Does the archaeoastronomic record of the Cotswold-Severn region reflect evidence of a transition from lunar to solar alignment?

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Abstract

This dissertation explores evidence for the practice of astronomy in central southern England during the Mesolithic and early Neolithic. It argues that those who built the prehistoric structures known as Cotswold-Severn earthen tombs embedded archaeoastronomic intent within their monuments' architecture for both navigational and calendrical purposes. This research analyses various aspects of the archaeology found within the tombs and claims the monuments show evidence of intended alignment to specific celestial horizon events. The period under investigation is one of transition not just between eras, but possibly in the types of astronomy practised as well, thus there is also investigation into whether there was a shift from a lunar to solar allegiance at this time.

Chapter 1

Introduction

This dissertation considers the question 'Does the archaeoastronomic record of the Cotswold-Severn region reflect evidence of a transition from lunar to solar alignment?' The originating research for this study is a paper written by Lionel Sims which argues that Stonehenge is a Neolithic monument designed by those who built it to 'juxtapose, replicate and reverse' key horizon properties displayed by the sun and moon, apparently in order to invest the sun with the moon's former religious significance.[1] Sims' view is that during the Mesolithic the greater engagement was with lunar rather than solar astronomy, suggesting that during the earliest periods of prehistory communities organised themselves by 'phase-locking their economic and ritual routines to the rhythms of the Moon.'[2]

Whether that was the case or not, Sims suggests his hypothesis be tested further. When discussing the apparent shift in astronomic allegiance between luminaries he writes that it recommends us to reinvestigate evidence from the Mesolithic and early Neolithic 'for earlier versions of the same complex.'[3] Given Sims' recommendation that prehistoric people's attachment to 'the rhythms of the Moon' be more fully explored, the aim of this study is to take his theory and investigate it in the field. The research undertaken in this dissertation focuses on both the architecture and landscape settings of Neolithic structures in the same region as Stonehenge. Specifically, this research will explore whether it is possible to identify a continuity or discontinuity of astronomic allegiance to and between luminaries. The pre-historic structures under investigation are Cotswold-Severn earthen tombs which Timothy Darvill defines as:-

> a widespread and fairly distinct class of monument comprising a long rectangular or trapezoidal mound that usually, but not always, contains human burials deposited within carefully constructed chambers set within the mound.[4]

Glyn Daniel points out that many different words are used throughout Britain for these mounds. Depending on their locality they are referred to as lows, tumps, howes

[1] Lionel Sims, 'The 'Solarization' of the Moon: Manipulated Knowledge at Stonehenge', *Cambridge Archaeological Journal* 16, no. 2 (2006). [hereafter: Sims. Solarization]. p. 1.
[2] Sims, '*Solarization*'. p. 3
[3] ———, '*Solarization*'. p. 14
[4] Timothy Darvill, *Long Barrows of the Cotswolds and Surrounding Areas* (Brimscombe, Gloucestershire 2004). [hereafter. Darvill: Cotswolds]. p. 14

and cairns, though in southern England, he writes, 'English archaeologists generally use the words *tumulus, barrow, cairn* or *mound*.'[5] These structures have subtle variations in design, but the reason I chose the Cotswold-Severn earthen barrows in particular is because they are literally long and as Darvill points out, 'since one essential feature of a long barrow is its linear form, each will naturally have an orientation.'[6] Where there is an orientation, there may be a deliberate alignment to a celestial event on the horizon and it is this particular structural feature of the Cotswold-Severns which allows for investigation of astronomic intent. The barrows surveyed in this study were built around 4230-3655 cal BC and they were a radically new form of architecture which heralded the emergence of the Neolithic onto the Cotswold landscape. As Richard Bradley points out, these were monuments which:-

> occupied prominent positions in the terrain and seem to have been addressed to a substantial audience. In that respect the monuments of the Neolithic period had no equivalent during earlier phases.[7]

Indeed, in his discussion on the cultural shift which occurred at this time, Sims suggests the formerly predominant Mesolithic foraging lifestyle now gave way to what he calls Neolithic pastoralism.[8] Sims himself suggests no dates for this transition, but he says it was a period of substantial social upheaval and claims this is when 'division and estrangement' grew.[9] This, Sims felt, lead to changes in lifestyles and beliefs, which cultural upheaval undermined the 'viability of ancient conceptions of ritual time and practice.'[10] With regards to the marking of time and to Stonehenge in particular Sims claims the monument was designed to 'modify and transcend' previous lunar engagement by introducing a greater emphasis on solar symbolism.[11] (See Appendix 1 for further discussion of Sims' thesis). Sims' speculative idea characterises Stonehenge as a binary monument, structurally designed to facilitate a symbolic transposition of qualities between the sun and moon.

Sims suggestion that lunar astronomy predominated in prehistory is based on Chris Knight's theory that human kinship systems first formed when women and their close

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[5] Glyn E Daniel, *The Prehistoric Chambered Tombs of England and Wales* (Cambridge University Press, 1950). [hereafter: Daniel: Prehistoric Tombs]. p. 6.
[6] Darvill, *Cotswolds* p. 97.
[7] Richard Bradley, '*Domestication, Sedentism, Property and Time: Materiality and the Beginnings of Agriculture in Northern Europe*', in *Rethinking Materiality the Engagement of the Mind with the Material World*, ed. Chris gosden & Colin Renfrew Elizabeth DeMarrais (Cambridge: McDonald Institute of Archaeological Research, 2004).[hereafter: Bradley. Rethinking Materiality]. p. 110.
[8] Sims, '*Solarization*'. p. 2.
[9] ———, '*Solarization*'. p. 2.
[10] ———, '*Solarization*'. p. 3.
[11] ———, '*Solarization*'. p. 3.

male relatives created 'coalitionary alliances.'[12] Knight suggested women in prehistoric times collectively controlled reproductivity by phase-locking their fertility to 'the only clock of appropriate periodicity' and that was the moon.[13] Knight openly links this co-operative impulse to twentieth century Communism, admitting 'because I am motivated politically - I am constructing a myth.'[14] Chris Wingfield allows that mythic narratives can emerge by 'fusing past and present'.[15] However, Wingfield also cautions that though such a narrative can be shaped to 'fit a desired end' it may be at the cost of selective use of historical data.[16] It is not the purpose of this research to enter this debate. The Moon's symbolism is highly variable across cultures, M. G. Guenther pointing to the 'considerable diversity and divergence of views on this enigmatic stellar body'.[17] With than in mind, Knight's complex theory is set aside. Of salient value to this study is the judgement that lunar astronomy appeared central to social process. Sims' idea that Stonehenge was then constructed to deliberately manipulate a transition to solar astronomy paves the way to a further question, which asks if other monuments were designed to function in similar manner. My research does not assume that the architectural complexity which inheres within Stonehenge's monumental structure is replicated in the more simple Cotswold-Severns, but it will search for evidence of a transition from lunar to solar alignment betweenst and amongst them.

As mentioned, Sims does not date the Mesolithic to Neolithic transition. He does however date Stonehenge precisely, in terms of the period during which he feels the 'complex logic' of solarisation occurred.[18] Sims notes the different building phases of Stonehenge, but points out that the main axial alignment he is referring to remained unchanged throughout these phases. The variation of Stonehenge he is referring to is the one illustrated by John North (Fig. 1), which has been nominated by Rosamund Cleal as Stonehenge Phase 3ii.[19] Cleal notes Phase 3ii 'was early second millennium

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[12] Chris Knight, 'The Wives of the Sun and Moon', *The Journal of the Royal Anthropological Institute* 3, no. 1 (1997). [hereafter: Knight. Wives]. p. 134.
[13] Knight, '*Wives*'. p. 135.
[14] Chris Knight, *Blood Relations: Menstruation and the Origins of Culture* (New Haven and London: Yale University Press, 1991). [hereafter: Knight. Blood Relations]. p. 5.
[15] Chris Wingfield, 'Historical Time Versus Imagination of Antiquity', in *The Qualities of Time Anthropological Approaches*, ed. Wendy James and David Mills (Oxford: Berg, 2005). [hereafter: Wingfield. Historical Time]. p 121.
[16] Wingfield, '*Historical Time*'. p. 121.
[17] M.G. Guenther, *Tricksters and Trancers: Bushhman Religion and Society* (Bloomington and Indianapolis: Indiana University Press, 1999). [hereafter: Guenther. Bushman Religion]. p. 65.
[18] Sims, '*Solarization*'. p. 3.
[19] ———, '*Solarization*'. p. 11.

BC' with an 'average calibrated date of 2413 BC'[20] It is against this date that all findings taken from the barrows will be compared.

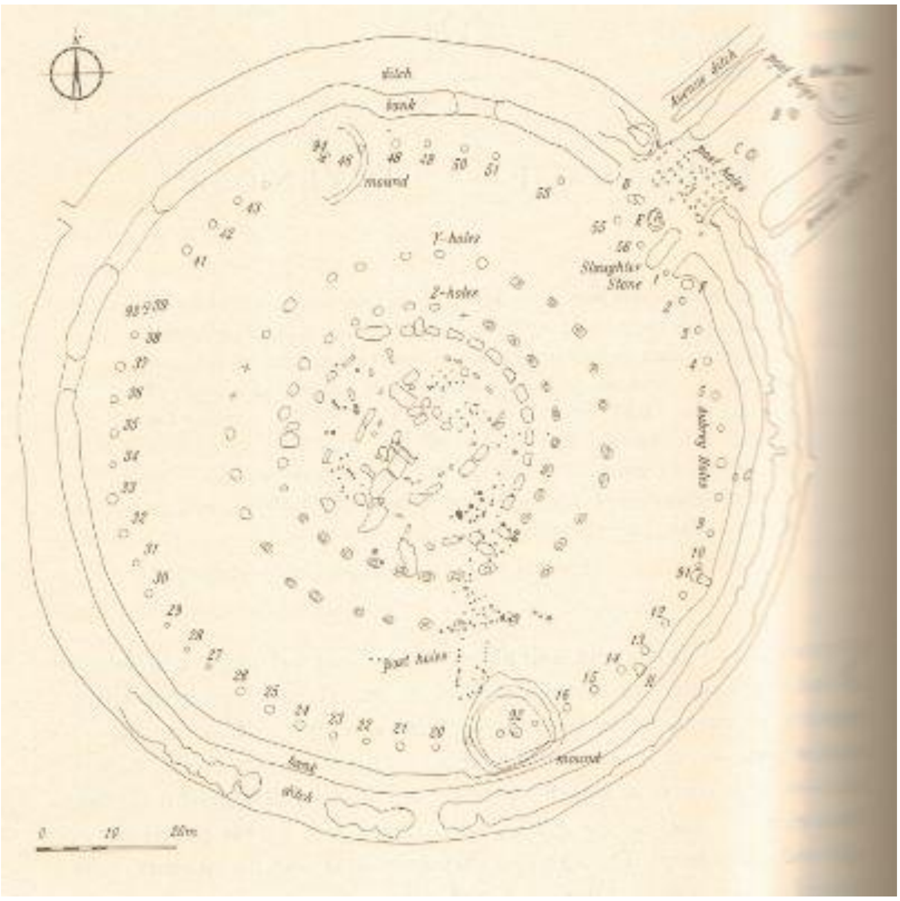

Fig. 1. North's plan of Stonehenge.[21]

In terms of the extent of archaeological record available to this research, which begins its enquiry during the Mesolithic, Cleal describes the Stonehenge landscape as being used from the early post-glacial period to the late Neolithic, 'covering nearly five millennia' altogether.[22] Based on Cleal's analysis, that would appear to imply there may be a number of ancient sites to explore in this locale. However, she also points out that land use and landscape evidence for the earlier Neolithic in southern England 'is pitifully sparse' and she warns that little is known about this environment except by inference and assumption.[23] Cleal concludes that detailed evidence of the earlier Neolithic within the landscape immediately around Stonehenge must be 'largely

[20] Rosamund M J Cleal, *Stonhenge in Its Landscape* (London: English Heritage, 1995). [hereafter: Cleal. Stonehenge / Landscape]. p. 231.
[21] John North, *Stonehenge Neolithic Man and Cosmos* (London: Harper Collins, 1997). p. 410
[22] Cleal, *Stonehenge / Landscape*. p. 231.
[23] ———, *Stonehenge / Landscape*. p. 41.

inferred from evidence elsewhere.'[24] Hence, it is the purpose of this research to explore some small aspect that evidence elsewhere, such as it exists.

To that end four Cotswold-Severn earthen barrows and their excavation reports were chosen for this research, forming three case studies, as follows (Fig. 2):-

1. Burn Ground, excavated by W.F.Grimes.[25]
2. Ascott-under-Wychwood, excavated by Alasdair Whittle and Don Benson.[26]
3. Hazleton North and South, excavated by Alan Saville. [27]

Fig. 2. Google Aerial view of the barrows in relation to Stonehenge. 15th March 2013.

[24] ———, *Stonehenge / Landscape*. p. 56.
[25] W. F Grimes, 'Excavations on Defence Sites, 1939-1945 1: Mainly Neolithic - Bronze Age', in *Burn Ground, Hampnett, Gloucestershire* (London: Her Majesty's Stationery Office, 1960). [hereafter: Grimes, Excavations].
[26] Alasdair Whittle and Don Benson, 'Place and Time: Building and Remembrance', in *Building Memories the Neolithic Cotswold Long Barrow at Ascott-under-Wychwood, Oxfordshire* (Oxford: Oxbow, 2007). [hereafter: Benson. Building and Remembrance].
[27] Alan Saville, 'Hazleton North, Gloucestershire, 1979-82 the Excavation of a Neolithic Long Cairn of the Cotswold Severn Group', in *Archaeological Report no 13*, ed. Elizabeth Hall and John Hoyle (English Heritage, 1990). [hereafter: Saville. Hazleton North].

Fig. 3. The four barrows, built at the same latitude, just over thirteen and a half miles apart. 15th March 2013.

The Local Landscape

The land between the three sites is made up of gently undulating, low lying hills which could be easily walked within a single day. These sites are situated in the north Cotswolds which is an area designated as being one of outstanding natural beauty.[28] There are no topographical features between the sites which would obstruct easy passage by foot; as I found when visiting the sites, the landscape invites one to travel through it.

[28] Cotswold Tourist Information, 'Area of Outstanding Natural Beauty', (2013).

Fig. 4. View of the gently rolling valleys from Ascott-under-Wychwood, looking southwards. 15th October 2012. All photographs are my own unless otherwise stated.

Fig. 5. The entirely flat landscape at Burn Ground Field. Taken from the east. 7th May 2013.

Fig. 6. Looking across Barrow Ground Field from the south-west, towards where Hazleton North barrow was built. The gentle downward slope and then subsequent rise of the land towards the distant green field to the right is typical of the slow rolling hills characteristic of the Cotswold landscape. 20th September 2012.

These barrows have been specifically chosen for this survey because I noted Don Benson's assessment of the Ascott-under-Wychwood excavation report, which he judged had produced 'a rich and important set of results.'[29] Benson further states that Ascott-under-Wychwood joins both Burn Ground and Hazleton North as 'only three Cotswold long barrows or cairns have been more or less fully excavated.'[30] He also points out that though there have been detailed archaeological investigations elsewhere they have been of a more limited nature, describing the quality of the excavations at these three sites as being 'absolutely rare in the context of research on the Early Neolithic of southern Britain.'[31] Alasdair Whittle confirms Benson's position, adding that though the list is small these are barrows which have been, particularly in terms of

[29] Benson, '*Building and Remembrance*'. [hereafter: Benson, Building and Remembrance], p.327.
[30] ———, '*Building and Remembrance*'. p. 327.
[31] ———, '*Building and Remembrance*'. p.327.

their dating, 'robustly investigated.'[32] Thus, it is the extent and competence of the written excavation reports as well as the comprehensive dating process attached to these barrows, which led me to qualitatively focus on these three sites.

Structure of this dissertation

In terms of the way this dissertation will be organised, a site by site case study approach has been taken. The findings unfold diachronically. Should there prove to be an alteration in astronomic allegiance across the period explored, it may possibly, as Sims argues, reflect the social 'division and estrangement' which he claims was evident during the Meso to Neolithic transition.[33] As Clive Ruggles points out:-

> discontinuities of ritual tradition, as manifested by clear changes in the patterns of astronomical symbolism incorporated in public monuments, may indicate significant social upheaval.[34]

Alasdair Whittle describes the Mesolithic/Neolithic transition as a period which saw the emergence of a new sense of 'seasonal time, fixity of place, a celebration of the local, and an abstract collectivized sense of an ancestral past' all of which combined may well have engendered a significant cultural shift, including in astronomy.[35] Michael Parker Pearson notes that Stonehenge was built 'at the end of the Stone Age.'[36] It is possible that the astronomic purpose embedded within this unique monument contributed to the ushering in of a new era.

In overview, it is the purpose of this research to explore whether the apparent archaeoastronomic intent which may have been in evidence at Stonehenge can also be found to exist within other monuments built elsewhere in the same region.

The next section discusses my methodology, after which each barrow will be explored.

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[32] Alasdair Whittle, 'The Temporality of Transformation: Dating the Early Development of the Southern British Neolithic', in *Going Over*, ed. Alasdair Whittle & Vicki Cummings (Oxford: Oxford University Press, 2007).
[33] Sims, '*Solarization*'. p. 2.
[34] Clive Ruggles, *Astronomy in Prehistoric Britain and Ireland* (New Haven and London: Yale University Press, 1999). [hereafter: Ruggles: Prehistoric Astronomy]. p. 152.
[35] Alasdair Whittle, *Europe in the Neolithic: The Creation of New Worlds.* (Cambridge: Cambridge University Press, 1996). [hereafter: Whittle. Europe in the Neolithic]. p. 261.
[36] Mike Parker-Pearson, *Stonehenge Exploring the Greatest Stone Age Mystery* (London: Simon & Schuster, 2012). [hereafter: Parker Pearson. Stonehenge]. p. 15.

Methodology

This dissertation will employ a hybrid methodology, which combines field work surveys as well as an analysis of the three archaeological reports mentioned above, along with maps, diagrams and archive photographs germane to the barrows in question. Field work calculations, phenomenological notes and a discussion of the horizon issues local to each site will be used. A case study approach will be used, each barrow being investigated individually. A literature review relating to each monument will be contained within each case study. This study is concerned with searching for evidence of archaeoastronomic intent within these monuments, most particularly in the form of an allegiance to lunar or solar astronomy. Should it be established that astronomies applied, there will then be further exploration to establish whether those astronomies changed over time.

There were two fundamental questions to consider when planning this research. The first was whether to take a quantitative or a qualitative research approach. The second had to do with the quality and condition of the material record under investigation. The barrows featured in this study, Burn Ground, Ascott-under-Wychwood and The Hazletons North and South, no longer physically exist. They were fully excavated and in that process completely dismantled. They were not reconstructed. This total absence of physical record has led to a re-consideration of what, in relation to this study, constitutes primary or secondary sources. Given Benson's stamp of approval which he attached to the three archaeological reports mentioned above, I have made those documents my primary source material. [37] These written reports are the only surviving record detailing the interior architecture of each of the three barrows. They thus provide a unique resource.

Methodology: Quantitative / Qualitative research process

It is estimated there are currently approximately 500 barrows across Britain.[38] Two hundred of those are counted within the Cotswold-Severn region itself, so a quantitative survey was certainly possible.[39] Indeed quantitative research has in the past proved useful. Accumulated data has for instance allowed Aubrey Burl to write in the late twentieth century that many tombs throughout Europe looked eastwards ‘whereas,’ he

[37] Benson, '*Building and Remembrance*'. p.327.
[38] Darvill, *Cotswolds* [hereafter: Darvill, Cotswolds.] p.71.
[39] ———, *Cotswolds* p. 83.

points out, 'the long cairns in the Cotswolds had entrances lying between north-east and south-east…….Common sense suggests that these restricted arcs resulted from the tomb-builders aligning their entrances on some astronomical event.'[40] Burl's assessment is informative, based as it is on a collection of barrows, mounds and monuments across Europe. But a quantitative estimation, encyclopaedic as it is, does not allow for singular focus on particular barrow. It gives no opportunity for exploration of pertinent detail specific to individual barrows.

Martin Trow's view that 'the problem under investigation properly dictates the methods of investigation,' applies in this instance.[41] The issue under investigation in this survey is whether it is possible to track a diachronic shift in astronomic allegiance across the Meso to Neolithic material record. As mentioned, one of the problems of this investigation is the nature of this material record. Barrows are closed structures. It is not possible to fully understand the logic of their design until they have been entirely dismantled and there are simply not enough dependable, archaeological reports on the interior architecture of the Cotswold-Severn barrows to supply the volume necessary to generate a meaningful quantitative statistical analysis. Thus this research draws on a qualitative methodology. Each barrow will generate its own qualitative case study and literature review. When describing the nature of this kind of investigation, Robert E. Stake writes:-

> Case study researchers use the method of specimens as their primary method to come to know extensively and intensively about the single case.[42]

The qualitative differs from the quantitative, claims Stake, because the second 'seeks out a relationship between a small number of variables.'[43] This is a reductive process. However, the complexity of design found with the Cotswold-Severns makes it difficult to reduce their myriad features to a manageably small set of easily measured markers and significators. Each Cotswold-Severn barrow is highly individual. Though there may be broad commonalities, no one design is commensurate with another. As Timothy Darvill explains, where design is concerned, there is a 'very considerable

[40] Aubrey Burl, *Prehistoric Astronomy* (Princes Risborough, Buckinghamshire: Shire Publications Ltd, 1983). [hereafter: Burl, Prehistoric] p. 27.
[41] Martin Trow, '*Comment On "Participant Observation and Interviewing: A Comparison"*', *Society of Applied Anthropology* 16, no. 3 (1957). p. 33.
[42] Robert E Stake, *The Nature of Qualitative Research* (London: Routledge, 1995). [hereafter: Stake. Qualitative Research]. p. 36.
[43] Stake, *Qualitative Research*. p. 41.

heterogeneity' amongst these monuments.[44] In the case of the barrows, a reductive approach militates against the emergence of significant detail and useful idiosyncracy.

Even when it may be possible to extrapolate and quantify a single denominator, such as possible orientation to celestial event, Ruggles' argues it is an error to claim that:-

> the mere existence of solar and lunar alignments at hundreds of British megalithic sites constitutes indisputable evidence that they were deliberately constructed with these alignments in mind.[45]

In this instance, Ruggles is calling for greater rigour to be applied to the quantitative process. But he was also pointing out that the simple existence of a large number of sites showing apparent alignment, does not in and of itself prove archaeoastronomic intent. Ruggles describes the quantitative approach as one where 'new, independent sets of data.....can be repeatedly acquired.'[46] But he also states there are times when this kind of 'classical statistical inference is inappropriate.'.[47] Concurring, I considered that Sims' thesis, which posits change, shift and alteration, was best explored using Stake's case study approach.[48] As my intention is to in a sense interrogate each barrow, given their variability, a flexible and open ended enquiry removes preconceived assumption. I am searching for evidence of transition so I am positively, as Stake puts it, 'seeking patterns of unanticipated as well as expected relationships.'[49] The value of the case study approach is that, as Stake implies, it embraces that which is 'seen as unique as well as common.'[50] Indeed, he claims that such a study may bring to light 'a critical uniqueness.'[51] It is my hope that by using a case study approach where each barrow is considered in its own right, the subtle revelation, the unanticipated or the unprecedented may have opportunity to emerge.

Though the barrows which I am exploring no longer exist, their sites do, so fieldwork is a significant feature of this study. Indeed all three of my case studies are fundamentally predicated on fieldwork measurements and calculations. Though Ruggles writes of the value of desk bound, map based research he warns that 'in addition, even map or GIS-based conclusions may need verification by "ground

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44 Darvill, *Cotswolds* p. 44.
45 David Turton and Clive Ruggles, 'Agreeing to Disagree: The Measurement of Duration in a Southwestern Ethiopian Community [and Comments and Reply]', *Current Anthropology* 19, no. 3 (1978).[hereafter: Ruggles. Agreeing to Disagree]. p. 599.
46 Ruggles, *Prehistoric Astronomy*. p. 161.
47 ———, *Prehistoric Astronomy*. p. 161.
48 Sims, '*Solarization*'.
49 Stake, *Qualitative Research*. p. 41.
50 ———, *Qualitative Research*. p. 44.
51 ———, *Qualitative Research*. p. 44.

truthing." '[52] 'It may be necessary,' Ruggles writes, 'actually to visit the place.'[53] It can thus be argued that a sensitivity to and engagement with the landscape should occur and this may take multiple visits to the same site, which speaks of a qualitative rather than quantitative experience. Ruggles' suggestions are a plea for a grounded, emic form of commitment on the part of the researcher.

When considering an engagement with the landscape, Christopher Tilley also values an in-depth phenomenological approach. He points out that landscape is 'perspectivally linked to the existential.'[54] This creates of it a space within which human agency operates and, continues Tilley, provides:-

> a cultural code for living, an anonymous 'text' to be read and interpreted, a writing pad for inscription, a scape of and for human praxis, a mode of dwelling and a mode of experiencing.and is always sedimented with human signficances.[55]

Clearly, in terms of this study, that exploration is circumscribed by distance of time, however as Tilley argues, 'Features of the natural landscape may be held to have provided a symbolic resource of the utmost significance to prehistoric populations.'[56] Thus my three case studies are grounded in the natural landscape, which is interpreted much like a text, as the 'sediment' of human significance is explored. [57] I consider a number of natural features, but my greatest focus is on the horizon local to each barrow, across which celestial events occur. These horizons may well have been deliberately chosen. Prehistoric people may have intentionally sited their monuments in order to create a connection between their radical new architecture and the sky. As Tilley writes, 'Architectural space only makes sense in relation to pragmatic, perceptual and existential space...Architecture is the deliberate creation of space made tangible, visible and sensible.'[58] Given the issues to do with primary sources as well as the nature of the fundamental question being asked, a qualitative methodology, based on individual case studies has been adopted for this project.

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[52] Ruggles, *Prehistoric Astronomy*. p. 165.
[53] ———, *Prehistoric Astronomy*. p. 117.
[54] Christopher Tilley, *A Phenomenology of Landscape* (Oxford: Berg, 1994). [hereafter: Tilley. Landscape]. p 10.
[55] Tilley, *Landscape*. p. 10.
[56] ———, *Landscape*. p. 24.
[57] ———, *Landscape*. p. 10.
[58] ———, *Landscape*. p. 17.

Methodology: Quality of Archaeological Record

Turning to the quality of the archaeological record available to this research, barrows have been documented for the last few hundred years. The antiquarians John Aubrey[59] (1626-97) and William Stukeley[60] (1687-1765) were amongst the first to write about these ancient monuments, since when a body of work has developed which describes these structures in all their variety and speculates as to their social function.

However, the fact that many early barrow diggers were primarily interested in the relics, treasures and curios to be found within these mounds meant that few accurate measurements of any kind were taken by those who preceded the antiquarians mentioned above. Barry M. Marsden writes that he tries not to judge the early diggers who failed to draw accurate contour maps or to note three dimensional measurements, because as pioneers they worked 'according to their own imperfect lights.'[61] But even where there has been bona fide scientific interest, Stuart Piggott notes that in many instances excavations of chambered tombs have been carried out 'with low critical standards.'[62] The consequences are that many barrows have been destroyed without record and detailed archaeological information is scant. A substantial amount of research for this paper has been to do with sifting through the literature in order to find dependable data, both in terms of the manner in which barrows were constructed and the way in which finds within them were catalogued.

Methodology: Dating

Mindful that Sims' originating research recommends there be an exploration of the Mesolithic on the landscape surrounding Stonehenge, and whilst a comparison between barrows and henge will take place, I felt there was also value in exploring whether structural uniformity existed between the barrows themselves. To that end I have paid great attention not only to the way the barrows were built, but also to their dates. The dating of a barrow gives an additional comparative element. If a date can be established and if the barrow in question shows possible evidence of astronomic intent then a time

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[59] John Aubrey, *John Aubrey's Monumenta Britannica (1626-97)*, ed. John Fowles Annotations by Rodney Legg, Part Two (Dorset Publishing Company, 1982).
[60] William Stukeley, *Paleographia Britannica: Or Discourses on Antiquities in Britain*, vol. 1 (London: R. Manby on Ludgate-Hill over against the Old Bailey, 1742).
[61] Barry M Marsden, *The Early Barrow Diggers* (Stroud: Tempus Publishing, 1974). [hereafter: Marsden, Barrow Diggers]. p. 7.
[62] Stuart Piggott, *The West Kennett Long Barrow Excavations 1955-56*, Ministry of Works Achaeological Reports No. 4 (London: Her Majesty's Stationary Office, 1962). [hereafter: Piggott, West Kennet], p 66.

frame for that possibly deliberate alignment is established. Should a comparison between barrows then show a shift in allegiance between the luminaries, this may reveal the period of time during which that transition was enshrined within the material record.

The manner of listing a date in this document is to use the style of dating given by each respective author. The way an author writes a date places them within a time frame, which is useful in identifying shifts between current schools of thought, as well as giving the actual dating of the artefact or historic time frame itself. BC is still standard terminology for some. Sometimes dates are given as 'years B.P.', meaning 'before present' which is considered to be 1950. BCE (Before Common Era) is latterly and more often substituted for BC.

Methodology: Primary and Secondary Sources

Taking into account the two basic issues mentioned above, that is the decision to use a qualitative case study approach, plus the at times poor quality of the data in relation to the barrows within both the written and material record, two types of primary source have been used in this research; fieldwork and archaeological report.

My fieldwork considers the horizons local to the barrows themselves, plus an assessment of the landscape they inhabited, as well as my phenomenological response to the three sites.

In terms of the importance of the horizon, A.T. Atkinson suggests the introduction of agriculture had a direct bearing on early astronomy as annual calendars became important to farmers and he contends 'it is the horizon that provides the essential frame of reference – and, moreover, a distant horizon,' which he also notes would remain invariant under small local displacements of the observer.[63] As Burl noted, we may never fully know what pre-historic people thought about the sun or moon but:-

> we do know what they saw, because the movements of these bodies have scarcely changed in the past five thousand years.[64]

Atkinson's description of an invariant topography, combined with Burl's reminder that celestial events remain more or less immutable through time allows for the taking of measurements against local horizons, which is what I do at each of my sites. As stated, I have settled on a hybrid of fieldwork and archaeological report, because my research's primary source, the barrows themselves, no longer exist. Essentially, I argue that the

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[63] R J C Atkinson, 'Neolithic Science and Technology', *Philosophical Transaction of the Royal Society of London. Series A, Mathematical and Physical Sciences* 276, no. 1257 (1974). [hereafter: Atkinson, Neolithic Science], p. 126.
[64] Burl, *Prehistoric*. p. 12.

three archaeological reports referred to earlier thus no longer function as secondary sources, but become primary ones.

The tools used for field work included a Garmin GPS 12 XL position finder, as well as a Suunto compass and a Suunto clinometer used to measure horizon altitude. Magnetic anomalies were checked for at the location of all three excavations. Using historic photographs and archaeological diagrams to infer the barrow's location as best as possible, two poles were inserted into the ground along the most probable orientation for each barrow. A compass was used to check the azimuth in each direction. No magnetic anomalies were noted. Recalculation for Magnetic North was done by accessing the National Geophysical Data Centre’s website.[65] As this research uses secondary sources to impute primary source measurements all calculations may benefit from some few degrees of latitude. Also, I have noted Bradley E Schaefer's warning about the 'uncertainty' which attends any judgement of a particular locale's extinction angle, that is, the lowest angle on the horizon at which a star is visible; all final measurements may be assumed to be close to, rather than precisely exact.[66] Two astronomy programmes have been used. The first is Stellarium.[67] The second is Starlight, whose star catalogue I accessed.[68] Starlight's catalogue is compiled from the Yale Bright Star Catalogue and Ptolemy's Almagest. The full astronomic data relating to each star is in Appendix 2. I have restricted stars chosen to those of a visual magnitude of 3 or less. An error margin of up to 2° has been used throughout. All horizons east, west, north and south were assessed for celestial event.

In summary, a qualitative, hybrid methodology which includes both fieldwork and an analysis of the excavation reports has been employed in order to manage the specific particularities of this research project. Three elements are investigated:

1. The architectural details of the structure of each barrow are explored, as well as the orientations they make to their local horizons.
2. An attempt has been made to date each barrow.
3. Dependent on the architectural information revealed in the excavators' reports, there is discussion of possible astronomic intent.

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[65] National Geographic Data Centre, 'Www.Ngdc.Noaa.Gov/Geomagmodels', (15th March 2013).
[66] Bradley E Schaefer, 'Atmospheric Extinction Effects on Stellar Alignments', *Archaeoastronomy* 10, no. xvii (1986). p. 41.
[67] Stellarium 0.12.0.
[68] *Starlight*, www.Zyntara.com.

It is hoped that these three disparate lines of enquiry will, when woven together, combine to form a suite of characteristics that may begin to address the issue as to whether there was a transition from lunar to solar astronomy in the Cotswold region during the early Neolithic. The three case studies are assessed individually and then in diachronic relationship to each other. Of particular interest to my research is whether there is uniformity between the monuments, both in the manner of their construction and also in terms of the dates when they were built. Conversely, of similar interest is whether they had features idiosyncratic and unique, each unto their own. As will be seen the findings which emerge suggest further comparison with the Stonehenge landscape itself may prove fruitful. All the fieldwork measurements for this research can be accessed in chart form in Appendix 2, and key features are available as a Timeline Chart in Appendix 3.

Chapter 2

The Case Studies

As discussed in the methodology section, a case study approach is taken to each of the sites. This chapter looks at the three archaeological reports which detailed the excavations of Burn Ground, Ascott-under-Wychwood and The Hazletons, North and South. The architecture of each barrow is analysed and assessed for archaeoastromic intent and the phenomenology of each site is discussed. Subsequent to that I will use my fieldwork calculations to explore whether any part of the construction process appeared to reveal an intended relationship to celestial horizon event. Each case study will end with a summary of possible continuities or discontinuities in the astronomy practiced at each site.

Case Study One

Burn Ground

Latitude: 51°N 50’ 32”
Longitude: 1° W 50’ 54”

Turning first to the literature on Burn Ground, Andrew Fleming suggests it is a site where 'some geometry must have developed.'[69] He writes that the evidence for this mathematical ability can be seen in the layout and dimensions of the monument, which 'could not have been reached without prior measurement.'[70] Fleming describes the complex inner walling system as one which would have required careful planning. Focusing on the internal walls in particular, Georg Eogan suggests they are 'splendid evidence' of an ability to construct independent features which when combined, create right angles.[71] Looking at its broader cultural context, Burn Ground is also cited as a monument which contains a confluence of architectural heritage, John Corcoran

[69] Andrew Fleming, 'Vision and Design: Approaches to Ceremonial Monument Typology', *Man* New Series, Vol 7, no. 1 (1972). [hereafter: Fleming. Monument Typology]. p. 71.
[70] Fleming, '*Monument Typology*'. p. 71.
[71] George Eogan, 'A Neolithic Habitation-Site and Megalithic Tomb in Townleyhall Townland, Co. Louth', *The Journal of the Royal Society of Antiquaries of Ireland* 93, no. 1 (1963). [hereafter: Eogan. Neolithic Habitation Site]. p. 74.

pointing out that it 'appears to have been influenced by more than one megalithic tradition.'[72]

All of these points have been made by W.F. Grimes in his archaeological report on the site.[73] This, my first case study, uses that report as a primary source in order to explore the possibility that these geometric features provide evidence of archaeoastronomic intent.

Burn Ground: The Archaeology of the Site

Burn Ground was a long barrow named after the field in which it lies. It is north-east of the village of Hampnett in Gloucestershire (Fig. 7).

The barrow was excavated between October 1940 and March 1941.[74] Darvill describes this particular archaeological dig as amongst ‘the most extraordinary excavations undertaken in Britain to that time.’[75] He claimed that more information was revealed during this dig ‘than had built up over the previous century.’[76] In terms of the archaeological data gleaned from this site, Brickley and Smith also note that the results of the excavation ‘were published to a high standard.’[77]

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[72] J. X. W. P Corcoran, 'The Cotswold-Severn Group, Distribution, Morphology, and Artifacts', in *Megalithic Enquiries in the West of Britain*, ed. T. G. E Powell (Liverpool University Press, 1969). [hereafter: Corcoran. Morphology and Artifacts]. p. 66.
[73] Grimes, '*Excavations*'.
[74] ———, '*Excavations*'. p. 41.
[75] Darvill, *Cotswolds* p. 31.
[76] ———, *Cotswolds* p. 31.
[77] Martin Smith and Megan Brickley, 'The Date and Sequence of Use of Neolithic Funerary Monuments: New Ams Dating Evidence from the Cotswold-Severn Region', *The Oxford Journal of Archaeology* 25, no. 4 (2006). [hereafter: Brickley and Smith, Date and Sequence of Use] p. 337.

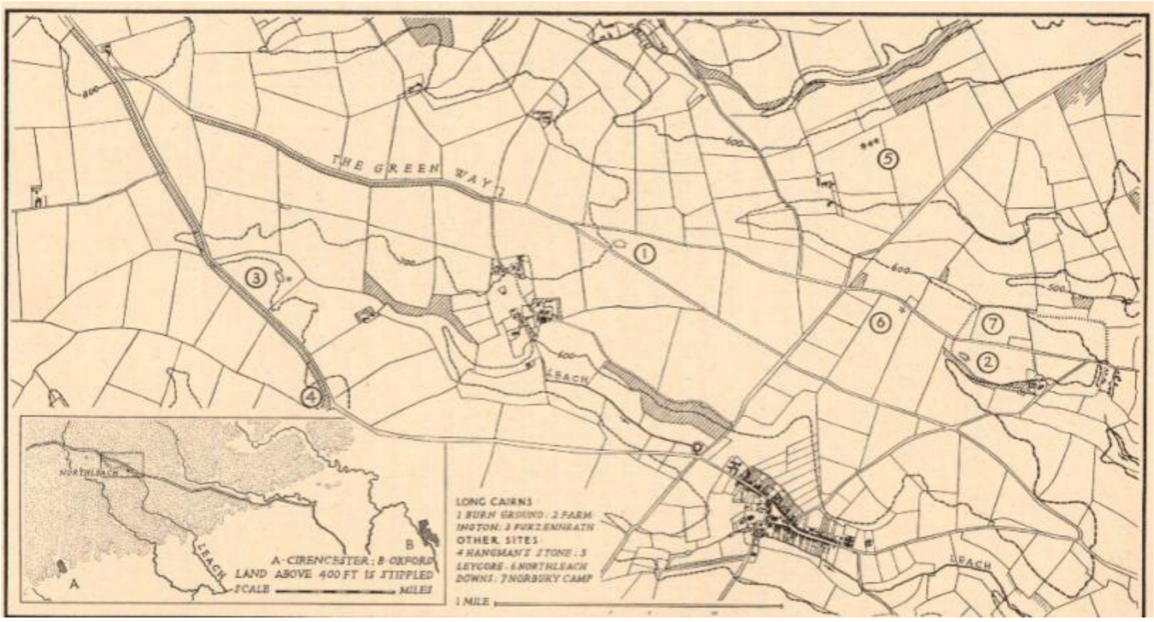

Fig. 7. Map of the Burn Ground site and its neighbouring antiquities. Burn Ground is in the centre, circled as Number 1.[78]

There are however, aspects of this monument which remain enigmatic, not least its footprint on the landscape. Archaeologist William F. Grimes reports that before the excavation, the barrow's true outline was impossible to discern not least because whenever their ploughs had been impeded by remnants of the structure, successive farmers had dug away stones ‘as they were met with.’[79] Also, where smaller stones had been exposed, weathering had over time turned many to rubble. Thus the smooth contours of this low mound ‘faded imperceptibly into the surrounding ground.’[80]

The tract of land which housed Burn Ground was a landing strip between 1939-45. Even though the barrow created a ‘slight undulation in the field’ the field was so long planes could avoid it.[81] At the time of excavation only a single large stone showed on the surface. Given this level of destruction is it unsurprising that Grimes warned, pre-excavation, that the archaeological results ‘were likely to be fragmentary.’[82]

However, even though much of the barrow had disintegrated and only a vestigial footprint remained, once its shape below the topsoil was revealed Grimes was confident enough of the barrow’s orientation to note that its ‘true axis was almost exactly east-west.’[83]

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[78] Grimes, '*Excavations*'. Fig. 16, p. 42.
[79] ———, '*Excavations*'. p. 43.
[80] ———, '*Excavations*'. p. 43.
[81] Historic Enivronment Record, 'Area 2573 ', in *Hampnett*, ed. Shire Hall, *HER Burn Ground* (GRID REF: 410420 216070). [Hereafter: "Area 2573"]
[82] Grimes, '*Excavations*'. p. 43.
[83] ———, '*Excavations*'. p. 43.

Surviving stretches of dry stone walling were found buried within the barrow, but they reached only ten inches at their highest. The volume of fallen rubble at the base of these inner walls was measured and it was calculated that when originally built they may have stood at most no more than two feet.[84] Most English barrows are typically higher than this, Witts measuring Hazleton North for instance as standing at nine feet high.[85] Grimes describes Burn Ground as belonging to 'the low type of cairn.'[86] So it is likely that this particular barrow was originally conceived of and designed as a relatively low lying structure. The photo below shows the first phase of the excavation after the top layer of earth had been removed.

Fig. 8. Burn Ground long barrow: general view from the east .[87]

The Interior Design and Orientations

The dry stone walling inside the barrow marked out two distinct orientations. A stone chamber with transepts travelled east-west along the barrow, forming a gallery which opened at its eastern end. Secondly, the entire structure was bisected in a perpendicular north-south fashion by a transverse corridor about four feet wide which extended across its full width. The north-south transverse corridor was 44 ft long and the east-west chamber, which I shall call the transeptal gallery, was 32ft long.[88]

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[84] ———, '*Excavations*'. p. 49.
[85] G. B. Witts, *Archaeological Handbook of the County of Gloucester*, Archaeological Handbook of the Country of Gloucester. Being an Explanatory Description of the Archaeological Map of Gloucestershire (Cheltenham: G. Norman, 1883). p. 80.
[86] Grimes, '*Excavations*'. p. 86.
[87] ———, '*Excavations*'. Plate X111a. p. 46.
[88] ———, '*Excavations*'. p. 49.

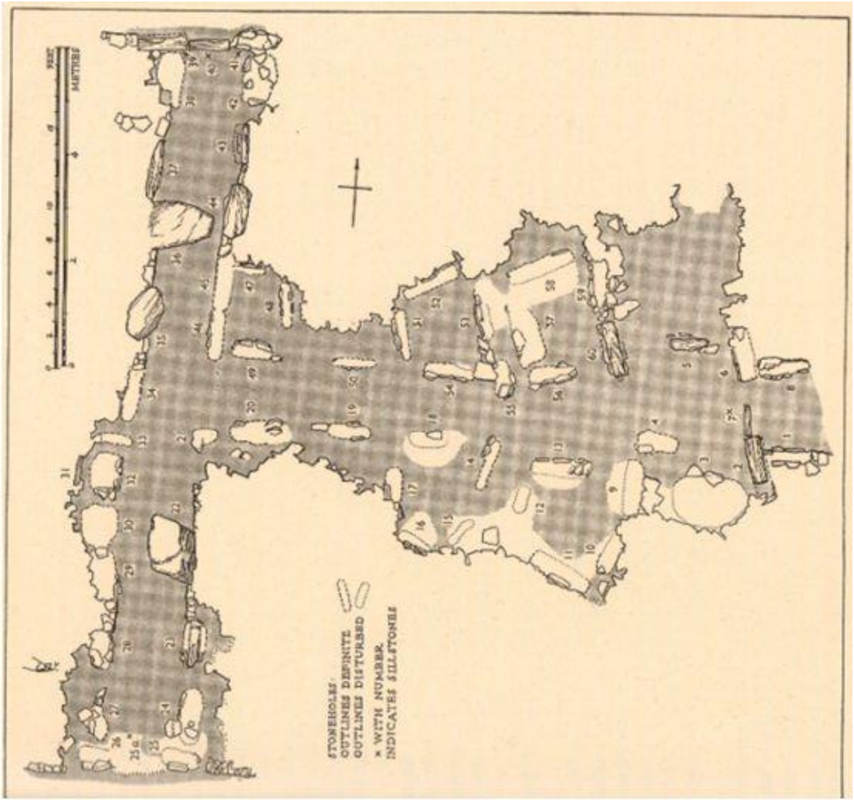

Fig. 9. Grimes diagram. Interior construction of barrow. [89]

The barrow was constructed from different types of stone used in a variety of ways. The walls of the east-west transeptal gallery and the north-south transverse corridor were formed by orthostats inserted into sockets dug in the ground. Some of these stones were large, whilst others were more slender, being described as thin slab-like stones of anything up to nine inches in width. Even smaller stones were used as wedges which firmly fixed the larger stones into their socket holes. Then different stones yet were used for the dry-stone walling packed between the large orthostats. The stones used for the walling are described as 'quite short pieces, rarely exceeding 2ft. in length.' [90]

Grimes was intrigued by one particular socket in the north-south transverse corridor which he singled out from amongst the many sockets and stones documented and catalogued. He appears to find it anomalous, writing:-

> The other feature calling for comment is the socket, 33, which must have held a small stone set up transversely in the west wall of the chamber a foot or two south of its middle point…its purpose is unexplained: if intended as a division it hardly jutted far enough into the chamber.[91]

Socket 33 is identified in the diagram below.

[89] ———, '*Excavations*'. Fig. 22, p. 51.
[90] ———, '*Excavations*'. p. 49.
[91] ———, '*Excavations*'. p. 52.

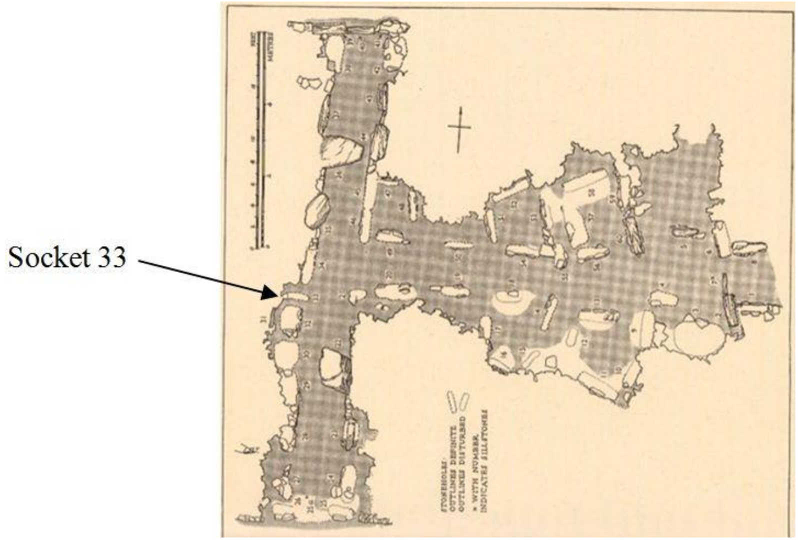

Fig. 10. Grimes' Diagram. Interior layout of stonework.
Arrow points to Socket 33. [92]

Taking Grimes' lead I decided to pursue further the possible function of this apparently anomalous socket.

Socket 33 appears half way along the left-hand side of the north-south transverse corridor, from which point the east-west transeptal gallery departs (Fig.10). The socket itself is described as:-

> 33. Narrow socket: 2 ft. by 6 ins. by 7 ins.[93]

This indicates that the lithic wedged into socket 33 would have been one of the more slender ones within the barrow. As such it would not have been used to provide substantive support for the roof above the barrow's inner chambers. It sits towards the centre of the barrow and square to the larger, elongated orthostats used to create the north-south divide. By so doing it established an east-west orientation in relation to that divide. Thus, socket 33, located close to the heart of the barrow is the point at which two lines of stone form a perpendicular relationship to each other.

Below is a photograph of the long barrow mid excavation. It shows the transverse north-south corridor as seen from the south. Midway along it, the east-west transeptal gallery travels away at a ninety degree angle. Grimes suggests that, 'It seems certain from the plan that the cross-walls were laid down before or at the same time as the main (outer) wall.'[94]

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[92] ———, '*Excavations*'. Figure 22. p. 51.
[93] ———, '*Excavations*'. p. 69.
[94] ———, '*Excavations*'. p. 66.

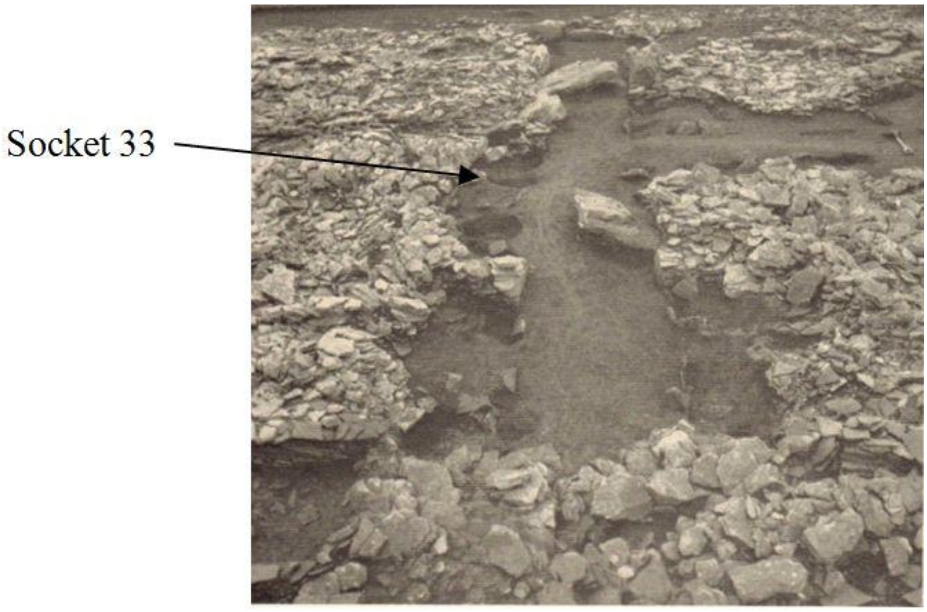

Fig. 11. North-south transverse corridor from the south.
Arrow points to Socket 33. [95]

The interior cross walls create the two orientations found within the barrow, their juxtaposed alignments forming a perpendicular. It appears these walls were built prior to or at the same time as the surrounding outer wall. This early sequencing suggests that a right angle was deliberately inscribed onto the landscape at the very inception of the barrow's design. It was fundamental to its conception. Certainly, if this barrow was built with archaeoastronomic intent, such precision and deliberation would have been the first essential in establishing an alignment.

