RESEARCH REPORT SERIES no. 71-2014

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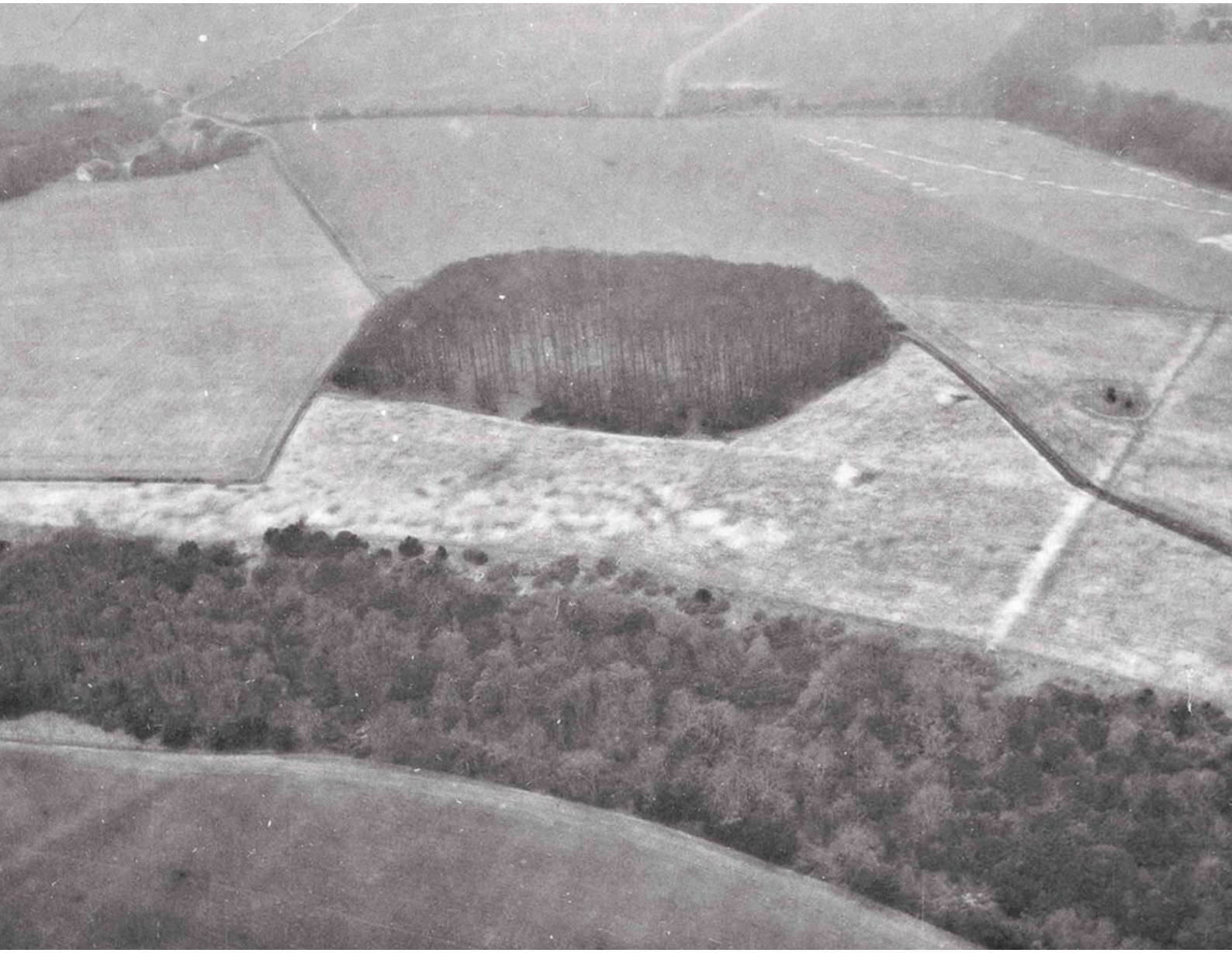
A SURVEY OF THE NEOLITHIC FLINT MINES AND ASSOCIATED FEATURES

Martyn Barber



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Research Report Series 71-2014

STOKE DOWN, WEST SUSSEX

A SURVEY OF THE NEOLITHIC FLINT MINES AND ASSOCIATED FEATURES

Martyn Barber

NGR: SU 834095

ISSN 2046-9799 (Print)
ISSN 2046-9802 (Online)

SUMMARY

This survey involved the interpretation, transcription and recording of archaeological features seen on aerial photographs in the immediate vicinity of the Stoke Down Neolithic flint mines near Chichester, West Sussex. The main stimulus was the discovery during the annual English Heritage reconnaissance programme of new cropmark detail, resulting in a need to update the existing 1994 transcription. The opportunity was also taken to examine the history of investigation at the flint mines.

CONTRIBUTORS

The interpretation, transcription, research and report writing were undertaken by Martyn Barber. The new reconnaissance photographs were taken by Damian Grady. The report also features extracts from Carolyn Royall's original RCHME archive report (Dyer 1994).

ACKNOWLEDGEMENTS

Archive photographs were retrieved and supplied by the Archive Support Team at English Heritage. The report also draws on research and fieldwork undertaken by Pete Topping and Dave Field during the RCHME's flint mines project during the 1990s (Barber et al 1999).

The photograph on the cover is an enlarged extract from JRB 9705 NMR 8309/2, taken in 1964 by John Boyden, viewing the site rather obliquely from the north.

ARCHIVE LOCATION

English Heritage Archive, The Engine House, Fire Fly Avenue, Swindon SN2 2EH.

DATE OF SURVEY

The survey was undertaken in 2003; the report was initially drafted in 2003/4 and updated in 2008. The survey plan (Fig. 7) was originally prepared for publication in Barber (2005) and reappears here in slightly amended form.

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INTRODUCTION

Aerial photographs taken in 2001 by Damian Grady, as part of English Heritage's southern aerial reconnaissance programme, suggested that the Neolithic flint-mining complex at Stoke Down, Chichester, West Sussex might be larger than had previously been documented. The site had first been identified as a flint mine during excavations undertaken between 1910 and 1914, but had subsequently attracted little attention until the 1990s, when all extant aerial photographs were examined by RCHME in the course of a national survey of Neolithic flint mines (Dyer 1994; Barber et al 1999). On that occasion, mapping of visible soil marks was undertaken, while a field visit by RCHME archaeological survey staff confirmed that no surveyable surface traces remained.

Following recognition of additional cropmarks on photographs taken in June 2001, it was decided to update the earlier mapping. At the same time, it was felt appropriate to produce a more detailed report on the archaeology of Stoke Down. All other Neolithic flint mines recorded as earthworks and/or cropmarks had each been the subject of a detailed archive report to accompany the project monograph (Barber et al 1999). The absence of earthworks and the rather brief excavation history had meant that the existing archive report on the Stoke Down mines dealt primarily with the AP mapping and only briefly with other matters (Dyer 1994).

In addition, a paper dealing with the history of investigation of the site, including the new AP evidence, was requested for publication in a monograph examining prehistoric mining and quarrying in Western Europe and North America (Barber & Dyer 2005). This report should be seen as complementing rather than duplicating the contents of that paper.

THE ENVIRONS OF STOKE DOWN

Location

The flint mine complex (EH AMIE database uid 245691) is centred at approximately SU 834095, and for the most part occupies the false crest immediately above a steep northeast-facing escarpment, below which runs a valley that a short distance to the southeast contains the River Lavant. The mines are located just below, and to the northeast and east of, the summit, south of which the Downs fall away more gently to the coastal plain. The area occupied by the mines mainly lies between circa 110 and 120 metres above OD, although they drift further down slope on the more gentle eastern side of the hill. The highest point in the vicinity, just to the southwest of the mines, reaches 126 metres above OD. Chichester lies circa 5 km to the southeast, while the village of West Stoke is circa 1 km to the south.

Topography, geology and land use

The dominant geology is, of course, chalk – in this instance the Cretaceous Upper Chalk – which gives the Downs their characteristic undulating topography. While pockets of clay-with-flints are not unknown in the area, a field visit by David Field in October 1995, in the course of the RCHME flint mines project, confirmed that no clay-with-flints appears to be present on Stoke Down itself. A short distance to the south, the coastal plain primarily comprises Tertiary sands and clays.

The area centred on the mines is primarily in agricultural use – mostly arable – with the wooded areas declining in extent during the 20th century. Stoke Clump itself, a small area of woodland immediately east of the summit and south of the mines, has been reduced considerably in area since the 1960s. There are earthwork indications of quarrying to the east of the flint mines. The precise date of this quarrying is unclear, but it is most likely to be relatively recent, probably post-medieval, activity.

Neolithic and Bronze Age activity in the vicinity

A scatter of findspots, mostly of lithic material, has been recorded from a 5 km radius around the flint mines. These findspots mostly comprise material recovered from the surface of arable fields. Perhaps the most noteworthy object is a flint dagger of Late Neolithic/Early Bronze Age date found "*when digging on the lower slopes of Stoke Down*" (Curwen 1940; AMIE uid 246284).

The most impressive and best known Neolithic monument in the vicinity is the Early Neolithic causewayed enclosure known as The Trundle, located on St Roche's Hill circa 4 km to the east-northeast, on the opposite side of the Lavant Valley (Oswald et al 2001;

AMIE uid 1032276), and still featuring extant earthworks. The causewayed enclosure itself is around 200 metres above OD with extensive views in all directions. Consequently, if the intervening trees were removed, it would be intervisible with the Stoke Down mines. A similarly early enclosure is also partly extant as an earthwork on Court Hill, a further 3 km northeast of the Trundle (ibid.; AMIE uid 246284).

