Gathering Space

Landscape and Enclosure in the Early Neolithic of Southern Britain

Volume 1 of 2

Thesis submitted for the degree of Doctorate of Philosophy

David M. J. Durkin

Kellogg College, University of Oxford

Trinity 2019

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Abstract

This thesis centres around a form of early Neolithic architecture described as the causewayed enclosure. Though detailed research has focused on the material recovered from their ditches, much of their wider interpretation is based on, or has roots in, the territorial models produced in the 1970s. This study draws on theoretical approaches including, Affordance, Proxemics, Phenomenology, and Agency to challenge these earlier interpretations.

The theoretical concepts are considered through a standardised methodology applied to 34 causewayed enclosures in four discrete areas. A Geographic Information System (GIS) is used to manage a very large dataset of early Neolithic components, ground conditions, and geospatial characteristics, and to construct 'cost of movement' and 'visibility' models.

These mathematical models examine the potential, capacity, and the presence and nature of contemporary activity. The output is used to contrast and compare characteristics, and to elucidate common landscape physiognomies.

The contribution of this research includes:

- A new interpretation of the relationship between causewayed enclosures and long barrows.
- A revised consideration of the spatiotemporal development of enclosures and the relationship between causewayed enclosures and the landscape.
- New ideas on the implications of these characteristics. Particularly in terms of mobility, the development of farming practice, though also and more generally, for social relations in the early Neolithic.

The research has demonstrated that these enclosures were carefully situated to extract very particular characteristics. A consistent pattern of avoidance emerges in respect of their relationship with long barrows. The research highlights the importance of river systems and challenges notions of fixed territories. The work shows that rivers facilitated both riverine and overland mobility, and had a pre-eminent role as 'cultural assets'. Whilst regional variability emerges as a constant theme, a sufficient consistency of results has enabled new commentary on the context of this important early intervention in the landscape, and on some facets of early Neolithic society.

In a wider context, the synthesis of GIS based mathematical modelling and the manipulation of large datasets, coupled with the integration of archaeological theory, offers a new intra and interregional methodology, that may be applied more broadly within archaeology.

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Glossary

ACS	Accumulated Cost Surface.
AOD	Above Ordnance Datum.
BGS	British Geological Society.
C14	Radiocarbon (Carbon-14).
Cambs.	Cambridgeshire.
DEM	Digital Elevation Model.
DNA	Deoxyribonucleic acid.
DTM	Digital Terrain Model.
Dors.	Dorset.
ESRI	Environmental Systems Research Institute.
Esx.	Essex.
EN	Early Neolithic.
GIS	Geographic Information System(s).
Glous.	Gloucestershire.
HER	Historic Environment Record.
LBK	Linearbandkeramic.
Lidar	Light Detection and Ranging.
Lincs.	Lincolnshire.
MaCD	Maximum Cost Distance.
MaCDA	Maximum Cost Distance Area.
MeCD	Mean Cost Distance.
MeCDA	Mean Cost Distance Area.
MiCD	Minimum Cost Distance.
MiCDA	Minimum Cost Distance Area.
MNI	Minimum Number of Individuals
NMR	National Monuments Record.
NMP	National Mapping Program.
NSG	Neolithic Studies Group.
Northnts.	Northamptonshire.
OS	Ordnance Survey.
Oxon.	Oxfordshire.
pdf	Adobe (Portable Document Format) file type.
RC	Radio Carbon (C14).
RMSE	Root Mean Square Error.
shp	ESRI (shape) file type.
SPTA	Salisbury Plain Training Area.
Srry.	Surrey.
Ssx.	Sussex.
THF	Tobler Hiking Function.
Wilts.	Wiltshire.

Introduction.

1.1 Preamble.

This thesis centres on the early Neolithic (EN) period in Britain and a class of monument variously described as causewayed enclosures, causewayed camps or interrupted ditch enclosures. The monument class is defined by reference to a (usually) sub-circular system of discontinuous quarry ditches surrounding the 'enclosure'. In some cases the ditches may also have had a more complete boundary defined by internal banks or palisades, or a combination of both.

The construction of causewayed enclosures appears to have been a westward diffusion of a traditional architecture. The form of this architecture is evident in northern and western France, where causewayed enclosures appear earlier than in Britain, and often display a greater degree of structural complexity (see, for example: Scarre, 2001, 24-25; Burnez & Loubouting, 2002, 11-27; Klassen, 2018).

The dynamics of Neolithisation remain a contested and much debated question. Whether Neolithic practices were spread by European pioneer colonists (e.g. Sheridan, 2000; 2003; Tresset, 2003; Sheridan, 2004; 2007; 2010; 2012), or through the indigenous adoption of continental ideas (e.g. Edmonds, 1995; Whittle, 2003; Cooney, 2007; Cunliffe, 2008; Thomas, 2008), or a combination of both (Garrow & Sturt, 2011), the process in England seems to spread from the extreme south east of Britain, just before the beginning of the 4th millennium (4100cal.BC) (Whittle *et al.*, 2011, 798 & 869). Neolithic 'things and practices'

included the introduction of plain and decorated, simple ceramic vessels (Gibson, 2002, 69-82), distinct changes to lithic technology (Edmonds, 1995), the beginnings of agrarian practices (e.g. Wickham Jones, 2010; Hadjikoumis *et al.*, 2011; Whittle & Bickle, 2014), the development of landscape and public architecture (e.g. Thomas, 1999; Oswald *et al.*, 2001; Russell, 2002; Field & McOmish, 2016), and an emerging sociality of 'manufacturing' and wide scale exchange, that Mark Edmonds labels as the *transformation of the social relations of production* (Edmonds, 1993b).

Despite the debate surrounding the dynamics of this primary phase of Neolithisation, the current evidence suggests that the first construction of causewayed enclosures in Britain commences after this phase. And, with the possible exception of Magheraboy in northwest Ireland (Sheridan, 2007, 441), causewayed enclosures first surface in the southeast of England, and then spread northward and westward (Whittle *et al.*, 2011), comprising one more component of a regionally variable 'Neolithic package'. The introduction of enclosure building also follows, by a period of two to three hundred years, the first phase construction of long barrows.

The construction of enclosures in southern Britain begins in the late 38th century cal BC, spreading northwards and westwards, and peaks around 3600 cal BC, (Whittle *et al.*, 2011) as the package that we now describe as constituting the Neolithic consolidates. However, Neolithic people's need for causewayed enclosures seems to have been a short-lived phenomenon. No new enclosures or additional circuits appear to have been constructed after about 3550cal BC, and though a few exceptional sites persist until the 33rd and 34th centuries cal BC, most are out of use by the late 36th century cal BC. Other components of

the early Neolithic, notably long barrows and cairns are more persistent and continue in use, beyond the demise of causewayed enclosures, until around 3000cal BC (Whittle *et al.*, 2011).

The chronological boundaries of this thesis are therefore limited and although some discussion on the periods immediately before and immediately after is included, the primary focus is on the period 3750 – 3300 cal BC[1].

The study is also limited to the British mainland, thereby excluding the Irish enclosures and the probable enclosure at Billown on the Isle of Man (Darvill, 2001; Oswald *et al.*, 2001, 158). These exclusions are justified both by the need to draw some boundaries in a limited study and because, in a study primarily concerned with transmission through and across landscapes, the introduction of 'offshore' enclosures raise a case for special treatment since the overland linkages between them and mainland enclosures will not be apparent. The enclosures chosen for the case studies are from southern and eastern England.

[1] Dates quoted here are typical and represent the peak of the posterior density estimate. Chronology interpreted through Bayesian statistical modelling exhibits a range of possible dates according to two probabilities, for example stated at 2 standard deviations (95%) and 1 standard deviation (68%). It is these statistically derived dates that are used in the interpretation of the subsequent GIS models.

1.2 **Aims of the thesis.**

Causewayed enclosures appear to have played an important role within early Neolithic society. Despite a considerable body of research, their function and role continue to stimulate debate and the tendency for a one-size-fits-all interpretation remains.

The recent application of Bayesian statistics to radiocarbon (C14) dating has resulted in significant improvement to the chronological precision associated with the lifecycle of some enclosures (Whittle *et al.*, 2011). In addition, advances in artefact sourcing (for example see: Davis & Edmonds, 2011; Walker, 2018) and isotope analysis have improved our knowledge of the movement of people (and animals), and the human connections between different areas. Research into the ecological environment (Allen, 2017) has also developed, and evolving thought around the Mesolithic / Neolithic transition (eg: Thomas, 2008; 2013), has provided an enhanced interpretive framework. Though inevitable gaps in knowledge remain, this improved precision and definition has significantly enhanced our understanding what is now believed to be a dynamic and regionally variable neolithisation of southern Britain

The interpretative legacy of early models, that placed causewayed enclosures at the centre of fixed territories, or on their margins, remains. This legacy now seems dated and unsuited to an early Neolithic society, that appears to have been more mobile than these models assumed and allowed. The theoretical landscape has also shifted. Frameworks based on Affordance (Gillings, 2009; 2012) and Proxemics (Wheatley, 2014) provide opportunity to develop the earlier work, and bridge the gap between the previous deterministic models, and the overtly experiential theory developed in the 1990s.

The aim of this research is to investigate the locational and spatial characteristics of causewayed enclosures and other early Neolithic indicators in order to better understand concepts of movement, mobility and landscape relationships in the early Neolithic.

In doing so, the research seeks to provide a more sophisticated understanding of why people chose to locate this new architectural form where they did. The research offers a new perspective on what cultural processes led to people choosing a particular space in the landscape to locate a causewayed enclosure.

1.3 Objectives of the thesis.

The objectives outline the research strategy adopted to support the aim. The following questions help establish a framework, and though the research does not slavishly seek to answer each for every enclosure, together they provide a basic structure around which the research is formed and the concluding chapter is drawn.

I. Mobility and early Neolithic farming practices.

How may the siting of causewayed enclosures and other early Neolithic indicators, support a notion of a semi-mobile early Neolithic, and how does this impact previous and current models concerning farming and landscape exploitation in the early Neolithic? How do causewayed enclosures relate to these early farming practices, and are there significant and relevant landscape relationships between causewayed enclosures and, for example, geology, topography or hydrology?

II. Causewayed enclosures and riverine mobility.

Can the research develop any further understanding of the role played by rivers and streams, and how important were these in determining the location of a causewayed enclosure? For example, by providing routeways of mobility to and from the enclosures?

III. Causewayed enclosures, rivers and overland mobility.

To what extent may rivers have been otherwise important in the siting of causewayed enclosures; specifically, can the research provide any further understanding of the importance of riverine features in aiding mobility across the land?

IV. Causewayed enclosures, mobility, contact and exchange.

To what extent can an analysis provide any improved understanding surrounding the dynamics of contact and exchange in the early Neolithic? For example, can the research support causewayed enclosures as centres of exchange, or nodes on exchange networks?

V. Causewayed enclosures and their visual characteristics.

What can a detailed analysis determine about the decision taken to site a causewayed enclosure within its environs? For example, how important was the visibility of the enclosure from the surrounding landscape, or conversely, the visibility from an enclosure across the surrounding landscape? How specific and carefully determined were these acts of agency, and were they consistently expressed, or subject to regional variations and patterns?

VI. Causewayed enclosures and long barrows.

What can a spatial analysis suggest concerning interrelationships between causewayed enclosures and other contemporary activity, and in particular the relationship between causewayed enclosures and long barrows?

VII. Causewayed enclosures and their spatiotemporal development.

What can be inferred by the spatiotemporal development of enclosures, and what might this indicate about mobility and social dynamics in the early Neolithic?

VIII. Causewayed enclosures and their role in alliances, memory, and the family.

The literature already contains significant contributions concerning the function or functions of causewayed enclosures. For this reason, a further 'quest for function' was explicitly excluded from the primary objectives. Significantly though, even in recent studies (e.g. Albrecht, 2012), interpretation is largely on the basis of the evidence recovered from ditches. Through investigating the wider perspective defined above, a further objective emerges:

What can the research suggest as the initial primary function of causewayed enclosures at the time the enclosure began to be built, and before they may have developed further purpose(s)?

It was recognised at an early phase in the research, that the work would involve the manipulation of very substantial archaeological and other datasets, and a significant degree of detailed analysis. For this reason, a decision was taken to use a Geographic Information System (GIS). The application of a GIS, deploying concepts including fine resolution terrain examination, visibility analysis, and cost of movement modelling, could be coupled with the ability to manipulate these extremely large datasets. When combined with our current understanding surrounding the early Neolithic, the GIS allows questions to be asked of the archaeological record, that could not be answered when the earlier models were published.

However, whilst this research is underpinned by spatial analysis employing complex mathematical models, we should not forget that the aim and objectives relate not to mathematical modelling, but to the lives and minds of an early Neolithic people, represented through the architecture and material culture evident in the archaeological record. This thesis therefore is not an exercise in computer aided archaeology. The application of GIS simply enables a methodology to better understand an early Neolithic way of life.

1.4 **Causewayed enclosures – a brief review.**

The early Neolithic period witnessed a sequence of cultural responses that for the first time included complex, large scale, and designed changes, to a landscape that had previously been shaped by nature and the limited impact of a largely mobile hunter-forager society. Whilst the presence of earlier monuments, perhaps most notably the Stonehenge posts (6590 – 8820 cal BC) (Cleal *et al.*, 1995, 42-43), mark what may be interpreted as a symbolism expressed *within* the landscape, the evidence suggests that the monumentalisation *of* the landscape was a Neolithic response beginning early in the fourth quarter of the fourth millennium BC.

The stimulant for this response remains uncertain. However the change of 'space' into a 'place' of special significance, through tenure and the collaborative investment of labour, perhaps within a regime of social obligation or elite power (Barrett, 1994, 137), suggests significant social change. For the first time, the more sedentary lifestyle of a semi mobile farmer-forager society attached sufficient importance to discrete areas of the landscape to justify an investment in complex static architecture of some permanence (Edmonds, 1993a). This investment first resulted in the symbolic construction of landscape orientated structures (e.g. Tilley, 1994; Cummings & Whittle, 2003; 2008; 2009) such as long barrows, followed two to three centuries later by the modification of the landscape itself and the construction of causewayed enclosures (Whittle *et al.*, 2011).

Causewayed enclosures represent the earliest evidence in Britain of a human desire to enclose areas of landscape, and in doing so marking out as 'special' particular spaces that were somehow different or had an altered purpose

imposed within discrete and defined boundaries. What precipitated this change in behaviour, and what function(s) these enigmatic enclosures served, remains obscure.

The first earthworks to be recognised as a Neolithic enclosure were those at Knap Hill (Wilts) following excavation by Maud and Ben Cunnington in 1908/9. Their report on Knap Hill Camp (Cunnington, 1912) tentatively suggested that the monument may have predated the introduction of Beaker pottery and hence have Neolithic origins. Their subsequent interpretation, being largely based on the distinct material culture recovered from the characteristic ditch systems, aligned well with the prevailing culture-historical fashion. Early research was also influenced by contemporary studies of Iron Age hillforts (e.g. Wheeler, 1935) and their early definition as 'camps' (e.g. Cunnington, 1912; Curwen, 1930; Piggott, 1930) intentionally suggested a militarist or defensive purpose.

However, the first report on the Abingdon enclosure suggested a habitative function based on the presence of what appeared to be a hearth within the excavated ditch (Leeds, 1927). Although the subsequent season revealed material culture to be more diverse than flint and pottery, this report (Leeds, 1928) also concentrates on the material rather than the site's interpretation. Cecil Curwen, reporting on excavations at The Trundle (Curwen, 1929; 1930; 1931), and referencing other known enclosures, also moves away from the notion of defence, drawing attention to the defensive frailties of the causeways. Instead he develops the notion of ditch dwellings, drawing analogies with continental Europe and the Fraueberg site near Marbugh, Germany (Curwen, 1931, 109).

Ross Williamson developed the notion of causewayed enclosures as settlements and following excavations at nearby Whitehawk Camp (Williamson, 1930) he suggested short term episodic habitation by large groups, with the ditches functioning as refuse tips. By 1934, and now also reporting on Whitehawk, Curwen had modified his interpretation and saw causewayed enclosure ditches functioning as '*house, dustbin and cemetery'* (Curwen, 1934, 107) and in 1936 concluded that they were *'very largely a midden for domestic refuse – not as a place for habitation'* (Curwen, 1936, 63). The theme was set.

Stuart Piggott's (1954) seminal work saw causewayed enclosures being interpreted as communal places where *'half a dozen small tribes'* rallied at the end of summer to corral and slaughter their young cattle prior to the onset of winter (Piggott, 1954, 28-29). Nevertheless, with a firmly entrenched reliance on pottery as a proxy for culture, Piggott looked to European enclosures with similar material, and hence argued that the dynamics of Neolithisation had been driven by continental migrants (Piggott, 1955) bringing new ideas, technologies and traditions. One of these ideas was the concept of causewayed enclosures.

Piggott also related causewayed enclosures to long barrows on the basis of a shared material culture as well as spatial associations, and a broad chronological concomitance (Piggott, 1970, 17-65 & 66-101). The relationship was more explicitly reiterated by Colin Renfrew (1973) (Fig1, p.12) and again as late as 1993 by Richard Bradley and Mark Edmonds (1993, 28).

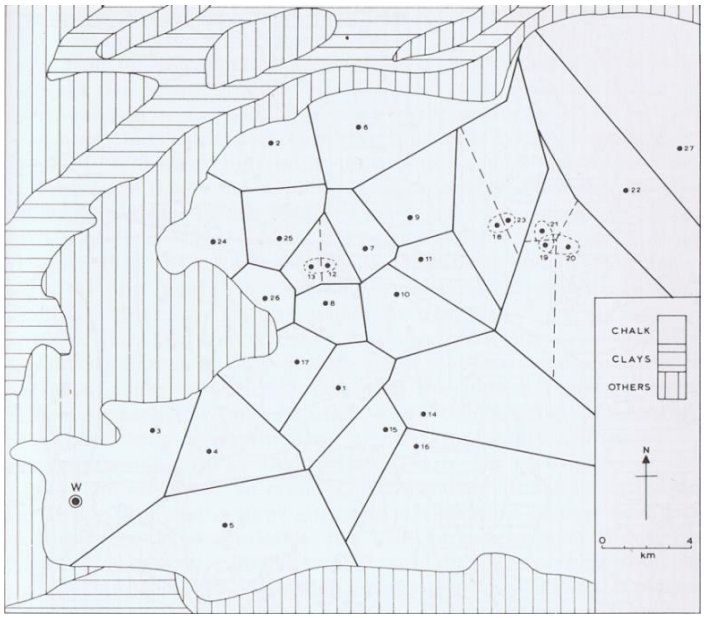


Figure 1: Renfrew's model of territorial boundaries.

Colin Renfrew centres territories on long barrows, and hence defines their relationship with causewayed enclosures within unweighted Thiessen polygons. 'W' represents the Whitesheet enclosure.

Source: Renfrew (1973), p.545

In 1965 Isobel Smith, preparing the report on Alexander Keiller's excavations of Windmill Hill between 1925-29 and 1937-39, was moved to remark that the purpose of causewayed enclosures was *'difficult to assess'*, whilst noting that the cattle were not young, and that any gathering had probably occurred for feasting in the spring and not late summer (Smith, 1965b). However in an early vision of structured deposition (Garrow, 2012), she also notes the 'careful' disposal of material in the ditches may have meant more than a matter of hygiene or cleanliness and may have had '*sacramental significance*' (Smith, 1965b, 20). Smith's interpretation has arguably had the most long-lasting influence on the nature of causewayed enclosures.

An important contribution was made by Rog Palmer who, in using evidence from aerial photographs, related the increasing amount of photographic evidence of the crop marks associated with lowland enclosures to the earthwork evidence of upland enclosures. In doing so he also provided a

categorisation system based on the characteristics of ditch systems, and attempted to demonstrate how the distribution of these different categories of enclosure were distributed across southern Britain. For the first time causewayed enclosures were placed in a wider landscape context (Palmer, 1976).

The 1970s and 1980s saw the scale of enclosure excavation and survey increasing, and some important contributions were made in the excavation reports from this era.

In explaining the function of the Offham Hill (Ssx) causewayed enclosure, Peter Drewett (1977) rejected the earlier arguments. With a detailed and quantitative analysis of the excavated material and the adjoining landscape, and whilst accepting that assigning a single function may not be appropriate for all causewayed enclosures, he suggested their role related to mortuary exposure, wherein the ditches and banks defined a '*taboo area'* (Drewett, 1977, 227), within which had been constructed an excarnation platform for the ritual processing of the dead.

Drewett also provides some early spatial analysis offering divergent explanations for their location on the Sussex Downs. In his first model he considers them as at the centre of a territory serving a single or related community, where communal activity was the primary function and burial played a secondary or subordinate role. However, he also suggested an alternative model, which suggested burial as the primary function and placed the causewayed enclosure on the margins of a communal area. Then subsequently developing this argument he went on to suggest that they were at the centre of a larger territorial area, which he equated by analogy to the medieval parish, drawing non-overlapping circles by which he defined these territorial boundaries (Drewett, 1977; 1978) (Fig.2).

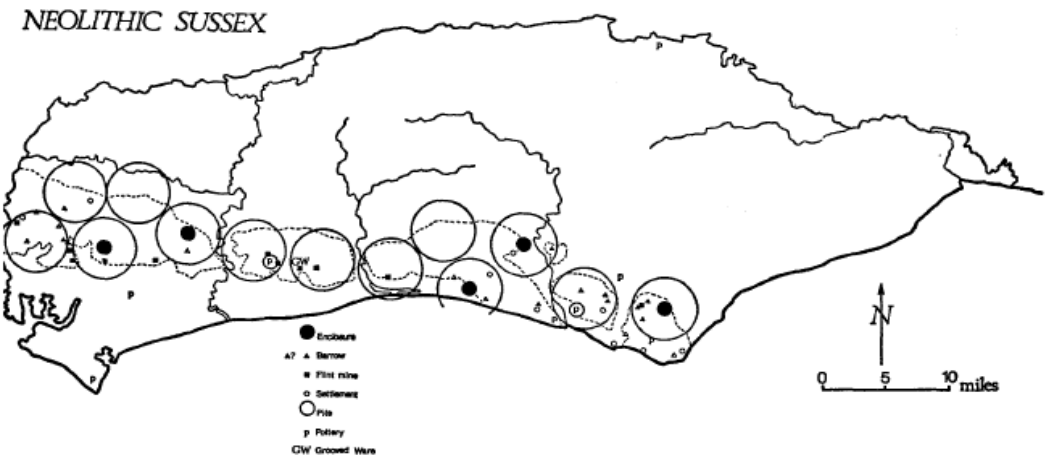


Figure 2: Drewett's model of territorial boundaries.

Peter Drewett suggest that non-overlapping circles of 4km radius, represent the 'territory served by each enclosure'. The difficulty with interpreting these sites as centres or on the margins is recognised, however Drewett favours this centrist model.

Source: Drewett, 1977, Figure 12.

In 1978, Grahame Barker and Derrick Webley continue the deterministic interpretation though an investigation of geology and the potential use of the land surrounding selected upland enclosures. In a detailed review they propose that causewayed enclosures were positioned to facilitate the 'satisficer' principle, which had allowed the 'inhabitants' of each enclosure access to a range of ecological habitats in a centrist model of early land exploitation (Fig.3) and through this suggest territorial boundaries dictated by geological conditions (Fig.4, p.16).

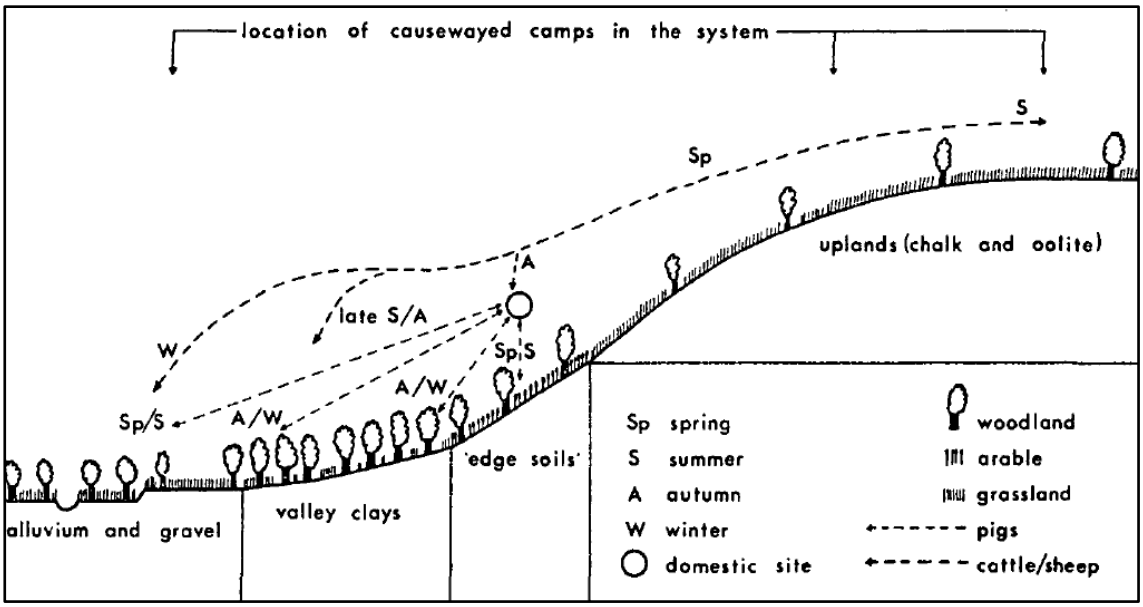


Figure 3: Barker and Webley's land use around causewayed enclosures.

Barker and Webley are careful not to suggest that economic resource was the defining factor in the setting of causewayed enclosures. They argue that the resources around them were 'essentially the same' and that they were positioned to equally apportion the high pasture, arable soils and lowland grazing. The increasing number of causewayed enclosures more recently found in predominantly lowland areas, suggests the model needs reconsideration.

Source: Barker and Webley (1978), p.174.

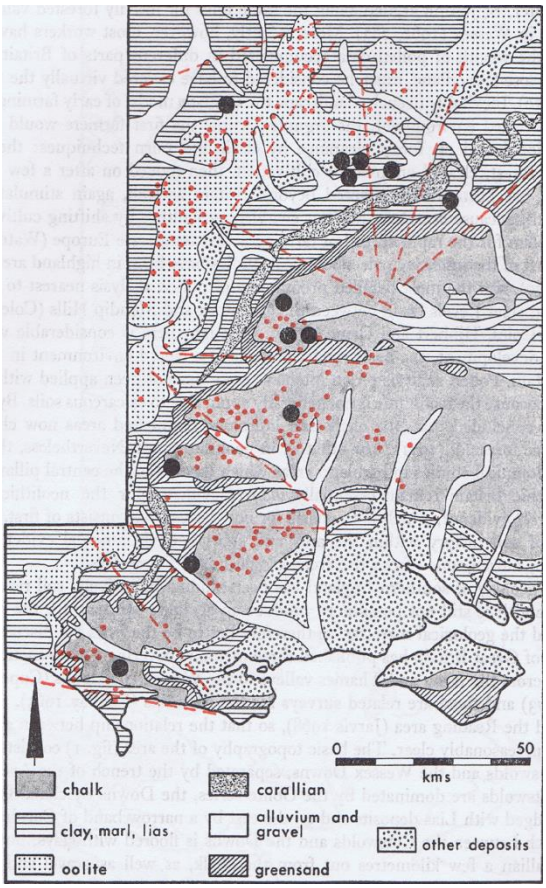


Figure 4: Barker and Webley's economic territories.

Here the model of territorial boundaries is centred on causewayed enclosures by associating a mix of differing geologies and hence economic resource.

Source: Barker and Webley, (1978), p.164

Roger Mercer continued the excarnation theme in his interim report on the Hambledon Hill investigations (Mercer, 1980). Published five years into what was to become a ten year series of excavations he, in the same volume, escalated from limiting his interpretation of the main causewayed enclosure as filling a *'non-rational function'* (Mercer, 1980, 37), to famously describing the hill as a *'vast reeking open cemetery whose silence was broken only by the din of crows and ravens'* (Mercer, 1980, 63).

The 1980s saw the rise of post-processualism and the interpretative archaeologies (Johnson, 1999, 101). Some notable causewayed enclosure excavations published during this period attracted various interpretations perhaps influenced by the author's response to this new theoretical approach.

However some, like Helen Bamford reporting on Briar Hill (Northnts.) (Bamford, 1985), continued the tradition of detailed analysis based on the quantitative assessment of material culture. Bamford largely focused her report on a considered view of the site in isolation, drawing on many tables of analytical detail concerning flint, pottery, and other artefact classes. In a short concluding statement on the nature of the early Neolithic site she suggests, '*the principal source of information about the precise nature of the activities which took place in the enclosure is once again, the material stratified within the ditches, and in particular the artefacts*' (Bamford, 1985, 134). A wider view of the enclosure in a landscape or regional sense is ignored, as she concludes, largely on the basis of the pottery, that the site acted as a nodal point for communities occupying the surrounding wider landscape using the enclosure as a '*place of brief resort'*. Bamford's interpretation, suggesting short-duration domestic events, having a frequency of occupancy possibly comprising of less than one event per year, contrasts with other reports from the same era.

Bamford's deterministic analysis of the Briar Hill enclosure was robustly challenged by Christopher Evans (1988) who was particularly critical of the geometric analysis contained in the report. In a distinctly theoretical paper he argues that *'the excavators of this important site have failed to see the forest due to the relative complexity of their recut trees'* (Evans, 1988, 88), and proceeds to make important arguments surrounding the social conditions in the early Neolithic, and the difficulties inherent in assigning discrete functions and assuming organised planning and symbolic intent.

The postprocessual interpretation of landscape reached a zenith with Christopher Tilley's seminal work on landscape phenomenology (Tilley, 1994).

In his third case study, Tilley links the enclosure at Hambledon Hill with the Dorset Cursus some 12km east. He suggests the Cursus as a pathway for the deceased, leading to Hambledon Hill, now described as '*a death island of the setting sun*' (Tilley, 1994, 200), where the bodies were allowed to decompose before selected bones were returned to the long barrows of Cranborne Chase. This speculative association is rendered unlikely by the more recent dating evidence demonstrating that Hambledon Hill had gone out of use prior to the construction of the Cursus (Whittle *et al.*, 2011, 150). The theme of causewayed enclosures as a proscribed liminal area for processing the dead prior to their disposal in barrows was not new. As well as Drewett, the notion had previously been postulated by Mark Edmonds (1993a, 116) who suggested the ritual was part of a necessary transformative precursor before a recently dead individual could enter a communal ancestral realm.

The investigation by Francis Pryor of the waterlogged Etton (Cambs.) causewayed enclosure (Pryor, 1998a) provided a unique opportunity to sample an enclosure with preserved organic deposits. Despite this, no structural evidence for buildings that may reflect permanent habitation were identified, and Pryor reverts to describing the enclosure as a fleetingly occupied 'camp' (Pryor, 1998a, 361) where the seasonal management of domestic animals, with a possible slaughter in the autumn was a significant function. The condition of the human bone suggested, as with Hambledon Hill, that the site had a role in the excarnation of cadaveric remains following death and before their final transition to a place of rest or beginning their journey to the next world.