Burn Ground: Dating and Sequence of the Long Barrow

As mentioned in chapter 1, I deemed it important to take great care in attempting to establish the various dates attached to the three sites in order that they may be compared each with the other. However, where Burn Ground is concerned, it is difficult in the first instance to date human habitation on the surrounding landscape either before, or when it was built. As mentioned, Cleal noted the poor archaeological record in this region as a whole.[96] Glyn Daniel has also written of the region's limited material record, mentioning specifically the overall 'paucity of burial chambers in England and Wales'.[97]

This dearth of archaeological resource holds true for Gloucestershire, which is where Burn Ground is located. Historic Record and Environment Officer, Keith Elliot from the Archaeology Department of Gloucestershire's Shire Hall, provided a variety of

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[95] ———, '*Excavations*'. Plate XV. a.
[96] Cleal, *Stonehenge / Landscape*. p. 41.
[97] Daniel, *Chamber Tombs*. p. 28.

spreadsheets for my research which identified everything recorded in the county dating from prehistoric times. Elliott also noted that local artefacts from the Mesolithic 'are few in overall number'.[98] He drew up a list of chambered barrows, chambered cairns, chambered graves, chambered long barrows, chambered long cairns and chambered tombs. Once this list was complete, he removed all sites that were post-Neolithic, but retained references to anything that was evidence from the pre-long barrow phase. Finally, he set up a search within 100m of all sites listed. [99] The resulting data was then schematised into three sets of listed categories (Appendix 4).

Elliot's first spreadsheet, 'Long Barrow Sites' simply catalogues relevant structures. His second list reclassifies these structures, both generally and specifically into 'Types and Dates'. His third list is entitled 'Finds'. This third list is of the greatest interest to my research because it catalogues artefacts which give evidence, not just of monument building, but of domestic activity around those monuments.

However, the brevity of the list illustrates the scarcity of the material record. For instance, nineteen types of artefact or find from out of the forty-three listed on that third, 'Finds' spreadsheet, were located at a single barrow. This happens to be Hazleton North, one of the barrows I have chosen to research. Though this speaks well of Hazelton as a case study meriting further investigation, by the time the three variables of date, site and archaeological find were cross referenced into Elliott's third, 'Finds' list, it becomes clear how limited the material record of the Meso to Neolithic transition period is.

Given this lack, the dating of Burn Ground, which is essential to the placing of it within the Cotswold-Severn sequence of barrows, can only be inferred from a small number of clues.

There are no clues under the barrow itself. Or at least, Grimes appeared to have found no record of prior habitation at the site. He does not mention the ground beneath the barrow, except to say the layer of reddish soil which underlies it was 'completely natural.'[100] This appears to indicate that no evidence of previous building works or agricultural land use were found.

Grimes also noted that the area under the central cairn within the barrow had been carefully prepared. A slightly raised floor was put in place which would have given the stone chambers some small prominence.[101] This preparation came in the form of stones

[98] Keith Elliott, email, 18.11, 6 March 2012.
[99] ———, email, 12.37, 6 March 2012.
[100] Grimes, '*Excavations*'. p. 77.
[101] ———, '*Excavations*'. p. 65.

laid ‘like a crude crazy paving’ nearly covering the barrow's entire foundation.[102] Almost all of this had turned to rubble but again, there is no mention of either a search for, or the finding of any evidence of, Mesolithic activity below it. So if there was continuity between the Mesolithic and Neolithic at this site there is no record of it.

However, there are other features which may give indication as to when Burn Ground was built.

These have to do with artefacts found in the barrow, its interior layout and radio carbon dating of bones found within it.

The Flints

Grimes writes of the very small quantity of flints discovered within the barrow numbering only four in all, ‘found scattered throughout the cairn and in the various parts of the chamber.’[103] It is possible these are of Mesolithic origin, but as their location was not recorded stratigraphically and as they certainly were not noted as being found beneath the barrow, they cannot be assumed to predate the structure. Historic Record and Environment Officer Nick Whitchell wrote of these flints:-

> I can’t find any information on the HER about the flints. From the illustrations in Grimes book, they look Neolithic to me (no. 3 looks like a typical Neolithic microlith).[104]

Thus, this implies that the flints may have been part of the material culture of those who built the barrow and if so that would appear to situate it as Neolithic.

The Quern Stone

It may be possible to date Burn Ground, or at least place it in sequence by exploring the genesis of one of its larger stones. The stone in question is a quern stone, used for cereal grinding and is characterised by Grimes as ‘outstanding.’[105] The quern was found firmly embedded in the floor of the barrow with undisturbed cairn material on either side of it, thus he writes ‘there can be no doubt that it is contemporary with the monument.’[106] Darvill calls querns exceptional finds, noting they have ‘special significance.’[107] Given their central role in food preparation, Alex Brown expands on their significance, noting ‘Cereal cultivation is one of the defining characteristics

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[102] ———, '*Excavations*'. p. 65.
[103] ———, '*Excavations*'. p. 73.
[104] Nick Whitchell, 30 November 2012 2012.
[105] Grimes, '*Excavations*'. p. 75.
[106] ———, '*Excavations*'. p. 75.
[107] Darvill, *Cotswolds* p. 119.

associated with a Neolithic lifestyle.'[108] The Burn Ground quern is described as being deeply worn in two directions indicating it was a grain grinding stone of some long usage. Certainly Grimes agrees with Brown suggesting it is finds such as this which may provide the 'first direct evidence that the economy of the Cotswold long-barrow builders was based upon a measure of agriculture.'[109] The archaeological department at Gloucestershire's Shire Hall supports this position, Witchell judging that the presence of the quern stone, embedded as it was within the foundations of the long barrow gives 'good evidence for an agricultural community, rather than a hunter gatherer one.'[110]

There is however a degree of ambiguity surrounding the function of quern stones. Willcox and Stordeur note that the presence of a quern stone does not necessarily prove that food preparation was carried out precisely where the stone was found. As well as being a domestic tool, quern stones are substantial lithics in and of themselves, so they are also useful as building material. When excavating at Jerf el Ahmar in Northern Syria, the authors unearthed about 400 querns in all and though some of those were preserved in situ in their working positions, the authors note that the majority were being reused as foundation stones. [111]

Even though Burn Ground's well worn quern stone had clearly been a domestic utensil of long use at some point, when it was unearthed its function appeared to be that of a foundation stone. This throws into question the notion that those who built Burn Ground included cereal agriculture in their food procuring and processing repertoire. To examine this question further it is necessary to explore the provenance of the stone itself.

The Burn Ground quern is made of arkosic sandstone and is of a type not sufficiently distinctive enough for its source to be definitely identifiable, but K. C. Dunham does write that the nearest possible location to Burn Ground where that type of stone might be quarried 'could be the Coal Measure sandstones of the Bristol-Somerset coalfield'[112] (Fig. 12).

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[108] Alex Brown, 'Dating the Onset of Cereal Cultivation in Britain and Ireland: The Evidence from Charred Cereal Grains', *Antiquity* 81(2007). [hereafter: Brown. Dating Cereal Cultivation]. p. 1042.
[109] Grimes, '*Excavations*'. p. 75.
[110] Whitchell.
[111] George Willcox and Danielle Stordeur, 'Large-Scale Cereal Processing before Domestication During the Tenth Millennium Cal Bc in Northern Syria', *Antiquity* 86(2012). p. 101.
[112] Professor K.C. Dunham. Petrologist. In Grimes, '*Excavations*'. p. 75.

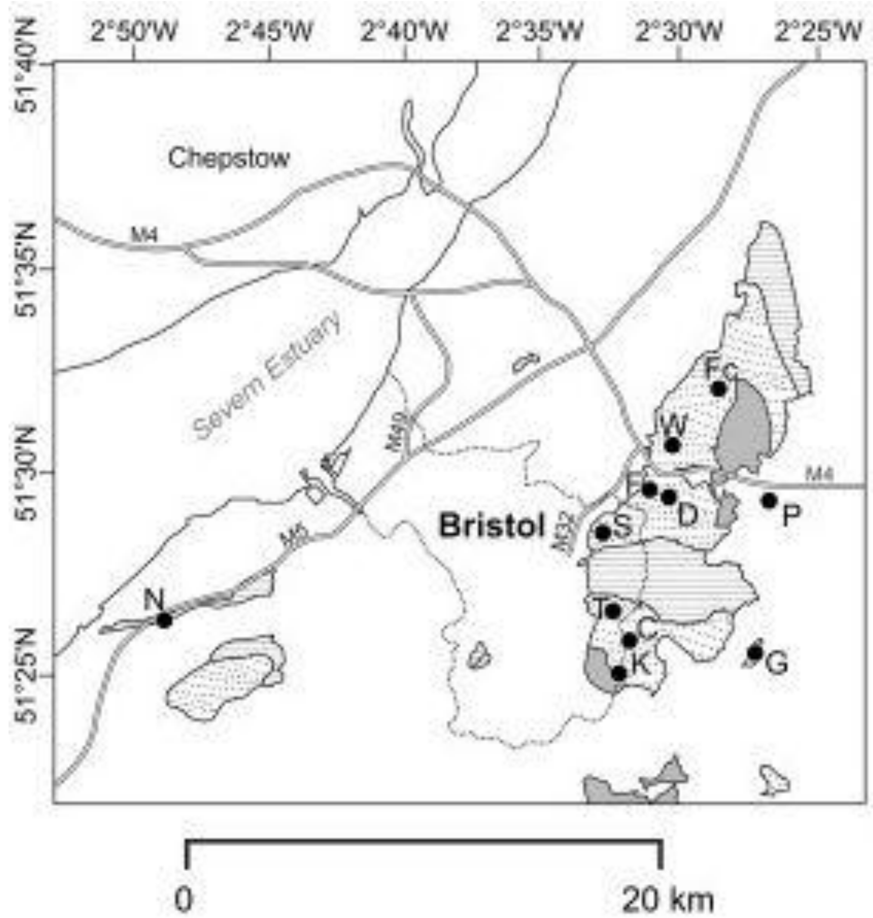

Fig. 12. Geological Map. Bristol Somersest sandstone. [113]

It is known that valued items were transported across long distances at this time. Alpine jadeite has been found under the Mesolithic Sweet Track on the Somerset levels, which track was built at or immediately after the end of the thirty-ninth century cal BC.[114] By the very early fourth millennium BC, there were Atlantic seashells on the shores of the Bodensee, between Germany and Switzerland, so as Whittle points out, ‘we have every reason to expect widespread and long-range movements by people across landmasses and sea in the late fifth millennium cal BC.’[115] It is certainly possible that this quern stone came from the Bristol area which being just over forty miles away, was a far shorter distance. [116]

[113] www.sciencedirect.com, 'Bristol Somerset Sandstone'.
[114] Monique Ricq-de Bouard, 'Trade in Neolithic Jadeite Axes from the Alps: New Data' (paper presented at the Trade and Exchange in Prehistoric Europe Conference, University of Bristol, 1992). p. 66.
[115] Whittle, 'The Temporality of Transformation: Dating the Early Development of the Southern British Neolithic'. p. 393.
[116] Google Earth Measurement, ed. Distance from Burn Ground to Bristol environs (2012). Hampnett to Bristol environs.

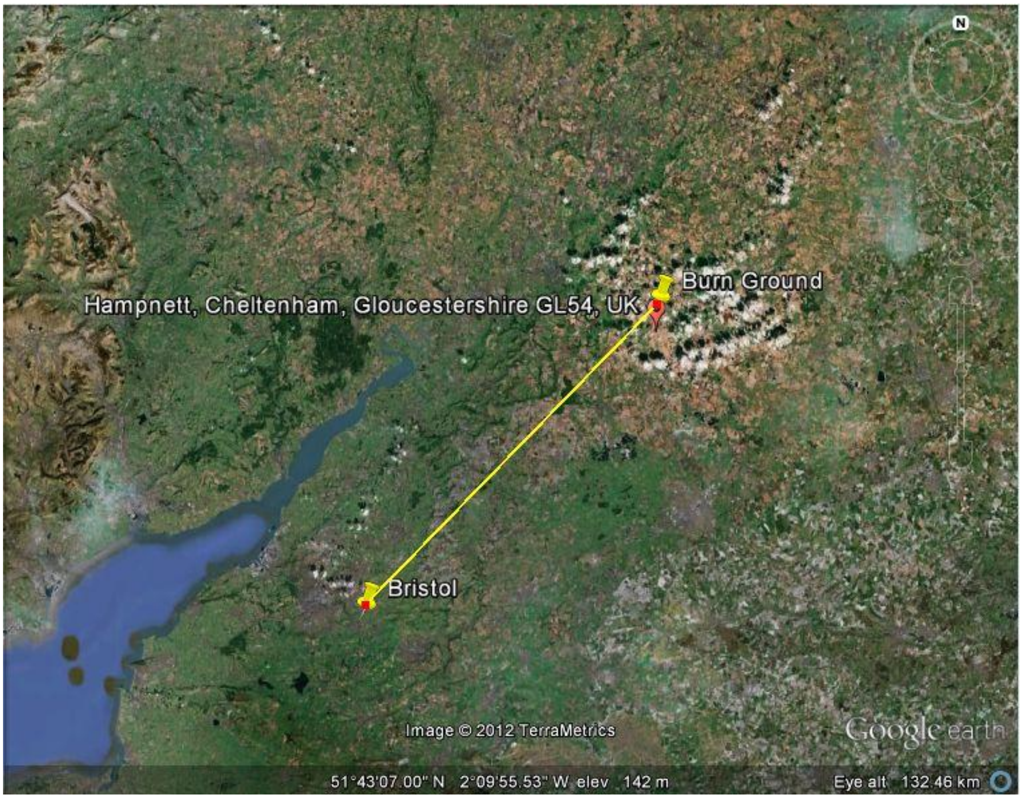

Fig. 13. Google Maps Aerial View display the just over 40 miles distance from quarries to Burn Ground.[117]

If the quern was imported, then Burn Ground may have been built by colonizers introducing not just innovative architecture but also new ideas to do with manifestly linking that architecture to celestial horizon events. Given that substantial lithics can be dug up and used as foundation stones throughout the Cotswolds, it is perhaps unlikely a large stone to be used as a building block would be carried that far.

The fact that the quern is described as well worn perhaps indicates that it served as a domestic grinding tool before its use as a foundation stone. If this particular stone was quarried in Somerset it may have been imported onto this landscape as a domestic implement. Should this be the case, this may identify Burn Ground as a site where incoming farmers settled. Darvill identifies this kind of population movement as 'a nucleated early Neolithic settlement pattern,' after which, he suggested there followed a process of expansion and infilling over Southern England.[118]

Thus, the evidence suggests that when Burn Ground was built, it may have marked both a time and place during which the frontier between Mesolithic hunter gatherer mobility gave way to a sedented Neolithic crop growing lifestyle. This may have heralded substantial social change of the type which Sims characterised as generating

[117] Measurement. Google Earth. Burn Ground, Hampnett to Bristol environs. 2012.
[118] Timothy Darvill, *The Megalithic Chambered Tombs of the Cotswold-Severn Region* (Highworth, Wiltshire: Vorda, 1982). p. 88.

'division and estrangement.'[119] Mark Edmonds warns that the shift from hunting and gathering to a sedentary form of food production has the potential to create:-

> major changes in the manner in which social relations are mediated, in the perception of thresholds between culture and nature and in conceptions of space and time.[120]

It is possible that those who built monuments such as Burn Ground were attempting to mediate the complex tensions created by the newly emerging Neolithic. Christopher Tilley writes that existential space is constantly made and remade through the activities of life carried out within it, creating:-

> a sacred, symbolic and mythic space replete with social meanings wrapped around buildings, objects and features of the local topography, providing reference points and planes of emotional orientation for human attachment and involvement. Places in existential space are foci for the production of meaning, intention and purpose of societal significance.[121]

If Burn Ground's quern stone does mark this barrow's community as incomers experiencing cultural transition, they may have created their monument in order to fulfil a number of functions. The barrow's massy outline may have provided both a territorial marker and a document that linked land to sky.

Burn Ground's Place in the Overall Design Sequence of Cotswold-Severn Barrows

The third clue to Burn Ground's date and hence comparative position in relation to the other two case studies in this research comes in the form of the barrow's interior design. It has been suggested that barrows can be sequenced, if not dated, by comparing and contrasting their interior designs. Oscar Montelius devised a system which did this and his is the one traditionally used to sequence the Cotswold-Severns. Montelius wrote, 'If we typologically examine all the antiquities, we find that one group contains more ancient and another group more recent types.'[122] The Montelian system of ordering establishes a chronological sequence of material remains. This sets up a benchmark against which all data is categorised. Once the benchmark is in place comparison and contrast can take place. Where the Cotswold-Severns are concerned, what has emerged is that, though they vary in design, there are two basic types. The first type are the terminal chambered tombs, which Darvill describes as 'classic' in

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[119] Sims, '*Solarization*'. p. 2.
[120] Mark Edmonds, '*The Polished Axe in Earlier Neolithic Britain*' (paper presented at the Trade and Exchange in Prehistoric Europe Conference, University of Bristol, 1992). p. 70.
[121] Tilley, *Landscape*. [hereafter: Tilley. Phenomenology]. p. 17.
[122] Oscar Montelius, '*The Chronology of the British Bronze Age*', *Archaeologia* LX1(1908). p. 98.

design.[123] Secondly, there are the lateral chambered tombs, entered from the sides.[124] The diagrams below illustrate the difference. (Figs. 14 & 15).

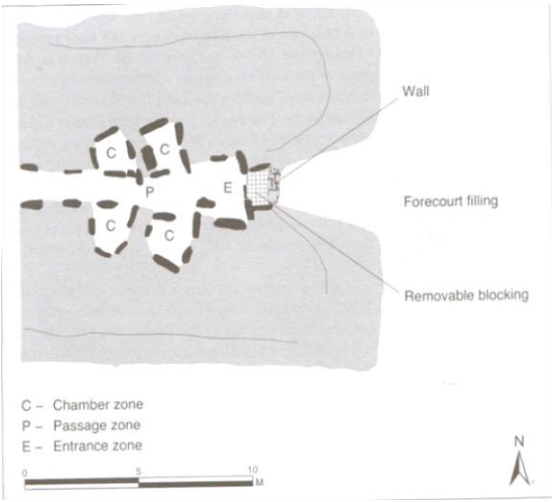

Fig. 14. Burn Ground. An example of a terminal Chambered barrow, entered at one end.[125]

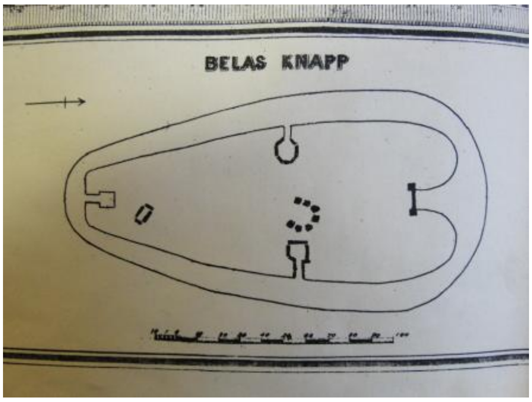

Fig. 15. Belas Knap. A lateral sided tomb, seven miles north-west of Burn Ground..[126]

The difficulty in applying the Montelian system to Burn Ground is that its design was atypical. Burn Ground did have a terminal entrance, but the transeptal gallery it opened onto connected to the bilateral north-south transverse corridor. These are two significant internal features, either of which are usually to be found individually within any one barrow. However within Burn Ground they are combined.

Fig. 16. Burn Ground Interior[127]

[123] Darvill, *Cotswolds* p. 37.
[124] ———, *Cotswolds* p. 35.
[125] ———, *Cotswolds* (GLO 60) 1960, fig 75, p 180.
[126] George Backhouse Witts, 'Map of Gloucestershire Shewing Its Ancient Camps, Roman Villas, Barrows, & Roads.', in *Archaeological handbook of the country of Gloucester. Being an explanatory description of the archaeological map of Gloucestershire.* (1882).
[127] Darvill, *Cotswolds* Ground Plan of Burn Ground Barrow. After Grimes (GLO 60) Fig 40, p.105.

The people who built this barrow created an unusually complex interior. Clearly, information about barrows is limited to those excavated so far. But when considering Burn Ground's north-south corridor in particular, Grimes claims that as a design feature it is ‘at present unique, and as the sequel will show, of considerable importance morphologically.’[128] In fact there is one other barrow with a similar north-south corridor, and that is Fairy Toote in Somerset.[129] So rather than unique, north-south transverse chambered barrows are perhaps rare. But certainly this unusual feature which adjoins the east-west gallery offers a complex design which may give a clue as to Burn Ground's place in the overall sequence of Cotswold-Severns. Taking the terminally ended east-west gallery first, Grimes contended that such designs ‘are now generally accepted as the earliest in the Cotswold-Severn complex.’[130] Grimes was following Glyn Daniel's lead. Daniel's survey of French barrows revealed they also contained terminal entrances.[131] He described these barrow builders as being from a culture that 'crystallised' in the Paris Basin and then diffused 'west to the Channel Islands and west Central France.'[132] Following this sequence, Grimes noted that many English barrows also had terminal entrances, thus he concluded the early English barrows 'derive immediately from W. France.'[133] Darvill, who changed his position over time on the diffusion issue, did finally agree that the Burn Ground type of design probably originated on the Atlantic seaboard.[134] However, laterally sided barrows need to find their place in this scheme and Darvill argued for what he named the ‘degenerative model’ of tomb evolution.[135] This holds that lateral sided barrows gained in ascendancy as terminally ended ones fell out of use. However as mentioned, Darvill was well aware that Cotswold-Severn barrows are widely heterogeneous in their design and he warned of the difficulty of trying to distinguish between such a variety of interiors in order to establish a sequence of barrow typology.[136]

These complexities meant that comparative attempts to classify barrows by design lead to contradictory results. Darvill warns of 'a general failure to understand that typological schemes were simply typologies, not chronologies.'[137] The barrows do not easily lend themselves to the Montelian system of ordering. Darvill himself originally

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[128] Grimes, '*Excavations*'. p. 51.
[129] Brickley, '*Date and Sequence of Use*'. p. 337.
[130] Grimes, '*Excavations*'. p. 77.
[131] Glyn E Daniel, 'The Allees Couvertes of France', (1939).
[132] Daniel, 'The Allees Couvertes of France'. p. 7.
[133] Grimes, '*Excavations*'. p. 90.
[134] Darvill, *Cotswolds* p. 37.
[135] ———, *Cotswolds* p. 37.
[136] ———, *Cotswolds* p. 44.
[137] ———, *Megalithic Chambered Tombs*. [hereafter: Darvill. Megalithic Chambered Tombs]. p. 16.

claimed the first designs on the English landscape were those of lateral sided tombs. He had thought they then evolved into the more complex, terminally ended, transeptal barrows.[138] This reversed the typology championed by Grimes. If Darvill was correct in his first position, it could be held that the Cotswold-Severns did not diffuse from the Paris Basin. Adding to the debate, there is a third position. This suggests there was no evolution in design either way, but that, as Darvill also described, there were those who thought 'long barrows with lateral chambers and those with terminal chambers should be seen as contemporary rather than sequential.'[139] However, whatever the barrows' sequence of design and wherever Burn Ground is situated within it, Burn Ground itself contained two defining architectural features where usually there would be one, and one of those features, the north-south corridor, was rare.

Forest Cover

Stepping back from Burn Ground and looking at Britain as a whole, it is possible to identify a broad change across the landscape at around 6,400 cal BP which was when the forests began to disappear.[140] Jessie Woodbridge's analysis of both pollen residues and archaeological artefact indicates that by 6000 cal BP, 'early Neolithic population growth is clearly evident with significant impacts on woodland cover.'[141] Previous to that, vegetative cover had been stable, but this significant shift coincides with the period when the long barrows began to appear on the landscape. As mentioned, the flints and the unearthed quern stone found at Burn Ground appear to situate it within the Neolithic, with Whittle more precisely suggesting the early Neolithic.[142]

Radio Carbon Dating

There is one last set of clues which may shed light on the date Burn Ground was built. They come in the form of recalculated radio carbon dates. In 2006 Martin Smith and Megan Brickley re-analysed previously excavated material from Burn Ground and they suggest their new dates provide fresh information about the constructional sequence of the monument.[143] Smith and Brickley's findings are discussed in Appendix

[138] ———, *Megalithic Chambered Tombs*. p. 17.
[139] Timothy Darvill and Leslie V Grinsell, '*Gloucestershire Barrows: Supplement 1961-1988*', 107(1989). p. 41.
[140] Jessie Woodbridge et al., '*The Impact of the Neolithic Agricltural Transition in Britain: A Comparison of Pollen-Based Land-Cover and Archaeological Radio Carbon Date-Inferrred Population Change*', *Journal of Archaeological Science* XXX(2012).
[141] Woodbridge et al., '*Agricultural Transition*'. [hereafter: Woodbridge. Agricultural Transition]. p. 1.
[142] Benson, '*Building and Remembrance*'. p.327.
[143] Brickley, '*Date and Sequence of Use*'. p. 335.

5. Taking their new dates and comparing them with the most likely pattern of funeral bone deposition, the evidence suggests Burn Ground can be dated by the oldest bones found buried within the barrow. This date stands at between 4230-3970 cal BC.[144] Given Woodbridge's analysis of the vegetation at this time, it would appear that Burn Ground's architects were amongst the first forest clearers of the earliest Neolithic.

Locating Burn Ground

Turning now to the field work survey I carried out, simply locating the site itself had its challenges. The Historic Environment Record's map appears to situate it clearly.

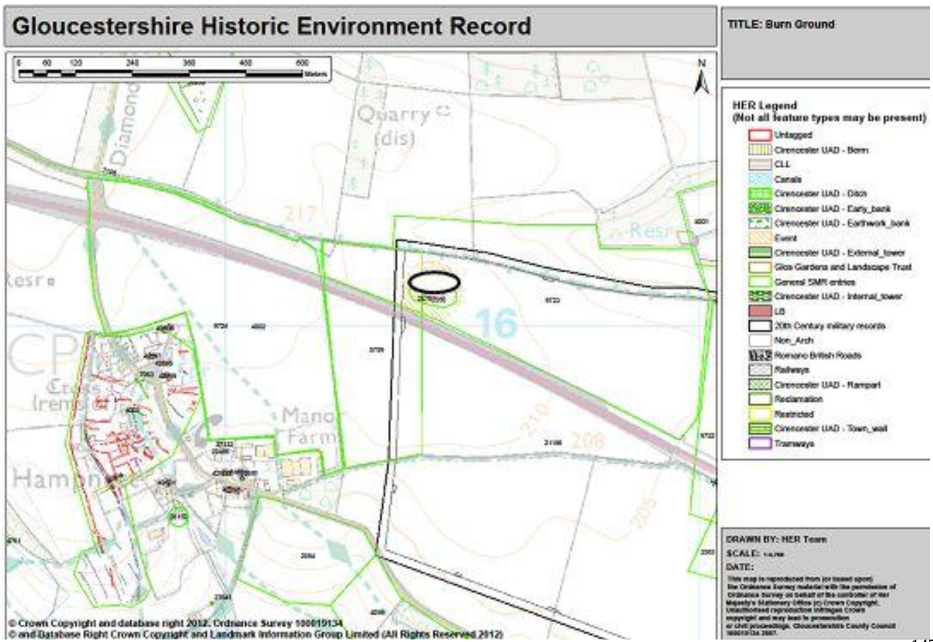

Fig. 17. Gloucestershire HER Map. Burn Ground barrow marked as oval at centre. [145]

However, when looking at an aerial view, two outlines seemed to appear, either of which could be the ghostly outline of the original barrow.

[144] ———, '*Date and Sequence of Use*'. p. 339.
[145] Historic Enivronment Record, 'Area 2573 '.

Fig. 18. Burn Ground Field. Google maps. Aerial View. 10th June 2013.

Comparing the HER map with the aerial view it seems that the arrow to the right may possibly indicate the original site. When asked to confirm this, the HER office at Shire Hall replied, ‘It is a little hard to tell as the site was completely excavated but it looks about right.’[146]

The eponymous tract of land where Burn Ground was built is currently just over a mile across.

Fig. 19. Burn Ground Field. Google Aerial 10th June 2013.

[146] Tim Grubb, 5 November 2012. Historic Environment Record Officer. Shire Hall.

This is an unusually long field by local standards, my two panoramic photographs below capturing the extent of the vista.

Fig. 20. Burn Ground 180° Panorama. The entire length of the field taken from the south-east. 7th May 2013.

Fig. 21. Burn Ground 360° Photographic Panorama. Point-of-view is from where I suggest the barrow most probably lay and from where GPS readings were taken. 14th February 2013.

Using the HER site location map I walked the field to the point where I judged the barrow must roughly have been. When I looked around the ground, I came across an unusually large number of stones in one small area, in a concentration unlike anywhere else (Fig. 22). These stones, which were flat, looked similar to those in one of Grimes' photos (Fig. 23).

Fig. 22. Area of increased concentration of flat stones. Photographed 14th February 2013.

Fig 23. Grimes' photo of Burn Ground.[147]

As no other part of the field showed evidence of so many flattened stones collected into such a concentrated area it seemed highly probably that these indicated the location Burn Ground barrow's excavation site.

Observations and Fieldwork

Turning to my experience at the site, the landscape has clearly altered superficially since pre-historic times, not least because the woodland cover has gone. But what remains is the topography. The land around Burn Ground is utterly flat, indeed Burn Ground sits on the flattest land of all three barrows. At the moment it is farmland under cultivation and given its uniformity there is an unhindered land and skyscape to the east, north and west. A high hedge sits immediately to the south, but the view beyond the hedge also travels, uninterrupted, to a distant horizon.

When one steps into the site there is a sense of having entered big sky country. It has an openness to it which appears to invite one to walk through it. However, given the likelihood that this site started as a small forest clearing, it cannot be known how close or distant the local horizon was at the time the barrow was built. Nevertheless the site chosen is on an upland, which gently slopes southwards so it would have had commanding views as the sun swept across it during the day.

Below is a photo taken as night falls, showing the impact of the uninterrupted skyscape and local horizon.

[147] Grimes, '*Excavations*'. plate XIV: p 266.

Fig. 24. Burn Ground Field. 180 ° panorama. Taken from the east. Photographed 7th February 2013.

Fig. 25. The uninterrupted local horizon at Burn Ground Field as the sun sets. 11th June 2013. 180° panorama.

One consequence of this extremely flat landscape is that the setting sun can be seen, even when behind trees. After taking the photograph above I refocused, and as can be seen in the panorama below, the sun is visible across the still level landscape beyond the tree line.

Fig. 26. A closer view of the local horizon, from the same eastern vantage point. 11th June 2013.

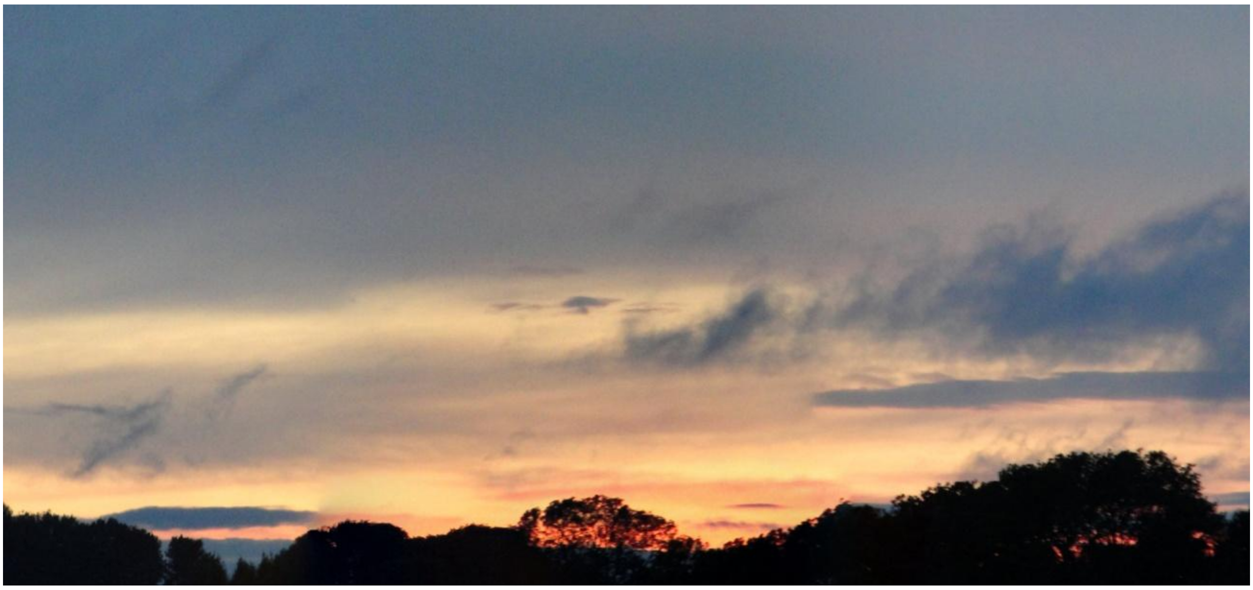

Fig. 27. Close up of tree illuminated by sunset. 11th June 2013.

I visited Burn Ground a number of times, sometimes fleetingly, such as this summer evening when Venus was setting (Fig. 28). With its relatively unchanged local horizon this is a sight which will have been shared by the barrow builders.

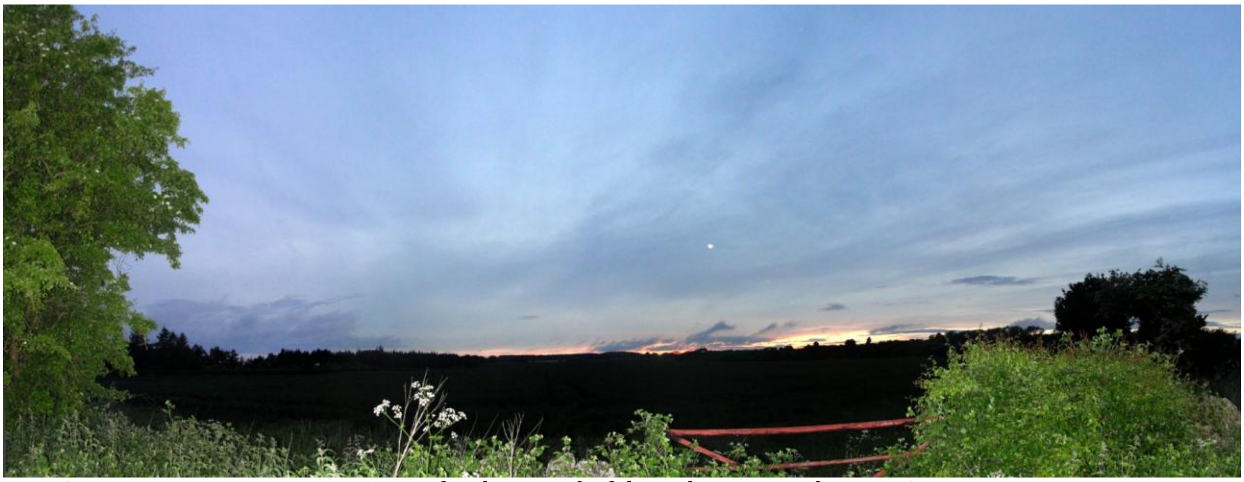

Fig. 28. Venus Setting over Burn Ground. Photographed from the east. 11th June 2013.

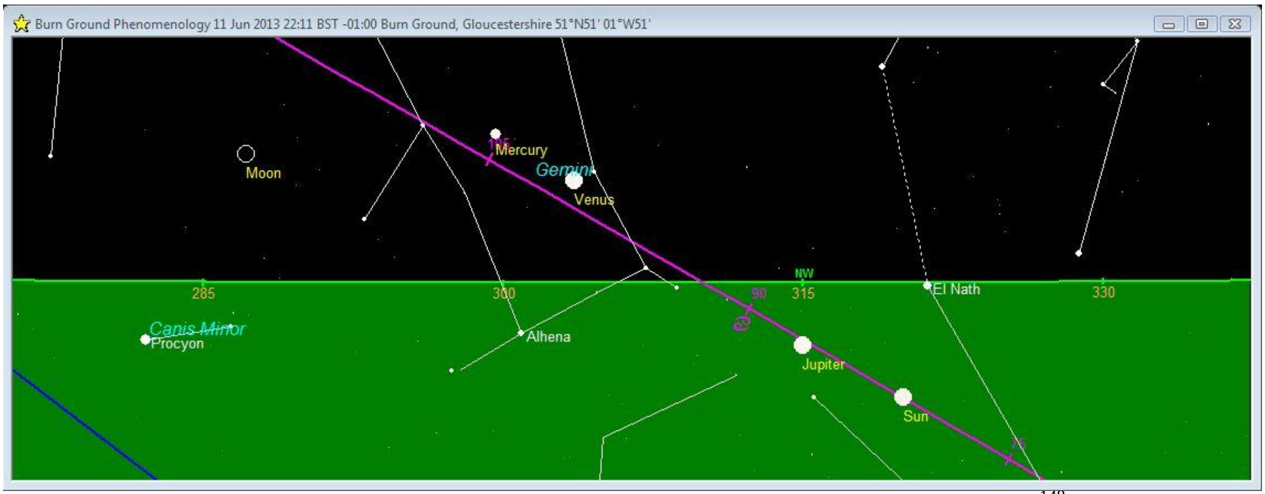

Fig. 29. *Starlight* programme showing the moment Venus was photographed in Figure 28 above.[148]

Horizon Issues

The contour map below (Fig. 30) shows the A 40, crossing on the diagonal. Burn Ground lies at a junction where the contour lines are furthest apart, hence its distant local horizons (Fig. 25).

Fig. 30. Contour Map of Burn Ground Landscape.[149]

[148] *Starlight*.
[149] http://www.heywhatsthat.com/, '13.6.13 Measured from True North'.

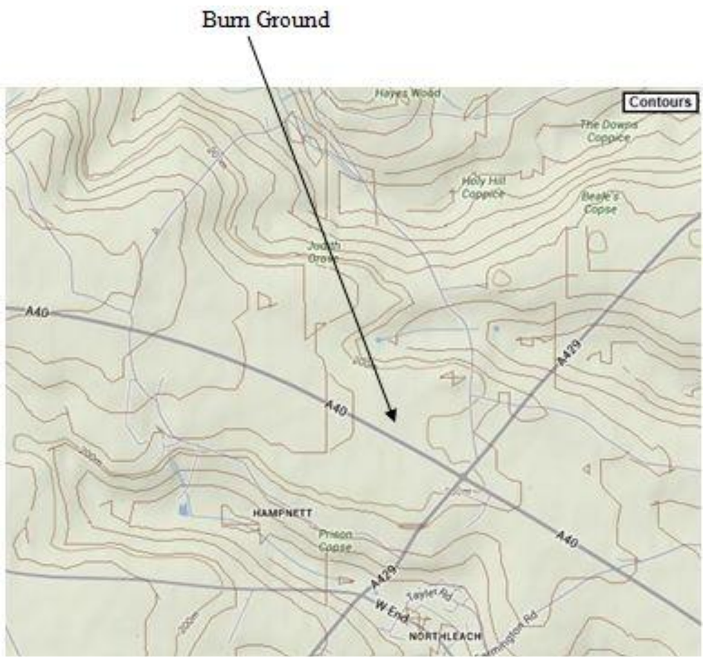

Fig. 31. Close up of widely spaced contour lines at the Burn Ground site.

Thus the most significant feature of this site's horizon is that, of the three sites surveyed for this research, it is the flattest, displaying absolutely no topographical features along the entire circularity of its horizon. As the panorama shows, it is featureless for the full 360° (Fig. 32 below).

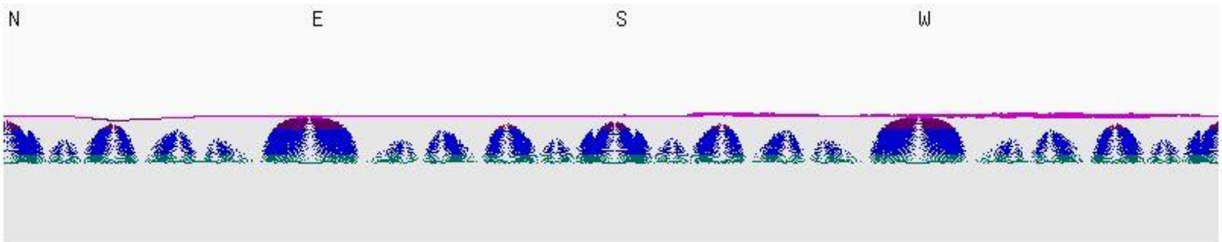

Fig. 32. Burn Ground's entirely flat topography. 360° diagrammatic panorama. Focal length 1000 feet.[150]

Declination of Burn Ground

The calculations for all declinations throughout this survey are in Appendix 7. The orientation of the barrow was measured using an archived RAF aerial photograph from 1947.[151] The photograph showed the scar on the land created by the excavation and using that as reference it was possible to calculate the angle between the barrow and adjacent road. After measuring the A40's azimuth I calculated that of the barrow.

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[150] ———, '13.6.13 Measured from True North'.
[151] English Heritage, 'Aerial View of Burn Ground Taken by '82 Sqdn', in *Serial No: 3280* (Archive, 28 May 1947).

Fig. 33. Aerial Photograph of Burn Ground in relation to the A 40.[152]

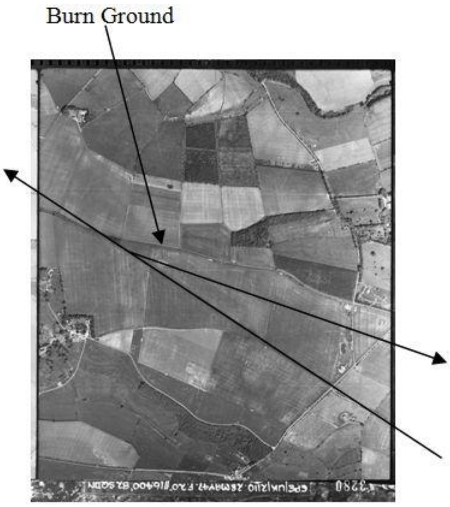

Fig. 34. Diagram showing angle between barrow and A 40.

Fig. 35. Close up of angle between barrow and road.

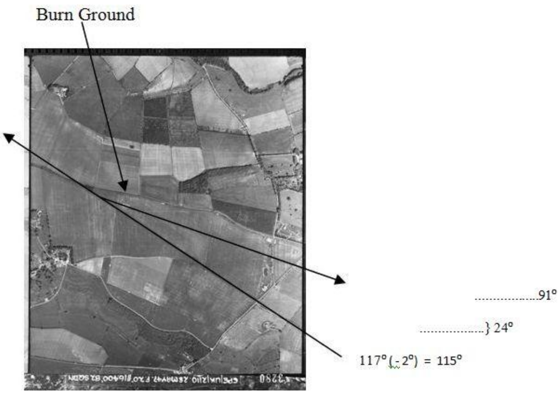

Fig. 36. Azimuth of barrow calculated from that of road.

The resulting declinations are -0.6°/+0.6°. My fieldwork calculations bear out Grimes' judgement that the barrow had a 'true axis....almost exactly east-west.'[153]

Burn Ground: Discussion of possible astronomic intent at this site

It is clear that given the perpendicular relationship between Burn Ground's north-south transverse corridor and the east-west transept, two orientations were embedded within the same monument (Fig. 37).

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[152] Heritage, 'Aerial View of Burn Ground Taken by '82 Sqdn'.
[153] Grimes, '*Excavations*'. p. 43.

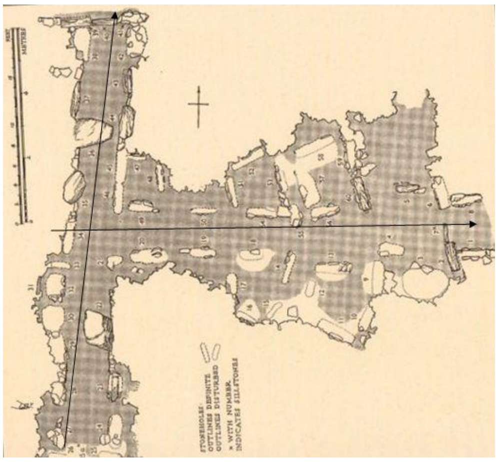

Fig. 37. The two orientations at Burn Ground.[154]

Socket 33's sensitive positioning has already been discussed. I suggest Socket 33 was deliberately placed in order to work in concert with Socket 34, which lay adjacent to it, their angular relationship creating a fulcrum at the heart of the barrow (Fig. 38). It is from these juxtaposed stones that the east-west transeptal gallery and the north-south transverse corridor diverge. It is highly probable this is the point at which the barrow's fundamental, roughly cardinal directions were established. This may be the 'geometry' that Fleming refers to.[155] Or it may possibly be one of the right angles that Eogan typified as 'splendid'.[156]

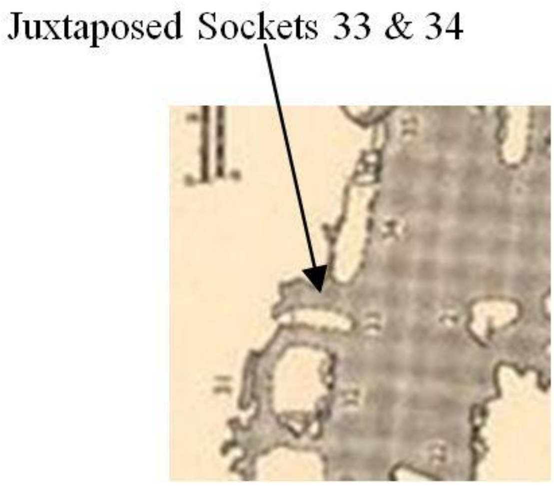

Fig. 38. Close up of angle created by sockets 33 and 34.[157]

Turning first to the east-west transeptal gallery, a line can be drawn from socket 33 to the barrow's eastern entrance, where the slender socket 1 can be found. I suggest these two stones were aligned with exactitude (Fig. 39). All the other stones which

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[154] ———, '*Excavations*'. p. 51.
[155] Fleming, '*Monument Typology*'. [hereafter: Fleming. Monument Typology]. p. 71.
[156] Eogan, '*Neolithic Habitation-Site*'. [hereafter: Eogan. Neolithic Habitation Site]. p. 74.
[157] Grimes, '*Excavations*'. Figure 22. p. 51.

define the transeptal gallery's corridor correspond to and parallel this primary direction. Thus I suggest the barrow's practically exact alignment to zero degrees of declination was deliberate and intended.

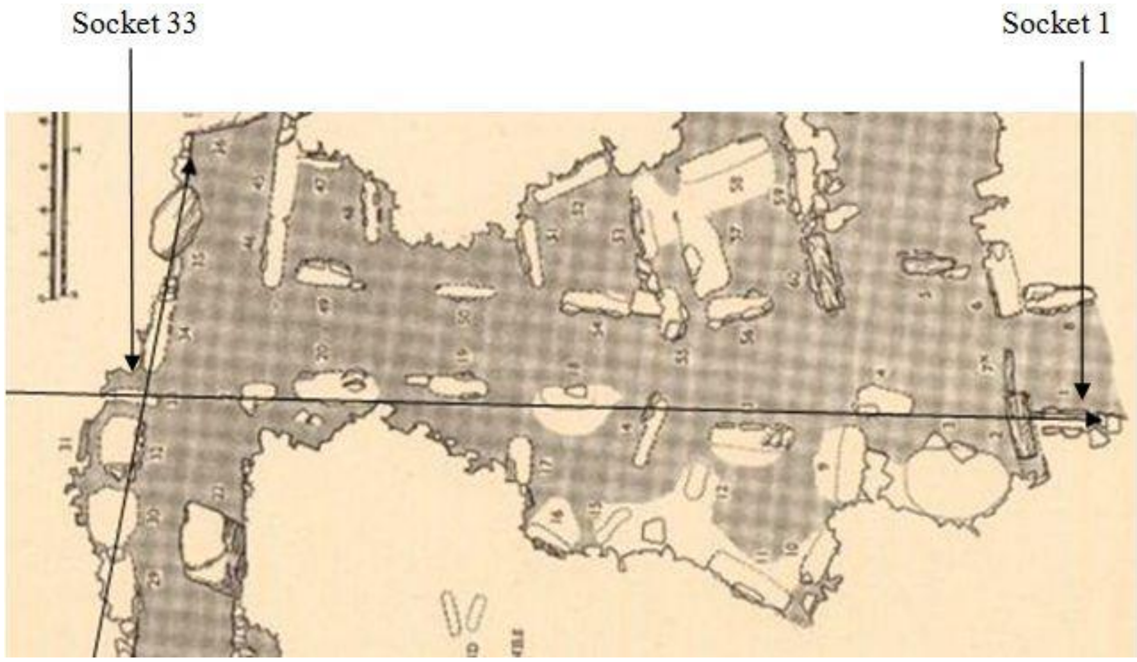

Fig. 39. East-west direction. Close up of connection between socket 33 and socket 1, located at barrow's eastern entrance.[158]

There are a number of horizon events this barrow possibly aligned to. First, it is clearly the equinoctial point. However, there is debate about whether the equinox was used in prehistory. Ruggles argues the word equinox should be 'eliminated' from the vocabulary of archaeoastronomers.[159] He claims its use displays a 'highly questionable' tacit assumption that the equinox was in any way meaningful in prehistoric times.[160] In his view, it is an assumption redolent of Western-style, abstracted conceptions of space and time.[161] Certainly, locating the equinoctial point is challenging given the speed the sun travels along the horizon in spring and autumn.

