the Ordnance Survey depicted the ditch as a plain circle, but concentrated on the stones with much greater accuracy. Indeed, so concerned was he regarding precision that, anxious about the errors of Gunter's chain, the standard measuring device used by surveyors, that he had a new pattern of links made before renewing his efforts in 1877. The stones were triangulated to the nearest ¼ inch and in some cases to 1/10 inch and the plotting was carried out to an accuracy of 1/1000 inch often using a magnifying glass. It was Petrie who provided the numbering of the stones that we use today, starting with the outer sarsen setting in which it was presumed that if set equidistant there should have been 30 stones. Stone number 1 lay immediately east of the central midsummer sunrise aligned axis and the circle finished at Stone 30 immediately to the west. The lintels were preceded by 100, thus the lintel over Stone 1 is 101 and so on (Petrie 1880, 3-4, 9-13).

Around this time Charles Darwin was collecting material for his ongoing work on the formation of vegetable mould by earthworms (letter from Horace Darwin 19 June 1877-notes on the position of one of the fallen stones at Stonehenge quoted in Burkhardt & Smith 1994, Amem 1p DAR162). He concluded that the action of earthworms was instrumental in stones effectively sinking through the soil. Darwin noted that some of the fallen stones had become 'buried to a moderate depth in the ground'. He dug next to one stone in the outer circuit described as '17 ft long, 6 ft. broad, and 28.5 inches thick' (c5m x 1.8m x 0.7m). This must be Stone 12 or 14. He observed that 'here the vegetable mould was at least 9.5 inches in thickness. At this depth a flint was found, and a little higher up on one side of the hole a fragment of glass. The base of the stone lay about 9.5 inches beneath the level of the surrounding ground, and its upper surface 19 inches above the ground' (Darwin 1881, 154-6).

He then dug next to a second large stone that had broken in two, likely to be Stone 9, and judging by the weathered nature of the fractured ends suggested that the break was probably ancient. It should be noted that a narrow trench-like feature with bank alongside appears to extend from Stone 12 to Stone 9 (Fig 19) and it is possible that this is the result of Darwin's digging. However, its extended nature doesn't correspond with his purpose and his other diggings are not represented in the same way. The base of the stone

> '*was buried to a depth of 10 inches, as was ascertained by driving an iron skewer horizontally into the ground beneath it. The vegetable mould forming the turf-covered sloping border round the stone, on which many*

castings had recently been ejected, was 10 inches in thickness; and most of this mould must have been brought up by worms from beneath its base. At a distance of 8 yards from the stone, the mould was only 5.5 inches in thickness (with a piece of tobacco pipe at a depth of 4 inches), and this rested on broken flint and chalk which could not have easily yielded to the pressure or weight of the stone.'

'A straight rod was fixed horizontally (by the aid of a spirit- level) across a third fallen stone [probably stone 8], *which was 7 feet 9 inches long* [2.3m]; *and the contour of the projecting parts and of the adjoining ground, which was not quite level, was thus ascertained, as shown in the accompanying diagram (Fig. 7) on a scale of 0.5 inch to a foot. The turf-covered border sloped up to the stone on one side to a height of 4 inches, and on the opposite side to only 2.5 inches above the general level. A hole was dug on the eastern side, and the base of the stone was here found to lie at a depth of 4 inches beneath the general level of the ground, and of 8 inches beneath the top of the sloping turf-covered border."* (Darwin 1881, 154-6)

Thus by the beginning of the 20th century there had been more than ten recorded interventions (Table 2) and the site was considered to be in a sorry state. Several sarsens were leaning, some dangerously so. Stone 56 of the Great Trilithon, that to the south, lay at a perilous angle, while its partner, Stone 55, lay prone, having tumbled and broken at some unknown date prior to 1575, shedding its lintel; it is depicted as such in the illustration used by Camden. Stone 57 of the south-west trilithon fell outwards to the west in 1797 joining its partner (Maton 1797) and stone 22 with lintel 122 fell on the last day of the 19th century. Cart tracks were abundant across the site and traffic continued to cause damage. Concerned at this, the Society of Antiquaries lobbied Sir Edmond Antrobus, the owner of the site, and offered to assist with conservation. A committee

Excavations	Year	Authority	Location
Dr Harvey	17th century	Webb	Central area
Gilbert North	17th century	Webb	Central area
Inigo Jones	17th century	Webb	By a trilithon
George Villiers	17th century	Webb	Central
Others	17th century	Webb	Central area
Thomas Haywood	18th century	Stukeley 1740	Central area
Richard Haynes	18th century	Stukeley 1740	Central area
William Stukeley	18th century	Stukeley 1740	Altar Stone
Gaffer Hunt	18th century	Smith 1771	Stone 59
William Cunnington	19th century	Hoare 1812	Altar Stone, Slaughter Stone, North and South 'barrows'; elsewhere
Captain Beamish	19th century	Long 1876	Altar Stone
Charles Darwin	19th century	Darwin 1881	Stone 8, 9, 12

Table 2. List of early excavations at Stonehenge.

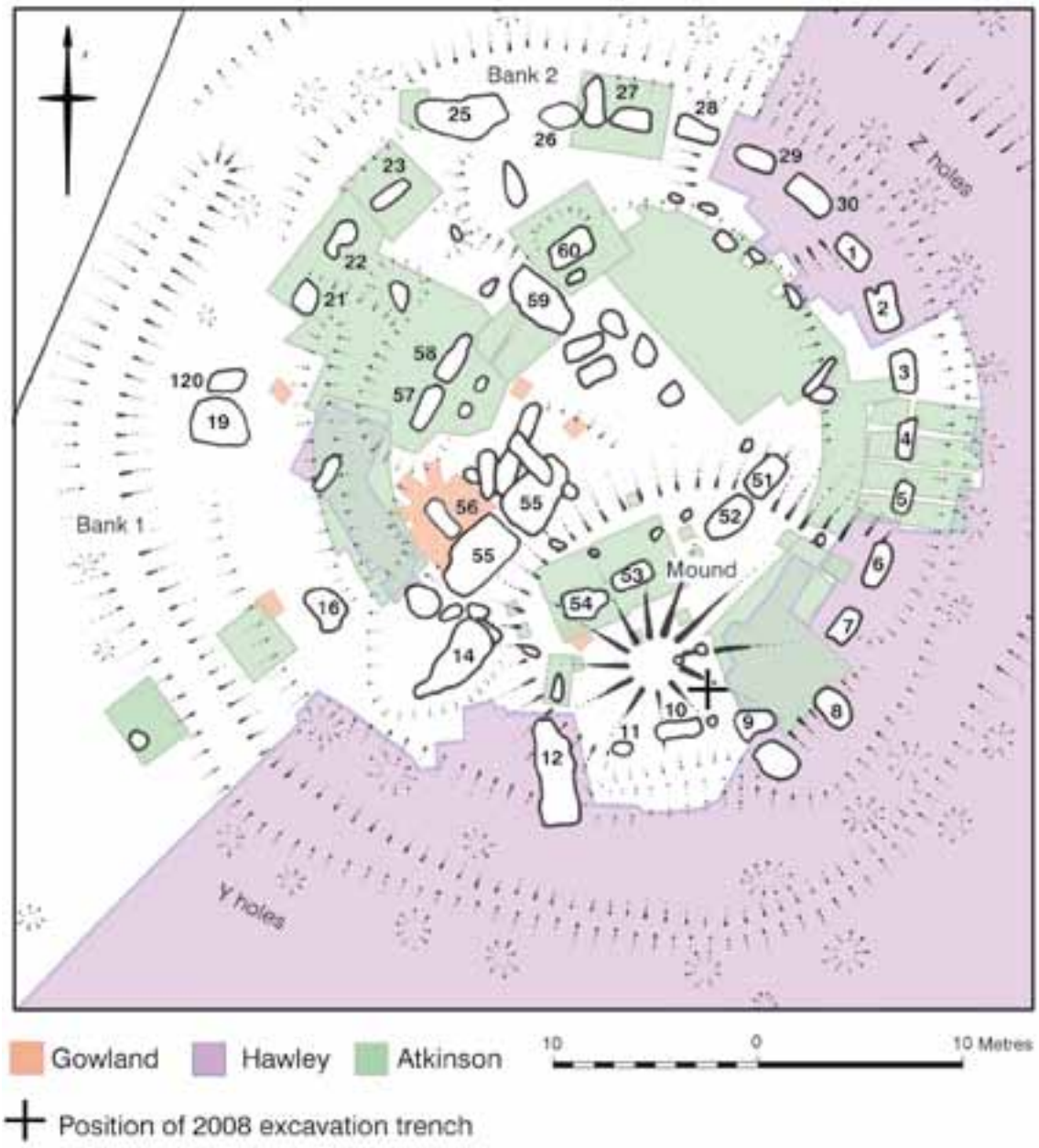

Figure 19. Outline of 20th century excavation trenches in the central area of Stonehenge (based on Cleal et al 1995 foldout) with selected stones numbered according to Petrie's 1880 system. The approximate location of the trench recently dug by the Stonehenge Bluestones Project (Darvill & Wainwright 2009) is marked by a cross.

recommended that the monument should be fenced off from the roads, that stones 6 and 7 with their lintel and 56 be examined and made safe, 22 replaced, 21 made safe and its lintel replaced, 57 and 58 be re-erected with their lintel, the trackway depicted on the Ordnance Survey trace (Fig 18) be diverted further to the west, the stones to be fenced off and the more dangerous set upright. William Gowland (1902) was engaged to carry out this work and he excavated extensively around Stones 55 and 56, made them safe and recommended that 56 be set upright.

Following the death of Sir Edmund Antrobus, the site was purchased by Sir Cecil Chubb of Bemerton (Table 3) who promptly donated it to the nation. This allowed diversion of the cart track and removal of an 'unsightly' fence alongside it. HM Office of Works noted that the site needed immediate attention. Stones were still unsafe but it was now possible to take remedial measures. Colonel Hawley was appointed by the Society of Antiquaries to lead the work which began in 1919. In a six-year campaign he

Name	Date	Authority
Mr Newdick	1620	Aubrey
Dawbony		Amesbury Estate papers 1824
Sir Lawrence Washington	1639	Boundary documents
Laurence Washington	1643	Inigo Jones
Robert Lord Ferrars of Chartley	1655	Aubrey
Thomas Hayward	1723	King 1874, 229
Rev Hayward	1724	King 1874, 228
Charles, Duke of Queensbury and Dover	1771	Smith 1771
William, Duke of Queensbury	1778	
Archibald Lord Douglas	1810	
Sir Edmund Antrobus	1824	
Sir Edmund Antrobus (nephew)	1826	
Sir Edmund Antrobus (son)	1870	
Sir Cecil Chubb	1915	
Commissioners of Works		

***Table 3**. Owners of Stonehenge adapted from William Long (1876, 237-9).*

excavated almost half of the site. He prepared for excavations in 1919 and cut some test pits outside the stone settings but in an unknown location. He started excavating the enclosure ditch, then excavated Stones 6 and 7 noting the amount of Roman material in the upper levels of the stone holes, following this with stones 29, 30, and 1 and 2, then stones 31 and 49; finally making them safe by setting them in concrete.