Pryor emphasises the difference between the east and western halves of the enclosure and associated a (undefined) symbolic or ritual reason for the

purposeful choice of the enclosure's location. He suggests that the location had been chosen carefully, such that the eastern side of the enclosure remained dry, whilst the ditches on the western side were subject to partial and occasional flooding. He places considerable emphasis on the symbolism of what he suggests are purposefully structured deposits (e.g. see Thomas, 1999, 224 - 225; Anderson-Whymark & Thomas, 2012) in the ditch systems, of in particular the earlier occupation phases (Pryor, 1998a, 357 - 359). The position of Etton within the wider landscape is less well developed by Pryor and although the causewayed enclosure is noted as '*socially liminal'*, there is little evidence presented to justify or support this, and no analysis has been developed in respect to other contemporary monuments or indeed other causewayed enclosures in the area.

The reassessment of the Windmill Hill dataset, coupled with further limited excavation of all three circuits (Whittle *et al.*, 1999), led to significant re-assessment of this causewayed enclosure's role in an early Neolithic cosmology. The work was aided by the considerable dataset amassed through previous archaeological investigations (e.g. Keiller & Smith, 1965) and of investigations into the wider Avebury landscape which were subsequently published (e.g. Pollard & Reynolds, 2002; Gillings & Pollard, 2004; Brown *et al.*, 2005; Gillings *et al.*, 2008). The primary focus of the interpretative analysis though, again relates to the formal deposition of animal and human bone, ceramic material, lithic material and special deposits, in the three concentric ditch systems. In a comprehensive and detailed account, the authors argue that the prior processing, particularly of human bone, and the differential deposits, imparted a structured symbolic grammar which had some form of

special significance which, although it cannot be read as a coded text or narrative, was nevertheless important to the constructors of the monument.

Considerable thought is given to the roles or symbolic function signified in the three concentric enclosures, which include firmly post-processual interpretations of the material evidence. The authors posit, for example, that each enclosure signified a different facet of Neolithic life, including the realm of sociality and 'domesticness' (Whittle & Pollard, 1999, 386) represented by the central enclosure, to the spirits and ancestral world lying beyond the bounds of the outer enclosure.

The hypothesis of Richard Bradley (1998c) was recalled, wherein the monument's circular construction reflected past communities or settlements in a similar manner that had been suggested for the symbolic relationship between long barrows and longhouses of the Linearbandkeramic (LBK) tradition (Whittle & Pollard, 1999, 383). Further links to the LBK culture are suggested, with regard to the location of the site symbolising the memory of killing sites, with animal killing as a metaphor for human killing (Whittle & Pollard, 1999, 390). Interestingly (and problematic for this thesis), the authors suggest that the site was relatively concealed in a woodland clearing and that ancestral memories of pre-enclosure activity, not visibility, was the primary motivation for the location of the enclosure (Whittle & Pollard, 1999, 383).

Though perhaps now a little dated, this reassessment of the Windmill Hill enclosure marked a watershed in the interpretation of causewayed enclosures. However, the chronological dating provided by Whittle *et.al.* (2011), and the indication that the construction and use of enclosure circuits were not

necessarily a single phase phenomenon (Whittle *et al.*, 2011, 61-96), will have important implications for any future re-interpretation of the site.

The ecological environment too, has been re-evaluated, and recent work by Michael J Allen suggests that the early Neolithic witnessed a more open landscape than has hitherto been understood. Allen suggests a model of ecological variation over time according to the 'Vera cycle' (Robinson, 2014). He argues that the same areas rotated between open park, to scrub, then becoming canopied woodland, before breaking up and repeating the cycle. He paints a picture of a landscape comprising a mosaic of grassland, scrub and natural openings the size of a parish, in an otherwise wooded landscape (Allen & Scaife, 2007; Allen, 2017, 156-160)

The advance of scientific techniques pose new interpretative challenges, and in a stimulating discussion on the future of archaeological theory a slight shifting of the ground is predicted by John Bintcliff and Mark Pearce (2011). Some contributions suggest that the advance of sciences such as isotope analysis, DNA analysis and quantitative methods (Kristiansen, 2011, 78), coupled with the development of computer aided tools such as Geographic Information Systems (GIS) (Bintliff & Pearce, 2011, 5), may lead to a resurrection of a more quantified archaeology: an archaeology in which 'theoretical pragmatism', and quantified scientific techniques play appropriate roles, according to the archaeological context.

This development is reflected in three of the latest studies concerning the causewayed enclosure of the British Isles.

The first of these saw the publication of a three year project by English Heritage (Oswald *et al.*, 2001). The work was empirical and analytical in nature and did address some of the key questions surrounding causewayed enclosures, including their form, landscape situation, their spatial distribution and their physical characteristics. Perhaps the most significant contribution, which forms one of the pillars on which this thesis is constructed, was their reinterpretation and classification of all known monuments that had hitherto been presented as candidates for causewayed enclosures (Fig. 5, p.27). In a gazetteer the authors categorised the candidates as 'dismissed', 'unlikely', 'possible', 'probably', 'very probable' and 'certain'. Except where identified in more recent publications that refer to causewayed enclosures not recognised by 2001 and hence not included in the review by Oswald et al., these classifications are accepted 'as stated' in this thesis (Fig. 6, p.28). To do otherwise would represent an unnecessary attempt to repeat the work of the authors.

One of the weaknesses of their study was perhaps the treatment of the monuments in their landscapes. Although considerable effort was extended to the physical survey of the landscape and subsequent review (Oswald *et al.*, 2001, 81-119), the analytical work was limited to rather sketchy contour diagrams or wire frame drawings (e.g. Oswald *et al.*, 2001, 99 -101) and it is hoped that this thesis will, through the spatial modelling of causewayed enclosures in their landscape, present a more detailed and analytical perspective.

Secondly, the monograph reporting the Hambledon Hill investigations (Mercer & Healy, 2008) was supported by an extremely detailed topographical survey by English Heritage (Oswald, 1997), identifying previously unrecorded potential

Neolithic earthworks. Other major contributions included, extensive environmental investigations of the Neolithic complex and the immediate environs (Bell *et al.*, 2008), and the application of Bayesian statistical techniques to derive fine resolution interpretive chronologies from radiocarbon samples (Bayliss *et al.*, 2008). This coupled with more traditional analytical techniques on the material artefacts enabled the authors to construct a very detailed account (Mercer & Healy, 2008).

Hambledon Hill seemed to emphasise the difference: the Neolithic complex was found to have been extensive, highly developed and appeared certain to have included a defensive function which had been tested, on separate occasions, at two locations. The chronology also suggests the complex developed as two separate causewayed enclosures which were later linked by a defensive earthwork on the western side. The site appeared to have been longer lived than most other causewayed enclosures and as well as the expected accounts of the enclosures' function, as necropolis, settlement areas, and cattle processing areas, the authors raise the interesting prospect of the hill as a frontier zone between the flat clay lowlands to the west and the developing Neolithic communities of Cranborne Chase to the east (Mercer & Healy, 2008, 775).

The third of these reports is arguably the most explicit example of a return to quantified archaeological analysis with the application of Bayesian statistical modelling to problems of archaeological interpretation.

The theoretical underpinning of such modelling dates to the 18th century (Bayes, 1763, cited in Whittle et al., 2011), however the widespread application

to archaeological radiocarbon (RC) dating is new. The technique relies on considering new RC information (the 'standardised likelihoods') in the light of earlier information ('prior beliefs') to establish new statistical information ('posterior beliefs') concerning the sample. This enables interpretation through a formal mathematical model. However, the posterior beliefs may then become the prior beliefs of a new interpretive question, and so on in a hermeneutic spiral. Using computer generated models, from some 40 causewayed enclosures, that incorporated hundreds of radiocarbon dates set within this Bayesian statistical framework, the authors build temporal models that plot the spread of Neolithisation across southern Britain.

The resultant models 'gather in' the timescales associated with the life of the enclosures, generally constraining them, whilst providing more 'definite' chronologies. The authors calculated firm periods of activity, replacing for the first time, in many cases, the vague chronological period that was the 'early Neolithic', with statistically derived dates, stated with known statistical uncertainties. The work considered the evidence for causewayed enclosures and other contemporary monuments, from their first construction, through their phases of subsequent construction and modification, to their eventually falling out of use. The data provided the finest resolution yet derived for their morphological development and for Neolithic change across the British landscape.

Although, as the authors point out, the statistical modelling presented by Alasdair Whittle, Frances Healy and Alex Bayliss (Whittle *et al.*, 2011) relied on a set of underlying assumptions underpinned by explicitly stated archaeological interpretations which will change in the light of further information, the work

provided the most detailed chronological account to date of early Neolithic development in southern Britain.

In some cases, where good stratified context records provided sufficient and suitable radiocarbon samples, the authors demonstrated that many causewayed enclosures had enjoyed very finite periods of activity, sometimes of little more than a single generation, before falling into disuse. A limited few enclosures, however, had demonstrably longer periods of activity and were extensively developed, before they too were left.

The work also included dating other contemporary features such as long barrows and pit deposits, thereby enabling the causewayed enclosures to be placed in a wider temporal and cultural context.

Though this work marked a watershed in our understanding of early Neolithic temporality, much is left undone. For example, all of the enclosures within the upper Thames Valley, with the exception of Abingdon (and now Thame) remain undated. Many barrows remain undated and their provenance unknown. For example, excavations of the long barrow on Whitehorse Hill has produced Romano-British, Saxon, and Bronze Age material, but no Neolithic (Grinsell, 1936).

Nevertheless, the dates calculated within ‘Gathering Time’ (Whittle *et al.*, 2011) provide a foundation on which this thesis is constructed. The chronological data contained within the publication, combined with other or subsequent, precisely derived chronologies for the period, and the temporal dynamics they imply, coupled with detailed spatial analysis, will be used to argue that

enclosures were objectified landscape entities, which, far from existing in isolation, did enjoy phenomenological, cultural and economic linkages.

These enclosures related to other symbolic monumentalisation of landscape and marked another stage in a continuum of transition and the establishment of a firmly Neolithic mode of thought (Tilley, 2007), a human-centred world where people controlled the landscape and created for themselves new landscape experiences. Within the defined spaces of causewayed enclosures, they built durable constructs that may have provided important and symbolic linkages, that facilitated the economic, ancestral, cultural, and ritual needs of the early Neolithic ‘here and now’.

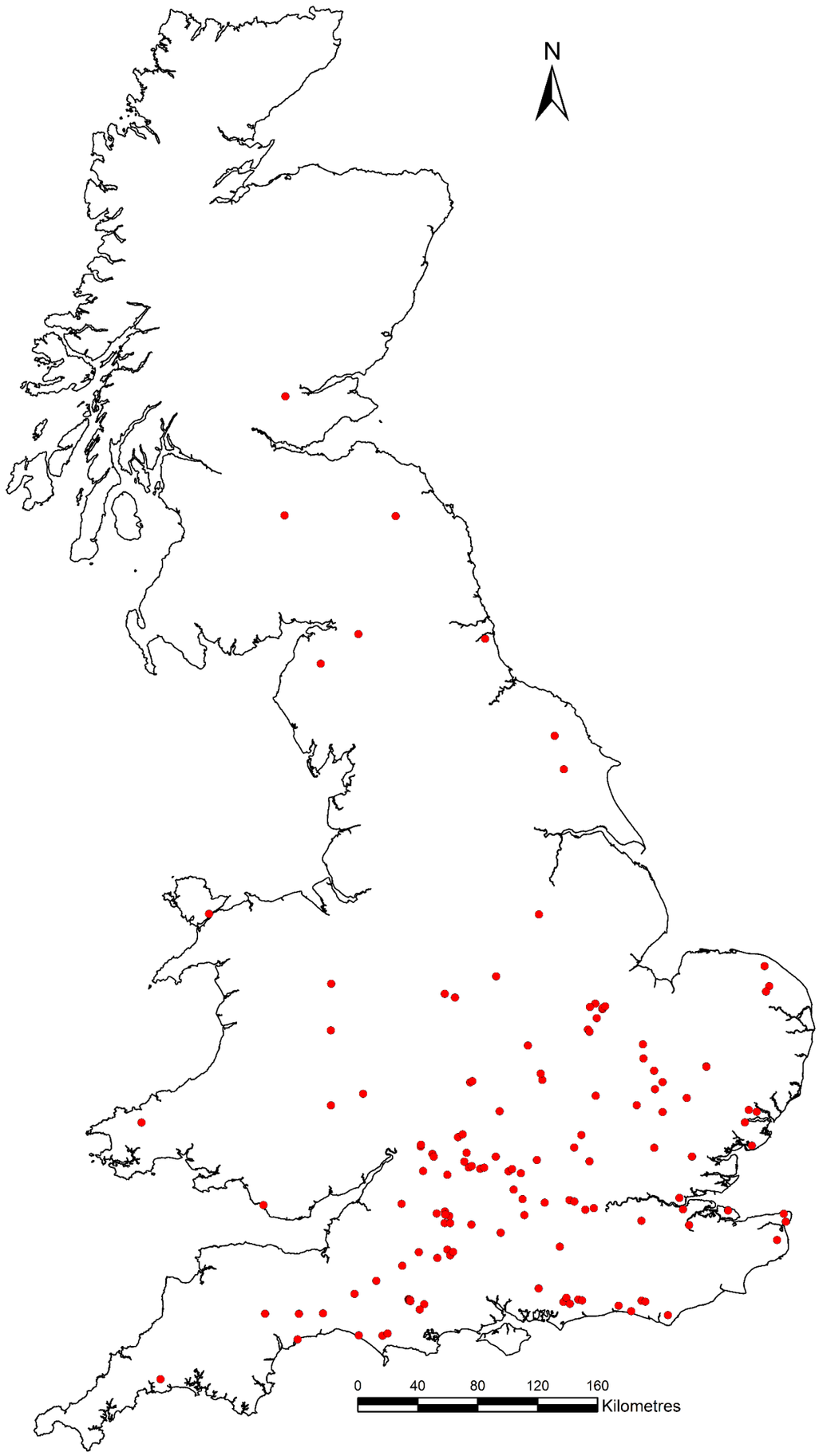
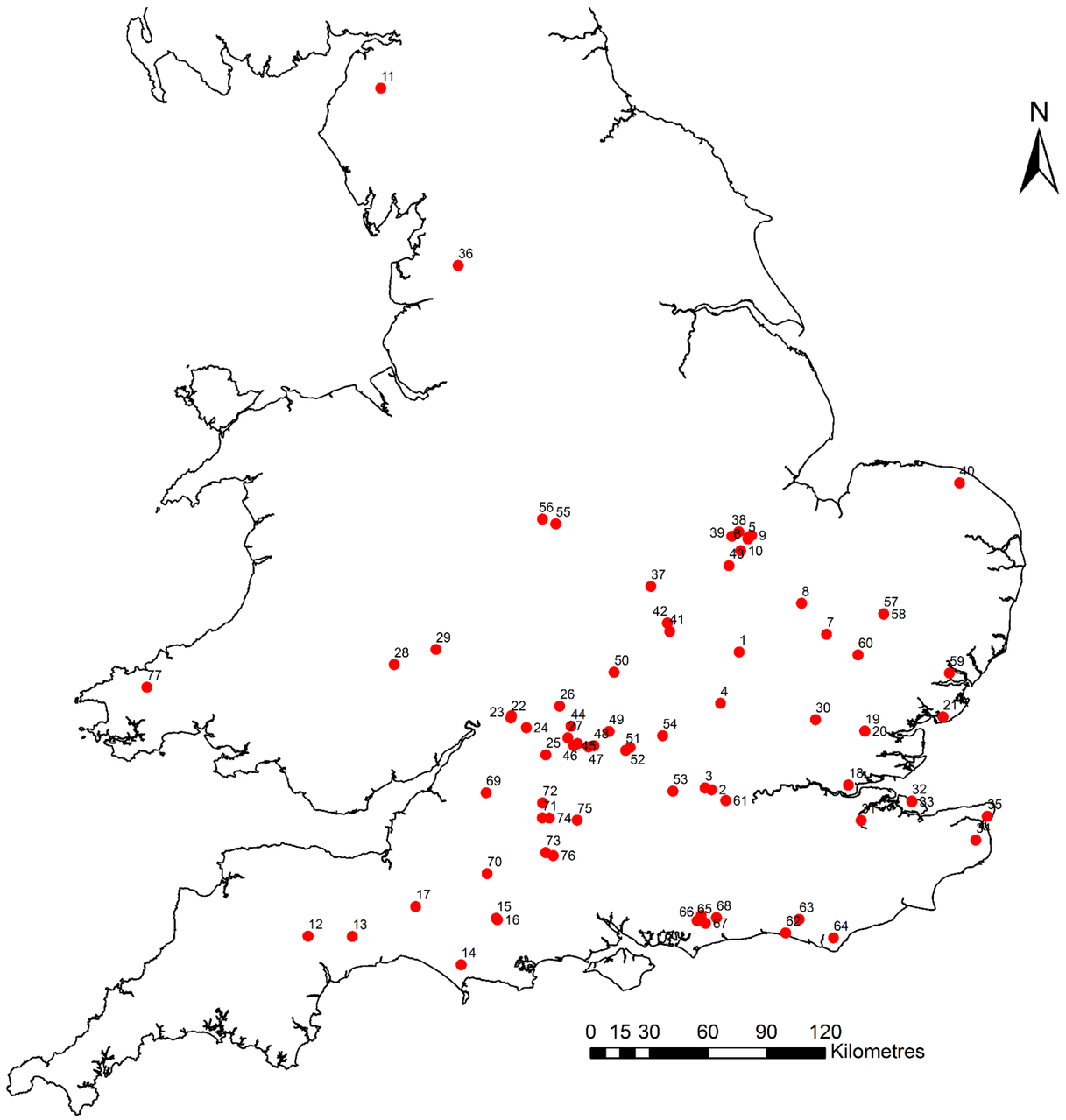


Figure 5: Distribution of all proposed causewayed enclosures in mainland Britain.

The 144 monuments suggested as potential sites for causewayed enclosures was tested by Oswald (2011) and subsequently the confirmed enclosures were reduced in number. Adding to the count, the causewayed enclosures at Larkhill, Netherfield Farm, Thame and Bank Du have subsequently been established.

Source: Author, after Oswald (2011) with amendments.
Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.



1	Cardington	18	Orsett	35	Chalk Hill	52	Lower Radley	69	West Kington
2	Eton Wick	19	Springfield Lyons	36	Whitewell	53	Eye and Dunsden	70	Whitesheet Hill
3	Dorney	20	Springfield Lyons	37	Husband's Bosworth	54	Thame	71	Rybury Camp
4	Maiden Bower	21	Lodge Farm	38	Barholm	55	Alrewas	72	Windmill Hill
5	Etton (2)	22	Birdlip Camp	39	Uffington	56	Mavesyn Ridware	73	Robin Hood's Ball
6	Etton(1)	23	Crickley Hill	40	Roughton	57	Fornham All Saints (1)	74	Knap Hill
7	Great Wilbraham	24	Southmore Grove	41	Briar Hill	58	Fornham All Saints (2)	75	Crofton
8	Haddenham	25	Down Ampney	42	Dallington	59	Freston	76	Larkhill
9	Northborough	26	Salmonsbury Camp	43	Southwick	60	Kedington	77	Banc Du
10	Upton	27	Eastleach	44	Burford	62	White Hawk Camp		
11	Green How	28	Dorstone Hill	45	Langford	61	Staines		
12	Raddon Hill	29	Hill Croft Field	46	Broadwell	63	Offham Hill		
13	Hembury	30	Sawbridgeworth	47	Buckland	64	Combe Hill		
14	Maiden Castle	31	Burham	48	Aston Cote	65	The Trundle		
15	Hambledon Hill	32	Kingsborough 2	49	Eynsham	66	Court Hill		
16	Stepleton Enclosure	33	Kingsborough 1	50	Banbury	67	Halnaker Hill		
17	Netherfield Farm	34	Eastry	51	Abingdon	68	Barkhale Camp		

Figure 6: Distribution of probable, very probable and certain causewayed enclosures in mainland Britain.

The dataset includes the 77 enclosures and associated earthworks classified by Oswald et al. or others as probable, very probable or certain. Despite some notable outliers the enclosures exhibit a distinctly southern distribution.

Source: Author, after Oswald (2011) with amendments
Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

1.5 **A 'problem' with causeways: the quest for common function.**

Accordingly, to assist analysis, we arrange the sites in four groups, distinguished by the principal features of their plans (i) Simple enclosures (ii) Enclosures with several ditches (iii) Promontory enclosures (iv) Complex enclosures (Wilson, 1975, 178).

The desire of archaeologists to classify and categorise monuments (e.g. Wilson, 1975; Palmer, 1976) and then define socio-economic activity and even cultural groupings according to these artificial constructs, puts in place interpretative boundaries that would not have existed in early Neolithic society. This is particularly evident with a monument type that is traditionally defined by the interrupted nature of a system, or systems of ditches which display a diversity of form, the reason and function of which remains largely unknown.

A number of problems arise: firstly, our codification process is in danger of obscuring a proper consideration of other arrangements of enclosure which do not conform to this type. Fortunately this deficiency is increasingly being recognised as the diversity in the characteristics of early Neolithic enclosure become apparent (e.g. Darvill & Thomas, 2001, 9-13; Oswald *et al.*, 2001, 77-79, 85-90 & 158-159). Stone-built or 'Tor enclosures' are an example of a different monument 'type' that are well considered in both publications; however, their treatment by the authors is different and interesting. Whilst Oswald et al. provide a detailed technical description and analysis of the sites and introduce distribution maps of Cornish Tor enclosures, Darvill and Thomas provide more insightful commentary on the implications such monuments may impose on the interpretation of Neolithic cultural development and activity. In particular they argue that these and other indicators of early Neolithic activity must be better understood, if our knowledge of causewayed enclosures is to improve.

A second example may be the enclosure at Bury Hill (Ssx) which has no evidence for causeways in the ditch system (Bedwin, 1981, 72) and whilst the excavator recognised this distinction, he draws comparisons with other causewayed enclosures which were later shown to be contemporary (Whittle *et al.*, 2011, 242).

Caution is necessary since our interpretation tends to elevate the relative importance of the ditch systems as a consequence of the nomenclature we use to describe the enclosure. Whilst the interrupted ditch systems are clearly significant, and they are often the only remaining clear evidence of the monument, we should not assume that they had the defining role. Certainly most archaeological interpretation centres around the function of the ditches and the material found within them, yet it is clear that in some cases, contained within their periphery, were substantial earthen banks, sometimes contained within a timber constructed framework (Mercer & Healy, 2008, 744), or enclosing palisades (for example see Dyer, 1995) that may have been the primary focus of the monument while the ditches principal role was as a source of quarried material. Many enclosures certainly had such banks (indeed it may be argued that all must have had some banked material), and although these rarely survive as structural elements, their presence is indicated either by asymmetric ditch fills representing a slump of bank material into one side of the ditch, or by 'protected' soils or chalk where the banked material quarried from the ditches has protected the underlying geology from the effects of frost or other weathering.

Court Hill (Ssx) is an example of one causewayed enclosure that is known to have had a bank external to the ditch system (Holden, 1951; Bedwin, 1984),

whilst Orsett (Esx) may have had a bank between the two ditch systems (Hedges & Buckley, 1978, 234). In most enclosures the role the banks played is unclear. In some cases they appear incidental in relation to the ditch, and display no sign of a defensive or even continuous form, whereas in others (for example see Mercer & Healy, 2008, 744-747), they seem to have had a more important utilitarian, protective, or even symbolic role. The repeated re-cutting of ditches evident in many enclosures does serve to emphasise their importance, though whether this reflects a contemporary desire to easily and repeatedly quarry material to reconstitute the bank system, or whether the cleaning of the ditches represented a symbolic reopening of the enclosure is also unclear.

The phenomenological experience is different in each case: a causewayed enclosure without a substantial bank or with no bank at all lies quietly in the landscape, and may suggest an inward-looking construction, where more importance was attached to those activities and rituals within the enclosure than was attached to activity outside. The addition of banks, revetments and palisades however would, through such a '*monumental intervention in nature*' (Hodder, 1990, 260), have made a powerful external declaration, more conspicuous across the landscape. A landscape for the first time, being substantially modified by human activity (Bradley, 1993). The first beginnings of a human dominance over the physical and social landscapes and perhaps the early stages of a more structured and formal society. The phenomenological context is important. This thesis must consider how these enclosures were experienced in the landscape, for despite the computer aided analytics, at the heart of this work is human agency and experience.

Lastly, the classification brings with it an implicit assumption that all enclosures with a similar constructional form had a similar role in Neolithic society. There is little in the archaeological record to support this notion. Some, like Offham Hill are characterised by small clustered flint deposits and a predominance of sheep and goat in the faunal record (Albrecht, 2012). Whitehawk contained whole deer skeletons and chalk blocks placed around the remains of a human infant, and perforated chalk interpreted as pendants (Albrecht, 2012). Windmill Hill was found to have zones of varying flint densities attributed to former middens (Pollard, 1999) and the presence of wild animals including cattle, boar, red and roe deer, fox, cat and pole cat.

Other enclosures have little cultural material in the ditches other than that contained in small localised concentrations (Bedwin, 1981, 74). This may indicate a limited period of activity with material having been gathered (cleaned) from within the enclosure and deposited in the ditch. Comparisons of the excavated material from Bury Hill with that from causewayed enclosures suggest this enclosure enjoyed a different role commensurate with the differing (continuous) constructional form at this site.

Most scholars accept that any one enclosure may have had a variety of functions at any one time, and that these functions may have changed over time (e.g Bradley & Edmonds, 1993, 177). There is also then an implicit acceptance that different enclosures may have had multiple, socially negotiable functions at the same point in time (e.g. Evans, 1988, 88). In practice, whilst common features of general characteristics can be demonstrated, there are few enclosures that do not bear some unique features, either in their construction or in their topographical aspect.

Windmill Hill (Wilts.) (Keiller & Smith, 1965; Whittle *et al.*, 1999), widely recognised as the 'type site', provides an example of an enclosure with three broadly concentric sub circular circuits, where the inner and outer ditches appear to have been constructed 30 years earlier than the middle ditch (Whittle *et al.*, 2011, 87-91). Whilst Whitehawk Camp (Ssx.) (Williamson, 1930; Curwen, 1934; 1936) has four circuits, it is unclear whether the outer circuit in particular was complete (Oswald *et al.*, 2001, fig.5.31).

Some like Burford (Oxon.) (Small, 1995a) have only a single circuit, and with an internal area of 0.22Ha are relatively small, simply formed, and near circular. Others such as The Trundle (Ssx.) (Curwen, 1929; 1931) and Briar Hill (Northnts.) (Bamford, 1985) have a series of ditch systems that exhibit a more complex 'spiral like' outer system.

Hambledon Hill (Dors.) (Mercer, 1988; Mercer & Healy, 2008), Knap Hill (Wilts.) (Cunnington, 1912; Connor, 1965), Birdlip (Peak) Camp (Darvill, 1981; 1982), and Crickley Hill (Glous.) (Dixon, 1988), make use of the natural topography and employ either a series of 'cross dykes', or facilitate a partial enclosure, where a sharp break of slope seems to serve the function of the missing section(s). Birdlip Hill and Crickley Hill are two adjacent enclosures that both seem to be built to the same design in that they enclose the end of narrow promontories overlooking the valley of the River Severn.

The significant point being that the monument 'type', if such a thing exists, is not consistent in form, construction, size or complexity and hence considering their distribution in isolation from other Neolithic entities may be misleading.

Furthermore, the quarrying of material from a system of interrupted ditches was not limited to causewayed enclosures, and similar construction techniques are noted around some long barrows (Kinnes, 1992), for example, Normanton Down (Wilts.) (Vatcher, 1961), Badshot (Srry.) (Piggott, 1970, 52-53), the long enclosure at Dorchester on Thames (Oxon) (Whittle *et al.*, 1992, 147-152) and both long barrows on Hambledon Hill (Dors.)(Mercer & Healy, 2008). Monuments on the European mainland also provide examples of linear interrupted ditch alignments (Barfield, 2002), and enclosures of considerably more complexity than those constructed in Britain (Scarre, 2001; Burnez & Loubouting, 2002).

Quite why this method of quarrying was used is uncertain, particularly when many ditches show evidence of repeated re-cutting carefully respecting the original form. Wilson (1975, 178) suggests '*some kind of gang work'*, continuing the prosaic interpretation of a traditional means of quarrying first postulated by Curwen (1930). However, the lack of evidence for any form of bank in some causewayed enclosures perhaps suggests that it was the discontinuous ditches, in delineating a bounded area of some importance, that was of symbolic potency (Thomas, 1999, 74), and the repeated re-cutting of the ditches may reflect social affinities with different 'tribal' groups coming together to participate in a communal reopening of a special place. A ceremonial action, where the activity associated with digging the ditches and the construction of the earthworks was the important act, rather than the resultant enclosure (e.g. Evans, 1988).

This common characterisation of causewayed enclosures has a significant impact on distribution patterns and other spatial analysis of enclosures in the

landscape. The challenge was taken up by Rog Palmer who challenged and tested the relationship between upland enclosures and those increasingly being identified by aerial photography on the river gravels (Palmer, 1976). Palmer differentiated between ‘causewayed enclosures’, where evidence of later, usually Iron Age, activity was present on the same upland site, and ‘interrupted ditch enclosures’, where such ‘continuity’ of use wasn’t apparent. Importantly he categorised the enclosures according to the nature of their ditch systems (Fig.7).

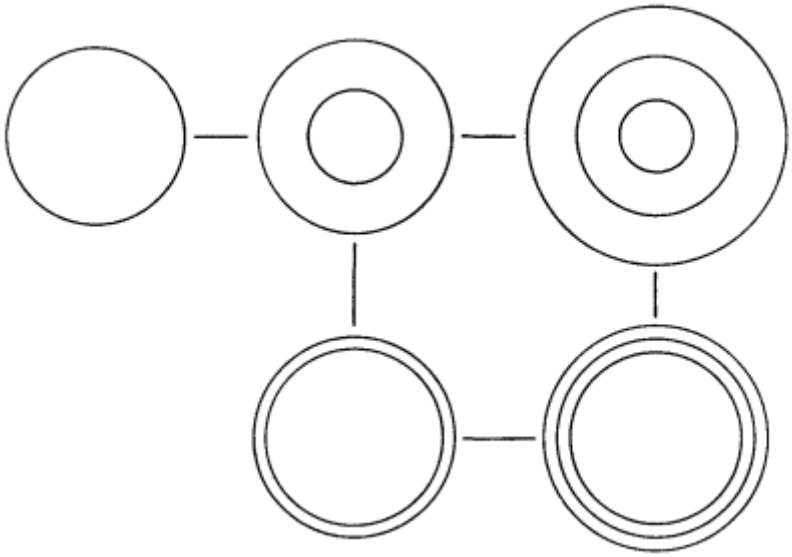


Figure 7: Palmer’s model for the classification of ditch systems.

The model identifies enclosures as either: single ditch systems, multi ditch systems with wide spacings between concentric ditches, or multi-ditch systems with narrow spacing between concentric ditches.