However, Ruggles further adds:-

> If we are seriously to try to understand something of the cognitive principles that really did underlie some of the patterns of alignment found in the prehistoric material record, then we must start from theoretical perspectives that will suggest plausible models for conceptual structures in non-Western world-views.[162]

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[158] ———, '*Excavations*'. Fig 22. p. 51

[159] Clive Ruggles, 'Whose Equinox Is It', *Archaeoastronomy* 22, no. xxviii (1997). [hereafter: Ruggles. Equinox?]. p. 45.

[160] Ruggles, '*Equinox?*'. p. 45.

[161] ———, '*Equinox?*'. p. 48.

[162] ———, '*Equinox?*'. p. 49.

Ruggles appears to be describing the people of pre-history as non-Western. Setting aside this complex conflation of cross-cultural, cross-temporal assumptions, perhaps the similarity of seasons at equatorial latitudes renders seasonal horizon markers redundant. However, farmers in temperate regions may have valued the seasonal markers a solar calendar affords. In terms of my research, the singularity of the Burn Ground location is its entirely flattened horizon, which at a continuous zero degrees altitude is a rare find in the generally hilly Cotswolds. Ruggles himself notes the usefulness of such an uninterrupted vista. The flatter the horizon, the more precise can be the measurement of the rise and set of the sun, moon and stars.[163] If deliberately chosen, Burn Ground's horizon offered a ruler against which to judge the rise moment most exactly.

Euan MacKie points to a second complication to do with judging the equinox, and that is the way the earth's elliptical orbit causes the equinoctial point to shift along the horizon depending on the season. When discussing equinoctial alignments he notes that a zero degree declination results in an ' "equinoctial" alignment.......set up to indicate the *average* of this halfway point in the spring and autumn (MacKie's italics).'[164] Ruggles himself describes this as 'the spatial mid-point.'[165] So, Burn Ground's alignment to -0.6º/+0.6 º of declination, may indicate an attempt to record the half way point in terms of distance that the sun travels between solstices, rather than its exact mid-point in terms of time. To the naked eye, the first task is significantly more achievable than the second, so if Burn Ground's close to zero declination was an equinoctial measurement, it may have been of the spatial midpoint type.

Although this research was initially designed as an exploration of the sun and the moon, evidence began to emerge of possible attachment to the stars as well. I noticed orientations to the fixed stars. Though the declinations of the fixed stars are date sensitive and will change with precession, they can be dependably measured for some generations, and may have played a part in Neolithic astronomy. As mentioned, I dated the barrow from the oldest bone found within it which ranged between '4230-3970 BC.'[166] In 3944 BCE, Procyon [HIP 37279], with a visual magnitude of 0.38 and described as very bright, rose at a declination of -0.61º, in exact alignment with the barrow's declination of -0.6.º[167] Two further bright stars also rose on this declination at

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[163] ———, '*Equinox?*'. p. 47.
[164] Euan MacKie, 'The Prehistoric Solar Calendar: An out-of-Fashion Idea Revisited with New Evidence', *Time and Mind: The Journal of Archaeology, Consciousness and Culture* 2, no. 1 (2009). [hereafter: MacKie. Solar Calendar]. p. 24.
[165] Ruggles, '*Equinox?*'. p. 45.
[166] *Starlight*.
[167] *Starlight*.

this time and they are Alhena [HIP 31681] in Gemini and Alphard [HIP 46390] in the Hydra[168] (Fig. 40). Both have visual magnitudes of 1.93.[169]

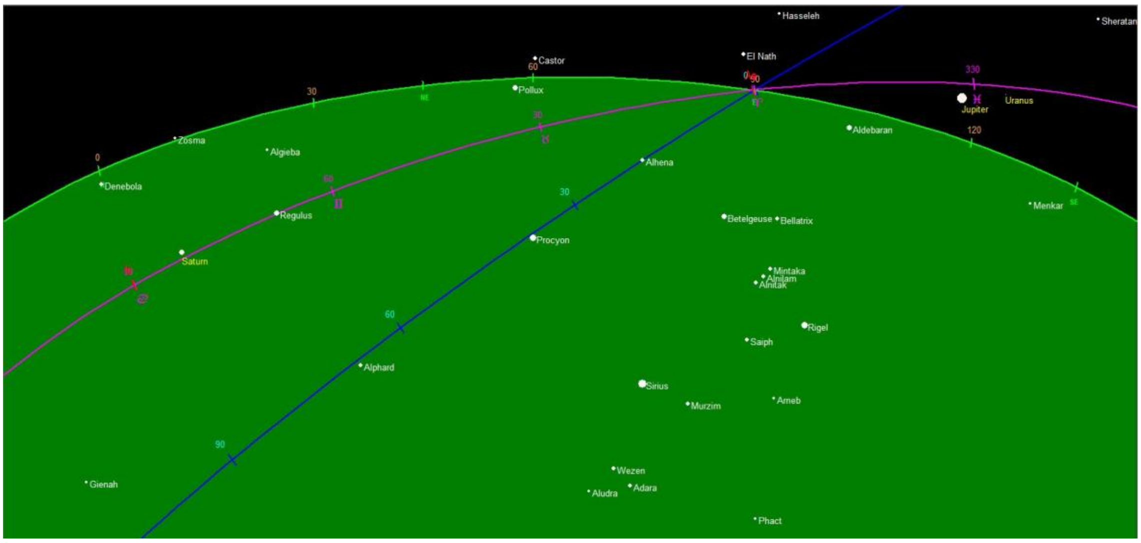

Fig. 40. Alhena/Procyon/Alphard rising at the Autumn Equinox. 22nd October 3944 BCE 19.08. Procyon, in Canis Major had a declination of -0.6°, the same as the barrow's. The blue line is the equator, which always cuts the horizon at east and west.[170]

It is possible that what might be called the Alhena/Procyon/Alphard star path featured in the astronomy of those at Burn Ground. Bernadette Brady, whose work focuses on prehistoric European megaliths, has written about the east-west axis and its potential for providing horizon points as location markers in terms of both time and place. If one were using a calendar event such as a solstice for instance, she suggests:-

> it is a simple matter to watch that same marker through the course of a few nights at different times of the year. One would then see that the same stars rose over this point and then set exactly opposite on the western side of the horizon, thus forming a path of stars through the night sky.[171]

Brady likens the process of noting both solar calendar horizon events as well as the rise and set of fixed stars at such a single horizon point, as the creation of 'a cosmic and cultural knot; a union that offered the tribe knowledge of navigation.'[172] As well as identifying solar horizon events and thus seasonality, familiarity with a number of star paths would also, adds Brady, 'offer freedom of movement in the landscape.'[173]

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[168] B Brady, 'Star Phases: The Naked-Eye Astronomy of the Old Kingdom Pyramid Text', in *Skyscapes: The Role and Importance of the Sky in Archaeology*, ed. F. Silva and N Campion (Oxford: Oxbow 2013 (forthcoming). 2013). [Hereafter: Brady. Star Phases].
[169] *Starlight*.
[170] *Starlight*.
[171] Bernadette Brady, 'Star-Paths, Stones and Horizon Astronomy', in *Stars and Stones*, ed. F Pimenta, et al. (Forthcoming). [hereafter: Brady. Star Paths]. p. 3.
[172] Brady, '*Star Paths*'. p. 4.
[173] ———, '*Star Paths*'. p. 3.

Charlotte Kursh and Theodora Kreps, who wrote about ocean going navigation in Polynesia, suggest that star paths should not be conceptualized as uni-dimensional lines, but rather as bands which 'probably customarily included several degrees of declination.'[174] Agreeing with Brady, Kursh and Kreps write that the value of star paths is that they offer a 'reasonably stable directional marker that can serve as a navigational bearing.'[175] Kursh and Kreps found Polynesian astronomers adapted to precession. Instead of being dependent on a single star path they used a range of stones as horizon markers and as precession led new stars to rise over them, the old star path was relinquished and the new one learnt.[176] They point out it is not just the star that is important. 'On the contrary,' they write, star paths 'would change and the true declination take precedence over any traditional grouping of stars.'[177]

There is a second relationship between the sun and Procyon at Burn Ground. Procyon underwent the phase of Arising and Laying Hidden at this latitude at this time.[178] It disappeared from the sky from Spring to early Summer, however it returned as the morning rising star, becoming apparent to the observer just two days before the summer solstice.[179] This moment of heliacal rise may have been socially significant. Brady writes about the re-appearance of a star in this way, noting that for some cultures:-

> It was a period of great celebration.........for this marked its return to the world of the living, the end of its period of darkness or invisibility. The star was thought to go into the underworld and its heliacal rising was a rebirth, a return of its energy to the planet.[180]

Burn Ground does not align to the solstice, but to the star whose reappearance brings alert that the moment of standstill approaches. Thus a second stellar/solar, cosmic and cultural knot may have applied, in this case calendrical.[181] The barrow's exact alignment to Procyon deeply implicates this very bright star in its possible astronomies. Should Burn Ground's astronomers have noted and marked the reappearance of this star with the solstice they essentially would have created what astronomers such as Hesiod

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[174] Charlotte O. Kursh and Theodora C. Kreps, 'Starpaths: Linear Constellations in Tropical Navigation', *Current Anthropology* 15, no. 3 (1974). [hereafter: Kursh. Linear Constellations]. p. 336.
[175] Kursh and Kreps, '*Linear Constellations*'. p. 334.
[176] ———, '*Linear Constellations*'. p. 335.
[177] ———, '*Linear Constellations*'. p. 336.
[178] *Starlight*.
[179] *Starlight*.
[180] B. Brady, *Brady's Book of Fixed Stars* (Boston: Weiser, LLC, 1998). p. 323.
[181] Brady, '*Star Paths*'. p. 4.

(active around 700 BCE) called parapegmata, or star calendars.[182] As Brady points out, solar observations are dependent on a location specific view, but star risings gave 'a calendar that was freely available, non-location specific and perpetually consistent.'[183] Thus, Procyon's heliacal rise at solar standstill, coupled with Burn Ground's uncharacteristically flat horizon, may indicate this starry messenger was used as a visual aid to judge a solsticial measurement of some exactitude.[184]

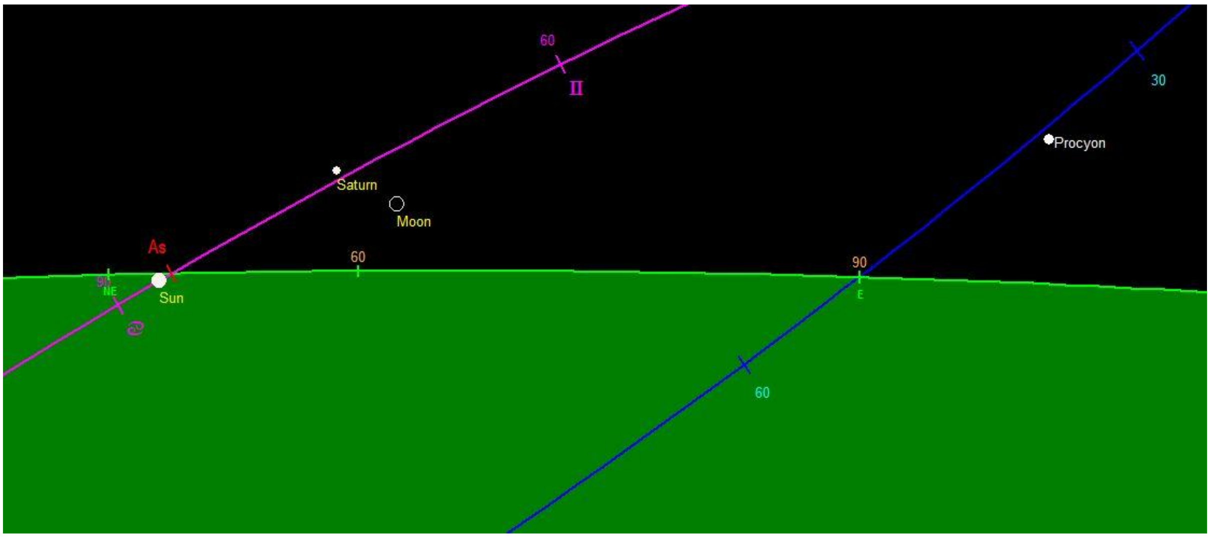

Fig. 41. Procyon's heliacal rise. This very bright star became apparent for the first time around 22 July 3944, its morning rising heralding the Summer Solstice just a few days later.[185]

As well as the solar and stellar links described above, there may have been a lunar alignment at Burn Ground. Fabio Silva notes it is worth exploring the 'distributions of declinations' found close to the equinoctial point for alignments to the moon.[186] His fieldwork amongst the megalithic dolmens of central Portugal identified monuments which, though previously thought to orient to the sun, may instead have aligned to Equinoctial Full Moons, whose risings 'scatter' close to zero degrees of declination.[187] These are the Spring and Autumn Full Moons which occur as the sun and moon cross over when they travel in opposite directions along the horizon**.** Equinoctial Full Moons are rarely explored in archaeoastronomy. But they were noted in antiquity. Equinoxes, and indeed solstices are solar calendar events which Claudius Ptolemy calls starting

[182] Hesiod, *Works and Days, Theogony and the Shield of Heracules* (New York: Dover Publications Inc, 2006). p. 10.
[183] Bernadette Brady, 'A Consideration of Egyptian Ascension Mythology as a Reflection of the Mythopoeic Nature of Star Phases and Its Implication for Belief in the Descent of Divine Beings', in *Current Research in Egyptology*, ed. Heba Ab el-Gawad and others (Oxford: Oxbow, 2012). p. 43.
[184] Ptolemy, *Tetrabiblos*, trans. Frank Egleston Robbins, The Loeb Classical Library (Harvard University Press, 1940). p. 197.
[185] *Starlight*.
[186] Fabio Silva, 'Equinoctial Full Moon Models and Non-Gaussianity: Portuguese Dolmens as a Test Case', in *Astronomy and Power*, ed. Barbara Rappengluck and Nicholas Campion (British Archaeological Reports, 2011). [hereafter: Silva. Equinoctial Full Moons]. p. 5.
[187] Silva, '*Equinoctial Full Moon Models*'. p. 1.

points, but he also notes the moon may play a significant role in these periods of seasonal transition:-

> It seems more proper and natural to me, however, to employ the four starting-points for investigations which deal with the year, observing the syzygies of (both) the sun and moon.**[188]**

Candido Marciano da Silva describes Equinoctial Full Moons as those which occur 'one way or the other', once the moon has passed the sun at the equinoctial point.[189] Silva adds these are the full moons which happen when 'in essence, the sun and full moon change their place, relative to the celestial equator.'[190]

Thus Burn Ground's declination of -0.6°/+0.6° may have aligned to a rising Equinoctial Full Moon. More precisely, it may have been a rising Autumn Full Moon, on a minor standstill year because Silva calculates this particular moonrise occurs at three probable peaks around 0°, 4° or 8° of declination.[191] Burn Ground's -0.6° of declination is just half a degree from the 0° peak. Minor lunar standstills occur only once every 18.6 years, but the significance of this period is that, as Silva points out, 'the lunar nodes are close to the equinoxes'.[192] This means the specific quality of the Autumn Full Moon at a minor lunar standstill is that it will herald a night when the moon will be eclipsed. Thus Burn Ground may have been an eclipse predictor. Pointing to the visual majesty of lunar eclipses and citing their possible cultural importance, Silva suggests that as celestial events they may have been more important than solar eclipses, being 'visible during the night across the whole hemisphere.'[193] This significant celestial event may have also been noted as a Full Moonset on the western horizon.

The north-south transverse corridor

Turning now to the barrow's north-south corridor, a close inspection of the diagrams indicates that it actually deviates five degrees from the 'north' legend on the diagram below (Fig. 42).

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[188] Ptolemy, *Tetrabiblos*. p. 197.
[189] C. Marciano Da Silva, 'The Spring Full Moon', *Journal for the History of Astronomy* xxxv(2004). [hereafter: Da Silva. Spring Full Moon]. p. 476.
[190] Silva, '*Equinoctial Full Moon Models*'. p. 1.
[191] ———, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.
[192] ———, '*Equinoctial Full Moon Models*'. p. 4.
[193] ———, '*Equinoctial Full Moon Models*'. p. 4.

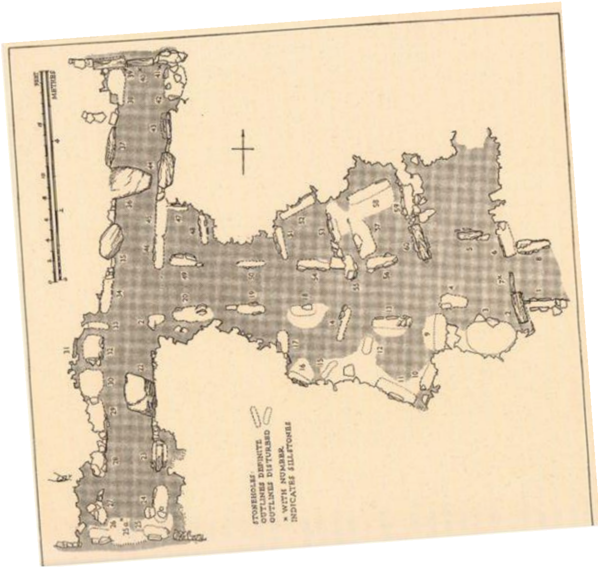

Fig. 42. Grimes' diagram of interior of barrow.[194]

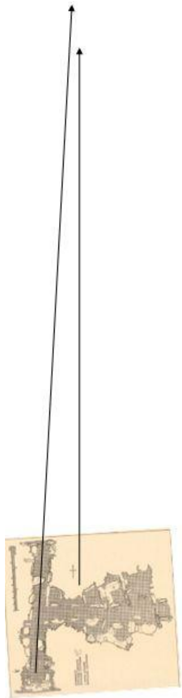

Fig. 43. North-south corridor's deviation.

If this offset from north was intentional it may indicate deliberate alignment. As already established the barrow itself has an azimuth of 91°. Turning again to Grimes' diagram and taking as best the illustration allows the median orientations of the east-west gallery and the north-south corridor, an angle of 80° is found between the two (Fig. 44).

[194] Grimes, '*Excavations*'. Figure 22. p. 51.

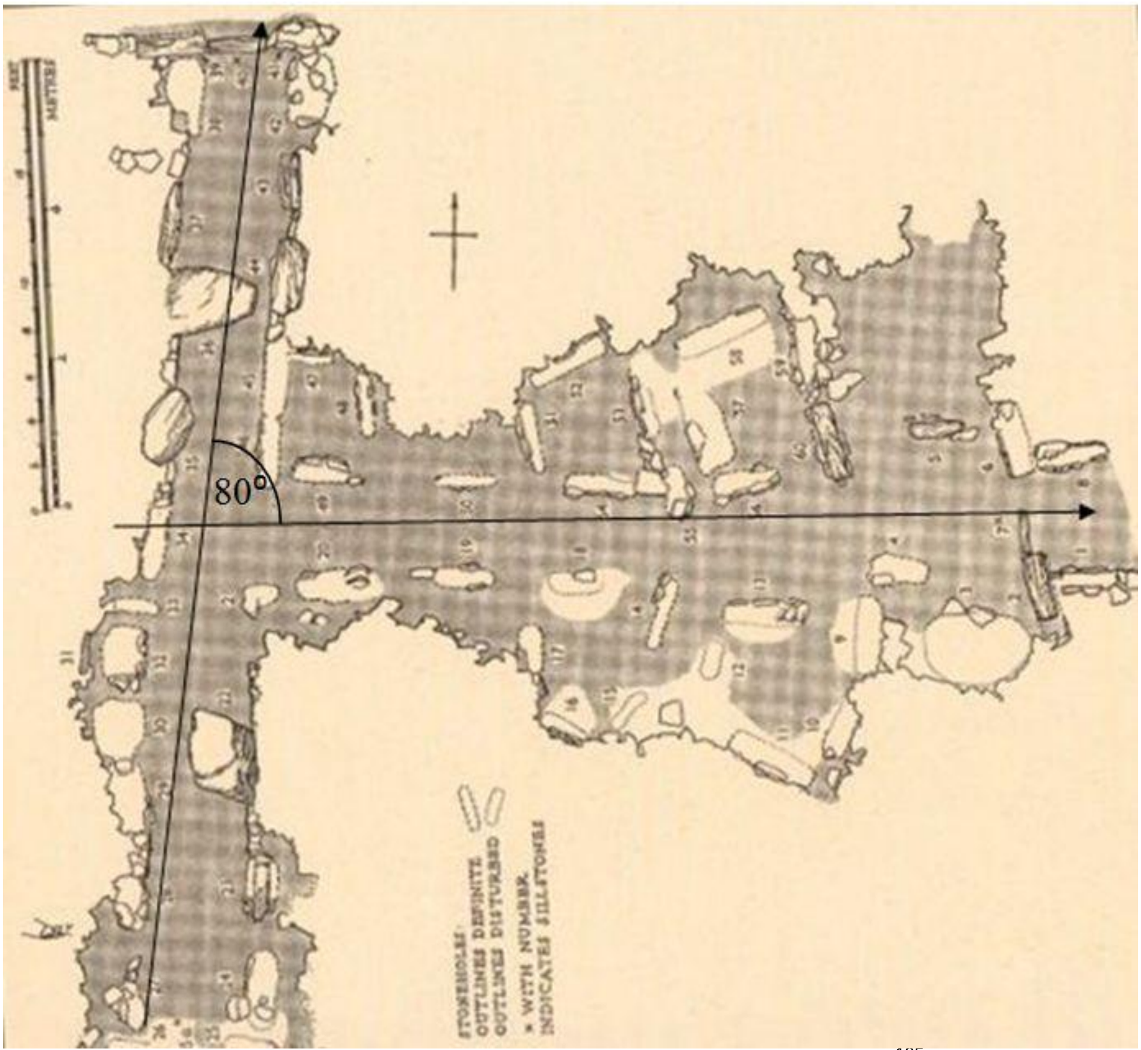

Fig. 44. Eighty degrees separate the east-west orientation from the north-south one.[195]

Based on this angle of 80°, the north-south corridor has an azimuth of 11°.

<u>Declinations of North South Transverse Corridor</u>

This azimuth gives declinations of +37°/-37° (Calculations appear in Appendix 7). As discussed, the barrow was dated to between '4230-3970 BC'. In 4000 BCE the bright star Deneb Adige [HIP 102098], visual magnitude 1.25, rose on the north-eastern horizon at a declination of +36.8°[196] (Fig 45).

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195 ———, '*Excavations*'. p. 51.
196 *Starlight*.

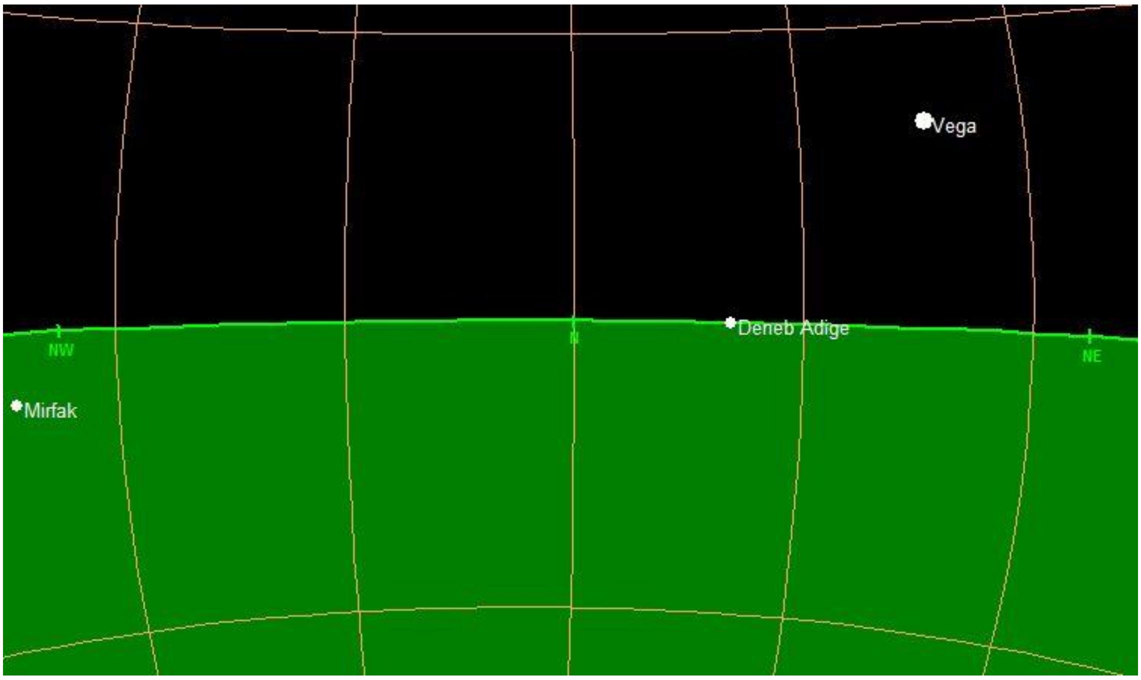

Fig. 45. Deneb Adige, a bright star in Cygnus in the Milky Way, undergoing the phase of Curtailed Passage and rising at a declination of +36.8° in 4000BCE'.[197]

At this latitude and era, Deneb Adige underwent what Claudius Ptolemy has described as the phase of Curtailed Passage.[198] Brady suggests there is lack of understanding about this star phase.[199] She notes there is little reference to Curtailed Passage in archaeoastronomy, indeed she calls it the 'forgotten phase.'[200] Stars undergoing the phase of Curtailed Passage will appear to set in the west like other stars, but, continues Brady, these stars:-

> upon being observed to set just after sunset do not begin a period of disappearing from the night sky, as is the case with a star subject to the ALH phase, instead they will be observed to rise later that *very* night. Comparing the two movements, a star which exhibits the ALH phase has a time of the year when it is visible and a time of the year when it is not. In contrast a star of this other group has, a time of the year when it will set and rise in the *same* night and then have a time of the year when it will appear to act as a circumpolar star.'[201]

Brady suggests this particular celestial motion may have played a part in the belief systems of the people of prehistory. She draws on the ancient Egyptian pyramid texts to make her case pointing out that it is within texts such as these that 'the potential for astronomy to be mythopoeic' is realised.[202] The following does not infer a link between southern England and Egypt, but Brady argues that without naming it as such, the

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[197] *Starlight*.
[198] C Ptolemy, '*The Phases of the Fixed Stars*', (Berkley Springs WV: The Golden Hind Press 1993). p. 5.
[199] Brady, '*Star Phases*'. p. 10.
[200] ———, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 42.
[201] ———, '*Star Phases*'. p. 4.
[202] ———, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 40.

Egyptian texts appear to be describing the celestial mechanics of the star phase of Curtailed Passage. These Old Kingdom documents are considered to be the most ancient religious tracts in existence. Indeed, when writing of the pyramid texts, Samuel Mercer suggests they are 'remnants of a much earlier literature.'[203] They are essentially ascension myths which narrate the story of the transformation of the king into an eternal spirit, free from death. The texts, according to Mercer, chronicle the king's 'declining in the West and rising in the East, his life as an imperishable star.'[204] Brady points to the fact that the celestial mechanics of the stars undergoing the phase of Curtailed Passage bear 'a strong parallel to the narrative of the ascension of the king.'[205] Using Raymond Faulkner's translations she notes that whatever the king's method of ascent, his journey is always towards the celestial north:-

> I ferry across in order that I may stand on the east side of the sky in its northern region among the imperishable Stars.[206]

The imperishable stars refer to those which are circumpolar. Thus the pyramid texts contain a 'mythic description' of royal ascension which echoes the literal celestial movement of stars undergoing Curtailed Passage.[207] Much like the deceased king such a star sets, or 'declines in the west.'[208] Then it is seen to rise in the evening light on the eastern horizon. Thus the star sets and rises within one night. However, after some days or weeks, it will leave the horizon altogether when:-

> for a length of time varying from days to months depending on the star, it will act in the manner of a circumpolar star.[209]

It is at this point that, as a star undergoing the phase of Curtailed Passage rises to become circumpolar, it liberates itself from the bounds of the earth. Brady suggests this physical ascension has a symbolic implication, which is that 'the Netherworld' cannot claim the star, or indeed the king who the star personifies.[210] Royalty held a cosmic position within the Old Kingdom. They were considered immortal gods, incarnated into physical flesh, born of divine parentage, who ascended to the eternal circumpolar stars at death. This dual, royal cycle of death and then immortality corresponds to the dual,

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[203] Samuel A. B. Mercer, *Literary Criticism of the Pyramid Texts* (London: Luzac & Company, 1956). [hereafter: Mercer. Pyramid Texts]. p. 1.
[204] Mercer, *Pyramid Texts*. p. 9-10.
[205] Brady, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 47.
[206] Raymond. O. Faulkner, *The Ancient Egyptian Pyramid Texts* (Oxford: Clarendon Press, 1969). [hereafter: Faulkner. Eygptian Pyramid Texts]. (~1000-1001).
[207] Brady, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 47.
[208] Mercer, *Pyramid Texts*. p. 9-10.
[209] Brady, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 42.
[210] ———, '*Star Phases*'. p. 11.

cyclic celestial mechanics of stars undergoing the phase of Curtailed Passage.[211] They too inhabit two distinct regions. It is their combined and unique journey which confers on the king 'the right to rule the mortal world as he will, after his resurrection, rule the cosmos.'[212]

Linking this back to the prehistoric megaliths of ancient Europe, the point remains that no matter which era is being explored, as Brady suggests, the mythical descriptions of Curtailed Passage in the Pyramid texts offer both a setting horizon point:-

> where a bright star descends to the earth from the immortal circumpolar stars, and the other, the place on the horizon where it ascends to the divine.[213]

Brady argues this gives the archaeoastronomer two additional horizon points to consider. She suggests that any northern hemisphere structure with a NE or NW orientation could be investigated for its possible involvement with a bright star undergoing the phase of Curtailed Passage. [214] Though not directly related to ancient Egypt, other cultures may have considered these rise and sets points 'divine'.[215]

Bearing Brady's argument in mind, I returned to previous fieldwork of mine, which involved surveys of three other Cotswold-Severn barrows.[216] On re-examination I found they too aligned to declinations where stars undergoing the phase of Curtailed Passage are found. They include Gatcombe, Wayland's Smithy and Belas Knap (Fig. 46. See Appendix 6 for calculations).

Labels	AZIMUTH	ALTITUDE	LATITUDE	DECLINATION
Gatcombe	4.5	0	51.7	38.16064466
Wayland's	345	1	51.5	37.94245881
Belas Knap	354	0	51.6	38.15165371

Fig. 46. Calculations for the declinations of three other barrows which are commensurate with that of Deneb Adige during the Cotswold-Severn barrow building era. The various azimuths indicate Waylands and Belas Knap orient to the setting horizon whilst Gatcombe favours the rising one.

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[211] ———, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 40.
[212] ———, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 41.
[213] ———, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 12.
[214] ———, '*Star Phases*'. p. 12.
[215] ———, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 12.
[216] Pamela Armstrong, '*A Survey of Ten Cotswold Severn Long Barrows with Particular Reference to Their Archaeoastronomic Properties*', (Lampeter: University of Wales Trinity St Davids, 2010).

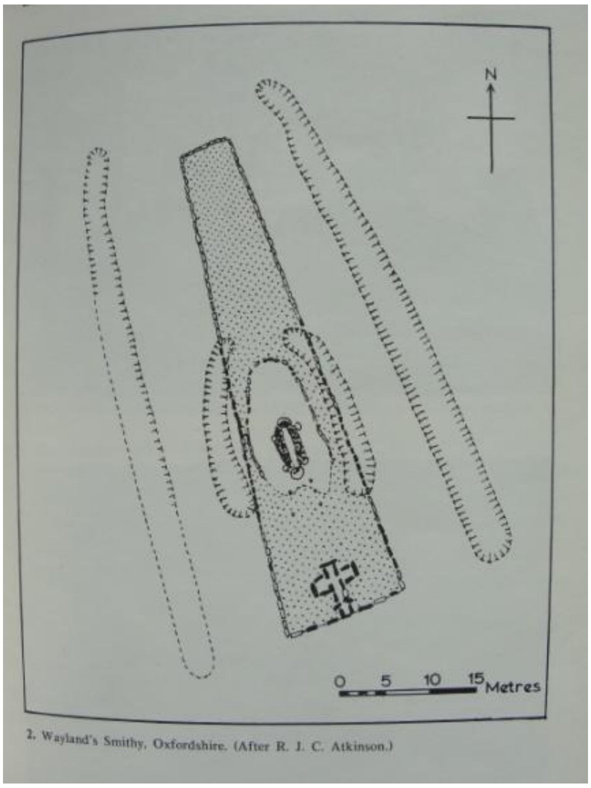

Fig. 47. Wayland's Smithy. With an azimuth of 345° the barrow orients to the western, setting horizon. [217]

Indeed, John North cites Wayland's probable alignment to Deneb Adige. North identifies Deneb Adige's horizon position as one which changed very slowly over the millennia, which would he claims, be 'an excellent reason for early people's fidelity towards it.'[218] Of the three barrows I surveyed, only one is dated and that is Wayland's Smithy, possibly constructed around 3950 BCE.[219] I checked Starlight, and Deneb Adige was indeed undergoing the phase of Curtailed Passage and occupying a delination of 36.8° at this time.[220]

If Brady is correct and ideas relating to the celestial motion of stars undergoing the phase of Curtailed Passage did resonate across cultures, then Deneb Adige may have been considered a star which 'defied death' in Neolithic southern England.[221] Perhaps the Cotswold-Severn architects embedded a symbolic link within their monuments to stars considered to link life, death and resurrection. In the same way as the writers of the pyramid texts later did, the barrow builders may also have felt that the corpse is bound for the earth, 'The spirit is bound for the sky.'[222] Certainly as mentioned above, the three barrows I previously surveyed are oriented to these sensitive points on the

[217] Leslie V Grinsell, *Barrows in England and Wales* (Shire Archaeology, 1979). p. 39.
[218] North, *Stonehenge*. p. 44.
[219] Darvill, *Cotswolds* p. 37.
[220] *Starlight*.
[221] Brady, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 45.
[222] Faulkner, *Egyptian Pyramid Texts*. (~747).

horizon where individual bright stars either 'descend' to earth or 'ascend to the heavens', and Burn Ground now joins them.

Burn Ground: Summary of continuities and discontinuities of possible astronomic intent at this site

Concluding Burn Ground's case study, the lack of material record from the pre-barrow context makes discussion of continuity impossible. However, finds within the barrow provide features of social and archaeoastronomic interest. These included flints, an imported quern stone and a complex double alignment embedded in the monument's architecture, one direction of which is created by a rare north-south transverse corridor which completely bisects the barrow. The imported quern stone may indicate the barrow was constructed by people new to this landscape, and given Burn Ground's rare combination of both terminal and lateral entrances this may give indication of what Christopher Tilley calls 'new innovations and practices.'[223] Tilley concluded during his survey of Neolithic monuments in Scandinavia that the transition from the Mesolithic brought adaptations of an evolutionary nature. The transition into the Neolithic was, he writes, a continuous process during which ‘the old and the new become fused together.'[224] Burn Ground may evidence such a moment when something new forged with the old. The barrow's design is described as morphologically significant.[225] Indeed Darvill, recognising the monument's architectural complexity, nominates it a 'missing link'.[226] However, both these references hark back to Daniels' suggestion that Cotswold-Severn monument design originated from a people who 'crystallised' in the Paris Basin and then diffused westwards.[227] Thus, it is not possible to assess whether the adaptation that Burn Ground may display was created by an entirely indigenous population, or happened because of an acculturation between those people already on the landscape and incoming Neolithic farmers. Though barrows usually had one orientation or another, there was a fleeting moment on the Neolithic Cotswold landscape, when all four cardinal directions were accessed simultaneously. This gave Burn Ground a rich combination of alignment. This was particularly so with its complex zero degrees of declination which offers a bi-modal, solilunar set of alignments

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[223] Christopher Tilley, *An Ethnography of the Neolithic: Early Prehistoric Societies in Southern Scandinavia.* (Cambridge: Cambridge University Press, 1996). [hereafter: Tilley. Early Prehistoric Societies]. p. 108.
[224] Tilley, *Early Prehistoric Societies*.
[225] Grimes, '*Excavations*'. p. 51.
[226] Darvill, *Cotswolds*
[227] Daniel, 'The Allees Couvertes of France'. p. 7.

resistant to differentiation. There may have been an equinoctial alignment, with the Procyon 'star path' used to locate this seasonal marker and, given the entirely flat local horizon, this could have been measured very precisely. A second solar measurement may have been Procyon's heliacal rise, which occurred just before the summer solstice, possibly heralding this seasonal shift too. Thus, Burn Ground may have aligned to lunar, solar, and stellar horizon events providing a complex 'cosmic and cultural knot'.[228]

My research is designed to explore Sims' contention that in central, south-western England there was an abrogation from a lunar to solar allegiance at some point during the Meso to Neolithic transition.[229] Sims contends that Stonehenge was designed to facilitate a transition between the two.[230] The building and design of Stonehenge's Phase 3ii, has been identified as the critical juncture when this happened.[231] Cleal suggests Stonehenge Phase 3ii dates to '2413 BC'[232]. Burn Ground possibly dates from the oldest bone within it (4230-3970 BC).[233] If the equinoctial alignment and summer solstice parapegmata described were in place, it may be that solar astronomy possibly occurred in this region some one thousand five hundred years previous to the period within which Sims suggests 'solarization' occurred. Sims recommends Mesolithic attachment to the rhythms of the Moon be more fully explored, and indeed lunar alignments may have been in place at Burn Ground, in the form of eclipsing Autumn Full Moons rising on the minor standstill. However, should all of the alignments that I have identified at Burn Ground hold, it may have been a tomb connected not just to the moon, but the sun and stars as well.

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228 Brady, '*Star Paths*'. p. 4.
229 Sims, '*Solarization*'. p. 14.
230 ———, '*Solarization*'. p. 3.
231 ———, '*Solarization*'. p. 3.
232 Cleal, *Stonehenge / Landscape*. [hereafter: Cleal. Stonehenge / Landscape]. p. 231.
233 Brickley, '*Date and Sequence of Use*'. p. 339.

Case Study Two:

Ascott-under-Wychwood

Latitude: 51º N 51’ 20”
Longitude: 1º W 33’ 50”

Alastair Whittle describes the 1965-69 excavation of my second site, Ascott-under-Wychwood, as one of 'central importance,' pointing to its examination of use of place before the monument was built, the building process itself as well as the funerary ritual attached to it, all of which were contained within a robust dating system. [234] This, he argues provided a ‘rich and important set of results.'[235] Unlike Burn Ground, the material record at the Ascott site records continuity from the Mesolithic to the Neolithic within what Whittle calls ‘a single, confined and protected context.’[236] Ascott's excavation uncovered 3,000 finds, including sherds, flints, stone objects and animal and human bone.[237] The literature on the barrows in this region contains no information on Ascott's interior before Whittle's excavation. Even so, the scope of Whittle's book is broad indeed, standing at 379 pages. This compares with Grimes' Burn Ground report of 62 pages and the 270 pages of the Hazleton report. Although the Ascott report did not nominate any features at this site as being of astronomic interest, I identified aspects which I felt related to the practice of astronomy.

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[234] Don Benson Alex Bayliss, Dawn Galer, Louise Humphrey, Lesley Mcfadyen & Alasdair Whittle, 'One Thing after Another: The Date of the Ascott-under-Wychwood Long Barrow', *Cambridge Archaeological Journal* 17, no. 1 (suppl.) (2007). p. 327.
[235] Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 327.
[236] Benson, '*Building and Remembrance*'. p. 327.
[237] Don Benson, *The Excavations of 1965 - 1969*, ed. Don Benson and Alasdair Whittle, *Building Memories the Neolithic Cotswold Long Barrow at Ascott-under-Wychwood, Oxfordshire* (Oxford: Oxbow, 2007). p. 21.

Fig. 48. 1966 Excavation of the Ascott-Under-Wychwood barrow.[238]

Radio Carbon Dating

When referring to the radio carbon dating method employed at this site, Bayliss notes that an interpretive Bayesian model of chronology was used.[239] Bayliss explains that once a radiocarbon date had been determined, he writes it up in normal type within his report. That form is reproduced in this case study. However, as well as this first method of dating Bayliss also used a second process, one based on a posterior density estimate. This takes the scientifically determined calibrated date first mentioned, which is then combined with archaeological interpretation from the material record. Bayliss advises that dates arrived at by this second process are written in *italics*, which system of typography is also reproduced when referring to his dates in this text. Using these two methods in concert, Bayliss suggests his dates were arrived at with '95% confidence.'[240]

The Ascott Site During the Mesolithic

Looking at the site in the broader context of the Mesolithic in this region, there are only two well documented early Mesolithic English sites. Star Carr is in the north, but

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[238] Benson, '*Building and Remembrance*'. p. 381. Plate. 1.1.
[239] Alex Bayliss, 'Interpreting Chronology: The Radiocarbon Dating Programme', in *Building Memories the Neolithic Cotswold Long Barrow at Ascott under Wychwood, Oxford*, ed. Don Benson and Alasdair Whittle (Oxford: Oxbow, 2007). [hereafter: Bayliss, Interpreting Chronology], p. 221.
[240] Don Benson and Alisdair Whittle, 'Radio Carbon Dates', in *Building Memories the Neolithic Cotoswold Long Barrow at Ascott-under-Wychwood, Oxfordshire*, ed. Don Benson and Alisdair Whittle (Oxford: Oxbow Books, 2007). p. xxxi

the closest is Thatcham, in West Berkshire (Fig. 49). Of the two, Gill Hey suggests Thatcham may have been the earliest, perhaps dating from within 2-300 years of the start of the Holocene (10,900-9,700 cal BC).[241]

Fig. 49. Google Aerial. Thatcham in relation to Ascott and Stonehenge. 22nd July 2013.

Hey writes of the country surrounding Thatcham:-

> In the north of the region, the majority of flint found has been brought over a great distance, for example sites in the north of Oxfordshire… where high-quality flint is found. Thus people moved over long distances to acquire important resources, or they exchanged materials with neighbouring groups.[242]

Hey also notes that despite changing technologies in Mesolithic flint production generally, there was a uniformity of tool traditions in this region which, she suggests, 'might point to widespread communication between groups and maintenance of longer-distance ties.'[243] Given this, I suggest the north Oxfordshire site of Ascott-under-Wychwood, was a place of trade, such as Hey ascribes to this part of the region.

In terms of the barrow's location, Whittle describes the monument as lying beside a brook, a tributary of the Upper Thames[244] (Fig. 50).

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241 Gill Hey, 'Solent Thames Research Framework Resource Assessment. Late Upper Palaeolithic and Mesolithic Period', (2010). [hereafter: Hey. Upper Palaeolithic and Mesolithic Period]. p. 3.
242 Hey, '*Upper Paleolithic and Mesolithic Period*'. p. 18.
243 ———, '*Upper Paleolithic and Mesolithic Period*'. p. 13.
244 Alex Bayliss, '*Ascott-under-Wychwood Date*'. [hereafter: Alex Bayliss, Ascott-under-Wychwood Date], p. 29.

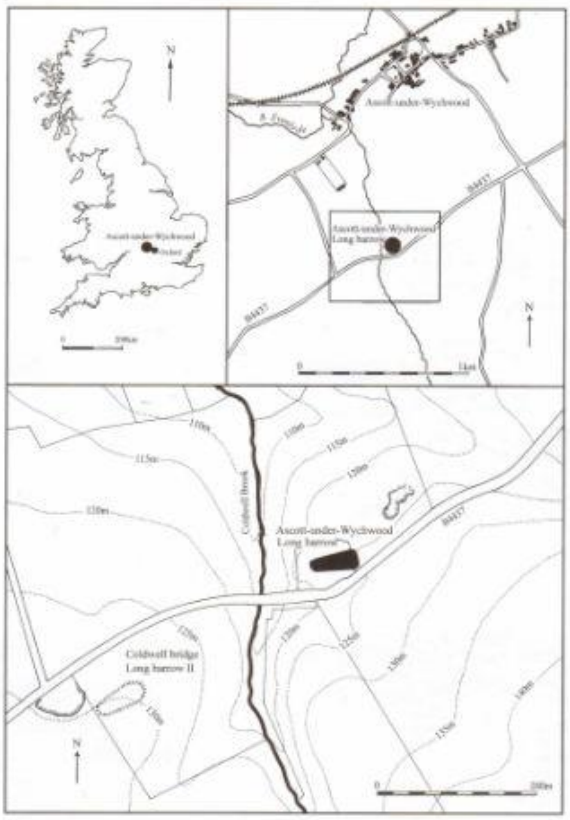

Fig. 50. Ascott's location by Coldwell Brook, a tributary of the Thames.[245]

Hey explains that Mesolithic sites were often preferentially positioned in this way, on scarps, bluffs and slopes overlooking watercourses or arranged along springlines. As well as being beside a brook, the site is found as Benson also points out, 'on rising ground.'[246]

[245] Benson, *Excavations*. [hereafter: Benson, Excavations], p.3.
[246] ———, *Excavations*. p.1.

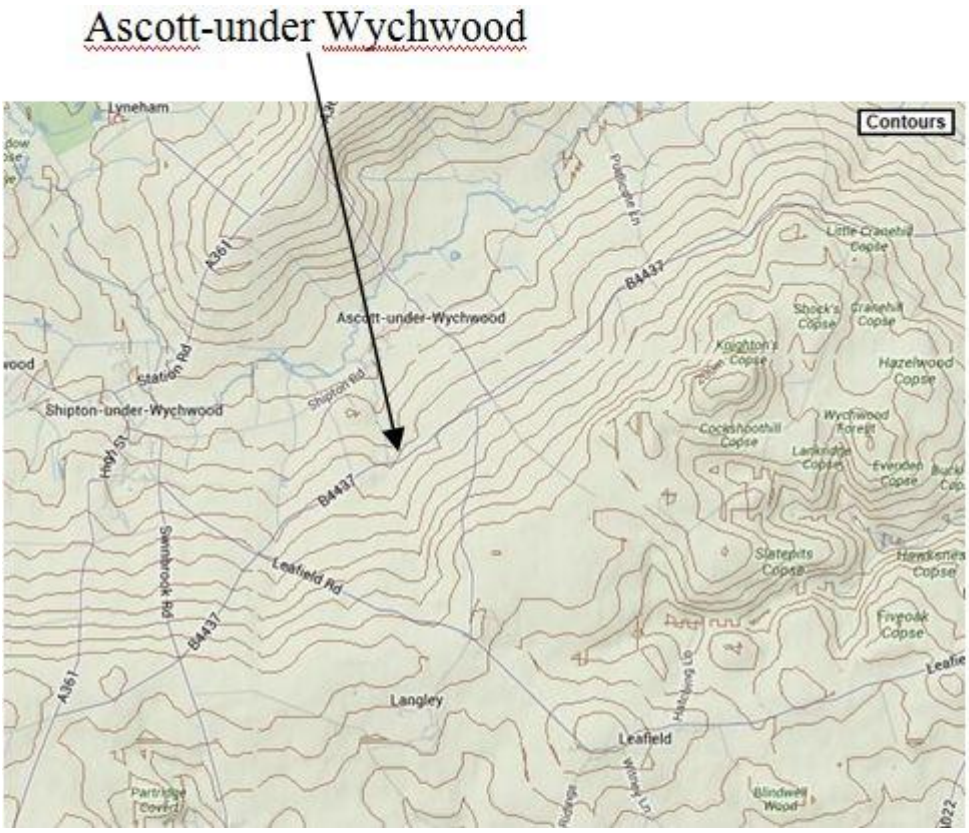

Fig. 51. Barrow situated on sharp slope down towards a brook in what is generally even rolling landscape.

My research is investigating the Meso to Neolithic transition, so of particular interest is Hey's suggestion that in the late Mesolithic:-

> resource exploitation and land use seems to have changed. Smaller sites are found over a much wider range of geologies and topographies, but the presence of nearby water remains an important factor in site choice. River valleys became increasingly utilised.[247]

This speaks of pioneer communities difusing across the landscape, working their way through a riverine system amply provided for by the Thames and its tributaries. Given Hey's mention of the trade in high quality flint through North Oxfordshire at this time it may be assumed meetings and their location would need to be agreed.

The Ascott Site During the Neolithic

In terms of trade and evidence of mobility beyond the area it is noteworthy that remains of a young horse were found within the barrow. This was a species unknown in the archaeological record to this point, Jacqui Mulville characterising the find as ‘uncommon.’[248] Agreeing with Hey, Whittle writes that finds such as flint, stone and pottery within the barrow context continue to suggest 'contacts with areas beyond the

[247] Hey, '*Upper Paleolithic and Mesolithic Period*'. p. 13.
[248] Benson, '*Building and Remembrance*', p. 253.

immediate locality.'[249] Thus the inhabitants of the Ascott site may have been geographically mobile traders during both the Meso and Neolithic.