Having studied Aubrey's plan of the site in the Bodleian Library, Hawley probed for the position of the five cavities recorded as being set around the inner foot of the enclosure bank with a steel bar. Although Aubrey had observed them as earthworks, none were visible on the surface to Hawley (1921, 30) but after probing one was eventually found. This and several others revealed were given the name X holes but were soon renamed after Aubrey. Hawley excavated 24 of them and backfilled them with white chalk (Hawley 1922, 48). Later, when systematically trenching the eastern half of the interior he encountered two other circuits of holes and numbered them consecutively, the Y and Z holes.

He examined the Slaughter Stone and the area around it, revealing a stone hole, presumably that previously encountered by Cunnington, in which he also thought that the Slaughter Stone had originally stood.

PART THREE

6. DISCUSSION

Stonehenge has long been a tourist attraction and the sheer number of tracks that converge on the site bear witness to this. Earthworks of prehistoric origin will therefore have suffered from particularly intense and concentrated activity over several millennia. Similarly, the extensive excavations of the 20th century coupled with various conservation measures have damaged and obscured earlier surface traces. Despite this, the survey has demonstrated the presence of a number of subtle earthworks that have a significant bearing on the interpretation of the site. What does survive is of great interest and supports and enhances the results of geophysical surveys carried out in 1994 (Payne in Cleal *et al* 1995) and provides a fresh baseline for understanding the visible remains. A considerable amount of new information relevant to the interpretation of the site has been obtained and is considered below.

The enclosure earthwork

The location of the enclosure at Stonehenge has little in common with the riverine or valley floor situation of most henges; instead it falls comfortably within the accepted landscape position of many causewayed enclosures (Oswald *et al* 2001, 99-102). Excavations in the western half of the enclosure by Hawley in the 1920s demonstrated the causewayed nature of the ditch (Hawley 1922; 1923). These are not true causeways in the sense that they allow direct access to the other side of the ditch, rather they are interruptions in the base that indicate that the ditch was first dug as a series of pits or segments subsequently joined together. It is, however, possible that they were once true causeways that were removed by the ditch re-cut identified by Parker Pearson *et al* (2009, 29-30), leaving them truncated. The earthworks indicate that further causeways exist in the unexcavated portion of the ditch floor. In two cases these lie opposite breaks in the inner bank and could be the result of traffic although there is no evidence of such wear continuing on either side of the enclosure earthwork. This causewayed or pitted nature of the ditches has led to a suggestion that the site falls within the causewayed enclosure tradition, albeit quite late in the sequence (Cleal *et al* 1995, 113) although recent work (e.g. Whittle *et al* 2010) would allow a gap of several centuries between the construction of causewayed enclosures and the construction of the Stonehenge enclosure. With its radiocarbon date of soon after 3000BC, the Stonehenge enclosure has been compared most closely with the almost circular enclosure of similar size at Flagstones, Dorchester, Dorset. Enclosures of this nature have recently been termed 'Formative henges' and placed alongside the early henges at Llandegai in north Wales, and more loosely with the Priddy Circles (Burrow 2010). Little is known of the Great Circle enclosure at Stanton Drew. At 136m diameter it dwarfs Stonehenge, yet its variation in ditch width, coupled with the complexity of concentric internal settings and an Avenue, this time in stone, provide one of the closest parallels (David *et al* 2004).

The Stonehenge enclosure, comprising ditch with external and internal banks, is essentially circular but has two straight sections in the north-west which are particularly noticeable in the outer bank. This may be a response to pre-existing features but it is worth bearing in mind that the admittedly larger henge enclosure at Avebury is similarly angular on one side, in that case the west (Brown *et al* 2005, 21). A further

pre-enclosure feature might have influenced the sinuous indentation 15m south of the eastern Station Stone and in this context it is worth noting the proximity of the oval vegetation mark depicted alongside it on Lt Sharpe's aerial photograph (Fig 9) and the accumulation of cultural material noted by Pollard & Ruggles (2001, 83).

Wood (1747, 79), who referred to the enclosure as comprising a double bank of earth separated by a ditch (1747, 43, 47), and Hawley (1923, 14; 1928, 52) were both aware of the presence of an external bank, but the latter referred to it as a counterscarp and this terminology has prevailed, with the result that is considered the secondary of the two banks. Hawley's excavation of it revealed a bank of flints 30cms in height that if consistent around the circuit would effectively form a ring cairn, although small sections dug by Atkinson and John Evans in 1984 revealed 'intermittent patches of chalk lumps'(Cleal *et al* 1995, 24) and provide no confirmation. The aerial photographs indicate that it was of lesser proportions than the inner bank although geophysical survey in 1994 emphasised that its width matched that of the internal bank and was clearly of some substance (Payne in Cleal *et al* 1995, 501). The earthwork survey confirms this and demonstrates that with care the outer bank can still be traced for most of its circumference although, except in the north where the proximity of the road has discouraged cultivation, it has been severely truncated by ploughing.

The presence of the outer bank has important implications for interpretations of the enclosure, for notwithstanding the comments above, it is conceivable that the enclosure could have been constructed as a standard henge with the inner bank added later. That interpretation, however, is not favoured here. Indeed, it is eminently possible, even likely, that two or more phases of activity are represented by the earthworks. The form of the ditch provides some suggestion of this, for its character differs from west to east (Fig 6). The western arc is relatively broad and flat-bottomed compared to the east, where it has admittedly been excavated, leaving a different surface appearance. Similarly, the bank in the west is more substantial and all this is seen quite clearly in the ground model. This difference is more than a surface observation for the change in character was also noted by Hawley, who commented on the pit-like nature of the excavated chalk in the south, compared to the long segment that he had excavated in the east. There may, of course, be cosmological implications in differential use of the east and western parts of the enclosure (see Pollard & Ruggles 2001, 83), but there has also been a re-cutting episode (Parker Pearson *et al* 2009) and an asymmetrical re-cutting of the ditch in the manner that some causewayed enclosures were refurbished i.e. over-cutting into one of the ditch faces, might equally explain the difference. Apart from a small trench excavated by Atkinson at a point where the track way breaks though (Cleal *et al* 1995, 66 fig 36), the western part of the ditch has not been tested and it is not known to what extent deposits and the presence of cultural material, for example, cremations, might differ from those in the east.

At 11m between ditch terminals, the break in the north-east is a wide entrance gap, much too wide for access of single individuals or animals, or even vehicles, and if an entrance in the modern sense it is as though it was left that wide in order to allow more than one individual to pass at once or to suit an existing feature or vista. The subtleties of surface undulation at this point are rather too amorphous to make sense

of, but there is just the slightest evidence that the outer bank may once have continued across the entrance gap, for although slight, the ground level is a little higher here than within the Avenue generally. This shallow rise in the ground surface is visible in Hawley's photographs (Hawley 1924, Figs 1 and 2) but he made no comment on it and instead referred to the manner in which this area had been denuded by tracks. Unfortunately the ground model does not help with this and the blandness of the depiction can only be put down to the effect of the excavation trenching and the fact that so much of the area had been eroded by heavy traffic (Hawley 1925, 23). It is worth noting, however, that the Aubrey holes likewise continue across the north-eastern entrance.

There is no evidence that the Avenue banks and ditches continue into the interior of the enclosure and the mis-match of enclosure entrance and the Avenue at their junction (Fig 2) has been noted before. The survey indicates that each of the Avenue ditches terminates at about 3m from the enclosure ditch and Hawley's excavations (1925, 22) additionally leave little room for doubt about this. In effect they butt up against the outer bank of the enclosure. It presents its own conundrum and indeed interpretation of the mis-match formed the difference between the phasing models of Atkinson and Cleal *et al* (1995, 455-6) respectively.

It can be interpreted that an original enclosure ditch with wider entrance was subsequently re-cut and extended into the line of the Avenue, but the general view and one preferred here is of an original phase 1 enclosure entrance as seen, leaving an entrance gap of 11m or a little more. To account for the Avenue mis-match, Atkinson (1970, 70-3) considered that several metres of ditch at the south-east terminal were backfilled to match the width of the Avenue in order to allow unhindered passage into the enclosure. He suggested that the eastern part of the enclosure ditch excavated by Hawley 'appears to have been filled up deliberately, when it was already partly silted, in order to enlarge the entrance to match the width of the Avenue' (Atkinson 1979, 70). The interpretation appears to assume that the ditch at this point had been filled to the surface level so that it was possible to pass across and he was perhaps influenced in this by R H Cunnington's earlier (1935, 86) account of the site. Hawley certainly referred to a deposit of clean white chalk 'which had been brought from elsewhere and cast into the ditch' but he did not appear to think that this was returned bank material or indeed that the ditch was backfilled to the summit such that it would allow unimpeded access from the Avenue. Hawley began excavating at the north-east terminal in spring 1922 (1923, 17-18) and continued the following year (1924, 30-4). He made no mention of whether the bank at that point was missing or denuded and it does not appear to have been modified to allow passage for, if not returned to the ditch, it still presented an obstacle. Atkinson's interpretation invites further comment, for Lt Sharpe's aerial photograph (Fig 9) indicates quite clearly that the ditch at this point was of this form, i.e. as an earthwork that impinged on the line of the Avenue, prior to those excavations. The bank was present also and both are additionally visible on a vertical taken in 1922 (Fig 11) before Hawley had begun excavation of the terminal. It is noteworthy that Cleal *et al* (1995, 139) also refuted Atkinson's interpretation which relied heavily on the presence of bluestone in backfilled layers and they pointed out that this material had in fact derived from a disturbance by a later burial. The survey thus supports the views of Cleal *et al* (1995) and it can be concluded that the enclosure ditch entrance terminal earthwork was not originally backfilled to match the Avenue.