Less than 3 km to the east of Stoke Clump, again across the Lavant Valley, and circa 2 km southwest of the Trundle, pipeline monitoring by Southern Archaeology in 1997 led to the discovery of a site referred to in interim statements as the Lavant Henge. Published reports (e.g. Turner 1997; Magilton 1998) show a triple-ditched sub-circular monument, the inner pair of ditches overlapping, and with a maximum diameter of around 35 metres. No entrance is visible through any of the ditches. Southern Archaeology no longer exists and consequently no further reports have appeared, making interpretation difficult. However, it is clearly *not* a henge. A few radiocarbon dates have escaped into the public domain, spanning in total the period 3520 – 2870 Cal BC (D Field pers comm.), though obviously a lack of contextual detail makes evaluation of these dates difficult. Nevertheless, it is worth remembering that prior to discovery during pipeline monitoring, the monument was unknown either as earthwork or cropmark, serving as a reminder that even quite substantial sites broadly contemporary in date with the mines may still be lurking hidden within the landscape.

Two probable long barrows (AMIE uid 246539) are located in close proximity to each other on Stoughton Down, circa 3 km north-northwest of Stoke Down and just north of Bow Hill. Trial trenching of both in 1980 revealed little in the way of structural evidence or datable material. A third long mound (AMIE uid 246700) lies just 1.2 km north of Stoke Down. Numerous round barrows, potentially ranging in date anywhere between the Late Neolithic and the Middle Bronze Age, have also been recorded in the vicinity of Stoke Down, particularly to the north and west, and with a notable cluster around Bow Hill.

Also of interest is the existence of a number of sites in the general vicinity that have been claimed as possible Neolithic flint mines. The site at Bow Hill (AMIE uid 246497) has probably attracted the most archaeological attention, though it has long been recognised that none of the flint extraction there is likely to have been undertaken as early as the Neolithic – indeed, the flint digging there clearly impinges on a trackway of later prehistoric date (Barber et al 1999). Closer to Stoke Down, some shallow depressions within Trumley Copse have been noted in the past, but seem likely to represent extraction, probably of chalk, of quite recent date (AMIE uid 245694). A number of shallow pits on Goodwood golf course (AMIE uid 245580) have also now been attributed to recent quarrying rather than Neolithic mining (Barber et al 1999). The best known of these alleged flint mines is the site known as the Lavant Caves (AMIE uid 245589), investigated in 1893 by Charles Dawson, probable perpetrator some two decades later of the Piltdown fraud (Russell 2003). Again, there is absolutely no evidence to support interpretation as a Neolithic flint mine. Underground chalk extraction of the post medieval

period is a far more likely explanation for the subterranean passages and 'chambers' (Barber et al 1999; Russell 2003).

STOKE DOWN FLINT MINES: A HISTORY OF INVESTIGATION

Antiquarian debate

The earthworks examined in 1910-12 by Major Wade (see below) were known to the Ordnance Survey by the mid-1870s, when the words 'British Village' began to appear over their approximate position on the Ordnance Survey's maps. Unfortunately, it is unclear how they became aware of these earthworks – there is no definite mention of them in any contemporary or earlier literature. Some earlier antiquarian debate, mainly concerning other alleged 'British village' sites around the Bow Hill – Kingley Vale – Stoke Down area is discussed in Barber and Dyer 2005, and has occasionally been mentioned in connection with the Stoke Down flint mines, but it seems clear than none of the participants in this debate ever referred to the site examined by Wade.

Figure 1 – 'Ancient British habitations on Bow Hill', as drawn by Mr. T. King of Chichester for W.H. Mason's 'Goodwood…' of 1839.

Briefly, a descriptive account of Goodwood House, plus park, grounds and general environs had included a short description of some earthworks on Bow Hill (Mason 1839) along with a rather fanciful illustration (Fig. 1). This was picked up on by William Saull (1845, 12; 1848). Subsequently, Saull was subject to criticism by the Reverend LV Harcourt (1853; 1856) over the reliability of the description, location and interpretation of the earthworks. This was somewhat unfair, as Saull was merely repeating Mason (almost word for word, in fact), but there was a little more to the debate than the interpretation and location of some earthworks on the South Downs.

Harcourt was the son of a former Archbishop of York, and in 1838 had published his own defence of the scriptures against the onslaught of contemporary geologists and palaeontologists. Saull, on the other hand, was a London-based wine-dealer, radical philanthropist and geological collector – "*a wealthy Owenite and free-thinker who not only talked of materialist science as a force to smash 'tyranny and priestcraft'…but acted on it*" (Desmond 2004). Saull's collection of fossils, opened up in 1833 as a museum for 'working people', contained specimens that played a key role in understanding the development of dinosaurs and, as a consequence, in undermining the Biblical record of the earth's history (Cadbury 2000, 234, 237; see also Critchley 2010). Not only did Saull's radical science and politics sit uncomfortably at times with his Fellows in the Society of Antiquaries, the Geological Society and the Astronomical Society, they seem to have been the real spur for Harcourt's attacks.

Harcourt claimed, wrongly, that nothing resembling Saull's (i.e. Mason's) site could be found on Bow Hill, and later asserted that he had actually discovered it to be at the foot of Stoke Down (Harcourt 1853, 159), offering his own very different and rather colourful interpretation of the site, which saw the earthworks as a place of Celtic sacrifice (see also Harcourt 1856). Harcourt gave the impression that he had undertaken a fair amount of searching in the Bow Hill – Kingley Vale – Stoke Down area, but made no mention of anything at the spot where the flint mines are now known to be. Similarly, when the Reverend Harry Smith (1870) digressed from his account of barrow excavations on the Downs to discuss 'British Villages', he again made reference to a possible site at the foot of Stoke Down but mentioned nothing that could be identified with the mines.

The Stoke Down 'British village' is not mentioned in George Clinch's (1905) articles on 'Early Man' and 'Ancient Earthworks' in the first volume of the Victoria County History of Sussex. The sole reference made by Clinch to the general area is a mention of 'Neolithic implements' from West Stoke (ibid., 331). Meanwhile, Allcroft (1916, 89) noted merely that by the time Major Wade arrived at Stoke Clump in 1910, "*the opinion that they represented another 'British village' had become firmly rooted*".

Finally, it is worth mentioning here an episode later recounted by Wade (1922-3, 83). He recalled a book illustration that he had seen

"*in a shop window of a bookseller in East St., Chichester, an old engraving showing what was described as ' A British Village on Stoke Down'. The village as shown consisted of deep round pits in which gentlemen with tall hats and long spades were standing. The pits were perfectly round with straight sides, smooth and flat at the bottom, as deep as they were broad and judging from the height of the men the pits would be from 10 to 12 feet in diameter and depth".*

This sounds remarkably like the illustration published by Mason (1839) and Saull (1945), but with the location transferred from Bow Hill to Stoke Down. One other obvious difference is that Mason's original did not feature any men with spades. This need not be a problem, of course – Saull's (1845) version (Fig. 2) of Mason's illustration was not

identical to the original, and other authors may well have had copies made, altering or adding detail as required. Wade neither purchased the book in question, nor gave any further details about it, so it is impossible at present to understand how an illustration sounding rather like Mason's became relocated to Stoke Down, unless of course Wade's memory was faulty.

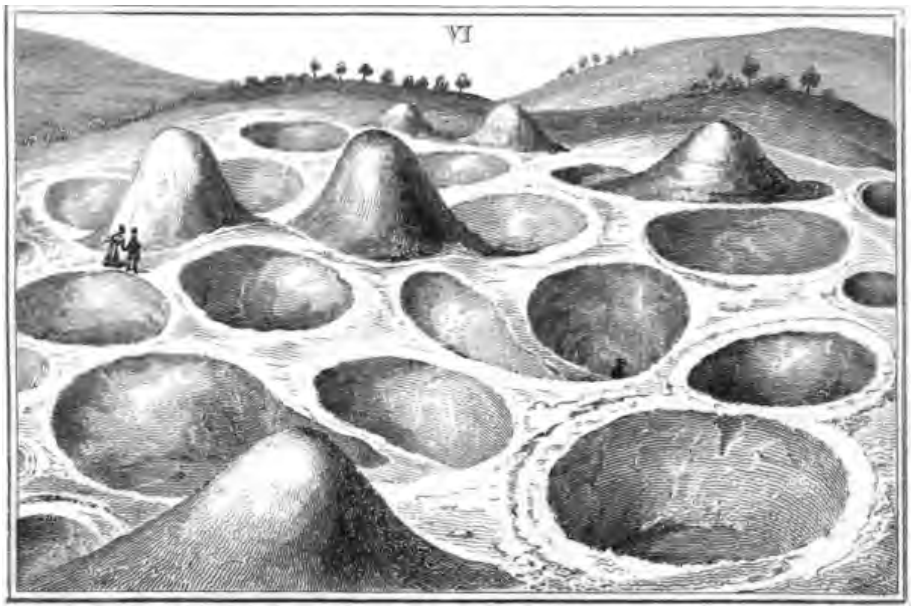

Figure 2 – 'Ancient British Habitations on Bow Hill, Sussex', from Saull's (1845) 'Notitia Britanniae; or an enquiry concerning the localities, habits, condition, and progressive civilization of the Aborigines of Britain…'.