Evidence for Neolithic sedentism was provided by a quern found within the Ascott barrow. However, unlike the Burn Ground quern, it was of a local, golden, Taynton stone. Also, unlike the quern at Burn Ground, there was no ambiguity about its function. Fiona Roe suggests the Ascott site showed clear evidence that its quern was used for food production, 'during the period of Neolithic domestic activity,' before, and perhaps also during, the building of the barrow.[250] Roe also points out that the entire occupation during the barrow period was 'unusual in having no evidence for imported stone.'[251] I suggest this use of local stone displays a telling contrast to Burn Ground. It would appear Ascott's barrow builders were sufficiently established on their landscape to be able to exploit local lithic resources for domestic use. This contrasts with the community at Burn Ground, who imported theirs. Thus those who built the Ascott barrow may have lived longer on their landscape than those at Burn Ground.

Observations on the site

The Ascott site is currently a long, narrow tract of meadow surrounded by relatively high hedges and trees. It feels an enclosed, safe place, the most open views of the horizon being to east and west (Fig. 52).

Fig. 52. Small meadow enclosed within the copse where the barrow used to be. 29 July. 2013.

[249] Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 30.
[250] Benson, '*Building and Remembrance*'. p. 315.
[251] ———, '*Building and Remembrance*'. p. 318.

The programme I used to merge the photographs I took at the site was unable to manage the sudden steep change in gradient found there, so the image below does not give a clear representation how steep the slope is at Ascott (Fig. 53).

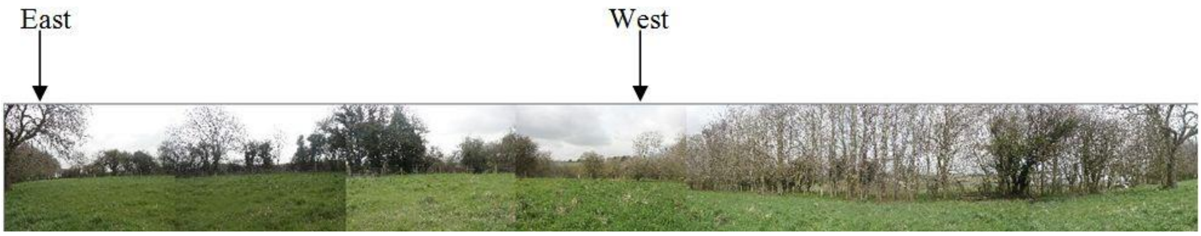

Fig. 53. Winter view. 360° panorama. Horizon level rendered and justified. 22nd April 2013.

The next panorma, containing the same photographs but left unrendered more accurately displays the steep slope which is only about one hundred yards long (Fig 54).


Fig. 54. Unrendered 360° panorama. Horizon level - unjustified and unrendered. Thus the real gradient is more apparent. 22nd April 2013.

Horizon Issues

The landscape surrounding Ascott-under-Wychwood is one of gently rolling countryside and, as the site lay towards the top of its slope, clear views were likely (Fig. 55).

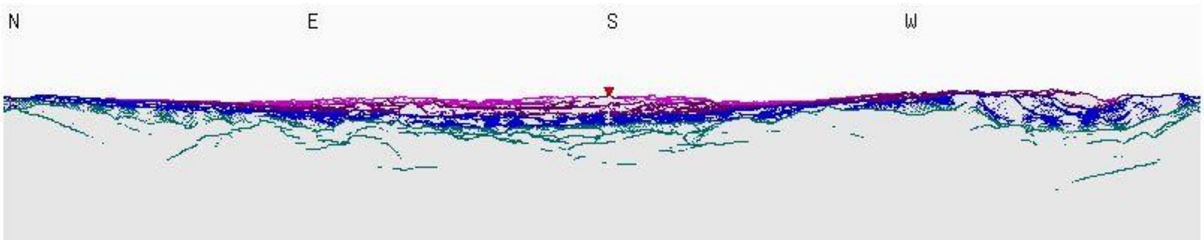

Fig. 55. 360° panorama showing the contours of the landscape around this site and the clear views afforded.[252]

In the photograph below I was standing where ‘South’ is marked in the panorama above, looking northwards across the valley to the barrow's site (Fig 56). The photograph below shows how traversable this landscape is. The slope travels down into the valley but these lowlands were ignored by the barrow builders who chose the higher ground.

[252] http://www.heywhatsthat.com/, '13.6.13 Measured from True North'.

Fig. 56. 180° panorama taken south of Ascott barrow, looking northwards towards it over the gently rolling landscape. 23rd May 2013.

Below is a photograph of the same vista showing the unimpeded the horizon across which celestial events can easily be viewed (Fig. 57).

Fig. 57. Looking northwards towards the ridge where the barrow lies as the sun sets in the west. 7th May 2013.

Ascott-under-Wychwood: The Archaeology of the Site

The Pre-barrow Sequence: Mesolithic Finds and Artefacts

Mesolithic artefacts found at the site included microburins, notched blades, axe-sharpening flakes, burins and cores providing ‘evidence for tool use’.[253] Lesley McFadyen also argues that these link the site to the regional distribution of microliths.[254] In terms of dating, Alex Bayliss argues that the particularity of the shape of the worked flints may indicate ‘an earlier Mesolithic occupation.’[255] McFadyen more precisely suggests the tools could be ‘tentatively assigned to the eighth millennium cal BC.’[256] There is then a long gap in the material record until the fifth millennium cal BC. A small number of microliths from this era are characterised by McFadyen as isolated finds possibly representing brief, periodic visits within the hunter-gatherer

[253] Don Benson and Alasdair Whittle Lesley Mcfadyen, 'The Pre-Barrow Contexts', in *Building Memories the Neolithic Cotswold Long Barrow at Ascott-under-Wychwood, Oxfordshire*, ed. Don Benson and Alasdair Whittle (Oxford: Oxbow Books, 2007). [hereafter: Mcfayden, Pre-Barrow Context], p.26.
[254] Mcfadyen, '*Pre-Barrow Context*'.p. 27.
[255] Alex Bayliss, '*Ascott-under-Wychwood Date*'. p.30.
[256] Mcfadyen, '*Pre-Barrow Context*'. p. 25.

range, rather than prolonged occupation.[257] Two roe deer bones found within a pre-barrow midden give the earliest radio carbon dates for less transitory site usage, the oldest one measuring in at between '*5300-4900 cal BC*.'[258] Thus, when exploring archaeoastronomic intent, these are the earliest dates I will use from this site.

Mesolithic Finds: The Tree Throw Pit

As mentioned, Mesolithic flint tools and bone finds indicate that, though episodic, the Ascott site was, as John Evans notes, a location which sustained 'long sequence.'[259] It was used across millennia and certainly across the Meso to Neolithic transition.

The first evidence of possibly human management of the landscape comes in the form of a tree throw pit beneath the barrow (F11 in Fig. 58). No artefacts were dated from within the pit, but Evans does note 'the concentration of Mesolithic material' within it.[260] And he does suggest the pit provided faunal samples amongst 'the earliest from the site'[261]

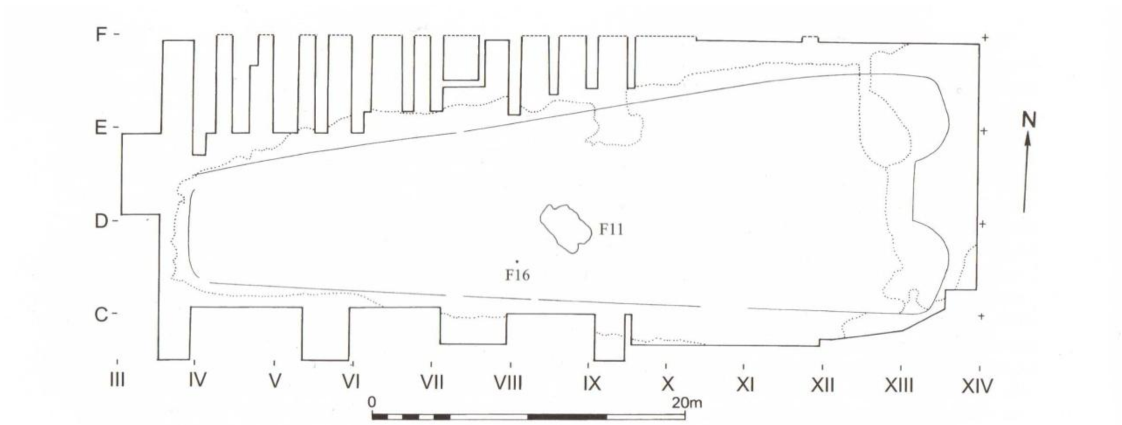

Fig. 58. Pre-barrow sequence. F11 marks tree-throw pit found on ground subsequently built over by barrow. [262]

A 'tree throw' is that rent hole which occurs when a tree is blown over in a storm.[263] Ascott's tree throw was considered particularly large, possibly caused by more than one tree falling, thus it may indicate purposive clearance.[264] The molluscan fauna within the tree throw was of the woodland variety, suggesting the tree throw was surrounded by

[257] ———, '*Pre-Barrow Context*'. p. 27.
[258] Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 38.
[259] Susan Limbrey and Richard Macphail John G Evans, 'The Environmental Setting ', in *Building Memories the Neolithic Cotswold Long Barrow at Ascott-under-Wychwood, Oxfordshire*, ed. Don Benson and Alasdair Whittle (Oxford: Oxbow Books, 2007). [hereafter: John G. Evans. Environmental Setting] p.56.
[260] John G Evans, '*Environmental Setting*'. p. 59.
[261] ———, '*Environmental Setting*'.p. 56.
[262] Benson, '*Building and Remembrance*'. p. 26.
[263] Lionel Sims, Personal communication. 11th October 2012.
[264] Mcfadyen, '*Pre-Barrow Context*'.p. 26.

forest. However the pit also contained shells from a snail known to flourish in dry, light conditions. Thus it was suggested that the added presence of this snail ‘may reflect some openness’ in the vicinity of the site.[265] Evans concluded the combination of snail types indicates the trees had probably receded and the site was 'grassland, rather than one of closed woodland.’[266] This appears though to have been a newly establishing habitat. Other common species which typically thrive on grasslands were absent, leading Evans to think that any open environments around this site ‘were not widespread.’[267] Indeed the area surrounding the Ascott site was heavily wooded, including in the direction of Stonehenge.[268] It was only immediately around the site that the stratigraphy within the pit showed a ‘succession from less to more open conditions.’[269]

The artefacts within the tree throw were judged amongst the oldest at the site. Kate Cramp writes that most of the flint assemblage, including a tranchet axe sharpening flake, can be assigned to the Mesolithic ‘with reasonable confidence.’[270] Tranchet axes are associated with woodland clearing, so the appearance of such a tool in this area may further support deliberate and purposive land clearance.[271]

Ruggles writes that we cannot hope to understand astronomical practice in pre-historic times without ‘beginning to think more seriously’ about the people themselves.[272] Evans imaginatively explores what the subjective, phenomenological experience of creating such a pit might have been. Different layers of soil and geologies would have been exposed, Evans claims. This sight, he feels, which revealed the history of the land, may subtly have given rise to an awareness by those who created the tree throw that ‘rapid change’ was possible.[273] Evans further suggests:-

> the tree-throw pit, the fallen trees, the changing ecology and its glimpse into the past were lessons in prehistoric palaeoecology and in the ecology of future lives.[274]

In other words the tree throw pit would, at a glance, give both symbolic and phenomenological evidence of the passage of time with Evans going so far as to suggest

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[265] John G Evans, '*Environmental Setting*'. p. 56.
[266] ———, '*Environmental Setting*'. p. 59.
[267] ———, '*Environmental Setting*'. p. 60.
[268] ———, '*Environmental Setting*'. p. 60.
[269] Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 30.
[270] Kate Cramp, 'The Flint', in *Building Memories the Neolithic Cotswold Long Barrow at Ascott-under-Wychwood, Oxfordshire*, ed. Don Benson and Alasdair Whittle (Oxford: Oxbow Books, 2007). [hereafter: Cramp, Flint] p. 301.
[271] Hey, '*Upper Paleolithic and Mesolithic Period*'. p. 15.
[272] Ruggles, *Prehistoric Astronomy*.[hereafter: Ruggles, Prehistoric Astronomy]. p. 78.
[273] John G Evans, '*Environmental Setting*'. p. 75.
[274] ———, '*Environmental Setting*'. p. 75.

the woodland clearing would have provided a place that was 'special.'[275] Certainly the site would have been new and different. Thus I suggest that this early Mesolithic land management may have created a small meadow at Ascott-under-Wychwood affording a view of the horizon.

Pre-barrow Post-holes

Subsequent to the Mesolithic, a turf line covered the tree throw pit, indicating that the forest closed in again.[276] However, soil stratigraphy shows another, second, woodland clearance, and also the first presence of post-holes. Pottery sherds belonging to the carinated bowl tradition, recognised as originating from the earliest Neolithic, were found in what was still a pre-barrow context. Given the volume present, this pottery possibly served a small group of about 20-40 individuals.[277] The lithic assemblage connected to this community reflected a broad range of skills including scraping, cutting, piercing, archery and flint knapping. Bones belonging to domestic cattle, sheep, pig and dog were found as well as deer and auroch, these last two species indicating that incursions into wilder and less managed territory occurred.[278]

Pre-Barrow Post-hole F16

The earliest disturbance of soil that can be definitely be ascribed to human intervention at the Ascott site was the hole dug for post F16 (Fig. 59). Two pieces of beech charcoal were found at the bottom of this solitary hole.[279] They dated between 4330-4040 cal BC and 4220-3970 cal BC.[280] This is the second date to which astronomic intent may be attached, should post F16 prove significant.

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[275] ———, '*Environmental Setting*'. p. 75.
[276] Mcfadyen, '*Pre-Barrow Context*'. p.27.
[277] Benson, '*Building and Remembrance*'. p. 33.
[278] ———, '*Building and Remembrance*'. p. 33.
[279] Alex Bayliss, 'Interpreting Chronology: The Radiocarbon Dating Programme', in *Building Memories the Neolithic Cotswold Long Barrow at Ascott under Wychwood, Oxford*, ed. Don Benson and Alasdair Whittle (Oxford: Oxbow, 2007). p. 225.
[280] Mcfadyen, '*Pre-Barrow Context*'. p. 26.

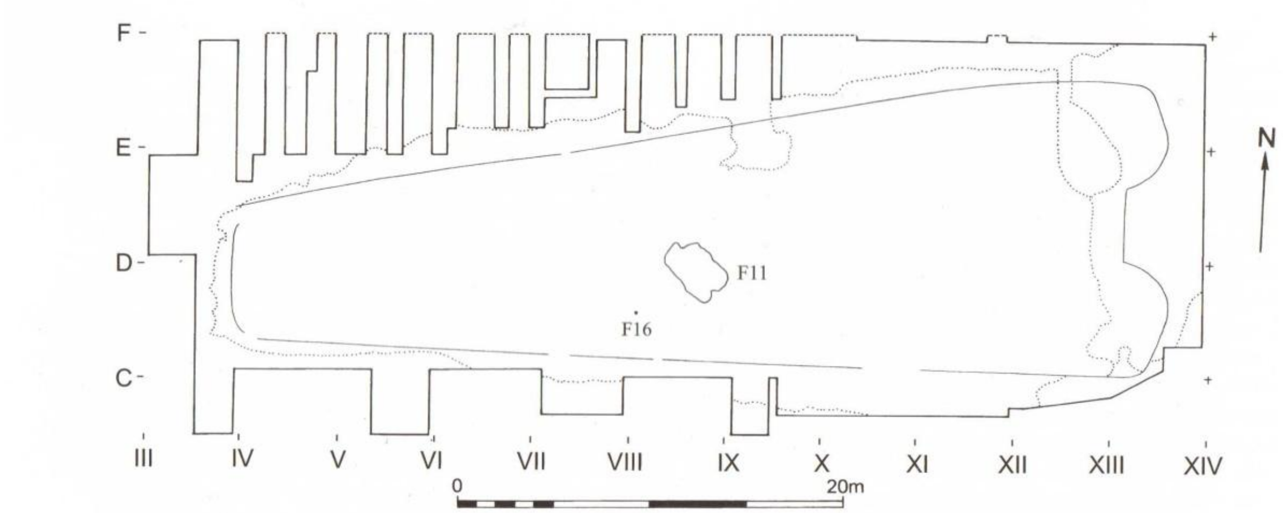

Fig. 59. Pre-Barrow Sequence. Stand Alone Post-hole Number F16. [281]

F16 was steep sided and dug in a way ‘which suggested packing.’[282] This careful preparation was perhaps designed to deliver a stable base of some hoped for longevity. Mention has already been made that the ‘steep scarp would have enhanced the setting’.[283] One reason for placing a post high on a slope could be to create a territorial marker. However, this hole was described as oval, 0.20m by 0.10, 0.17m deep, with a ‘long axis north-south.’[284] This pole may have had a number of functions. Its oval shape, the sharper edge of which defined north-south, may have been used to either establish cardinal direction, or time keep as a gnomon. Lastly, it may have functioned as back or foresight to aid horizon astronomy. If it was put in place with deliberate astronomic intent, the charcoal dates that decision as being made between 4330-3970 cal BC. [285]

Pre-Barrow Post-holes F2, F3, F4, F5, F6

There were further post-holes in the pre-barrow context (Fig. 60). McFadyen claims the rows they were found in ‘probably represent separate structures’[286] Both were given orientations. She describes Timber Structure 1 as being ‘oriented approximately east-west.’[287] And Timber Structure 2 was judged exactly ‘east-west.’[288] A hearth (F12) lay between the post-holes of Timber Structure 2 (Fig. 60). This may indicate

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[281] Benson, '*Building and Remembrance*'. p. 26.
[282] Mcfadyen, '*Pre-Barrow Context*'. p. 26.
[283] Benson, *Excavations*. p. 1.
[284] Mcfadyen, '*Pre-Barrow Context*'. p. 26.
[285] ———, '*Pre-Barrow Context*'. p. 26.
[286] ———, '*Pre-Barrow Context*'. p. 27.
[287] ———, '*Pre-Barrow Context*'. p. 27.
[288] ———, '*Pre-Barrow Context*'. p. 29.

that food preparation occurred in that area. However Timber Structure 1 had no hearth nearby so its poles may have had a use other than domestic.

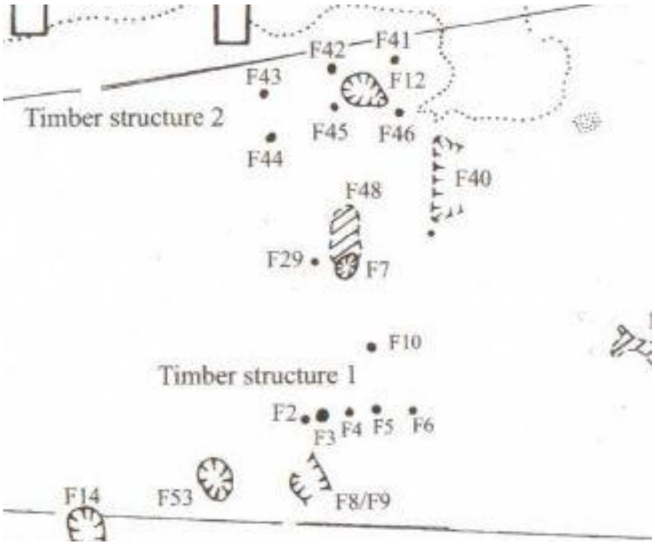

Fig. 60. Pre-barrow context. Post-holes found under the barrow. Nominated by the excavators as Timber Structures. [289]

Given my survey's reliance on archaeological reports used as primary sources, much of my research depends on the analysis of diagrams at second remove; in this case concerning the tenuous relationship between post-holes. So I approached Professor Whittle about the precision of the post-hole drawings and he replied it was worth endeavouring ‘to check orientations etc from the plans carefully made by Don Benson at the time.’[290] As best endeavours to achieve exactitude were taken, Ascott's plan diagrams are used to judge apparent orientation. At first glance, given the pattern they form, the eleven post-holes may seem connected. But their functions are ambiguous. Most tellingly, they vary in depth, and though described as lying east-west, there is in fact a slight deviation from direct cardinality (Figs. 61 & 62).

[289] Benson, '*Building and Remembrance*'. p. 27.
[290] Alasdair Whittle, Distinguished Research Professor in Archaeology, Cardiff University. 17 October 2012.

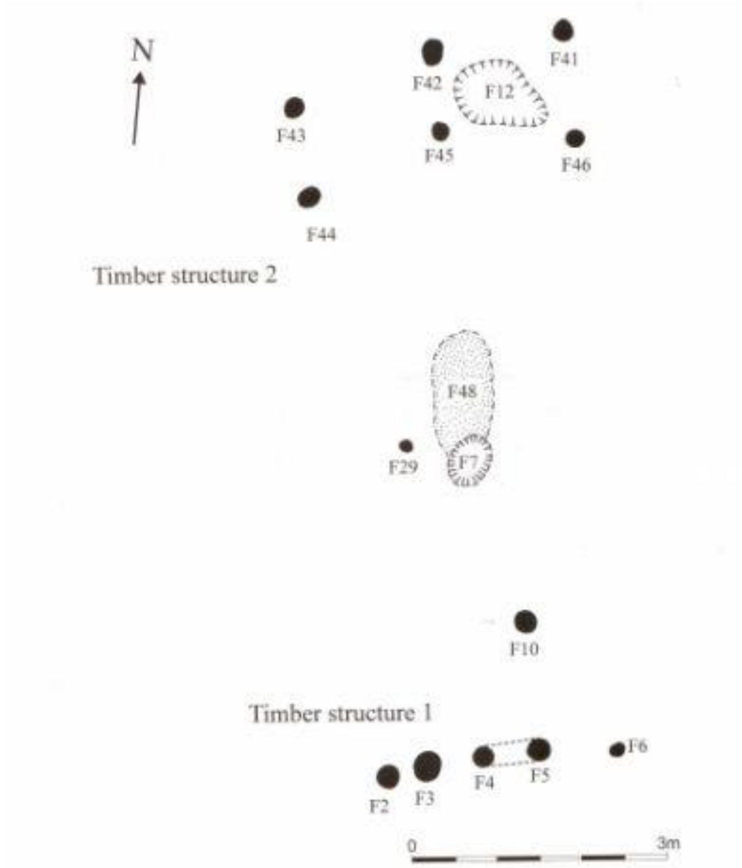

Fig. 61. Plan of the timber post-holes structures.[291]

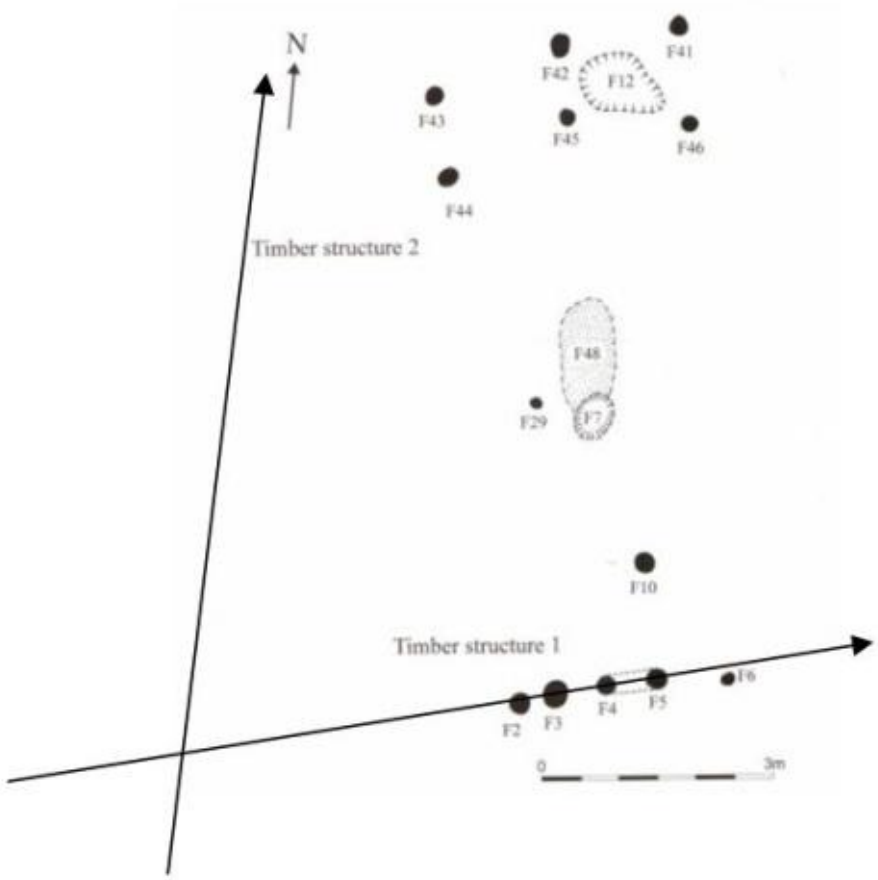

Fig. 62. Possible orientation of post-holes F3, F4 and F5.[292]

[291] Benson, '*Building and Remembrance*'. p. 28.

Within the lower row, F2 and F6 are immediately questionable. F2 is the shallowest of all the holes, standing only 0.03m deep and, in terms of being a post-hole at all, is described as of irregular shape and 'the least certain.'[293] Similarly F6 was an 'irregular circle' and is also amongst the shallowest, at only '0.12m deep.'[294]

There are however, three holes significantly different to all the others, namely F3, F4 and F5. These are of a different order of depth, including comparison with the holes of Timber Structure 2.

F4 and F5, measuring in at '0.4m deep', are the two deepest post-holes in the whole of the pre-barrow context.[295] And though F3 initially appeared shallower than F4 and F5, standing at 0.25m, this third post had vertical sides and its infill was dark brown loam, which, McFadyen suggests, 'may represent *[a]* former post.'[296]

If these three post-holes were dug in relationship to each other, they may not have been a timber structure at all. They may have been stand-alone posts which collectively offered an orientation to the horizon. If a line is taken from the centre of F3 and drawn through the centres of F4 and F5 that line can be seen to deviate northwards from true east-west (Fig. 62). Further, when considering the three deepest post-holes, F3, F4 and F5, Benson estimates the original solitary post-hole F16, could have been included in their ranks. He describes F16 as 'located 1.75m directly west of F3.'[297] If all four post-holes were dug contemporaneously, the charcoal which dates post-hole F16 can also be used to date F3, F4 and F5. So if these post-holes do have an astronomic function it is possible to date it.

As well as incorporating F16, Benson includes F10 in this grouping. Thus five post-holes are now implicated in this pattern. F10 was included because its contours displayed 'a similar large diameter' to F3, F4 and F5.[298] If these five post-holes were dug simultaneously, then the row made up of the three deepest holes now becomes longer and hence more efficient in terms of delivering an orientation. Added to that, as Benson couples the outlier F10 with F5, describing it as 'being located 2.50m directly *north* of F5'(my italics), a second, northerly, orientation appears [299] (Fig. 63).

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[292] ———, '*Building and Remembrance*'. p. 28.
[293] Mcfadyen, '*Pre-Barrow Context*'. p. 27.
[294] ———, '*Pre-Barrow Context*'. p. 29.
[295] ———, '*Pre-Barrow Context*'. p. 29.
[296] ———, '*Pre-Barrow Context*'. p. 28.
[297] ———, '*Pre-Barrow Context*'. p. 27.
[298] ———, '*Pre-Barrow Context*'. p. 27.
[299] ———, '*Pre-Barrow Context*'. p. 27.

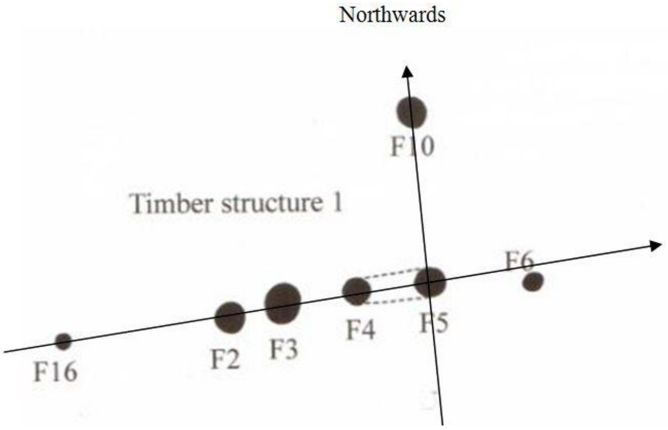

Fig. 63. Pre-barrow post-holes with their possibly deliberate alignment. [300]

It is my view these post-holes were dug in order to deliberately establish contrasting alignments east-north-east, and north-south. If Bayliss is correct and these post-holes were dug contemporaneously, I suggest the charcoal dated within post-hole F16 may put local horizon astronomy occurring at Ascott-under-Wychwood 'sometime between...4330-3970 cal BC.'[301]

Ascott-under-Wychwood: The Long Barrow

Axial Divide and Alignment

Turning now to the barrow itself, when built, the monument measured 31.33m in length by 11.73m in width and its horned end faced east.[302] It stood about eight feet at its highest point.[303] One of the barrow's predominating and original features was its fundamental axis, described by Benson as 'the central E–W baulk'[304] (Figs. 64 & 65). Benson volunteered that Figures No. 4.37 and 4.20, were of all his site plans 'most likely accurate' so it is these two diagrams I have predominantly referenced [305]

[300] Benson, '*Building and Remembrance*'. p. 28.
[301] Mcfadyen, '*Pre-Barrow Context*'. p. 26.
[302] Benson, '*Building and Remembrance*'. p. 113.
[303] ———, *Excavations*. p. 5.
[304] ———, *Excavations*. p. 10.
[305] Don Benson, email, 11 November 2012. 11 November 2012.

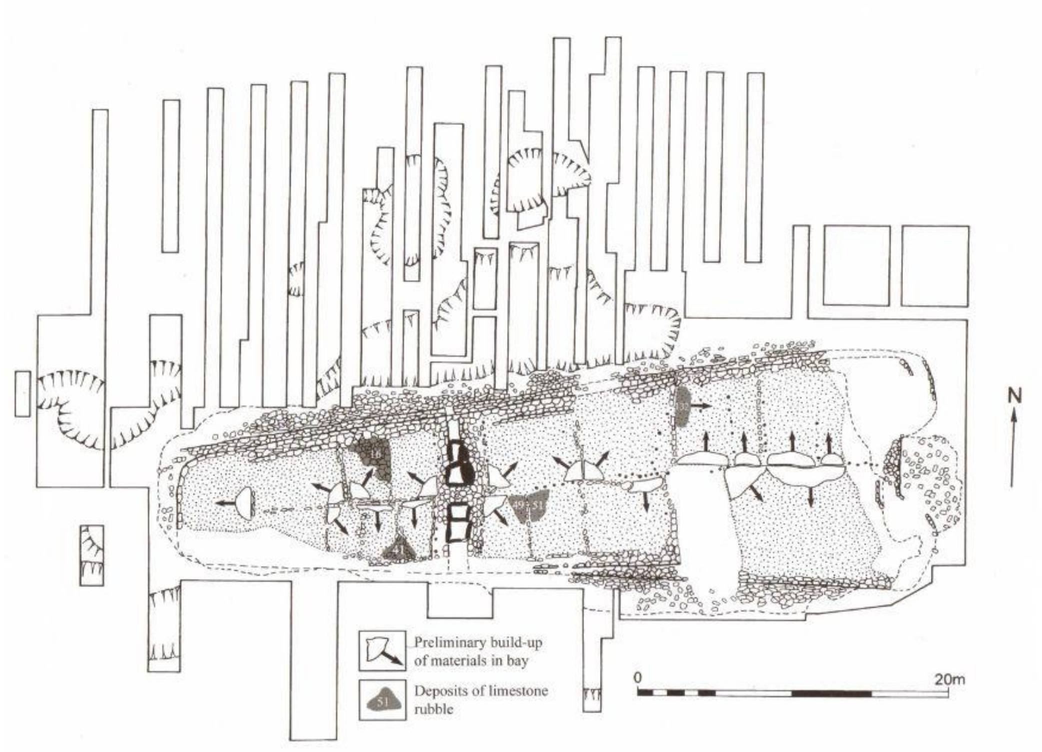

Fig. 64. Plan showing the principle orientation of the barrow and the central axis, or baulk running through it. [306]

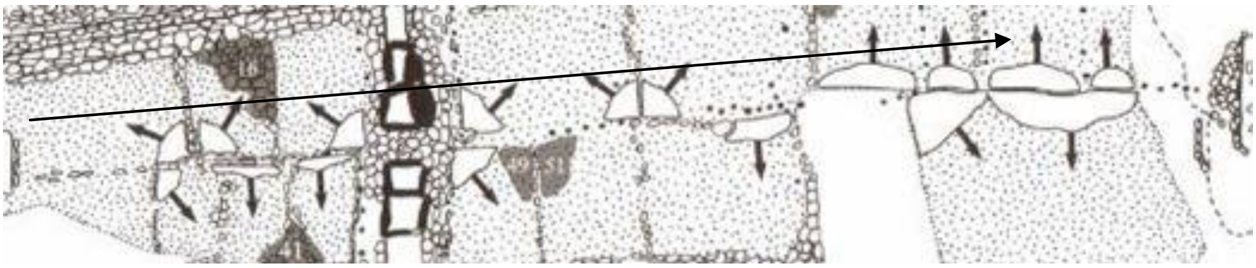

Fig. 65. Close-up of central axial divide described by Benson as the central east-west baulk.

McFadyen nominates the central axis a major architectural feature and one which connected ‘the western and eastern areas of the site.’[307] Darvill noted that it was painstakingly laid out and added, it is ‘easy to imagine that considerable trouble was taken to get it exactly as the builders felt it should be.’[308] This primary orientation was constructed by the weaving together of materials including stacks of turves, regularly spaced stakes of wood possibly connected by wicker panels and vertically set stone slabs.[309] These original constituent parts when conjoined became what the excavators

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[306] Don Benson and Alasdair Whittle Lesley Mcfadyen, 'The Long Barrow', in *Building Memories the Neolithic Cotswold Long Barrow at Ascott-under-Wychwood, Gloucestershire*, ed. Don Benson and Alasdair Whittle (Oxford: Oxbow, 2007).[hereafter: Mcfayden, The Long Barrow], p. 104.
[307] Lesley Mcfadyen, '*The Long Barrow*'.p. 93.
[308] Darvill, *Cotswolds* p. 97.
[309] Lesley Mcfadyen, '*The Long Barrow*'. p. 93.

designated the 'axial division.'[310] This, they judged, was a precursor, laid 'before there were other kinds of building activity'[311] (Fig. 66).

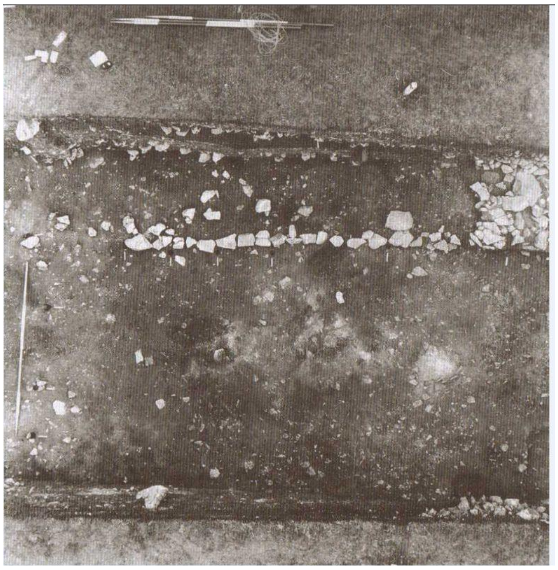

Fig. 66. White stones and white tabs mark out the line along which the axial divide was woven.[312]

It is this part of the structure, made up of various materials, which created the barrow's linear axis and it is my contention it was created with fundamental archaeoastronomic intent. Its constituent parts are described as being:-

> witnesses to coherent and continuous ways of controlling and implementing the alignment, shape and form (including the height) of the emergent barrow mound.[313]

If a coherent and continuous control was implemented during the construction of the axial divide, it could be said that planning, measurement and execution went hand in hand. The divide established the primary orientation of the barrow. It was carefully constructed and this gives evidence of a search for precision and exactitude which infers intent. Also, I noticed that McFadyen was struck by the fact that the axis 'was oriented rather uncannily, in the same direction as the post-holes in Timber Structure 1.'[314] She is referring to the pre-barrow post-holes F2, F3, F4, F5 and F6. McFadyen's impulse to consider this repetition deliberate is apparent when she adds:-

> In one view spatial relationships of some kind might be contemplated between the posts in the timber structures and the later stakes in the axial divide.[315]

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310 ———, '*The Long Barrow*'. p. 95.
311 ———, '*The Long Barrow*'. p. 93.
312 ———, '*The Long Barrow*'. p. 116.
313 ———, '*The Long Barrow*'. p. 95.
314 ———, '*The Long Barrow*'. p. 81.
315 ———, '*The Long Barrow*'. p. 81.

In fact, replication occurred again, when a deliberate choice over the barrow's orientation occurred a second time. Bayliss estimated that the principle use of the monument spanned a period of ‘65 and 160 years.’[316] But he also notes the barrow was extended ‘less than 55 years after its original construction.’[317]

Darvill writes that many long barrows in the Cotswolds and surrounding areas ‘seal’ earlier structures.’[318] The new barrows were built over and around the old. He suggests that such extensions were an opportunity to change key structural aspects not least the axes of the barrows themselves, that there were indeed barrows which when rebuilt entirely ‘disregarded the orientation of earlier features.’[319] There is, he says, a ‘tension’ which can be seen when there is a shift in orientation between a newly enlarged barrow and the edges of the earlier structure it subsumed.[320] However, when the Ascott barrow was extended, fidelity to the original orientation remained. When questioned about the extension, Benson said:-

> One very important element was the clear line which the foundation stonework established through the centre of the newly extended part of the barrow. It was exactly in line with the foundational axis of the original barrow. So, it can be confidently determined that the primary axis of the barrow was clearly carried through.[321]

I suggest this strongly supports the fact that creating alignment was central to the architects' plans throughout the entire build. Further, this was an alignment which satisfied not just those who built the barrow, but those who previously inserted the post-holes. There was a repetition of orientation on this landscape across time. This particular alignment was chosen three times. I explore the astronomies of the relationship this alignment created with the horizon and thus the sky, in my field work.

Continuities between Post-holes and Barrow's Axial Divide.

Though an intellectual fidelity to this alignment clearly existed it is unlikely it continued materially. Mcfadyen argued for continuity, but when considering the possibility that the posts were still in existence when the barrow was built adds the caveat, ‘even if [*they were*] largely rotted.’[322] This admits to a substantial time period between the insertion of the post-holes and the construction of the monument.

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[316] Alex Bayliss, '*Ascott-under-Wychwood Date*'.p. 37.
[317] ———, '*Ascott-under-Wychwood Date*'. p. 36.
[318] Darvill, *Cotswolds* p. 47.
[319] ———, *Cotswolds* p. 97.
[320] ———, *Cotswolds* p. 97.
[321] Don Benson, Telephone conversation, 28 April 2013.
[322] Lesley Mcfadyen, '*The Long Barrow*'. p. 81.

Disagreeing with McFadyen, Benson advises against physical continuity arguing the stratigraphic evidence is ‘strongly against’ the post-holes and the barrow co-existing.[323] Supporting Benson, Bayliss points to the turf line found between the pre-barrow post-holes and the monument's foundation. Bayliss suggests the pre-barrow occupation ended ‘most probably between *3870-3775 cal BC'*.[324] Benson calculates the interregnum between the post-holes falling from sight and the laying down of the axial divide lasted between *‘35-125 years.’*[325]

This appears to indicate a discontinuity of use at this site. Even though the two features were ‘oriented rather uncannily’ in the same direction, the pre-barrow post-holes’ alignment cannot have been a visible influence on the orientation of the barrow’s axis.[326] However, if the site did fall out of use, if astronomic intent did inform the alignment of both post-holes and barrow, though it may have been assayed by two different communities, that alignment remained constant.

Dating of the Long Barrow

It may be possible to locate the time when this 'uncanny' similarity in orientation was replicated. Six samples of wood, antler and bone were found buried beneath the barrow's central axis. One item was a cattle skull ‘used to mark the easternmost point of the axial divide.’[327] This may have been apotropaic. The concealing of an object under a foundation in order to avert evil is a typical ritual activity, possibly pointing to the barrow's function as a sacred place. The date given for the cattle skull was sometime between ‘*3760-3700 cal BC*.’[328] Thus I suggest it is possible that astronomic principles were being embedded in Neolithic architecture during the latter part of the fourth millennium BCE in a similar fashion to those applied during the Mesolithic.

The Stone Cists

Uniquely from amongst my three case studies, Ascott-under-Wychwood’s funeral chambers were cists. Cists are made of upright stone slabs, placed in a square, which box is closed over by a single roof slab[329] (Fig. 67).

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323 ———, '*The Long Barrow*'. p. 81.
324 Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 36.
325 ———, '*Ascott-under-Wychwood Date*'. p. 36.
326 Lesley Mcfadyen, '*The Long Barrow*'. p. 81.
327 Bayliss, '*Interpreting Chronology*'. p. 225.
328 Benson, *Excavations*. p. 226.
329 Glynn Daniel, *The Megalith Builders of Western Europe* (London: Hutchinson, 1958). p. 15.

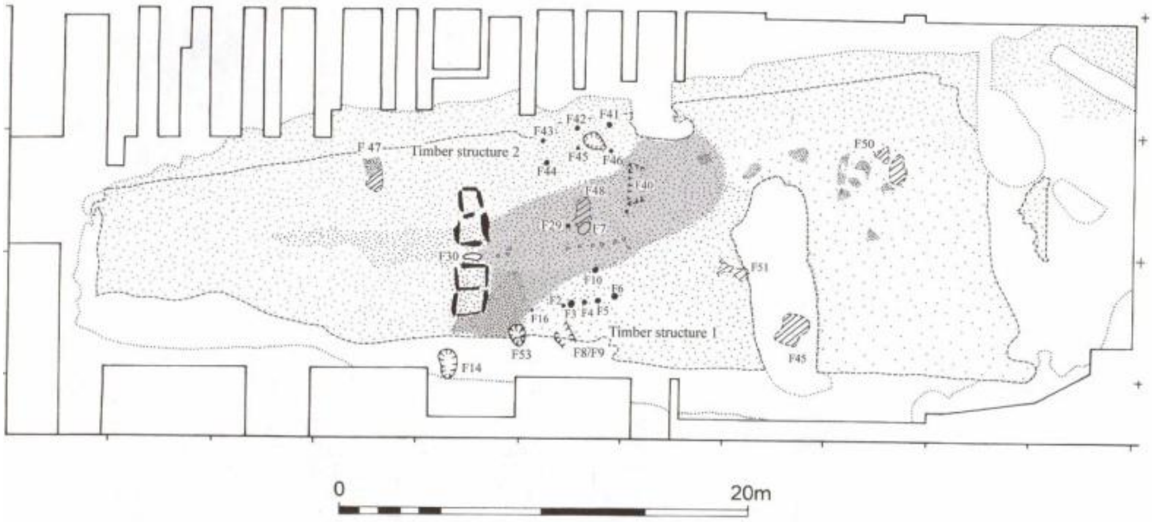

Fig. 67. The four central stone cists in relation to the whole barrow. [330]

The cists stood at right angles to the axial divide, bisecting it north-south and forming a ‘transverse corridor across the site.’[331] Bayliss suggests the installation of both the cists and the axial divide appear contemporaneous, so these stone burial chambers may also be dated to ‘*3760-3700 cal BC*.’[332] The angle between these two internal features appears to be carefully considered. Turning to the stone cist corridor first, in order to align them accurately two separate partitions described as 'north-south oriented' and made of stakes and wood panels were erected.[333] Subsequent to that and using them as guidance, the cists were built in a straight line running between the panelling (Figs. 68 & 69).

[330] Lesley Mcfadyen, '*The Long Barrow*'. p. 83.
[331] ———, '*The Long Barrow*'. p. 96.
[332] Benson, *Excavations*. p. 226.
[333] Lesley Mcfadyen, '*The Long Barrow*'. p. 96.

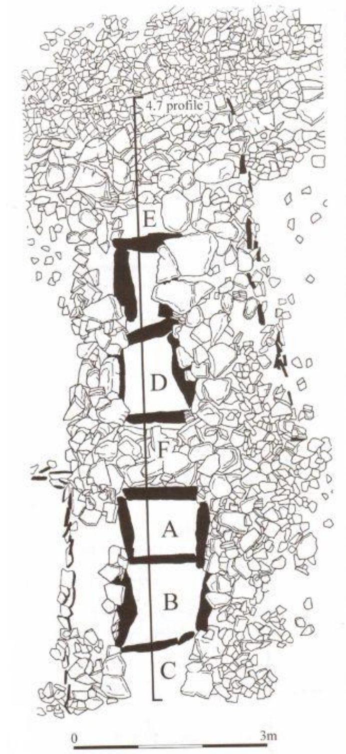

Fig. 68. The cists and surrounding stonework.[334]

Fig. 69. The excavated Ascott stone cists, currently located near Ascott-under-Wychwood's Church.[335]

The stone cists were very precisely positioned. The middle stones, that is the top stone of cist A and the bottom stone of cist D, were placed in exact horizontal relationship to each other (Fig 68). McFadyen noted:-

> It is the inner cists in each pair which in fact present the straightest alignment.[336]

It was only once those two stones were carefully placed in parallel that the central axis was added to in each direction till it spanned the monument's entire length.[337] Bayliss, noticing this sensitive measurement, concluded that from amongst all the many architectural features of this barrow, 'the alignment of the cists is of considerable importance.'[338] He infers that those who built Ascott took great care over the orientation of this north-south corridor precisely at the point of its junction with the axial divide. As well creating a deliberate parallel between the stones, it was noticed that the ground soil had been carefully re-worked precisely where stone cists and the axis bisected. Fresh soil had been imported and it was described as, 'loose, almost

[334] ———, '*The Long Barrow*'. p. 85.
[335] Secretary. Wychwoods Local History Society. Wendy Pearse, Ascott-Under-Wychwood. 25th September 2012. Photograph by kind permission.
[336] Lesley Mcfadyen, '*The Long Barrow*'. p. 82.
[337] ———, '*The Long Barrow*'. p. 93.
[338] ———, '*The Long Barrow*'. p. 82.

stone-free, dark brown loam, contrasting with compact stony horizon at base of soil profile.'[339] The excavators describe the shape of the hole created here as:-

> F30. Metre square 1-m 22-23. Shallow hollow, ?stone hole. Cut. Oval shaped, long axis east-west.[340]

They speculate as to whether this stone socket provided the base for an 'orthostat that had putatively been erected *[there]*.'[341] The socket is described as providing 'shallow footing for a stone' and as can be seen from the figure below, it was central, parallel and integral [342] (Fig. 70).

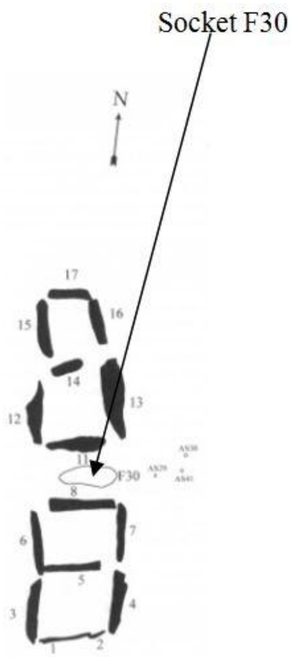

Fig. 70. Socket F30, centred between inner stone slabs of central cists. [343]

The fact that the earth around socket F30 was not compacted may indicate the stone inserted in the specially prepared hollow was not used for structural support.[344] Thus I suggest the earthen hollow was especially prepared in order to receive and stabilize a stone designed to function as a marker. As discussed, the axial divide underpinning the entire length of the barrow was constructed from turves, slabs and wooden stakes, except at the point where socket F30 is found. This socket made room for a stone, providing something far more substantial, and it did this at a focal point. Socket F30's long, east-west oval stone created a perpendicular to the north-south transverse corridor of cists. In my estimation it is at this pivotal point, during the initial laying

339 Mcfadyen, '*Pre-Barrow Context*'. p. 53.
340 ———, '*Pre-Barrow Context*'. p. 53.
341 Lesley Mcfadyen, '*The Long Barrow*'. p. 96.
342 ———, '*The Long Barrow*'. p. 93.
343 Benson, '*Building and Remembrance*'. p. 82.
344 Mcfadyen, '*Pre-Barrow Context*'. p. 53.

down of the barrow's foundations, that the monument's fundamental orientations were established. I discuss what I suggest are these definitely intended archaeoastronomic features in greater detail when considering all the barrow's alignments below.

<u>Continuities between Post-holes and Stone Cists</u>

As mentioned, McFadyen had noticed the replication between the alignment of the east-west pre-barrow post-holes and the subsequent monument's axial divide.[345] Turning to the north-south orientation, though no mention was made of a similar continuity of alignment between post-holes 5 & 10 and the stone cist corridor, I suggest these two features also share an orientation. It is my contention that those who built the Ascott-under-Wychwood barrow replicated not just the east-west alignment established pre-barrow, but also the north-south one (Fig. 71).