The simplest explanation for all this is of two separate and self contained construction episodes: first of the enclosure and then Avenue construction. Given the long chronological gap between the date of the enclosure and that of Avenue construction and the inevitable complete change of purpose over that time, there is no need for symmetry as by the second phase of use the enclosure may have been a silted, grass grown and ancient earthwork. Cleal *et al* (1995, 170. fig 70: see also Newall 1929, 83-4, 88) indicate that there was a change in orientation between these phases of activity. Phases 1 and 2 of the monument were based on an axis that bisected the narrow entrance. In contrast, Phase 3 which incorporated Avenue construction bisected the stone settings between stones 1-30. Both axes pass to the west of the Heel Stone. In this case, there was no need for the two to match for, as Cleal *et al* (1995, 140) point out, they are not conceptually related and they are not reliant on each other to form part of a coherent design. If the full width of the Avenue was planned with procession or access as its main purpose it might indeed be expected to have matched the width of the enclosure entrance or at the very least approach it in a symmetrical manner. However, if its alignment is a solar one and its purpose related to viewing rather than processing there is no need for it to 'fit'. It is worth noting that this is a circumstance matched at the Great Circle at Stanton Drew, where the stone avenue aligned east-north-east is at considerable variance with the gap in the enclosure ditch in the north-east (David *et al* 2004).

At Stonehenge, the slight angle change in the southernmost Avenue ditch towards the fence alongside the A344 road, initially considered to be a survey error or possibly the result of damage from a former visitor entrance, can also be detected on an aerial photograph taken in 1906 (Fig 10) and is therefore considered to be genuine. It can be considered in two ways. As noted above, it may result from a need to respect the ditch around the Heel Stone which implies that the Avenue is later than the Heel Stone ditch. Alternatively, having ascended the slope from Stonehenge Bottom, perhaps aligned on some visible marker, it needed to be re-aligned on the enclosure entrance as it drew closer and came into view. In the latter case it could have been better executed. It is conceivable that answers to this may in part lie beneath the A344 road.

The North and South 'Barrows'

Neither of the well-known North or South 'Barrows' are barrows. This was also commented on by Hawley (1928, 174) who referred to the southern example as a 'so-called barrow' (1923, fig 1) and demonstrated that it was anything but. Nevertheless, the terminology continues to be used and to confuse and it may be far better to consider the adoption of some other less functionally loaded description than to persist with the confusion. Henceforth and in the absence of definitive interpretation they are referred to in this document in more neutral terms as 'circles'; the expression may not be entirely out of place given the presence of North and South Circles at some other major henge sites (the northern and southern circular features at Marden can also be considered in this way; see Field *et al* 2010). Stukeley simply recorded the existence of 'two remarkable cavities' and there has been a tendency to imagine that these might refer to the Aubrey holes. His illustration (Stukeley 1740, 16, Tab 9) described as looking south-west from Stonehenge in fact looks towards Salisbury, the Cathedral spire being depicted, shows

the southern cavity drawn with vertical hatching surrounded by a ditch and evidently overlain or curtailed by the enclosure bank. Wood (1747, 50) also commented on them, describing them as concavities rather than barrows, 'one with a single Bank of Earth about it; and the other with a double Bank separated by a ditch' (1747, 44). They were 'compleat Works of themselves', the depression measuring nearly 5m in diameter and the feature as a whole about 12m 'each Pit is about Sixteen Feet diameter, and the Banks that surround them increase the Diameter of each Work to about forty Feet'. The North Circle was 'further enlarged by a Ditch and a Second bank of earth, though not expressed on my plan'. Was he perhaps wrong in this? It will be recalled the painstaking detail in which he surveyed the central area and there is no reason to suppose that his observation of the earthworks was any less acute. If we accept these descriptions it implies that the surface may have been considerably modified at some point since. Smith's account (1771, 52) certainly supports those of Stukeley and Wood. He referred to the features as two 'circular holes encompassed with the earth that was thrown out of them; but they are now almost effaced by time'. In contrast to Stukeley, Smith considered that they were intended for a meridian line through the monument.

Richard Colt Hoare (1812, 144) appears to have been the first to describe these features as tumuli, noting that they were only 'very slightly elevated above the surface' and basing his categorisation on William Cunnington's excavation of the northern of the two wherein was a deposit of burnt bones. Cunnington himself may have influenced Hoare's thinking by describing it as a 'small Druid [i.e. disc] Barrow' (Devizes Museum Cunnington MSS Book 1, 13 letter to Hoare Dec 18 1806). It now seems likely that Cunnington may have encountered deposits associated with Aubrey hole 46, which lay on or beneath the central platform of the feature (Newall 1929, 82).

The present survey introduces the likelihood that the Northern Circle was overlain by the enclosure bank and Crocker's plan of the enclosure published by Hoare (1812) would tend to support that. Later in the 19th century William Long (1876, 54) assessed the site in some detail and he also considered that the enclosure bank 'cuts through the ring of a low barrow on the northwest side…..and it embraces another low barrow on the opposite side. From this treatment of the former tumulus it is clear that it was in existence before the ditch was dug'.

Today the Northern Circle comprises a ditch with external bank that forms a crescentic plan, the rest being obscured by the trackway. It is assumed that its complete form may be circular and it looks so on Lt Sharpe's aerial photograph (Fig 9) where the trackway has cut through the enclosure bank material. The circle's bank appears to butt up against the inner bank of the enclosure and certainly does not cut through or across it to complete a circuit. Whether it indeed lies beneath is now difficult to determine from the surface evidence alone, for a succession of trackways and pathways has cut through and destroyed the greater part of it. Again, given the evidence of Lt Sharpe's photograph, one would expect the bank of the 'circle' to mirror the ditch. If so it must lie beneath the enclosure bank for at no point can the bank be seen to overlie the latter. Perceptively, however, Hoare (1812, 145) ventured that the circle was '*constructed before the enclosure ditch was dug*' and the former observations mentioned above, not to mention the depiction on Crocker's plan, supplement this view. It is worth noting that the outer bank

of the enclosure changes direction at this point and this could conceivably have been to encompass a pre-existing feature. Similarly a causeway or entrance in the circle's bank might have encouraged early traffic and resulted in the trackway. The trackway that cuts through it was presumably post-Cunnington in date as he and earlier surveyors were clear about the form of the North 'Barrow' and none mention the disfigurement caused by the trackway. Indeed its change in form may derive from cutting through it by the trackway perhaps sometime between 1826 when Crocker's survey was republished by Hoare in *'Modern Wiltshire'* and 1873 when the large scale 1st edition 25" Ordnance Survey map was produced.

There are nevertheless some uncertainties. For example, W Hyatt's plan of 1820 (Devizes Museum 1982.7712) depicts the North Circle as a ditched mound that lies on top of the enclosure bank with a forerunner of the trackway exiting through the eastern side of the ditch.

Hawley's excavation plan revealed a central crater of at least 2m across descending to a steep sided hole of little more than a metre depth (Cleal *et al* 1995, fig 164) which, given its location in relation to the extant Station Stones and a similar hollow at the South Circle makes a rhomboidal plan, is interpreted as a stone hole. Unfortunately Hawley did not complete excavation of the hollow in order to confirm the point. Hawley placed a small trench across the circle ditch and bank which indicated that the ditch was V-shaped and similar in profile to that around the Heel Stone, the latter considered to represent an early phase of the monument since the Avenue ditch overlies it. In the bank material was a piece of 'bluestone' and in the secondary ditch silts more 'bluestone' chips along with Iron Age/ Romano-British pottery. This material should indicate that it was of a period later than the enclosure bank and contrasts with the earthwork observations. If we take the survey evidence coupled with the earlier accounts it becomes clear that there has been a considerable degree of disturbance at this point.

In its present form, with its external bank and what amounts to a little more than a platform in the interior, it might be described as an embanked ring ditch, but it can equally be compared to mini-henges such as Maxey 69, I and II, Northamptonshire; High Knowes, Alnham, Northumberland; Corporation Farm, or Dorchester VI, Oxfordshire; or much closer to home, to the mini-henge in Fargo Plantation (Harding & Lee 1987, 84-5, 213-4, 235-8, 246-7) or that north of the lesser cursus on Winterbourne Stoke Down (David & Payne 1997). If all this is correct, and it should be emphasised that it needs testing, it is of profound importance for the sequence of construction at Stonehenge. The enclosure has in recent times been seen as the earliest feature of the monument, but it is now possible to tease out some potentially earlier features that might have influenced site development.

The Southern Circle is rather different. On the surface its surrounding ditch is of contrasting profile to that of the North Circle and there is no external bank. The survey supports the observations of Hawley that it is of later date than the enclosure bank although it is not clear to what extent the ditch represents an original earthwork, for it must be stressed that surface observation here is of Hawley's reconstituted enclosure bank and 'barrow' ditch and Lt Sharpe's aerial photographs (Fig 9 and 10) demonstrates

that prior to excavation the crisp earthwork was not visible. On excavation, Hawley (1922, 48) depicted the ditch as V-shaped in profile (but see his pl VIII fig 1 and 2 which perhaps indicates a re-cut). Amongst the cultural material it is worth noting that Hawley found a fragment of a ground axe variously reported as from the matrix of the mound or the 'top of the barrow' (Hawley 1922, 48, 52).

Hawley made it clear that the enclosure bank had been cut into 'nearly up to the crest' in order to locate part of a levelled area surrounded by a trench. Cutting in to the enclosure bank to this degree is quite a strange thing to do unless the association was of particular significance. The level floor encountered consisted of a 'yellow substance resembling chalk beaten fine and mixed with clay.. .' up to 0.15m thick and the surrounding trench was 'covered with the same kind of compo as the floor'. Hawley considered that the feature was more like a hut than a barrow. While the purpose and date of it remains difficult to determine, the recent discovery of Neolithic houses at Durrington Walls with floors not dissimilar to that recorded by Hawley, has allowed Parker Pearson (2009, 33-34) to re-appraise Hawley's evidence and conclude that this may indeed have been a house platform (Parker Pearson 2007; 2009, 33-34). Should it be so, the need for a level platform makes more sense of Hawley's description of cutting into the bank. Hawley did, however, encounter what was evidently the hollow noted by earlier observers. Initially he considered it the result of an earlier excavation (Hawley 1922, 48) – presumably that of Cunnington who according to Hoare found nothing (Hoare 1812) and later considered that it was a stonehole (Hawley 1923, 15). Unfortunately the relationship of this to the platform remains unclear, but there is an assumption that the stonehole must have been dug through the platform, otherwise the hollow would not have been visible to early observers. There are clearly a number of phases here that could only be disentangled by re-excavation.