Source: Palmer, (1976), p.169

Palmer considers all the enclosures then known and, through his analysis identifies two conflicting conclusions (Palmer, 1976, 70-71), both of which propose the Thames Valley as an interface zone since this area contains

examples of enclosures that exhibit single-ditch systems, widely spaced multi-ditch systems, and narrowly spaced multi-ditch systems. He also identifies exceptions within the areas he defines, most notably Hambledon Hill and Maiden Castle, and also notes that his model may be further complicated by the successive addition of ditch systems over time.

Combining his models, and with the inclusion of some simple spatial distribution, and the exclusion of some less certain enclosures, he concludes four isolated groups of enclosures existed (Fig.8) developing this into an argument that the 'Midlands Group' '*had more chiefdoms per unit area than Wessex' (Palmer, 1976, 175).*

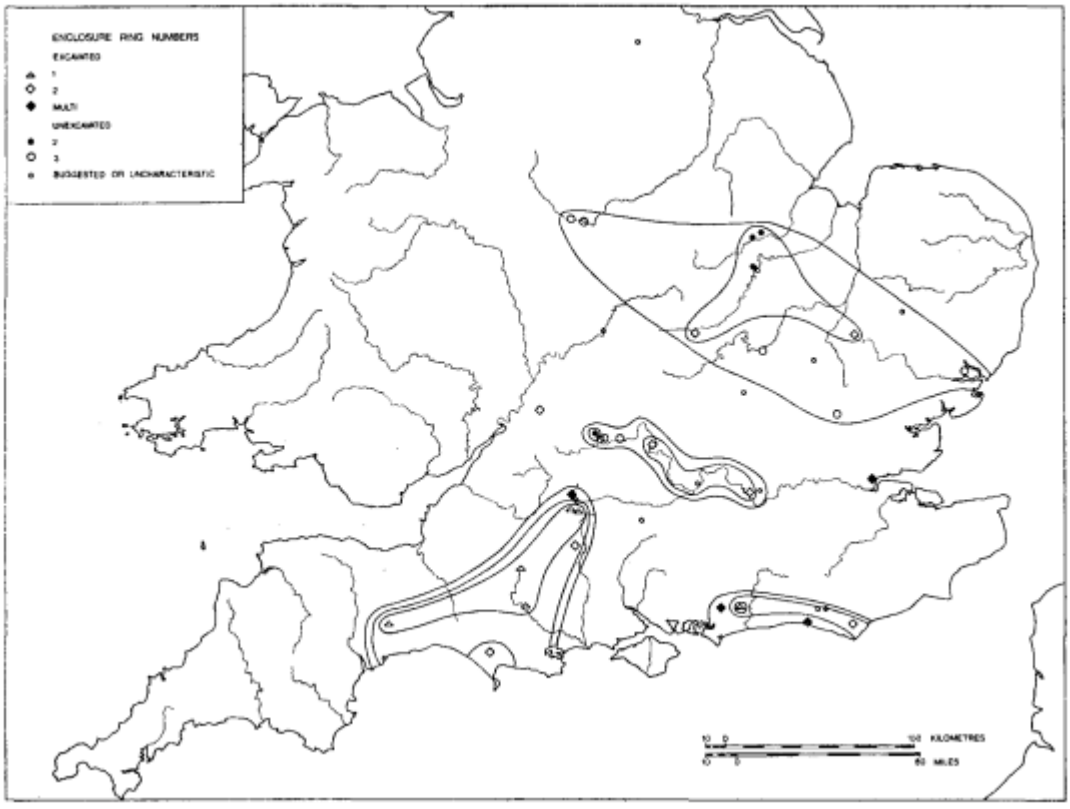


Figure 8: Palmer's isolated groups of enclosures.

The model uses a combination of ring number classification, ring characteristic classification, though makes some significant assumptions about surrounding the inclusion or exclusion of enclosures based on 'certainty'. The four case studies are based on this grouping.

Source: Palmer, (1976), p.169

Palmer's contribution is extremely important. For the first time a quantified argument was developed relating 'all' causewayed enclosures to their distribution in the landscape, and in doing so he demonstrated that regional traditions and preferences in design were apparent in an otherwise related class of monuments. He was able to test and offer verification, that the unexcavated, often poorly recorded lowland enclosures of the Thames Valley and northwards, were indeed related to the better understood, excavated enclosures, primarily (though not exclusively) of Sussex and Wessex.

The frailties of the work, however, are self-evident. These fragilities include: the necessity to explain exceptions as displaying inter or intra-regional variation, the exclusion of some enclosures on the basis of their certainty, and the exclusion of the large number of additional enclosures now known to exist. Perhaps most importantly however, is the ease and validity of moving from a pseudo-quantified categorisation of notions that may or may not have had contemporary relevance, through analysis, to then support and develop the notions of chiefdoms and territories, prevalent at the time.

1.6 **Introduction to the methodology.**

The research is based on four case studies comprising multiple enclosures and other early Neolithic monuments and indicators in discrete areas. Each area was chosen for a specific reason. The enclosures of the Sussex Downs were chosen as representing a group in close proximity to the south coast and a flint extraction area of considerable scale. In common with many of the Wessex enclosures they represent enclosures situated on the chalk uplands. Wessex was chosen since many of the enclosures and other contemporary monuments have firm and precise chronologies defined by Bayesian statistical analysis (Bayliss *et al.*, 2008; Whittle *et al.*, 2011). The area also provides an opportunity to examine and test previous notions of territoriality. The upper Thames Valley was selected since it provided an opportunity to explore the riverine connections and consider potential relationships between a large number of enclosures in a compact geographical area. The fens were chosen as representative of enclosures on a subtle, near-flat, landscape. The lowland areas of the upper Thames Valley and the Fens also represent very different topographies to that of Wessex and Sussex.

A methodology based on a Geographic Information System (GIS) was developed in order to achieve a consistent analysis across the whole dataset. The dataset was substantial and was derived from the NMR, relevant HERs, grey literature and published reports, and geological databases and other sources. This data was cleansed and consolidated, then used to support visibility and cost distance analysis carried out in the GIS. The same GIS models were applied to the whole dataset, which itself was consistently treated.

The output from the GIS was then used, alongside excavation reports and other published materials, to facilitate investigations and interpretations in support of the aim and objectives.

1.7 **Organisation of the thesis.**

Following this introduction, chapter two describes the GIS methodology and the treatment of the datasets. Since the GIS modelling is secondary to the interpretation, a detailed description seems inappropriate. However, the text provides a summary discussion on the GIS models and the cleaning and consolidation of the archaeological dataset. Importantly, the section also provides some discussion around the frailties of the GIS methodologies and the archaeological dataset, leading to a short conclusion summarising the validity of the approach.

Chapter three provides a descriptive review of the four case studies. This summary is designed to highlight salient points, reinforce the methodology and the methodological frailties, as well as provide some indication of the output of the GIS modelling. A detailed analysis of the geology was carried out in Sussex, but was not repeated for other case studies since, in terms of the aims and objectives of the thesis, the usefulness of the results was limited. Section three also includes a precis of some geophysical survey work on Hambledon Hill that was necessary to confirm the validity of the analysis.

Figures representing the output of the GIS models are generally located at the end of each section to avoid interrupting the text. To assist the reader, page numbers are given with figures and tables unless these are referenced on the same page.

Chapter four provides a brief summary of the four case studies, highlighting commonalities and variations.

Chapter five focuses on the physical and social 'place' of causewayed enclosures in early Neolithic society and is structured in terms of the aims and objectives stated above. The text synthesises the results of the research and GIS modelling, with previous and current models and understanding of the early Neolithic. The work argues that causewayed enclosures were carefully located according to affordances in the landscape that included what was accessible, and what was, and was not, visible.

I argue that what could **not** have been visible was an important factor in the locating causewayed enclosures.

Building on the GIS modelling, the section considers the relationships with long barrows and what this relationship might say about attitudes to the dead in the early Neolithic. The relationship with flint mines and the sea in Sussex is explored and consideration is given to social memory and the recollection of past practices and places. Overland and riverine mobility is discussed, and in particular what the location and inter enclosure proximities, and the relative ease of travelling from one enclosure to another, may say about farming practices, trading, and exchange, and the family in early Neolithic society. The chapter discusses how the research impacts on the literature and importantly, highlights where this research supports or refutes the literature.

Chapter six provides some concluding discussion and highlights how this work has contributed towards a better understanding of the causewayed enclosure in an early Neolithic society.

2 Methodology.

2.1 Introduction to the methodology.

Despite the ubiquitous use of GIS in many areas of archaeology, the use of the technique in landscape studies has received criticism in the literature. In particular for its emotional detachment from the landscape, and the apparent quantitative and mechanistic approach. Examples include Christopher Tilley's (2010, 477) view that:

"GIS provides a dumb, indeed surreal, view of landscape in which everything is equally visible and therefore equally important – which is clearly never the case and, of course, it can only cope with the visual rather than with other forms of sensory experience. Like any other mathematical technique, it is terribly impoverished and inevitably makes inhuman assumptions in the form of the modelling that is involved. In short it is incapable of providing an embodied encounter with a landscape, or a monument, a feeling for the place in which the place itself exerts its agency, exerts its own powers in relation to human perpetual experience".

And Vicky Cummings (2009, 127) commented:

"*Quite simply GIS cannot replicate the experience of being in the landscape so was not used here*".

Other scholars also recognise that vision is itself only one of a number of human senses, and have argued that visibility is over emphasised in landscape studies. For example Tim Ingold (2000, 158-197) maintains that a "*multi-sensory and kinesthetic dimension*" must also both be considered as part of any spatial experience where audio, feel and memory also play key roles.

Whilst these arguments are convincing, visibility remains an important facet of most scholarly works of monument analysis. Other (indeed sometimes the same) scholars direct their attention to intervisibility between monuments (e.g. Tilley, 1994, 133-4, 156-159), or may relate a particular monument or

monument group to distant landscape topographical features (e.g. Cummings *et al.*, 2005, 47), or for example, derive astronomical associations (e.g. Bradley, 1993, 52&100-104).

Marcus Llobera (2007, 66), supporting the archaeological application of GIS, suggested that some of these criticisms reflect an inability amongst many archaeologists to embrace computer based modelling. David Wheatley and Mark Gillings (2001, 28-29; 2002), and LK McNamara-Kearin (2013), a decade later, concur, and argue that carefully deployed, GIS can play an important part in archaeological analysis. In particular, in extending beyond 'just' the visible, to include the quantified topography, geology, and hydrology.

GIS modelling is necessarily a complex undertaking. The following section offers an explanation of the data and methodology, and also importantly, the frailties and the constraints. I argue that the application of GIS in archaeology is one quantitative facet of an analytical technique, underpinned by pre-analysis interpretation, then subsequently overlaid by a qualitative and interpretative theoretical framework.

2.2 **Dataset types.**

2.2.1 **Vector datasets.**

Causewayed enclosures and other monuments are represented by vector datasets, comprising points, lines or polygons. A linear archaeological feature may be represented by a line, whilst an enclosure might be represented as a point at a regional scale, or digitised (drawn) 'full-size' as a polygon and

displayed at a scale appropriate to a single site. These geometric primitives have discrete ‘x’, ‘y’ and sometimes ‘z’ coordinates, and are physically located in Cartesian space on a common coordinate system or projection. Associated with these primitives are descriptors, characteristics, and other data, that may be used in any analysis.

Typical vector source data included National Monument Record (NMR) and Historic Environment Record (HER) spatial datasets for the location of monuments, artefact find spots, and the location of archaeological interventions. Vector datasets for rivers and geology were provided by Ordnance Survey through the University of Edinburgh’s Edina service.

Data derived from other sources, such as archaeological records in published literature, and manually digitised representations of enclosures, were also typically added as vector data.

2.2.2 **Raster datasets.**

Mapping data and the digital terrain models were obtained as raster datasets. These store graphical information by encoding cells in a grid, where the grid itself is spatially located (georeferenced). At its simplest, the grid appears like a chess board, where the black squares correspond to a location where the grid cells intersect with a feature of interest (Wheatley & Gillings, 2002, 50).

Typical raster data included mapping data, the digital terrain model (DTM), Lidar, and imagery such as geophysical survey plots and aerial photographs.

2.3 **Archaeological spatial data and spatial data sources.**

Sources of archaeological data are given in Table 1 (p.45). Archaeological datasets were initially obtained from Historic England's National Monuments Record (NMR) and local authority Historic Environment Records (HER). The two sources did not always agree and utilising separate records provided a valuable cross check. Any necessary modifications to either dataset were cross checked against other records, including georeferenced aerial photographs, geophysical and physical survey records and other reliable sources. In addition, some 3500 grey literature reports were reviewed to add to the GIS data tables. Data was obtained in 2015 (for the Sussex case study), 2016 (Wessex and upper Thames Valley), and 2017 (Fens).

Data	Type	Primitive	Sources
Causewayed enclosures	Vector	Point / line / polygon	NMR, HER, archaeological contractors, 'heads up digitising'
Causewayed enclosures	Raster	Layer	NMR – NMP, Published literature, geophysical surveys
Long barrows	Vector	Point/ polygon	NMR, HER
Other barrows	Vector	Point	NMR / HER
Mortuary enclosures	Vector	Point	NMR / HER
Trackways	Vector	Point / line	NMR / HER
Stone monuments	Vector	Point	NMR / HER
Pits	Vector	Point	HER, Archaeological contractors
Leaf shaped arrowheads	Vector	Point	HER, Archaeological contractors
Fully polished axes	Vector	Point	HER, Archaeological contractors
Other early Neolithic lithics	Vector	Point	HER, Archaeological contractors
Ceramics	Vector	Point	HER, Archaeological contractors

Table 1. Archaeological spatial data and spatial data sources.

2.4 **Other spatial data and spatial data sources.**

Non-archaeological data comprises mapping data, elevation data to build the Digital Terrain Model (DTM) and hydrological and geological data. See Table 2.

Data	Type	Primitive	Sources	Notes
Terrain model	Raster	Layer	Edina DigiMap	Cleansed to remove negative values and offshore components. Further conditioning of cost surfaces to reduce the effects of undesirable artefacts and edge effects impacting path distances.
OS Mapping data	Raster	Layer	Edina DigiMap	
Geological	Vector	Polygons	Edina DigiMap / BGS 1:10,000 1:50,000	Cleansed to remove the inconsistent inter-sheet treatment of deposits.
Hydrology	Vector	Lines	Edina DigiMap	Cleansed to remove modern features including drains and canals.
Lidar	Raster	Layer	Environment Agency	

Table 2. Other spatial data and spatial data sources.

2.5 **Standard approach to archaeological data**

Datasets for significant monuments were good with high spatial accuracy. Where errors were detected, the necessary adjustment was made to the dataset. The quality of datasets for lithics, arrowheads and similar, was more variable and all datasets required filtering and cleansing before entering the GIS. To ensure consistency the following standard method was adopted for all case studies:

- NMR and HER Data was obtained electronically. The preferred and most commonly supplied format being an abbreviated record in ESRI .shp file format, and a full record in PDF format.
- Data was merged if appropriate and de-duplicated.
- Published data was added.
- Unpublished sources (grey literature) were added.
- Shp. file records were verified against the full record and errors removed or corrected.
- PDF files were electronically interrogated for early Neolithic indicators and added to shp files if appropriate. Keyword searches were used to identify potential records.
- Records were classified into long barrows, settlement or habitation, leaf shaped arrow heads, fully polished axes, and other early Neolithic lithics. Some judgements were necessary in classifying the data. See Table 3.

Class of data	Included archaeology
Causewayed enclosure	Those causewayed enclosures appropriately classified in Oswald *et a*l, 2001, and in addition, those enclosures identified after the publication of this standard work.
Long barrow	Also including oval and round barrows where these are identified as potentially EN. Else excluded. Notes made in the meta data.
Settlement or habitation	EN pits (Anderson-Whymark & Thomas, 2012, 3), houses, trackways, ceramics.
Leaf shaped arrowhead	All included
Fully polished axes	Only fully polished examples were included, uncertain and part polished were excluded.
Other EN lithics	Only where positively identified as EN by the excavator or specialist

Table 3. The definition of Early Neolithic indicators used in the analysis.

2.6 Generic constraints and complications with the archaeological datasets.

In addition to causewayed enclosures and long barrows, the research defines early Neolithic indicators to include: leaf-shaped arrowheads (Gardiner, 1988, 86; Butler, 2005, 124-5), fully ground/polished axes (Edmonds, 1995, 70-71) (though it is recognised that some may originate in, or be curated into, the middle or later Neolithic), sites of activity or settlement (comprising early Neolithic pits, burials and trackways) and other lithics positively identified by the excavator as early Neolithic. Some difficulties have to be recognised.

2.6.1 Problems with the record.

Lithics distribution patterns introduce particular difficulties of interpretation. Described as a '*very blunt instrument*' (Thomas, 1999, 18), they nevertheless form part of an archaeological record, and their use is justifiable in the context of a pan-regional landscape study (Bayer, 2011; Pollard & Hey, 2015, pers. comm.).

This position is encouraged by Richard Bradley (cited in: Healy, 1986, 14) who suggests consideration of lithics scatters at a landscape level more valid than their consideration within 'individual living-places'. In addition, the more recent work by Clive Bond (2006; 2009; 2011) also proves their value at the macro level. Bond argues that the value of lithic scatters are undervalued by archaeologists in the curatorial and academic sectors (Bond, 2011, 29) and reiterates Bradley's argument:

lithics analysis…*'must think big…landscapes rather than individual living spaces, societies rather than single knappers….; in short the mainstream of prehistory rather than a by-passable backwater (Bradley cited in: Healy, 1986, 14).*

Further reassurance is added by Gibson, who notes that pits and lithics *are* important indicators of *people* (Gibson, 2003, 139), and although not necessarily indicators of settlement *sites* do indicate areas within the spatial range of human groups operating in the locality (Thomas, 1999; Gibson, 2003, 141).

We increasingly recognise mobility in the early Neolithic (eg: Whittle, 1997; Thomas, 2013; Leary, 2014; Leary & Kador, 2016). Many of the lithic artefacts represent the accidental losses of mobile people or individuals. Hence it is considered reasonable to use lithics as indicators of *potential* early Neolithic activity, recognising the problems resident in their known distribution pattern and cautiously deriving any interpretation.

It is important, however, to recognise the limitations. Some complications identified during the research included:

- Different recording strategies across HERs, particularly in the early years which have resulted in a different quality of record. In some cases this effect may persist into later years since the planning process tends to focus archaeological interventions on areas of known potential.
- The distribution of artefacts reflects the level of archaeological intervention, which in turn follows development and the impact of the planning process. In practice, on a wide regional study, this effect is attenuated at the macro level, but great caution must be exercised in making any lower-order interpretations.
- Different treatments have resulted in differing records, for example an antiquarian find of an axe with poor spatial detail, may either be recorded at the

centre of a parish or excluded from the shp file dataset completely, according to the policy of the particular HER at a particular time (and see: Morrison *et al.*, 2014, 3-6). There was little to be done except update the data table, note the occurrence in the metadata, and be cautious in making interpretations.

- When reviewing the distribution of artefacts following river courses, care was taken in the interpretation to ensure these are representative and not the consequence of dredging activities, concentrating lithics in one dump area.
- The surety surrounding the positive identification of early Neolithic lithics by the excavator can vary. In some authorities many of the grey literature reports include assessments by the same recognised specialist (e.g.Waddington, 2004, 35-40; Butler, 2005, 119-138) whilst in other cases identification is much less secure.
- The quantity of artefacts following formal excavation or, for example, large-scale field-walking exercises (Richards, 1990; Woodward, 1990) can significantly distort the analysis. Lithics recovered as a result of these activities were included in the analysis as a single case since what was required for the analysis was an indication of activity in a locality, not the number of arrowheads, for example, recovered at a particular point. Similarly, where for example, lithics were found in combination with ceramics within a pit, this was recorded as a single instance of a habitative site, rather than recording the individual count of lithics or pieces of pottery.

Portable Antiquity Scheme data was similarly excluded. Whilst nationally the record contained 9550 lithic records in 2007 (Bond, 2010), inspection of the record in 2015 suggested few (less than 3% of lithics) were potentially early Neolithic. Furthermore, many finds seem to recorded by metal detectorists

operating in specific areas, presumably where they enjoy permissions. Inclusion would have introduced a bias similar to that noted above.

In addition, we can expect variations in chronology, for example, whilst fully ground and polished axes are typically considered early Neolithic (e.g. Manby, 1988; Edmonds, 1993b, 70) their dwindling persistence, curation, and re-use, into the middle and later Neolithic are particular challenges. Though not limited to lithics, the necessary introduction of chronological uncertainties is particularly difficult on a study where one of the objectives is to build on the more precise temporal data provided by statistical dating.

2.7 Generic constraints and complications with the Digital Terrain Model.

The Digital Terrain Model (DTM) underlies both the visibility and cost modelling. The DTM is derived from Ordnance Survey (OS) data in the form of 5x5km grids, merged together to form a digital surface of southern Britain, where each point on the surface corresponds to the elevation of a 5x5m point on the landscape at the centre of that location. Each one of the 240 grids used therefore carries 1,000,000 spatially located data points, each with a defined elevation. OS claim an accuracy of 1.5m RSME in urban areas and 2.5m RMSE in mountain and moorland regions (c.f. Fisher, 1998; Ordnance Survey, 2017a). This error affects calculations of slope, aspect, and ultimately viewsheds and cost surfaces, and since the actual error at any given point is undefined, the effect of the error is unquantifiable in the outcome of the analysis.

Techniques have been developed to model multiple outcomes reflecting different levels of error (Fisher, 1998), and though such techniques are useful in a more defined case, the analysis of a multiplicity of, for example, different viewsheds from the same enclosure are beyond the scope of this work. DTM errors must be born in mind however when interpreting the output, and this matter is well discussed in the literature (e.g. Fisher, 1991; Monckton, 1994). Errors in the source data are compounded by errors inherent in the mathematical modelling within the GIS, and the effects are difficult to predict. For example, variations in topography close to the observer will have a greater effect on visibility than the same variation at a greater distance, whilst hilltops will have a greater effect than valley bottoms (Gillings & Wheatley, 2001, 31-32).

The DTM also reflects today's real-world views, and modern constructs are apparent as artefacts within the DTM. In rural locations the practical effect of these is minimal. However, for example, inspection of the DTM in the vicinity of the causewayed enclosure at Staines reveals substantial problems with reservoirs, the M25, other road systems, and the airport at Heathrow. These errors affect the models built on the DTM and are further discussed in 2.8.2 and 2.9.2 below.

2.8 **Visibility analysis.**

2.8.1 **Standard approach to visibility.**

The preliminary step consisted of first digitising the enclosures as polygons within the GIS. The digital model was constructed from geophysical and earthwork survey plots contained within (preferably) published sources or from

unpublished sources including contractor reports and aerial photographs. A standard methodology is then deployed in all instances.

The 'observer' points were first established through analysis of the DTM, and identifying the highest points within the enclosure. To these were added points at 20m intervals along the enclosure boundary. For multiple ditch systems, the founding circuit was used, where the founding circuit is represented by the circuit with the earliest probable construction date (at c.65 percentile), or, where statistical dating evidence is not available, the inner circuit. The elevations of all these points were extracted from the DTM.

Judgements are made, based on evidence in the literature, concerning any change in elevation since the early Neolithic and appropriate adjustment made. For example, through progressive soluble erosion of the chalk (Young & Lake, 1998; Mercer & Healy, 2008; Robinson *et al.*, 2013).

The dataset was modified to include any parameters that may be necessary to calculate a simple binary viewshed representing a cumulative viewshed of all the highpoints and the points on the enclosure circuit. Such parameters include vertical and horizontal (azimuth) angles of view, offsets, and minimum and maximum radii of view (Fig.9, p.54). The importance of choosing an appropriate maximum view radius is discussed by Ogburn (2006, 405). The viewshed is generated as a raster, where value 1 represents a cell that is in-view as seen from the observer point (enclosure), and 0 represents an out-of-view cell. The model therefore calculates a viewshed that may not be visible from any one point on the enclosure. However it represents the accumulation of views that may have been obtainable from various points within the

enclosure and on its boundary. All viewsheds were then ground-truthed by visual survey, recognising that the methodology employed could not be reflected in the field if a view was judged from a single observation point.

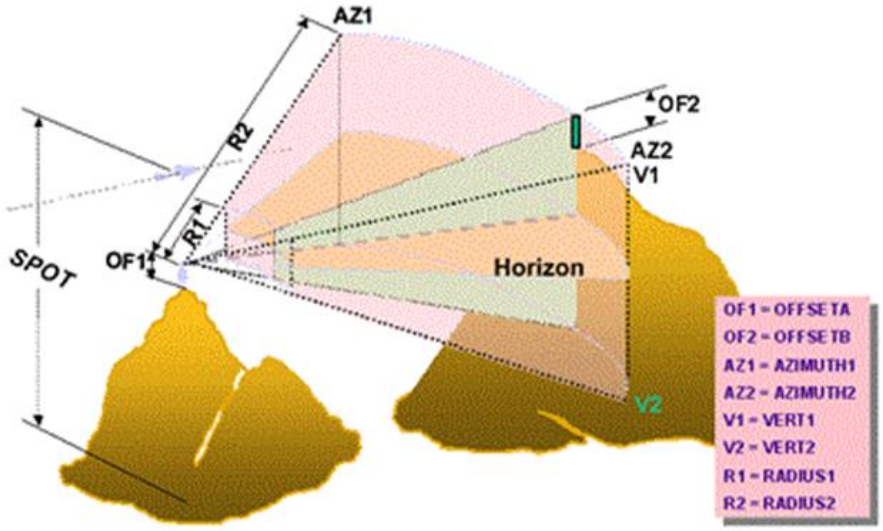


Figure 9: Viewshed parameter definition.

The GIS viewshed tool provides control over the parameters used to construct the viewshed. The height offsets, 'OF1' and OF2, allow for adjustment of the observer and target elevation to account for changes in elevations since the early Neolithic.

Source: ESRI ArcGIS Resources / ARC GIS online

In particular cases, an amalgamation of these cumulative viewsheds was calculated where it was considered informative to identify the ‘depth of view’ of any particular target, for example, to understand the number of enclosures a long barrow may have been visible from. The process of combining cumulative viewsheds generates data that may inform argument concerning the nature of the relationship of a secondary monument or feature, with the observer feature, or propose that a number of monuments reflected some form of social ‘system’.

The viewsheds are presented as a form of ‘fuzzy viewshed’, with a non-linear distance decay function (Fig. 10, p.56). The creation of fuzzy viewsheds in this methodology is designed to present an awareness of the fragility of the viewshed model, particularly as it relates to the reducing apparentness of a target feature as straight-line distance increases away from the observer point. A red to green colour ramp was used where red indicated the visible range to 5km, yellow to 18km, and green above 30km to a practical limit of daytime visibility from a hill top considered to be 60km (Fig.4 below). The non-linearities are introduced to highlight near, medium and long-distance visibility. In a limited sense the stretched colour ramp addresses some of the criticism of the simple binary viewshed since the model recognises the inherent decay of visual clarity with distance. More complex modelling, for example, ‘target size-sensitive fuzzy viewsheds’ (Ogburn, 2006, 409), or the statistically based ‘probable viewsheds’, relating the decay function to the visual arc subtended, is well documented in the literature.

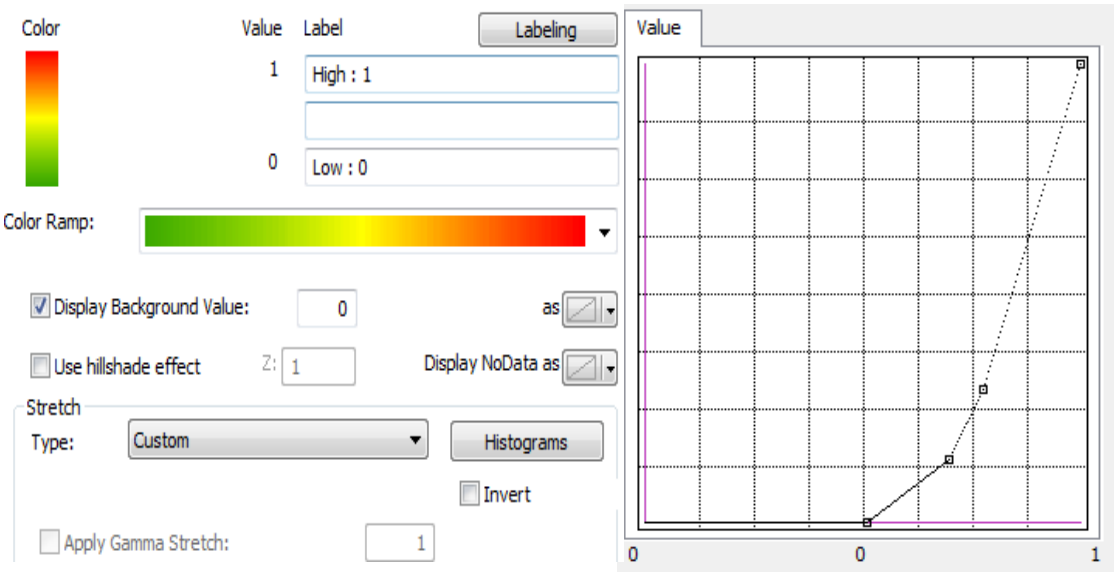


Figure 10: Definition of the nonlinear distance decay function.

The transition within the red to green colour ramp was constructed to provide a visual indication of decreasing visual acuity with distance

Source: Definition by author, output by ESRI GIS

2.8.2 **Generic constraints and complications with the visibility analysis.**

Concerns surrounding the validity and methodological integrity of viewshed analysis have been argued and discussed since the introduction of GIS to archaeology. This short section briefly reviews some of the main criticisms.

The error inherent in the DTM causing uncertainty in the output of the GIS model, has resulted in some specialists (e.g. Fisher, 1991; 1994; 1998) defining probability surfaces rather than the simple Boolean models used here. Fisher defines a surface raster representing the probability of a feature being visible. The probable viewshed can be calculated by introducing randomised errors through applying a Monte Carlo simulation to the DEM (Nackaerts *et al.*, 1999),

thereby generating multiple DEMs which can be combined in a cumulative viewshed. Though justifiable, the technique adds a degree of complexity, unwarranted in a pan-regional study, where quantified comparison between features is the primary objective.

Some criticism is levelled concerning the principal of reciprocity and the demonstrable notion that although a target may be visible from an observation point, it may not be the case that the observation point will be visible from the target point. In this study, since the height of the observer is low compared to the distance, this shortcoming can be ignored for all practical purposes (Gillings & Wheatley, 2001, 32). The terms, visible and intervisible are interchangeable.

The different characteristics offered by near distance and far distance views may also have been important. Whilst long distance views are phenomenologically striking, the degree of clarity declines with distance and other factors. For example, Ogburn, Fisher and Llobera have all demonstrated the importance of target size and the relationships with distance, the significance of colour contrast, and the effect of atmospheric conditions (Fisher, 1991; 1994; 1995; 1996; Llobera, 1996; Wheatley, 1996; Ogburn, 2006; 2007).