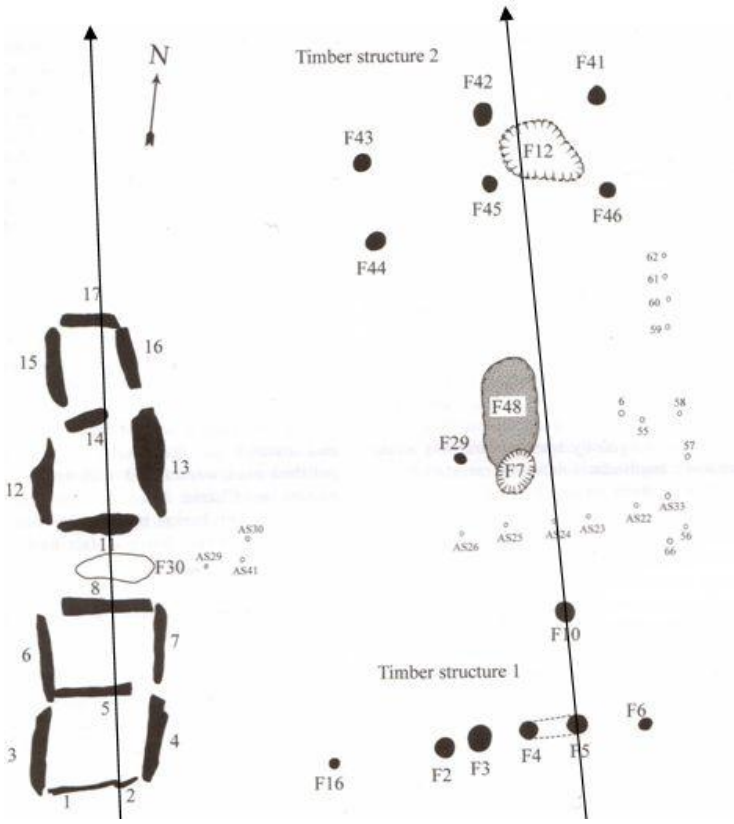

Fig. 71. Post-holes F5 and F10 showing similar orientation to stone cists. [346]

Thus a duality emerges. All cardinal directions are accessed and, as will be argued, there is continuity across time periods (Fig.72).

[345] Lesley Mcfadyen, '*The Long Barrow*'. p. 81.
[346] Benson, '*Building and Remembrance*'. p. 28.

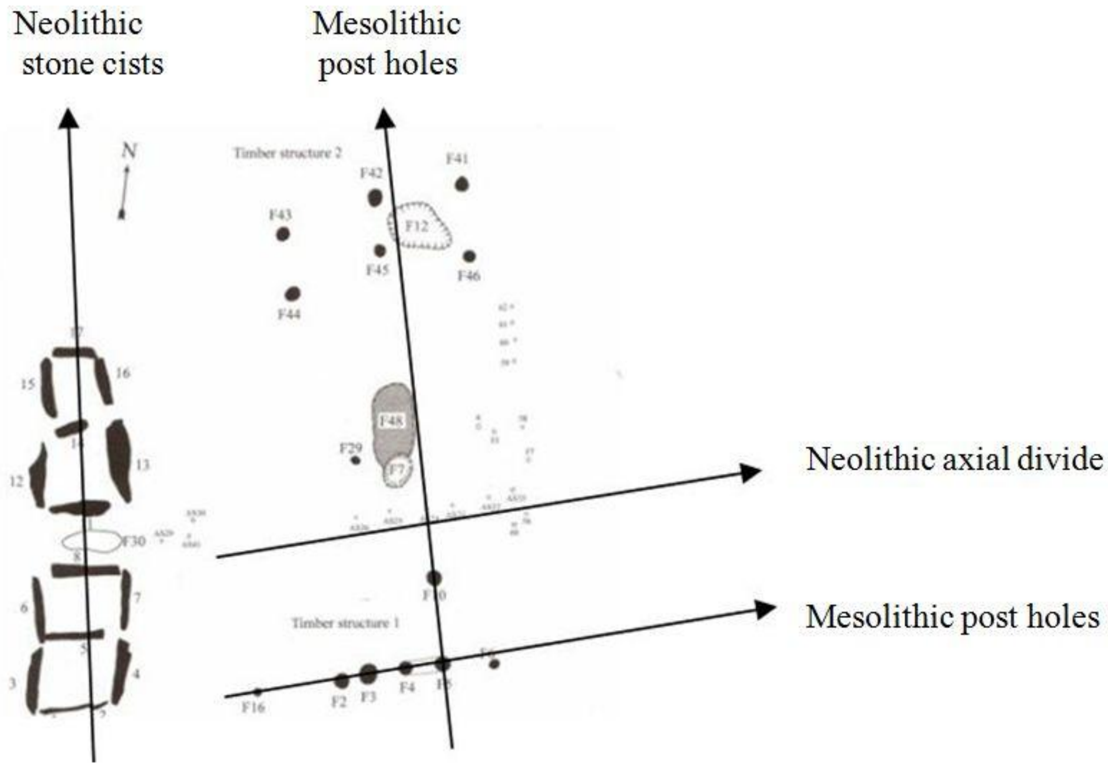

Fig. 72. Replication of orientation across the Mesolithic to Neolithic transition.

It is not possible to know if the Mesolithic post-holes and the Neolithic barrow served the same community. As discussed above, there may have been a discontinuity of use at the site. If there was a fidelity to intended alignment, then its record was oral, in some other material form, or elsewhere. Whoever this site served, there appear to have been continuities of alignment across time.

Ascott-under-Wychwood: Establishing Alignment

The Barrow

Referring to one of Benson's most accurate diagrams[347] (Fig. 73), it can be seen that the longer, western section of the barrow's axis was laid down first as a primary orientation, and the angle remains true for the rest of the barrow's length.

[347] ———. 11 November 2012. Email.

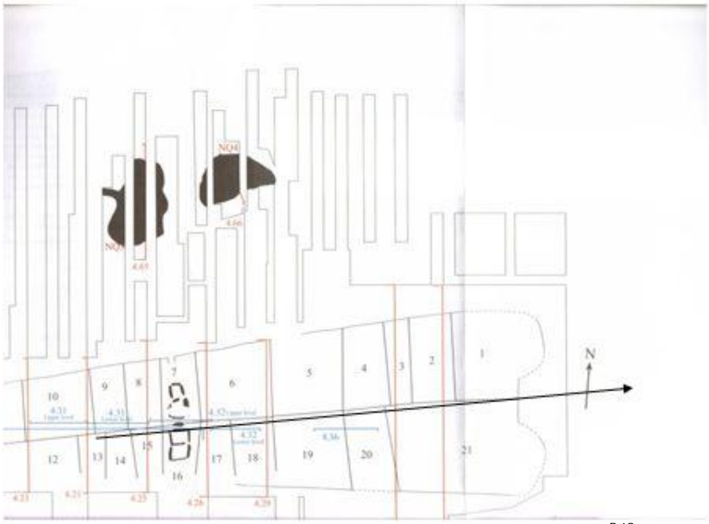
Fig. 73. Don Benson's Excavation Plan Figure No. 4.20.[348]

I had asked Benson about the barrow's orientation pre-excavation and he replied, 'my own calculation is that the **overall** alignment of the completed barrow site is approximately 7 degrees N of E.'[349] (Benson's emphasis).

Ascott-under-Wychwood: Declination of barrow

The declinations which result from my calculations are +9º/-8º. (All calculations for all declinations are in Appendix 7).

The North-South Stone Cist Corridor

Returning to the north-south stone cists, as mentioned, Baylis noted that their orientation must have been 'of considerable importance.'[350] Stone Socket F30 was placed at the centre of the cists and I contend that its 'oval shaped, long axis east-west' was deliberately positioned in order to establish a fundamental orientation[351] (Fig. 74).

348 ———, '*Building and Remembrance*'. [hereafter: Benson. Building and Remembrance] p. 93.
349 ———.
350 Lesley Mcfadyen, '*The Long Barrow*'. p. 82.
351 Mcfadyen, '*Pre-Barrow Context*'. p. 53.

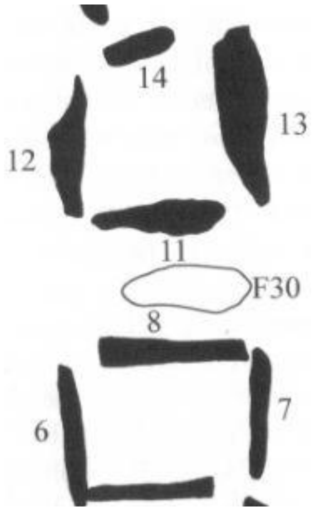

Fig. 74. A fundamental alignment at the centre of the barrow,
emanating from the centrally placed east-west Stone F30.[352]

The careful paralleling of stones 8 and 11 has been mentioned. Indeed McFadyen further pointed out how these two stones presented 'the straightest alignment.'[353] On close inspection, stone 8 can be seen to be uncommonly flat and I would suggest it was hand crafted to deliver a level measure (Fig.75).

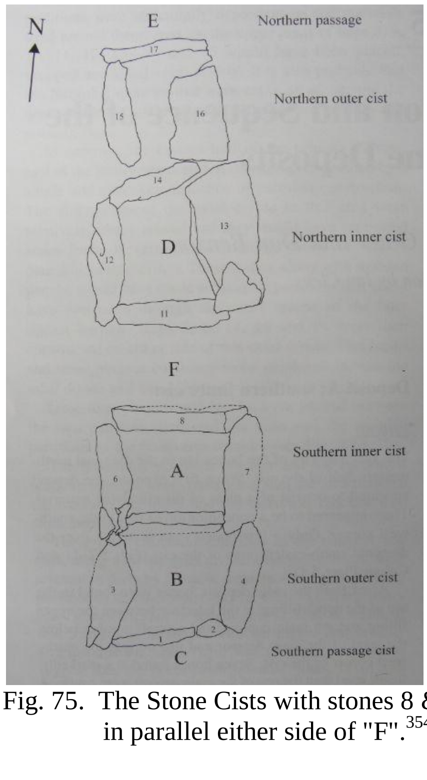

Fig. 75. The Stone Cists with stones 8 & 11
in parallel either side of "F".[354]

[352] Don Benson and Alasdair Whittle, *Building Memories the Neolithic Cotswold Long Barrow at Ascott-under-Wychwood, Oxfordshire* (Oxford: Oxbow Books, 2007). p. 82.
[353] Lesley Mcfadyen, '*The Long Barrow*'. p. 82.
[354] Whittle, *Building Memories*. p. 138.

With the stone cist corridor travelling north-south and the three stones, 8, 11 & F30 travelling east-west, a right angle is created at the heart of the barrow (Figs. 76 & 77).

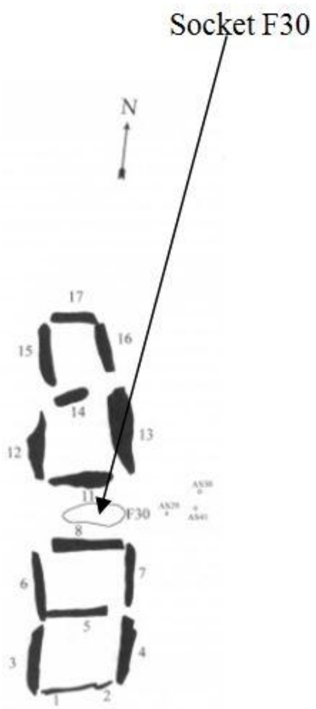

Fig. 76. Stone Socket F30 in parallel to stones 8 & 11.[355]

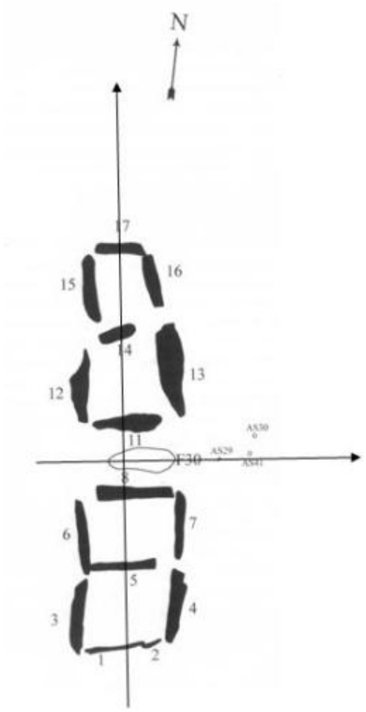

Fig. 77. Right angle created by entire length of stone cists and F30.

This right angle can be measured against the orientation presented by the stake-holes which formed the basis of the axial divide, marked AS26, AS25, AS24, AS22, AS33 (Fig. 78).

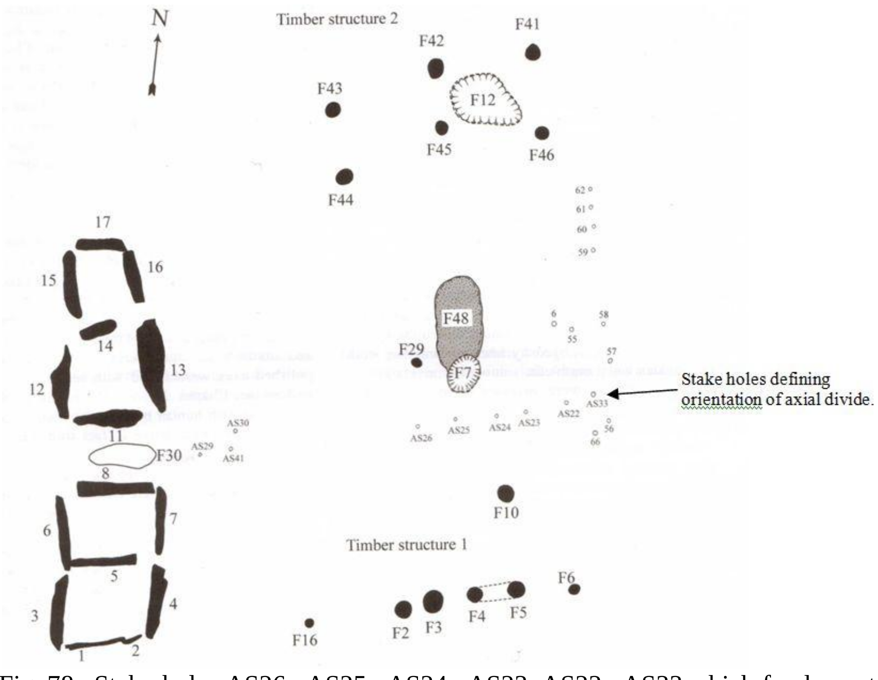

Fig. 78. Stake-holes AS26, AS25, AS24, AS23, AS22, AS33 which fundamentally oriented the axial divide.[356]

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[355] Benson, '*Building and Remembrance*'. p. 28.
[356] Whittle, *Building Memories*. p. 82.

The stake-holes integral to the construction of the barrow's axial divide echo the orientation of the monument (Fig. 79).

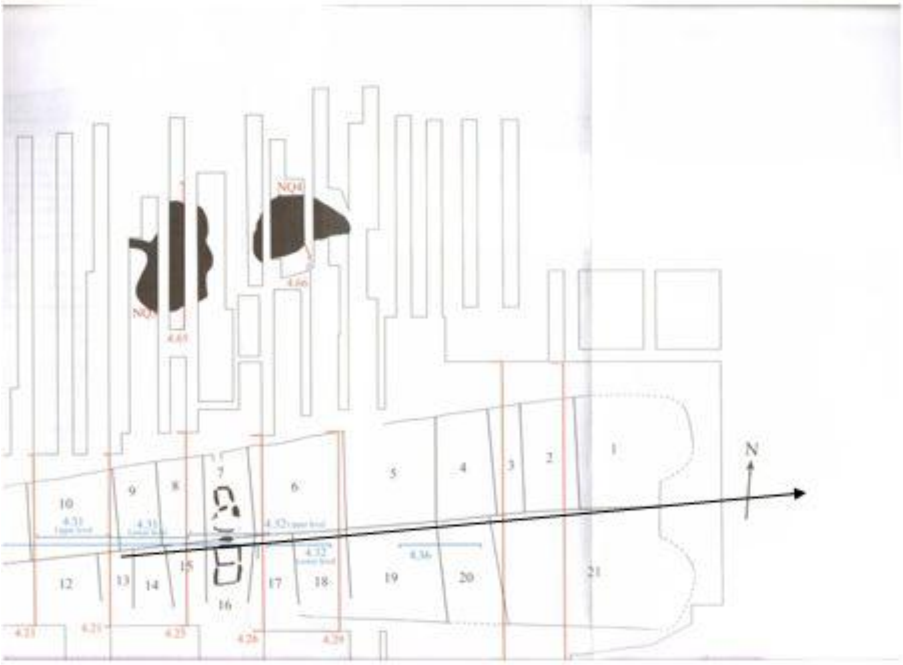

Fig. 79. Don Benson's Excavation Plan Figure No. 4.20.[357] The barrow lay in the same direction as the stake-holes which established its axial foundation.

It is possible to measure and then compare the orientation of the stake-holes and the parallel stones including F30, at the heart of the barrow. There is a 10° difference in their alignments. The diagram below illustrates the two different orientations which emerge (Fig. 80).

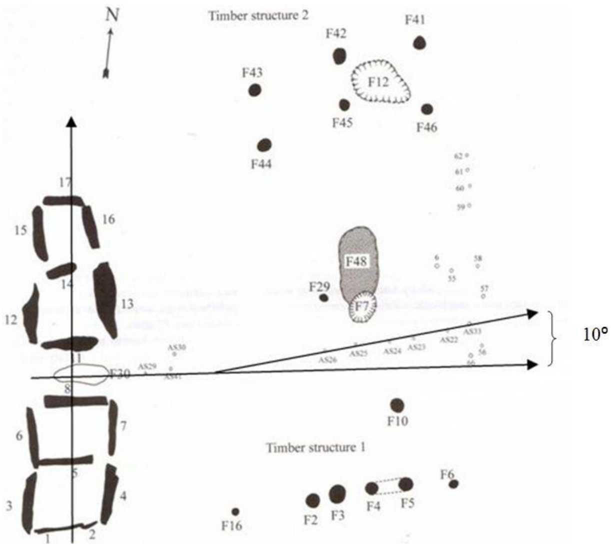

Fig 80. Angle of deviation between the parallel stones, including F30, and that of the azimuth (from magnetic north) created by the stake-holes.

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[357] Benson, '*Building and Remembrance*'. [hereafter: Benson. Building and Remembrance] p. 93.

Benson's measurement of 83° of azimuth from magnetic north in July 1966, recalculates to 75° from True North. As the stake holes are ten degrees from Stone F30's azimuth and as this parallel stone creates a right angle with the burial chambers, it is possible to calculate the Stone Cists azimuth to 355° (Fig 81).

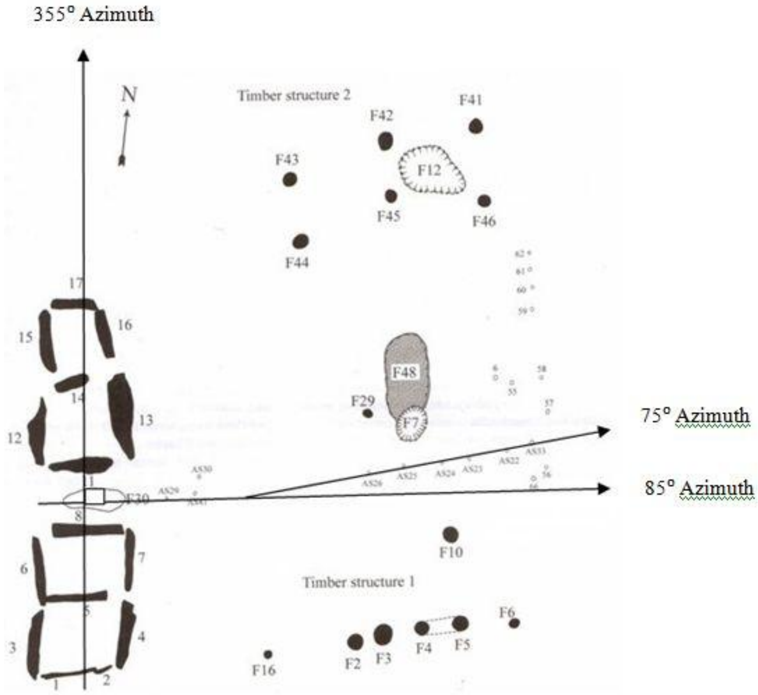

Fig. 81. 75° azimuth + 10° - 90° = Stone cists azimuth 355°/175° from True North.
Stones F30, 1 and 8 create a right angle with the north/south burial chambers.

North-South - Declination of Stone Cist Corridor

The declinations which result from these calculations are +38°/-38°.

East West - Declination of parallel stones including Stone F30

The declinations which result from these calculations are 3°/-2°.

Ascott-under-Wychwood: Discussion of possible astronomic intent at this site

Mesolithic Pre-Barrow Post-holes: *'4330-3970 cal BC'*[358]

East/West Post-holes: Declination +9°/-8°

The Mesolithic post-holes provide some of the earliest evidence of site usage at Ascott-under-Wychwood. The east-west posts align to the rising Autumn Full Moon eclipse on a minor standstill. When Silva's theoretical declination is adjusted for the variability of the ecliptic, the full moon's probable rise point becomes +8.6° close to the post-holes' declination of +9°.[359] In terms of stellar alignment, if the Mesolithic post-

[358] Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 38.
[359] Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.

hole date of 4330 cal BC is applied, the Pleiades [HIP 17702] Visual Magnitude 1.6, set at -7.5°, close to the post-holes' declination of -8°.[360] The Pleiades star cluster has traditionally been associated with farming. Hesiod (750-650 BCE), wrote of their use as an agricultural calendar, noting 'When the Pleiades, daughters of Atlas, are rising, begin your harvest, and your ploughing when they are going to set.'[361] It is possible the Pleiades were used for the same calendrical purpose in central southern England. As they lay close to the celestial equator they underwent phases of both Arising and Laying Hidden and Curtailed Passage. They disappeared from the night sky for 44 days across the winter, heliacally rising five days after the Vernal Equinox. This perhaps provided what Silva describes as a 'temporal marker,' which in this case heralded Spring.'[362] The Pleiades remained circumpolar for 27 days during their period of Curtailed Passage, switching horizons from their last evening rise to their first morning set three weeks before the Autumn Equinox. This first contact with the western horizon was within a degree of the declination the barrow aligned to, perhaps again providing a seasonal marker.

<u>North South Mesolithic Pre-Barrow Post-holes: Declinations +38°/-38°</u>

Turning to the north-south Mesolithic posts, if the same date is used as the post-hole date from above, no alignment is found. However Benson advises that 'the earliest radio carbon dates for less transitory site usage at Ascott,' come from roe deer bones dated '*5300-4900 cal BC'*, so I decided to check those.[363] The following is speculative, but having assessed their range, it is possible an alignment to Deneb Adige was established around 4900 cal BCE. Deneb Adige's declination was +38°, so it was just circumpolar, never quite setting. It came closest to a setting point at the post-holes' azimuth of 355° then skimmed along the horizon for about ten degrees before rising towards the 'imperishable' stars at around 5° of azimuth[364] (Fig 82).

[360] Stellarium 0.12.0.
[361] Hesiod, *Works and Days, Theogony and the Shield of Heracules*. p. 13.
[362] F Silva, 'Landscape and Astronomy in Megalithic Portugal: The Carrgal Do Sal Nucleus and Star Mountain Range', *PIA* 22(2012). p. 109.
[363] Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 38.
[364] Brady, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 42.

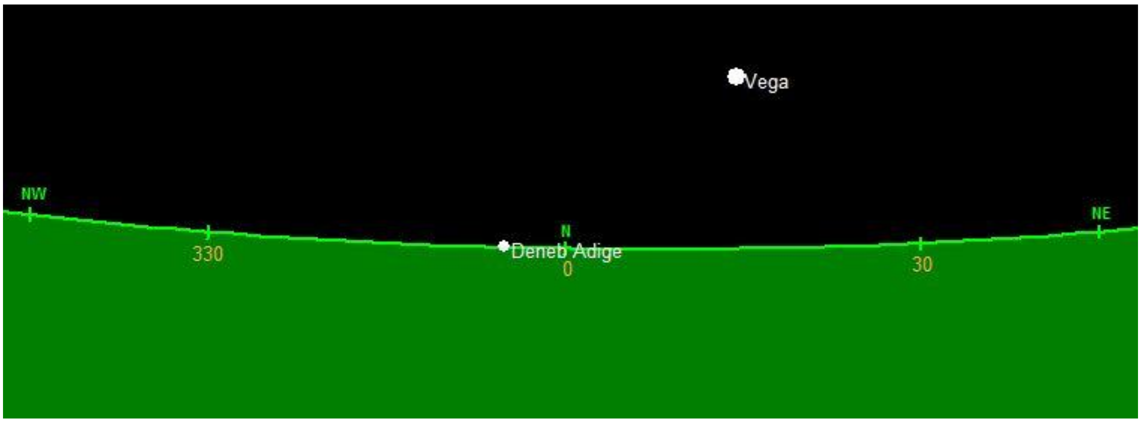

Fig. 82. Deneb Adige, circumpolar at +38.5º of declination at Ascott-under-Wychwood, first 'contacting' the horizon at around 355ºof azimuth, which it shares with the Mesolithic post-holes. This was during the earliest date of proven site usage, 4900 BCE.[365]

This alignment is one where Schaefer's extinction angle principle should perhaps be considered. He suggests a careful assessment be made of the angle on the horizon below which a star becomes invisible.[366] Aveni also addresses this issue, advising that 'owing to the increased absorption of light by the earth's atmosphere at low altitudes, not all objects are visible down to the horizon.'[367] Given Deneb Adige's celestial motion, it may not have been observable as it skimmed along the horizon. However it is the apparent setting/rising motion that is under discussion here. Should Deneb Adige have become invisible as it entered the angle of extinction it would in fact have as efficiently performed the 'descent/ascent' function displayed by stars of Curtailed Passage even if technically circumpolar. Certainly at Ascott-under-Wychwood's latitude there would have been times when Deneb Adige would be seen to journey only amongst those stars considered 'divine', before it then re-connected with the horizon at the point aligned to by the post-holes.[368]

The Neolithic Barrow: *3760-3700 cal BC*'.[369] Declination: +9º/-8º

The barrow's orientation replicated the Mesolithic east-west post-holes which it overlay, so its declination was also +9º/-8. In terms of stellar alignment, Aldebaran (α Tau) – HIP 21421, Visual Magnitude 0.8, set at -9º close to the barrow's declination in 3730 BCE.[370] This star, which is the brightest in its constellation, is red to the naked

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365 Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 38.
366 Schaefer, '*Atmospheric Extinction Effects*'.
367 Anthony F Aveni, 'Astronomical Tables Intended for Use in Astro-Archaelogoical Studies', *American Antiquity* 37, no. 4 (1972). p. 532.
368 Brady, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 41.
369 Benson, *Excavations*. p. 226.
370 Stellarium 0.12.0.

eye.[371] In similar fashion to the Pleiades, it also underwent phases of Arising and Laying Hidden and Curtailed Passage. It heliacally rose about a month after the Vernal Equinox, its reappearance in the sky possibly marking the approach of Spring.[372] About five months later it entered a brief period of Curtailed Passage. Its last evening rise was just a day before the Autumn equinox. Aldebaran then displayed circumpolar qualities for five days till it switched horizons with its first morning set. This shift to the western horizon, on a declination close to that shared by the barrow, may have been used as a seasonal marker (Fig. 83).

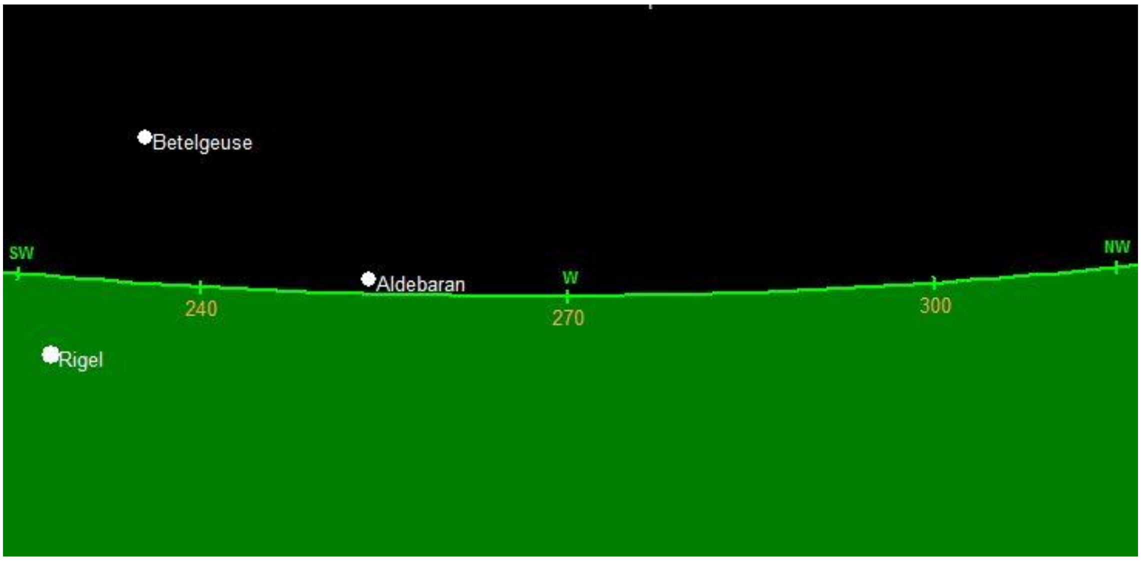

Fig. 83. Aldebaran setting at Ascott-under-Wychwood at a declination of -9° in 3730 BCE.

Given the barrow's replication of orientation, this second alignment could be intended or co-incidental. However, the repetition means the newly built barrow also aligned to a rising Autumn Full Moon eclipse on a minor standstill year.

Embedded deep within the barrow, the parallel stones F30, 8, and 11, orient to a declination of 3°/-2° which is an indeterminate alignment.

Neolithic North South Stone Cists Declination +38°/-38°

The Neolithic stone cists also repeated the orientation created by pre-barrow Mesolithic features. They share the same declination as the north-south post-holes and I contend this was deliberate (Fig. 72. p. 85). The funeral cists date to around 3730 BCE when Vindemiatrix [HIP 63608], visual magnitude of 2.8, and the third brightest star in the constellation of Virgo, travelled along the horizon at +38° of declination. It covered an area of about ten degrees of azimuth from 355° to 5°. Vindemiatrix was also

[371] Silva, '*Landscape and Astronomy*'. [hereafter: Silva. Landscape and Astronomy]. p.108.
[372] ———, '*Landscape and Astronomy*'. p. 109.

circumpolar, never quite setting, so perhaps this star performed as Deneb Adige had done in an earlier era (Fig. 84).

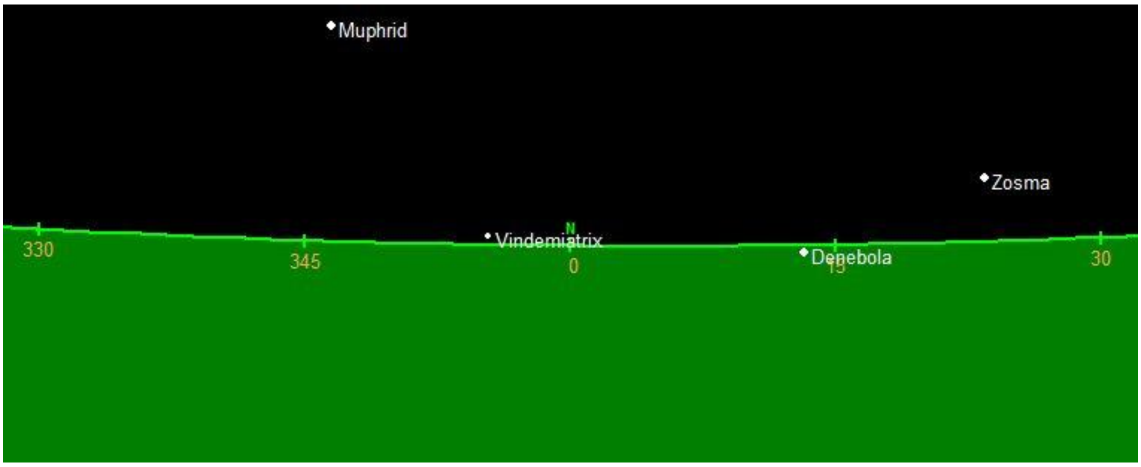

Fig. 84. Vindemiatrix, approaching 355° of azimuth on the horizon at Ascott-under-Wychwood, at a declination of +38. 3°in 3730 BCE.[373]

Ascott-under-Wychwood: Summary of continuities and discontinuities of possible astronomic intent at this site

Concluding the Ascott case study, the material record at this site reflects the transition from the Mesolithic to the Neolithic.[374] I have identified four features which possibly indicate deliberate archaeoastronomic intent. These include the tree throw's opening up of the horizon, the pre-barrow Mesolithic post-holes, the orientation of the Neolithic stone cists and the monument itself. Framing these findings within my broader research, the Ascott barrow postdates Burn Ground, but predates the period of 'solarization' Sims posits for Stonehenge. [375] Burn Ground possibly dates from its oldest bone which was interred between '4230-3970 BC.'[376] As the Ascott barrow was constructed between '*3760-3700 cal BC'*, at least two hundred and seventy years or possibly more separated the two monuments. [377]

I suggest that as the Neolithic cists and barrow appear to replicate the orientations of the Mesolithic post-holes beneath, continuity across eras occurred at this site with deliberate choices being made twice, in some cases to the same horizon events. The extremely sensitive way the north-south stone cists bisected the barrow's east-west line of stake holes speaks of both these alignments being carefully established in counter distinction to each other. The first alignment at Ascott-under-Wychwood appears to have been a stellar one, possibly to a star undergoing Curtailed Passage. This celestial

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[373] *Starlight*.
[374] Bayliss, '*Interpreting Chronology*'. p. 228.
[375] Sims, '*Solarization*'. p. 14.
[376] Brickley, '*Date and Sequence of Use*'. p. 339.
[377] Benson, *Excavations*. p. 226.

motion may have informed a belief system which symbolised ascension to the divine.[378] If this alignment did have ritual significance it dated from the earliest fifth millennium through to the Neolithic, lasting episodically for over fifteen hundred years.[379] A separate, lunar alignment, possibly established in the Mesolithic and repeated again in the Neolithic may have been in place periodically for at least six hundred years. When first installed, this lunar alignment combined with a stellar one. Certainly, as at Burn Ground, Sims' proposition that lunar astronomy was in place at this time in this region holds true for Ascott-under-Wychwood.

[378] Brady, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 41.
[379] Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 38.

Case Study Three:

Hazleton North and South

Latitude: - 51^0 N 52’ 05”
Longitude: - 1^0 W 53’ 40”

My third case study is an exploration of the barrows Hazleton North and Hazleton South. They are located in Barrow Ground Field which is described as a local highpoint[380] (Fig. 85).

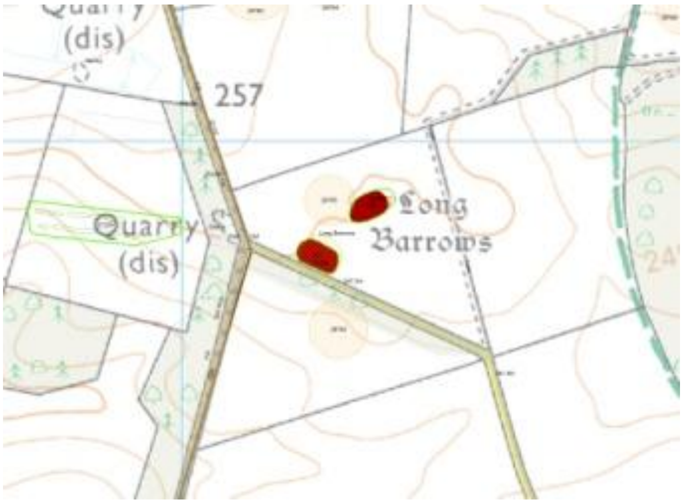

Fig. 85. Hazleton North and South in Barrow Ground Field.
Hazleton North is the ellipse adjacent to the phrase ‘Long Barrow’.
Historic Environment Record contour map. [381]

Whitts makes an early reference to Hazleton North when in 1883, he measured the mound as standing at nine feet high.[382] He also judged that Hazleton's orientation lay east-west, but H. O'Neil and Leslie V. Grinsell later refined that measurement, suggesting a more accurate 'ENE/WSW'.[383]

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[380] Saville, '*Hazleton North*'. [hereafter: Saville. Hazleton North]. p. 1.
[381] Historic Environment Record, 'Hazelton North and South', *Shire Hall* Gloucester(2013).
[382] Witts, *Archaeological Handbook*. p. 80.
[383] H O'Neil and Leslie V Grinsell, 'Transactions of the Bristol and Gloucestershire Archaeological Society', (1960). p. 81.

Fig. 86. Hazelton North before excavation in September 1979, viewed from the north-east.[384]

Hazleton North is referred to in the literature as the Flintknapper's Grave.[385] It has been dated by worn deer antlers found adjacent to the barrow which were probably used as tools during the barrow's construction.[386] These dates stand at around *'3710-3655 cal BC.*' This particular barrow's rarity is noted by Saville who points out it is one of only two Cotswold-Severn tombs where 'the specific association between an individual burial and personal grave goods can be substantiated.'[387] A large flint core and an extensively worn quartzitic pebble hammerstone were found next to a skeleton within a burial chamber.[388] Saville nominates this hammer a curated possession of personal significance. This artefact, he contends, can be 'interpreted as a flint knapping tool.'[389] The fact that the hammer was found 'very close to where the left hand would have been prior to....disturbance' may indicate a deliberate placement showing purposive ritual.[390] Thus Hazleton North may offer a rare insight into a Neolithic mortuary practice. Aside from ‘The Flintknapper’, the human bones within the chambers were chaotically strewn

384 Saville, '*Hazleton North*'. p. 3.
385 ———, '*Hazleton North*'. p. 167.
386 John Meadows, Alistair Barclay, and Alex Bayliss, 'A Short Passage of Time: The Dating of the Hazleton Long Cairn Revisited', *Cambridge Archaeological Journal* 17, no. 1 (2007). p. 53.
387 Saville, '*Hazleton North*'. p. 262.
388 ———, '*Hazleton North*'. p. 105.
389 ———, '*Hazleton North*'. p. 176.
390 ———, '*Hazleton North*'. p. 176.

but possibly represent up to 42 people. The youngest was a small baby and the eldest between 40 to 50 years old.[391]

In terms of human inhabitation and sequence of site development, pollen and molluscan evidence beneath the barrow indicated cereal crops, primarily wheat, were grown before the mound was built.[392] Fragments of quern stone were also found under the monument, clearly predating it.[393] The stone from the quern was not local, again indicating 'the import of finished artefacts' foreign to the landscape.[394] As at Burn Ground and Ascott-under-Wychwood, the quern's presence may signifiy a domesticated culture existed on Barrow Ground Field pre-barrow. Indeed as Saville points out, 'the pre-cairn evidence represents the existence at Hazleton of the settlement of an early Neolithic farming group.'[395] Thus the possible astronomies attached to the monument served an agrarian, sedentary population who imported new methods of food preparation onto this site. The barrow may have been built as a response to the social pressures attached to those changes. Julian Thomas argues these changes may have involved territorial and economic imperatives, writing:-

> People do not bury themselves: the burial of the dead is an aspect of the power strategies of the living. These new burial traditions were a means by which the inheritance of land and wealth from one individual to another was made legitimate.[396]

Thus the barrows may have functioned as a public statement, built to establish lineage and ownership in a contested environment. When a culture embeds the astronomy it practices within the fabric of a new building it is a declarative act inferring continuity will apply. For those who are laying claim to land and territory an intended alignment from a power base such as a barrow, to a celestial event links past, present and, critically, the future.

Turning to Hazleton North specifically, it has a number of features which replicate those at Burn Ground and Ascott-under-Wychwood, so they will not be reprised here. Yet again, the dating of bones proved useful in identifying periods of interest.[397] In similar fashion to Ascott, Hazleton was situated above a tree throw which may suggest deliberate woodland management designed to clear views to the horizon occurred at this

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[391] ———, '*Hazleton North*'. p. 250.
[392] ———, '*Hazleton North*'. p.240.
[393] ———, '*Hazleton North*'. p.240.
[394] ———, '*Hazleton North*'. p. 176.
[395] ———, '*Hazleton North*'. p. 241.
[396] Julian Thomas, 'Relations of Production and Social Change in the Neolithic of North-West Europe', *Royal Anthropological Institute of Great Britain and Ireland* 22, no. 3 (1987).[hereafter: Thomas. Relations of Production]. p. 423.
[397] Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'.

site.[398] Mesolithic post-holes were found beneath this barrow too.[399] As mentioned, a quern stone was found under the barrow and this writes Saville, combined with ‘drinking, cooking, and storage vessels appropriate to domestic occupation,’ gives indication of a sedented community.[400] But the prime evidence for archaeoastronomic intent is the same at this site, as found at Burn Ground and Ascott. As Saville notes:-

> One of the first stages of construction was the fixing of a roughly east-west axial longitudinal line, which served as the reference point for all subsequent building.[401]

Yet again the fundamental architectural feature used to create an alignment to the horizon was prioritised. Saville describes the skilful masonry employed in the construction of the complex orthostatic burial chambers, but he also noted the primacy of the axial alignment writing:-

> Whatever the precise point at which the orthostats were erected, the initial act of the cairn construction must have involved the establishment of the axial alignment.'[402]

Thus Hazleton North, in similar fashion to my first two sites, witnessed the possible emergence of a people who embedded orientation within their architecture in order to connect their landscape to their skyskape. This statement of intent went hand in hand with new lithic technologies and a sedented way of life which was emerging at this time and place. It appears that embedding alignment on the landscaspe was an integral aspect of this radically new cultural process. My fieldwork observations and calculations for declination for both Hazleton North and South can be found in Appendix 7.

<u>Hazleton North and South: Summary of continuities and discontinuities of possible astronomic intent at this site</u>

Given the material record at the Hazleton site, it is possible to assess the transition from the Mesolithic into the Neolithic at Barrow Ground Field. When considering the main barrow, Hazleton North, Saville points out it may have been in use for 'a very limited time.'[403] His estimation that it served its community for ‘possibly as little as 50-100 years,’ indicates a relatively brief engagement with this monument.[404] In terms of

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[398] Saville, '*Hazleton North*'. [hereafter: Saville. Hazleton North]. p.240.
[399] ———, '*Hazleton North*'. p. 15.
[400] ———, '*Hazleton North*'. p. 240.
[401] ———, '*Hazleton North*'. p. 241.
[402] ———, '*Hazleton North*'. p. 243.
[403] ———, '*Hazleton North*'. p. 239.
[404] ———, '*Hazleton North*'. p. 268.

archaeoastronomic intent, Hazleton North aligns to the rising eclipsing Autumn Full Moon at lunar standstill, whilst Hazleton South appears to display alignment to either or both the rising sun at winter solstice or the setting sun at summer solstice.[405] Hazleton South may have been bi-modal as, given its declination of 24º/-25º, it also aligns to the rise point of the summer first crescent moon and the set point of the winter last crescent moon.[406] These are the moon's first and last crescents either side of a new moon. The rise and set points of crescent moons are too dispersed to be used as dependable seasonal markers. But as Silva points out 'this does not preclude their use in ritual and other symbolic realms' it may be possible Hazleton South's astronomy was linked to belief systems at the time.[407] In terms of stellar alignment at Hazleton South, Sirius [HIP 32349], Visual Magnitude -1.4 and described as very bright, rose at -25º, within a degree of the barrow's declination. It was undergoing the phase of Arising and Laying Hidden so was visible from its heliacal rise around a month after the summer solstice till its acronychal set about two weeks before the Spring Equinox. As it was last seen to rise in the east five days before the winter solstice it may have been noticed that its departure from the eastern horizon coincided with that time when the sun was seen to stand still and turn.

When comparing the Hazletons to other barrows a significant difference displayed by both monuments is their shift in horizon preference. The Hazletons, almost uniquely amongst the Costwold-Severns, orient westwards.[408] Thus the Cotswold region's possibly predominant attachment to rising celestial events may have been challenged by the orientations at Barrow Ground Field. Certainly Hazleton North's alignment to the setting of the very bright star Aldebaran emphasises the western horizon.[409]

Another discontinuity has to do with possible alignments to stars undergoing Curtailed Passage. The stake and post-holes which possibly align in the first instance to Deneb Adige and in the second Denebola, may indicate an attachment to stars undergoing the phase of Curtailed Passage which lasted from the Mesolithic to at least the Neolithic pre-barrow context at this site. However, by the time Hazleton North the barrow itself was built, there appeared no evidence of any such orientation. This moment witnesses the first disengagement from this star phase from amongst the three

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[405] Clive Ruggles, *Astronomy in Prehistoric Britain and Ireland* (New Haven and London: Yale University Press, 1999). p. 9.
[406] F Silva and F Pimenta, 'The Crossover of the Sun and the Moon', *JHA* xliii. (2012).
[407] Silva and Pimenta, '*Crossover*'. p.9.
[408] Alan Saville, 'Preliminary Report on the Excavation of a Cotswold-Severn Tomb at Hazleton, Gloucestershire', *The Antiquaries Journal* 64, no. 1 (1984). p. 11.
[409] *Starlight*.

barrows in this study. As the long row of post-holes immediately predate the barrow, this discontinuity dates almost exactly to the barrow's construction period of around *3710-3655 cal.* Thus at least two astronomic traditions were relinquished at Hazleton North. One was the horizon preference and also the possible alignment to stars undergoing the phase of Curtailed Passage.

There was no agreement about the provenance of the stone from which the Flintknapper's hammer was made. A geographically diverse range of quarries were suggested which stretched from South Wales to the Pennines.[410] However stones of another kind were more readily sourced. Saville writes:-

> Angular fragments of fine-grained pale-grey to brownish-grey quartzite from beneath the cairn are of sarsen. Some show worn surfaces. They are all likely to have been brought to the site, presumably from the Salisbury Plain area. A rounded hammerstone/pounder is also of a very fine-grained quartzite or quartzitic sandstone and is lithologically very close to sarsen.[411]

Thus it is possible that there were links between the Hazleton community at Barrow Ground Field and those who inhabited the Salisbury Plain area, where Stonehenge is found. As mentioned, Hazleton North dates to *'3710-3655 cal BC*.'[412] Phase 3ii of Stonehenge, the phase this study is concerned with, has an ‘average calibrated date of 2413 BC’.[413] Thus it is possible that Hazleton North and perhaps Hazleton South predated Stonehenge Phase 3ii by more than one thousand five hundred years. Barrow Ground Field may have played host to a people whose astronomy was informed by, or informed that practised on the Stonehenge landscape itself, and it appears to be an astronomy in transition.

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410 Saville, '*Hazleton North*'. p. 231.
411 ———, '*Hazleton North*'. p. 230.
412 Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 54.
413 Cleal, *Stonehenge / Landscape*. [hereafter: Cleal. Stonehenge / Landscape]. p. 231.

The Mesolithic Landscape at Stonehenge

Latitude: 51º N 10' 47" 51.17º
Longitude: 1º W 49'44" 1.8º

My research originally focused on Neolithic barrows, so the emergence of alignments created by the Mesolithic post-holes found beneath them was unanticipated. However, once these possible alignments were revealed I decided to deepen the time frame of my research by looking for the earliest evidence of Mesolithic that I could find. Some of the earliest dates attached to the material record in this region are found on the hillside at Stonehenge itself. Indeed given Sims' contention that a lunar 'complex' held sway in this earliest of eras, evidence of a lunar astronomy may just as well be found at this location as elsewhere.[414] Also, Richard Bradley points out:-

> many monuments were constructed in places that had already acquired a special significance....*(and)* some of those places developed into monuments themselves.[415]

So I felt an exploration of the site at Stonehenge pre-sarsen stone circle, may prove fruitful. The Mesolithic features found on the Stonehenge hillside are post-holes, three of which are marked on the tarmac of the old Stonehenge car park (Figs. 87 & 88). Two of those are dated. The earliest, post-hole 'A' is dated between 8820-7730 cal BC and the later post-hole 'B' is from around 7480-6590 cal BC.[416]

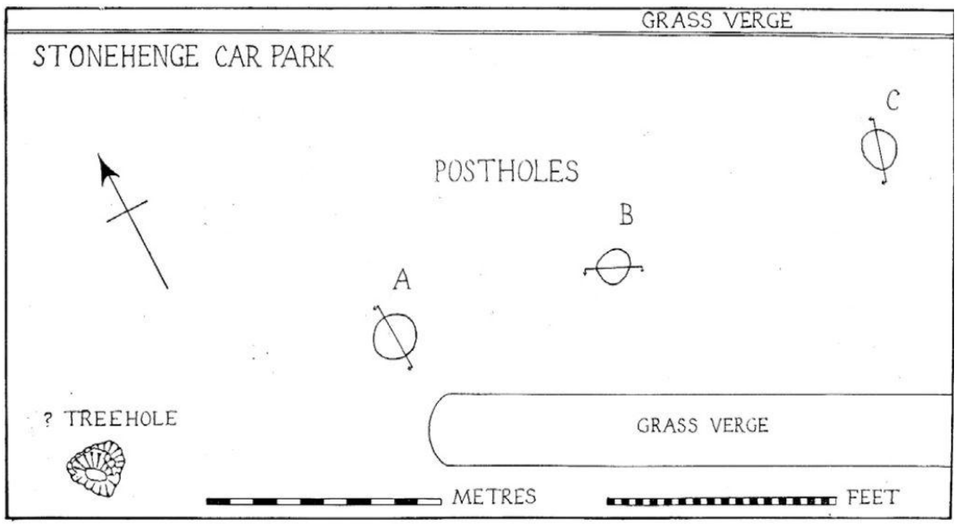

Fig. 87. Mesolithic post-holes under the car park at Stonehenge, including the tree hole.[417]

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[414] Sims, '*Solarization*'. p.14.
[415] Richard Bradley, *Altering the Earth: The Origins of Monuments in Britain and Continental Europe: The Rhind Lectures*, vol. 8 (Society of Antiquaries of Scotland, 1993). p. 23.
[416] Cleal, *Stonehenge / Landscape*. p. 43.
[417] Roy Loveday, '*The Greater Stonehenge Cursus - the Long View*', *Proceedings of the Prehistoric Society* 78(2012). p. 344.