The nature of the North and South Circles remains intriguing. The cavities noted by the earlier observers appear to have been stoneholes, thought to have been those of Station Stones 92 and 94, and the surrounding embanked spoil perhaps the upcast. That such cavities remained visible as earthworks might be taken to imply that the stones had been extracted in recent times. That the spoil apparently overlay Aubrey holes may indicate that the stoneholes were a later insertion. Such a spoil heap, however, may simply be the product of those who extracted the stone, for it would be very unusual for extracted spoil from a stonehole to remain as an earthwork. None is visible at the other Station Stones for example, or indeed any of the other stones at Stonehenge. Similarly, the relationship with other features remains unclear as does their chronology. It is not clear whether a 'platform' similar to that at the South Circle, lies at the North, while the relationship of each to the enclosure needs to be confirmed to a greater degree of certainty than that presented here. One thing is certain; they are not barrows.

The Aubrey holes, Y and Z holes and accompanying features

Careful survey of the surface immediately around the stone settings revealed that a number of surface undulations still survive for study. The Y and Z holes were discovered by Colonel Hawley during his stripping of the eastern half of the enclosure (Hawley 1925, 27-8) but are, quite surprisingly, actually visible on the surface. They were depicted by

him as forming circuits around the sarsen settings, though as presented here the circuit is angular rather than circular with a slight possibility of a spiral arrangement, although damage in the north-east has obscured crucial detail and it is impossible to pursue this point.

First considerations suggest that the surviving depressions are the result of poor backfilling for those on the east side have been excavated, but with hindsight they can be observed on Lt P H Sharpe's aerial photographs taken in 1906 (Capper 1907) and particularly clearly on a RAF vertical photograph taken in February 1922 (NMR CCC 8561/173 SU 1424/14), that is, before Hawley's excavation of them. They appear to have been original features and in any case depressions were observed corresponding to Y holes 25-28 where no excavation has taken place.

Oval rather than circular (excavated examples tended to be sub-rectangular), the Y holes essentially form a complete circuit were it not for that portion in the west where they have been obliterated by the visitor pathway. An additional depression was noted in the south-east as part of the circuit but a little out of line with the others. The Z holes are particularly well represented on the north-east side of the monument where, like the Y holes at this point, in good part they mirror the stones of the extant sarsen circle. Some of them do not precisely match the position as indicated in the plans published by Cleal *et al* (1995, fig 151 and insert) but it was pointed out in that volume that Hawley's co-ordinates were not always clear. Hawley does not appear to have had a surveyor on site; a plan appeared for the first time in 1923 part way through the excavations (Hawley 1924, 22) courtesy of HM Office of Works and it is not clear how features were plotted.

There is a problem in the area of Z hole 8. Atkinson did not encounter this pit during excavation and was confident that it did not exist (Atkinson 1979, 34). However two depressions were encountered on the surface a little outside the predicted circuit and Atkinson's trench. Their signature was also encountered by the geophysical team in 1994 for they similarly identified a second anomaly that was referred to as 8a (Payne in Cleal *et al* 1995, 503).

Overall less attention has been given to the Y and Z holes than other aspects of the monument. Only Y hole 30 has been dated, based on three C14 determinations on antler to an estimated 1640-1520 cal BC (Cleal *et al* 1995, 533). According to the accepted chronological model this fits a period when the stone phase of the monument has gone out of use and when fields were laid out over parts of the surrounding landscape and indeed windblown silt thought to have derived from nearby fields was present in the silting (Cornwall 1953, 153-140).

Immediately within each circle of depressions is an extremely slight bank. While evidently forming a circuit, as with the holes themselves, there is a gap in the north-west where a trackway impinges. The rest of the circuit is not precisely circular but comprises a series of sinuous bulges and sharp angles. In plan, the north-east part of the arc is crescentic and closely follows the line of the extant part of the sarsen circle. The nature of these banks cannot at present be determined. It is entirely feasible that they are recent or the product of activity during the historical period. The shallow and diffuse appearance

of the earthworks invites comparisons with former plough ridges and hedge banks and either remain possible, a product of land-use in historical times if not antiquity and in this context it is worth noting the cultivation mentioned by Long (1876) that was encroaching on Stonehenge during the latter part of the 19th century. It is also worth noting that Hawley (1923, 14) suggested that the enclosure counterscarp may at some point have supported a hedge. A wire fence was placed around the stones during World War I and is visible in some photographs ((NMR ALO 93/017/01) (Richards 2004, 38) and there may have been other earlier examples. A trench was dug in which floodlight cables were placed in 1968 but these avoided the Y holes. However, a similar trench cut in the same year for geophone cables does, at least in part, correspond with the position of the Z bank (Cleal *et al* 1995, 12, 563, fig 289). However, slight traces of the inner bank can be seen in Lt Sharpe's photograph (Fig 10) and of the outer on enlargements of the 1922 air photograph (Fig 11) mentioned above. Given the evidence of the aerial photographs, at least in the case of the outer of the two banks, thoughts that they represent excavation spoil dug from the respective pits or the edge of Hawley's excavation trenches can be discounted.

That Hawley did not comment on this is curious. Hawley's method of excavating the area was evidently via a series of narrow strips set radially from the stones to the enclosure bank, slowly working his way around the quadrant. There was almost 0.5m of soil in the interior (Cunnington 1935, 69) compared to about 0.15m outside the enclosure and Hawley seems to have whisked this off down to the chalk rock, initially noticing the Y and Z holes simply because of their humic content that stood out against the chalk sub-soil rather than as earthworks in their own right. Thus we might assume that he would have encountered any post or stake holes dug into the chalk that might have supported a fence. However, it is likely that the presence of similar dark material forming features above the chalk might similarly have been scooped away. However, his plan (Cleal *et al* 1995, 14 fig 8) suggests that having initially encountered the Y holes by chance in the north-east, he was able to observe the rest either as earthworks or by probing and clearly targeted them with small trenches. In each case the trenches avoided the internal scarping and the banks therefore remain unexplored and may be substantially intact. It remains possible, however, that they represent an undulation in the chalk, a portion of old land surface preserved as a 'ghost' formerly protected by upcast from the original digging of the pits. Again, only further excavation will resolve the matter.

Disturbance to the central area.

Given the extensive digging and probing described in Inigo Jones and various other authorities (Table 2) it is quite surprising that earthworks representing these activities do not remain to be recorded. Petrie noted that there was no cavity or undulation in the centre of the area, although the photographs of J J Cole taken in 1881 indicate otherwise (NMR MPBW Collection S617). One problem of survey and observation at the centre of the stone settings is lack of room in which to observe the ground surface, for the complex of fallen and standing stones restricts vision of subtleties quite considerably. Perhaps it was the extent of excavation and conservation activity that took place during the 20th century, or the activities of Gaffer Hunt (see below) who had a hut or shelter amongst the stones during the 18th century that obscured them, but evidence of even his activities is missing.

The presence and potential of parchmarks recorded during dry summers within the central settings was illustrated by Cleal *et al* (1995, plate 6) and should they be revealed again the opportunity should immediately be taken to record them. The position of Atkinson's trench in the north of the interior (Cleal *et al* 1995, C12) is clearly depicted by these, while another to the north of the Altar Stone could result from a combination of Stukeley, Cunnington, Beamish and Atkinson excavations (see Table 2).

The mound

Perhaps the most striking of the discoveries, however, is the oval mound noted above. It should be emphasised that while this is subtle and diffuse it is nevertheless substantial and significant. The traditional hachured survey depiction indicates that it appears to be of two phases, a plinth with a further mound set over it.

It appears to underlie fallen stone 12 although on the surface it is difficult to verify this observation and it is only necessary to refer to Darwin's work around Stone 12 on how the stones have sunk – or the soil profile raised - to underscore the point. It is equally difficult to determine the relationship with Stones 53 and 54 of Trilithon II and unfortunately the 20th century excavation illustrations shed little light on the matter (Cleal *et al* 1995, fig 147 and 228). Thus explanations at such a well-researched monument are difficult to present. Initial thoughts inevitably turn to the extensive programmes of excavation and conservation that took place during the 20th century, although the Ministry was evidently careful to ensure that backfilling was adequate and to be fair there is little sign of trenches that survive even as subtle earthworks around the site. The interior was covered with clinker and gravel during the 1960s (Richards 2004, 88) but it seems unlikely that a mound of residue material would have been allowed to remain unspread without notice and air photographs depict only part of that area as covered with gravel. Similar considerations can be made of earlier excavations, in particular, that of the Duke of Buckingham who dug the saw-pit sized hole mentioned above. Presumably, most of the soil went back into the trench otherwise its location would have been quite visible and observed long before now.

Little is known of other activities that may have taken place during the medieval and post medieval periods although recent investigation might in due course shed some light on this (Darvill & Wainwright 2009). Stukeley noted that rabbits were causing damage within the settings, which raises a slight possibility that the feature in question might be a pillow mound. However, such an explanation seems unlikely and it can be objected that to build any such feature amongst standing and prone stones would have been a particularly awkward task when it could have been more easily constructed in an open area. There are none of the features usually associated with pillow mounds, such as collapsed tunnels or even a surrounding ditch to provide drainage, and there is similarly the problem of where the earth came from. Elsewhere in the locality and in Wiltshire in general, the ubiquitous barrows were used as pillow mounds; the rabbits simply being left to burrow in and sometimes barrow groups, for example those at Winterbourne Stoke (NMR Nos SU 04 SE24 and SU 04 SE83), were enclosed in warrens. Stukeley did not mention the construction of a mound which he is likely to have done and neither was one mentioned by other commentators. In contrast, his observations imply that rabbits had simply been

encouraged to colonise the open down and he writes of a 'colony of rabbits' rather than a conyger or warren and was specifically aware of the warrens at Winterbourne Stoke (Stukeley 1740).

Unfortunately, early photographs add little, though one taken around 1885 by J L Lovibond (NMR MPBW Collection: Richards 2004, 20) shows the undulating nature of the centre of Stonehenge. Undoubtedly, much of this was the debris of centuries of tourism. Smith (1771) had earlier drawn attention to the modern debris and dung cluttered about the monument while R H Cunnington (1935, 69) later referred to the number of bottles and other litter that had accumulated around the Altar Stone. An undated but apparently 19th century photograph (NMR BB91/2487) depicts the mound. In addition, two photographs taken during Gowland's excavation in 1901 shows his caravan parked at an angle on the mound (NMR AA80/6438 and AA80/6439) which implies that it was not a result of the 20th century interventions while a further photograph taken by W E Zehetmays in 1913 (NMR BB90/3032) prior to Hawley's work adds support.