Major Wade's excavations

Stoke Down's first real impact on the archaeological world occurred in 1923, with Major A.G. Wade's brief publication of his exploratory excavations there. Alongside his military career, Wade was a leading figure in the Boy Scout movement (his wife was also Baden-Powell's private secretary), and he 'discovered' the site in 1910 whilst leading a group of Boy Scouts from Chichester on a camping expedition to Stoke Clump, the fairly compact wooded area on the summit of Stoke Down. Wade's account suggests that he was unaware that the location of 'British village' earthworks had been marked on Ordnance Survey maps for at least 35 years.

Wade's decision to excavate stemmed both from curiosity and a long-standing interest in archaeology. In his autobiographical work 'Counterspy' (Wade 1938, 38) he wrote that his schooldays gave him "*two of the greatest and most lasting joys of my life*" – philately and archaeology. There is no doubt that he was keen, but contemporaries might have been a little surprised at his claim that "*to-day I am regarded as a leading field-archaeologist*" (ibid., 39). He certainly dabbled in excavation and other archaeology-based pursuits from time to time, particularly between the wars, but much of the archaeology

recounted in 'Counterspy' concerns nothing more than artefact-hunting – 'looting' might be a better term for some episodes – in the tells and tombs of the Macedonian Plain during the First World War, Macedonia apparently being "*a wonderful hunting-ground for all kinds of archaeologists*" (ibid., 232-3).

Wade's excavations at Stoke Down occurred mainly in 1910 and 1912, with a little further exploration by a Mr Gorham in 1913 and 1914 (Appendix 3; see Barber and Dyer 2005 for a more detailed summary). At least three mineshafts were completely cleared out, as well as some other pits of uncertain date and function. The largest of the shafts dug out by Wade was 12 feet (3.6 metres) wide at the surface and 15 feet (4.5 metres) deep; the smallest was 9 feet (2.7 metres) wide at the surface and 6 feet 6 inches (2.85 metres) deep. The largest featured a single 'undercutting', while another featured two, although in the latter case Wade noted that "*the veins of flint were running diagonally from top to bottom*".

Wade and Gorham's work led to the site being more accurately located and depicted on the Ordnance Survey maps (a line of small circles, representing pits, now replaced the words 'Site of British Village') but knowledge of which of these pits were actually excavated by Wade and Gorham has always been somewhat tentative. Wade's excavation report contained no site plan, and none is known for certain to have existed. Ordnance Survey field investigation on March 16th 1962 noted two pits that seemed a little deeper than the others, and it was suggested that these may have been among those excavated. Nine years later, the Ordnance Survey field staff reported that further ploughing had left little more than vague unsurveyable depressions (AMIE uid 245691).

Wade was able to demonstrate that at least some of the pits had been dug to obtain flint from a seam or seams within the chalk, but in his excavation report he was careful to avoid the key issue of the day as far as flint mines were concerned – their date – although one of his finds, part of a quern, subsequently proved to be of some importance in fixing flint mining as an activity of the Neolithic and not the Palaeolithic. His avoidance of the issue, in print at least, was probably due to Reginald Smith of the British Museum. Smith's 1912 paper on the dating of Cissbury and Grime's Graves was a detailed statement in favour of a Palaeolithic origin for all flint mines, the culmination of years of doubt among some prehistorians about the more orthodox assignment of flint mines to the Neolithic. Wade mentioned Smith's visit to his excavations (though whether in 1910 or 1912 is not clear) at a time when it is fair to say that Smith would have been quite confident about assigning the site to the Palaeolithic.

Wade read his report on his excavations at a meeting of the Prehistoric Society of East Anglia on 10th October 1923. An account of the meeting in The Times the next day implies that Wade was happy with a Neolithic date, the discovery of the quern offered in support of the view "*that there were late neolithic people who grew corn and ground grain between sandstone handmills*". However, The Times' correspondent also reported

Reginald Smith's opinion that "*The pits seem on all fours with the Cissbury series, which I consider paleolithic* [sic]". As for the worked flints, he continued:

"*They appear to be most allied to the Aurignac Cave period, but the large nodules and their plentifulness have materially disguised the style and misled people as to their date. The best implement (a large elongated hand celt) is identical with a late St Acheul form from the drift gravels*".

Little wonder, then, that the published version of Wade's report, in the Society's journal, omitted any discussion of date, save for the opening statement that "*The object of this report is to record 'finds' rather than deal with the problem of the date of the mines and implements*" (Wade 1922-3, 82).

Closer dating of the site remains difficult today. None of the artefacts reported by Wade allow the mining to be placed within any particular phase of the Neolithic, and unlike some of the other South Downs sites, it has not proved possible to track down any organic material from the excavations for radiocarbon dating. Broadly speaking, the extant dates from the other flint mines on the South Downs – all some distance from Stoke Down – suggest a main phase of mining spanning the period c4000 – 3500 BC, with hints that is may have begin prior to 4000 BC at some, and stronger indications that it may have continued well beyond 3500 BC at others, though with little sign of mining continuing beyond 3000 BC. This dating evidence is limited in both quantity and quality (see Barber et al 1999; Barber 2005), but the contrast with Grime's Graves, where mining seems largely confined to the third millennium BC, is marked.

After Wade, the Stoke Down site generally attracted little more than footnote status in discussions of the Neolithic in general and flint mining in particular. Unlike the other known Sussex sites, it saw no further excavation, the next episode of fieldwork being a short episode of surface collection and ground survey by Robin Holgate in the 1980s, part of a programme of work assessing the extant remains of all known flint mines on the Sussex Downs (Holgate 1989). It was Holgate who first noticed evidence on aerial photographs for a possible eastern extension of the mines. Finally, in 1994, as part of the RCHME project focusing on flint mines (originally called 'Industry and Enclosure in the Neolithic': Barber et al 1999; Oswald et al 2001), an aerial photographic transcription of the site was prepared by Carolyn Dyer. The site was also visited on the ground by RCHME field staff in October 1995. The RCHME survey work was summarised in the project monograph, with the site attracting no further attention until the recognition of additional cropmark detail on photographs taken in 2001.

STOKE DOWN FLINT MINES: AP INTERPRETATION

The complex as known to 1994 was featured in both the RCHME archive report (Dyer 1994) and the RCHME flint mines monograph (Barber et al 1999, fig. 5.6). That plan should be compared with the one reproduced here in order to appreciate the extent of additions and alterations, as well as the difference in approach.

The 1994 transcription

As already mentioned, prior to 1994, Robin Holgate had already noted the occurrence of features on air photographs indicating that the mines were more extensive than indicated on the Ordnance Survey map. Following Wade's excavations, the Ordnance Survey had sketch plotted an east-west line of 21 pits to the north of Stoke Clump (this area is referred to within this report as the western group). Holgate noted on aerial photographs a possible extension of the mined area within arable fields a short distance to the east (this area is referred to as the eastern group). Carolyn Dyer's RCHME transcription was the first occasion on which all available photographs were consulted in order to map the full extent of the site. The following account of the 1994 survey is summarised from Dyer 1994:

Figure 3 – Extract from SU 8309/3 CCC 9097, 15th May 1933. The wooded area known as Stoke Clump is just off-centre, with the mines investigated by Wade situated between it and the more linear band of trees to the north.

All the specialist oblique and vertical photographs held by the National Monuments Record at Swindon (now the English Heritage Archive) were consulted. The index to the collection held by the Cambridge University Committee for Aerial Photography (CUCAP) was also checked but no relevant photographs were identified. The earliest aerial photograph examined was a single vertical in the NMR's Crawford Collection. Taken in 1933, the level of detail visible is disappointing to say the least (Fig. 3). Next were verticals taken by the RAF in 1946, which show the area investigated by Wade to be under scrub with scattered bushes. No traces of the slight earthworks are visible, even through a stereoscope. However, the eastern area of mines is visible on these verticals as a series of cropmarks.

Further vertical photographs were taken between the 1950s and 1980s, principally by the Ordnance Survey but also by organisations such as Meridian Air Films, but with little if any useful detail being visible. Of more use were the first oblique photographs of the site which, unlike the aforementioned verticals, were taken for archaeological purposes. On some taken by John Boyden in 1964, the western part of the site appears to be under the plough and the features show up as soilmarks. Further obliques taken by RCHME in the 1970s and 1980s confirmed the evidence of the 1946 RAF verticals – that possible traces of flint extraction extended further east than Wade had realised.

The 1994 transcription was undertaken via computer-aided rectification using AERIAL software, with field control taken from the then-current editions of the Ordnance Survey 1:2500 plans (SU 8209-8309 and SU 8208-8308). The residual errors recorded during the rectification of the archaeological features were generally below ± 1.5 metres. Where archaeological features were plotted from more than one photograph, correlation was in most cases good, indicating that features were located within 2.0 metres of their true ground position.

However, problems were encountered with some archaeological features in the vicinity. Much of the field system to the south of the flint mines was only visible on some of the verticals, as was one of the ring ditches. The small scale of these images meant that errors as large as 5.4 metres were recorded. In these cases, the archaeological features were plotted using local fit with the digitised field boundaries and previously plotted archaeology.