Fig. 88. Curved row of Mesolithic post-holes'A', 'B' and 'C'
in the Stonehenge car park. 13 November 2013.

The car park post-holes may have been established to create deliberate astronomic alignment. Roy Loveday points out:-

> ...their relatively even spacing, coupled with the comparable space left between the westernmost example and an isolated tree pit, points to purpose and integrity.'[418]

Parker Pearson's drawing further illustrates this possibly intended purpose[419] (Fig. 89).

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[418] Loveday, '*Greater Stonehenge*'. hereafter: Loveday. Greater Stonehenge]. p. 343.
[419] Parker-Pearson, *Stonehenge*. p. 136.

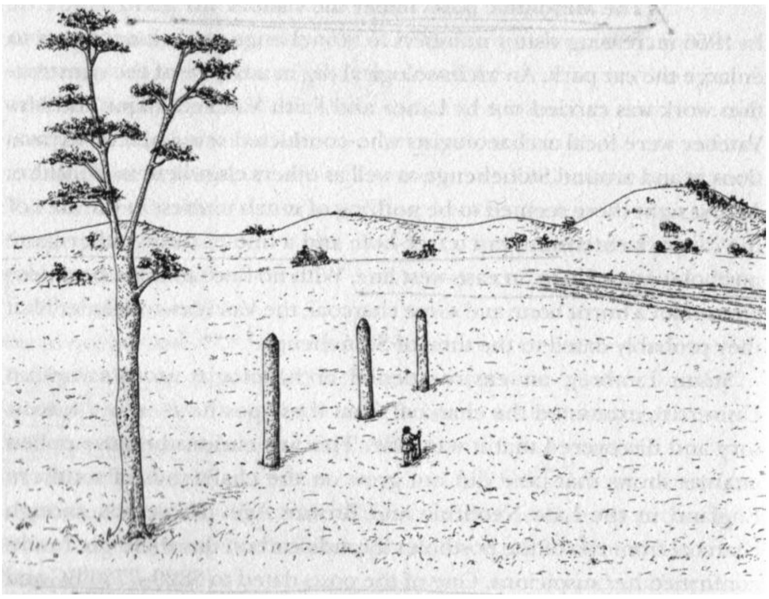

Fig. 89. A reconstruction of the Early Mesolithic posts under the Stonehenge car park.[420]

Loveday suggests these four uprights were sensitively placed in relationship to each other, writing:-

> Unless the pattern is coincidental, an alignment independent of physical markers but etched into a long enduring mental template must be supposed.[421]

I noticed was a second row of posts holes which may also have created an alignment. These are described by Cleal as being located near what later became the main north-eastern entrance to the subsequent sarsen stone circle[422] (Fig. 90).

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[420] ———, *Stonehenge*. p. 136.
[421] Loveday, '*Greater Stonehenge*'. p. 345.
[422] Cleal, *Stonehenge / Landscape*. p. 42.

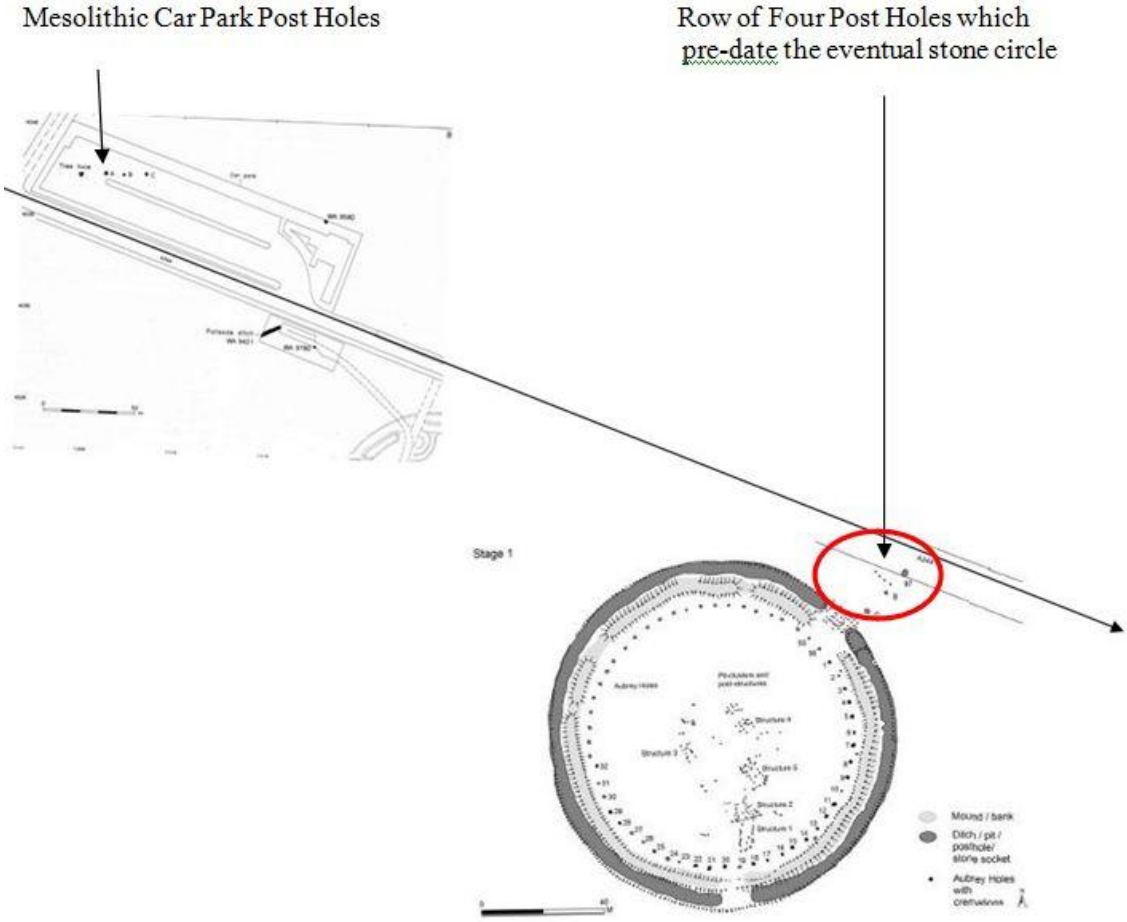

Fig. 90. Two diagrams combined, showing Mesolithic car park post-holes, and the second, separate row of four post-holes at what became the entrance to the sarsen stone circle. Both rows are adjacent to the A344.
Top Diagram to left - Mesolithic post-holes in car park.[423]
Lower Diagram to right - row of four post-holes.[424]

The second row of four post-holes appears to stand alone, Cleal judging 'they cannot therefore be assigned with absolute confidence to any of the *(sarsen stone circle)* monument phases.'[425] William Hawley who excavated the post-holes suggests they 'were evidently of early date' as they predated the Avenue which passed above them.[426] Cleal writes, 'the evidence suggests that the Avenue was constructed and used in one main phase of activity, within and presumably as part of phase 3 of Stonehenge itself.'[427] As Sims' theory applies to Phase 3 of Stonehenge, the four post-holes clearly predate his 'solarization' period as well.

<u>Stonehenge: Summary of continuities and discontinuities of possible astronomic intent at this site</u>

423 ———, *Stonehenge / Landscape*. p. 42.
424 Timothy Darvill et al., 'Stonehenge Remodelled', *Antiquity* 86(2012). p. 1208.
425 Cleal, *Stonehenge / Landscape*. p. 142.
426 William Hawley, '*Report on the Excavations at Stonehenge During the Season of 1923*', *Antiquaries Journal* 5(1925). p. 24.
427 Cleal, *Stonehenge / Landscape*. p. 319.

My fieldwork findings are covered in full in Appendix 7, but the declinations for the posts' orientations are as follows:

Tree Hole / Post A	+5.3º/-4.2º	(Post 'A': 8820-7730 cal BC).[428]
Car Park Posts A / B	-0.2º/+1.4º	(Post 'B': 7480-6590 cal BC).[429]
Car Park Posts A / C	+2.8º/-1.7º	
Row of Four	-18.2º/18.6º	

The first orientation may have been created by the already in situ tree linked to the first post to be established, post 'A'. Their alignment to +5.3º/-4.2º of declination is close to the rising declination of the Autumn Full Moon and/or the rising Autumn Full Moon eclipse at minor lunar standstill.[430] Silva suggests the peak declination for the Spring Full Moon is -4º, and for the Autumn Full Moon, +4º. He advises that 0.8º be added to these theoretical declination values, to allow for the variation in obliquity since the Neolithic.[431] Recalculated, the theoretical declination becomes +4.8º, close to the monument's rising declination of +5.31º.[432] Conversely the alignment to the western horizon corresponds to Spring Full Moon sets during minor standstill years.[433]

Another possible orientation may have been from 'A' to 'C'. If this was established at the earliest date of 8820 BC, it may have aligned to Capella rising [HIP 24608], visual magnitude 0.08. [434] If it was established later, possibly around 8355 BC, 'A' to 'C' oriented to the rising of the very bright star Regulus [HIP 52634], visual magnitude 0.03.[435] Turning to posts 'A' to 'B', they align to -0º/+1º of declination. Post 'B' was added to the Stonehenge landscape sometime between '7480-6590 cal BC'.[436] As this was established after post 'A', it was a secondary orientation, which if intended was to the equinox, or a rising Autumn Full Moon eclipse at minor lunar standstill year, or both.[437] In addition, the star Pollux [HIP 37826], visual magnitude 1.15, rose at zero degrees of declination at that time.[438] This possibly created a navigational aid.[439]

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[428] ———, *Stonehenge / Landscape*. p. 43.
[429] ———, *Stonehenge / Landscape*. p. 43.
[430] Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.
[431] ———, '*Equinoctial Full Moon Models*'. p. 2.
[432] ———, '*Equinoctial Full Moon Models*'.
[433] ———, '*Equinoctial Full Moon Models*'. p. 5.
[434] ———, *Stonehenge / Landscape*. p. 43.
[435] F Silva, 'Star Data Calculations', (2013). These dates calculated by Silva using an algorithm developed in Matlab, based on the works of Schaefer (1987, 1997, 2000) and Purrington (1988).
[436] Cleal, *Stonehenge / Landscape*. p. 43.
[437] Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.
[438] Stellarium 0.12.0; ———, '*Equinoctial Full Moon Models*'.
[439] Brady, '*Star Paths*'.

Turning to the row of four post-holes at the entrance to Stonehenge's stone circle, their possible orientation towards a declination of -18.2°/+18.6° may indicate an alignment to the rising southern minor lunar standstill which Ruggles suggests occurred at -19.6° of declination in this era.[440] When considering the visual effect of a lunar standstill Sims points out that:-

> an alignment on a lunar standstill, unlike on the solstices, is immediately a multiple alignment which theoretically identifies 13, not just one, of the lunistices. The lunistices at a standstill therefore scroll in reverse order through a full suite of phases normally associated with a lunar (synodic) month, but now taking one year to unfold.[441]

Thus a standstill is a celestial event which occurs over time and as this particular alignment may have involved both the stars and the moon slowly turning, a period of focused lunar/stellar activity occurred on the horizon at this time. In terms of stellar alignment, I have used the date that attaches to the earliest post, post 'A', which combined with the tree possibly created the first alignment at this site. One of the stars the post-holes aligned to was Fomalhaut [Hip 113368], visual magnitude 1.15, which rose at -19.3° of declination. Fomalhaut appeared in the sky from autumn, through spring and into the summer, disappearing from sight just days before the Summer Solstice, perhaps alerting to the seasonal shift. The Pleiades and Antares also rose or set close to the same declination. Alcyone, the brightest star within the Pleiades, rose at -19.2°, whilst on the western horizon, Antares set at a declination of +18.6°.[442] Either one or other of these were visible all year except for a month across the Winter Solstice when the Pleiades, which underwent the phase of Arising and Laying Hidden, disappeared from the night sky. Within days of their disappearance, Antares began its period of Curtailed Passage, so these stars, which had up to this point connected with the horizon, now moved to celestial regions which may have had symbolic meaning. Though Brady was referring to the king's ascension mythology of the Old Kingdom, should a similar symbolism to that seen in Egypt have applied in earlier times in Britain, the Pleiades and Antares may have been considered to have travelled beyond the mortal realm.[443] One descended to and lay hidden in the underworld, whilst the other ascended to and travelled amongst the imperishable circumpolar stars. Of interest is that when Antares descended back to the earth after about three weeks, reconnecting with horizon as it heliacally set, it did so on the same day as the Pleiades heliacally rose. Thus an

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[440] Ruggles, *Prehistoric Astronomy*. p. 57.
[441] Sims, '*Solarization*'. p. 13.
[442] Stellarium 0.12.0.
[443] Brady, '*Star Phases in Old Kingdom Ascension Mythology*'.

ancient stellar axis was created and it involved a synchronous process which may have symbolised a journey to the underworld as well as an ascent to the divine.[444]

Given the dynamic between Fomalhaut, Antares and the Pleiades, the row of four post-holes possibly aligned these stars alone. But as mentioned this declination was also shared by the minor lunar standstill. So Antares' setting position on the western horizon would have marked the furthest reach of the northern minor moonset at minor standstill and the setting point of the Pleiades and Fomalhaut would have marked the most southern minor moonset. Antares' rising point would have located the minor standstill's most northern moonrise whilst the rising points of both the Pleiades and Fomalhaut marked the most southern. Thus these stars operated as non-local, specific horizon markers, creating a rectangular lunar/stellar axis at the minor lunar standstills at this time. Perhaps these stars acted as sentinels during the Mesolithic, alerting observers to the fact that as the Moon approached the rise and set points of Fomalhaut, the Pleiades and Antares, a suite of lunar phases was about to unfold heralding the standstill. This celestial combination may have led to the creation of what Brady terms a 'cosmic and cultural knot'.[445] Indeed it is possible celestial events such as these may have entered oral history. If so it would be descriptions of this kind of stellar motion which may have contributed to the first document to record celestial mechanics known as The Phaenomena. Though attributed to Aratus (315-240 BCE), it is thought to be a collation of oral star lore from previous millennia.[446]

Finally, if as well as aligning to the stars, the row of four posts also aligned to the rising moon at minor standstill, then every 18.6 years the loss of the Pleiades from the mid-winter sky would have occurred at the same time as the dark moon that Sims specifies later played a part in 'solarization.'[447] It may however be worth identifying the component parts of this celestial event. A point made by Sims about this 'solarizing' lunar phase is that:-

> Special to both southern standstills is the way the phase-locking of an abstracted, attenuated and reversed lunar cycle combines dark moon with the winter solstice.'[448]

Thus though alignment to the lunar standstill may be considered to display lunar allegiance, the physical reality is that the winter solstice is as integral to this horizon

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[444] ———, '*Star Phases in Old Kingdom Ascension Mythology*'.
[445] ———, '*Star Paths*'.
[446] Aratus, 'Phaenomena', in *Callimachus, Hyms and Epigrams Lyocpron, Aratus* (Cambridge: Harvard Universtiy Press, 1989). p. 511-515.
[447] Sims, '*Solarization*'.
[448] ———, '*Solarization*'. p. 13.

event as the moon. Should it be the case that this lunar/solar phase locking at minor lunar standstill was noticed by those on the Mesolithic hillside at Stonehenge, it would have been precisely the sysygy which underpins Sims' solarisation theory. However, in this case it may have been a solar/lunar/stellar process, and if it was noted it would have been seen some five millennia before the building of what Sims considers was the 'solarizing' Stonehenge, Phase 3ii.

Conclusion

In conclusion, the aim of this survey has been to consider the question, 'Does the archaeoastronomic record of the Cotswold-Severn region reflect evidence of a transition from lunar to solar alignment?' Sims' 'solarization' theory was chosen as the originating research for my study.[449] Sims argues that in central, south-western England there was an abrogation from a predominantly lunar to a solar astronomy.[450] Stonehenge was designed, he suggests, to engineer this transition.[451] According to Sims, the process of 'solarization' occurred during Stonehenge's Phase 3ii building period, which is dated by Cleal to around '2413 BC'.[452] When arguing for this cultural and essentially calendrical shift Sims recommends there be a reinvestigation of evidence further afield than Stonehenge 'for earlier versions of the same complex.'[453] My research has attempted that reinvestigation, focusing on the archaeosastronomies of Cotswold-Severn earthen barrows. The material record provided by these monuments is considered a rich historic resource; R J Mercer et al describe them as 'the finest group of stone chambered tombs in England.'[454] The methodology I used to explore these burial chambers was qualitative and hybrid, including fieldwork and in depth analysis of archaeological reports. I chose these reports because they were identified as amongst the best on record.[455] The barrows in question were Burn Ground, Ascott-under-Wychwood and the Hazletons. The unexpected emergence of Mesolithic post-hole alignments found in pre-barrow contexts suggested that a deepening of this study's time profile may prove useful. The earliest dates in the region attach to the Mesolithic material record at Stonehenge, so this site was also explored. One of the fundamental aims of this research was to establish a dating sequence in order to contextualise and compare alignments. The earliest dates discovered attach to possibly ninth millennium BC post-holes on the Stonehenge landscape.[456] The latest dates apply to the construction of the Neolithic barrow, Hazleton North, at around *'3710-3655 cal BC.'*[457] Thus I have created a diachronic profile of one small part of the material record across the Mesolithic to

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449 ———, '*Solarization*'. p. 3.
450 ———, '*Solarization*'. p. 14.
451 ———, '*Solarization*'. p. 3.
452 Cleal, *Stonehenge / Landscape*. [hereafter: Cleal. Stonehenge / Landscape]. p. 231.
453 Sims, '*Solarization*'. p. 14
454 I Kinnes, R J Mercer, and I F Smith, 'Research Priorities in the British Neolithic', (unpublished report submitted to the DoE by the Prehistoric Society, 1976). p. 6.
455 Benson, '*Building and Remembrance*'. p. 327.
456 Mcfadyen, '*Pre-Barrow Context*'. p. 25.
457 Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 54.

Neolithic transition in central southern England. This profile has allowed me to explore the possible astronomies of those who inhabited this region at this time and indeed intended alignment appeared to emerge.

My conclusions are twofold, one aspect having to do with the methodology used throughout this study and the second with my findings. Turning to my research process first, given the manner in which my evidence was gathered it may be of some use to assess how feasible a hybrid methodology may or may not be when applied to a research project such as this. I decided on my methodology in direct response to the fragile, ancient material record under investigation. Many barrows are degraded beyond measure and the very nature of a tomb is that it will generally be closed and inaccessible, which makes the rigorous recording of salient archaeological features difficult. As well as this, each of my ancient sites contained idiosyncratic complexity. However, I suggest the hybrid methodology employed in the study, which organised the material on a case by case basis, accommodated this variety and indeed, as I hoped it would, allowed opportunity for the unexpected and unanticipated to emerge. The case study approach meant each barrow had its own context, yet broad comparison was possible. By prioritising written archaeological reports, my research process turned what were ostensibly secondary sources into primary ones. It may be possible that future archaeoastronomic research which similarly deals with a limited material record may find this adaptive, hybrid approach useful. It is one which lends itself to qualitative measurement. A quantitative approach requires a uniform data-set, but a qualitative one allows for the gathering of disparate evidence from a variety of sources. This is particularly useful where the Cotswold-Severn barrows are concerned, as they are so individual and indeed unique each unto themselves. As Saville points out:-

> Within the Cotswold-Severn group, while there are certain standard design features, each monument for which there are reasonable records is different in some detail.[458]

This holds for my survey. For instance, Burn Ground's extremely rare bisecting north-south corridor was one such unusual feature. Ascott's funereal stone cists could only be accessed from above, affording no side entrances unlike almost every other barrow I have surveyed or read about. The Hazleton barrows completely invert typical barrow orientation by aligning westwards. These irreconcilable features, combined with a limited material record, make quantitative comparison impossible but they do respond to a qualitative assessment.

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458 Saville, '*Hazleton North*'. p. 255.

Some of the measurements I arrived at using the hybrid methodology I put in place corresponded surprisingly closely to the measurements recorded by the archaeologists themselves. Grimes notes that Burn Ground's ‘true axis was almost exactly east-west' and indeed my measurements, which used archived photograph, maps and diagrams, eventuated in a calculation that gave the barrow a declination of-0.6°/+0.6°.[459] The diagrams I used to gauge the overall azimuth of the Mesolithic car park post-holes at Stonehenge led to an azimuth of 91°, which corresponds to Loveday's fieldwork calculation.[460] It may be best to assume this level of congruency will not always occur but it does perhaps suggest that a hybrid methodology may be fine tuned to suit the project in question and as a form of research it may generate findings which could be used with some confidence.

Regarding my findings, a number of points arise. Turning to stellar alignment first, unexpected but repeated orientations to the stars emerged throughout my survey. It is possible the stars were used for navigational and calendrical purposes, perhaps generating a rich intellectual heritage in the process. If used in concert with the luminaries, they would have created what Brady terms a 'cosmic and cultural knot.'[461] Added to that, alignments to stars undergoing the phase of Curtailed Passage may have had cosmological significance.[462] Brady suggests that astronomy becomes 'mythopoeic' when stellar celestial motion informs ritual belief, so it is possible that alignments to stars of Curtailed Passage were part of a rich symbolic language linking earth and sky.[463] However, alignments to Curtailed Passage did not occur consistently across all sites, so if this star phase did attach to sky lore, they may not have been uniform across the whole region. Overall, though my research originally focused on the sun and moon, the emergence of alignments to the very brightest stars on the east, west and northern horizons suggest that if an astronomy was practised at this time, it contained a vital stellar component.

Another issue which arose during my research was how to address the basic archaeoastronomic problem of inferring alignment. The single orientation afforded by a long barrow appears to offer a straightforward measurement. But the following illustrates the complexities involved. For instance, when assessing Burn Ground's zero degrees of declination, this may in the first instance suggest a solar, equinoctial

459 Grimes, '*Excavations*'. p. 43.
460 Loveday, '*Greater Stonehenge*'. p. 345.
461 Brady, '*Star Paths*'. p. 4.
462 ———, '*Star Phases*'. p. 4.
463 ———, '*Star Phases in Old Kingdom Ascension Mythology*'. p. 40.

alignment. However, the barrow's very length could have operated as a perpendicular bisector.[464] As mentioned, the singular topographical feature at Burn Ground was its entirely flat zero degree altitude local horizon. If two appropriately positioned flanking stones were installed at +4º and -4º of declination in relation to the monument, it would have been perfectly poised to mark the exact mid-point between Silva's suggested rise points for Spring and Autumn Full Moons.[465] Given his determination that the rising Autumn Full Moon eclipse on minor standstill also shares zero degrees of declination, if this simple archaeoastromic strategy had been applied, Burn Ground's repertoire would have immediately assumed a suite of lunar alignments.[466] The above is entirely speculative, but it may be worth considering that zero degrees is a bimodal declination with a number of potent properties.

Of ethnographic interest is that where the lunar alignments were concerned there appeared to be an emphasis on autumnal events, suggesting this may have been a season involving ritual, trade or social activity at barrow sites.

Turning now to the question at the heart of my survey, which asked whether a solar astronomy superseded a lunar one, my findings seem to suggest lunar alignments did apply at this time. The first lunar orientation discovered in this survey was that of the ninth millennium BCE Mesolithic 'Tree Hole'/Post 'A' at Stonehenge and the last was that at Hazleton North. This supports Sims theory that a lunar astronomy may have applied across this region pre-sarsen Stonehenge. However, the emergence of an orientation to zero degrees of declination established by the second set of Mesolithic Stonehenge post-holes ‘A' to 'B', raises the possibility of equinoctial alignments joining 'lunar' ones as early as the eighth millennium BCE. As mentioned above, alignments to zero degrees of declination remain resistant to definitive interpretation, but the further arrival in this region of 'zero degree' Burn Ground and the possibly 'solsticial' Hazleton South suggest a solar astronomy may already have been operative across the Mesolithic to Neolithic transition.

Given the difficulty of definitively assessing this complex declination, it may be useful to now analyse what is meant by the word 'lunar'. The lunar alignments which possibly emerge in these findings are to total lunar eclipses or Autumn Full Moons. Though this terminology infers a lunar predominance, the sun is as integral to the celestial unfolding of these events as the moon. In the first the sun disappears, in the

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[464] H. A Priestly, *Introduction to Complex Analysis*, Second ed. (Oxford: Oxford University Press, 2003).
[465] Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.
[466] ———, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.

second it is fully present. Either way, these events are culminations within a complex and continuous solilunar sysygy created by our local horizon.

Focusing on the rising Autumn Full Moon, as Silva points out, it is the only full moon of the year when both sun and moon visibly oppose each other horizon to horizon.[467] As the moon rises at +4º of declination, the sun sets at -4º creating a solar/lunar 'equinoctial axis'.[468] It is possible that this rare axial relationship may in and of itself have been meaningful. This axis would only be visible across a flat horizon. But as Christopher Tilley points out, tree clearance in pre-historic times revealed the contours and profiles of the landscape, and he describes how settlers chose to site themselves at the tops of these cleared high hills.[469] This choice of elevated location artificially establishes close to zero degrees of altitude on surrounding horizons. This may have particularly applied in the Cotswolds, which, as mentioned, offer a landscape of long views across gently rolling, featureless hills and where many barrows are found at the crests of hills. My own measurements show zero degrees altitude is the norm with a few horizons rising no more than a single degree. Burn Ground's possible exploitation of its local horizon has been mentioned, but both my other barrow sites were noted for being sited in elevated positions in relation to their local horizon. This may indicate deliberate choice to facilitate best rise and set measurements possible including those of the rare lunar axis mentioned above.

The second 'lunar' alignment which emerged from my study was to the rising Autumn Full Moon eclipse at minor standstill. These are eclipses during which the Moon is seen to turn red.[470] They unfold over a number of hours, the actual totality lasting anything up to 72 minutes.[471] As Silva points out, the darkening of a bright Autumn Full Moon at minor standstill is visually arresting.[472] But of note is that these are full moons which occur just after the sun and the moon are seen to cross over the equinoctial point as they travel in opposite directions along the horizon. C. Marciano Da Silva explains how the relationship between the luminaries is clearly visible at this time. 'One way or the other,' he writes of this full moon, '(it) would be the first full

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[467] F Silva, '*Equinoctial Full Moons and Solstitial Crescent Moons: An Empircal Luni-Solar Division of the Year?*', in *Ninevah to Chaco: Calendars through Time* (Pagosa Springs2011).
[468] Silva, '*Equinoctial Full Moons and Solstitial Crescent Moons: An Empircal Luni-Solar Division of the Year?*'. Slide 4.
[469] Christopher Tilley, 'The Neolithic Sensory Revolution: Monumentality and the Experience of Landscape', in *Going Over*, ed. A Whittle and V Cummings (Oxford: Oxford University Press, 2007). p. 331.
[470] F Silva, 2013. EMail.
[471] http://blog.nasm.si.edu/astronomy, 'Total Lunar Eclipse'.
[472] Silva, '*Equinoctial Full Moon Models*'. p. 4.

moon past the sun.'[473] At this point it may be worth questioning the assumptions which underlie phrases such as 'lunar event.' In the two lunar events described above, the sysygy is apparent, either along the horizon or across the rising/setting axis. In both instances the 'lunar' component is indivisible from the solar. Certainly there is no way of establishing which luminary was prioritised or emphasised in the languages of the Mesolithic or Neolithic. The 'lunar' events just mentioned, happen within days of the autumn equinox, a term currently used to define what is considered a solar calendar moment. But when it comes to describing Equinoctial Full Moons, Silva also notes this is, 'the time the sun and moon actually change positions in the sky,' and then he adds, 'In fact, it is possible that EFMs (Equinoctial Full Moons) are the ethnographic definition of equinox.'[474] If this was the case, it suggests a solilunar experience of the sky. So, when addressing the fundamental question of this research, which asked if there was a shift from lunar to solar astronomy across the Mesolithic to Neolithic transition, I suggest that there was no transposition of allegiance between luminaries. It is possible that a 'solar' astronomy informed by the sun's already inherent and deeply implicated relationship with the moon, may have already existed in the first place.

[473] Da Silva, 'Spring Full Moon'. p. 476.
[474] Silva, '*Equinoctial Full Moon Models*'. p. 5.

Appendix 1: Stonehenge as a mechanism. The role of the sarsen Stone Circle in engineering the transition from lunar to solar astronomy on the southern English landscape

In explanation of his theory, Sims points out the ‘defining design property’ of Stonehenge, which is that its tiered, lintelled pillars, standing in concentric nested circles created arcs which effectively formed two horizons one above the other.[475]

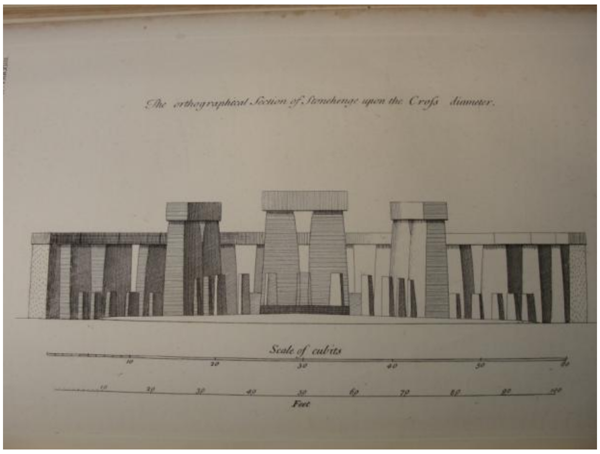

Fig. 1. Pen and ink diagram of Stonehenge.[476]

This juxtaposition creates a false horizon, across which Sims suggests it is possible to see a ‘double alignment from one viewing position.’[477] It is from this vantage point he writes, that both moon and sun can be seen to descend from the world above to the world below ‘through the centre of the sarsen monument.’[478] This claims Sims, ‘suggests that some association between them is being sought’. [479] This is the moment when ‘solarisation’ occurs.

There was a particular sun/moon alignment which Sims claims Stonehenge’s architects preferenced above all others. It is the one which delivers the ‘guaranteed longest, darkest night.’[480] This occurs every nineteen years, when the winter solstice sunset combines with the dark moon of the southern minor standstill moonset. Sims writes that when these two are bracketed, each:-

> mimics the other in their properties of signalling the onset of darkness. And by abstracting one dark moon from the twelve others in any one year, winter solstice provides the annual anchor for estranging ritual from a monthly to an annual cycle.[481]

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[475] Sims, '*Solarization*'. p. 11.
[476] William Stukeley, *Stonehenge a Temple Restor'd to the British Druids* (London: W.Innys and R. Manby, at the West End of St *Paul's,* MVCCXL (1740)). [hereafter: Stukeley. A Temple Restor'd]. p. 48.
[477] Sims, '*Solarization*'. p. 11.
[478] ———, '*Solarization*'. p. 13.
[479] ———, '*Solarization*'. p. 11.
[480] ———, '*Solarization*'. p. 13.
[481] ———, '*Solarization*'. p. 13.

It is this 'estranging ritual' which Sims appears to identify as a fulcrum in time. At this point he claims 'techniques of juxtaposition, mimicry and reversal' create an exchange between the sun and moon.[482] Sims appears to be describing what was a shift from a lunar based calendrical system to a solar one.

[482] ———, '*Solarization*'. p. 14.

Appendix 2: Fieldwork Findings

Monument	Material artefact	Date of Interest	Declination of alignment	Celestial Event	Declination of Celestial Event
Burn Ground Barrow: East-West Transeptal Gallery	Oldest bone 4230-3970 BCE[483]	3945 BCE	-0.6°/ +0.6° East-West	Equinox Rising/Setting Autumn Full Moon eclipse at Minor Standstill [484] Alhena rising, Procyon rising Alphard,rising Possible 'star path'[485]	0° 0° -0.01° -0.61° -0.48°
Burn Ground Barrow: North-South Transverse Corridor	Oldest bone 4230-3970 BCE[486]	4000 BCE	+37°/-37° North-South	Deneb Adige Curtailed Passage Rising	+36.8°
Gatcombe		No date	+38.1[487]	Deneb Adige Curtailed Passage Rising	
Wayland's Smithy		3950 BCE	+36.5[488]	Deneb Adige Curtailed Passage Setting	+36.8°
Belas Knap		No date	+37.8	Deneb Adige Curtailed Passage Rising	
Ascott-under-Wychwood: Pre-Barrow Post-holes	Roe Deer Bones Oldest date in survey *5300-4900 cal BC*[489] Two pieces of beech charcoal 4330-4040 cal BC[490]	4900 BCE 4330 BCE	+38°/-38° North-South Post-holes +9°/-8° East-West Post-holes +9°/-8° East-West Post-holes	Deneb Adige Skimming Horizon Setting Rising Autumn Full Moon eclipse at Minor Standstill [491] Pleiades Setting	+38.5° +8.65° -7.5°
Ascott-under-Wychwood:	Cattle bone under axial divide	3730 BCE[493]	+9°/-8° Barrow	Rising Autumn Full Moon eclipse at	+8.65°

[483] Brickley, '*Date and Sequence of Use*'. p. 339.
[484] Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.
[485] Brady, '*Star Paths*'. p. 3.
[486] Brickley, '*Date and Sequence of Use*'. p. 339.
[487] Armstrong, '*A Survey of Ten Cotswold Severn Long Barrows with Particular Reference to Their Archaeoastronomic Properties*'.
[488] ———, '*A Survey of Ten Cotswold Severn Long Barrows with Particular Reference to Their Archaeoastronomic Properties*'.
[489] Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 38.
[490] Mcfadyen, '*Pre-Barrow Context*'. p. 26.
[491] Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.

Barrow	*3760-3700 cal BC*[492]	3730 BCE	+9°/-8° Barrow	Minor Standstill [494] Aldebaran Setting	-9°
Ascott-under-Wychwood: North South Stone Cist Corridor	Cattle bone under axial divide 3760-3700 BCE[495]	3730 B**C**E[496]	+38°/-38°	Vindemiatrix Skimming horizon Setting	+38.5°
Ascott-under-Wychwood: East-West Stone F30 Ambiguous alignment from parallel stones deep within the barrow	Cattle bone under axial divide 3760-3700 BCE	3730BCE.[497]	3°/-2°	Indeterminate	
Hazleton North: Barrow	Red deer antlers in southern quarry.[498] *3710-3655 cal BC*[499]	3710 BCE	+8°/-8°	Aldebaran Setting Rising Autumn Full Moon eclipse at Minor Standstill [500]	-9° +8.7°
Hazleton North: Post-Holes Long row	Bone fragments in pre-barrow midden 3940-3690 cal BC[501]	3940 BCE	+35.7°	Denebola Curtailed Passage Setting	+36°
Hazleton North: Post-Holes Short row	No material record: date taken from long row of post-holes	3940 BCE Questionabl e date	+38°	Vindemiatrix Skimming northern horizon. Rising.	+38°
Hazleton North: Post-Holes Short row	Roe deer bones at Mesolithic Ascott *5300-4900 cal BC*[502]	4900 BCE Speculative Re-date to earliest Mesolithic	+38°	Deneb Adige Skimming Northern Horizon. Rising.	+38.5°
Hazleton South: Barrow	Assumed Contemporaneity with Hazelton North *3710-3655 cal BC*[503]	3710 BCE	-24°/+25°	Winter Solstice Sunrise Summer Solstice Sunset	-24° +24° -24°

493 ———, *Excavations*. p. 226.
492 Benson, *Excavations*. p. 226.
494 Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.
495 Benson, *Excavations*. p. 226.
496 ———, *Excavations*. p. 226.
497 ———, *Excavations*. p. 226.
498 Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 53.
499 ———, '*Dating of the Hazleton Long Cairn*'. p. 54.
500 Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.
501 Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 53.
502 Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 38.
503 Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 54.

				Summer First Crescent Moon Rising Winter Last Crescent Moon Setting Sirius Rising	+24° -25
Stonehenge	Tree Hole to Post-hole 'A' Post-hole 'A' to 'C' Post-hole 'A' to 'C' Post-hole 'A' to 'B' Short Row of Four Post-holes	8820 BCE[504] 8820 BCE 8355 BCE 7480 BCE[505] 7480 BCE ?8820 BCE ?8820BCE Speculative date.	+5°/-4° +2.8/°-1.7° +2.8/°-1.7° -0°/+1° -0°/+1° -18°/+18°	Rising Autumn Full Moon eclipse at Minor Standstill [506] *Rising Autumn Full Moon* Capella Rising Regulus Rising Equinox Rising/Setting Autumn Full Moon, eclipse at Minor Standstill [507] Pollux rising Rising Minor lunar standstill Pleiades rising Fomalhaut rising Antares setting	+4.8° +4.8° +2° +3° 0° 0° 0° -19.2° -19.2° -19.3° +18.7°

[504] Cleal, *Stonehenge / Landscape*. p. 43.
[505] ———, *Stonehenge / Landscape*. p. 43.
[506] Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.
[507] ———, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.

Appendix 3: Time Line Chart

DATE	BURN GROUND	ASCOTT-UNDER-WYCHWOOD	HAZLETON NORTH	STONEHENGE
8820-7730 cal BC[508] 7480-6590 cal BC[509]				Post-hole 'A' Post-hole 'B'
Eighth millennium cal BC		Tentative date for stone tools indicating an earlier Mesolithic occupation[510]		
End of the sixth millennium BC			Mesolithic flint finds[511]	
Fifth millennium cal BC		Microliths: represent brief, periodic visits within the hunter-gatherer range, rather than prolonged occupation[512]		
5300-4900 cal BC		Earliest radio carbon dates for less transitory habitation: deer bones in midden. First proof of settled usage[513]		
4330-3970 cal BC		Possible date for local horizon astronomy [514] based on date of beech charcoal found in post-hole F16[515] giving possible date for erection of post in hole F16 and also possibly F3, F4, F5, F10.		
4230-3970 cal BC	Most likely date for construction of barrow. Taken from the oldest bone found within[516]			

508 Cleal, *Stonehenge / Landscape*. p. 43.
509 ———, *Stonehenge / Landscape*. p. 43.
510 Alex Bayliss, '*Ascott-under-Wychwood Date*'. p.30.
511 Saville, '*Hazleton North*'. [hereafter: Saville. Hazleton North]. p.240.
512 Mcfadyen, '*Pre-Barrow Context*'. p. 27.
513 Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 38.
514 Mcfadyen, '*Pre-Barrow Context*'. p. 26.
515 ———, '*Pre-Barrow Context*'. p. 26.
516 Brickley, '*Date and Sequence of Use*'. p. 339.

3940-3690 cal BC[517]			Pre-barrow period: fragments of human, pig and cattle bone found in the midden giving possible dates for the long row of post-holes[518]	
3870-3775 cal BC (68% probability)		Pre-barrow occupation ended[519]		
3760-3700 cal BC		Construction of barrow based on date given for the cattle skull buried at eastern end of axial divide[520] Contemporaneous construction of north-south transverse stone cists [521]		
3710-3655 cal BC			Construction of barrow[522]	
Phase 3ii Stonehenge 2413 BC[523]				

[517] Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 53.
[518] Saville, '*Hazleton North*'. p. 14.
[519] Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 36.
[520] Benson, *Excavations*. p. 226.
[521] ———, *Excavations*. p. 226.
[522] Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 54.
[523] Cleal, *Stonehenge / Landscape*. [hereafter: Cleal. Stonehenge / Landscape]. p. 231.

Appendix 4: Historic Record and Environment Officer's spreadsheets describing archaeological finds from the Meso to Neolithic period, in Gloucestershire, Burn Ground's home county.

1. Long Barrow Sites

Area Number	Grid ref. (Easting)	Grid Ref. (Northing)	Area Description
4	406800	208360	Colnpen Long Barrow is a Neolithic long barrow located to the north of Colnpen Barn, Coln St De
40	402100	225400	Belas Knap Long Barrow is a scheduled Neolithic chambered long barrow, Sudeley.
60	409570	221200	Notgrove Long Barrow is a scheduled Neolithic Chambered Long Barrow located to the north of
61	378960	200050	Uley long barrow also known as Hetty Pegler's Tump, 400m SE of Knapp Farm House, Uley.
63	379390	201320	Nympsfield long barrow is a scheduled monument dating to the Neolithic period. It is located 50
83	410750	209410	Two long barrows: Lamborough Banks and a long barrow 240m to the south east, Bibury.
85	410890	209240	Two long barrows: Lamborough Banks and a long barrow 240m to the south east with a beehive
96	388930	198390	Norns Tump Long Barrow is a scheduled Neolithic Chambered Long Barrow 400m south-east of
99	388380	199720	Gatcombe Long Barrow is a scheduled monument located 400m east of Gatcombe Farm, Minchi
100	386040	197820	The scheduled Lechmore Neolithic Long Barrow is located to the west of Westfield Barn, Horsley
139	381900	191300	West Barrow, is a scheduled Neolithic long barrow 200m west of Leighterton School, Boxwell wit
148	391140	213230	West Tump Long Barrow in Buckle Wood is a scheduled Neolithic long barrow, Brimpsfield.
158	404500	210600	Pinkwell Long Barrow is of Neolithic date and is visible as an earthwork to the west of Longbarro
159	403050	214150	Withington Long Barrow is a scheduled site 870m south west of Woodbridge Cottage, Withingto
163	393421	217373	Crippets Neolithic long barrow, is a scheduled site 680m north east of Dryhill Farm, Coberley.
183	413520	226270	The remains of a scheduled Neolithic Chambered Long Barrow are located 400m NE of Chalk Hil
216	417350	228950	Ganborough Neolithic Long Barrow is a scheduled site located to the west of Ganborough Arbret
228	416730	226370	Poleswood South Neolithic long barrow is located 950m NW of St Mary's Church, Swell.
230	417160	226520	The scheduled Neolithic Poleswood East long barrow has a horned entranced and is visible as an
265	393620	205260	Westwood long barrow, is a Neolithic chambered Long Barrow located 400m east of Westwood
277	407200	218810	Hazleton South Long Barrow is one of two Neolithic barrows visible as earthworks, Hazleton.
278	407260	218900	Hazleton North Long Barrow is one of two Neolithic barrows visible as earthworks, Hazleton.
287	396490	206590	Hoar Stone chambered long barrow, is a scheduled monument of Neolithic date, Duntisbourne A
293	391360	209080	The Camp long barrows, are two Neolithic long barrows located to the north of The Camp, Mise
298	382300	201800	Bown Hill long barrow is a scheduled monument located 790m south east of Longwood Farm, W
350	382490	206900	Randwick Hill long barrow is a Neolithic scheduled monument located at Cockshoot, Randwick.
2147	404868	215785	Long barrow and possible occupation site - Withington
2509	411510	209060	Saltway Barn Long Barrow - Bibury
2573	410420	216070	A Neolithic Long Barrow is visible as the cropmark of a levelled earthwork. Hampnett.
2582	410000	215000	Reported Site of Beehive Chamber - Hampnett
2640	415000	222000	Lead Coffin Upper Slaughter
2686	417300	225340	Site of the Whistlestone
2966	387890	198380	Three Burial Chambers (not in situ)
3410	389500	197840	Long Barrow (site of)
3503	387700	200700	Site of the Langstone
3682	395730	207180	Jackbarrow' (site of Long Barrow)
3699	391770	206110	The Giant's Stone' Long Barrow
3701	391400	205050	The remains of an excavated long barrow at Bisley-with-Lypiatt.
3742	391800	211900	Possible Bronze Age Cist, Cranham
5392	398000	229000	2 Stones - Odo & Dodo
5421	394550	222500	Long Barrow (site of) near St James' Square
39922	414260	225800	A Neolithic Long barrow is visible as an earthwork to the NNE of Eyford Hill Farm, Upper Slaught

2. Types and Dates of Sites

Area Num	General Type Desc	Specific Type Desc	General Period Desc	Specific Period	Description
60	RELIGIOUS, RITUAL AND FUNERARY	CHAMBERED LONG BARROW	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Notgrove Long Barrow
60	RELIGIOUS, RITUAL AND FUNERARY	CIST	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Notgrove Long Barrow
85	RELIGIOUS, RITUAL AND FUNERARY	CHAMBERED LONG BARROW	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Two long barrows: Lamborough Banks and a long baarrow 240m to the south east
85	AGRICULTURE AND SUBSISTENCE	SHEPHERDS HUT	UNKNOWN	UNKNOWN	Two long barrows: Lamborough Banks and a long barrow 240m to the south east. Long barrow may be a shepherd's cot.
117	RELIGIOUS, RITUAL AND FUNERARY	LONG BARROW	PREHISTORIC (500,000BC-AD43)	EARLY / MIDDLE NEOLITHIC	Long barrow 800m north east of Oldwalls Farm
183	RELIGIOUS, RITUAL AND FUNERARY	CHAMBERED LONG BARROW	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	The remains of a scheduled Neolithic Chambered Long Barrow are located 400m NE of Chalk Hill Cottage, Swell.
183	RELIGIOUS, RITUAL AND FUNERARY	BURIAL	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Burial within long barrow 400m NE of Chalk Hill Cottage
183	RELIGIOUS, RITUAL AND FUNERARY	CIST	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	A chamber containing burials within the barrow.
191	RELIGIOUS, RITUAL AND FUNERARY	ROUND BARROW	PREHISTORIC (500,000BC-AD43)	BRONZE AGE (2500-700BC)	Cow Common round barrows (one of)
191	RELIGIOUS, RITUAL AND FUNERARY	CREMATION	PREHISTORIC (500,000BC-AD43)	BRONZE AGE (2500-700BC)	Cow Common round barrows (one of)
217	RELIGIOUS, RITUAL AND FUNERARY	ROUND BARROW	PREHISTORIC (500,000BC-AD43)	BRONZE AGE (2500-700BC)	Hull Plantations round barrows (one of)
278	RELIGIOUS, RITUAL AND FUNERARY	LONG BARROW	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	The barrow was completly excavated in 1979-82 and prior to this it was an earthwork measuring 63m WSW to ENE and 22m NNW to SSE.
278	INDUSTRIAL	QUARRY	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton long barrows (N of two)
278	UNASSIGNED	HEARTH	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton long barrows (N of two)
278	MONUMENT <BY FORM>	WALL	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton long barrows (N of two)
278	RELIGIOUS, RITUAL AND FUNERARY	BURIAL	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton long barrows (N of two)
278	RELIGIOUS, RITUAL AND FUNERARY	CHAMBERED LONG BARROW	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton North Long Barrow is one of two Neolithic barrows visible as earthworks, Hazleton.
278	AGRICULTURE AND SUBSISTENCE	MIDDEN	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton North Long Barrow is one of two Neolithic barrows visible as earthworks, Hazleton.
278	UNASSIGNED	POST HOLE	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton North Long Barrow is one of two Neolithic barrows visible as earthworks, Hazleton.
278	UNASSIGNED	STAKE HOLE	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton North Long Barrow is one of two Neolithic barrows visible as earthworks, Hazleton.
430	DOMESTIC	PROMONTORY FORT	PREHISTORIC (500,000BC-AD43)	IRON AGE (800BC-AD43)	Nottingham Hill Camp, is an Iron Age to Romano-British Hillfort, Gotherington.
430	TRANSPORT	HOLLOW WAY	PREHISTORIC (500,000BC-AD43)	IRON AGE / ROMANO-BRITISH	A hollow way assiociated with the hillfort.
430	DEFENCE	BIVALLATE HILLFORT	PREHISTORIC (500,000BC-AD43)	IRON AGE (800BC-AD43)	Nottingham Hill Camp, is an Iron Age to Romano-British Hillfort, Gotherington.
430	DOMESTIC	SETTLEMENT	PREHISTORIC (500,000BC-AD43)	IRON AGE / ROMANO-BRITISH	Nottingham Hill Camp, is an Iron Age to Romano-British Hillfort, Gotherington.
3411	RELIGIOUS, RITUAL AND FUNERARY	ROUND BARROW	PREHISTORIC (500,000BC-AD43)	BRONZE AGE (2500-700BC)	Possible site of Round Barrow
3411	RELIGIOUS, RITUAL AND FUNERARY	BARROW	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	Possible site of Round Barrow
4590	MONUMENT <BY FORM>	CURVILINEAR ENCLOSURE	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	A ditched curvilinear enclosure and an outer boundary ditch of possible prehistoric date are visible as cropmarks.
4590	MONUMENT <BY FORM>	SQUARE ENCLOSURE	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	Cropmarks S of Hazleton Covert
4590	DOMESTIC	ENCLOSED SETTLEMENT	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	Cropmark complex south of Hazleton Covert, double ditched enclosure (possible banjo enclosure), square enclosure and linear ditches. Rodmarton.
4590	MONUMENT <BY FORM>	DOUBLE DITCHED ENCLOSURE	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	Cropmark complex south of Hazleton Covert, double ditched enclosure (possible banjo enclosure), square enclosure and linear ditches. Rodmarton.
4590	MONUMENT <BY FORM>	BOUNDARY DITCH	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	A ditched curvilinear enclosure and an outer boundary ditch of possible prehistoric date are visible as cropmarks.
4590	AGRICULTURE AND SUBSISTENCE	BANJO ENCLOSURE	PREHISTORIC (500,000BC-AD43)	IRON AGE (800BC-AD43)	Possible Banjo Enclosure, south of Hazleton Covert
4590	DOMESTIC	RUBBISH PIT	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	Cropmark complex south of Hazleton Covert, double ditched enclosure (possible banjo enclosure), square enclosure and linear ditches. Rodmarton.
4590	AGRICULTURE AND SUBSISTENCE	STORAGE PIT	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	Cropmark complex south of Hazleton Covert, double ditched enclosure (possible banjo enclosure), square enclosure and linear ditches. Rodmarton.
6695	MONUMENT <BY FORM>	ENCLOSURE	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	Prehistoric Enclosure locateted on photographs. The area of this feature has been destroyed by quarry workings.
6695	DEFENCE	BIVALLATE HILLFORT	PREHISTORIC (500,000BC-AD43)	IRON AGE (800BC-AD43)	A later prehistoric or Iron Age bivallate hillfort is partially visible as earthworks. A probable Bronze Age round barrow or ring cairn is visible as an earthwork inside the hillfort. Dowdeswell.
6695	MONUMENT <BY FORM>	BOUNDARY DITCH	PREHISTORIC (500,000BC-AD43)	IRON AGE (800BC-AD43)	A pair of ditches and banks are located outside the quarried area and maybe all that is extant of the hillfort.
6695	MONUMENT <BY FORM>	BANK (EARTHWORK)	PREHISTORIC (500,000BC-AD43)	IRON AGE (800BC-AD43)	A pair of ditches and banks are located outside the quarried area and maybe all that is extant of the hillfort.
6695	RELIGIOUS, RITUAL AND FUNERARY	ROUND BARROW	PREHISTORIC (500,000BC-AD43)	BRONZE AGE (2500-700BC)	A probable Bronze Age round barrow or ring cairn ic visible as an earthwork inside the hillfort.
9310	RELIGIOUS, RITUAL AND FUNERARY	BARROW	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	The Tump
14658	MONUMENT <BY FORM>	FINDSPOT	MODERN (1901-PRESENT)	C20	FLint scatter, Hill Barn
29783	EVENT	FIELDWALKING SURVEY	MODERN (1901-PRESENT)	C21	Field walking survey at field containing barrows, Hazleton, in 2006
38202	MONUMENT <BY FORM>	RECTANGULAR ENCLOSURE	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	A possible prehistoric or Roman enclosure is visible as a cropmark to the northeast of Bowldown Wood, Westonbirt with Lasborough.
38202	MONUMENT <BY FORM>	RECTANGULAR ENCLOSURE	ROMAN (AD43-410)	C1 C2 C3 C4 C5	A possible prehistoric or Roman enclosure is visible as a cropmark to the northeast of Bowldown Wood, Westonbirt with Lasborough.
42950	UNASSIGNED	BURIED LAND SURFACE	PREHISTORIC (500,000BC-AD43)	MESOLITHIC (10000-4000BC)	Mesolithic flints recovered from a Mesolithic buried land surface totally excavated during the 1982 excavation season of at Hazleton North chambered long barrow, Hazleton.