There are a surprising number of 18th and 19th century illustrations that depict the area as less than flat and some even incorporate a mounded area among the stones. Some confuse the tumble of stones with earth and give the impression of a mound. One of the earliest of these is a water colour by Joshua Roselyn entitled 'Stonehenge on Salisbury Plain Aug 9th 1784' (Devizes Museum) which depicts a barrow-like mound of considerable height amid the stones. Others are less exaggerated and there is a significant number (20 amongst the collection at Devizes) that depict undulations. In an engraving of 1776, S Hooper shows a low mounding with stones overlying. An engraving by Martin and Head 1797 (1983.3844) depicts a mound with prone sarsen on it; J Malton's illustration of 1796 shows the centre as substantially level but with a low mounding of the central area; Keates drawing of 1770 shows a mounded area. Thomas Hearne's engraving of 1786 shows a low mound. Major de Kretchmer's painting shows two mounded areas among the stones. In fact, almost as many illustrate a mounded area as depict the centre of the stones as flat. As now, when most visitors are mesmerised by the stones and rarely look at the ground around them, past artists were similarly captivated. Turner, for example, clearly tried to illustrate the drama and character of the place by focussing on the stones, sky and lighting, rather than the detail of the undulating ground surface. In some, a blur of fallen stones roughly drawn provides the impression of a mound at the centre but this is likely to represent greyed-out stones. Others, however, may have been more objective. The engravings accompanying W G Maton's (1800) article on the fall of stones at Stonehenge in 1797 published in *Archaeologia*, for example, quite clearly portray a mound amongst the stones. Some of these illustrations depict the mound in different positions and while in some it covers the whole of the central area, in others it is placed in approximately the position where the surveyed mound lies. Buckler's watercolour of 1810 (Devizes Museum) depicts the mound exactly as it is now, while George Richmond's pencil and watercolour drawing of 1850 depicts the area as more undulating. Scott's engraving of 1870 depicts the central area as mounded, but in part, this might reflect a choice of viewpoint and perspective. The best is perhaps that of Ellis dated to 1878 where mounding in the central area is unmistakable (Fig 20).

While a mound is frequently depicted as a feature at the end of the 18th and beginning of the 19th century when requirement for illustrations to satisfy an increasing magazine and journal readership was greater, careful study of the earlier illustrations, for example, those of Stukeley (Devizes Museum : Stukeley 1740-3: Burl and Mortimer) and of those in the 1725 edition of Inigo Jones' essay (1655) suggests that the area of the stone settings was not flat in the earlier part of the 18th century. None of these depict the mound with any prominence yet there is appropriate shading to indicate that the centre of the stones was not flat.

The feature is certainly intriguing. It represents a considerable amount of soil and there is no obvious location within the immediate area from which it could have derived. It is feasible that it represents a Roman or Medieval accumulation and Darvill & Wainwright (2009, 8), for example, indicate that the Stonehenge Layer, a mixture of prehistoric and later deposits is locally some 350mm thick. There is one further important contributing factor that can be observed from the earthwork plan. Namely that both Y and Z hole circuits appear to deviate from their course at this point as if in order to avoid or encompass the mound in question, Z holes 9 and 10 for example are out of line with the others. It should be re-emphasised that Hawley's triangulation points were not always known (Cleal *et al* 1995, 549) for in contrast to some earlier illustrations which depict the holes forming neat circles there is some fluctuation around the circuit amongst the excavated examples. Whereas, for example, Z hole 6 lies just 6m from Stone 6, Z hole 10 is 11m from Stone 10. There is a similar variation in the distance of Y holes from the stones. While there might be some doubt about the date of these features, the few available C14 dates indicate that they are prehistoric (Cleal *et al* 1995, 533) and by respecting the mound imply that the latter is of considerable antiquity.

Visible on the ground model (Fig 5), however, but less easily seen on site is a very shallow semi-circular depression, a little over 8m wide and no more than 0.2m deep, situated immediately to the north of the mound and which extends for about 7m westwards into the interior from stones 2-5 in the outer circle. Given its proximity to the mound it is tempting to link the two and draw attention to the possibility that this depression is the vestige of the hole created by digging material to create the mound, or the reverse, that the mound is the vestige of spoil from digging the hole. If that were so, however, it would pre-date the stone setting as the outer sarsens clearly cut across it. A further possibility takes account of the massive unexplained excavation to the north of Stones 55 and 56 encountered by Gowland (1902).

At the other end of the scale, there is indeed a possibility that the mound is natural and that its raised profile is due to the surrounding area, particularly the lower ground to the west, being weathered away, or even altered by human agency. Gowland's excavation trench adjacent to Stone 55 revealed that the natural chalk rose markedly from one end of the trench to the other (Gowland 1902, 52, fig 12), while Hawley (1921, 22) noted that the chalk rose higher behind stone 7. Several of Atkinson's trenches clipped the fringe of the area (Cleal *et al* 1995, insert plans 1 and 2), but little can be ascertained from the section records. More recently, Tim Darvill and Geoff Wainwright (2009) have excavated in this area, but their trench, immediately behind Stone 10, appears to have avoided the summit. Published illustrations (Darvill & Wainwright 2009, 7 fig 6, 9 fig 7

Figure 20. Painting of Stonehenge by Ellis 1873 (courtesy Wiltshire Heritage Museum, Devizes).

and 10 fig 8), however, indicate that remnants of natural chalk occur at a remarkably high level. Elsewhere on site Hawley considered that the mounded appearance of the Southern Circle was due to a localised mounding in the chalk (Hawley 1928, 174) and it is conceivable that the natural ground surface was more uneven than imagined. Utilisation and enhancement of such a natural feature would not be out of place in British prehistory. The results of the 2008 excavation, when published, should provide a little more certainty one way or the other.

Some reconsiderations of the stone circles

All this is very uncertain and an unusual thickness or accumulation of post-prehistoric deposits could easily account for it. If the mound is, however, of earlier, that is prehistoric, date; it is conceivable that it is associated in some way with construction of the monument. Alternatively, if it is natural it may have influenced subsequent construction developments. It does not lie on the central axis but offset (though is on an axis through the North and South Circles). Instead, its location corresponds to the area of the stone settings that survives poorly. Many of the stones here have fallen, or are missing, but there are other irregularities and the location of the mound serves to encourage greater focus on these. John Wood (1747) and Flinders Petrie (1880, 15-16) both suggested that the assumed circle was not complete. Others such as Ashbee (1998) recognised this as a real and indubitable problem and the view has recently been given fresh expression by Tilley *et al* (2007) as part of the fieldwork for the Stonehenge Riverside Project.

Wood, in particular, was extremely concerned about this and questioned why lintels were missing over Stones 2, 3 and 5 (since reconstructed). He considered that the neatly mortised and curved stones would have been locked securely in place and would have needed to be hoisted off without damaging the pillars. He went on to make several further points along similar lines. 'These and many more Questions, will show us that the whole Work was never compleat' (Wood 1747, 61-2).

The reasons concentrate around the observation that some stones in this part of the monument are irregular and were not dressed in the same way as others. In particular, Stone 11 is smaller and slighter than others and Petrie added Stones 21 and 23 to the list

that were also 'defective in size'. In addition it can be observed that Stone 12 is irregular and 14 completely asymmetrical such that it would be difficult to set them upright. Additionally, Hawley's excavations (1926, 7) demonstrate that the hole for Stone 9 is askew to the others in the 'circle' which are cut reasonably regularly. The fallen Stone 9, now in two pieces, has been dressed in part, but is irregular and appears to have no tenon. Tilley *et al* (2007) point out that Stone 11 could not have supported a lintel and a similar consideration applies to the chisel-edge top of Stone 16 which, despite vestiges of tenons, has the look of having been modified.

In fact, only 17 of a presumed 30 stones representing an outer 'circle' are in position and a further 8 prone or in fragments. Five are missing completely. In addition 22 lintels are missing and of those present Wood was concerned that some lay so far from the uprights that they could not have fallen from them. Petrie (1880) acknowledged that part or all of Stones 8, 15, 19 and 26 could have been removed and others pushed over or broken, but he was very clear that this did not account for the inconsistencies. Evidence for non-completion was strong and he concluded that if material was in such short supply that full-sized stones could not be provided in these cases then it is probable that there wasn't enough material for a circle to be completed. Perhaps of greater and crucial significance, geophysical survey in 1994 did not detect stone holes for Stones 14, 15, 17 and 18 (Payne in Cleal *et al* 1995, 505) and if they are indeed missing an important component of the circle is not present. None of these points is of great significance in itself, but cumulatively they demand some attention.

Figure 21.
The diminutive Stone 11 photographed looking south-southeast (Photo: D Field ©English Heritage).

An alternative view emerged to account for some of these problems. Lukis (1882, 147) believed that the reduced size of Stone 11 was because it was the last stone in the circle to be set in place and that there was insufficient space for a larger stone. Subsequently, Edgar Barclay (1895, 64) accounted for the small size of 11 by suggesting that the lintels could have been discontinuous at this point and that it marked a previously unnoticed south-east entrance to the monument. E Stone (1924, 5 and pl 3) later investigated these points and found that there was indeed room for an average stone with average spacing and there was nothing in Lukis' claim. In order to explain the missing stones, Stone (1924, 5, 73) concurred with Petrie that the builders had run out of material. He consequently provided a frontispiece of a perfectly reconstructed Stonehenge circle in his volume and emphasised the point by immediately following it with a quotation from John Wood's work 'Many have undertaken to Describe the Ruins of Stonehenge; and to Restore those Ruins to their antient State; and in general to Explain the whole Work; Yet it is not Stonehenge that they have Described, Restored and Explained to us, but a Work that never existed unless in their own Imaginations' (Wood 1747, 30).

More recently Johnson (2008, 146) has suggested that the idea of non-completion is a modern myth and argued that in the case of Stone 11 a thin stone could equally have supported a lintel as a regular sized one, which may be true but the need to use such a stone would simply support Petrie's view that there was a dwindling supply of material. In any case the fact that it is also too short is more difficult to account for. The stone could of course have been broken in Roman or medieval times, its upper half carted away and the lower portion re-erected but the explanation is getting unnecessarily complex.