In all but one photograph, the mines were showing as diffuse soil marks, being well spread by the plough. Consequently, some difficulty was experienced during transcription and interpretation. The best oblique photographs of the mines were also taken at very oblique angles, leading to further likely inaccuracies in the finished plan. These and other problems were also encountered in the 2003 transcription, and are therefore described in more detail below.

The 2003 transcription

During a routine flight on 19th June 2001, as part of English Heritage's southern reconnaissance programme, Damian Grady took a series of photographs of the area east and southeast of Stoke Clump. These photographs were mainly focused on the cropmarks of a late prehistoric field system, but they also included the eastern area of the flint mines with cropmarks clearly visible – all previous photography had captured soilmarks. However, there are difficulties in reconciling the cropmark and soilmark evidence.

The 2001 photographs show two distinct clusters of possible mine workings at the southeastern end of the site. The most notable is the more southeasterly of these two clusters. In 1994, a line of three spaced pits or shafts had been tentatively plotted in this area. In the 2001 photographs, a dense cluster of at least 30 such features can be seen in an area measuring circa 90 metres by 70 metres. However, some are clearer than others, and consequently some are highly conjectural.

On the southern edge of the belt of trees immediately to the north, it is possible to see slight earthworks probably representing traces of extraction. However, only further fieldwork on the ground could determine the extent and nature of these features. They need not have anything to do with the Neolithic mining, and certainly their location and form as viewed on aerial photographs suggests they are much more likely to be more recent – the general vicinity is hardly lacking in the remains of post-medieval quarrying. These features have not been mapped for this report. The remainder of the previously-known mines, in the area north of Stoke Clump, is only visible as the faintest of cropmarks on the periphery of some of the 2001 photographs. Consequently no new information is available from this area.

A major contrast between the 1994 and 2003 transcriptions is the chosen means of depicting the photographed traces of definite and possible prehistoric flint extraction. This was partly dictated by the fact that pre-2001 photographs were almost exclusively of soilmarks, whereas in 2001 it was cropmarks that were captured. This caused considerable difficulties in areas where cropmarks and soilmarks overlapped, but also raised questions about what exactly was being seen and consequently what was being mapped. These problems are probably best appreciated by examining some of the key photographs used in the 2003 transcription in sequence.

Fig. 4 is an enlarged extract from the 1946 RAF vertical showing Stoke Clump and the area of earthworks examined by Wade. The definite mine shafts lie in the area between Stoke Clump and the belt of trees to the north, but are impossible to distinguish on this photograph. Meanwhile, further east, an irregular, nearly north-south line of pits can clearly be seen, as – more faintly – can a ring ditch ('F' on Fig. 8) which has a possible pit within its interior. Equally faint, ring ditch 'E' lies in the adjacent field to the west. This field too has a blotchy appearance in some aerial photographs, though to date the soilmarks and

cropmarks photographed in this area have not, with the exception of the ring ditch, resembled anything of definite or probable archaeological origin.

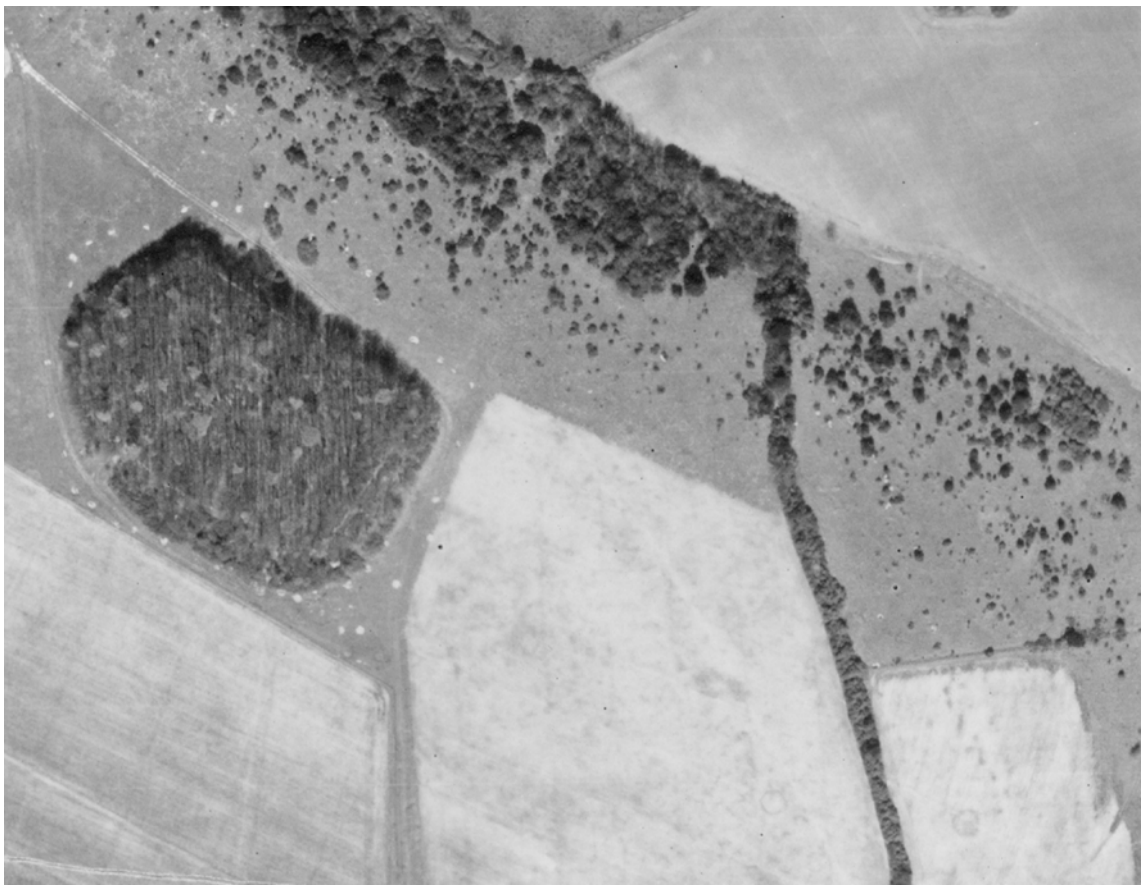

Figure 4 – Enlarged extract from the 1946 RAF vertical (RAF/3G/TUD/UK/156/5418 19th April 1946), north to top. Stoke Clump is centre left, the field containing a line of possible pots and ring ditch 'F' is bottom right. The field below centre has a distinctly spotty appearance here, but aside from a ring ditch there is nothing that can be confidently plotted as being of definite or potential archaeological interest.

As the only photograph to show the area examined by Wade as either earthworks, cropmarks or soilmarks with anything approaching reasonable clarity, John Boyden's 1964 oblique (Fig. 5) is a key image but one with obvious limitations. As can clearly be seen, the obliqueness of the view, the distance of the site from the camera, and consequent obscuring of key detail and ground control points suitable for aiding mapping all severely limit the photograph's interpretative value.

The mining complex appears to be visible as soilmarks, a lengthy spread of light and dark patches of soil running east-west across the centre of the photograph. Once rectified and enlarged to a reasonable size to allow mapping, none of these darker or lighter areas are sharply defined. Moreover, the problems with accurately pinpointing sufficient and reliable ground control means that mapping from this photograph provides only an approximation

of any particular feature's location on the ground. Even after adjusting the rectified image with digital contour data, errors of 5 metres or more remain.

Figure 5 – John Boyden's 1964 oblique view, looking from the north and with Stoke Clump at the centre of the photograph. The area of flint mines appears as several linear and curvilinear arrangements of pits (the darker spots) amidst a more general scatter. Linear 'A' can be seen on the right and, alongside it, possible windmill mound 'C'. English Heritage Archive SU 8309/2 Boyden Coll. JRB 9705).

Fig. 6 is an extract from a 1982 oblique showing part of the presumed southeastern extension of the site, the area displaying soilmarks being immediately north of the arable field in the bottom right corner of Fig. 4. In Fig. 6, only a small area is showing with any clarity as soilmarks, ironically an area that has not been under the plough on other occasions when the site has been photographed. The soilmarks are of a similar character to those seen more obliquely in Fig. 5, a relatively narrow, linear spread of darker patches of soil surrounded by somewhat whiter areas. On earlier occasions, as in Fig. 4, this area was under grass when photographed, which may rule out one potential cause of the soilmarks – they seem unlikely to represent the sites of recently uprooted tree. Note particularly the jagged edges of some of the darker patches caused by the plough moving debris backwards and forwards across the surface.

Figure 6 – Extract from an RCHME oblique, with northeast approximately to the top. English Heritage Archive 2106/1127, 8th March 1982.

Fig. 7 is an extract from one of the 2001 photographs showing the southeastern part of the site, this time as cropmarks. The area in Fig. 6 is here bottom centre. The general lack of clarity of the cropmarks is notable, as is the contrast between them and the form of the previously photographed soilmarks. It is the fact that so many of what are presumably negative features – pits of some form dug into the chalk - are clustered together that allows them to be viewed as something of potential archaeological interest.

In the 2003 transcription, the aim was not to try and identify individual shafts and their associated spoil heaps. Even leaving aside the aforementioned problem of trying to reconcile soilmarks and cropmarks on a site of this nature, drawing lines and plotting

features remains a highly subjective exercise, complicated further by the unsuitability of some of the photographs for this purpose. Instead, what have been plotted are, for the soilmarks, areas of soil noticeably darker or lighter than their surroundings. It could be assumed that the darker patches represent the upper, disturbed fill of pits or shafts plus spreads of lithic waste, whereas the lighter, white areas represent chalky spoil spread by the plough. However, given that spoil is unlikely to have comprised purely chalk, and that shaft fills would be predominantly chalk and flint, the situation is unlikely to be so straightforward. Moreover, the spreading of debris by the plough may have concealed features.