3. Finds

Area Num	Artefact Type Desc	Material Type Desc	General Period Desc	Specific Period	Description
60	SHERD	POTTERY	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Notgrove Long Barrow
60	ARROWHEAD	FLINT	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Notgrove Long Barrow
60	SHERD	POTTERY	PREHISTORIC (500,000BC-AD43)	LATE NEOLITHIC / EARLY BRONZE AGE	Notgrove Long Barrow
60	HUMAN REMAINS	BONE	UNKNOWN	UNKNOWN	Adult male in Notgrove Long Barrow
60	ANIMAL REMAINS	BONE	UNKNOWN	UNKNOWN	Notgrove Long Barrow
60	AMULET	BONE	UNKNOWN	UNKNOWN	Notgrove Long Barrow
60	BEAKER	CLAY	PREHISTORIC (500,000BC-AD43)	LATE NEOLITHIC / EARLY BRONZE AGE	Notgrove Long Barrow. Beaker sherds retrieved.
60	HUMAN REMAINS	BONE	UNKNOWN	UNKNOWN	Notgrove Long Barrow
183	SHERD	POTTERY	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Cow Common long barrow
183	SHERD	POTTERY	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Long barrow 400m NE of Chalk Hill Cottage
191	SCRAPER (tool)	FLINT	PREHISTORIC (500,000BC-AD43)	MESOLITHIC (10000-4000BC)	5 small scrapers found after ploughing on Cow Common round barrows (one of)
191	SHERD	POTTERY	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	Cow Common round barrows (one of)
278	ARROWHEAD	FLINT	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton long barrows (N of two)
278	AXE	FLINT	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton long barrows (N of two). Fragment of flint axe-head retrieved.
278	TOOLS AND EQUIPMENT	FLINT	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton long barrows (N of two)
278	BEAD	BONE	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton long barrows (N of two). Bone bead retrieved.
278	SHERD	POTTERY	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton long barrows (N of two). Neolithic pottery retrieved.
278	FLAKE	FLINT	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton long barrows (N of two)
278	COIN	METAL	ROMAN (AD43-410)	C1 C2 C3 C4 C5	Hazleton North Barrow
278	MICROLITH	FLINT	PREHISTORIC (500,000BC-AD43)	MESOLITHIC (10000-4000BC)	Mesolithic flint microliths found in 1982 at Hazleton North long barrow including a number of rare micro-
278	ANIMAL REMAINS	BONE	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton North Barrow. Animal remains tentatively interpreted as ritual offerings.
278	HUMAN REMAINS	BONE	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton North Barrow. Human remains interpreted as the remains of seven individuals.
278	QUERN	STONE	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton North Barrow. Fragment of quernstone retrieved.
278	PLANT MACRO REMAINS	ORGANIC	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Hazleton North Barrow. Hazelnut shells and cereal grains retrieved.
278	ANIMAL REMAINS	BONE	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Animal bones recovered from the pre-long cairn Neolithic phases totally excavated during 1982 season a
278	HUMAN REMAINS	BONE	PREHISTORIC (500,000BC-AD43)	NEOLITHIC (4000-2200BC)	Human cranial fragment recovered from the pre-long cairn Neolithic phases totally excavated during 198
430	COIN	METAL	PREHISTORIC (500,000BC-AD43)	IRON AGE (800BC-AD43)	A Dubonnic coin found at Nottingham Hill Camp, Gotherington.
430	SPEAR	UNKNOWN	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	Nottingham Hill Camp
430	SHERD	POTTERY	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	Nottingham Hill Camp
3411	SWORD	UNKNOWN	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	Possible site of Round Barrow
14658	LITHIC IMPLEMENT	FLINT	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	FLint scatter, Hill Barn
29783	LITHIC IMPLEMENT	FLINT	PREHISTORIC (500,000BC-AD43)	PREHISTORIC (500,000BC-AD43)	33 lithic implements
29783	SHERD	POTTERY	POST MEDIEVAL (1540-1901)	C17 C18 C19 C20	1 sherd of post-medieval pottery
29783	CLAY PIPE (SMOKING)	CLAY	POST MEDIEVAL (1540-1901)	C17 C18 C19 C20	Bowl from a clay pipe
42950	CORE	FLINT	PREHISTORIC (500,000BC-AD43)	MESOLITHIC (10000-4000BC)	Six Mesolithic period cores recovered from the forecourt area of Mesolithic date recovered from a Meso
42950	FLAKE	FLINT	PREHISTORIC (500,000BC-AD43)	MESOLITHIC (10000-4000BC)	Rejuvenation flakes as Mesolithic flint pieces recovered from during the 1982 excavation season of Hazle
42950	DEBITAGE	FLINT	PREHISTORIC (500,000BC-AD43)	MESOLITHIC (10000-4000BC)	Possible debitage as Mesolithic flint pieces recovered from during the 1982 excavation season of Hazleto
42950	MICROBURIN	FLINT	PREHISTORIC (500,000BC-AD43)	MESOLITHIC (10000-4000BC)	Three microburins recovered from the forecourt area of Mesolithic date recovered from a Mesolithic bur
42950	MICROLITH	FLINT	PREHISTORIC (500,000BC-AD43)	MESOLITHIC (10000-4000BC)	35 microliths recovered from the forecourt area of Mesolithic date recovered from a Mesolithic buried la
42950	FLAKE	FLINT	PREHISTORIC (500,000BC-AD43)	MESOLITHIC (10000-4000BC)	503 unretouched flakes recovered from the forecourt area of Mesolithic date recovered from a Mesolith
42950	AWL	FLINT	PREHISTORIC (500,000BC-AD43)	MESOLITHIC (10000-4000BC)	Three Mesoilithic awls recovered from the forecourt area of Mesolithic date recovered from a Mesolithic
42950	BURIN	FLINT	PREHISTORIC (500,000BC-AD43)	MESOLITHIC (10000-4000BC)	One Mesolithic burin recovered from the forecourt area of Mesolithic date recovered from a Mesolithic

Appendix 5. Dating Burn Ground using radio carbon dates of skeletal material

In 2006 Martin Smith and Megan Brickley re-dated material found from within the barrow. The new dates, they say, provide fresh information regarding the constructional sequence of the monument.[524] The authors used accelerator mass spectrometry (AMS) which can process tiny pieces of bone, useful for the Burn Ground assemblages, most of which were disarticulate and fragmentary.[525] Smith and Brickley found 640 pieces of human bone which they estimate may have combined to form a minimum of ten adults and three sub-adults.[526]

Even whilst using this latest method of radio carbon dating, the authors advise caution. They point out that these new dates can only be considered to give a '*terminus post quem* (TPQ).'[527] In this instance, a TPQ may roughly indicate an end date in terms of last use of barrow as a place of interment, but it cannot be used to date construction. Further, the physical condition of the bones when excavated can complicate and compromise the dating process.

As Thomas points out, skeletal deposits within barrows are presented in three different ways; as complete burials, as scattered bones, or as piles of disarticulated remains.[528] It may be thought that the nature of the deposition, that is, skeletal integrity or lack of it, would reflect the type of funeral given. But disarticulation can occur post-interment due to reuse of space as bones are re-arranged by subsequent generations, animal depredation or grave robbing. Further, Martin King's suggestion that it was likely that there was 'the transport of human skeletal material around the dwelling scape for a period of time prior to later deposition elsewhere' gives indication that date of death and funeral deposition may not be contiguous.[529] Smith and Brickley describe bones being 'rearranged, removed, circulated and redeposited' in a variety of ways.[530] This suggests that bones may have been used as tools, heirlooms, trophies or relics, possibly at other locations, ported from place to place before final interment. These

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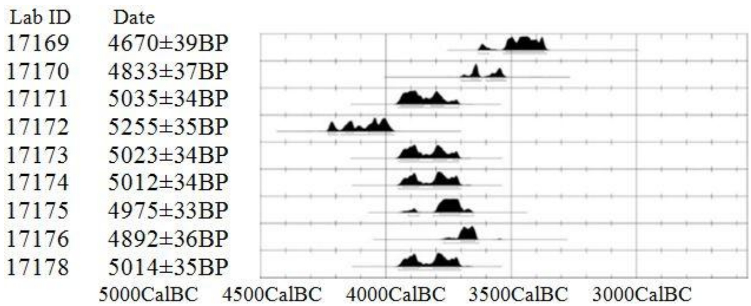
[524] Brickley, '*Date and Sequence of Use*'. p. 335.
[525] Megan Brickley and Jacqueline I McKinley, ed. *Guidelines to the Standards for Recording Human Remains*, vol. 7, The Institute of Field Archaeologists (Reading: University of Reading,2004). p. 44.
[526] Brickley, '*Date and Sequence of Use*'. p. 337.
[527] ———, '*Date and Sequence of Use*'. p. 336.
[528] Julian Thomas, *Understanding the Neolithic* (London: Routledge, 1999). p. 148.
[529] Martin P. King, 'Life and Death in The "Neolithic": Dwelling-Scapes in Southern Britain', *European Journal of Archaeology* 4(2001). p. 327.
[530] Martin Smith and Megan Brickley, *People of the Long Barrows Life, Death and Burial in the Earlier Neolithic* (Stroud: The History Press, 2009). [hereafter: Smith & Brickley. Life, Death and Burial] p. 64.

various practices compromise any assumption that date of bone equates with date of barrow.

Taking the above into consideration and turning to Smith and Brickley's re-calibrated AMS dates listed in Figure 1, it is possible that the one date which might tentatively be used in relation to Burn Ground is the first in the list, Lab ID Number 17169, which identifies the youngest bone. This does not necessarily give the end date for the barrow being used for purposes other than interment, but it may possibly give a TPQ for what might have been the last deposition of bones at Burn Ground. If that were the case that last interment may have been around 4670±39BP.



[531]

Fig. 1. Plot of calibrated AMS dates presented by Smith and Brickley. All dates calibrated with OxCal v.3.10 (Bronk Ramsey 2005).

However, when looking down that list, there is another date of patent interest and that is the one taken from the fourth bone, Lab ID Number 17172. As can be seen this bone gives the earliest date in the barrow standing at 5255±35BP.

In Fig. 2, Smith and Brickley further describe this oldest bone as a radius and citing a 95% probability give its most likely date as being between 4230-3970 BC.

Lab ID	Deposit Number	Skeletal Element/ Specimen Number	Result	Cal BC at 1 s.d. (68%)	Cal BC at 2 s.d. (95%)
17169	1	Long bone shaft fragment/A2611	4670 +/− 39 BP	3520–3370 BC	3530–3360 BC
17170	2	Ulna/A2612	4833 +/− 37 BP	3660–3530 BC	3700–3520 BC
17171	3	Long bone shaft fragment/A2613	5035 +/− 34 BP	3940–3770 BC	3950–3710 BC
17172	4	Radius/A2614	5255 +/− 35 BP	4230–3980 BC	4230–3970 BC
17173	5	Fibula/A2615	5023 +/− 34 BP	3940–3710 BC	3950–3710 BC
17174	6	Long bone shaft fragment/A2616	5012 +/− 34 BP	3930–3710 BC	3950–3700 BC
17175	7	Long bone shaft fragment/A2617	4975 +/− 33 BP	3785–3705 BC	3910–3650 BC
17176	7	Long bone shaft fragment/A2617	4892 +/− 36 BP	3700–3645 BC	3770–3630 BC
17178	9	Long bone shaft fragment/A2619	5014 +/− 35 BP	3930–3710 BC	3950–3700 BC [532]

Fig. 2. AMS dates on human bone from Burn Ground. All dates calibrated with OxCal v.3.10 (Bronk Ramsey 2005).

[531] Brickley, '*Date and Sequence of Use*'. p. 340.
[532] ———, '*Date and Sequence of Use*'. p. 339.

As already discussed, the presence and date of this bone cannot be assumed to give evidence of a primary insertion into the newly built barrow. The bone in question may have been curated elsewhere for some duration. However if that were not the case, being able to tie this oldest bone with its earliest date to the construction of the barrow would give a putative start date of some use.

The type of skeletal deposition that the bone was extracted from, gives one clue as to the nature of its interment. The human remains at Burn Ground are described as being:-

> identified from a number of articulated, disarticulated and co-mingled bones, with the transept chambers occupied by single individuals and the transverse passage with at least nine individuals.[533]

This appears to indicate that there were different types of skeletal deposition within the barrow, possibly giving evidence of different forms of funerary practice. The pile of comingled, disarticulate bones which were found at the entrance of the north-south transverse corridor are contrasted as being 'at odds with the deposition of single individuals in the transepts.'[534]

The bone we are considering here, ID Number 17172, was found in the N W transept. Grimes describes finding a number of human bones in this transept, amongst which were three clavicles 'probably representing two people'.[535] So the oldest bone at Burn Ground appears to come from a collection of bones or a skeleton 'largely composed of material from a single individual.'[536] This would seem to indicate there was enough integrity amongst the bone assemblage in this particular transept, for the skeletons to be recognisably identified as belonging to single people.[537]

As well as the type of skeletal mass from which it came, this bone's physical condition may also offer proof as to the timing of its interment within the barrow. In order to explore this proof it is necessary to further consider the social usage of bones at this time. Smith and Brickley claim that the 'removal, circulation and redeposition' of selected bones from burial assemblages implies they were regarded as a powerful substance.[538] Whatever their ritual, social or economic function, the extended curation of any bone outside of a barrow is likely to have lead to some degree of marking or damage to the bone's surface. But critically and in terms of this research the Historic Environment Record states none of the bones at Burn Ground showed any traces of

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[533] Historic Enivronment Record, 'Area 2573 '.
[534] Brickley, '*Date and Sequence of Use*'. p. 339.
[535] Grimes, '*Excavations*'. p. 71.
[536] Brickley, *Life, Death and Burial*. p. 53.
[537] ———, *Life, Death and Burial*. p. 55.
[538] ———, *Life, Death and Burial*. p. 86.

marking or weathering.[539] This is supported by Smith and Brickley's re-analysis. They re-confirm the bones showed no signs of having been exposed.[540]

It is possible that Burn Ground's bones were physically undamaged because they were not handled, moved or left open to the elements. However, Smith and Brickley do warn that the Burn Ground bones may be so unmarked because they were possibly moved from secluded, long interment elsewhere.[541] It may be that the bones are, as the HER describes, unweathered and unmarked precisely because they were physically protected, but at another location. However, if that were the case, once they were removed from safe storage elsewhere, the successful transportation of a complete, but desiccated skeleton from location to location is a delicate, perhaps impossible task. As mentioned, it is known that bones were shifted and transported between barrows, but Smith and Brickley point out these were more often 'selected' bones, favourite extractions being long bones and skulls.[542] Bones carried between barrows were generally disarticulate and were often signature bones, possibly trophies.[543] But as mentioned, the bones found within the N W transept at Burn Ground were not of this nature. They had not been extracted or selected, but were instead considered to have retained skeletal integrity to the point of being recognisably 'individual'.[544]

Given the above, if a skeletal mass presents as being a recognisable individual and remains unmarked and undamaged during six millennia of interment, it is possible those bones continue as articulate because they have not been tampered with or moved since first insertion. Should that be the case in this instance, then the oldest bone measured at Burn Ground and found within its N W transept, may originate from one of the first burials within the barrow. Indeed Smith and Brickley do so suggest that Burn Ground appears to have been 'a primary place of interment into which individuals were placed initially as articulated corpses.'[545]

This practice is known to have happened elsewhere. Similar to the skeleton found in the N W transept at Burn Ground, the articulated skeleton of an adolescent boy was discovered in a furthest recess of the transepted tomb at West Tump. Again, this skeletal mass was positioned as deep within the barrow as was possible to reach and differed in form from the amassed disarticulate bones found closer to West Tump's

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539 Historic Enivronment Record, 'Area 2573 '.
540 Brickley, *Life, Death and Burial*. p. 53.
541 ———, '*Date and Sequence of Use*'. p. 348.
542 ———, '*Date and Sequence of Use*'. p. 55.
543 ———, *Life, Death and Burial*. p. 109.
544 ———, '*Date and Sequence of Use*'. p. 339.
545 ———, *Life, Death and Burial*. p. 55.

entrance. The West Tump adolescent had an AMS date which proved to be the earliest of seven taken from that site. Smith and Brickley point out that this youngster had been deliberately left ‘intact’ whilst later burials had been dispersed.[546] This may indicate a shift in burial ritual, but it may also point to the fact that as these bones are in the innermost chambers of their barrows and do not appear to have been moved, tampered with or damaged, the earliest dated bones of deepest interment indicate the earliest burials.

Given that barrows functioned as tombs, it may be possible that Burn Ground was built for, amongst others, those interred in its N W transept and that the two events, the construction of the barrow and this earliest burial, were roughly contemporaneous. Smith and Brickley point out that the dates found at Burn Ground are amongst the oldest obtained from the Cotswold-Severn group, and this they say ‘may raise questions about the appearance of the earliest Neolithic in the region.’[547] They note that six of the nine dates in their list, numbers 3 and 5–9, display considerable overlap spanning the period between 3950 and 3630 BC. But they do point to the fact there is ‘only one individual (4) producing an earlier (late fifth millennium BC) date which does not overlap with any of these.’[548] It is this bone from that individual which is under discussion here and certainly, if bone number four can be judged a reliable find in terms of linking both time and place, that may give the construction of the barrow a possible date of between 4230-3970 BC.[549]

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546 ———, *Life, Death and Burial*. p. 54.
547 ———, '*Date and Sequence of Use*'. p. 348.
548 ———, '*Date and Sequence of Use*'. p. 339.
549 ———, '*Date and Sequence of Use*'. p. 339.

Appendix 6. Calculations for the declinations of three barrows from previous research separate to this study, showing possible alignment to Deneb Adige.[550]

Gatcombe Barrow

Lat: 51° N 44' 12" = 51.7
Long: 2° W 10' 20"

164 mtrs elevation
Horizon altitude 0°

Azimuth 7°

Surveyed on 5th May 2010. Magnetic Declination +2° 27' W

Recalculated for true north: +4.5°

Wayland's Smithy

Lat: 51° N 33' 58" = 51.5

Long: 1° W 35' 41"

213 mtrs elevation

Horizon altitude 1°

Azimuth 345°

Surveyed on 18 March 2010. Magnetic Declination +2° W

Recalculated for true north: +343°

Belas Knap

Latitude: 51° N 35' 37" = 51.59
Longitude: 1° W' 10"

Horizon Altitude North: 0°
Horizon Altitude South: 0°

Azimuth 1: 353°
Azimuth 2: 173°

Surveyed on 13 July 2013. Magnetic Dec = +1° 52' W

Recalculated for True North: +351°

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[550] Armstrong, '*A Survey of Ten Cotswold Severn Long Barrows with Particular Reference to Their Archaeoastronomic Properties*'.

Declinations

Labels	AZIMUTH	ALTITUDE	LATITUDE	DECLINATION
Gatcombe	4.5	0	51.7	38.16064466
Wayland's	343	0	51.5	36.53499884
Belas Knap	351	0	51.6	37.84303879

Fig. 1. Declinations for Gatcombe, Wayland’s and Belas Knap

Appendix 7.: Fieldwork Calculations for Burn Ground, Ascott-under-Wychwood, Hazleton North and South and Stonehenge

Burn Ground

Fieldwork Measurements - Calculating Declination

Establishing the adjacent road’s azimuth from true north:-

There is an arc of 24° between the A40 and the excavation site of the barrow.

The road adjacent to the barrow runs at: 117° magnetic (measured 15 June 2013).

Burn Ground: Horizon Altitude.

English Heritage's archive photograph was used to establish orientation and as best could be inferred, the horizons at those bearings were measured:

East: 0°
West: 0°

Latitude: 51°N 50’ 32” = 51.84°
Longitude: 1° W 50’ 54” = 1.84°

Elevation: 218 metres.

Magnetic Field

Latitude:	51.84° N
Longitude:	1.84° W
Elevation:	218.0 M

Date	Declination (+ E | - W)	Inclination (+ D | - U)	Horizontal Intensity	North Comp (+ N | - S)	East Comp (+ E | - W)	Vertical Comp (+ D | - U)	Total Field
2013-06-15	-1.88°	66.67°	19,293.6 nT	19,283.2 nT	-632.4 nT	44,731.3 nT	48,714.8 nT
Change/year	0.15°	-0.01°	16.7 nT	18.3 nT	50.7 nT	15.4 nT	20.8 nT

Fig. 1. Download from www.ngdc showing degrees between magnetic and true north.[551]

Magnetic North @ 15 June 2013 = -2°

Burn Ground: Recalculation for road’s azimuth from true north:

Road's Azimuth 1: 115°

Road's Azimuth 2: 295°

Burn Ground: Subtracting 24° which is the arc between road and site to find barrow's azimuth:

Barrow's Azimuth 1: 91°

Barrow's Azimuth 2: 271°

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551 http://www.ngdc.noaa.gov/geomag-web/#declination, (13.6.13).

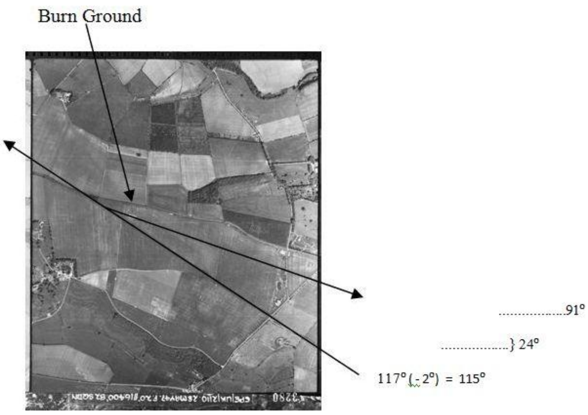

Fig. 2. Burn Ground Azimuth

Burn Ground: Declination of Barrow

The declinations which result from these calculations are -0.6° and +0.6° (Fig. 3).

Labels	AZIMUTH	ALTITUDE	LATITUDE	DECLINATION
Burn Ground	91	0	51.84	-0.617840219
Burn Ground	271	0	51.84	0.617840219

Fig. 3. Calculation of Declination: East-West Transeptal Gallery Gallery.

Burn Ground: Declination of North South Transverse Corridor

The declinations which result from these calculations are +37° and -37° (Fig. 4).

Labels	AZIMUTH	ALTITUDE	LATITUDE	DECLINATION
Burn Ground	11	0	51.84	37.33741966
Burn Ground	191	0	51.84	-37.33741966

Fig. 4. Burn Ground's north-south corridor: calculation of declination, which stands at +37°.

Ascott under Wychwood

Fieldwork Measurements

Latitude: 51° N 51’ 20” (1”) = 51.85
Longitude: 1° W 33’ 50” (9”)

Ascott-under-Wychwood: Horizon Altitude.

During my site visit I used the plans drawn up by the excavators in order to infer as best I could the angle of the barrow, along which length the horizon altitude measurements were taken in each direction.

Horizon Altitude East: 0°
Horizon Altitude West: 1°

Elevation: 129 metres.

Ascott-under-Wychwood: Recalculation for azimuth of road, from true north:-

Benson's report of his measurement of the barrow's azimuth as '7 degrees N of E' gives an azimuth of 83° from magnetic north.[552] Recalculation for True North is shown below.

Horizon Altitude East: - 0°

Horizon Altitude West: 1°

Elevation: - 129 metres.

Magnetic Field

Latitude:	51.84° N						
Longitude:	1.5° W						
Elevation:	129.0 M						
Date	Declination (+ E | - W)	Inclination (+ D | - U)	Horizontal Intensity	North Comp (+ N | - S)	East Comp (+ E | - W)	Vertical Comp (+ D | - U)	Total Field
1966-07-01	-8.18°	66.95°	18,653.4 nT	18,463.4 nT	-2,655.4 nT	43,842.8 nT	47,646.0 nT
Change/year	0.07°	-0.02°	24.0 nT	27.1 nT	20.2 nT	18.9 nT	26.8 nT

Fig. 5. Download from www.ngdc showing -8° degrees between magnetic and true north on July 1st 1966.[553]

Ascott-under-Wychwood: Barrow's Azimuth from true north:-

Azimuth 1: 75° true

Azimuth 2: 255° true

Ascott-under-Wychwood: Declination of barrow

The declinations which result from these calculations are +9°/-8° (Fig. 6).

Labels	AZIMUTH	ALTITUDE	LATITUDE	DECLINATION
Ascott	75	0	51.8	9.210139151
Ascott	255	1	51.8	-8.413516384

Fig. 6. Calculations for the barrow's declinations.

Ascott-under-Wychwood: North South - Declination of Stone Cist Corridor

The declinations which result from these calculations are +38°/-38° (Fig. 7).

Labels	AZIMUTH	ALTITUDE	LATITUDE	DECLINATION
N/S StoneCists	355	0	51.8	38.0286305
N/S StoneCists	175	0	51.8	-38.0286305

Fig. 7. Calculations for declination of stone cists

Ascott-under-Wychwood: East West - Declination of parallel stones including Stone F30

[552] Don Benson, Email, 4 March 2013.
[553] http://www.ngdc.noaa.gov/geomag-web/#declination.

The declinations which result from these calculations are 3º/-2º (Fig. 8).

Labels	AZIMUTH	ALTITUDE	LATITUDE	DECLINATION
E/W Stone F30	85	0	51.8	3.08961604
E/W Stone F30	265	1	51.8	-2.302451239

Fig. 8. Calculations for the east-west Stone F30's declinations

The Hazleton Barrows North and South

Hazleton North: The Dating Process

Three separate time periods were identified at the Hazleton site. Flint finds showed the first human activity, Saville describing them as 'of later Mesolithic character.'[554] More precisely, he suggests they can be dated to the end of the sixth millennium.[555] A second episode of inhabitation is dated by a separate scatter of Neolithic flint work, again pre-barrow. Then there is the barrow construction period itself. Turning to the two sets of flints, considering the different knapping styles involved in the different assemblages, Saville suggests these represent 'a chronological gap between the Mesolithic and Neolithic activity.'[556] When dating the immediate pre-barrow period of inhabitation, he notes:-

> Numerous radiocarbon samples, mainly from human bones but also from antler and animal bones showed the pre-cairn activity and the construction and use of the monument to be essentially of the same Early Neolithic date.[557]

When calculating dates for the pre-barrow Neolithic inhabitation and the subsequent barrow construction Saville estimates there was only '50 years or so between the two.'[558] Thus, should astronomy have been practised at Barrow Ground Field, two scenarios are possible. As Saville points out, 'it seems unlikely that the same population group could be responsible for producing the two assemblages, unless a significant period of acculturation intervened.'[559] Alternatively, 'if the two assemblages are chronologically very close, then two quite separate populations must be supposed.'[560]

[554] Saville, '*Hazleton North*'. p. 14.
[555] ———, '*Hazleton North*'. [hereafter: Saville. Hazleton North]. p.240.
[556] A Saville, 'Hazleton Excavation Project, Gloucestershire, Interim Report. Hazleton North Neolithic Long Cairn', ed. Historic Environment Record (HER) (Gloucester: Western Archaeological Trust (formerly Committee for Rescue Archaeology in Avon,Gloucestershire and Somerset), 1982). p. 1.
[557] Saville, '*Hazleton North*'. p. 268.
[558] ———, '*Hazleton North*'. p. 241.
[559] ———, '*Hazleton North*'. p. 175.
[560] ———, '*Hazleton North*'. p. 175.

Observations and Field Work

Saville describes the barrow as lying 'approximately west-east'. [561] An aerial view offers a ghostly echo of the monument, confirming its general orientation (Fig. 9).

Fig. 9. Google aerial map of Barrow Ground Field showing site of barrow's excavation and destruction. 29 July 2013.

Hazleton North was situated in a position which optimised the view afforded by the rising slope of Barrow Ground Field (Fig. 10).

Fig. 10. Barrow Ground Field. Standing at the eastern edge of the field, looking north-westwards across

561 ———, '*Preliminary Report Hazleton*'. p 10.

its upward slope. 11th June 2013.

Saville's diagram below illustrates what he calls the 'steady rise in elevation across the field from the SE to the NW, with interruption in the contour pattern created by the barrows'[562] (Fig 11).

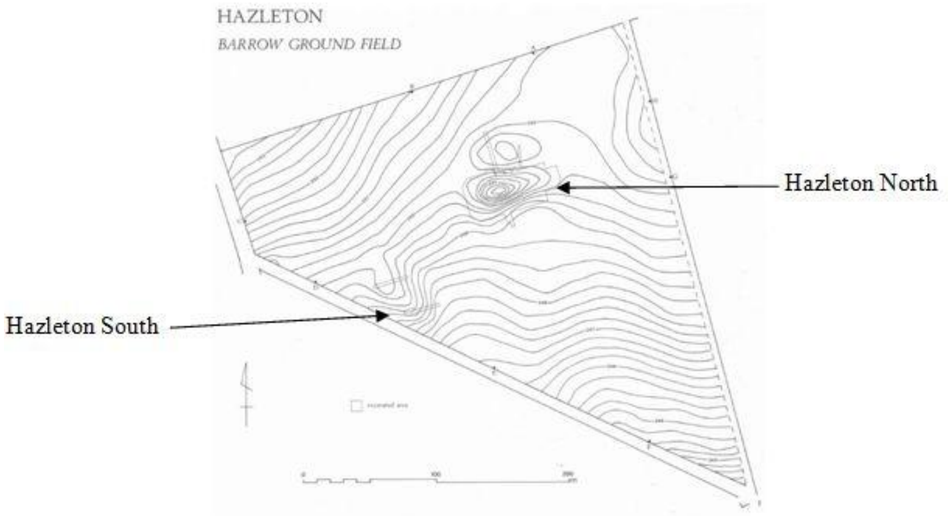

Fig. 11. The oncentrated high points indicate where the barrows were built in Barrow Ground Field. The elevated area by the road shows Hazleton South's location.[563]

The contour map below shows the way the barrow's architects worked with the landscape, exploiting the natural slope (Fig. 12).

[562] A Saville, 7th October 2013. E-mail.
[563] Saville, '*Hazleton North*'. p. 5.

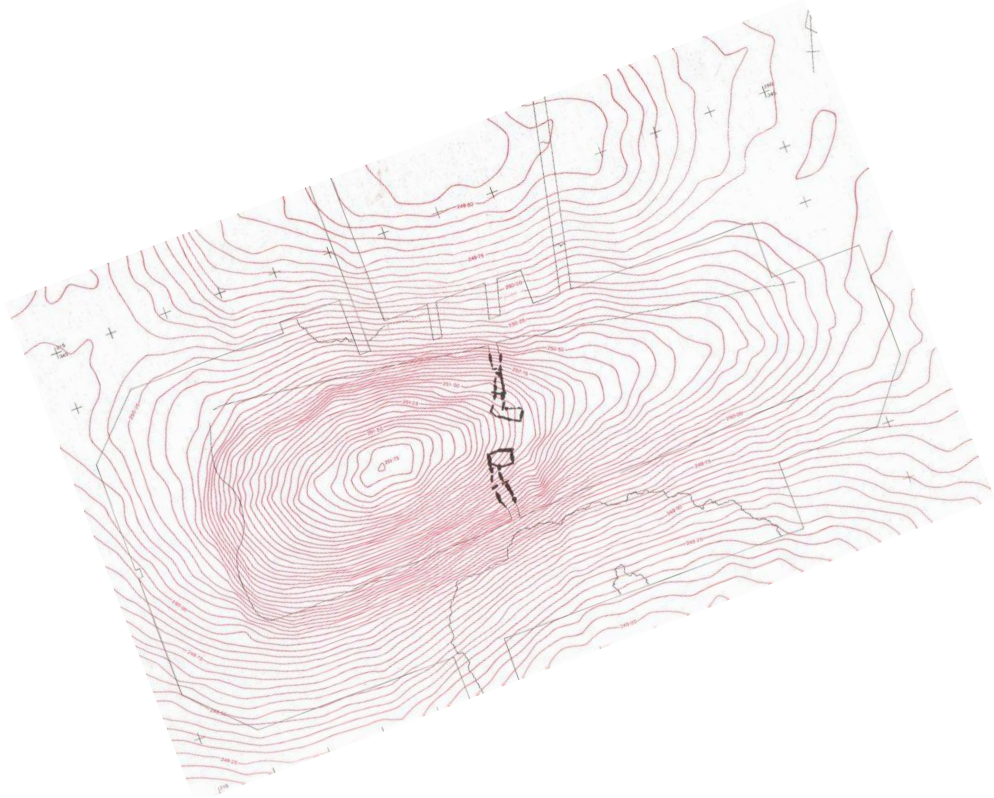

Fig. 12. Highest point in field and the barrow's position in relation to it.
Contours in metres above OD at 50mm vertical intervals.[564]

The upward slope of the field is shown in the panorama I photographed below, which rises from south to north (Fig. 13).

Fig. 13. Barrow Ground Field. 360° panorama, photographed whilst standing on Hazleton South. 16th February 2013

When contacted about the monument's precise orientation, Saville suggested a three step process:-

> To get the best alignment for Haz N you need to take the line of the central spine, which I believe was the crucial guideline for construction, then match this to the position of the cairn within the plan of the excavation area, and then match this to the field plan.[565]

The barrow's central spine can be seen to run the length of the mound (Figs. 14 & 15).

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[564] ———, '*Hazleton North*'. p. 6.
[565] Alan Saville, 30 April 2013 Email.

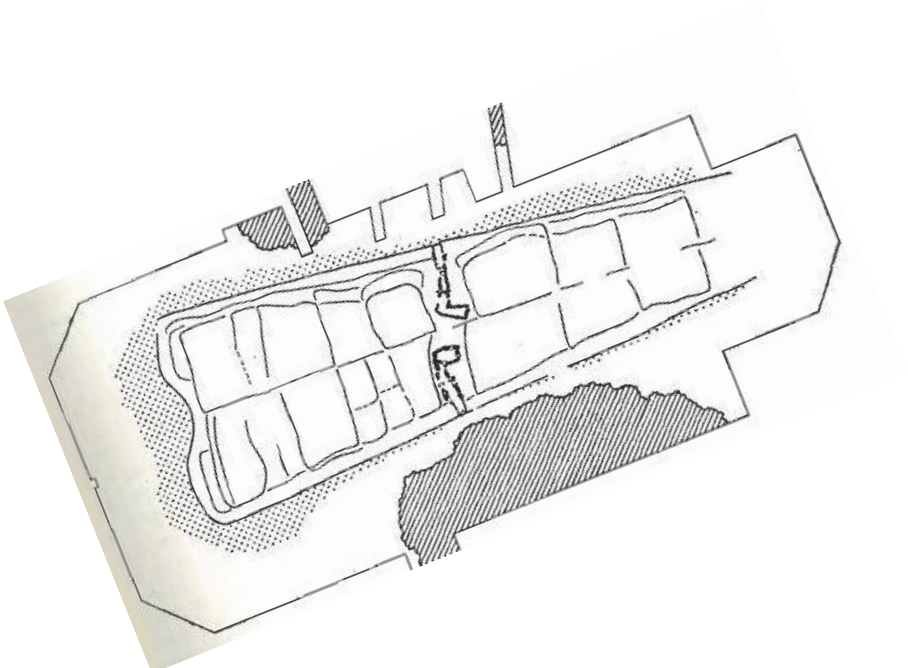

Fig. 14. Plan of the barrow showing its central spinal axis.[566]

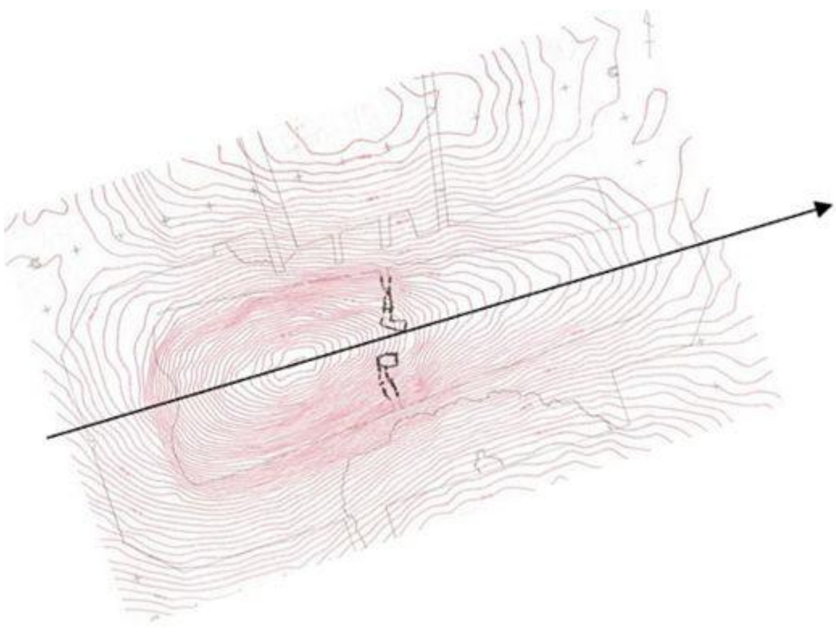

Fig. 15. Barrow's orientation in relation to contour map.[567]

<u>Calculating the barrow’s azimuth in relationship to the adjacent road</u>

Using Saville's diagrams, the structure’s overall orientation can be measured in relation to the adjacent road (Fig. 16).

[566] Saville, '*Hazleton North*'. p. 11.
[567] ———, '*Hazleton North*'. p. 6.

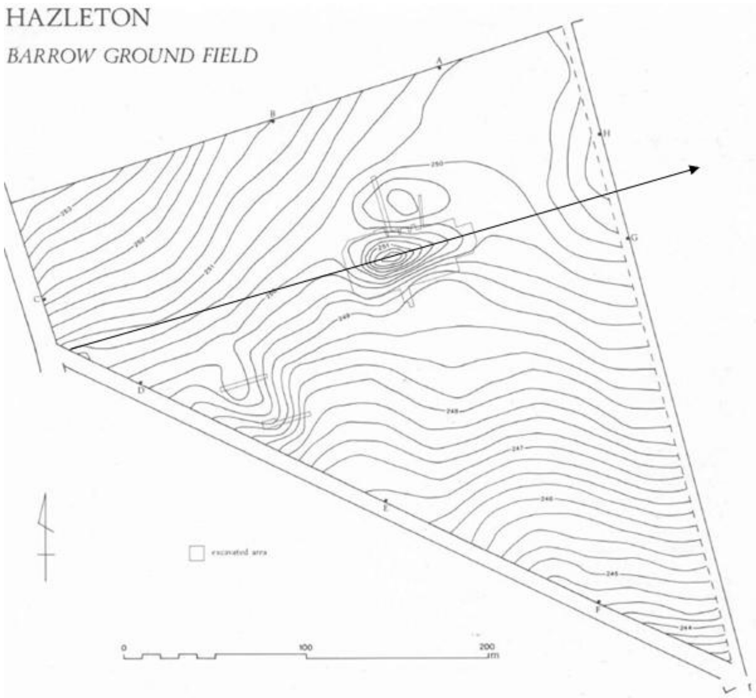

Fig. 16. Hazleton North. Contour survey: contours in metres above OD at 0.25 vertical intervals.[568]

Fieldwork Measurements

The line drawn across the barrow in the above diagram replicates as best possible the primary architectural feature which Saville terms the 'the axial west-east alignment...established as a basic subdivision at the beginning of construction'[569] (Fig. 17). The road's azimuth from magnetic north is 121^{o}. There is an angle of 42^{o} between it and the likely position of the central axis of the barrow, thus the barrow's azimuth from magnetic north stands at roughly 79^{o} in 2013 (Fig. 17).

[568] ———, '*Hazleton North*'. p. 5.
[569] ———, '*Hazleton North*'. p. 32.

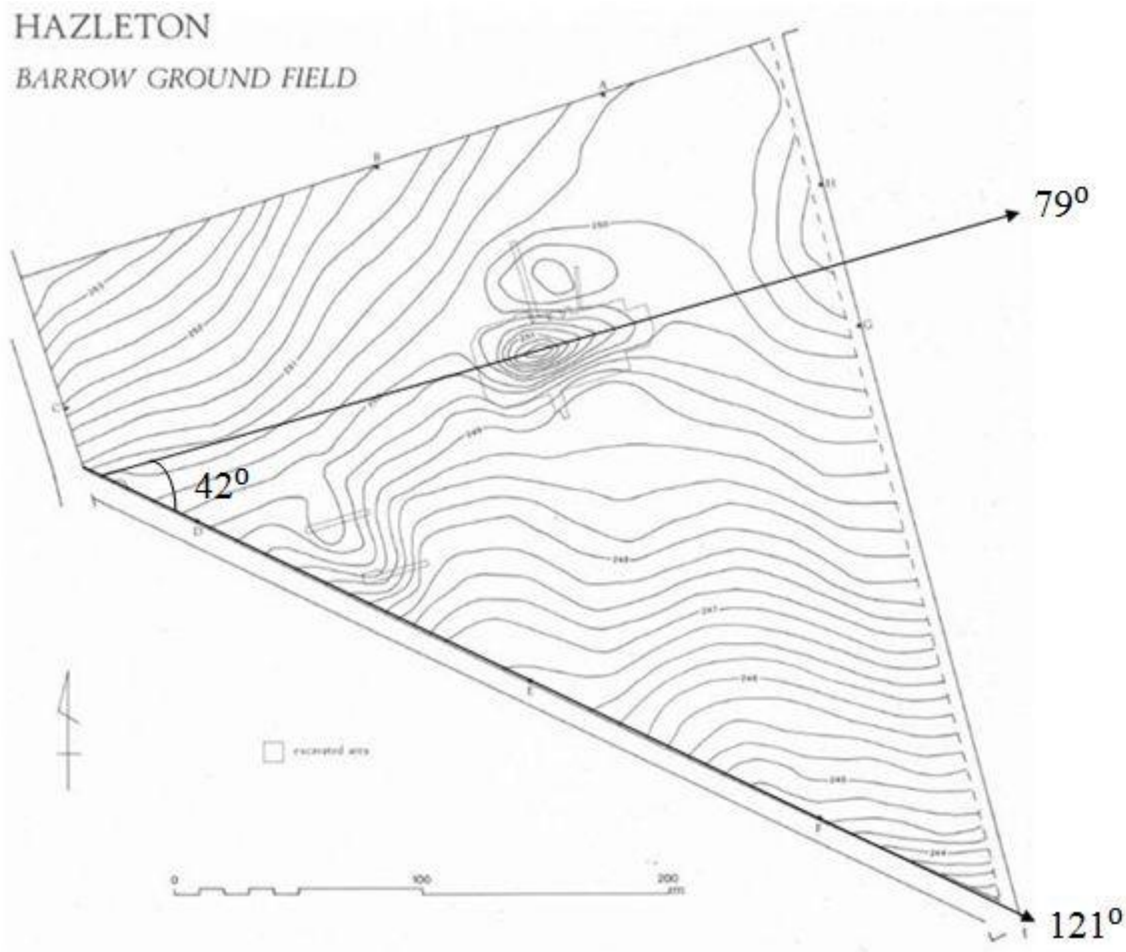

Fig 17. Barrow's azimuth from true north, in relation to adjacent road.
Contour survey: contours in metres above OD at 0.25 vertical intervals.[570]

Declination of Hazleton North Barrow

I estimated that Magnetic North stood at -2⁰ on the day of measurement. Subtracting that, gives the barrow an azimuth from True North of roughly 77⁰ (Fig. 18).

Magnetic Field

Latitude:	51.86° N
Longitude:	1.89° W
Elevation:	258.0 M

Date	Declination (+ E | - W)	Inclination (+ D | - U)	Horizontal Intensity	North Comp (+ N | - S)	East Comp (+ E | - W)	Vertical Comp (+ D | - U)	Total Field
2013-04-29	-1.92°	66.68°	19,281.4 nT	19,270.6 nT	-645.9 nT	44,738.0 nT	48,716.1 nT
Change/year	0.15°	-0.01°	16.7 nT	18.3 nT	50.7 nT	15.4 nT	20.7 nT

Fig. 18. Calculation for Magnetic North on 29th April 2013.

Fieldwork measurements:-

Latitude: 51⁰ N 52’ 05” (4”) = 51.86⁰

Horizon Altitude: NE 0⁰
Horizon Altitude: SW 0⁰

Elevation: - 258 metres.

---

[570] ———, '*Hazleton North*'. p. 5.

Hazleton North   Declination of Barrow

The declinations which result from these calculations are +8º/-8º (Fig. 19).

Labels	AZIMUTH	ALTITUDE	LATITUDE	DECLINATION
HazN.Barrow	77	0	51.86	7.985727653
HazN.Barrow	257	0	51.86	-7.985727653

Fig. 19. Hazleton North: calculation for declinations of barrow.

Hazleton North:

The Post-holes and Stake-holes

There were a number of pre-barrow post-holes of archaeoastronomic interest found under the south-western part of the monument, close to the 'structure' (Fig. 20).

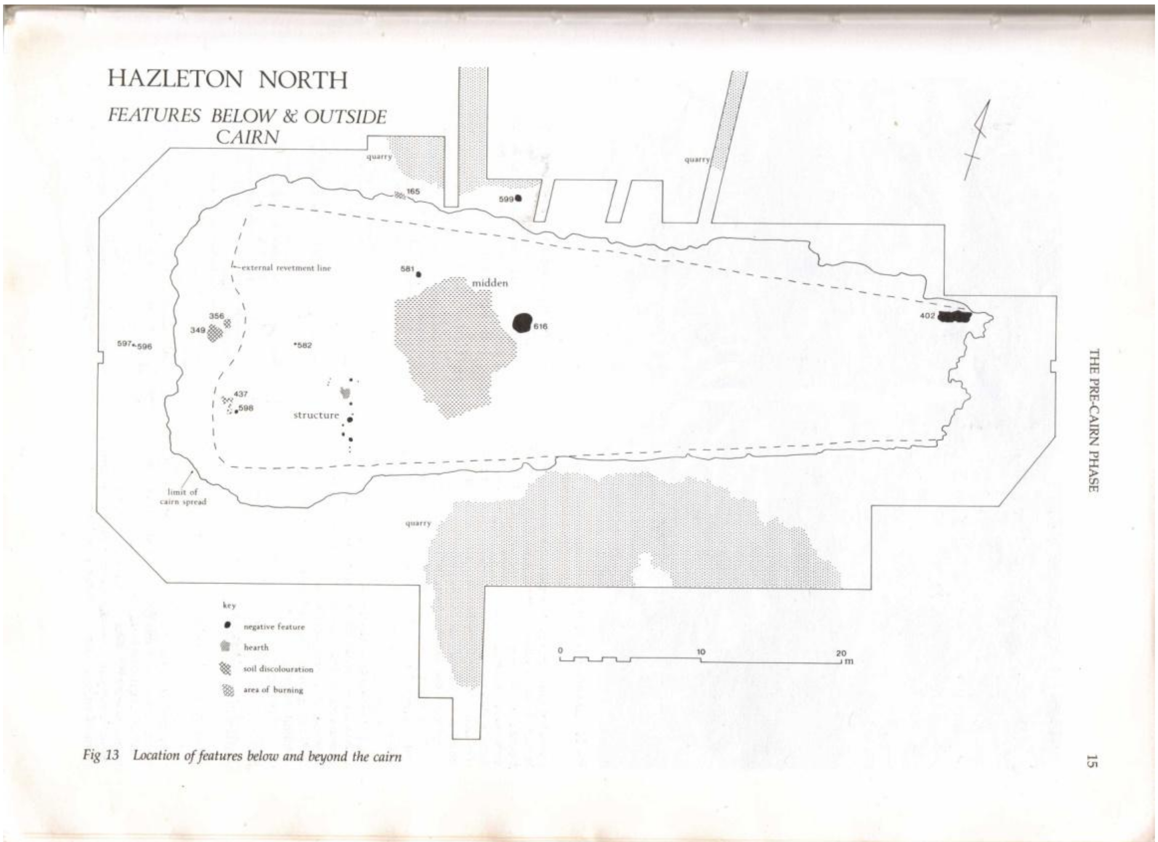

Fig. 20. North-south post-holes running past 'structure' at south-western end of barrow.[571]

Saville describes the post-holes as having a north-south alignment though their purpose he admits, 'remains obscure.'[572] A diagram was drawn and they were also photographed (Figs. 21 & 22).