Notwithstanding the technical frailties, the archaeological interpretation of visual characteristics has to be considered cautiously. The early Neolithic communities that constructed the causewayed enclosures of the Wessex and Sussex regions have undoubtedly shown a preference for constructing them on high (though not always the highest) ground. This in turn leads to long-distance and commanding views, which can include many natural and man-made features. We cannot therefore necessarily argue that these impressive visual

characteristics were *the* determining factor in a location, which may have been chosen for other prosaic or symbolic reasons. However, where we can identify consistent patterns, we can posit a purposeful association or disassociation between the enclosure, and the characteristics of a surrounding landscape (e.g. see Wheatley & Gillings, 2002, 209).

Perhaps the most compelling criticism of the methodology lies in the 'tree factor' and our limited knowledge concerning the patterns of early Neolithic vegetation. The problem is neatly summed up by Christopher Tilley:

'*At first glance the task seems hopeless. It is simply impossible to know exactly where the trees and bushes were in relation to sites and monuments, where the flowers bloomed and the rushes sighed in the wind'* (Tilley, 1994, 73).

Though excavation reports and other research have made some limited inroad into understanding these patterns (e.g. Allen, 1995a; Allen, 1995b; Allen, 1998; Allen & Green, 1998; Allen, 2002; Allen & Scaife, 2007; French *et al.*, 2007a; French *et al.*, 2007b; Allen *et al.*, 2008b; Bell *et al.*, 2008; Pryor, 2010; Hey & Robinson, 2011; Allen *et al.*, 2013; Hey *et al.*, 2016), such work is limited in dimensions of both scale and temporality, reinforcing the earlier argument made by Gary Lock that, even at the level of a single site and its environs, such detail '*cannot and does not warrant being incorporated',* (Lock, 1996, 220).

Furthermore, most scholars suggest that woodland clearance in the early Neolithic began a process of soil erosion and a depletion or removal of the loess cover, resulting in extensive colluvial deposits in valley bottoms, which again cannot readily be modelled in a pan-regional scale GIS.

The effect of vegetation in viewshed analysis cannot be overstated, particularly when considering the lowland enclosures and proximate tree cover. The DTM reflects a vegetation-free land form of today and the subsequent viewsheds, although readily testable in the field, cannot represent an accurate detailed reflection of the early Neolithic conditions.

We must also note that tree cover in a deciduous woodland varies according to the seasons (Cummings & Whittle, 2003) and also with activities that may have resulted in the localised clearing and thinning of woodland which had been practised since the later Mesolithic (Coles & Coles, 1986; Finlayson & Edwards, 1997; Austin, 2000).

Viewsheds are arguably more accurate in defining what could not have been seen, rather than what was seen, and, particularly for upland enclosures, may estimate areas where the distant tree cover, smoke from fires, and localised clearings were visible, rather than the terrain itself.

Despite the constraints and caution that must remain a consideration in the interpretation, the technique remains important and valid, since the existential experience pertaining at an enclosure must have been at least partly affected by what could and could not have been seen in the immediate and distant environs.

2.9 **Cost distance modelling.**

2.9.1 **Standard approach to cost distance modelling.**

The theoretical relevance of folk movement within a landscape was explored by Alan Pred (1986), who emphasises the importance of social interaction in the structuralisation of social conditions and practices.

The application of GIS in archaeology has been led by proponents such as Llobera who responds to some of the critics of GIS (Llobera, 1996, 613-614, 622) in considering how Bronze Age ditch systems on the Salisbury Plain Training Area relate to topography as defined by a DTM (Llobera, 1996).

Llobera's work builds on that by Pred in developing accumulated cost surface (ACS) models exploring the prehistoric importance of movement. To the concept of movement, he introduces three variables. Firstly, *'capability constraints',* which is the ability of folk to move through the landscape, perhaps impeded by features such as slope, soil, vegetation and hydrology. Secondly, '*coupling constraints'*, which is the degree to which mobility is impeded by the need for people to bind together at certain places and/or at certain times. Lastly, '*authority constraints',* which is the degree to which a higher authority or different social group may limit access to certain areas (Llobera, 2000, 67-68).

Other work has highlighted the importance of topographical and geological prominence (Llobera, 2001) in the choice made by prehistoric peoples in their location of landscape structures. In his later work (Llobera *et al.*, 2011) he also emphasised the role of the ACS for use in isotropic and anisotropic analysis. Deploying the ACS as a proxy for a *'topographies of movement'*, Llobera develops the notion of focal mobility networks to estimate the ordered

movement of persons approaching (in this case) an Iron Age hillfort. The movement across a landscape can be estimated in the GIS, and a number of models are attested in the literature which can be described broadly as 'relative' and 'absolute'.

2.9.1.1 **Relative cost distance.**

Bell and Lock (2000, 88) propose a relative energy expenditure (cost) model estimating the cost of movement according to slope θ.

Cost = (Tan θ) / (Tan 1deg) = (Tan θ) / 0.01745)

Implemented in ArcGIS thus:

Cost = Tan ((slope degrees * math.pi) / 180) / 0.01745

The model appears to respond well to topography but has been criticised as "dimensionless" (Wheatley, 2015, pers. com.). For this reason, relative cost distance modelling was not used.

2.9.1.2 **Absolute cost modelling.**

Here the effort or energy required to move across a landscape is described in real world values such as Watts and Time.

For example, Pandolf et. al. have suggested a model that estimates energy expenditure (M, in Watts) of a person travelling, with provision made for the weight of the traveller (W, kg), the load carried (L, kg), the speed of walking (V, m/s), the slope angle (G, percent) and a terrain factor (η = 1 for treadmill) (Pandolf *et al.*, 1977, 577). The equation for energy is:

$$M = 1.5W + 2(W+L)(L/W)^{2} + \eta(W+L)(1.5V^{2} + 0.35\,VG)$$

Which may be implemented in ArcGIS thus:

Cost = (1.5 * 85) + (2(85+10) * Power ((10/85),2)) + (0.75 * (85+10) * ((1.5 * Power (1.39,2)) + (0.5 * 1.39 * slope %tage)))

The authors suggest the validity of the model is enhanced by a substantial body of medical tests under laboratory conditions, and is claimed to be reliable for all walking speeds (including standstill) (Pandolf *et al.*, 1977, 580). A similar model is proposed by Van Leusen (2002; cited in: Conolly & Lake, 2006)

The Tobler Hiking Function (THF) proposed by Waldo Tobler (1993) is a commonly deployed algorithm (e.g.Wheatley, 1996; Yanchar, 2010; Kondo *et al.*, 2011; White & Barber, 2012).

The model relates to slope and is defined as:

$W = 6e^{(-3.5 *abs(S+.05))}$

Where: W = walking velocity (km/hr)

S = dh/dx = slope = TanTheta

And: Tobler suggests multiplying by 3/5 for off-path walking

The time in hours (cost) to traverse 1 metre can be implemented in ArcGIS thus:

Cost=(5/3) * (0.00016666 * (Exp(3.5 * (Abs((Tan((slope degrees * math.pi) / 180)) + 0.05)))))

The model provides a symmetrical, though offset, response to varying conditions of slope and can be developed to provide isotropic (independent of direction of travel) or anisotropic (dependent on direction of travel) models (Fig.11, p.63).

The THF provides an output in an archaeologically intuitive unit and hence this equation is used throughout the analysis to calculate an accumulated cost surface, which is used as an input into the 'path distance' function and the calculation of an anisotropic cost model. The output models journey times from all points in the landscape to each of the causewayed enclosures. Contours were calculated at four, eight, and twelve hourly intervals to define cost distance boundaries (section 2.10 below).

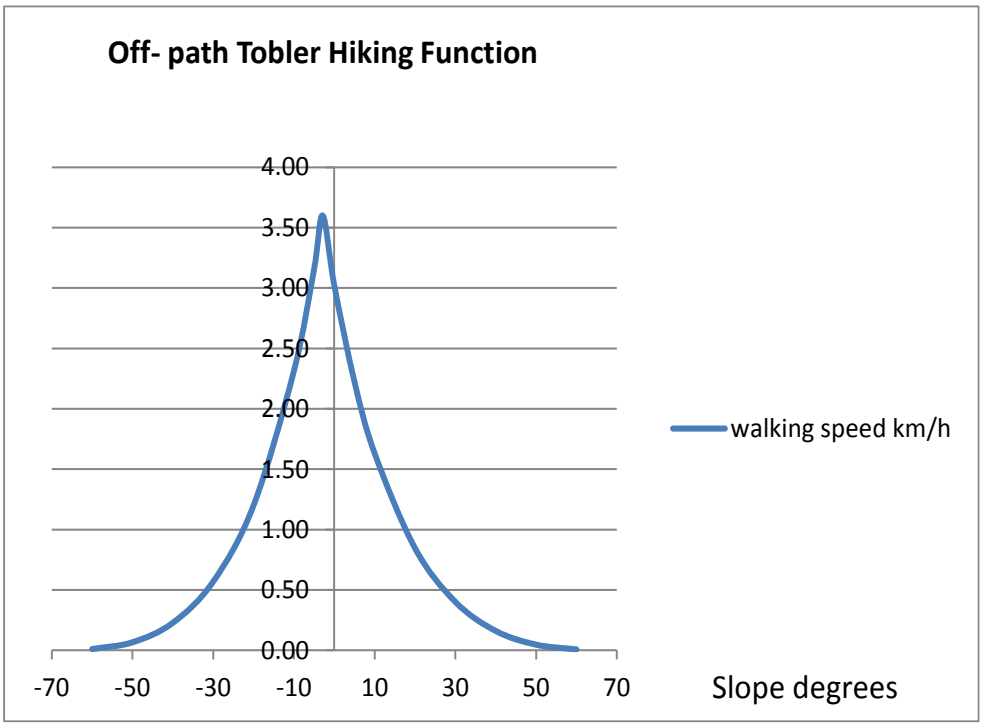


Figure 11: Response of the Tobler Hiking function.

The Tobler model suggests that walking on uphill or downhill slopes adversely affects the speed of progress. Walking up a slope being slightly slower than walking down a slope of the same angle

Source: Author

2.9.2 **Generic constraints and complications with the cost models.**

The UK-wide DTM was constructed using a mosaic of 5x5km tiles each with a horizontal resolution of 5m. The DTM was then modified to convert all negative height values to 0.1m and then clipped to the UK coastline. Despite this high resolution, errors in the DTM data set and the distribution of these errors are known to cause uncertainties in operations reliant on the data (Fisher, 1998).

Both the ACS and the implementation of the 'path distance' function use the tangent of the 'slope angle' as a variable. Occasionally, particularly where the DTM suggests step changes in elevation, for example cliff faces, calculation problems were experienced. Since the DTM used is derived by remote sensing, occasional erratics were also apparent. This increased processing times, and led to very high cost distances in isolated areas. Such areas were necessarily conditioned within the GIS by the judicious application of 'set null' and 'con' functions.

Offshore islands, for example the Isle of Wight, caused difficulty with the ACM due to the way ArcGIS manages areas of 'no data' (the sea) with isolated areas of valid data (the islands). Islands were hence removed from the model to reduce processing times from potentially thousands of hours to acceptable limits (tens of hours). Processing the calculation of path distance functions, took typically 10 to 30 hours per enclosure.

Hydrology presents a particular analytical complexity in cost distance modelling (Wheatley & Gillings, 2002, 121; Conolly & Lake, 2006, 260; White & Barber, 2012, 2690). Modern rivers have been diverted and canalised since at least the Roman period. The period preceding the industrial revolution saw major

riverine navigation improvements, followed by the development of canals in the 18th century. Water extraction has also reduced water tables, and some small streams easily crossable now, may not have been so in the period under study. Conversely, Mark Robinson and George Lambrick (1984, 11 & fig.5) have noted the lower water table and water flowing across (the Thames) floodplains in the Neolithic consequent on the more extensive tree cover in this period. Present day rivers and streams are hence not representative of the hydrology present in the Neolithic. Some of these effects can be mitigated using flow accumulation techniques in the GIS. However, these can only be crude estimates, particularly in a regional study. Whether a slow moving, marsh-bound river, hindered mobility, or mobility improved through water borne transport, cannot be accurately judged, and may anyway have changed with the season. For example, streams that freeze over in the winter, which may then be easily crossed, may later have become impassable torrents, caused by snowmelt in Spring (Seitsonen *et al.*, 2014) .

It was considered appropriate on a regional study to exclude hydrological effects from the analysis (Wheatley, 2015, pers. com.).

The formal models consist of 4, 8 and 12 hour cost distance contours calculated according to Tobler (1993) as indicated above. The models use slope and aspect to calculate anisotropic path distances based on a uniform terrain. Their primary weakness may be the spatial variability of terrain and how well the modelled terrain reflects that pertaining during the early Neolithic. Whilst other terrain coefficients are available and could have been applied (e.g. Soule & Goldman, 1972), no mathematical model can reliably define the time taken to cross a variable terrain of unknown constitution. Different models,

being mathematical representations, accordingly managed by computer algorithms, respond differently to the same input conditions and whilst the THF may be widely used, a critical reflection might deduce that it under-represents the effects of climbing slopes in rough terrain.

Notwithstanding the technicalities, actual times in the early Neolithic would have been affected by a range of physical and conceptual constraints (Chapman, 2006, 108). Unlike visibility analysis, ground-truthing the model output in today's developed landscape is impractical.

The results must be interpreted as approximate estimations of the time taken to reach an enclosure from any point on the contour line. They are better considered as contours that reflect equivalent iso-lines: points in the landscape from which the time taken to reach an enclosure is exactly unknown, but where each, given the assumptions, has a constant relative magnitude with respect to another. They provide a formal description which facilitates the comparison of one causewayed enclosure with another.

For this reason, I prefer to describe the areas contained within the contours as the Minimum Cost Distance Area (MiCDA), Mean Cost Distance Area (MeCDA) and the Maximum Cost Distance (MaCDA), although their absolute theoretical value, as a 4, 8 and 12-hour cost distance, is generally given in parenthesis to remind the reader of their scale (Fig. 12, p.67).

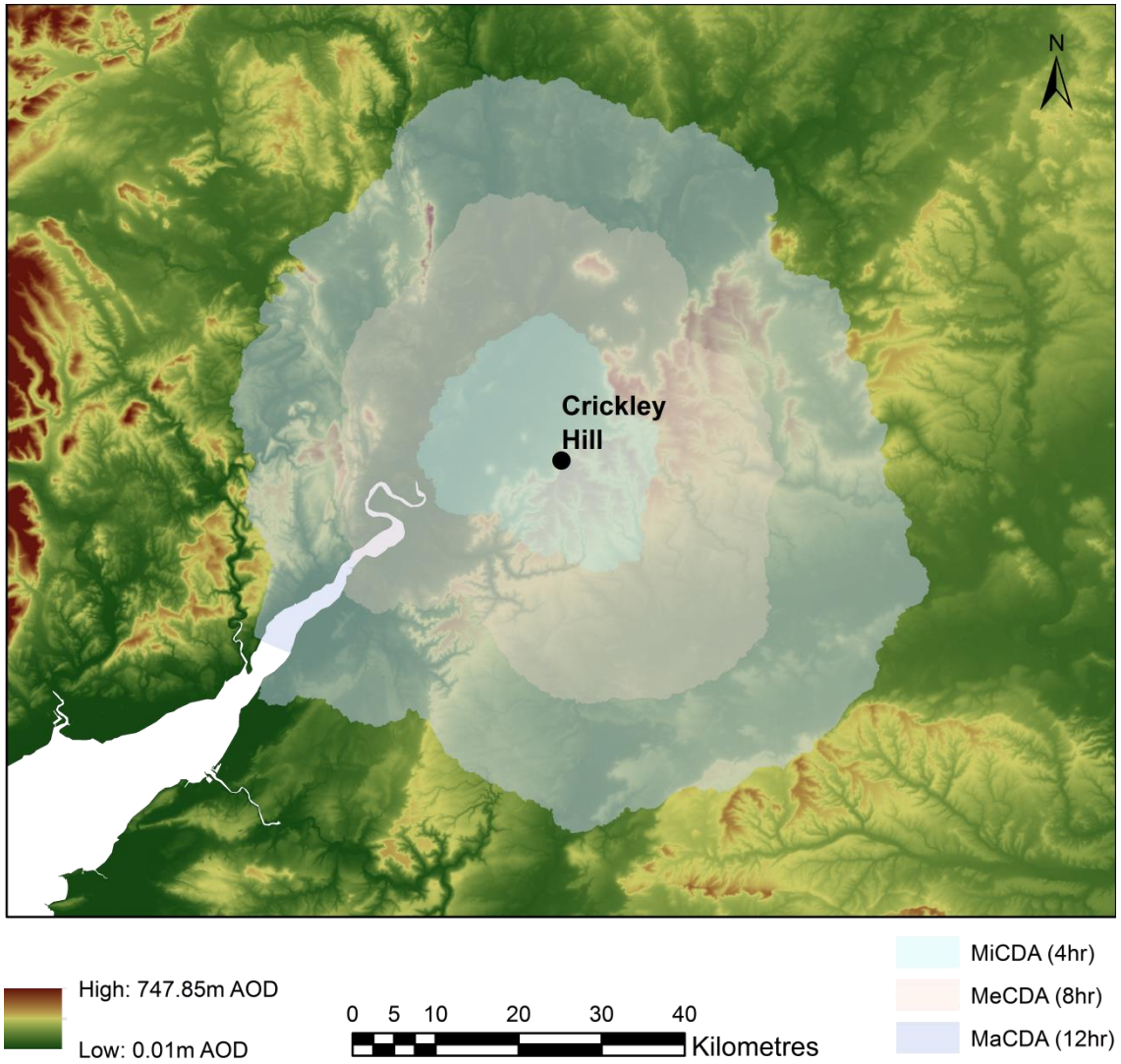


Figure 12: Cost distance definition.

The boundaries of the coloured bands represent the areas defined by the Tobler Hiking Function calculated as 4, 8 and 12 hour contours.

Source: Author.
Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

2.10 **Conclusions and the validity of the GIS modelling.**

'*Models aimed at exploring any aspect of humanity, do not, cannot and should not aspire to provide an objective view of the phenomena they aim to understand.* ***Their value resides in that they provide a formal, reproducible description*** *……..*' (Llobera, 2000, 81: my emphasis).

There is no doubt that more complex models could have been constructed. However, the aim of this work is not to 'lead the way' in the application of GIS to archaeology but to use a formal, reproducible, and consistent methodology, that allows investigation and comparison in support of the aims and objectives of the study.

Many of the assumptions necessary to 'improve' the models, carry with them some interpretative overburden that cannot be known for certain. For example, how 'visible' an object may be is determined by many factors other than distance and size. In the case of causewayed enclosures, visibility would be significantly influenced by, for example, the contrast provided by the exposed white chalk of banks and ditches, their prominence in the landscape, whether they were in the clearings of an otherwise wooded environment, where they may appear as notches in the tree canopy (Oswald, 2017; pers. comm.), and of course a myriad of human and atmospheric factors. Visibility is, to a large degree, a personal experiential phenomenon.

In constructing a visibility model an important consideration is the constraint imposed by distance and hence the dimension of the zone or buffer placed around the observer point. Without such a constraint the model may suggest intervisibilities that are simply not practical. However the view from Hambledon Hill, 54km to the Isle of Wight, indicates the practical potential extent of visibility from a high point on a clear day.

Nevertheless, and despite the fact that vision is only one of the senses that may have been important in the siting of an enclosure (Gillings & Wheatley, 2001), visibility remains an important component in landscape analysis, and in particular for hilltop enclosures. Many causewayed enclosures are located at a point on a hill where inward or outward visibility could have been different and arguably 'better'.

Importantly the models do define with more certainty what *cannot* have been visible. Where the models can include adjustment for known topographical variations since the early Neolithic then we can expect, for example, a long barrow that is not visible today from an enclosure to also have not been visible in the early Neolithic. For these reasons and in combination with the cost models, the use of visibility analysis, cautiously interpreted, is justified.

The definition of cost distances is similarly defensible. Here I argue that, despite the frailties, the models offer significant improvement to the unquantified earlier spatial models that have been applied to causewayed enclosures and the early Neolithic.

Piggott (1954, 17-101) emphasised the importance of causewayed enclosures as central places that had an undefined spatial relationship with long barrows and settlements. Renfrew (1973, 544-550) again emphasised the relationship with long barrows, though he suggests long barrow groups reflect territorial centres, defined by unweighted Thiessen polygons (Fig. 1, p.12 above), each with a single causewayed enclosure. Barker and Webley (1978) echo Piggott's earlier work, suggesting territorial limits defined by linear boundaries, constructed to include causewayed enclosures as central places within these

territories (Fig. 4, p.16 above). Neither Renfrew nor Barker and Webley offer any explanation for the variability apparent in their distribution maps of long barrows and causewayed enclosures, a theme later explored by Wheatley (1996). Deploying a statistically verified visibility analysis within a GIS, Wheatley proposes such variability exists but again, says little about why, or what it may suggest of early Neolithic society. What appear to be anisotropic cost models are also included by Wheatley (1996, 85), though are not discussed.

Defining the boundary of each area corresponding to a minimum, a mean, and a maximum cost distance requires justification. We can consider the boundaries of these areas as defining three polygons where the physical effort required to reach the origin from anywhere on each boundary is equal.

- The MiCDA is the local scale and is easily traversed in a short period. Within this area people, living together in small groups of extended family, exchange routine contact on perhaps a day to day, week to week basis. People are likely to have enjoyed very similar cultural and social affinities. The MiCDA may be considered the scale of the (extended) family.
- The MeCDA area is the sub-regional scale. Here we can expect less routine contact, where individuals or groups come together for particular purpose, such as trade and exchange. The area may be subject to partition, for settlement, the exploitation of resources, and economic development. The MeCDA may be considered the area of shared common interests.

- The MaCDA is the regional scale. Here we might expect groups with different customs and traditions to come together more rarely, perhaps for celebration and rites of passage, the settling of differences and obligations, and the exchange and trade of more prestige items such as partners and cattle. It may be that people knew of other groups and individuals in the area but did not consider them as 'belonging'. Hence the MaCDA may be considered an economic area (c.f. Wheatley, 1996, 77).

These areas must be interpreted, not as implying discrete boundaries, but in a human sense, where activity further away from an enclosure requires accordingly more effort than near activity, if that activity is associated with the enclosure.

Modelling these areas radiating around enclosures gives the impression of the causewayed enclosure as the 'central place'. This is an unfortunate necessity due to the dearth of archaeological evidence for other early Neolithic settlement. Throughout the interpretation, it is always necessary to consider that causewayed enclosures may not have been *the* central place.

The archaeological implications of this, and the specific interpretation for causewayed enclosures must hence be treated with some caution. For example, whilst it may be useful to describe the areas so defined as 'catchment areas', it is problematic to assume that their constructors exploited the resources associated with each region in a similar manner to that ascribed to early medieval 'central place theory' (eg: Aston, 1985, 35; Faith, 1997; Gerrard *et al.*, 2007, 5). Firstly the technique continues to risk perpetuating the view of

a causewayed enclosure as a monument whose function was to act as a central place, at the (cost) centre of three 'territories': an up-rated version of Renfrew's territories bounded by Thiessen polygons (Renfrew, 1973, fig.1) or the later model of territorial organisation developed by Drewett (1978, figs 9 & 13). Secondly, since some of the enclosures are in relatively close proximity and the cost distance area of one enclosure overlaps another, the analysis results in the artefact, spatial area, waterway or geological features, being associated with more than one enclosure, or with no enclosure.

The analysis does, however, provide a lens through which to view each enclosure, and whilst we must bear these 'limitations' in mind, the technique is a valid mechanism to place the enclosure in its spatial context. To avoid prejudicing the interpretation, the term 'site catchment' usually associated with this analytical technique is not used.

Lastly, despite the appearance of accuracy and precision that the GIS exhibits, we must not consider the output as absolute. Rather, the technique provides a single generalised model within a common computational framework (Lock, 1996).

Despite these limitations, the methodology can demonstrate that early Neolithic relationships, territories, areas of influence, social groupings, and common cultures, may be better described through this modelling technique, than by the earlier work. It may also be noteworthy that the application of GIS to problems of big (archaeological) data is being successfully exploited, albeit for later periods, in the EngLaid project (e.g: Gosden & Harkel, 2011; Cooper & Green,

2016; Green *et al.*, 2017) for substantially larger datasets over a similarly wide area.

3 The case studies.

3.1 Introduction to case studies.

This thesis is built around four case studies, which between them include 34 of the 78 probable to certain causewayed enclosures currently known to lie on the British mainland (Table 4.).

Sequence	Study area	Number of enclosures
1	Causewayed enclosures of the Sussex Downs. Considered as two sub-groups comprising the West Sussex and East Sussex clusters	7
2	Causewayed enclosures of the Wessex region. Each enclosure considered individually	9
3	Causewayed enclosures of the Upper Thames Valley. Each enclosure considered individually	13
4	Causewayed enclosures of the Fens area. Each enclosure considered individually	5

Table 4. The four case studies developed for GIS modelling.

Each case study represents a discrete cluster of spatially proximate enclosures which, my research suggests, were also related in the early Neolithic. I shall suggest that these clusters, to a greater or lesser extent, formed one component of a structured early Neolithic society that comprised distinct folk groups, perhaps extended families, where each group was responsible for the construction of more than one enclosure and perhaps, in some cases, all the enclosures within a cluster.

The range of case studies was purposefully chosen to represent enclosures built in areas with dissimilar landscape physiognomies. The chosen clusters were built on dissimilar geologies, with differing topographical characteristics and with different aspect**s.** For example, although both on the chalk uplands, the enclosures of Sussex differ from those in Wessex in their spatial proximity to the coast. The case studies do, however, reflect two landscape types. The Sussex and Wessex enclosures, are dominated, though not exclusively so, by their construction on elevated chalk uplands, whilst the upper Thames Valley and the Fenland enclosures reflect constructions within a largely flat landscape, albeit usually on very localised elevated islands.

The case studies were also chosen to test previous models of territory and land use (e.g. Barker & Webley, 1978; Drewett, 1978) associated with causewayed enclosures.

The territorial models, related earlier, are tested in all four case studies. An alternative model is developed reflecting a greater early Neolithic mobility, removing the causewayed enclosures as *the* central place, and removing the implicit assumption that one enclosure related to one 'territory'.

The Sussex case study explores the relationship with geology (as a proxy for soil type) in some analytical depth. The objective was to test the 'satisficer' model (and see Fig.3, p.15 above) proposed by Graeme Barker and Derrick Webley and hence determine whether land use could be responsible for their position in the landscape. Since no evidence could be found that related the position of an enclosure to geology, the matter is treated superficially in the three subsequent case studies.

3.2 Case study 1: causewayed enclosures of the Sussex Downs.

3.2.1 Introduction.

The South Downs is an extensive range of chalk hills running along the coastal edges of Hampshire in the west, through West Sussex and on to East Sussex around Eastbourne, in the east. There are seven known causewayed enclosures in two spatially distinct sub-groups (Fig. 13, p.76).

The four enclosures of the western sub-group are contained within a limited geographical area bounded to the west and to the north by the River Lavant and to the east by the River Arun. 'The Trundle' lying on St. Roche's Hill (Goodwood), is largely contained within the curtilage of a later Iron Age enclosure. To the east are the larger enclosures of Court Hill (Charlton), Halnaker Hill (Selhurst Park) and Barkhale Camp (Bignor).

The three enclosures of the eastern sub-group lie east and west of the river Ouse and are more widely separated. Whitehawk Camp, approximately 1.5km inland from the present line of the south coast lies within the modern conurbation of Brighton, whilst Offham (Lewes) lies on a promontory of the Downs overlooking the plains of the River Ouse and its tributaries, with Combe Hill (Willingdon) further east towards Beachy Head.



Figure 13: Location and extent of the Sussex study area.

Though parts of west areas of Kent and southern areas of Surrey fall inside the bounded area, these counties fall outside the area defined by the MaCDAs. The dataset from these counties is hence excluded from the models.

Source: Author
Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

The two discrete clusters appear to be legitimate groupings and not a relic of survival. The area has been well researched and any further causewayed enclosures on the chalk are unlikely, though others may have existed on the alluvial plains to the south or the north. Despite the considerable record of excavations on the Sussex enclosures, they, with the exception of Whitehawk, have provided few suitable radiocarbon samples and the chronological estimates remain 'unsatisfactory' (Whittle *et al.*, 2011, 251).

Tabula flint deposits at the base of the upper chalk were an important focus of the Neolithic extractive industry, with six definite and a further three possible flint quarrying sites identified (Barber *et al.*, 1999) (Fig. 14, p.79). Activities here are broadly contemporary with activities at causewayed enclosures (Gardiner, 1990; Whittle *et al.*, 2011, 253 & 257) and though only the Cissbury and Harrow Hill mines have provided sufficient material for statistical modelling, radiocarbon dates suggest initial activity at the Sussex mines begins between 85 and 380 years earlier than the start of enclosure construction (Gardiner, 1990; Barber *et al.*, 1999; Russell, 2000; Whittle *et al.*, 2011). Like the enclosures, flint mines enjoyed a relatively short period of use (Fig. 15, p.80).

The GIS model incudes all seven causewayed enclosures, the six definite flint mines and all the definite long barrows. Excluded from the analysis are the discredited long barrows at Halnaker Hill (RCHME, 1995) and Buxted (EH, 2014). Both have been dismissed as later industrial features, while a further example at Whitehawk is also dismissed by RCHME (1994) and is not mentioned following excavations at Whitehawk in 1993 (Russell & Rudling, 1996). The distribution of the remaining long barrows align with the clustering

of the enclosures, with eleven long barrows spatially associated with the four enclosures of the western group and twelve long barrows associated with the three enclosures of the eastern group. The chronological relationship with causewayed enclosures is unclear due to the paucity of reliable radiocarbon samples and the stratigraphical uncertainty associated with those few that are available (Whittle *et al.*, 2011, 251-252) (Fig. 15, p.80). Neolithic dates are assumed, based on form and lithic clusters.

The distance between the two groups of enclosures is sufficient to suggest that visibility analysis should be considered only within the two groupings and not between enclosures of different groups. In extremis, the degree of separation between The Trundle and Combe Hill is 65.5km, whilst the line of sight between Barkhale Camp, which is the most easterly enclosure of the western group and Whitehawk Camp, the most westerly of the eastern group, is over 33.3km. The GIS model suggests that both these examples are inter-visible. However, for all practical purposes the distances suggest that intervisibility is unlikely to have played a significant role in their function or location.