Figure 7 – English Heritage oblique taken in 2001, looking approximately southeast. The area in the centre of Fig. 6 is here bottom centre, with the 'new' cropmarks immediately above. English Heritage Archive 21241/07 19th June 2001.

For the cropmarks, only the darker patches have been plotted. Again, these do not necessarily equate to individual shafts or pits, merely to areas where relative crop growth has been affected by buried features, that one might assume to have been caused by such

features. Clearly missing from the cropmarks is any indication of the spread of surface chalk or lithic debris. Consequently the 2003 transcription provides an approximation of the likely (minimum) extent of the definite and possible mine workings without necessarily trying to identify definite shafts or pits. The precise identification of the latter, if that is indeed what they are, would require cropmarks of far greater clarity, or extensive geophysical survey.

Survey methods and techniques

(i) sources consulted

The 1994 survey provided the framework for the 2003 transcription, the same area and Ordnance Survey map background being utilised. The 1994 survey drawing was scanned and loaded into Autodesk Map 5, as was the Ordnance Survey 1:2500 mapping. However, for the reasons outlined above, none of the cropmark or soilmark detail mapped in 1994 was retained. Instead, all detail was plotted afresh, using a combination of the new photographs from 2001 and a selection of those used in 1994. A full list of the photographs used can be found in Appendix 1.

(ii) methods and constraints

All features of relevance to the survey that were visible on aerial photographs were examined and mapped using a compilation of photographs. Those displaying the clearest cropmark or soilmark detail were scanned and then rectified via the AERIAL 5 rectification programme, with archaeological detailed the transcribed within Autodesk Map 5 (see Appendix 2). Control information for aerial photographs was taken from the 1:2500 scale Ordnance Survey mapping for the post-1970s photography. For the earlier photography, it was necessary to use the 1977 1:10,000 scale Ordnance Survey mapping, reflecting some changes in field boundaries and land use that affected the choice of control points available.

The target accuracy level for the survey was ± 2 metres, which was achieved in the majority of cases, aided by use of the digital contour data, which had not been available in 1994. The major exception was the 1964 oblique photography which, for reasons already outlined earlier, offered some challenges. It proved necessary to move the scanned and rectified photograph around within Autodesk Map 5 in order to achieve a 'best fit' with both OS mapping and other aerial photography.

DESCRIPTION OF THE ARCHAEOLOGICAL SITES

The mines

The cropmark and soilmark features at Stoke Down are featured in Fig. 8. As already noted, the area of probable and possible mining has been separated into two groups for the purposes of discussion. The western group includes the area examined by Wade, while the eastern group comprises the cropmarks and soilmarks photographed and identified since the Second World War. The division is useful for discussion purposes, but is entirely a product of visibility on aerial photographs. The apparent 130 metre gap between the two may well be due chiefly to differences in land use and consequent visibility of any archaeological features across the area on each occasion that photographs were taken. Note that Russell (2001, 55-6) also applies a twofold division to the site, but his 'West Stoke' appears to comprise the eastern group alone, while his 'Stoke Down' seems to include both eastern and western groups.

Western Group

Plotted entirely from Boyden's 1964 oblique photograph, rather than attempting to identify individual shafts or pits and their associated spoil, what have been mapped are areas of noticeably darker or lighter soil. Even at this more generalised level of interpretation, mapping remains extremely subjective. The 1994 transcription assumed that the darker areas represented backfilled shafts or pits, while the whiter patches marked areas of chalky spoil. This remains a plausible assumption, although isolating individual pits and shafts proved difficult, especially once the 1964 oblique had been rectified and enlarged. Some of the darker areas may also represent clusters of more closely-spaced pits. In addition, other flint mines have proved to feature extensive and sometimes quite thick deposits of waste flint on the surface. It is unclear how any such deposits might be represented in this photograph.

Clearly the area of potential flint mining is more extensive than was apparent to Wade and subsequent visitors, suggesting that many of the mapped features were not distinguishable on the surface by 1910, and certainly not by the time the Ordnance Survey Archaeology Division visited in the early 1960s. However, it appears as a fairly discrete, more or less linear band of workings following the contours of the north side of the hill, mostly lying between the 110 and 120 metre contours. A line of small pit-like features can be seen running between the western end of the main area of possible mines and the linear earthwork to the west. It is worth noting that if these are indeed Neolithic mine shafts or pits, then judging by the 1964 oblique, at least one of them appears to impinge on the bank of the linear earthwork, which is presumed to be of first millennium BC date.

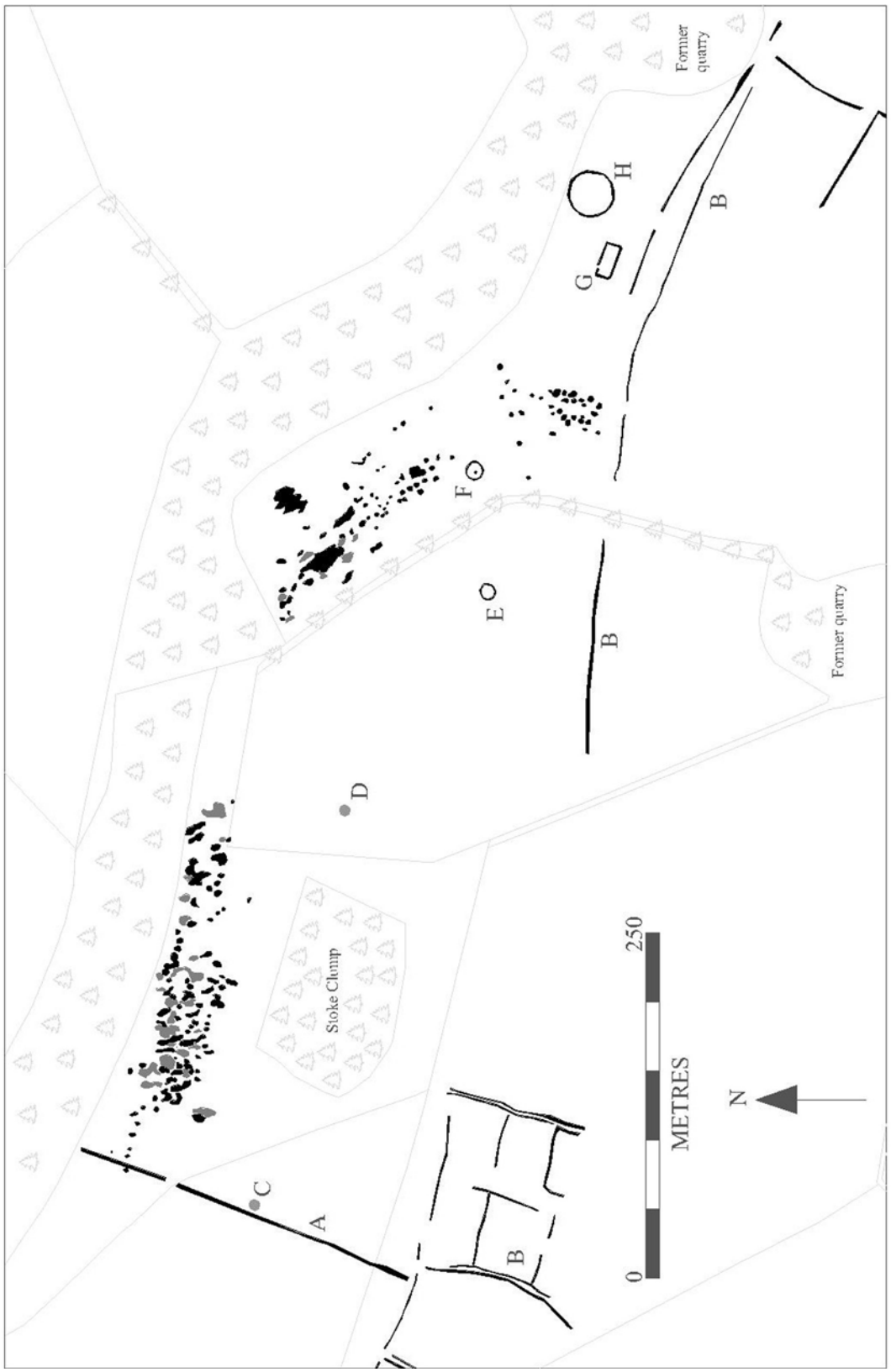

Figure 7: Transcription of archaeological features visible on APs, slightly amended from Barber & Dyer 2005, with background detail mapped from the 2001 APs rather than from Ordnance Survey mapping, which did not reflect recent field boundary changes.

However, given that the linear itself has been levelled by ploughing, it is impossible to tell from this photograph whether or not the linear really is the later feature. Dyer (1994) and Barber et al (1999) both showed possible shafts/pits and spoil continuing a short distance west of this linear earthwork. However, it was felt that the for the current survey, the traces visible on the 1946 RAF verticals and the 1964 oblique were too vague to be plotted as possible archaeological features.