571 ———, '*Hazleton North*'. p. 15.

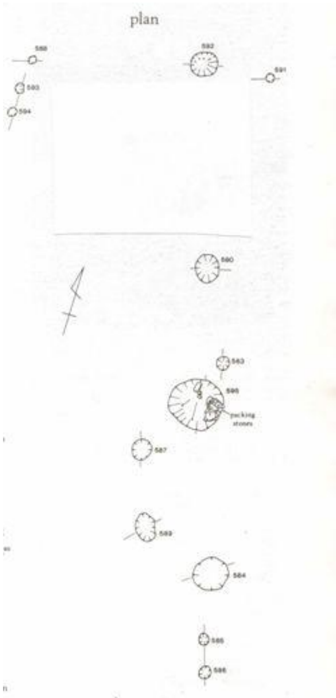

Fig.21. This diagram is drawn from a southerly perspective.[573]
The short row contains stake-holes number 588, 593, 594.

Fig. 22. This photo is taken from a northerly perspective, inverting the previous point of view.[574] The long row is made up of post-holes number 592, 590, 595, 584, 585, 586.

Saville identified this single row of post-holes during his excavation, but I felt there were actually two. There was a second short row made up of stake-holes. The two rows veer at slightly different angles (Figs. 23 & 24).

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572 ———, 'Hazleton Excavation Project, Gloucestershire, Interim Report. Hazleton North Neolithic Long Cairn'. p. 9.
573 ———, '*Hazleton North*'. p. 21.
574 ———, '*Hazleton North*'.p. 20.

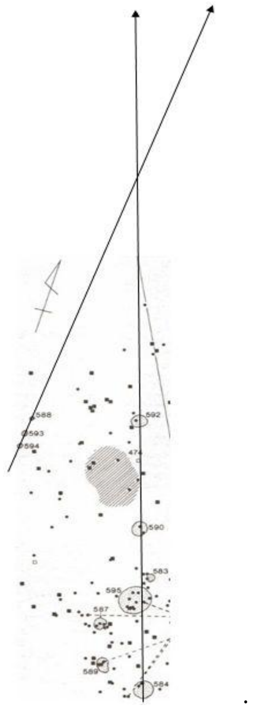

Fig. 23. Plan diagram of flint finds and holes beneath the barrow [575]

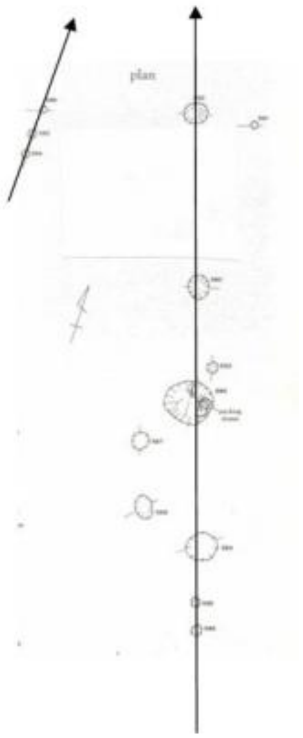

Fig. 24. Close up of holes of archaeoastronomic interest and their orientation.[576]

The post and stake-holes were of variable depth. Taking the long row of post-holes first, these were described as having 'convincing post-sockets.'[577] The topmost hole in the long row was so deep it penetrated the bedrock. Saville also mentions that the central hole in this row was the deepest of all the holes and had been shored up with 'obvious post-hole packing.'[578] That particular post-hole was 12 inches deep. Saville reiterates the fact that 'a straight north-south line passes through' this row.[579] There is suggestion that the two post-holes positioned next to the structure may have been used to create a doorway, but that does not preclude the possibility that they also provided alignment (Fig. 24).

The post-holes themselves were not dated, but they were sealed beneath the barrow in an area where fragments of human, cattle and pig bone were found.[580] These were given dates of around '*3940-3690 cal. BC.*'[581] Shards found in the ground between two of the post-holes matched flint discards discovered in the midden and it is animal bones

575 ———, '*Hazleton North*'. p. 21.
576 ———, '*Hazleton North*'. p. 19.
577 ———, '*Hazleton North*'. p. 20.
578 ———, '*Hazleton North*'. p. 20.
579 ———, '*Hazleton North*'. p. 20.
580 ———, '*Hazleton North*'. p. 14.
581 Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 53.

from the midden which provide the dates mentioned above.[582] Saville argues that this 'may point to a chronological and cultural link' between the holes and the midden. Usefully, it also suggests a date for at least two of the posts in the long row of post-holes.[583]

Spatially separate to the above, were the three stake-holes. These formed a short row which deliberate or not, had an orientation. The row can be seen in Figs. 23 & 24. The stake-holes were shallower than the post-holes, measuring just 2, 3 and 5+ inches deep, though one 'penetrated the bedrock.'[584] It is possible they were put in place during a transitory visit to the site. Saville has suggested the Mesolithic flint assemblages found in the pre-barrow context ‘could imply a temporary camp for retooling of hunting equipment.'[585] If the stakes were used for orientation or ritual purposes during such a fleeting visit, they would not need to be deep. They are however undated. It cannot be assumed they are linked to either of the flint finds, but if they were installed by Mesolithic hunters retooling their weapons, they may date to the end of the sixth millennium.[586] Conversely, if they were inserted when the Neolithic flint scatter was formed Saville suggests a 'near contemporaneity of pre-cairn and cairn-use phases' so that dates them to the barrow construction period.[587] Even though there is no way to dependably establish the stake-holes' dates, I have still calculated their declination, as their very impermanence may speak of transient hunter gathering whatever the time period. When measured against the barrow's azimuth, the bearings of the long row of post-holes and the short row of stake-holes are found to be 345° and 6° respectively (Fig. 25).

[582] Saville, '*Hazleton North*'. p. 16.
[583] ———, '*Hazleton North*'. p. 170.
[584] ———, '*Hazleton North*'. p. 20.
[585] ———, '*Hazleton North*'. p. 14.
[586] ———, '*Hazleton North*'. [hereafter: Saville. Hazleton North]. p.240.
[587] ———, '*Hazleton North*'. p. 241.

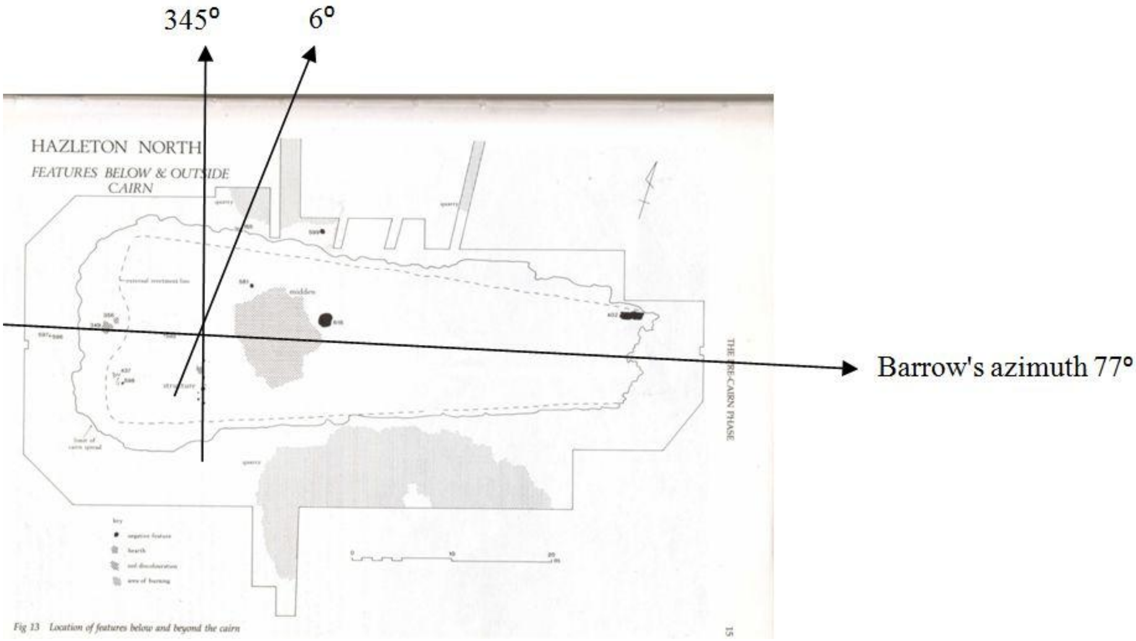

Fig. 25. Post- and stake-hole azimuths from True North.

Hazleton North: Declination of Long Row of Post-holes and Short Row of Stake-holes

Labels	AZIMUTH	ALTITUDE	LATITUDE	DECLINATION
Row of Posts	345	0	51.86	36.62259367
Row of Stakes	6	0	51.86	37.89395274

Fig. 26. Hazleton North: calculation for declinations of Long Row of Post and Short Row of Stakes

The declinations which result from these calculations are +36° and +38°.

Hazleton South

Hazleton South is the other mound in Barrow Ground Field (Fig. 11). Witts pointed out it lies 'only eighty yards' from Hazleton North, so possible links may apply.[588] Although the map shows this barrow as lying parallel to the road, its remnants were too degraded to allow for a realistic judgement of its orientation. It is barely apparent, presenting as indeterminate, rough terrain. Saville described this second barrow as 'an elongated amorphous, low mound with a stony surface after ploughing.'[589] It seemed too convenient to assume it lay parallel to the road so I emailed two separate diagrams to Alan Saville asking which one best illustrated the barrow's orientation (Figs. 27 & 28.).

[588] Witts, *Archaeological Handbook*. p. 80.
[589] Saville, '*Hazleton North*'. p. 137.

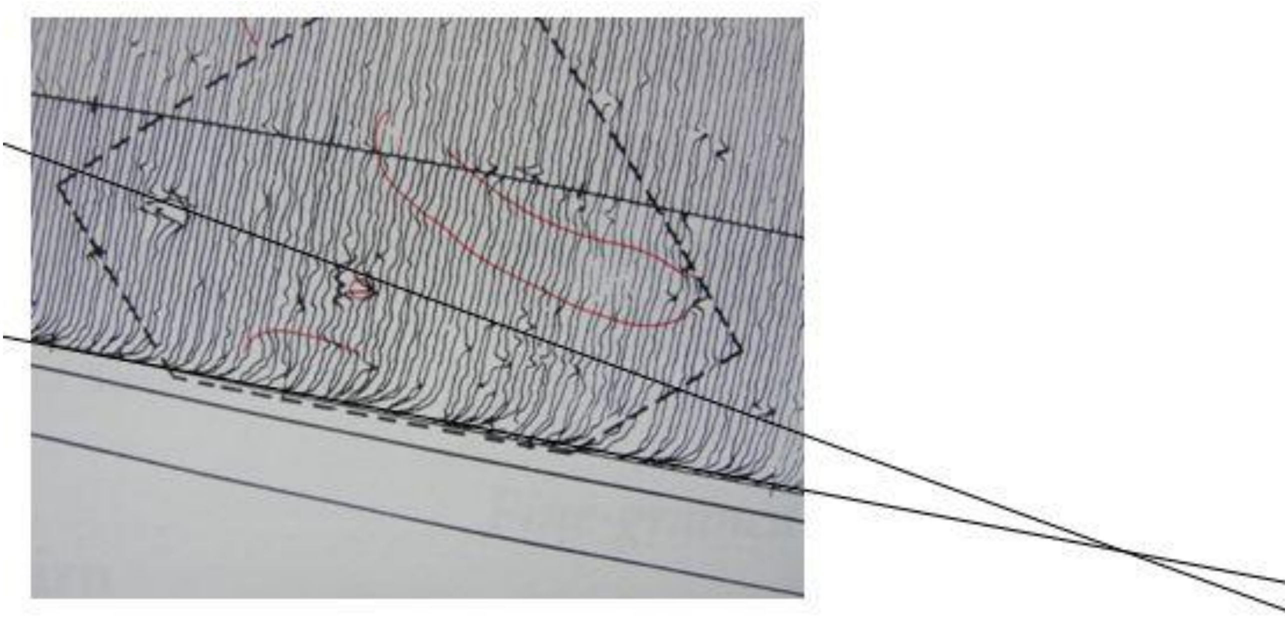

Fig. 27. First diagram sent to Alan Saville. Geophysical resistivity diagram taken of Hazleton South's surface, showing apparent obtrusions which may indicate the barrow's path. The angle between the road and this path is 9°.[590]

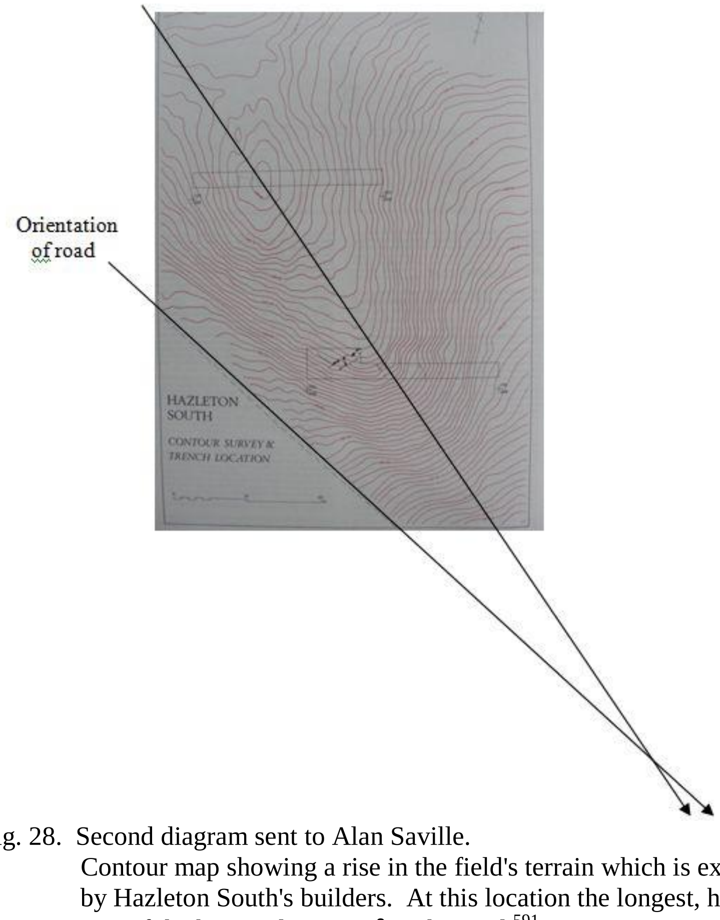

Fig. 28. Second diagram sent to Alan Saville.
Contour map showing a rise in the field's terrain which is exploited by Hazleton South's builders. At this location the longest, highest part of the barrow lies at 13° to the road.[591]

In reply, Alan Saville agreed that the barrow did not run parallel to the road, writing:-

590 ———, '*Hazleton North*'. p. 232.
591 ———, '*Hazleton North*'. p. 136.

> My feeling, and all the evidence so far, is that the alignment definitely does not correspond to that of the road. The 13 degree offset in your second diagram seems to me to fit the evidence best.[592]

Taking this advice I used the second 'contour' diagram to calculate Hazleton South's azimuth (Fig. 29). As already established the road which runs adjacent to the Hazleton field has an azimuth of 121°.

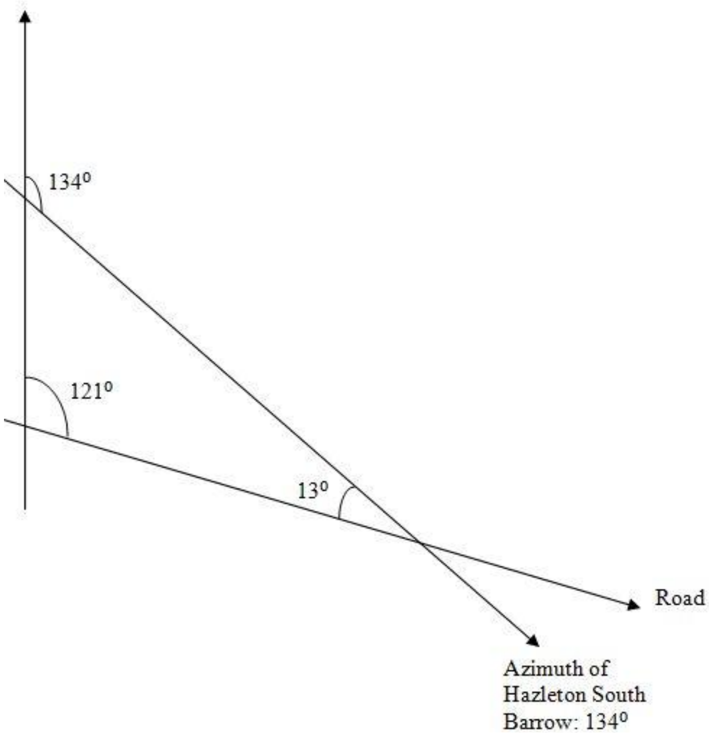

Fig. 29. Calculation for establishing azimuth of Hazleton South in relation to the adjacent road.

Factoring in the 13° suggested by Saville, it can be estimated that the possible azimuth for Hazleton South ran close to 134°.

<u>Fieldwork Calculations:</u>

<u>Establishing Declination</u>

Latitude: 51° N 52’ 03” = 51.87

Longitude: 1° W 53’ 43”

Horizon Altitude: NE 1°

Horizon Altitude: SW 0°

The compass reading for the road was taken on 29 April 2013. Magnetic north on that day stood at -2° (Fig. 30).

[592] A Saville, 20.9.2013. Email.

Magnetic Field

Latitude:	51.86° N
Longitude:	1.89° W
Elevation:	258.0 M

Date	Declination (+ E | - W)	Inclination (+ D | - U)	Horizontal Intensity	North Comp (+ N | - S)	East Comp (+ E | - W)	Vertical Comp (+ D | - U)	Total Field
2013-04-29	-1.92°	66.68°	19,281.4 nT	19,270.6 nT	-645.9 nT	44,738.0 nT	48,716.1 nT
Change/year	0.15°	-0.01°	16.7 nT	18.3 nT	50.7 nT	15.4 nT	20.7 nT

Fig. 30. Magnetic North on 29th April 2013.

Thus the recalculation for Hazleton South's azimuth from true north is = 132°

Hazelton South Declination of barrow

The declinations which result from these calculations are -24° / +25° (Fig. 31).

Labels	AZIMUTH	ALTITUDE	LATITUDE	DECLINATION
Haz South	132	0	51.8	-24.44351676
Haz South	312	1	51.8	25.305716

Fig. 31. Calculation for declination.

Hazleton North: Discussion of possible astronomic intent at this site *'3710-3655 cal.BC.'*[593]

The Barrow

In terms of celestial horizon events, Hazleton North may have aligned to the moon. When recalculated for a variation in the obliquity Silva notes that during a minor standstill year, one of the peaks of probable rise for the Autumn Full Moon was at a declination of +8.7°, which is close to Hazleton's declination of +8°.[594] As similarly occurred near the equinoxes at Burn Ground and possibly Ascott-under-Wychwood, this again is an alignment to a rising, eclipsing, Autumn Full Moon which occurs only every 18.6 years.

When considering fixed stars for Hazleton North barrow, I have used the dates of the deer antlers associated with its construction process, which stand at around *'3710-3655 cal.BC.'*[595] No bright stars rose at or near the barrow's declination of +8°, at this time. However, a significant feature of Hazleton was its unusual inversion. The Cotswold-Severns have a signature design feature not found in other barrows and that is the horned shape always found at one end of the monument. Referencing these horns Burl writes that in almost all the early tombs they 'looked eastwards.'[596] However O. G. S. Crawford noticed that Hazleton North uncharacteristically turned its horns to the

[593] Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 54.
[594] Silva, '*Equinoctial Full Moon Models*'. p. 5.
[595] Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 54.
[596] Burl, *Prehistoric*. p. 27.

west.[597] Saville argues this made Hazleton 'unique so far amongst tombs of the Cotswold-Severn group.'[598] Certainly, as he says, this inversion 'confounded the norm.'[599] Thus Hazleton North was significantly, perhaps uniquely different to other barrows in that its celestial emphasis may have lain westwards.[600] As noted, the start date for the construction of the barrow was judged to be around 3710 BC, and at that time Aldebaran set at -9° close to the barrow's setting declination of -8°[601] (Fig. 32).

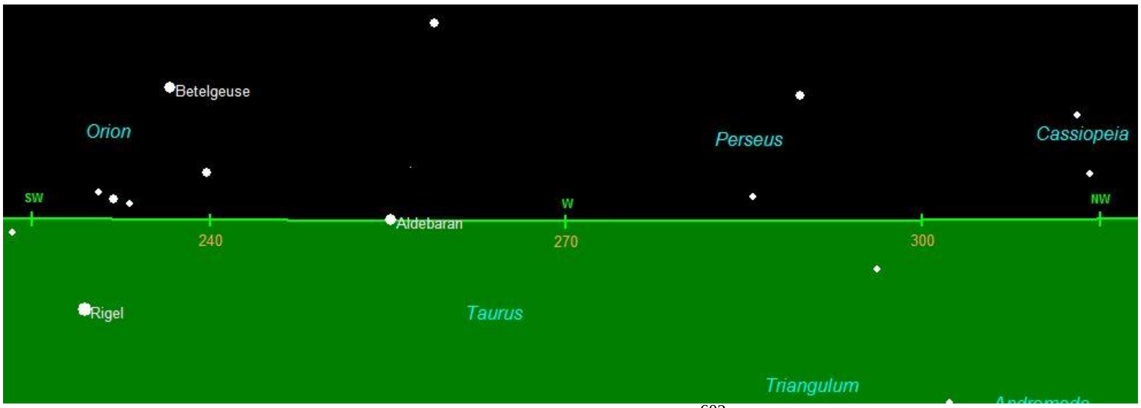

Fig. 32. Aldebaran setting at Hazleton North at -9° in 3710 BCE.[602]

Aldebaran was undergoing the phase of Arising and Laying Hidden when aligned to the barrow and had an interesting axial relationship with the sun at this time. Its first morning setting would have occurred as the sun rose at zero degrees at the Autumn equinox in this era.[603] The term morning setting is used in this instance in the manner defined by Brady as being a star of the Arising and Laying Hidden phase which set as the sun rose. [604]

Hazleton North: The Pre-Barrow rows of Post-holes and Stake-holes

Post-holes

Turning to the long row of post-holes, these have been dated to around '*3940-3690 cal. BC.*' [605] Checking across that date range, Denebola (HIP 57632), set on the north western horizon at a declination of +36.6° early within that period[606] (Fig. 33).

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[597] O G S Crawford, *The Long Barrows of the Cotswolds* (Gloucester: John Bellows, 1925). p. 102.
[598] Saville, '*Preliminary Report Hazleton*'. p. 11.
[599] ———, '*Hazleton North*'. p. 4.
[600] Daniel, *Chamber Tombs*. p. 80.
[601] *Starlight*.
[602] *Starlight*.
[603] *Starlight*.
[604] Brady, '*Star Phases*'. p. 7.
[605] *Starlight*.
[606] *Starlight*.

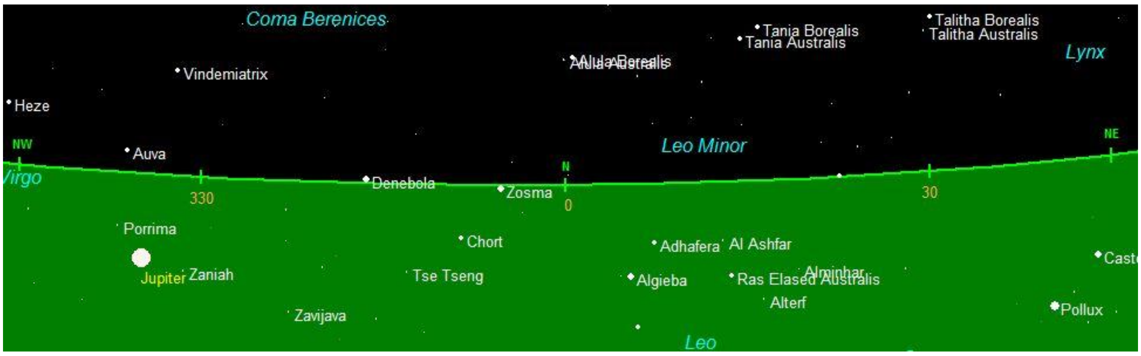

Fig. 33. Denebola setting in the north west, whilst undergoing Curtailed Passage around '*3940 cal. BC.*'[607] The long row of post-holes aligned to Denebola's declination of +36.6° at this time.[608]

The star was undergoing Curtailed Passage at this time. It acronychally rose in the autumn, a couple of months before the winter solstice and it would have remained in the circumpolar region till it heliacally set about a month before the Spring equinox, thus remaining in the northern sky across much of the winter.[609]

Stake-holes

As regards the short row of stake-holes, these aligned towards +38° of declination. This was the same declination that the Neolithic funeral cists at Ascott-under-Wychwood oriented to, which in their era aligned to Vindemiatrix. But Vindemiatrix had by now precessed to +39° of declination.[610] Thus it had entirely separated from the horizon, becoming fully circumpolar. If ritual was attached to the stars of Curtailed Passage, Vindemiatrix may have lost its capacity to facilitate passage from the earthly to the divine[611] (Fig. 34).

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[607] Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 53.
[608] Stellarium 0.12.0.
[609] *Starlight*.
[610] Stellarium 0.12.0.
[611] Brady, '*Star Phases in Old Kingdom Ascension Mythology*'.

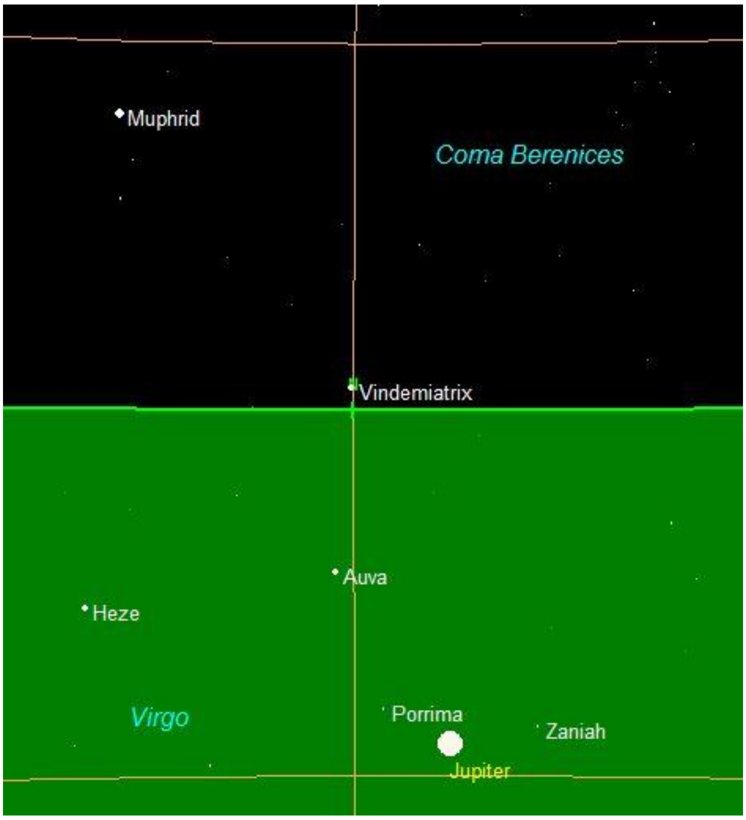

Fig. 34. Vindemiatrix had precessed to +39° by 3940 BCE, and was thus fully circumpolar. It no longer touched the horizon.[612]

As no alignment occurred during the Neolithic, and given this location's early, episodic use, I decided to look at Mesolithic horizon events.[613] The stake-holes are spatially separate from other pre-barrow features discussed so far, thus temporal separation may also apply. Considering the other dates which relate to the material record at other sites, the earliest dates mentioned in this survey attach to the roe deer bones found at Ascott-under-Wychwood. These stood at '*5300-4900 cal BC'*.[614] In fact they are so early they were considered anomalous at Ascott, but as they were found in the midden they do speak of food preparation, site management and less transitory settlement.[615] Transferring those very earliest Mesolithic dates thirteen miles across country from Ascott to Hazleton and checking across the entire date range of '*5300-4900 cal BC'*, Deneb Adige described as Circumpolar and rising at a declination of +38° did engage with Hazleton's horizon during this earliest Mesolithic period.[616] It travelled along it, just skimming the earth, then it rose into the divine area of the imperishable

[612] *Starlight*.
[613] Saville, '*Hazleton North*'. p. 14.
[614] Alex Bayliss, '*Ascott-under-Wychwood Date*'. p. 38.
[615] ———, '*Ascott-under-Wychwood Date*'. p. 38.
[616] *Starlight*.

stars when it reached an azimuth closely shared by that of the three stake-holes[617] (Fig. 35.).

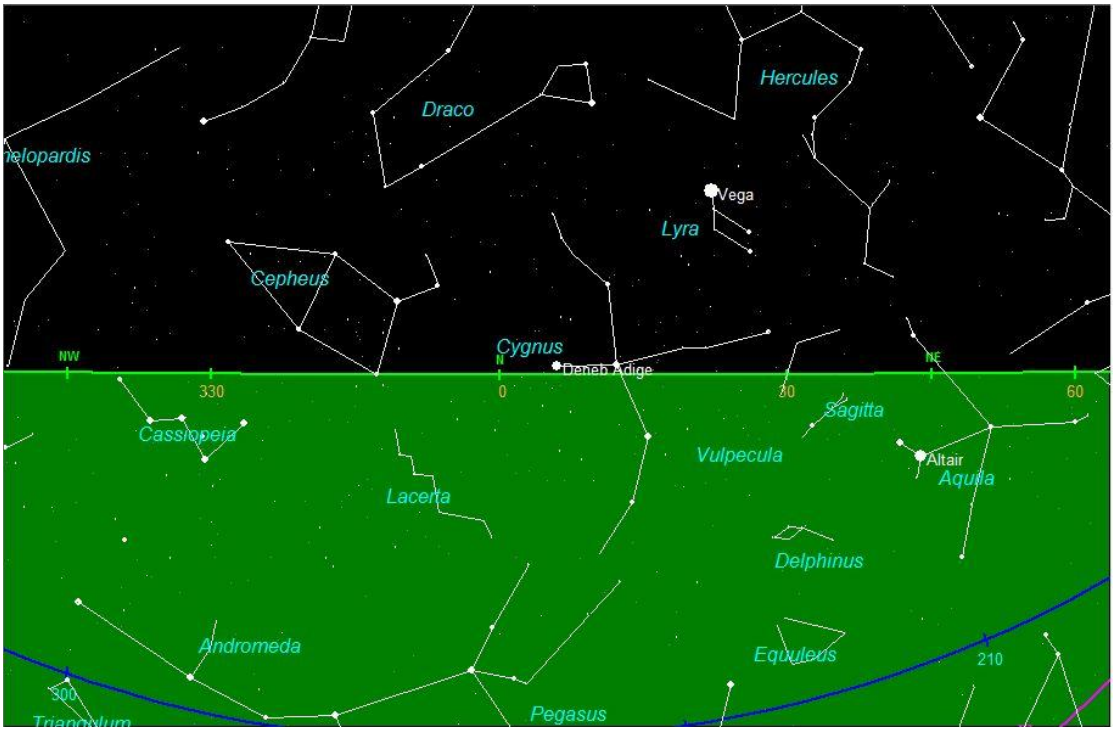

Fig.35. Deneb Adige, declination +38°. 5300BCE. Aligning with short row of stake-holes. Rising into the sky at around 6 degrees of azimuth, close to that shared by the stake holes.[618]

Hazleton South

Possible construction date, may be close to that of Hazleton North: ?*'3710-3655 cal.BC.'*[619]

Declination of Hazleton South

The declinations which result from these calculations are -24.4° / +25.3° .

Observations

Hazleton South's limited excavation revealed no dates, though pottery similar to that from the pre-barrow context at Hazelton North was also found across the field at Hazleton South. However these sherds could not be stratified so a temporal link between the two barrows cannot be assumed. There is no way of establishing if the barrows were built at the same time and any such suggestion remains speculative. Looking at the broadest time frame Saville does write, 'I think the cairns were contemporaneous, in the sense of both being built as part of the florescence of long

617

618 *Starlight*.

619 Meadows, Barclay, and Bayliss, '*Dating of the Hazleton Long Cairn*'. p. 54.

barrow building in the early 4th millennium.'[620] But that is as far as the attempt to establish a unifying time frame can be taken.

The Mesolithic Landscape at Stonehenge

The two rows of post-holes at Stonehenge predate Phase 3ii's sarsen stone circle period. Thus their possible alignments would have been established during the Mesolithic, or in the case of the row of four, if not the Mesolithic then across the transition into the Neolithic.

The Mesolithic Car Park Post-holes

I decided to compare the declinations of both the Mesolithic car park post-holes shown above and the row of four post-holes at the entrance to Stonehenge itself. I calculated the azimuth for the road which bisects the Stonehenge site, the A 344 stands at 110°17'. The angle between the Mesolithic car park posts holes and the road is 19°. The angle between the road and row of four post-holes is 10° (Fig. 36). Thus the Mesolithic post-holes have a rough azimuth of 91°. And the row of four post-holes, have a rough azimuth of 120°.

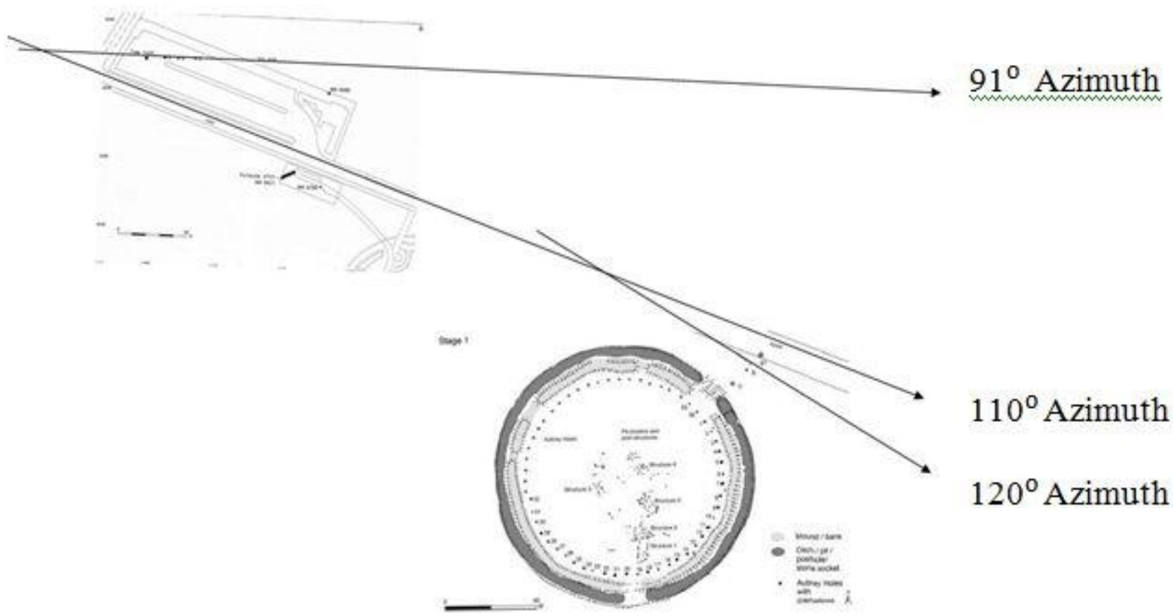

Fig. 36. The A344 has an azimuth of 110°.

Mesolithic Car Park Post-holes

620 ———, 17 October 2013. Email.

The azimuth of 91°, that I arrived at above corresponds to Loveday's calculation for the orientation created by post-holes 'A' too 'B.'
He describes this azimuth as 'A to B c. 91°'[621] (Fig. 37).

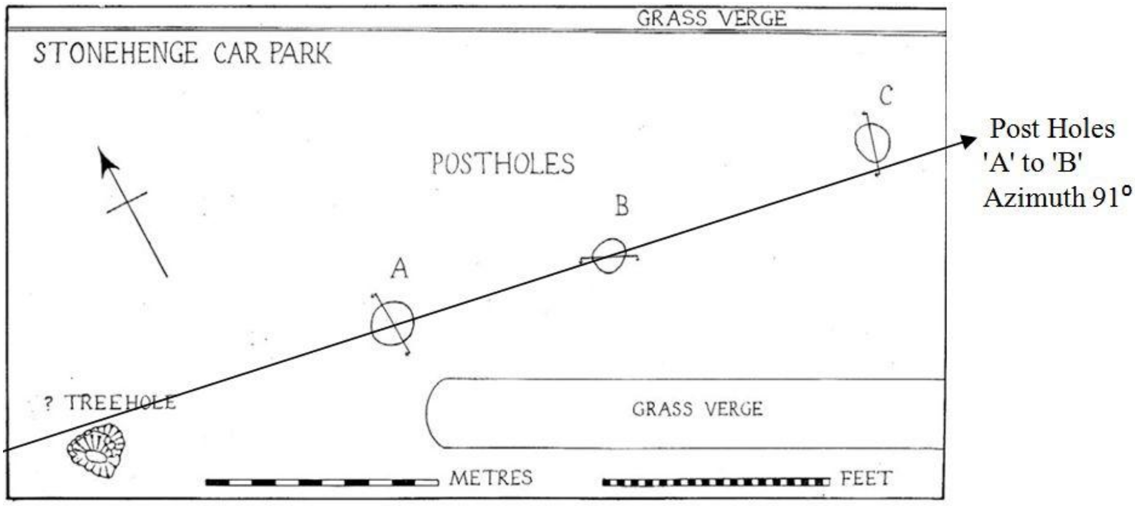

Fig. 37. Possible alignment created by post-holes 'A' and 'B'.[622]

Loveday also measured another azimuth, this one created by the relationship between post-hole 'A' to post-hole 'C' (Fig. 38). He describes this measurement thus:-

> Within the limits of prehistoric "surveying" that between the outermost two (A and C: c. 86°).[623]

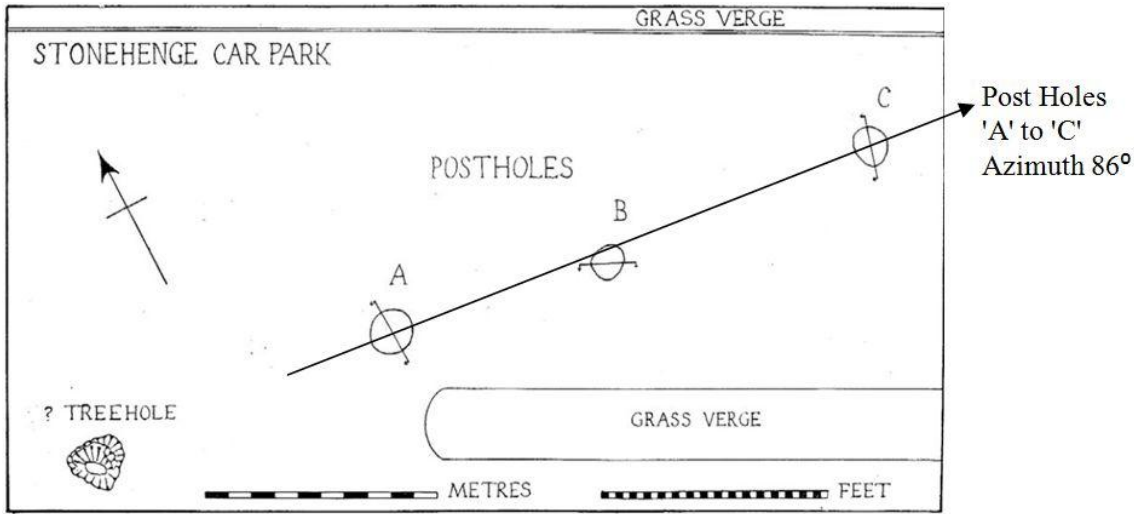

Fig. 38. 'A' to 'C's azimuth.[624]

Turning to the tree hole, Cleal describes the Mesolithic landscape surrounding Stonehenge as having been forested.[625] As the tree would probably have been in situ

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[621] Loveday, '*Greater Stonehenge*'. p. 345.
[622] ———, '*Greater Stonehenge*'. p. 344.
[623] ———, '*Greater Stonehenge*'. p. 344.
[624] ———, '*Greater Stonehenge*'. p. 345.

from the inception of this site it may have been the addition of post 'A', the earliest dated post-hole which created the first alignment. The tree hole is currently not visible so I have drawn a diagram and using a protractor, estimate that four degrees separate the tree hole /Post 'A' azimuth from Loveday's 86° of azimuth that attaches to posts 'A' to 'C'. Thus the azimuth for tree hole/Post 'A' is roughly 82° (Fig. 39).

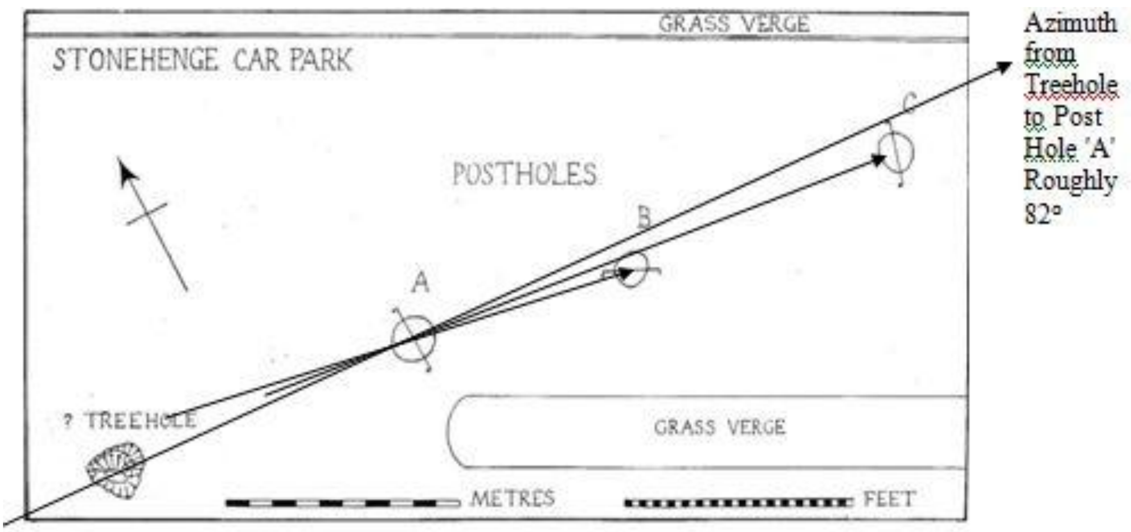

Fig. 39. Possibly the first alignment, from tree hole/post 'A', which relative to the others gives an azimuth of 82°.

Stonehenge Fieldwork

Mesolithic Car Park Post-holes

Row of Four Post-holes at entrance to Stonehenge

Azimuth of A344

Horizon altitude for Mesolithic Car Park Post-holes: 0.5° SW
1° NW

Horizon altitude for row of four post-holes at N E entrance to Stonehenge: 0° SE
0.5° NW

Elevation 101 meters

Azimuth of Road A 344 from Magnetic North: 112° / 292° Dated: 13 November 2013 (Fig. 40).

Magnetic Field

Latitude:	51° 11' N
Longitude:	1° 50' W
Elevation:	0.0 K

Date	Declination (+ E | - W)	Inclination (+ D | - U)	Horizontal Intensity	North Comp (+ N | - S)	East Comp (+ E | - W)	Vertical Comp (+ D | - U)	Total Field
2013-11-13	-1° 42' 49"	66° 7' 59"	19,648.1 nT	19,639.3 nT	-587.5 nT	44,407.6 nT	48,560.1 nT
Change/year	8.8'	-0.5'	17.6 nT	19.1 nT	49.5 nT	21.8 nT	27.1 nT

Fig. 40. Download from www.ngdc showing degrees between magnetic and true north.[626]

[625] Cleal, *Stonehenge / Landscape*. p. 43.
[626] http://www.ngdc.noaa.gov/geomag-web/#declination.

Azimuth of A 344 recalculated for True North: 110°17' 110.3°

Declinations of Car Park Post-holes 'A' to 'C' and 'A' to 'B'

plus Row of Four Post-holes at Entrance to Stonehenge

The rough declinations which result from these calculations are shown below (Fig. 41).

Labels	AZIMUTH	ALTITUDE	LATITUDE	DECLINATION
Car Park Post	91	0.5	51.17	-0.237456819
Holes A / B	271	1	51.17	1.405995786
				90
Car Park Post	86	0.5	51.17	2.896648613
Holes A / C	266	1	51.17	-1.72691988
				90
Treehole to	82	0.5	51.17	5.397099136
Post Hole A	262	1	51.17	-4.223904863
				90
Row of Four	120	0	51.17	-18.27063946
Post Holes	300	0.5	51.17	18.68058545

Fig. 41. Declinations for Car Park Post-holes and Row of Four by Stonehenge's entrance.

Because of the hybrid methodology used to arrive at these findings, the declinations which result should perhaps be considered approximate. Nevertheless alignments of interest are created.

Row of Four Post-holes at Entrance to Stonehenge

Taking the row of four post-holes by the entrance to Stonehenge first, as their declinations stand at -18.2°/+18.6°, these orient close to the point on the horizon where Ruggles suggests the southern minor lunar standstill occurred during the megalithic building period of Stonehenge. He suggests that during this era this stood at around -19.6° of declination.[627] The post-holes are undated so the following is speculative, but if the very earliest Mesolithic date for Stonehenge is applied, the post-holes may have aligned to three different stars. That date stands at 8820 BC.[628] The Pleiades rose at -19.2° of declination then.[629] The bright southern star Fomalhaut [Hip 113368], visual magnitude 1.15, also rose at -19.3° of declination at this time. On the western horizon, Antares, set at a declination of +18.6°.

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627 Ruggles, *Prehistoric Astronomy*. p. 57.
628 Cleal, *Stonehenge / Landscape*. p. 43.
629 Stellarium 0.12.0.

The Mesolithic Car Park Post-holes

Turning to the car park post-holes, if the tree hole was implicated in an orientation, given it would likely have been in situ when the earliest post was established, which was post 'A', that would date the first alignment at this site to around 8820 BC.[630] The declination of the tree hole / post 'A' alignment stands at +5°/-4°. If 0.8° is added to Silva's theoretical value of +4° to allow for variation in the obliquity, the above declination at Stonehenge corresponds with his suggested probable peak for alignment to the annual Autumn Full Moon and the Autumn Full Moon eclipse, on the minor lunar standstill every 18.6 years.[631]

Post 'A' to post 'C'

The second possible alignment in the car park area, may have been created from the first post 'A', to post 'C'. The declination arrived at for this alignment is +2.8°/-1.7°. If this orientation was established at the same time as the lunar ones above, posts 'A' / 'C' aligned with the very bright star Capella [HIP 24608], visual magnitude 0.08, in the constellation of Auriga, which rose at a declination of 2° at this time.[632] However the treehole/post 'A' lunar alignment described above appears to be an autumn lunar event and Capella did not rise over the horizon during the Autumn equinox at this time. But by the year 8355 BC, the very bright star Regulus [HIP 52634], visual magnitude 0.03 in the constellation of Leo did.[633] It rose at a declination of 2.9° across the Autumn.[634] It is possible this alignment was added then as additional horizon marker enabling identification of the approaching annual Autumn Full Moon and the Autumn Full Moon eclipse, on the minor lunar standstill every 18.6 years.[635] If this stellar alignment was included with the lunar one possibly created by tree/post 'A' described above there would again have been the establishment of a seasonal lunar/stellar 'cosmic and cultural knot.'[636]

Post 'A' to post 'B'

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[630] ———, *Stonehenge / Landscape*. p. 43.
[631] Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.
[632] Stellarium 0.12.0.
[633] Cleal, *Stonehenge / Landscape*. p. 43.
[634] ———, *Stonehenge / Landscape*. p. 43.
[635] Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.
[636] Brady, '*Star Paths*'. p. 4.

The second date revealed by the car park post-holes comes from post-hole 'B' which is dated around '7480-6590 cal BC.'[637] Should post 'A' or its antecedents have remained operative across this period and created an alignment in concert with the eventual inclusion of post-hole 'B', the two combined would have aligned to a declination of -0°/+1°. This may have been to either the equinox, or an Autumn Full Moon eclipse on a minor lunar standstill year, or both.[638] However, the star Pollux [HIP 37826], visual magnitude 1.15, in the constellation of Gemini, rose at a declination of exactly 0° in this era, becoming apparent when it heliacally rose around the first week of April, heralding the beginning of Spring.[639] Thus there may have been a shift to a Spring horizon event. This bright star may have combined with either the solar or lunar horizon events already listed as occurring at this degree, again joining with one or both of the luminaries in providing navigational aid and calendrical marker.

[637] Cleal, *Stonehenge / Landscape*. p. 43.
[638] Silva, '*Equinoctial Full Moon Models*'. Fig. 3. p. 5.
[639] Stellarium 0.12.0; ———, '*Equinoctial Full Moon Models*'.

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