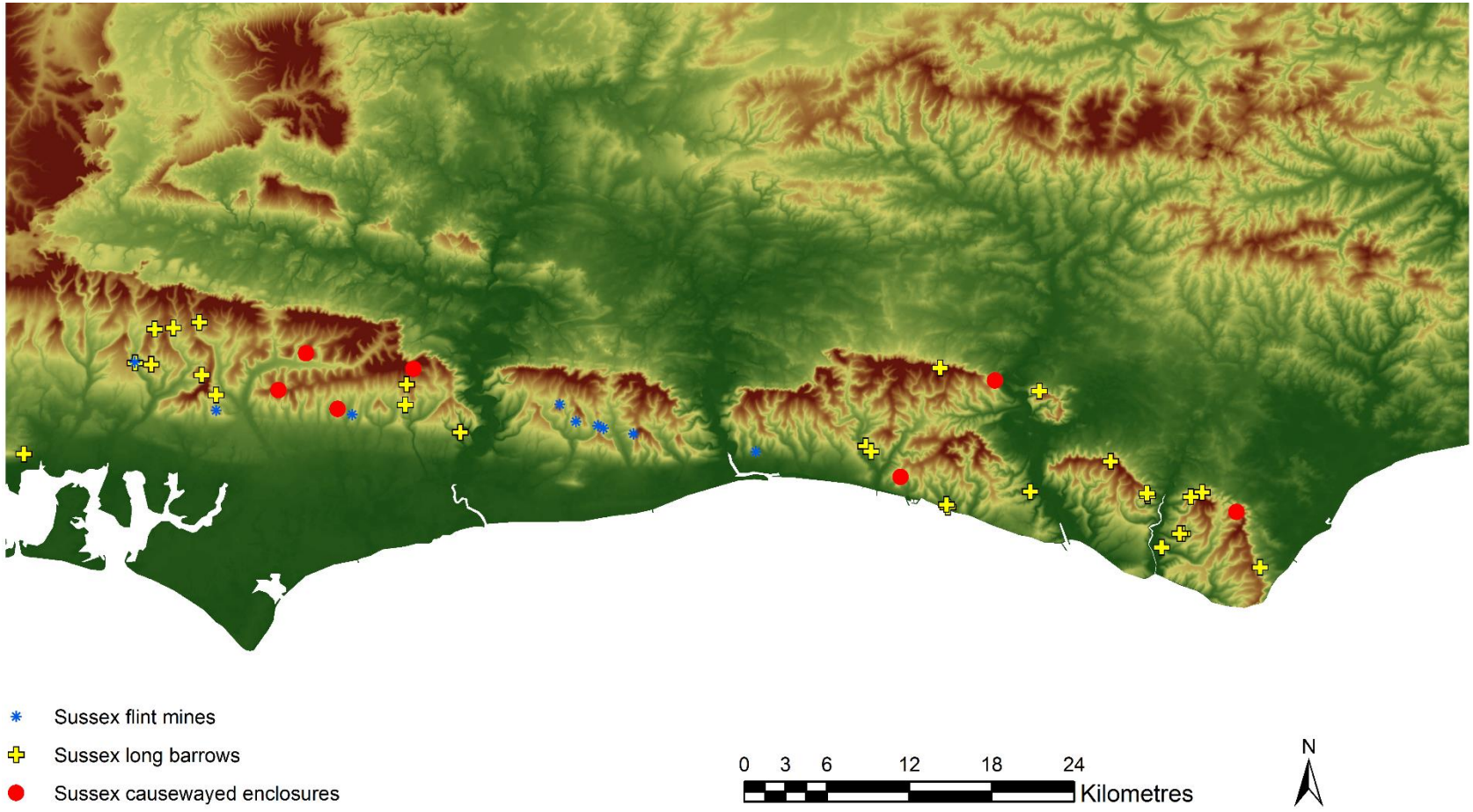


Figure 14: Distribution of early Neolithic monuments in the Sussex study area.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

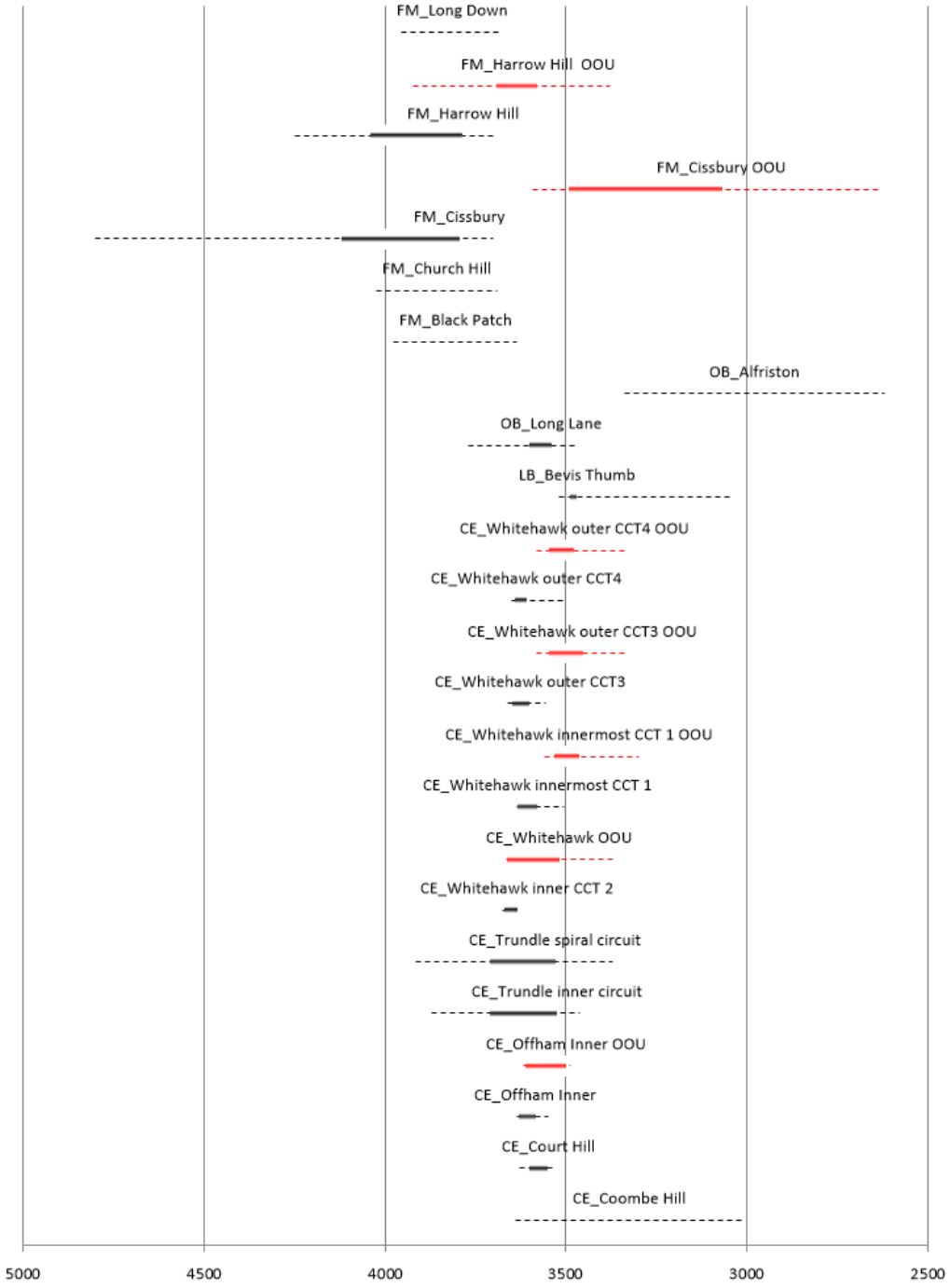


Figure 15: Statistically derived chronologies of the early Neolithic components**.**

Black lines represent construction dates and red lines out of use dates. Dashed lines are high probability (typ. 95%), solid lines are lower probability (typ. 65%). CE denotes causewayed enclosure, LB = long barrow, OB = oval barrow, and FM = flint mine.

Source: Author, after Whittle et al 2011

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

3.2.2 **Geological summary.**

The Sussex enclosures lie on the elevated levels of the Upper Cretaceous chalk. The chalk group underlies much of the area and beyond, stretching from Dorchester (Dors.) in the west, through the Wessex region towards High Wycombe in the north, with two elements surrounding the Wealden area. One running through Dorking (Srry.) towards the Medway (Kent) area and the other comprising the South Downs terminating in impressive coastal cliffs at Beachy Head (Ssx.), in the east (Young *et al.*, 1988; BGS, 2003b) (Fig.16, p.84). The Chalk Group comprises the White and Grey Chalk subgroups. Except where terminating at the coast, the chalk downs are characterised by a gently inclined dip slope towards the coastal plain to the south, and a more steeply sloped escarpment to the north. Deposits of Upper Greensand and Gault Clay outcrop at the base of the chalk escarpment. The oldest rock group in the study area, laid down in an alluvial floodplain between 125 and 135 million years ago, are the poor-draining Mudstones and Clays of the Wealden Group which comprise a series of Clay vales and intervening, low-lying Sandstone escarpments on the southern limb of the Wealden anticline lying to the north of the chalk. The Wealden Group comprises the Purbeck Group, the Hastings Beds, the Weald Clay, the Lower Greensand, the Gault and the Upper Greensand. Apart from a few isolated exposures northeast of Barkhale Camp, most of the clays in the study area are today overlain by later deposits, though just outside the area a substantial horseshoe shaped outcrop runs towards Guildford (Srry). Superficial deposits mapped as ‘clay-with-flint’ occasionally cap the chalk (BGS, 2003a), contributing to a localised reduction in solution erosion (Scott-Jackson, 2000). These deposits, here and elsewhere, have been shown to provide

resource for tool production from the Palaeolithic onwards (Scott-Jackson, 1996; 2000; French *et al.*, 2007a, 219).

A substantial sequence of early Cretaceous bedrocks underlies Quaternary deposits to the south of the chalk. The later covering comprises deposits of Brickearth, gravelly periglacial materials, colluviums, alluviums and a sequence of river terraces and marine deposits which occur up to around 43m AOD. Some of these deposits have yielded long sequences of human occupation (e.g. Bedwin, 1983; Jackson *et al.*, 2002), and the Lower Palaeolithic site at Boxgrove is well documented (Pitts & Roberts, 1997; Roberts & Parfitt, 1999).

The Chalk Downs are notable for their lack of surface water, though their undulating valley systems are the consequence of past water erosion (Robinson *et al.*, 2013). The slopes are characterised by this extensive system of valleys, many of which today, lack any form of perennial streams and most are completely dry. Small settlements have developed along the spring line towards the base of the scarp. Though today many of the springs have little or no flow, the number of 'Winterbourne' and 'Bourne' place-names suggest a different historical hydrology.

Soil erosion can be substantial and results in the re-deposition of soils from the chalk slopes to the valley bottoms in a process that has continued since the Neolithic when the Downs were first cleared for agricultural purposes. The process results in the upland soils remaining poor and thin, whilst the lowland soils become richer and thicker. Erosion through a loss of chalk in solution contributes to some $60m^3/km^2$/year and a surface lowering of around 60mm per 1000 years (Robinson *et al.*, 2013, 62-3).

The river systems drain south into the English Channel and are characterised, particularly in the east, by small, now canalised, tidal rivers flowing in very wide flat-bottomed valleys, close to sea level. These wide riverine channels are apparent on the Digital Terrain Model. The rivers flow through poorly drained, silt rich, alluvial material where a high water table ensures the fine grained soils remain waterlogged for much of the year. Beneath the current drift geology, the rivers have previously cut into the underlying strata to form valleys in the bedrock, significantly deeper than current sea levels (Gallois *et al.*, 1965). These valleys were eroded at the time of glacial maximums during the Quaternary when sea levels were much reduced. The last of these maximums occurring around 16000BC resulting in sea levels 130-140m lower than present, when the English Channel was dry and the nearest coastline was considerably west of the current position. The rock floor of the river Alun, for example, is 36m lower than the current valley floor (Robinson *et al.*, 2013). As the climate warmed, sea levels rose and the rivers slowed depositing the gravels, clays, silts and sands that compose the superficial geology of today. The marine incursion was complete by around 3000BC and the lower valleys had become tidal estuaries complete with chalk cliffs and peat bogs. These wet liminal areas, with deep fertile soils, would have provided an important resource during the Mesolithic and Neolithic periods and may have encouraged the early Neolithic exploitation of the area.

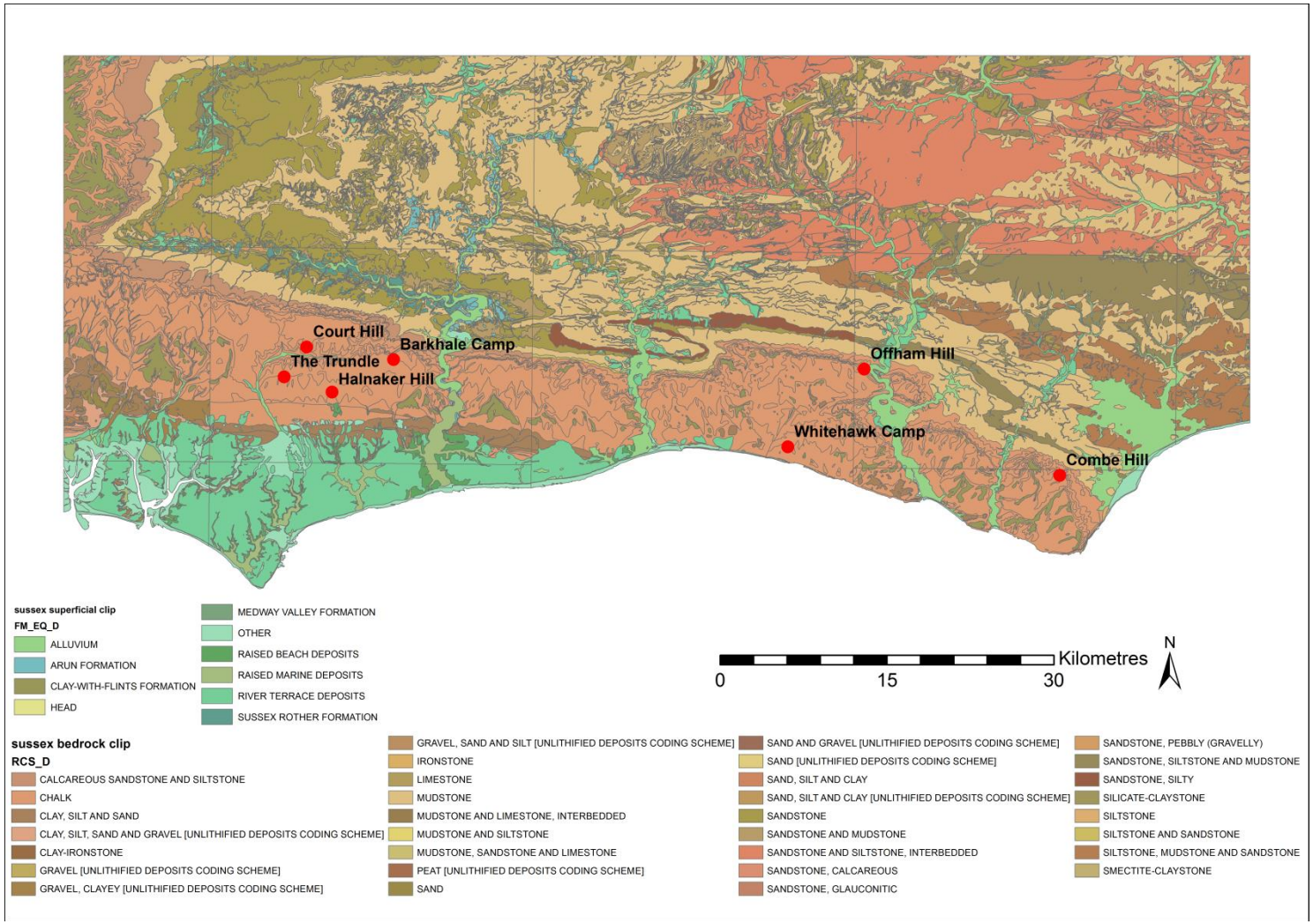


Figure 16: Geology of the Sussex study area.

Spatial data: Edina Digimap, Crown copyright 2010 An Ordnance Survey / Edina supplied service. Geological map data ©NERC 2014

3.2.3 **The western cluster.**

The cluster comprises four enclosures with a maximum separation of 10km (The Trundle to Barkhale Camp) and a minimum of 4km (The Trundle to Court Hill) (Fig.17). All occupy elevated locations.

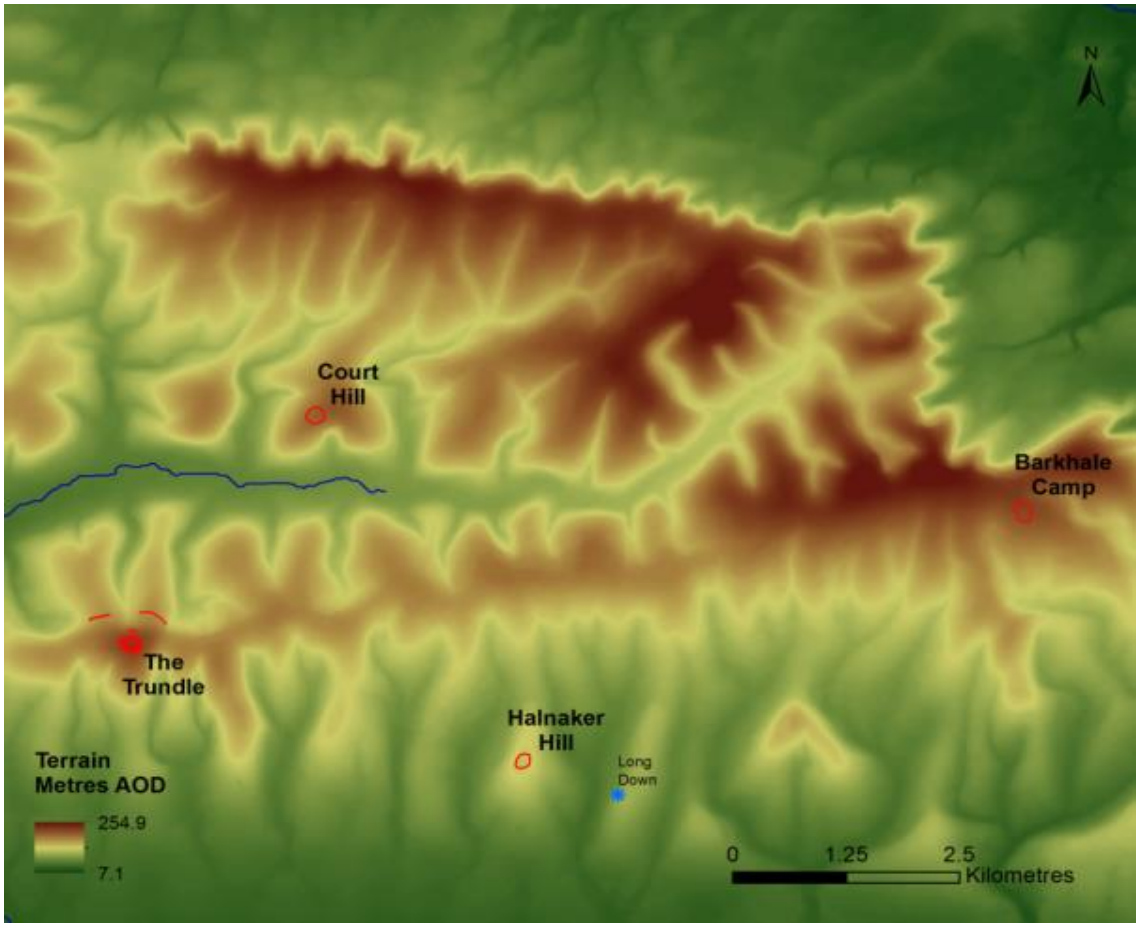


Figure 17: Sussex enclosures – the western cluster.

Spatial data: 1m Lidar data, Geomatics – The Environment Agency

The Trundle

The Trundle is a 'complex' or 'developed' monument comprising an inner (1.15ha) and outer (1.65ha) enclosure, some directly associated earthworks and two possible Cross Dykes (Fig.18).

Halnaker (2.13ha), Court Hill (2.87ha) and Barkhale Camp (3.07ha) are simple single-circuit enclosures. Only The Trundle and Court Hill benefit from a Bayesian-derived chronology (Fig.13, p.76). Barkhale is dated on the basis of lithic and pottery typology (Leach, 1983) and the probable enclosure on Halnaker Hill remains undated.

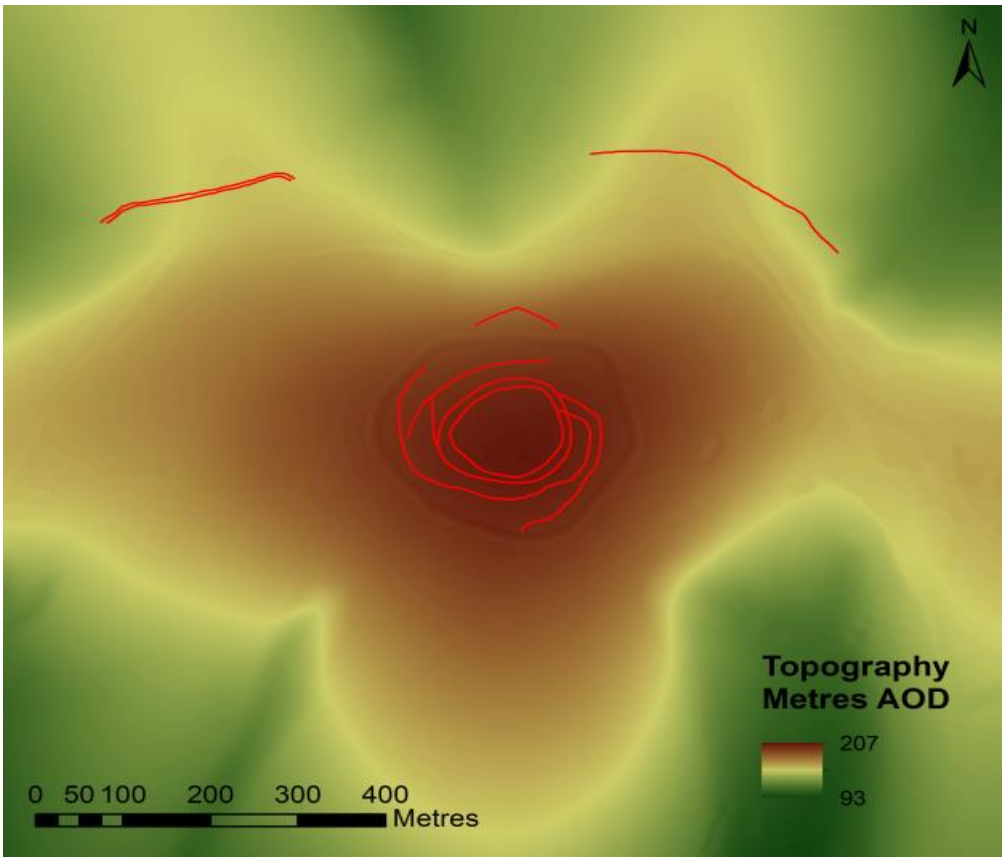


Figure 18: The Trundle.

The undated Cross Dykes may be associated with the later hillfort, just visible and encircling the Neolithic complex.

Spatial data: 1m Lidar data, Geomatics – The Environment Agency

Though dates for Halnaker and Barkhale remain imprecise, The Trundle may be the earliest and is certainly the most developed.

The Trundle is situated on a glacial outlier and, as noted by Oswald et al. (2001, 102), is slightly orientated towards the north. Views in this direction might be expected to be the dominant characteristic, but they are interrupted in the near distance by the main range of the Downs on which Court Hill is situated. This precludes either a view over, or a view from, the lower areas associated with the rivers Arun to the east and the Rother to the north. More extensive views to the west are precluded by the Downland around Marden and Stoughton which limit the visible distance to 5km. The most extensive views lie to the south over the wide coastal plain (Fig.21, p.102). This field of view stretches from the modern conurbation of Portsmouth and Hayling in the west, to the Worthing area in the east, and includes sites with demonstrable Neolithic activity at Oving, Chidham and Selsey (Bedwin, 1983, 31-34). It is perhaps noteworthy that none of the seven Neolithic barrows in the western sub-group are visible from The Trundle, or indeed from any other of the enclosures (Fig. 21, p.102).

The lack of any visual connection between The Trundle and long barrows may weaken the suggestion of affinities between these monument types, particularly in light of the chronological relationship between the well-dated enclosures and the oval barrow at Long Lane. Long Lane is constructed after the first, but is broadly contemporary with the second circuit at The Trundle, whilst the long barrow, Bevis Thumb, appears to be constructed after the final phase of construction at The Trundle (Fig.15, p.80 above). The cost modelling (Fig.22 p.103 below) also suggests that the relationship between the enclosures and

the barrows is weak. Long barrows appear to be preferentially located in areas that are difficult to access, in cost distance terms, from the causewayed enclosures. It may be significant that of the 81 known long barrows along the Downs only five lie within the MiCDA (Table 5, p.90), and the closest barrows to The Trundle are those at Blackbush Copse which lie some 5.5km to the west.

The location of flint mines is driven by factors that must include geology. Nevertheless, the model suggests a similar pattern of disassociation for the known flint mines in Sussex. Here again the model reports that all the flint mines, with the exception of two at Stoke Down (certain) and Long Down (certain) lie beyond the visible areas (Fig.21, p.102).

The visibility, and cost distance models for The Trundle exhibit similar characteristics, which is not necessarily to be expected. Both models suggest a greater affinity with the coastal plains to the south than with the Wealden Clay deposits that dominate the areas to the north beyond the immediate chalk downland. Whilst the chalk hills provide an obvious visual screen, it is these hills coupled with the preponderance of waterways running west to east in the model that increase the cost per unit distance and restrict the catchment in this direction. Interestingly the orientation of the enclosure is opposite to the dominant visibility and cost areas, again possibly suggesting a form of physical detachment of the monument from its immediate environs.

Analysis of the geology in the MeCDA's (Fig.23, p.104 and Table 7, p.145) suggests that the predominant superficial geology comprises the free-draining sand, silts and gravels of the alluvial and head deposits across the southern plain. However, these soils make up only 1.5% the total area defined in the

model as within the MeCDA boundary. Other notable geologies include 889736H of chalk and 8738H of clay-with-flint (for Court Hill) spread along the chalk in 30 discrete locations. The clay-with-flint is notable in that nearly all (>95%) of it is located beyond the MeCDA and only Halnaker Hill enjoys any local source of clay-with-flint.

The distribution of ‘possible’ early Neolithic find spots around The Trundle, and the other enclosures in the western cluster, exhibits a distinct pattern (Fig.22, p.103 and summarised in Table 5, p.90).

The Trundle	MiCDA	MeCDA	MaCDA
Causewayed enclosures	3	3	3
Long barrows	5	9	18
Settlement habitation	4	10	10
Leaf-shaped arrowheads	6	21	26
Fully polished axes	33	65	108
Other EN lithics	2	10	13
Flint mines	2	7	9
Court Hill	MiCDA	MeCDA	MaCDA
Causewayed enclosures	3	3	3
Long barrows	4	9	18
Settlement habitation	4	10	10
Leaf-shaped arrowheads	7	20	27
Fully polished axes	33	66	108
Other EN lithics	1	10	13
Flint mines	2	5	9
Halnaker Hill	MiCDA	MeCDA	MaCDA
Causewayed enclosures	3	3	3
Long barrows	1	9	17
Settlement habitation	4	6	10
Leaf-shaped arrowheads	6	18	27
Fully polished axes	28	61	105
Other EN lithics	3	11	14
Flint mines	2	8	9
Barkhale Camp	MiCDA	MeCDA	MaCDA
Causewayed enclosures	3	3	4
Long barrows	1	6	15
Settlement habitation	3	4	10
Leaf-shaped arrowheads	6	15	38
Fully polished axes	19	60	107
Other EN lithics	4	11	13
Flint mines	2	8	9

Table 5. Distribution of early Neolithic indicators in the western group of enclosures.

The models define the recorded early Neolithic archaeology within the boundaries defined by the cost distance areas. A close correspondence between the enclosures is unsurprising due to their close spatial proximity. Polished axes appear randomly distributed throughout the models, though less dense concentrations occur to the south and east of the MaCDA. Habitation areas (excluding the axe production site at 471540, 115,850 SMRM26803) are exclusively to the south, whilst the long barrows (with the single exception of Bevis Tomb) lie to the west.

Source: Author

The four known pit sites within the MiCDA positively identified as early Neolithic (Chadwick, 2004) and six additional within the MeCDA (Stevens, 2001, & West Sussex HER Nos. 8575 & 9994) all lie at some distance from the enclosure. All in the MiCDA are to the south of The Trundle and lie beyond 4.5km, whilst the additional six habitation sites in the MeCDA lie at least 16.8km to the west and beyond the viewable area. This may suggest a degree of purposeful separation between area of daily activity and the causewayed enclosure.

Within the MeCDA, and again, all to the south of The Trundle, are a total of 18 separate locations recorded as find spots for polished axes in the West Sussex (Chichester) HER, and a further two recorded in the NMR. There are a further two recorded in the HER to the north of The Trundle within the MaCDA boundary

Miscellaneous lithics, mainly scrapers and blades, positively identified as early Neolithic (Place, 1993; Kenyon, 1997; Hillier, 2001; Valentin, 2004; Whittaker, 2008; Clarke, 2009; Priestley-Bell & Rayner, 2009), are predominantly strung in a cluster along the coastal plain on the southern edge of the MeCDA, with a further one (Matthews, 2000) recorded within the MaCDA and an isolated example southwest of The Trundle at Nutbourne (478164, 105565). Again, these are at some distance from the enclosure and (excepting the Nutbourne example) are outside the viewable range.

Leaf-shaped arrowheads are represented by 26 examples which appear randomly distributed. Although six are located within the MiCDA, five are on the boundary and none are within 6.2km of the enclosure.

Court Hill

Court Hill is a relatively small (2.87H), simple, single-circuit enclosure located on a spur of the Upper (Seaford) Chalk formation (Fig.26, p.107). The monument overlooks the upper reaches of the River Lavant which now rises in East Dean and runs east to west at the base of the chalk scarp. This river, now diverted westward following the Roman development of Chichester, originally drained into the English Channel at Pagham. A second crescent-shaped earthwork lies 30m to the north of the enclosure which though undated, has a morphology that suggests a broadly contemporary date. This feature has been variously described as a possible boundary for settlement activity (Bedwin, 1984, 19) or an unfinished second causewayed enclosure (Russell, 2001, 16).

Court Hill, in common with other enclosures, has the appearance of a construction that has been purposefully created to facilitate a particular visual characteristic. The enclosure does not occupy the highest ground, which lies only 250m to the northeast, resulting in the enclosure being overlooked by adjacent land some 8m higher in elevation. The earthwork has a distinct orientation towards the west (Fig.174, p.432). Three kilometres to the north the ground is 50m higher than the elevation chosen for the enclosure, and an enclosure located here would have enjoyed much more extensive views. The chosen location results in Court Hill being only intervisible with The Trundle and hidden from the other enclosures of the West Sussex group (Fig.177, p.438).

The limited viewshed from Court Hill is indicated in the model (Fig.24, 105). Views across the fertile alluvial plains to the north are interrupted by the main body of the South Downs which, at some three kilometres distance, is up to

20m higher than the elevation of the enclosure. Views to the south are interrupted by the chalk spur running from Barkhale Camp to the Trundle which although lower in elevation, is sufficiently high as to interrupt the view across the important coastal plain. Two probably insignificant exceptions are two small areas around modern Bognor Regis and Atherington, and a very small area at the extreme limit of view, towards Hayling Island.