Eastern Group

This area is plotted from a selection of the 1946, 1964, 1976, 1982 and 2001 photographs. The distance between the eastern and western groups as mapped here is circa 130 metres. For this eastern group, the combination of cropmark and soilmark evidence makes concordance between different photographs difficult. As with the western group, for soilmarks the emphasis has been on mapping darker and lighter patches visible on the surface, and the same caveats apply here with regard to identifying individual pits and shafts. For the cropmarks, darker patches only have been plotted. It is presumed that these relate to individual, negative features, i.e. pits or shafts cut into the chalk. There is no indication of any variation in crop growth or colour that might be attributable to areas of spread chalk or flint spoil.

There is a general resemblance to the western group – the cropmarks and soilmarks suggest a linear band of exploitation, though this time running across rather than along the contours, gradually moving down the gentler eastern slopes of the hill, beginning around the 115 metre contour and drifting below the 100 metre contour at the easternmost extent of the cropmarks. As with the western group, many of the possible pit or shaft traces seem fairly small, generally between 2 and 4 metres across, although this is consistent with the size of the features dug into by Wade and Gorham in 1910-1914, the largest of which was less than 4 metres wide at the surface.

Linear 'A'

This linear feature was first recorded in the early 20th century as an upstanding earthwork (AMIE uid 245685), but now survives mainly as a plough-levelled feature best seen as soilmarks or cropmarks. Visible for a minimum of 255 metres and aligned roughly northeast-southwest, it originally comprised a ditch with a bank on its eastern side. A date somewhere in the first millennium BC would seem most plausible for this feature, which appears to connect with the cropmarks of a field system to the south (see below). Cunliffe (1966, 109-113) refers to a collection of pottery amassed by the Reverend W.A. Shaw, who was rector at nearby West Stoke until his death in 1938. Predominantly Late Bronze Age and Early Iron Age in date (see also Champion 1980; AMIE uid 245674), much of Shaw's collection is poorly provenanced, though one small group of sherds said to be "*somewhat larger and less well weathered than the others*" was described as coming from "*the entrenchment*" or "*the entrenchment near the tumulus*", which Cunliffe

took to mean this linear earthwork. He proposed that "*the fresh nature of these sherds and their recorded provenance suggest that they were recovered by excavation*" (Cunliffe 1966, 109) though if he is correct in this assumption, no record of any such excavation has been uncovered so far.

Field System 'B'

Southwest of Stoke Clump are cropmark traces of a field system which probably originated somewhere between the Middle Bronze Age and the Late Iron Age (AMIE uid 245755). There are hints that the field system may continue across the currently arable areas to the east, thought the situation is obscured somewhat by later boundaries. The relationship with the Linear 'A' is unclear – the latter certainly doesn't appear to cross the field system, but it is impossible to determine whether it stops short of the field system of abuts its northern boundary. A bend in the latter at this point may indicate that the linear is the earlier feature. The broadly east-west linear feature mapped to the east of the field system may be a trackway connected with it, or it may be linked to the more recent quarrying in the area.

Mound 'C'

A sub-circular feature visible on the 1946 RAF vertical APs as a donut-shaped earthwork, though since then it has been heavily denuded by ploughing. In 1971 the Ordnance Survey's Archaeology Division recorded it as a mound 18 metres in diameter and 0.8 metres high, with a large hollow in the centre. Traces of a surrounding ditch were apparently visible in the 1930s (Grinsell 1934, 247). It has been variously considered a bowl barrow or bell barrow, though it has reportedly been used as a stead for a 3-legged windmill (ibid.; Curwen 1929, 143; AMIE uid 245688). The fact that it appears to overlie the bank of linear 'A' further reduces the likelihood of a prehistoric date, although the possibility that an extant barrow mound was adapted for use as a windmill base cannot be entirely ruled out.

Bowl Barrow 'D'

A bowl barrow comprising a mound 26 feet (7.8 metres) in diameter and 2 feet (0.6 metres) high, surrounded by a ditch 5 feet (1.5 metres) wide and 1 foot (0.3 metres) deep was recorded by a 15 year old schoolboy, P.J. Williams, during the late 1930s. A note was subsequently published by Leslie Grinsell (1941). In 1962 the Ordnance Survey Archaeology Division recorded a "*low unsurveyable rise of dark soil containing a large concentration of flints*" (AMIE uid 245716). The feature has since been completely levelled by ploughing. Consequently only the approximate location is marked on the plan (Fig. 7).

Ring Ditch 'E'

A circular ditched feature is visible as a cropmark on the 1946 RAF vertical AP. Slightly irregular in shape, it is circa 12 metres in diameter and presumably represents a plough-levelled ditched round barrow. In 1962 the Ordnance Survey Archaeology Division recorded a low mound 9 metres in diameter and no more than 10 centimetres high, with the faintest traces of a surrounding ditch (AMIE uid 245708).

Figure 9 – Extract from a 1976 oblique, north to top, showing towards top left part of the eastern group of mines and ring ditch 'F'; right of centre are the rectangular feature 'G' and ring ditch or enclosure 'H', as well as faint traces of linears possibly associated with the later prehistoric field system. English Heritage Archive SU 8309/5/279 4th March 1976.

Ring Ditch 'F'

Circa 77 metres west of 'E' is a similar cropmark (see Fig. 9), but less circular in appearance and up to 14 metres across. There appears to be a single pit, positioned a little west of centre, in the interior, which may represent a grave pit or, perhaps, one of the pits dug to obtain flint. Assuming the ring ditch represents the site of a plough-levelled barrow, there is no record of the mound ever being observed as an earthwork (AMIE uid 245708).

Rectangular Feature 'G'

A rectangular, presumably ditched, feature or structure and possibly the site of a former building, measuring circa 25 metres by 12 metres (see Fig. 9). It is orientated broadly WSW-ESW, with a possible gap or entrance towards the western end of its northern side. It need not be contemporary with any of the prehistoric features in the vicinity, and may be related to the more recent quarrying in the area, but clearly only excavation could provide evidence as to its date and function. It is visible as a cropmark both on the 1946 RAF vertical photography and on later obliques. There is no record of any above-ground traces being observed (AMIE uid 1589833).

Circular Feature 'H'

A sub-circular enclosure circa 33 metres in diameter has been recorded on several occasions as a cropmark (see Fig. 9). It is located some 125 metres from the nearest traces of possible mining and almost 200 metres from ring ditch 'F'. Dyer (1994) suggested that a darker area in the enclosure's interior, visible only on some photographs, might suggest the presence of a shallow depression, perhaps a pit or a grave. There is no record of this enclosure ever being recorded as an earthwork, and the cropmark evidence offers no hint that an internal mound ever existed (AMIE uid 1589835).

DISCUSSION

Survival and condition

With the exception of the site at Durrington, Wiltshire, which lies beneath a housing estate and was discovered during pipeline trenching, all of the accepted Neolithic flint mines in England were originally identified as upstanding, though not necessarily spectacular, earthworks. Many have suffered encroachment from agriculture past and present, but records including plans of varying quality and a number of vertical aerial photographs showing the earthworks survive for most of these sites, while excavation and geophysical survey have also contributed to a better understanding of their nature and extent.

An important exception here is Stoke Down. No excavation has occurred since 1914. No adequate plan of the site before or during excavation, or before more recent ploughing removed what surface traces there were, has been located. Moreover, no good quality photographs appear to exist showing any of the mined areas as earthworks in contrast, for example, to the West Sussex site of Blackpatch which, although levelled by bulldozer shortly after the Second World War, was photographed by the RAF in far more clarity than is the case for Stoke Down (see Barber 2005). Almost the entire area occupied by the definite and possible flint mining at Stoke Down remains under cultivation.

It seems clear that by the time Wade discovered the site, the earthworks were less than spectacular. For example, prior to excavation, the first shaft apparently lacked any obvious corresponding spoil heap, and was visible only as a very slight, shallow surface hollow:

"*The actual depression was hard to see at first… in fact the whole surface of the minefield is as smooth as many croquet grounds… I placed one well known authority, who came to see the area, in the centre of one of the best defined pits. When still standing there, he asked me how I found the mine as he could see nothing*" (Wade 1922-3, 83-4).

The croquet comparison may be an exaggeration, but nonetheless it is clear that the surface remains were slight, something that prompted Wade to suggest using aerial photography to help identify further traces (Wade 1922,-3, 84). An article in the Sussex Daily News on 3rd October 1910 quoted Herbert Toms, an experienced archaeological surveyor and excavator, explaining that:

"*the depressions indicating the mouths of the shafts are so shallow that, before excavation, it was thought that thy were but the remains of small prehistoric pit dwellings*".

It isn't clear if the 'pit dwelling' interpretation was based solely on the Ordnance Survey's labelling of the site as a 'British Village', or whether it also represented Wade's initial

thoughts about the site. Certainly neither of the first two features excavated by him seem to have been mineshafts, assuming of course that he reached the bottom of them. Instead, they were attributed by him to Bronze or Iron Age settlement.

During the period that Wade was digging, the western group appears to have been under grass, or at least that part that he identified on the ground was, as he refers to turf covering the pits he excavated. The 1933 vertical AP suggests that this was still the case then, and other photographs and comments about the sites imply that it may have remained under grass until 1962. Boyden's 1964 obliques show that it was certainly under the plough then.