There may of course have been post-prehistoric damage and as noted above stone removal has always been a problem. Inigo Jones reported that some bluestones had been removed within his memory (Jones 1655, 63) while Stukeley referred to the chipping of stones for souvenirs. Petrie pointed out that only stumps remain of four bluestones, 35, 64, 65 and 66, while Darvill & Wainwright (2009, 18) indicate that the process of breakage may have begun in the later prehistoric period. This must indeed account for some of the missing bluestones, but sarsen is altogether much tougher and difficult to break up, witness the serious but unsuccessful attempt to break up the Slaughter Stone that involved drilling holes (e.g. Burl 1994, 87-88). Wood (1747, 43) noted that the stone was deliberately buried so that it was level with the ground surface and it could have been a deliberate attempt to bury it like those at Avebury. The Folly, Gay's Cave on the slopes of Vespasian's Camp contains large pieces of sarsen that could have been taken from Stonehenge, but equally from elsewhere. Stukeley seems to have assumed that 'natural boulders in the vicinity had all been carted away from Stonehenge and dumped….They seem to have been carried back to make bridges, mill dams orr the like in the river…'. . Long noted these and other accounts of disfigurement and damage (1876, 76) some of which he demonstrated as being mistaken (1876, 224) and he implied that this explanation for missing stones may have been over-played. Certainly, should stone have been needed, a large number of weathered and broken sarsens lie around (including before reconstruction a number of lintels) that could easily have been carted off (Stone 8, part of 9, 26, parts of 59, 120, 127, parts of 160, etc) without much difficulty and without resorting to lifting lintels off the settings or prising down monoliths.

Perhaps the prevailing view, at least one that has entered the public consciousness is that suggested by R H Cunnington (1935, 130) that the stones represent a circle that was part demolished and damaged in the Roman period. Atkinson considered that the lintels could have been removed by medieval masons but acknowledged the problem with Stone 11 and like earlier commentators could only conclude that the builders 'were hard put to it to find sufficient blocks of the requisite size to complete the circle' (Atkinson 1979, 38). But this was never entirely satisfactory: burials and other deposits in long barrows (Field 2006, 161-2), construction of temples within hillforts and other prehistoric sites, for example at Maiden Castle (Wheeler 1951), or Lydney Park (Wheeler & Wheeler 1932), or adoption and re-modelling of shrines such as Uley (Woodward & Leach 1993), indicate at least recognition and respect of these places and a tendency to adapt, construct and utilise rather that destroy. At Silbury Hill a small town developed around the prehistoric monument (Leary & Field 2010, 153-164). Atkinson's conclusion about the shortage of sarsen also poses questions regarding the often quoted source as being on the Marlborough Downs where there was said to be an endless supply.

Cleal *et al* (1995) also recognised the problem but concluded that whether or not the monument was finished the *intention* to complete was the important factor. However, in terms of conservation and reconstruction the point is important. Ashbee (1998) addressed some of these issues but considered that damage done to some stones was likely to be the result of medieval activity rather than Roman, similar to events at Avebury. Indeed, given the proximity of Amesbury Abbey, it would be of no surprise were that so and it might be considered quite remarkable that there was no episode of similar stone destruction or dismantling at Stonehenge, particularly of the iconic trilithons. Even so, like Petrie, Ashbee acknowledged that this could not account for all of the problems and was forced to invoke the use of wooden uprights and lintels in order to explain the absence of certain stones and complete a circle.

The prominent, popular and enduring view of Stonehenge is of a neat sarsen circle with various circular, oval, or horseshoe stone settings within and it is thus depicted in countless illustrations. As Tilley *et al* (2007) suggested, this seems to derive from the vision of Inigo Jones, who having visited Italy and seen at first hand such buildings as the Pantheon, assumed that the 'dancing stones' of Camden and others must once have formed a coherent structure and that only Romans would have had the architectural expertise to construct it. As noted above, subsequent researchers seem, rather unfairly, to have utilised and criticised Jones' reconstruction drawing rather than his measured plan of the site, particularly when providing comparisons with their own work. Consequently his influence was unwittingly transferred to later researchers who in turn actually looked for geometric figures.

Given these problems, there are several ways of looking at this. The remains can be seen as either an unfinished version of a deliberately contrived geometric monument; or as a continually metamorphosing site that developed and changed through time to a greater degree than perhaps anticipated. While some (e.g. Johnson 2008) remain keen on precise geometry, other monuments of this period appear to have less of a concern for symmetry. Indeed there is sometimes an observable and apparently deliberate asymmetrical streak visible in both Neolithic monuments and artefacts (for example

some ground axes). Change and development in form is demonstrated at an increasing number of Neolithic and early Bronze Age sites, for example, Amesbury G71 on Earls Farm Down (Christie 1967), at Shrewton (Green & Rollo Smith 1984) or further afield at Barnack, Cambridgeshire (Donaldson 1977) and these sites can typically be seen to evolve and change intermittently. Stonehenge need be no exception to this process. Equally, many henges contain gaps or straight segments (e.g. Avebury itself: Brown *et al* 2005, 21). It may be that the that the stone monoliths were erected in increments, or that the missing part of the stone 'circle' was not intended at all and the 'half' that was constructed was meant to be like that – a horseshoe. Horseshoe-shaped structures may be rare in the British Neolithic and Burl (1988, 10-11) lists no more than a dozen, while the simpler and more angular but equally monumental coves at Avebury and Beckhampton (e.g. Pollard & Reynolds 2002: Gillings *et al* 2008) may also be related. While acknowledging the relationship, however, Burl (1988, 1; 1997, 1, 12) pointed out that horseshoes were not the same monument type as coves and could therefore have had a different purpose. Instead he suggested that the origins lay in Brittany where sixteen *fer-aux-chevaux* had been identified including examples at Carnac (Burl 1997, 5, 10-11).

Disturbance at the centre

According to Aubrey, the Duke of Buckingham's trench was situated at the centre of the monument and he depicted it as such on a diagram (Fowles and Legg 1980, 93). As noted above, it was said to be as large as two saw-pits although Aubrey himself drew it as an oval, and it was evidently still visible, only partially backfilled, in his day. The deep excavation was said to have resulted in the leaning and eventual collapse of one of the large sarsens and this has often been thought to be Stone 56 since Aubrey placed a mark above this on his plan (Fowles and Legg 1980). Petrie (1880, 11) and subsequently Gowland believed this to be so and the latter seems to have presumed that it was the trilithon as a unit that fell in 1620 leaving Stone 56 leaning. It was depicted as such in countless illustrations (e.g. that by Crocker published in *Ancient Wiltshire* by Hoare 1812 fp 153) and it was still reclining in 1902 (Gowland 1902, 38, 56). It may have been Hoare, however, who referred to the fall of the Great Trilithon rather than Stones 57 and 58 in 1797 who caused the confusion (Hoare 1812, 150) and it is clear that search for the trench has been in the wrong place. Notwithstanding this, the illustration in Camden seems to depict Stone 56 which is instantly identified by its prominent tenon as leaning in 1575 and the fall of that stone must therefore have occurred before the Duke of Buckingham's digging.

At 8.8m (29ft), Stone 56, is much longer than the 6.4m (21ft) mentioned by Aubrey and it is much more likely that he was referring to Stone 59 which at 6m (19.5 ft) is a much closer match. Maton (1797, 104) described the Stones 57 and 58 of Trilithon IV, then recently fallen (subsequently re-erected by Gowland) as measuring a maximum of 22 and 23 feet (6.7 and 7m) respectively and given the increasing height of the respective trilithons this measurement fits nicely. Jones depicts Stone 59 as fallen inwards and Petrie (1880, 11) suggested that it had fallen before 1575 basing this on Camden's illustration. However, Stone 59 would have been adjacent to the Duke of Buckingham's trench as depicted by Aubrey.

Jones dug at the base of one of the trilithons though there is no evidence to indicate which one. According to Stukeley, Thomas Haywood also dug around in the centre and found 'heads of oxen and other beasts bones'. As noted above, Stukeley himself dug on the inside of the Altar Stone in 1723 finding 'perfectly solid chalk that never had been stird' (Burl & Mortimer 2005, 67), while Cunnington also excavated in the same area. The latter dug to a depth of 1.8m and in contrast to Stukeley found it disturbed to a considerable depth, while Captain Beamish also excavated a large hole some 2.4m square by 1.8m deep in front of the Altar Stone also digging under it (Long 1876, 86). In addition Atkinson excavated there in 1958 and, like Cunnington found the stone dressed on the underside (Cleal 1995, 560, fig 286).

There is a further large hole unaccounted for. That encountered by Gowland in his excavation adjacent to Stone 55 and 56 (Gowland 1902). This was a massive pit, dug leaving a ledge for the base of Stone 56 to rest on and a vertical face for it to lean against. The vertical face extended beneath the fallen Stone 55 and was filled with clean white chalk rubble. It extended for at least 1.8m to the north of Stone 56 and beyond bluestone 68. Gowland (1902, 81) noted that the ground had been dug away to a depth of between 2.1m and 2.5m and in one place to 3.3m. It is possible that it extended as far as the Altar Stone where, as noted above, neither Cunnington or Beamish appear to have encountered chalk close to the surface but instead found the area disturbed to a depth of almost 2m although evidence of this digging is not shown on Atkinson's plan (Cleal *et al* 1995, 560 fig 286). The full extent of the pit is unknown but a small trench 7.5m from the front of stone 56, i.e. north of the Altar Stone, recorded the chalk rock at only 0.6m from the surface. The nature of this massive hole is unclear. Gowland presumed that it had been dug to set Stone 56 in place and that there was a massive ramp leading down into it. The material found in the upper levels and the fact that Bluestone 68 is set into its fill indicates that it is of some antiquity and unlikely to represent antiquarian digging. Such an enormous hole could have been responsible for a considerable spoil heap on the surface, although there is an implicit presumption that most material was returned to the excavation. However, it could be this rather than the Duke of Buckingham's trench that was responsible for the Great Trilithon falling.

Chronology and dating

The survey has certain implications for the accepted chronology at Stonehenge. At present the earliest component is considered to be the enclosure bank, but it is suggested here that the North Circle preceded it, making this one of the earliest features. The indentation in the eastern half of the bank and ditch is also potentially indicative of an earlier feature at this point and it is noteworthy that the three postholes discovered in 1954 during excavation of the bank (Cleal *et al* 1995, 107) lie just a few metres south of this. However, as they point out, the excavation records do not make it clear whether these lie beneath the bank or were inserted through it. Within the central area there is some uncertainty regarding the nature of the mound amongst the settings, but sufficient indication that it too may be an early or even original component.