As with the Trundle, other early Neolithic monuments are outside of the field of view available from Court Hill (Fig.24, p.105)

Court Hill has the most limited viewshed of all the enclosures in the Sussex group yet may be an early established enclosure, which could have been located on higher ground, both very locally, or more distantly. It is an example of an enclosure that, despite its 'tilting' on the landscape, does not enjoy distant views, reinforcing the notion that in this case at least, visibility to or from the enclosure was not a prime determinant in deciding on its location. The enclosure is not visible from the River Lavant, with which it appears to be spatially related.

The chronological relationship with the other enclosures remains difficult to establish with certainty. The Bayesian model suggested by Whittle et al. (2011, 251) places the construction of Court Hill ((3650-3530 cal BC, at 95% probability), (3640–3620 cal BC, at 19% probability)) within the range of dates offered for construction of The Trundle inner ditch (Table 8, p.150) though possibly very slightly later than the continuous ditched enclosure at Bury Hill ((3775–3650 cal BC, 95% probability), (3760-3740 cal BC, 7% probability)) just east of Barkdale Camp (Whittle *et al.*, 2011, fig. 5.31). The spatial and

chronological proximity make it difficult to assess whether the four enclosures of the western sub-group were in contemporary or sequential use, or if one enclosure became dominant at the expense of one of the others.

The cost distance area is, reflecting its geographical proximity, very similar to that of the Trundle.

The MaCDA for Court Hill (Fig.25, p.106) reflects the difficult topography in the immediate environs surrounding the enclosure. There are steep ascents, particularly from the south, east and western approaches which are reflected in the model, and which, coupled with the effort required to cross adjacent watercourses (now dry coombes), serve to constrain the cost distance area to the east and to the west. As with the other enclosures of the western cluster, the MiCDA extends to the south coast and includes the flat low-lying areas beyond modern Chichester towards Selsea. It is notable, however, that there are very limited views from Court Hill over any of this area and those that the model reports as in-view are restricted to the immediate area of Downs on which the hill is situated. Court Hill is very much 'hidden' in its landscape.

The geological context of Court Hill is unsurprisingly very similar to that of The Trundle (Table 7, p145). The clay-with-flint areas, particularly exploited in the Mesolithic are essentially the same deposits as those associated with The Trundle and with the other western group enclosures.

The similarity of the Court Hill Cost Distance Areas to those of The Trundle also results in the model reporting that many of the same artefacts may be associated with this enclosure. However some interesting patterns arise.

The pits previously noted all lie within the MeCDA, though at a greater distance from Court Hill than they were from The Trundle, perhaps suggesting that this habitative area is more likely to be firstly associated with the Trundle than with Court Hill. The model reports 108 polished axe find spots, of which 66 are within the MeCDA and 33 within the MiCDA. The distribution shows a distinct clustering on the Selsea peninsula and along the coastal plain area. The distribution of early Neolithic lithic and ceramic reflect a similar pattern with only two of the thirteen recorded find spots being away from the coastal fringe. The distribution of leaf-shaped arrowheads, however, is more random with no discernible pattern of distribution.

Overall the distribution may be suggestive of a coastal-orientated settlement with hunting excursions into what is now the southern Wealden area. Such a hypothesis would place the two enclosures not as a central place within a greater tribal territory, nor on the boundary between two or more territories. Instead, the model raises the possibility that although the enclosures were located away from areas of settlement, they were within the 'territory' associated with that settlement. Furthermore, they were located in areas that were repeatedly passed by those engaged in hunting or the gathering of seasonal foods. Such a hypothesis might be supported by the existence of the flint extraction industries and the location of the long barrows.

Halnaker Hill

Halnaker Hill is a small (2.13ha) enclosure that lies on a pedestal-spur of the Tarrant Chalk, to the south of the main range of the South Downs (Fig.29,

p.110). The chalk, at this location, is capped with a significant deposit of clay-with-flint and it is this impermeable deposit, protecting the underlying chalk, which accounts for the isolated, elevated chalk massif. Halnaker Hill is unique amongst the Sussex enclosures in being located on this geology, though Hambledon Hill (Dors) is another example. No compensation is made in the model for a reduction in the elevation of the enclosure through chalk solution loss. The enclosure is bounded on the east and west sides by steep coombs which reflect in the model as having at their base slight streams, draining the main range of the chalk Downs past Halnaker Hill and towards the south.

The enclosure is almost centrally located on the hilltop. Although a slight tilt to the east is apparent, there is only a two-metre difference in elevation (Fig.19, p.97) between the eastern and western flanks, which, across an enclosure diameter of 170m, may suggest that unlike The Trundle or Court Hill, this characteristic was not a factor in siting this enclosure.

At 128m AOD Halnaker Hill is at a significantly lower elevation than The Trundle at 205m. Nevertheless, the model returns a very similar visual characteristic and the fuzzy viewshed (Fig. 27, p.108) covers much the same area. Like The Trundle, the views to the north are interrupted by the higher grounds of the main range of the Downs, whereas the views to the south, southeast and southwest, over the low, flat coastal plains are extensive. The long barrow ‘Bevis Grave’, 23km to the west is on the boundary of visual contact, whilst all other long barrows are outside the bounds of the fuzzy viewshed generated by the model (Fig. 27, p.108). The adjacent flint mine at Long Down 1.1km to the west is visible, as is the flint mine at Stoke Down 8km to the west. Both of these are characteristics shared with The Trundle.

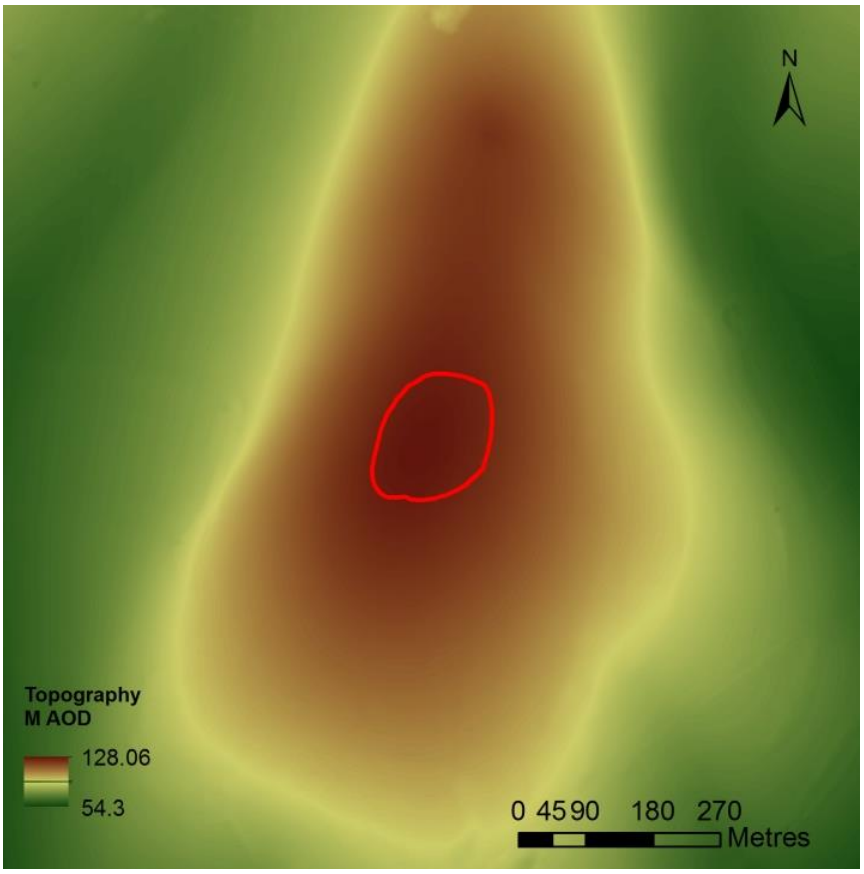


Figure:19 Topography around Halnaker Hill.

The enclosure has been affected by significant modern development and is now the site of a disused windmill. Remnant earthworks of an earlier mill, a miller's house and WW2 searchlight positions are also apparent. A possible long barrow 100m southwest of the enclosure has been discredited as a modern feature.

Source: Author

Spatial data: 1 metre Lidar data from Geomatics – The Environment Agency

Like The Trundle, the cost distance areas associated with Halnaker Hill (Fig. 28, p.109) are limited to the north by the main range of the South Downs which requires a significant expenditure of energy to transgress. However, the anisotropic model does indicate that the more westerly Halnaker Hill has a greater potential to exploit the alluvial plains to the north as a result of its reduced elevation. This is particularly evident in the northern extent of the MeCDA associated with the alluvial plains of the rivers Arun and Adur to the east.

The closer association with the two rivers may be an important factor in the location of the Halnaker enclosure. The waterways, which may have been navigable, could have provided easier access to and from upstream locations within what is now the Weald. Halnaker is better able to exploit the fertile river silts than, for example, The Trundle, or conversely, is more accessible to a society exploiting those areas.

Excepting that the enclosure is located on an isolated deposit of clay-with-flint, the geological context of Halnaker Hill is broadly similar to that of The Trundle.

The records show a single find of a polished stone axe, from an otherwise Romano-British context, 1.2km to the south of the enclosure and well within the MiCDA. There are a total of 105 examples of polished stone axes recorded with the MaCDA (Fig.28, p.109) of which 61 are within the MeCDA and the clustering to the southwest towards modern Selsey and towards Worthing in the southeast is previously noted for the other enclosures. There are 27 leaf-shaped arrowheads recorded in the MaCDA and as previously noted these lie mainly on the alluvial soils to the north of the South Downs. The pits noted

previously as possibly associated with The Trundle are also proximate to Halnaker Hill. All lie in a cluster to the southwest within the area defined by the MiCDA, with one at Claypit Lane (Chadwick, 2004) within five kilometres, two within seven kilometres (Stevens, 2001, & W. Sussex HER) and one within 9 kilometres (W. Sussex HER).

Barkhale Camp

The 3.07ha single circuit ovoid enclosure at Barkhale Camp (Fig.20, p.100) is the most easterly of the western sub-group and is defined by 13 segments of ditch, many of which, on the north side of a public right of way that bisects the enclosure, are still evident as extant earthworks. A remnant internal bank also survives and Barkhale is an unusual example of an enclosure wherein the internal bank segments have dimensions that exactly correspond to the dimensions of the corresponding segmented ditches. Knap Hill (Wilts) being the only other known example (Oswald *et al.*, 2001, 43-44).

The enclosure lies on the main range of the South Downs, 2.7km west of a cut in the Downs where the chalk has been breached and eroded by the river Arun. In an east to west direction, the enclosure is broadly level, but it displays a 10m tilt to the south in the direction of the southern coastal plane, over which it enjoys substantial views.

Despite excavation by Ryle in 1930, then by Seton-Williams who between 1958-61 excavated 20 narrow trenches (Leach, 1983, 11-22), followed by a

limited excavation by Leach in 1978 (Leach, 1983, 22-30), there is no material suitable for radiocarbon dating.

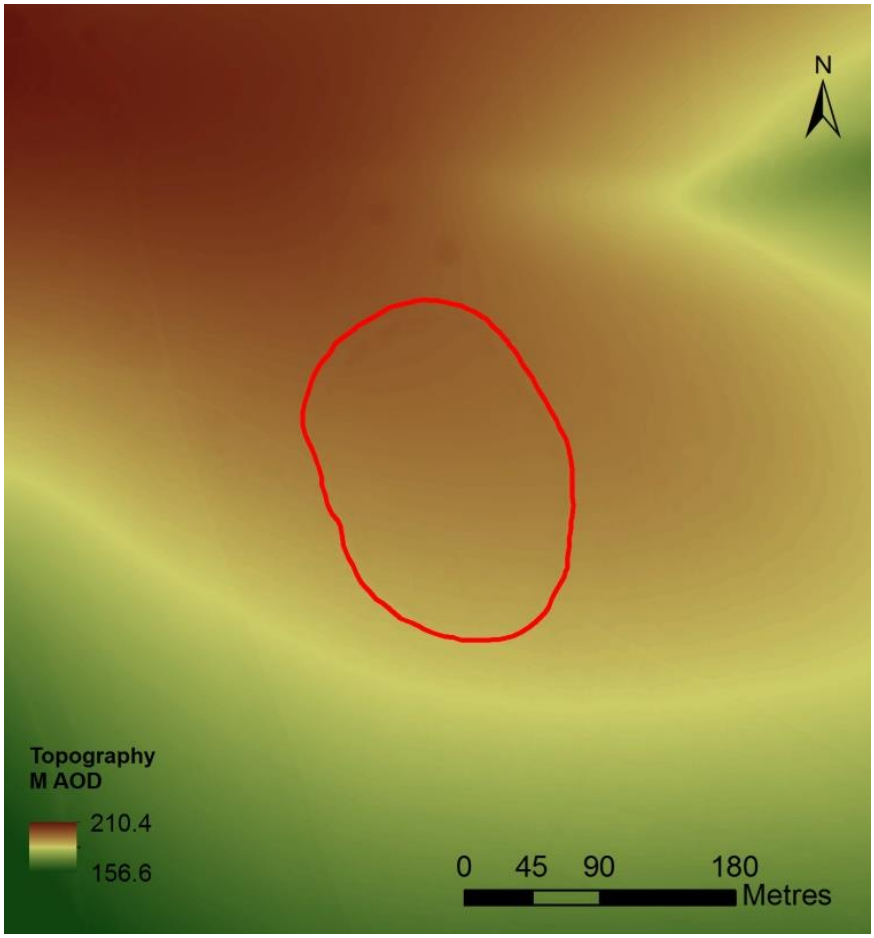


Figure 20: Topography around Barkhale Camp.

Spatial data: 1 metre Lidar data from Geomatics – The Environment Agency.

Views from the enclosure are unusual. The highest point of the enclosure lies to the north. In the near distance, views are very restricted by the rising ground to the north and to the west, whilst to the east visibility is restricted by the higher ground some 2.5km distance and to the south the topography ensures a view restricted by the falling ground beyond the enclosure and then a ridge at five kilometres distance. Beyond this ridge, views towards the south coast exist

(Figure 30, p.111) from a south westerly to a south easterly perspective. The topography ensures that the views are very affected by vegetation and today the plantation of trees to the south of the enclosure prevents any view beyond the enclosure in the southerly direction. The model reports that both Halnaker Hill and The Trundle are intervisible with Barkhale Camp which would reflect conditions on the ground if the thin strip of vegetation south of the Barkhale enclosure were removed.

The Barkhale enclosure is situated on an elevated broad plateau just to the south of the highest ground that forms the ridge of the South Downs. The maximum elevation within the enclosure is 200m AOD and the maximum of the ridge at this point on the Downs is 230m AOD. This relatively flat plateau results in a large MiCDA for Barkhale which, combined with the easterly position relative to the other enclosures of the western cluster, also results in the MaCDA including the causewayed enclosure at Whitehawk Camp.

Beyond the MiCDA, the catchments fall into two distinct areas (Fig.31, p.112). To the south the CDAs are similar to The Trundle, Court Hill and Halnaker Hill, and extend over the coastal plain to the south coast. There is a small excursion into the north associated with the flood plains of the river Arun. To the north the MaCDA extends into the Weald. The geology is consistent with the other enclosures and the main components comprise: chalk, 8401097ha, clay-with-flint, 19107ha, clays, 3314107ha, gravels, 146581ha, sands and sandy silts, 69721ha. The fertile alluvial soils comprise 65803ha. (Table 7, p.145 & Fig. 32, p.113).

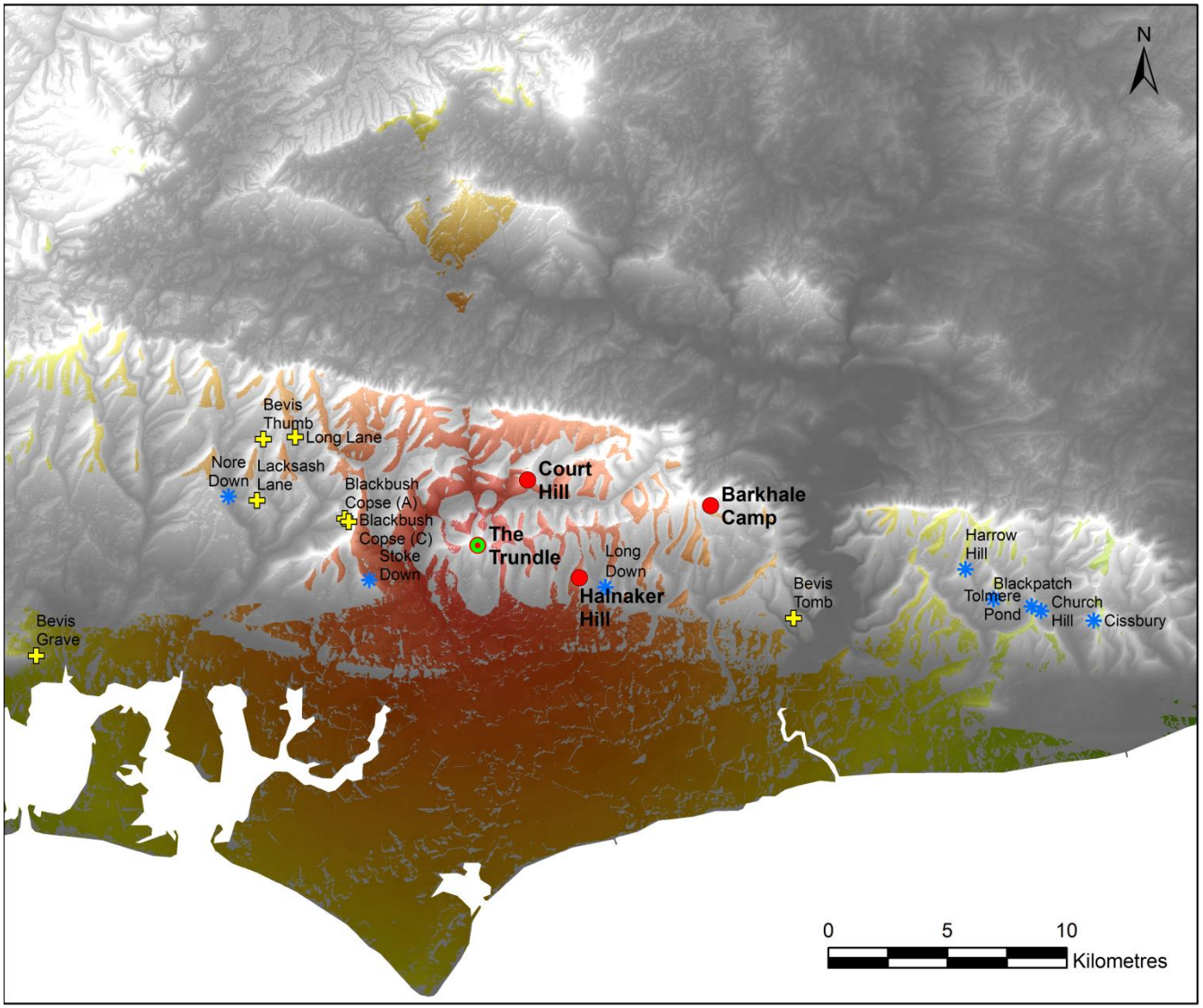


Figure 21: Views from The Trundle.

The model estimates the maximum potential extent of any views to and from The Trundle enclosure, with a decaying visibility index function based on increasing Euclidean distance from the origin.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

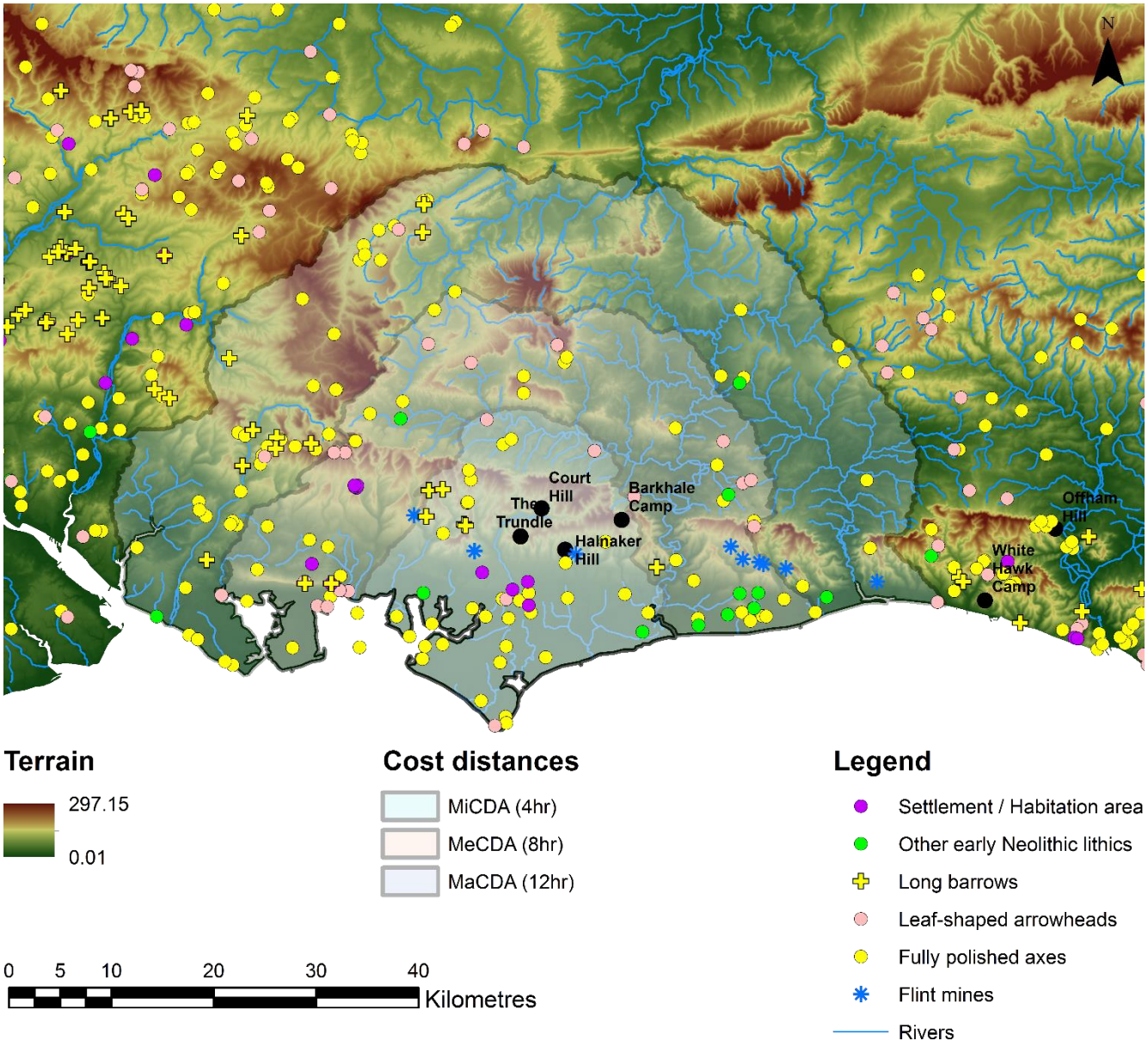


Figure 22: The Trundle cost models

The model estimates the degree of access to The Trundle, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined. The models show The Trundle to be accessible from the coast and from three other enclosures, within four hours, whilst the enclosures of the East Sussex group lie beyond the MaCDA boundary and are hence considered beyond a twelve hour journey time.
Of note also are the number of proximate long barrows, particularly to the west, whilst the concentration of habitation appears to be to the south.

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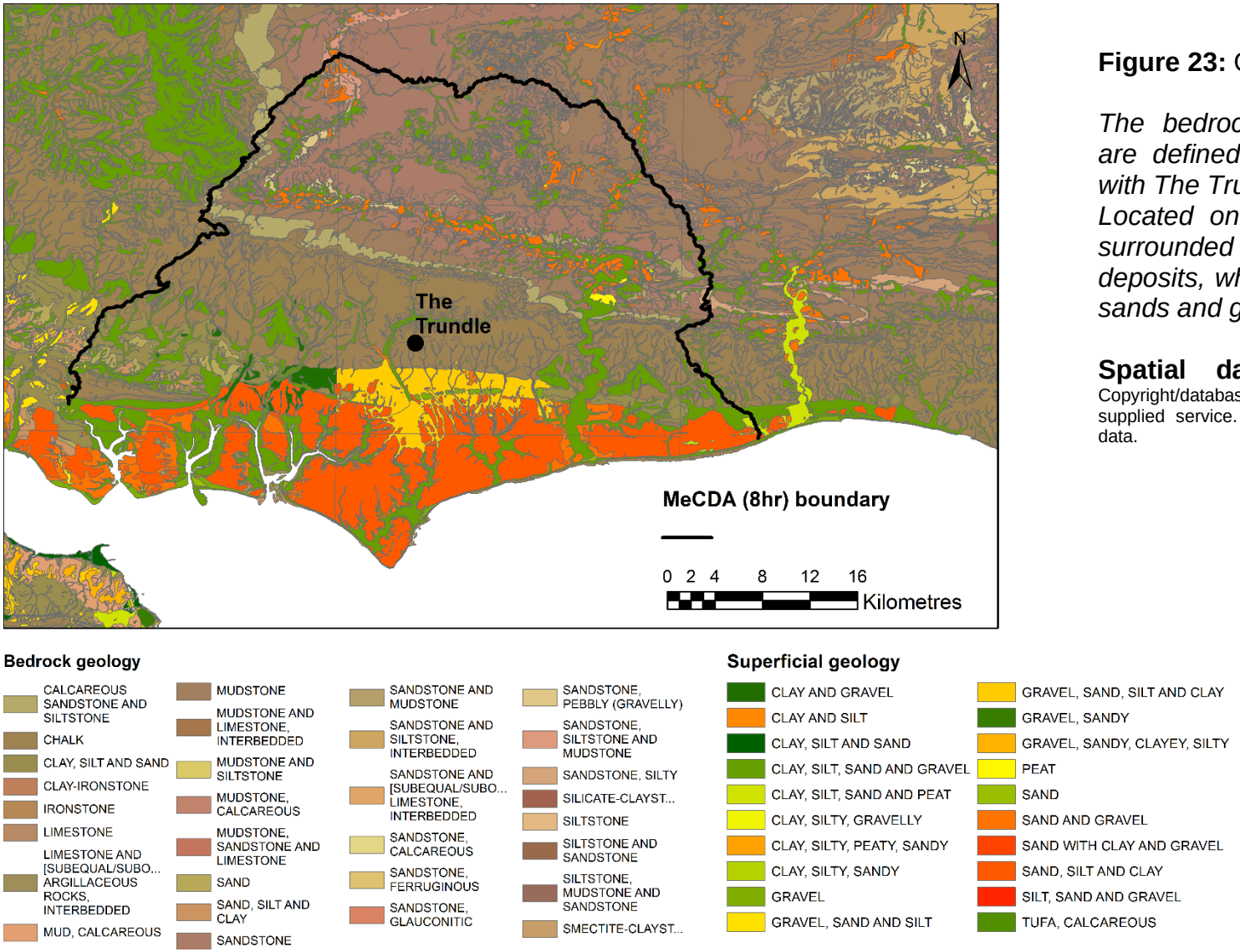


Figure 23: Geology around The Trundle.

The bedrock and superficial geologies are defined for the MeCDA associated with The Trundle.
Located on the chalk the enclosure is surrounded on all sides by fluvial deposits, whilst to the south are the silts, sands and gravels of the coastal plain.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service. Geological data by BGS 1-50000 series data.