In 1962, AS Phillips of the Ordnance Survey's Archaeology Division reported that "*A group of about 20 filled-in mine shafts lie along the top of the N-facing slopes of Stoke Down. They appear as very slight depressions amongst scattered scrub, with the exception of two which are deeper and contain little bushes. They may be those excavated in 1910-13*" (AMIE uid 245691). If we assume that the surface traces of Neolithic mining at Stoke Down ever achieved the scale of the earthworks known at sites such as Harrow Hill and Cissbury, then their erosion, presumably by ploughing, must have occurred some time prior to 1910, and probably some time prior to the mid-19th century if the failure of the likes of Harcourt and Smith to spot anything can be regarded as a reliable indicator. The area of the eastern group appears to have been under the plough since at least 1933 on the basis of aerial photographic evidence, and probably much earlier if we can regard Wade's inability to see them on ground as a trustworthy guide.

The mining

The 2001 APs appear to show two distinct clusters of potential mine workings at the southeastern end of the complex, as described earlier. It is important to state clearly that these features remain undated. Their reasonable proximity to the mine workings examined by Major Wade offers the potential of a Neolithic date, as does their general appearance – a narrow band of pit-like negative features broadly following the contours in a curve along the northern and eastern sides of Stoke Down. However, it is necessary to recall that Wade himself dug into some pit-like features that he felt may not have been connected with mining. Moreover, there is extensive evidence for flint extraction of much more recent date in the general vicinity, notably at Bow Hill, as well as chalk extraction (Bone & Bone 2004). Chalk extraction has clearly occurred to the north and east of the Stoke Down cropmarks, and may well be linked to the rectangular cropmark, which has the appearance of a building, as well as some of the linear features, which may represent trackways connected with this quarrying.

The broadly linear nature of this extraction stands in marked contrast to the situation at other definite or possible Neolithic flint mines on the chalk of southern England, though it is not without parallel (Barber et al 1999, 41). However, there is a problem with visibility at Stoke Down. Clearly surface traces were slight at best by 1910 and neighbouring areas

which have, for the most part, remained under grass or woodland, are beyond the range of aerial photography (although LiDAR may help here). Nonetheless there remains a marked linearity, perhaps to be partly explained by topography and by the presence and/or accessibility of the flint itself. The possibility of deliberate choice should also be considered – preference for the north and northeast-facing slopes of Stoke Down may have been determined at least in part by cultural rather than purely practical concerns.

The contrast is most marked with sites such as Easton Down, Wiltshire, where the known pits and shafts appear to have been placed seemingly at random around the sides, floor and edge of a coomb, perhaps suggesting sporadic development of the mining complex. However, a more organized approach seems evident at other West Sussex sites such as Cissbury and Harrow Hill, where it can be argued that erosion on steeper slopes led to exposure of a flint seam which was then exploited at length along the hillside, before mining moved upslope in order to explain the same seam, but now requiring the digging of deeper pits to reach it. At Cissbury in particular, the shafts lying above the steep northwestern-facing slope seem to be arranged in tiers along the contours, not too dissimilar to the situation at Stoke Down (Barber et al 1999, 44).

At Stoke Down, then, it mat have been the case that extraction was initially focussed on an exposed seam on the steeper north-facing slope, this seam gradually being followed along the hillside between the 110 and 120 metre contours. Certainly during the RCHME field visit in 1995 it was noted that

"*there are many flint nodules lying on the surface, particularly close to the surface here, perhaps outcropping in the immediate vicinity*" (AMIE uid 245691).

The possible eastward extension of the mining is a little more difficult to account for, unless the miners were exploiting a second, lower seam, although it may be worth bearing in mind Wade's comment about the seam in one of his shafts being diagonal rather than horizontal.

The ring ditches

The presence of definite and possible round barrows is something that Stoke Down has in common with other Stoke Down sites. At Blackpatch, which has seen the most extensive archaeological exploration of the burial mounds, it seems that most of the funerary activity post-dated the main mining phase, perhaps by centuries, but made explicit reference to it via the use of mining spoil and nodular flints as construction material. The use of large nodules to cover mounds at Blackpatch also hints that some extraction may have been undertaken during the Late Neolithic/Early Bronze Age specifically for this purpose (Barber 2005).

The relationship between ring ditches and mining at Stoke Down is far less clear, primarily because none of the former and so little of the latter has been excavated. The available

evidence hints at the possible presence of a scattered linear group of ring ditches and round barrows to the south of, and broadly parallel to, the mines, occupying higher ground and in some cases overlooking them. However, the status of barrow 'C' is at best uncertain. If removed from the discussion, the remainder of the barrows and ring ditches are focused more towards the gentler eastern slope of the hill, and any relationship with Neolithic flint mining less obvious. In contrast, the slight nature of barrow 'D' when first recorded raises the possibility that other, similar monuments had been eroded or levelled beyond recognition long before the 20th century.

At Blackpatch and Church Hill, mounds with burials were encountered among the shafts and spoil of the flint mines, the mounds themselves primarily comprising mining spoil and lithic waste. If such a situation ever existed at Stoke Down, the level of plough destruction may mean that such features are unlikely to survive in any meaningful form, the only real clue being ring ditch 'F', located between the two main pit or shaft clusters at the southeastern end of the site, and containing a single pit within the enclosed area. This could, of course, represent a grave pit, or a shaft dug to extract flint and subsequently used as the focus for a burial monument. If so, it is worth reiterating that at both Blackpatch and Church Hill, such funerary activity among the mines generally belonged not to the Early Neolithic but to the Early Bronze Age.

One observation about the structure of barrow 'D' is of note – in 1962 the Ordnance Survey field investigator described the remnant mound as a "*low unsurveyable rise of dark soil containing a concentration of large flints*". Thus it may be that as at Blackpatch, the mines, possibly by now inactive, were a source for raw material for the construction of burial mounds. However, it is far from unusual for barrow mounds on the South Downs to feature an abundance of flint, particularly in nodule form, and many recorded cases are some distance from the nearest mine. As early as 1870 the Reverend Henry Smith was able to point to an important distinction between round barrows of prehistoric and Saxon date: "*the Saxon being composed of chalk, while the British were of flints, carefully piled together*" (Smith 1870, 62). The presence of large quantities of flint nodules appears also to have been a regular construction element of the round barrow mounds on Bow Hill, where none of the alleged prehistoric flint mines have survived modern scrutiny.

Enclosure 'H' offers intriguing possibilities. It may be a large ring ditch, but the absence of any indication of a mound – including any documentary reference – does permit speculation that it may have been more ceremonial than funerary in nature. The obvious parallel is with the much smaller 'barrow' 9 at Blackpatch, a circular ditched feature 12 metres in diameter situated a short distance northeast of the flint mines there. Although human remains were recovered from the ditch, it was not primarily a funerary monument and appears not to have featured a mound. In passing, it is worth recalling that in his discussion of the site at the foot of Stoke Down, Harcourt (1953, 159) noted that "*at a little distance on the level ground there is a circle which may have been the habitation of the priest*". It is not completely impossible that he was referring to enclosure 'H'.

APPENDIX 1: LIST OF AERIAL PHOTOGRAPHS CONSULTED

All of the following are held by the English Heritage Archive, Swindon.

(1) Vertical APs

EH Archive Index	Frame No.	Date Flown
SU 8309/3 CCC 9097	85	15 May 1933
RAF/3G/TUD/UK/156	5382-5385	19 April 1946
RAF/3G/TUD/UK/156	5417-5419	19 April 1946
MAL/65009	017-018	12 March 1965

(2) Oblique APs

EH Archive Index	Accession No.	Frame No.	Date Flown
SU 8309/1-2	JRB 9705	26-27	1964
SU 8309/5	NMR 909	278-281	4 March 1976
SU 8309/6	NMR 909	288-289	4 March 1976
SU 8309/11	NMR 1942	105	23 April 1981
SU 8309/13	NMR 2106	127	8 March 1982
SU 8309/27-31	NMR 21241	06-10	19 June 2001
SU 8309/32-35	NMR 21181	06-09	19 June 2001

APPENDIX 2: AERIAL FILE INDEX

AERIAL File	Photograph	Maximum Error (in metres)
3G-TUD-156-5418	RAF/3G/TUD/156/5418	± 1
SU 8309-2	JRB 9705/207	± 5.4
SU 8309-6	NMR 909/289	± 1.3
SU 8309-11	NMR 1942/105	±1.8
SU 8309-13	NMR 2106/1127	± 1.7
SU 8309-28	NMR 21241/07	± 1.4

APPENDIX 3: SUMMARY OF EXCAVATED FEATURES

Wade (1922-3) refers to excavations on seven features between 1910 and 1914. In most cases, very little descriptive detail and locational information is provided. Likewise there is barely any mention of excavation technique. Wade noted (1992-3, 88) that both Reginald Smith and Herbert Toms, visitors to the excavations, reminded him of Lane Fox's error at Cissbury in 1867-8, when compacted chalk fill was mistaken for undisturbed 'natural' chalk, with Lane Fox consequently failing to reach the real bottom of the mine shafts. It may well be that until this intervention, Wade believed he was excavating a settlement rather than a flint mine. Wade mentioned in his excavation report that

"I employed to clear Shaft No. 1 a skilled navvy, who had been digging in the chalk for some 30 years, he knew almost by instinct what had been moved and what was solid original chalk" (ibid.).

Whether this same gentleman emptied out the other excavated features is unclear, but the implication is that he was not involved in the excavations of the first three pits.