There is earlier Neolithic material on the site although not in great quantities. A single sherd of Windmill Hill style pottery from what is evidently Stone hole 97 immediately

adjacent to the Heel Stone by was reported by Atkinson (1979: also Pitts 1982, 82) and another found 'on the bank' (Cleal *et al* 1995, 350). Similarly there is an early date on animal bone from Stonehole 27 (Cleal *et al* 1995, 522). In itself this is not surprising and these few pieces could have been curated and brought to the site much later, but it would be of interest to know whether they in any way represent activities associated with any of the multiplicity of post holes on site. Cleal *et al* (1995, 107-9) allow for the possibility that some or all of the postholes could pre-date the enclosure and, while Alex Gibson suggests that there may be as many as six timber circles present, his plot of the holes unencumbered by circular features also helps to emphasise the potential for rectangular or square arrangements on site (Gibson 1998, 141 and fig 37).

The C14 sequence is woefully inadequate for a site of such complexity, but has recently been re-assessed and modified by Parker Pearson *et al* (2007). The site is long lived and the potential for contamination of deposits enormously high. The date for the enclosure has already been mentioned but just one accepted determination helps place the iconic outer sarsen setting within chronological context: Stonehole 1 is dated on antler to 2580-2470 cal BC. There is a tendency to accept this as it matches a single date for the trilithons which can be placed within the bracket 2600-2400 cal BC (ibid).

The Y and Z holes fare little better. A single date for the Z holes places them some time in the span 2030-1740 cal BC while three dates for the Y holes cover the period 1880-1520 cal BC. These last indicate that ceremonial activities were taking place at the site at a time when many of the round barrows in the immediate vicinity were in use.

Roman Stonehenge

Any more than a casual glance through the literature serves to emphasise the amount of Roman material recovered from the site. Reginald Smith commented on the ubiquity of Roman finds early in Hawley's excavation programme (Hawley 1921, 41). On reflection this is not surprising as Roman material is often plentiful at prehistoric sites. One explanation offered is that it is the result of manuring (Cleal *et al* 1995, 435) but usually it is considered the residue of occasional visits whereby pottery is broken during picnics, or on occasions of wilful damage to destroy indigenous cultural icons that were symbols of opposition to the Roman occupation. Darvill & Wainwright (2009, 14-15) encountered two features containing Roman artefacts and referred to the 1,857 Roman pottery sherds found by earlier excavators. We should, therefore, be aware of the possibility of greater re-use of the site including, as a contrast to views about destruction, the potential for architectural reconstruction and rearrangement at this time. As mentioned above, Silbury Hill, just 26km to the north, with a burial on its slopes and brooches and coins deposited in its ditch, attracted development of a Roman town around it. The settlement was presumably lured by the symbolic, supernatural properties of the mound and surrounding springs. There is no Roman road at Stonehenge, but the site is surrounded at little distance by a number of Romano-British villages. Having found what he considered to be a lid of thuribulum buried by one the trilithon stones it is small wonder that Inigo Jones considered the site to be of Roman date.

Medieval Stonehenge

In contrast, the cultural material recovered provides little evidence of medieval use although this may in part reflect the recovery technique of excavators during the 20th century. Green glazed pottery was recovered by Hawley during excavation of Stone 29 (Hawley 1922, 45) and from one or two other places but he indicated that generally he did not retain 'modern rubbish' (Hawley 1921, 19) and Atkinson may have treated it in a similar manner. Results of the recent work by Darvill & Wainwright (2009) could change interpretations when analysed and published as they note the presence of a remarkable complexity of deposits some of medieval and early modern date; not least such deposits in the upper fill of one of the Q-holes. Little is known of other activities that may have taken place during the medieval and post medieval periods and the earthworks add little here, but the presence of no less than seven iron arrowheads from the site provides some clues. Search of medieval documents including those of Amesbury Abbey, could not be carried out as part of this study, but is badly needed.

Stonehenge during the 18th and 19th centuries

One of the illustrations by Major de Kretchmer, depicts what appears to be a structure apparently built of boulders within the stone settings. This may have been the home of Gaffer Hunt who was present on site during Wood's survey and who provided shelter in his 'little smoaky Hut in the Body of the Ruins'. There is some indication from the illustration that the structure was of broken stone and there was evidently a 'shed at the End of his Hut'. Wood (1747, 32-36) indicated that Gaffer Hunt was 'a Carpenter by Trade, and on my retiring into his Hut, and he discovering my Profession, the venerable old man assured me, that in his memory no regular survey had been taken of Stonehenge; nor had anybody measured it with that Accuracy, though the Curiosity of many had led them to spend a deal of Time in taking the Dimensions of the stones and the Distances between them; for which purpose he himself always kept measuring Rods in his Cottage'. He was still on site 24 years later when Smith (1771, 52) added that Hunt was from Amesbury and had built his hut against the upright stone that he (Smith) had referred to as 'Mars' and 'attended there daily with liquors, to entertain the traveller, and show them the stones'. Astonishingly, 'his cellar was under the great stone, next the hut'. According to his plan, Mars was stone number 60 (1747, 58) and the cellar was almost certainly beneath fallen Stone 59. Wood (1747, 40) indicated that the area just inside the sarsen circuit immediately west of the axis was 'so incumbered with Dung and other Rubbish' that it was difficult for him to stake out the area for accurate survey. This was precisely the area excavated by Atkinson in 1956 although there was no mention of the historic material.

Aubrey's plan (Fowles and Legg 1980, 76-80) indicates the position of 'pathes worne by Carts' in the south, south-west and north and visitor traffic might be expected to have increased after the turnpike road was constructed along which a stage coach route from London to Wells passed twice a week (Smith 1771, 69). One of the trackways depicted on the English Heritage survey plan deserves further comment. The wide cut through the bank in the west is curious (Fig 7, f). It appears quite purposeful and is unlikely to represent the wear of casual passing traffic. It seems designed to allow access to vehicles and could have been constructed to ensure easy access for some important individual,

perhaps a Royal visit. Both King James I and Queen Victoria are known to have visited and there may have been others. A coach is depicted immediately adjacent to the stones in 1853 that may have represented a Royal visit as the photographic record is present in the Royal archives (copy English Heritage NMR 58/1987), while a further Royal visit occurred in 1880 (Richards 2004, 15, 19).

7. CONCLUSION

This new survey of Stonehenge has demonstrated the presence of subtle earthworks that have a bearing on the interpretation of the site. Some of these are undoubtedly ancient but others attest to the attrition of the historic period. The site has long been a tourist attraction and the myriad tracks that converge on the site bear witness to this. Many of them have damaged or obscured earlier surface traces and the extensive excavations of the 20th century coupled with conservation measures have done likewise although with time these in themselves will be considered of archaeological importance. It should be emphasised that many of the earthworks are extremely diffuse and subtle and consequently easily erased by inappropriate management or conservation measures. What does survive, however, is of immense interest and supports and enhances the geophysical surveys carried out in 1994 as well as providing a fresh baseline for understanding the visible remains. Whether natural or artificial the mound situated in the south-east quadrant of the 'circle' provides new focus and along with the increasingly likely possibility that the outer stone structure was not completed as a circle, even if intended as such, invites questions of origins, of site development and of the search for earlier arrangements – perhaps even single monoliths or alignments - as much as the nature of use as a major stone setting. Our approach to this depends a great deal on archaeological preconceptions and in this respect it should be pointed out that the 1970s reconstruction of New Grange is now widely observed as incorrect (e.g. Eriksen 2008, 271) but has created assumptions about form that have masked the archaeological phasing. In the case of Stonehenge major conservation was mostly a question of stones being made safe but much of the 20th century work will have obscured earthworks and the reconstructions will have created similar assumptions.

Some perceptions of the monument have become fixed in the public imagination largely as a result of Atkinson's extensive media work during the 1950s and 60s and these have been reinforced by countless magazine articles. Our modern perception of the site can be rather different. Much of the mystique is dissipated if we accept, as seems potentially the case or even likely, that the sarsen is local to the site and not the subject of a long, difficult and tortuous journey. Greater investigation of this would be well worthwhile. This still leaves the question of the bluestones unresolved but the current emphasis on research into this matter suggests that new and perhaps more decisive data will soon be forthcoming. Following the publication of the 20th century excavations a catalogue of new questions arose. Recent work by various universities, the Stonehenge Bluestone Project (Darvill and Wainwright 2009) and the Stonehenge Riverside Project (Parker Pearson 2009) will have addressed some of these and added immensely to our knowledge of the site and there will no doubt be fresh chronological sequences and interpretations offered into which the findings presented here might fit. One thing is very apparent and that is just how little is known about the site. Descriptions of 17th century discoveries of cattle skulls etc from the interior are tantalising, but whether they were deposits from the prehistoric or Roman past is quite unknown while the nature of the enormous hole adjacent to Stonehole 56 remains an enigma.

Every tourist will ask exactly what it was for and every archaeologist will shy away from answering. Of course we can never know exactly, but there can be approximations and

reasoned estimates. As noted, interpretations of the early 21th century might be very different from those of 50 years ago and we might more readily invoke anthropological examples to assist us to divorce interpretation from western commercial or Christian pre-conceptions in order to support our case. The purpose is likely to have changed as the monument metamorphosed throughout the third and second millennia. There is a better idea of chronology and dating, while excavation of Neolithic and early Bronze Age sites elsewhere in the country in recent times has demonstrated how repeated change and development is a frequent feature of contemporary monuments. Recent excavations at the site (Darvill & Wainwright 2009, 11: Parker Pearson 2009) have added to this and in contrast to the idea of orderly construction phases emphasised the 'fluidity' in site development. The idea of a planned and finished building is now difficult to entertain; instead each phase of activity on site (including later ones) is seen as being as important as any other. Nevertheless, there will be a tendency to pick out a snapshot from all this, doubtless those elements that have solar or lunar significance. One thing is clear from the clutter of stones that were present in the central area in its later third millennium phases is that the observation of solar events along the axis could *not* have involved great numbers of people. As the full-sized polystyrene reconstruction 'foamhenge' constructed on Stockton Down, Wiltshire in 1995 for a Channel Five television programme 'Stonehenge Live' demonstrated, the combination of sarsen and bluestone monoliths severely limits visibility, the latter being so closely set that, as Darvill & Wainwright (2009, 13) more recently observed, they almost formed a wall. Like similar occurrences at New Grange, Maes Howe and Bryn Celli Du where the focal point is enclosed, the experience could only be appreciated by very restricted numbers (Stout 2010); at Stonehenge just one or two could witness the event.