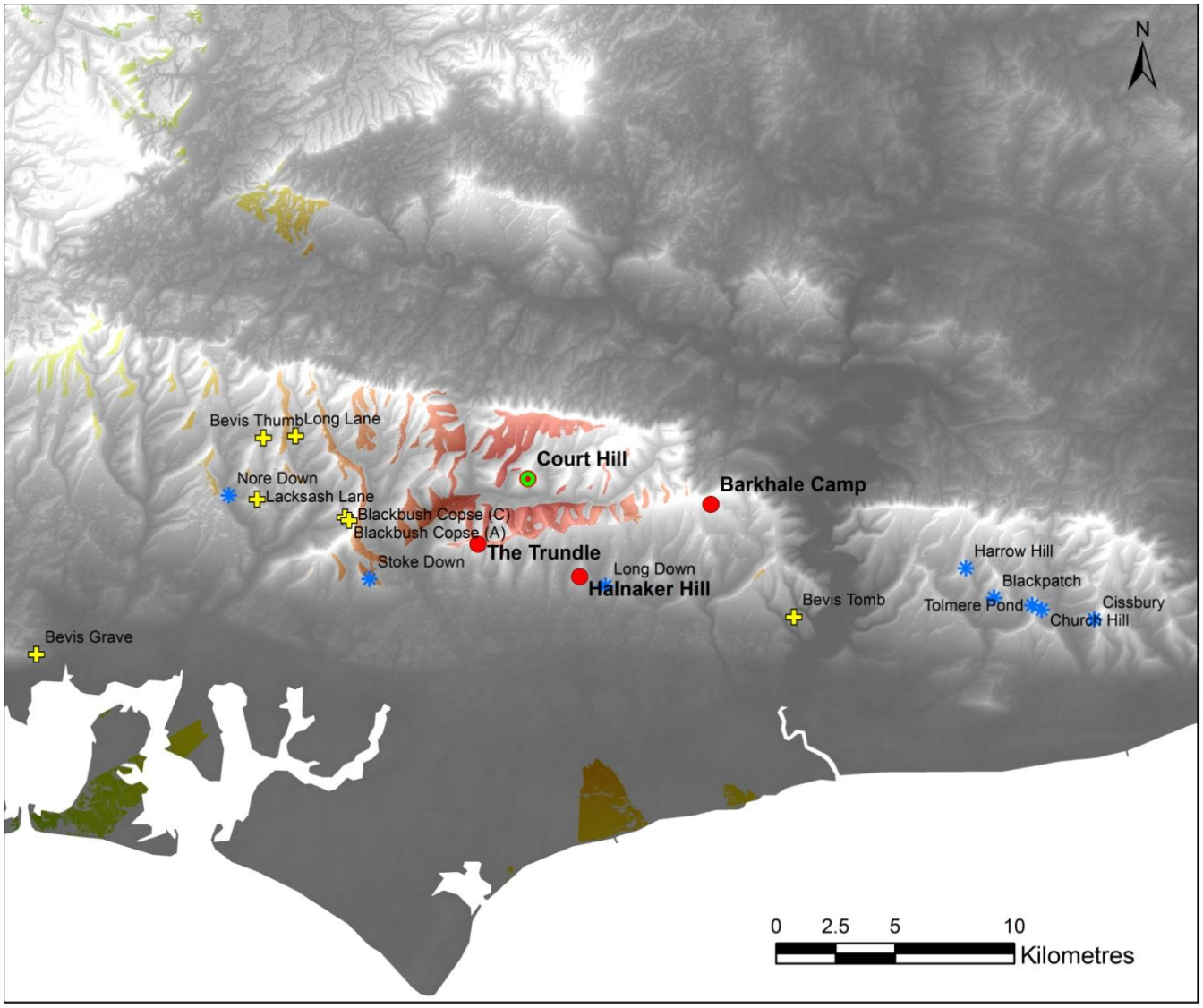


Figure 24: Views from Court Hill

The model estimates the maximum potential extent of any views to and from the Court Hill enclosure, with a decaying visibility index function based on increasing Euclidean distance from the origin.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

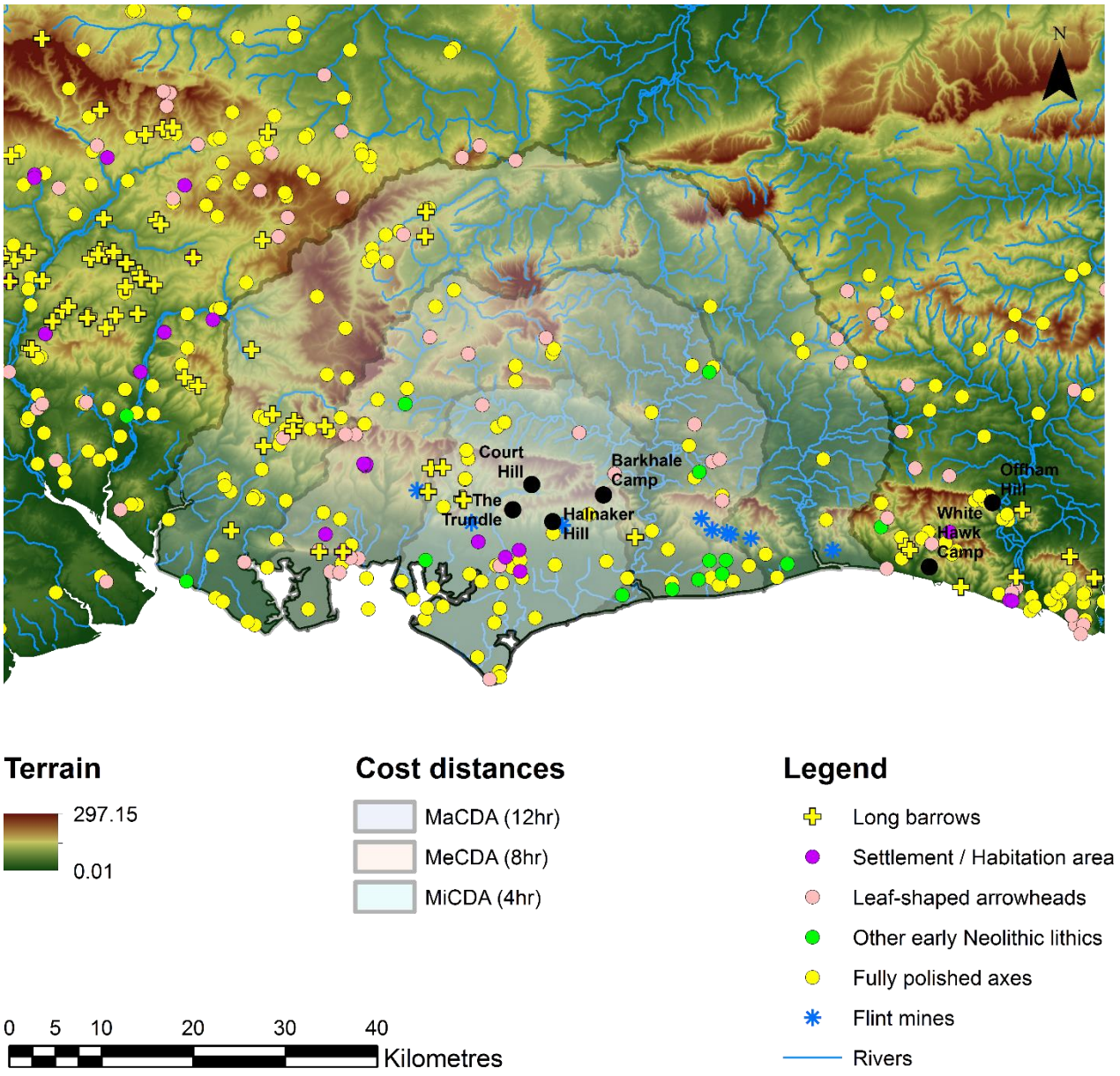


Figure 25: Court Hill cost models

The model estimates the degree of access to Court Hill, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.
Court Hill exhibits very similar characteristics to The Trundle with an extended north-south axis reflecting the ease of passage across the flat plains to the south and north of the South Downs range. The causewayed enclosures of the East Sussex group lie outside the maximum extent of the MaCDA

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

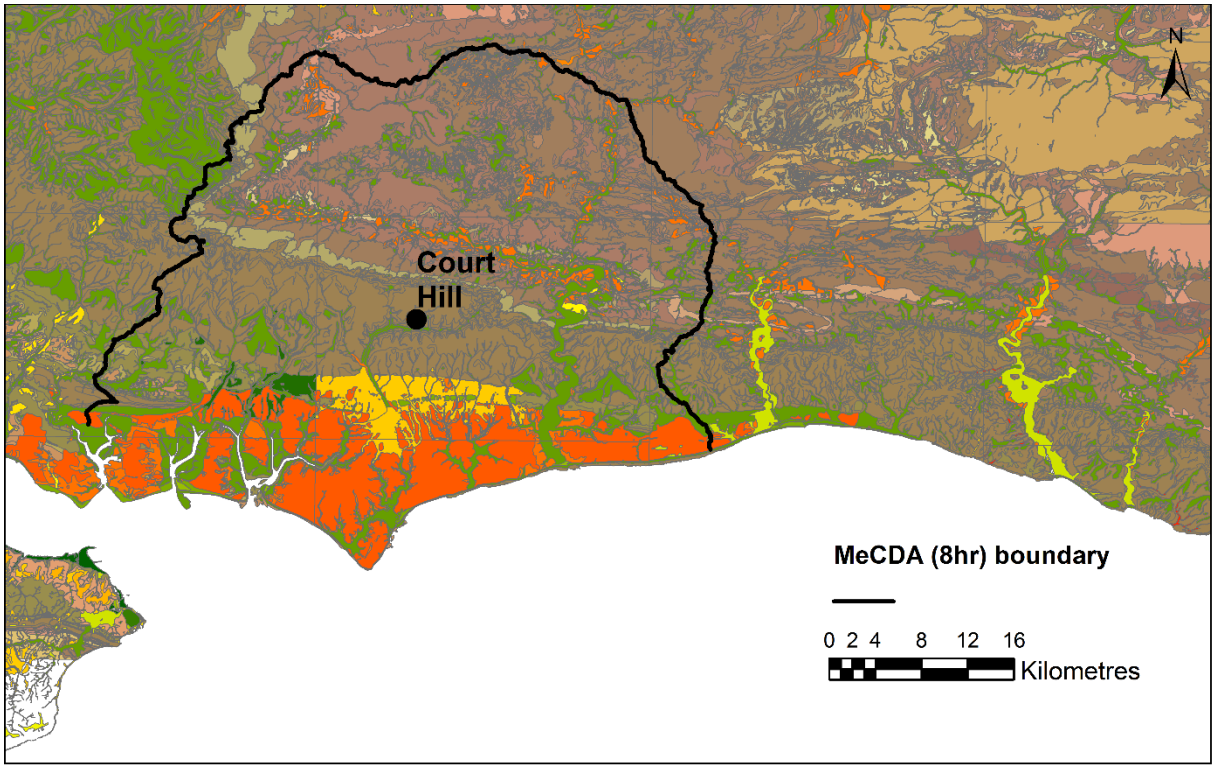


Figure 26: Geology around Court Hill.

The bedrock and superficial geologies are defined for the MeCDA associated with Court Hill.
In common with all the West Sussex enclosures (though see Halnaker Hill) Court Hill lies in the only area of the chalk devoid of any clay-with-flint deposits. The nearest patchy deposits are 6km to the west. 5km to the south (on which the enclosure at Halnaker Hill is situated) and 10km to the east. Most of the substantial deposits of clay-with-flint lie directly outside the MeCDA boundary.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service. Geological data by BGS 1-50000 series

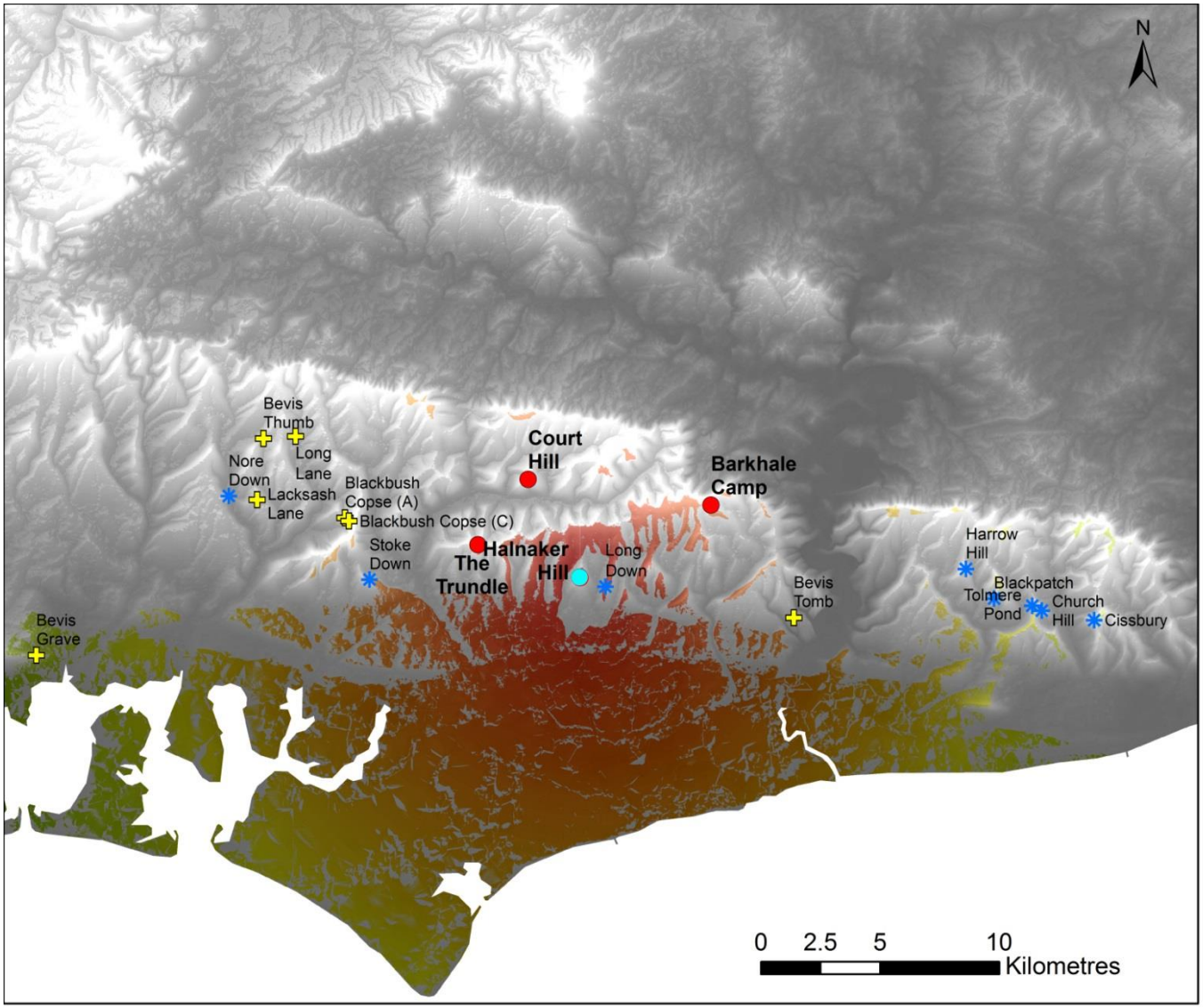


Figure 27: Views from Halnaker Hill.

The model estimates the maximum potential extent of any views to and from the Halnaker Hill enclosure, with a decaying visibility index function based on increasing Euclidean distance from the origin.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

West Sussex

- Highest area within Halnaker Hill
- Longbarrows
- Flint mines
- Enclosures

Terrain
Metres AOD

High : 281

Low : 0

Fuzzy viewshed
Distance decay function

High : 1

Low : 0

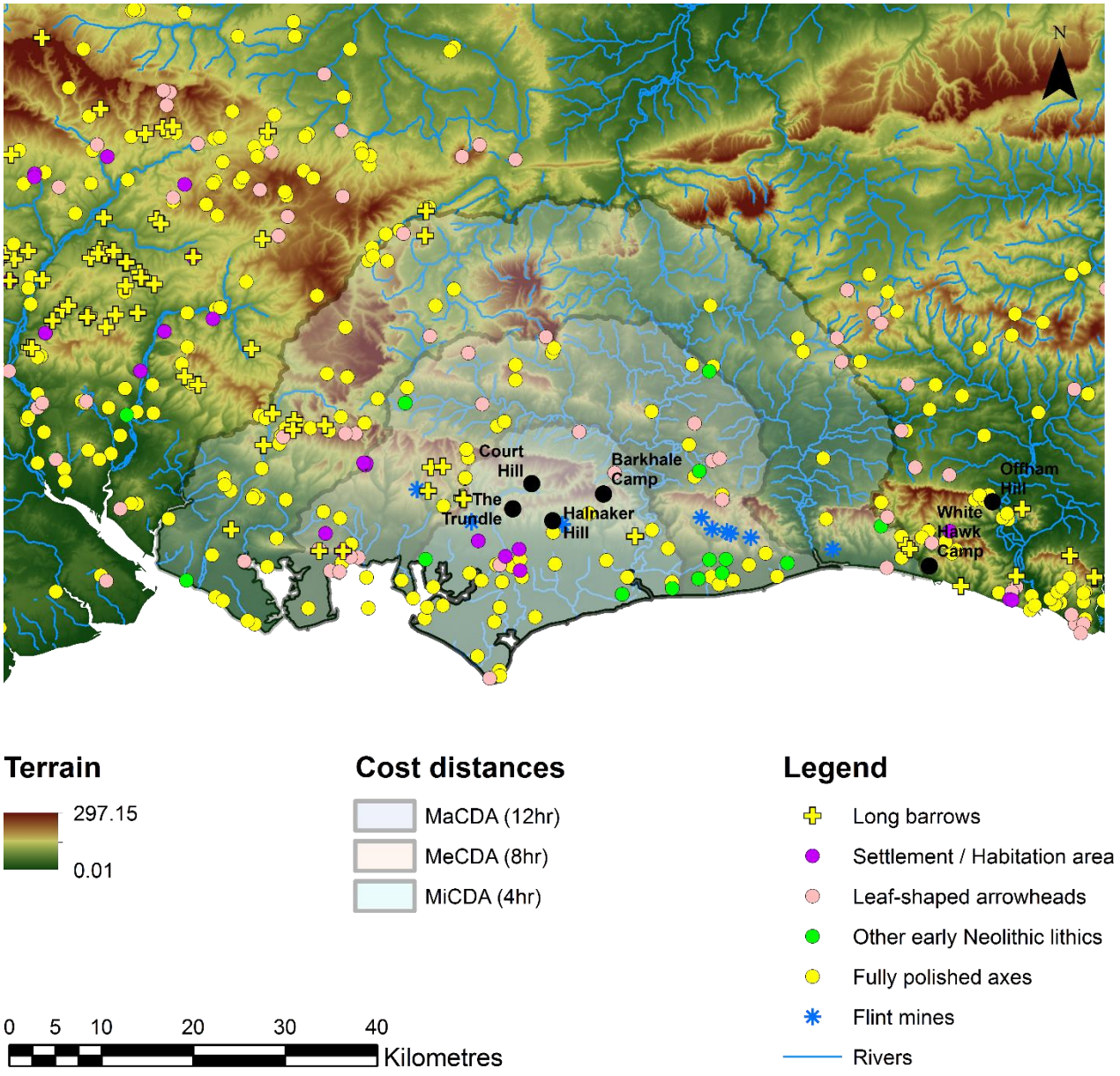


Figure 28: Halnaker Hill cost models.

The model estimates the degree of access to Halnaker Hill, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.
Halnaker Hill lies 10.8km from the nearest point of the modern line of the south coast and 1.12km from the Long Down flint mines. The early Neolithic pits in the Chichester and Lavant regions range from 5.8km to 8.2km distant and are thus within the MiCDA.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

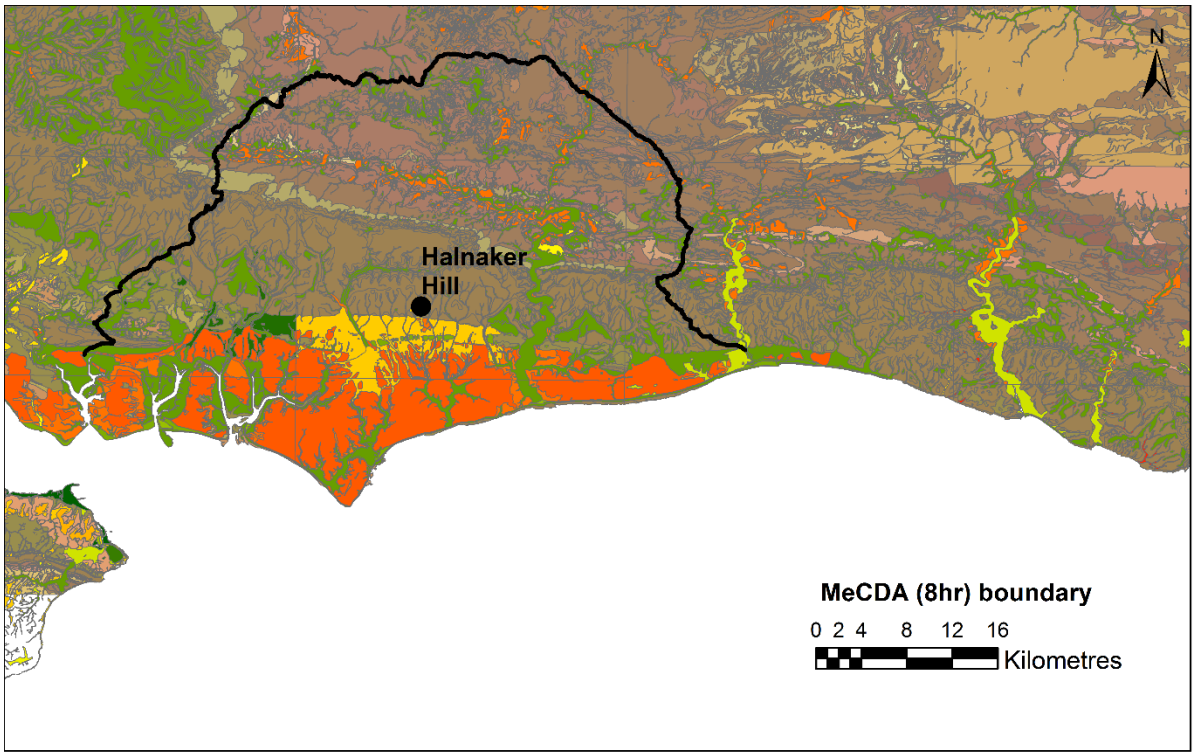


Figure 29: Geology around Halnaker Hill.

The bedrock and superficial geologies are defined for the MeCDA associated with Halnaker Hill.
The enclosure lies on a very small isolated deposit of clay-with-flint that caps the hill and may account for its local prominence. The general area is otherwise unusual for the lack of such deposits. The nearest patchy deposits are 9.5km to the west and 6km to the east. Most of the substantial deposits of clay-with-flint lie directly outside the MeCDA boundary. At the base of the chalk, 1.1km to the south east is the Long Down flint mine

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service. Geological data by BGS 1-50000 series data.

Bedrock geology

- CALCAREOUS SANDSTONE AND SILTSTONE
- CHALK
- CLAY, SILT AND SAND
- CLAY-IRONSTONE
- IRONSTONE
- LIMESTONE
- LIMESTONE AND [SUBEQUAL/SUBO... ARGILLACEOUS ROCKS, INTERBEDDED
- MUD, CALCAREOUS
- MUDSTONE
- MUDSTONE AND LIMESTONE, INTERBEDDED
- MUDSTONE AND SILTSTONE
- MUDSTONE, CALCAREOUS
- MUDSTONE, SANDSTONE AND LIMESTONE
- SAND
- SAND, SILT AND CLAY
- SANDSTONE
- SANDSTONE AND MUDSTONE
- SANDSTONE AND SILTSTONE, INTERBEDDED
- SANDSTONE AND [SUBEQUAL/SUBO... LIMESTONE, INTERBEDDED
- SANDSTONE, CALCAREOUS
- SANDSTONE, FERRUGINOUS
- SANDSTONE, GLAUCONITIC
- SANDSTONE, PEBBLY (GRAVELLY)
- SANDSTONE, SILTSTONE AND MUDSTONE
- SANDSTONE, SILTY
- SILICATE-CLAYST...
- SILTSTONE
- SILTSTONE AND SANDSTONE
- SILTSTONE, MUDSTONE AND SANDSTONE
- SMECTITE-CLAYST...

Superficial geology

- CLAY AND GRAVEL
- CLAY AND SILT
- CLAY, SILT AND SAND
- CLAY, SILT, SAND AND GRAVEL
- CLAY, SILT, SAND AND PEAT
- CLAY, SILTY, GRAVELLY
- CLAY, SILTY, PEATY, SANDY
- CLAY, SILTY, SANDY
- GRAVEL
- GRAVEL, SAND AND SILT
- GRAVEL, SAND, SILT AND CLAY
- GRAVEL, SANDY
- GRAVEL, SANDY, CLAYEY, SILTY
- PEAT
- SAND
- SAND AND GRAVEL
- SAND WITH CLAY AND GRAVEL
- SAND, SILT AND CLAY
- SILT, SAND AND GRAVEL
- TUFA, CALCAREOUS

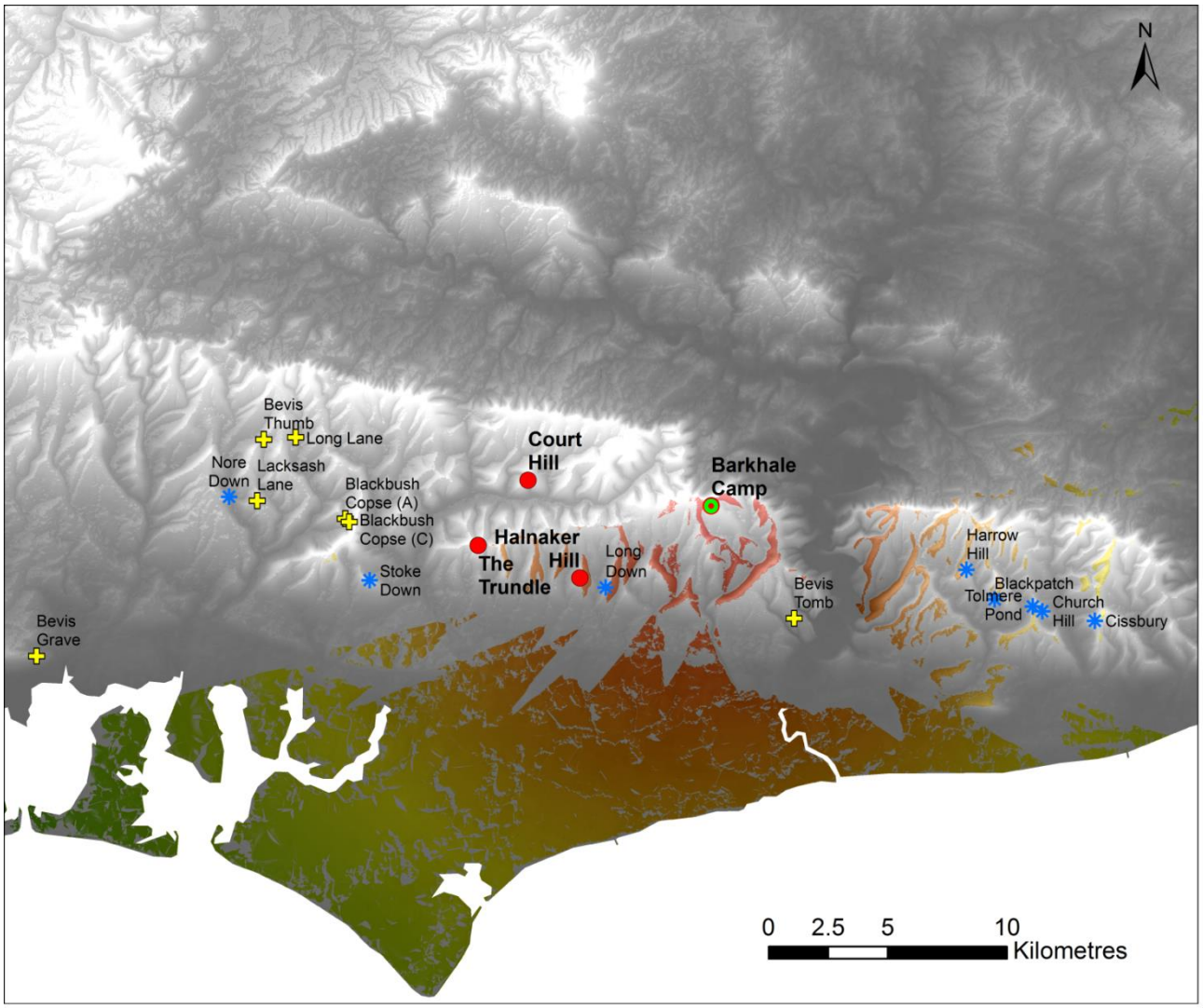


Figure 30: Views from Barkhale Camp.

The model estimates the maximum potential extent of any views to and from the Barkhale Camp enclosure, with a decaying visibility index function based on increasing Euclidean distance from the origin.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

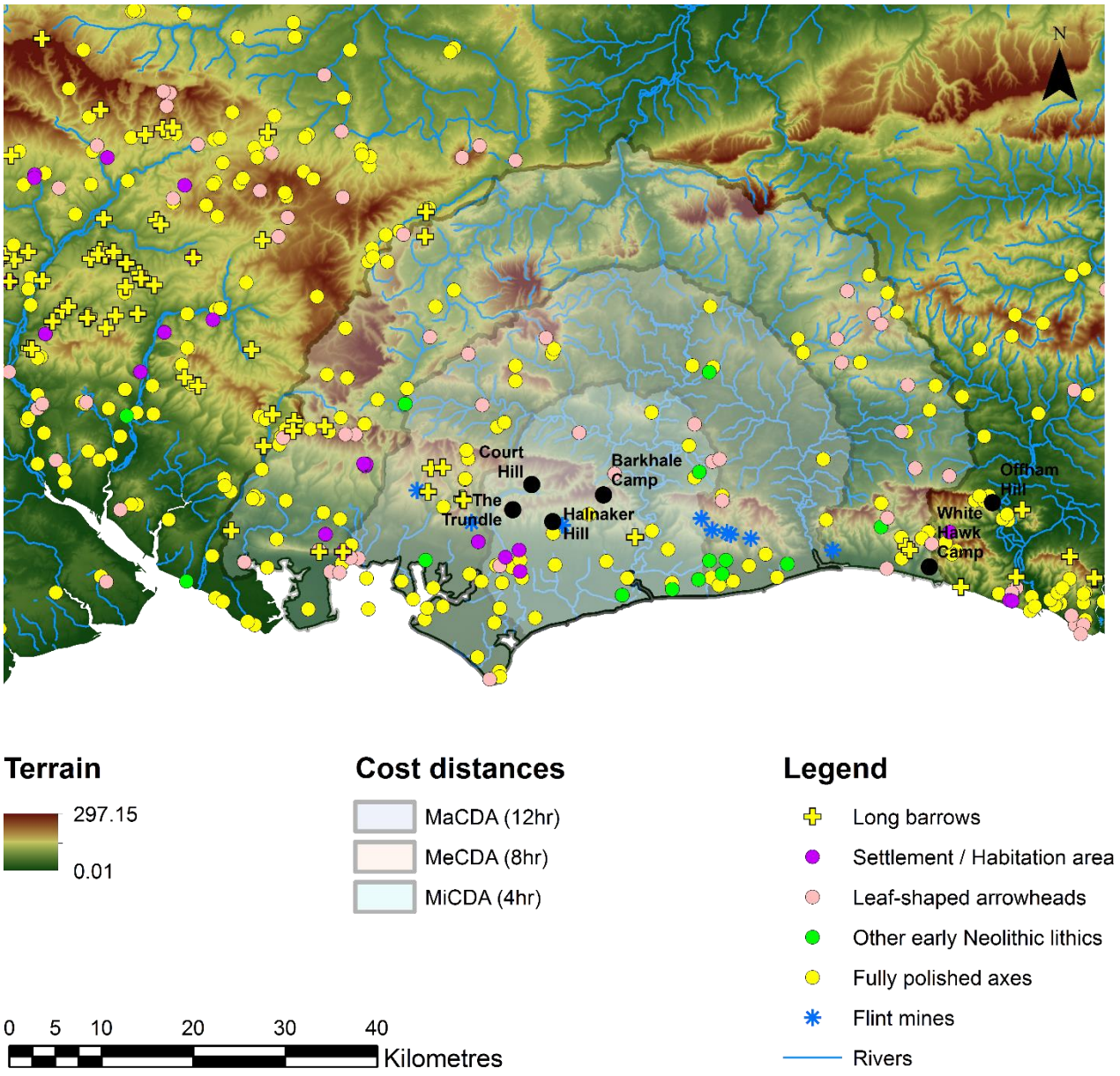


Figure 31: Barkhale Camp cost models.