The seven features excavated at Stoke Down, in approximate order of excavation, were as follows:

1. Wade (1922-3, 82) noted: *"To return to the summit of Stoke Down itself on the West there is a star-shaped depression, a trial hole here produced mediæval and Roman pottery and a triangular implement and a long rough implement. This depression should be a water catch, if so it should be puddled".*

2. Wade (1922-3, 83) continued: *"On the East, there is a considerable depression. A trial hole here produced a rough triangular implement. At the moment though I do not know for what purpose this pit was originally dug".*

It is not entirely clear when these two 'trial holes' were dug, although Wade's account implies that they were his first excavations at the site, undertaken in 1910, possibly during the Boy Scout expedition and certainly before Wade asked the landowner, the Duke of Richmond and Gordon, for permission to undertake excavations on the site.

3. Pit D.1, as Wade named it, was the first feature excavated after permission had been obtained, and will have been dug in 1910. According to Wade (1922-3, 83) it was located

"on the Eastern end of the line of pits. This I found to be a living pit, probably of the Bronze Age. Immediately under the turf here there was a certain amount of coarse pottery…bones and horn of fallow deer, a good deal of burned stone and earth, but no flint flakes or implements. This pit had not been dug before".

4. Pit D.2, or Shaft No. 1, was the next depression excavated. At the surface it appeared perfectly circular and circa 12 feet in diameter.

"There was no corresponding mound of earth, so that if it had been a big pit…the earth and chalk that had been taken out had either been put back very carefully or disposed of away from the pit. The actual depression was hard to see at first, there was no basin shaped depression as at Cissbury. There was no raised ring around the lip and only the very slightest dip in the centre" (Wade 1922-3, 83-4).

Excavation showed this shaft to be 15 feet deep and, apparently, a regular 12 feet in diameter throughout, except for an undercutting at the bottom. The contents are described and discussed in Barber & Dyer 2005. The shaft was mentioned in an account of a field visit by the Brighton and Hove Archaeological Society to Cissbury on Saturday 1st October 1910 (as reported in the Sussex Daily News on 3rd October). In that account, the shaft is described as follows:

"This proved to be in shape like a gigantic Wellington boot. The shaft, 12 feet in diameter and 15 feet deep, was filled with broken chalk; but the "toe" of the boot was found to be quite clear of filling or fallen material. Among the objects found in the pit were 2,000 artificial chips of flint, 2 flint knives, 3 flint cores, and three rough implements, all of Cissbury types; fragments of bone, horn (wedges), and wood; and a well-preserved example of a prehistoric miner's pick, 13 inches in length, made from the antler of a red deer. Several deep marks made by deer horn wedges were observed in the chalk sides of the lower portion of the pit."

There appears to have been no excavation undertaken in 1911.

5. In full, Wade's published account is as follows: *"No. 2 shaft excavated in the Autumn of 1912 was only 9 feet in diameter and only 9ft 6ins in depth. There was no step or undercut, but the shaft produced some good implements and an extremely important domestic implement, a top stone of a greensand saddle quern showing marked signs of use. This was found 7ft down in the undisturbed chalk infilling"* (Wade 1922-3, 84-6).

6. *"Shaft No. 3 partly dug by myself and finished by Mr Gorham in 1913 showed the same main characteristics as No. 1 shaft, except that here we found a step left in the solid chalk on to which the miners shovelled the chalk on its way to the surface. In shape No. 3 shaft was slightly oval. At the mouth it measured 11 feet and 13 feet across, when entirely excavated 14 feet in depth. At the bottom of the shaft we again found undercutting, in fact there were two distinct undercuts. The veins of flint were running diagonally from top to bottom"* (Wade 1922-3, 86-7). Again, further discussion and detail in Barber & Dyer 2005.

7. In a brief footnote, Wade (1922-3, 83) added that *"Mr. Gorham in 1914 excavated a pit out of the line of mine shafts which answers to the village pits. No flakes or implements were found in this pit"*. No further details were given.

BIBLIOGRAPHY

Allcroft, A.H. 1916. Some earthworks of West Sussex. *Sussex Archaeological Collections* 58, 65-90.

Barber, M. 2005. Mining, burial and chronology: the West Sussex flint mines in the Late Neolithic and Early Bronze Age. In P. Topping & M. Lynott (eds.) *The Cultural Landscape of Prehistoric Mines*, 94-109. Oxbow Books, Oxford.

Barber, M. & C. Dyer. 2005. Scouting for shafts: aerial reconnaissance and the Neolithic flint mine at Stoke Down, West Sussex. In P. Topping & M. Lynott (eds.) *The Cultural Landscape of Prehistoric Mines*, 30-50. Oxbow Books, Oxford.

Barber, M., D. Field & P. Topping. 1999. *The Neolithic Flint Mines of England.* RCHME/English Heritage, Swindon.

Bone, A.E. & D.A. Bone. 2004. Lavant Stone: a Roman and medieval building stone in West Sussex. *Sussex Archaeological Collections* 142, 63-78.

Cadbury, D. 2000. *The Dinosaur Hunters. A story of scientific rivalry and the discovery fo the prehistoric world.* 4th Estate, London.

Champion, T. 1980. Pottery in the First Millennium BC. *Sussex Archaeological Collections* 118, 43-52.

Clinch, G. 1905. 'Early Man'; 'Ancient Earthworks'. In *The Victoria History of the County of Sussex* Volume 1.

Cirtchley, E. 2010. *Dinosaur Doctor. The Life and Work of Gideon Mantell.* Amberley Publishing, Stroud.

Cunliffe, B. 1966. Stoke Clump, Hollingbury and the Early Pre-Roman Iron Age in Sussex. *Sussex Archaeological Collections* 104, 109-120.

Curwen, E.C. 1928. Neolithic road, Bow Hill. *Sussex Notes & Queries* 2 (3), August 1928, 80-81.

Curwen, E.C. 1929. *Prehistoric Sussex*. The Homeland Association, London.

Curwen, E.C. 1940. Flint Diggers of the Early Bronze Age from Sussex. *Sussex Notes & Queries* VIII, 69-70.

Curwen, E.C. 1954. *The Archaeology of Sussex* (2nd edition). Methuen & Co. Ltd, London.

Desmond, A. 2004. Saull, William Devonshire (1783-1855). *Oxford Dictionary of National Biography*, Oxford University Press [http://www.oxforddnb.com/view/article/24683, accessed 30 June 2005]

Dyer, C. 1994. *West Stoke Neolithic Flint Mines*. RCHME archive report.

Francis, D.L. 1957. Iron Age finds at Stoke Clump. *Sussex Notes & Queries* XIV, 280.

Grinsell, L.V. 1934. Sussex Barrows. *Sussex Archaeological Collections* 75, 217-275.

Grinsell, L.V. 1941. Sussex Barrows: Supplement No. II. *Sussex Archaeological Collections* 82, 15-123.

Hamilton, B.C. 1933. Suspected flint mines on Bow Hill. *Sussex Notes & Queries* 4 (8), November 1933, 246-7.

Harcourt, L.V. 1838. *The Doctrine of the Deluge: vindicating the scriptural account from the doubts which have recently been cast upon it by geological speculation*. Longman, Orme, Brown, Green and Longmans, London.

Harcourt, L.V. 1853. Celtic Antiquities near Chichester. *Sussex Archaeological Collections* 1 (2nd edition), 149-159.

Harcourt, L.V. 1856. [Untitled note on Stoke Down]. *Report on the Transactions of the Annual Meeting of the Archaeological Institute of Great Britain and Ireland held at Chichester, July 12th to 19th 1853*, 32. Archaeological Institute, London.

Holgate, R. 1989. *The Neolithic flint mines in Sussex: a plough damage assessment and site management report*. Field Archaeology Unit, Institute of Archaeology, London.

Magilton, J. 1998. Sussex's first henge? *Sussex Past and Present* 84, April 1998, 4-5.

Mason, W.H. 1839. *Goodwood, its House, Park and Grounds, with […] an account of the antient encampment, tumuli, and British village, on the adjacent Downs; and a detailed record of Goodwood races from their first establishment*. Smith, Elder and Co., London.

Oswald, A., C. Dyer, M. Barber. 2001. *The Creation of Monuments. Neolithic Causewayed Enclosures in the British Isles*. English Heritage, Swindon.

Russell, M. 2003. *Piltdown Man. The Secret Life of Charles Dawson*. Tempus Publishing Ltd,Stroud.

Saull, W.D. 1845. *Notitia Britanniae; or, An enquiry concerning the localities, habits, condition, and progressive civilization of the aborigines of Britain: to which is appended a*

brief retrospect of the result of their intercourse with the Romans. John Russell Smith, London.

Smith, H. 1870. Notes on Prehistoric Burial in Sussex. *Sussex Archaeological Collections* 22, 57-76.

Smith, R.A. 1912. On the date of Grime's Graves and Cissbury flint mines. *Archaeologia* 63, 109-158.

Turner, D. 1997. Pipelines from Lavant. *The Archaeology of Chichester and District 1997. A rerview of fieldwork and research by Southern Archaeology and others in Chichester District*, 19-24. Southern Archaeology/Chichester District Council, Chichester.

Wade, A.G. 1922-3. Ancient Flint Mines at Stoke Down, Sussex. *Proceedings of the Prehistoric Society of East Anglia* 4 (1), 82-91.

Wade, A.G. 1938. *Counterspy*. Stanley Paul & Co. Ltd, London.

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ENGLISH HERITAGE

ISSN 2046-9799 (Print)
ISSN 2046-9802 (Online)