Inigo Jones believed that Stonehenge was a temple. Over 300 years later the Ministry of Works prepared a booklet asking *What is Stonehenge?* (Atkinson 1980) which like Jones concluded that it was a temple. Julian Richards came to a similar conclusion in 1991 for his popular *English Heritage Book of Stonehenge*. In the 21st century and after several centuries of research the word may seem inadequate, not least as it also takes the snapshot that consigns beliefs and functions concerning the rest of the site's history to obscurity. A recent discussion of interested individuals within English Heritage considered that the history of Stonehenge really makes it irreducible to single word descriptions or even short sentences but, is there any better description? When pressed they considered not. It's a temple.

8. SURVEY METHODOLOGY

The survey used a combination of Trimble R8-2 GNSS and Trimble 5800 GPS receivers linked to a single on-site base station fixed on to the Ordnance Survey National Grid using the Trimble VRS network to access the Ordnance Survey system of active stations (OSNet). Recent tests of this system indicate that the methodology used to fix the base station is likely to achieve a rms accuracy of better than 10-20mm in plan and 15-30mm in height (Edwards et al. 2008). The areas at the centre of the henge where satellite reception was obscured by the stone monument were recorded using a Trimble 5600 total station theodolite and the readings tied to the GNSS/GPS survey by resection.

The most notable and well-known earthwork is, of course, the enclosing bank and ditch, but its well-preserved profile of this contrasts enormously with the extremely shallow and subtle earthworks among and around the stones. In order to make sense of these, in addition to the standard method of depicting measured slopes by hachure which is used for analytical purposes (Fig 2), a digital terrain model was produced to supplement and enhance interpretation (Fig 3). While such ground models provide an image with immediate visual appeal and which can be used in a range of computer-based applications, their creation is not often a central component in the interpretation and analysis of earthwork sites. This is because analysis rests upon careful observation and recording of individual earthworks and their inter-relationships and the results are represented far more clearly and succinctly by a hachured plan. The methods do, however, complement each other, although it should be borne in mind that models are exactly that. While the traditional method is quick and efficient, reading of models depends on an adequately large number of measurements that can be manipulated and interpreted in the office rather than in the field. In this case, to reduce the risk of error and to enable modelling of the subtleties of the ground, GPS readings were taken in evenly spaced transects, initially at every half metre around and among the stones, with slightly wider spacing of 1m elsewhere in order to allow the more prominent earthworks to be depicted without overloading the database. The model was thus created from nearly 20,000 individual 3D points gathered by four survey grade GPS/GNSS receivers and a theodolite over the space of five consecutive days in March 2009 ensuring sufficient readings to accurately define the shape of each earthwork in plan, while in areas with no visible earthworks, readings were taken along evenly-spaced transects to ensure complete and even coverage of the ground surface. The area covered by the ground model totalled just over 3ha and extended as far as the outer rope barrier then in place on the south and east and fence lines on the west and north. The resulting model achieves a good degree of accuracy and realism and can be compared favourably against currently available 1m resolution Lidar (Fig 3).

The areas at the centre of the henge where satellite reception was obscured by the stone monument were recorded using a Trimble 5600 total station theodolite and the readings tied to the GNSS survey by resection. The existence of a digital 1:200 scale survey of the stone monument undertaken by the firm of M. J. Rees and Co. in July 1989 obviated the need to re-survey all the standing and recumbent stones at the centre of the henge. Instead the 1989 survey was fixed to the 2009 survey by re-surveying three permanent ground anchors established in 1989 (1989 points Z1, Z3 and Z4) at intervals

around the henge monument (see Appendix 1). These were located using a R8 GNSS receiver and surveyed as observed control points using the VRS link to OsNet. This provided a more accurate fix on to the Ordnance Survey National Grid than had been possible in 1989. Several elements of the stone monument were also mapped using the GNSS receiver to validate the internal accuracy of the 1989 survey.

To create the hachured survey plan, sufficient points were recorded using either the GNSS/GPS receivers or the TST to define the tops and bottoms of individual scarps accurately at 1:500 scale. In areas of complex or subtle earthworks detail was supplied using standard graphical techniques of offset and radiation from a temporary network of pegs previously located with the electronic survey equipment and plotted on to polyester drawing film at the elected scale of 1:500 for use in the field.

The electronic survey data was downloaded first into Trimble Geomatics Office v1.63 where a handful of points with a recorded elevation worse than 0.025m precision were filtered out in order to give the resulting DGM a consistent surface. The data was then exported to Trimble Geosite 5.1 software to process the field codes and then transferred to AutoCad Map v2007 software for plotting out the elements of the survey needed for the completion of the hachured survey drawing graphically in the field.

The points to create the DGM were transferred from AutoCad to ArcMap v9.1 and the model created using the 3D Analyst extension. The model was used for analysis in particular to define the area of the mound within the stone monument and for presentational purposes it was combined with existing Lidar data to create an image showing the setting of the henge in the wider landscape.

Report illustrations were completed using Adobe CS4 software and the report was prepared for publication using Adobe InDesign software. The survey data has been archived in compliance with English Heritage guidelines and deposited at the NMR. The GIS data has been archived to GEMINI metadata standards in compliance with English Heritage RADF guidelines and deposited at the NMR.

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APPENDIX 1. PERMANENTLY-MARKED SURVEY STATIONS

SITE NAME	Stonehenge		
Station Number	Z1	**Status**	Permanent point
Type of mark	Rivet in concrete at depth of 0.1-0.15m	**NMR number**	
Date of Survey	18-Mar-09	**SAM number**	
Office of Origin	Swindon	**Surveyors**	DF; TP
Methodology	Point surveyd to OS National Grid using Trimble R8 GNSS receiver over 180 epochs with differential correction delivered via Trimble VRS from OS Active Station network		

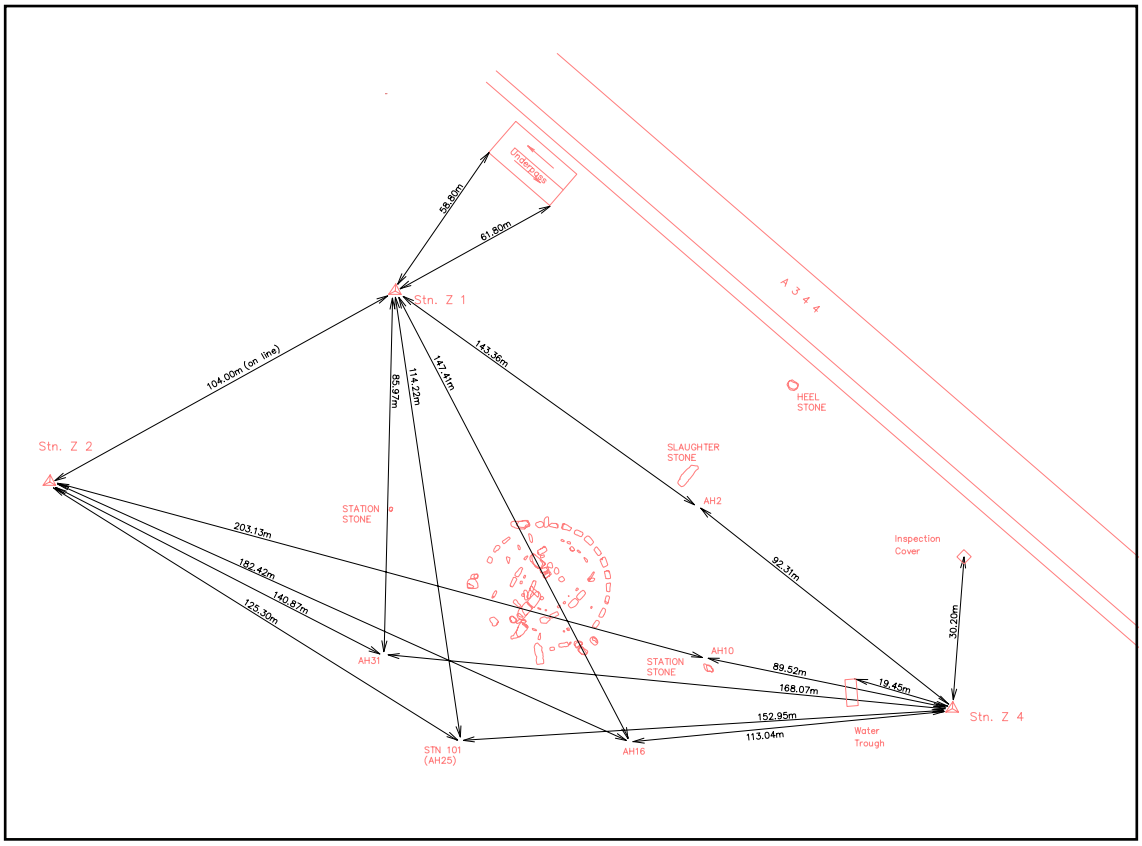
CO-ORDINATE SCHEME	Eastings	Northings	Height
OS National Grid	412141.943	142234.634	103.496
Local Grid			

SITE NAME	Stonehenge		
Station Number	Z2	**Status**	Permanent point
Type of mark	Rivet in concrete block at depth of 0.1-0.15m	**NMR number**	
Date of Survey	18-Mar-09	**SAM number**	
Office of Origin	Swindon	**Surveyors**	DF; TP
Methodology	Point surveyd to OS National Grid using Trimble R8 GNSS receiver over 180 epochs with differential correction delivered via Trimble VRS from OS Active Station network		

CO-ORDINATE SCHEME	Eastings	Northings	Height
OS National Grid	412084.474	142148.131	104.792
Local Grid			

SITE NAME	Stonehenge		
Station Number	Z4	**Status**	Permanent point
Type of mark	Rivet in concrete block at depth of 0.1-0.15m	**NMR number**	
Date of Survey	18-Mar-09	**SAM number**	
Office of Origin	Swindon	**Surveyors**	DF; TP
Methodology	Point surveyd to OS National Grid using Trimble R8 GNSS receiver over 180 epochs with differential correction delivered via Trimble VRS from OS Active Station network		

CO-ORDINATE SCHEME	Eastings	Northings	Height
OS National Grid	412373.522	142192.982	99.8
Local Grid			



Station location diagram prepared by M. J. Rees and Co 1989



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