The model estimates the degree of access to Barkhale Camp, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.
Halnaker Hill lies 10.8km from the nearest Although Barkhale Camp is the most easterly of the West Sussex cluster, the enclosures of the East Sussex cluster are still just beyond the maximum extent of the Barkhale Camp MaCDA. All the enclosures of the West Sussex group lie within the boundary defined by the MaCDA and the model therefore suggests that Barkhale Camp can be reached in less than four hours journey time from these enclosures

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

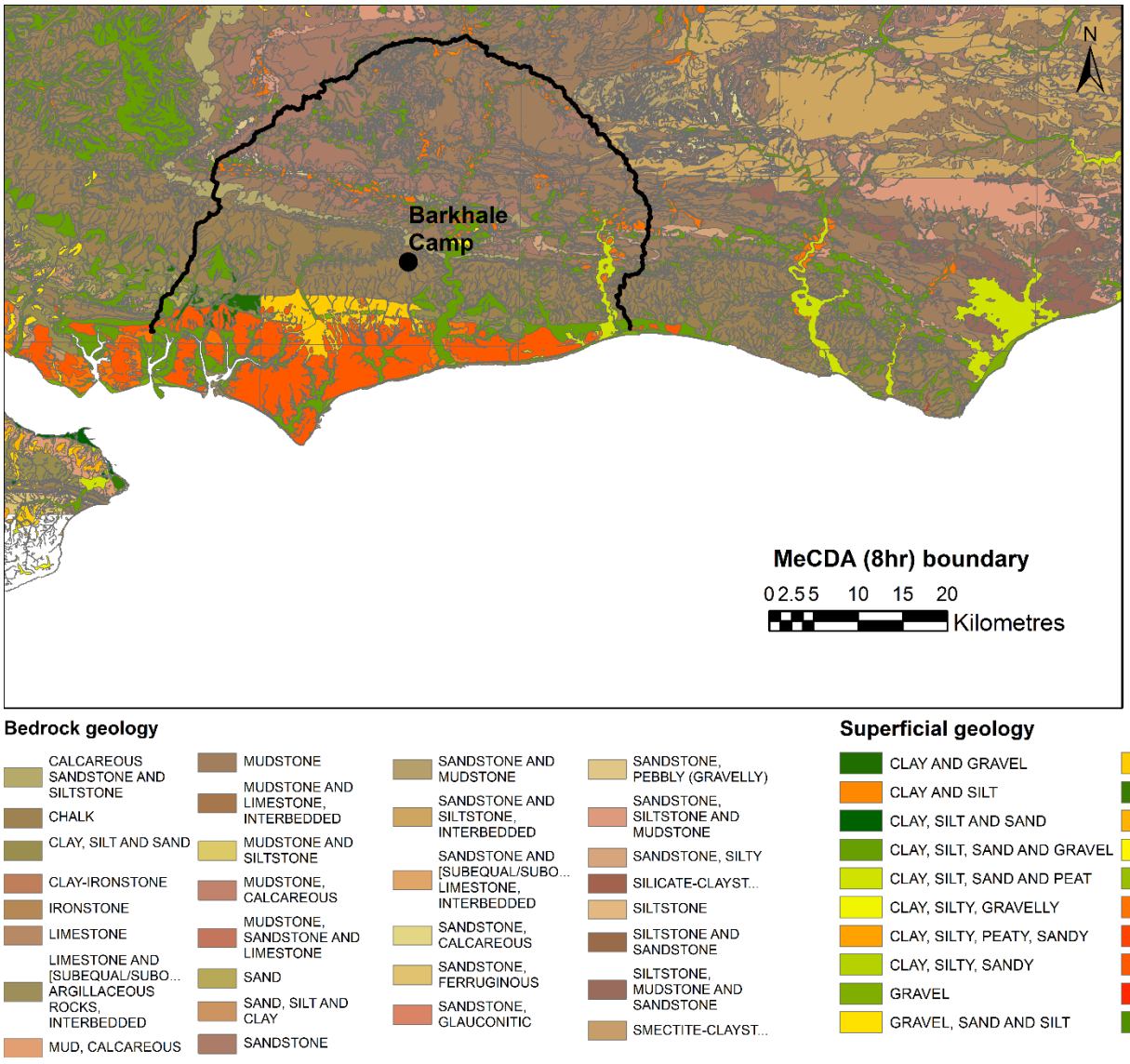


Figure 32: Geology around Barkhale Camp.

The bedrock and superficial geologies are defined for the MeCDA associated with Barkhale Camp.
The enclosure lies on the chalk, some 4.2km north of the nearest clay-with-flint deposits. To the east and to the north are the rich alluvial soils associated with the River Arun. Further east, though still within the MeCDA are the alluvial plains of the River Adur

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service. Geological data by BGS 1-50000 series data.



Views from Halnaker Hill

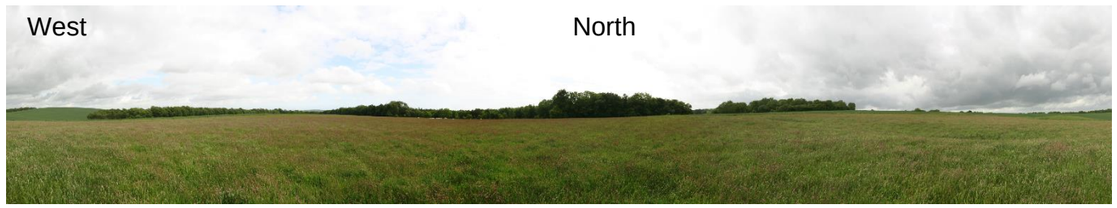


Views from The Trundle





Views from Court Hill Court Hill is today located within woodland. Photographs are taken 150m southwest of the enclosure (left) and 500m east of the enclosure boundaries (right)





Views from Barkhale Camp. The southern half of the enclosure is today within woodland. Photographs are taken from the centre of the enclosure (left) and 250m south of the enclosure (right).

Figure 33: Views from the enclosures of the West Sussex cluster.

Source: Author

3.2.4 **The eastern cluster.**

The eastern cluster comprises three enclosures (Fig.34, p116). The largest and the most developed is that at Whitehawk Camp, with four broadly circular enclosures (0.64ha, 1.00ha, 2.83ha and 5.02ha) and at least two 'spiral' earthworks. To the east and to the northeast respectively are Combe Hill and Offham Hill. The enclosure at Combe Hill comprises two concentric circular enclosures (0.76ha and 1.67ha) and two linear cross dykes that isolate the enclosure within the elongated hilltop. The inner enclosure is substantially complete though broken for a short section by the steep scarp to the north. The fragmentary remains of the outer circuit survive best on the west side, only as vestigial earthworks on the south side and may be interrupted by later activity on the east. It is unclear whether the outer circuit continued across, or was interrupted by the scarp to the north. Offham Hill lies on a chalk spur overlooking the Ouse Valley and has been badly disrupted by quarrying activities and, whilst the eastern component is now lost, the enclosure originally seems to have comprised two concentric enclosures (pace Drewett, 1977, 203) which are reconstructed in the model and estimated to have been 0.38ha and 0.73ha.

Bayesian modelling of radiocarbon dates by Whittle et al. (2011, 208-232) provides good precision for Whitehawk, probably (68% probability) to within 55 years, placing the construction of the inner ditch somewhere between 3635-3580 cal BC and the construction of ditch two slightly earlier at 3665-3635 cal BC. Precision associated with the chronological modelling of Offham is less impressive and it is uncertain whether the inner ditch (3640-3500 cal BC at 68% probability) or the outer ditch (3635-3555 cal BC at 66% probability) was

constructed first. The data available for Combe Hill is even less precise and the single sample used here suggests an in-use date range of 3640-3010 cal BC at 95% probability.

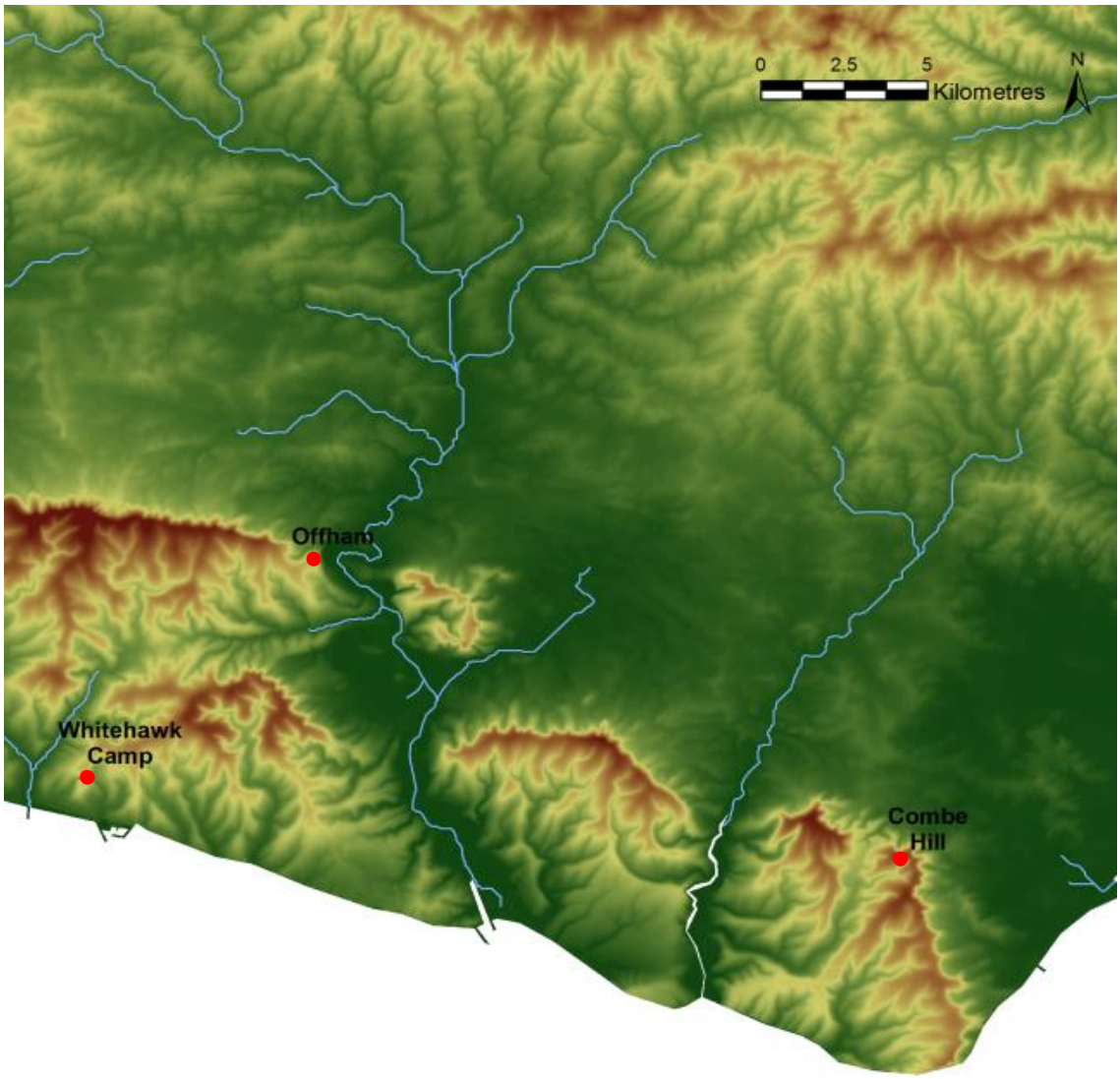


Figure 34: The East Sussex sub-group.

River systems are those developed in the GIS model.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

Whitehawk Camp

Whitehawk is situated at 117m AOD on the chalk approximately 1km from the south coast. Although the chalk uplands are elevated above the surrounding coombes and valleys, the enclosure has been constructed on a low saddle, at a position where there is higher ground both immediately north and south of the enclosure site (Fig. 35).

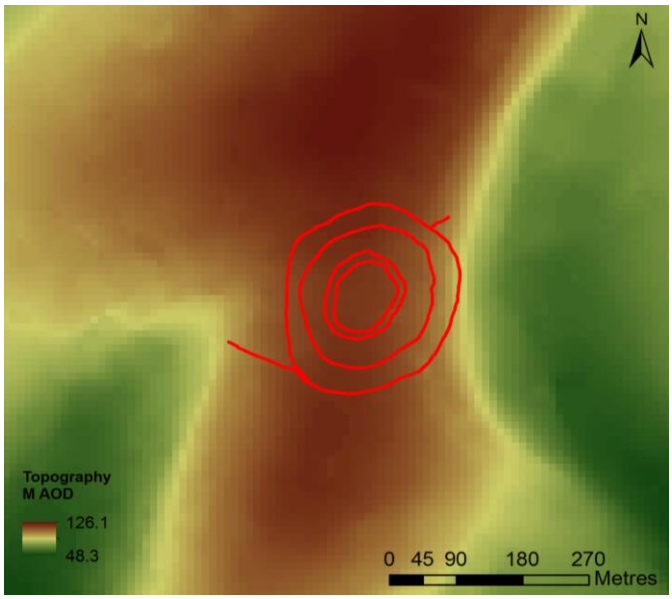


Figure 35: Topography around Whitehawk Camp.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

The enclosure is broadly level though has a very slight tilt in the northeast direction. This very slight characteristic is unlikely to have been a factor that influenced the choice of location, which may be more associated with the ability to isolate the southern knoll through the strategic placement of the enclosure at a narrow neck of upland. The close association of a complex developed enclosure with the coast may be significant and may represent either an early established enclosure or a successful one that was maintained and repeatedly revisited, maintained and improved. It may be significant that the earliest enclosure was not the smallest and this may signify that the size of the enclosure is related to the needs from time to time according to the purpose of any particular enclosure at any particular point in time.

The choice of location made for Whitehawk has had a significant effect on the viewshed characteristics and the enclosure has a distinct westward bias (Fig. 38, p.129). In any other direction, local views beyond the immediate environs were very restricted and limited to a small arc of higher ground in a narrow swathe running along the south coast. The model suggests that there were two distant barrows: Firle Beacon (oval barrow, 15.3km from Whitehawk) and Hunter's Burgh (long barrow, 22km), which, both being to the east are within the range of view, though dating of these barrows is insecure (Whittle *et al.*, 2011, 254). Their distance, coupled with a further four long barrows and three oval barrows, in the same general direction and range, perhaps suggests that this may not have been a significant factor to those constructing or using the enclosure.

Any association with long barrows is also perhaps rendered less likely in noting that two long barrows to the west (Surrendon Road and Preston Drove) were also out of view despite the views to the west being the dominant viewshed for Whitehawk. The two flint mines west of Whitehawk Camp at Cissbury (19.2 km) and Slonk Hill (10.5km) are also unlikely to have been within the fields of view from Whitehawk though the model suggests that Slonk Hill may have just been.

The limited viewable area is mimicked by the CDAs (Fig. 39, p.130). For example, the MaCDA for Whitehawk (288132ha) is the smallest of the whole Sussex group. By comparison the MaCDA of the small simple enclosure at Court Hill is 310676ha. The areas bonded by the cost distance models are constrained by the rising ground of the South Downs, and the same rolling topography constrains their eastward extent. This may suggest that Whitehawk

Camp was more likely to have been associated with the coastal plains, than the alluvial plains to the north of the Downs. Notwithstanding this, the long barrows at Beacon Hill, Surrendon Road and Preston Drove all fall within the MiCDA of Whitehawk Camp and lie within 4.1km, though their contemporaneity with the causewayed enclosure is as yet unproven (Table 6, p.120).

Whitehawk Camp	MiCDA	MeCDA	MaCDA
Causewayed enclosures	1	1	2
Long barrows	4	8	12
Settlement habitation	3	3	3
Leaf-shaped arrowheads	6	15	29
Fully polished axes	20	65	119
Other EN lithics	1	7	10
Flint mines	1	4	6

Combe Hill	MiCDA	MeCDA	MaCDA
Causewayed enclosures	0	1	2
Long barrows	5	8	11
Settlement habitation	1	4	4
Leaf-shaped arrowheads	4	14	23
Fully polished axes	36	70	105
Other EN lithics	0	0	1
Flint mines	0	0	1

Offham Hill	MiCDA	MeCDA	MaCDA
Causewayed enclosures	1	2	2
Long barrows	4	11	11
Settlement habitation	3	3	4
Leaf-shaped arrowheads	7	21	32
Fully polished axes	35	89	124
Other EN lithics	0	2	9
Flint mines	0	1	6

Table 6. Distribution of early Neolithic indicators in the eastern group of enclosures.

The models define the recorded early Neolithic archaeology within the boundaries defined by the cost distance areas.
Whilst the overall count of long barrows may suggest Offham Hill to more accessible from these areas of activity, Combe Hill appears more isolated from the earlier Neolithic activity associated with the flint extraction sites. The higher number of flint axes within the Offham Hill cost distance areas may reflect Offham's suggested status as an axe finishing area.

Source: Author

The geology of the MaCDA is dominated by the sandy silts of the southern plain and the heavy soils associated with the estuaries and floodplains (Fig.40, p.131). These soils, with a high clay component, have three distinct origins. Around the course of ancient river systems lie the superficial deposits associated with past alluvial processes; these are mixed soils comprising of clay with varying quantities of silt, sand, gravel and peat. Prior to the canalisation of the rivers and drainage systems, these were associated with flood plains and low-lying areas, and, being regularly inundated and refreshed, would have remained fertile. Capping the chalk are various deposits of clay-with-flint and, although there are upwards of forty separate locations where these deposits occur, the total available resource is 1795ha, which, representing 0.5% of the MeCDA, is the lowest of all the Sussex causewayed enclosures. Other clay areas are represented by large deposits of bedrock clays, comprising of the Wealden Clay to the north and smaller isolated deposits of London Clays along the upper coastal plain area. Chalk constitutes 654544 of the MeCDA.

The distribution of artefacts away from the Camp itself (Fig.39, p.130), may reveal indicators of early Neolithic activity and suggests little activity in the immediate environs of the enclosure. None are recorded within 2.5km of the enclosure and most relate to polished axes at the base of the chalk scarp to the north. Excepting the flint mine at Slonk Hill and the possible flint mine at Falmers Stadium, the only recorded habitative sites lie on the extreme boundary of the MiCDA at site at Keymer Avenue and Seaview Avenue. Further afield there are 65 polished axes recorded in the MeCDA and a further 54 in the MaCDA, most of which are associated with the coastal plain with a

particular clustering to the west. This relative paucity of finds is unexpected considering the developed nature of the Whitehawk enclosure and the degree to which the eastern fringe of modern Brighton has been subject to commercial development.

Combe Hill

Combe Hill is the most easterly of the Sussex enclosures lying towards the north end of the final range of the Downs at the range turns and heads towards the sea at Beachy Head. The duel-circuit enclosure is located at 190m AOD on the summit of an elongated area of upland, at a point where the hill crest narrows to form a neck no wider than the enclosure (Fig. 36) and both circuits run off the north facing scarp. Two undated Cross Dykes (not shown) may have served to isolate the enclosure along the summit. In the north-south direction the inner enclosure is constructed at equal elevations across the hill and shows no sign of any directional bias and although the topography of the summit ridge results in the enclosure being slightly tilted towards the east, this is likely to have been a

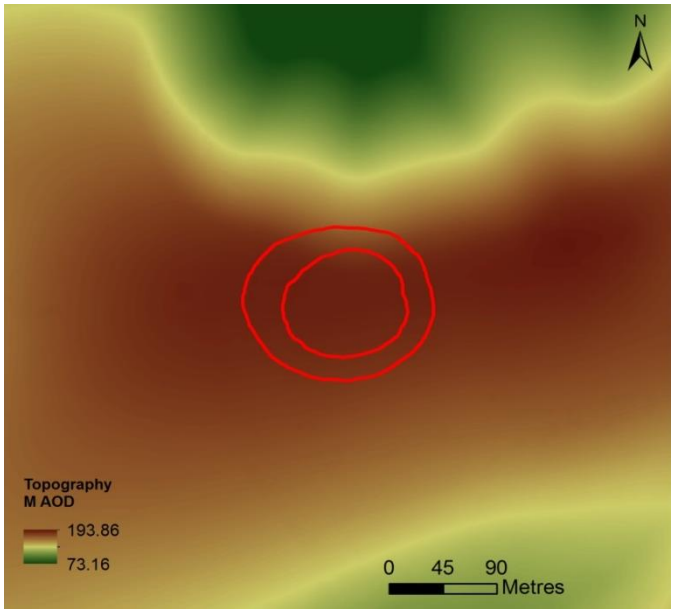


Figure 36: Topography around Combe Hill.

Spatial data: 1m Lidar data, Geomatics – The Environment Agency.

factor in the selection of this particular location, since other positions on the summit could have provided much better views to the east (Fig. 41, p.132).

The near-distance views are very limited by the natural topography and the situation of Combe Hill within the Downs. The model makes due allowance for chalk erosion and predicts that the dominant viewshed covered a wide arc, extending from a north-westerly direction to east-northeast, and also had the potential to extend across the levels and well into the Weald (Fig.41, p.132). Views notably excluded the coast (with minimal exception), the other east Sussex enclosures and, with the exception of Hunter's Burgh, the closest barrow to Combe Hill, the cluster of nine long barrows. The views from the enclosure seem specifically orientated away from the long barrows.

Whilst the area associated with MiCDA is relatively large, the area associated with the MaCDA is constrained to the west by the river Ouse, and to the north by the higher reaches of the Weald, beyond the Pevensey levels. The area generally appears to be orientated and focused to the north and to the southeast and includes a large stretch of coastline (Fig.42, p.133). The correlation therefore between the visibility analysis and the cost distance analysis is very strong and the views seem specifically orientated towards the north and across the main areas of the cost distance models.

The geology within these areas differs from the other enclosures (Fig.43, p.134). There is a marked decrease in the extent of sandy silts which have been present within the coastal plains associated with other enclosures. Instead a high percentage of clays predominate, which combined with Siltstones and Mudstones of the Tunbridge Wells Sand Formation, comprise

the dominant geology, particularly to the north and to the east. There is a significant component of clay-with-flint present in nine deposits to the southwest, which although not on Combe Hill are within the MiCDA and within 2km of the enclosure.

The record is dominated by finds of polished axes, and in particular, a cluster of 15 between Combe Hill and Beachy Head. There are 36 recorded within the MiCDA, 70 within the MeCDA and a total of 105 within the MaCDA. There are 23 leaf-shaped arrowheads (Fig. 42, p.133 below).

Offham Hill

The dual circuit at Offham Hill is located on a northward spur of the upper chalk just below the highest point of Offham Hill and overlooks the alluvial deposits comprising the Ouse Valley. The eastern section of both circuits has been lost to 19th century chalk quarrying and although Drewett (1977, 203) considered the enclosure to be 'D' shaped, a later survey by the Royal Commission concluded that both circuits were probably circular (RCHME, 1997). It is this later interpretation that is used in the GIS modelling (Fig. 37, p.125).

Prior to the complete excavation of the southern quadrant in 1976, the enclosure is described as being largely ploughed out and subject to some 700mm of chalk solution erosion. Despite this, two important observations were made. Firstly, it was apparent that although the diches were interrupted, the slight remains of the internal banks suggested they were less so. Where more substantial causeways were noted in the ditch system, these were

reflected by similar gaps in the banks, whilst opposite the 'lesser' causeways the bank was continuous. Secondly, the irregular and shallow nature of the ditches suggests again that they performed a utilitarian or at least secondary function. Both factors may indicate that the ditches were primarily a quarry for bank material. Despite a large open area excavation of the enclosure interior, no Neolithic features were found.

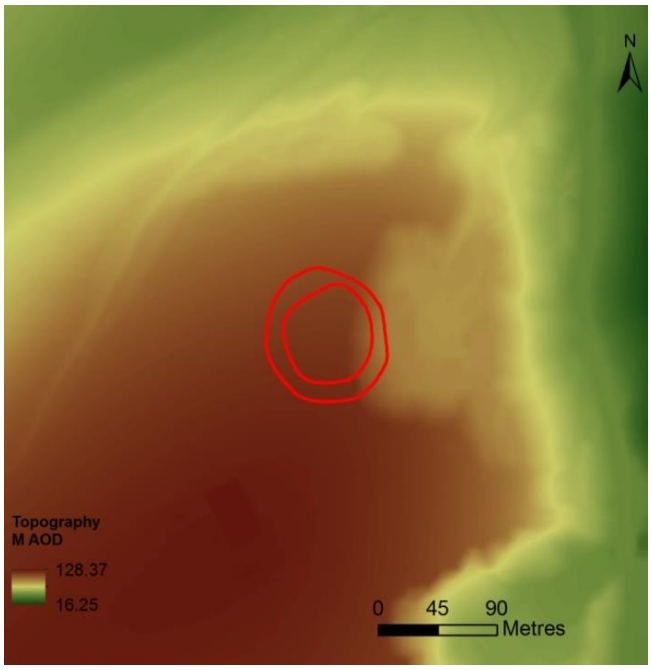


Figure 37: Topography around Offham Hill.

Spatial data: 1m Lidar data, Geomatics – The Environment Agency.

The enclosure appears carefully located on a gentle north-facing slope some 8m below the summit. The resultant 'tilt' orientates the enclosure towards the northeast and the low flat ground of the Ouse floodplains (Fig.44, p.135). These characteristics combine to focus the viewshed from the enclosure

directly up the shallow Ouse Valley. The River Ouse at this point is running towards the enclosure in a northeast to southwest direction before reaching the base of Offham Hill, where it sharply changes direction and heads southeast toward the coast. The association with the River Ouse is a strong characteristic of the viewshed, which otherwise, although extending through a 150deg arc, provides only interrupted views across areas outside the Ouse Valley (Fig. 44, p.135 & Fig.47, p.138). The enclosure banks of clean white chalk may have provided a strong visual marker for anyone in the valley or on the Ouse itself. Whilst the enclosure was not visible on a riverine journey coming upstream from the south coast to Offham, it became very visible as one passed the bend at the foot of Offham Hill. The direction of view excludes all the other known Neolithic monumentality in the area, with the single exception of The Camel's Hump long barrow 4km to the south east on Cliffe Hill. This relationship may not be coincidental, since the mutual intervisibility of the two monuments relies on their precise co-location in the landscape.

The cost distance areas for Offham are extensive (Fig.45, p.136). With the exception of the high ground immediately around the enclosure, the MiCDA consists of an area of low-lying (<20m AOD) ground to the north, and the flood plains of the Ouse to the northeast and to the south. Offham is in a unique position amongst the Sussex enclosures as one that is particularly accessible from, or has ready access to, wide geographic areas from an immediately adjacent river system over which it has direct visual control. The MiCDA includes a large relatively low-lying area which is drained by a number of small streams and rivers that drain into the Ouse. A similar pattern emerges to the east of the Ouse where small river systems, including the River Uck, drain

westward into the Ouse or into the Cuckmere River, which has also cut through the chalk downs to drain into the south coast. Further east the MeCDA also includes the Pevensey Levels, another area of low-lying land which today is characterised by an extensive network of land drains, which discharge into the English Channel between modern Eastbourne and Bexhill.

North and east of Offham, the extent of the MeCDA is limited by the rising grounds of the High Weald, however there is no such constraint to the west or to the south west, and here the MeCDA is limited only by the distance from Offham itself. For this reason, the MaCDA of Offham extend westward almost to Barhale Camp and includes all of the South Coast as far as modern Littlehampton.

Despite these extensive distances and the large area associated with Offham, it is notable that the enclosure still remains distant (in cost distance terms) from all other known Neolithic monumentality. Of the four long barrows within the MiCDA, only the Camel's Hump lies within 3km, and the most proximate enclosure at Whitehawk is 9.8km away.

Within the MeCDA there are seven more long barrows, the enclosure at Combe Hill, and the flint mine at Slonk Hill. Beyond this, the remaining five flint mines, on the distant southern slopes of the South Downs, are within the MaCDA.

The geology associated with Offham is varied (Fig.46, p.137) and the largest component comprises the alluvial clays and the sandy silts of the Weald. Chalk is a relatively minor component (Table 7, p.145).

The distribution of potential Neolithic indicators (Fig.45, p.136) reflects the large MaCDA. Aside from that recovered during excavation of the Offham ditches, there are 35 recorded examples of polished axes to be found within the MiCDA, one of which is recorded as a possible Greenstone axe of non-local origin (NMR, MES1657). There are a further 54 polished axes in the MeCDA and a further 35 in the MaCDA. Ten leaf-shaped arrowheads are evenly distributed around the periphery of the MeCDA. Leaf-shaped arrowheads appear randomly distributed in the area, though some clustering is apparent on the coastal fringes. There is a cluster of lithics and ceramics finds classified as early Neolithic reported in the grey literature (Place, 1993; Kenyon, 1997; Matthews, 2000; Hillier, 2001; Valentin, 2004; Whittaker, 2008; Priestley-Bell & Rayner, 2009; Porteous, 2010). These occur in the coastal belt between Worthing and Littlehampton, but these may be reflective of modern patterns of development rather than patterns of Neolithic activity. Two pits are recorded by the coast near Peacehaven (NMR MES18989 & 18994) and a further one inland at Farmer Stadium (NMR MES16396).

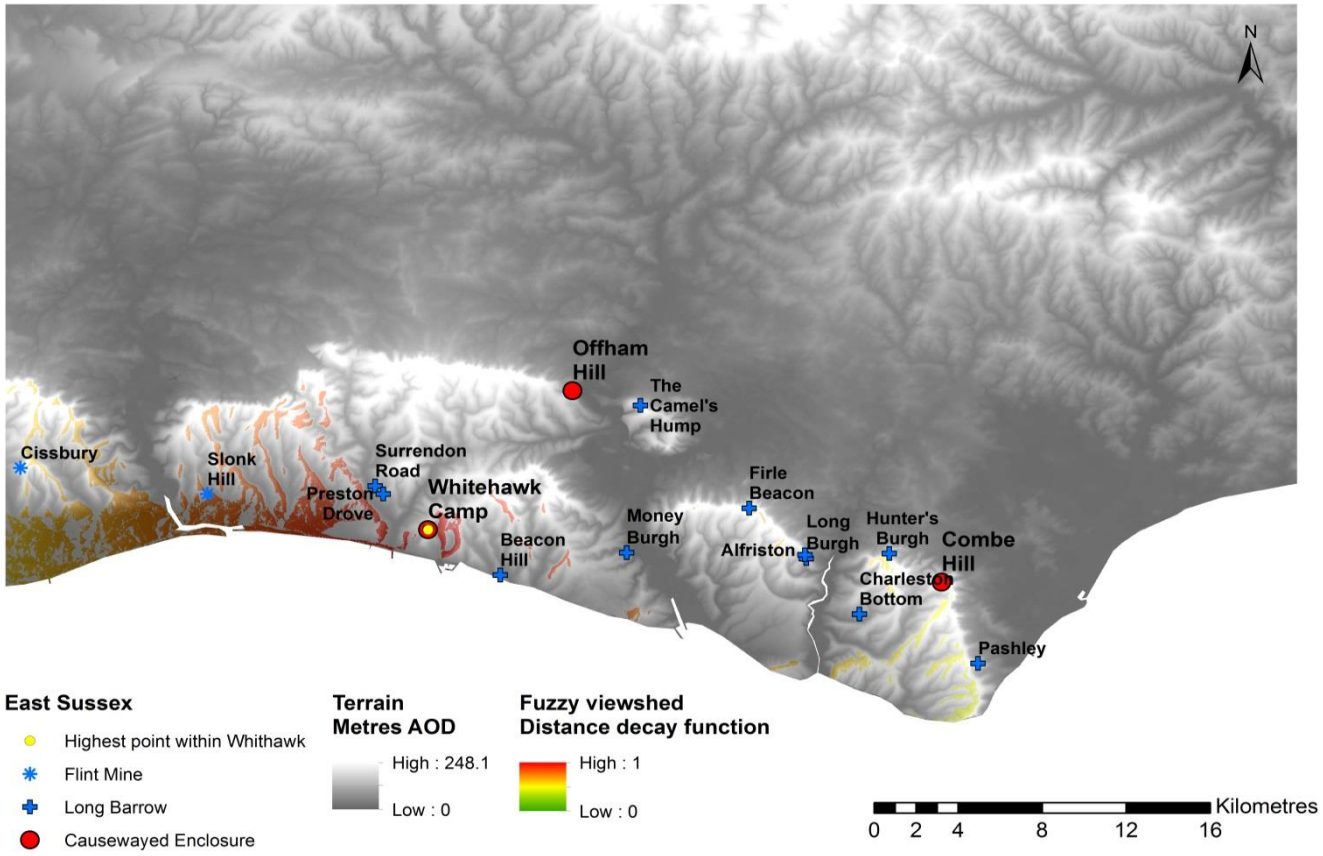


Figure 38: Whitehawk Camp visibilities model.
The model estimates the maximum potential extent of any views to and from the Whitehawk Camp enclosure

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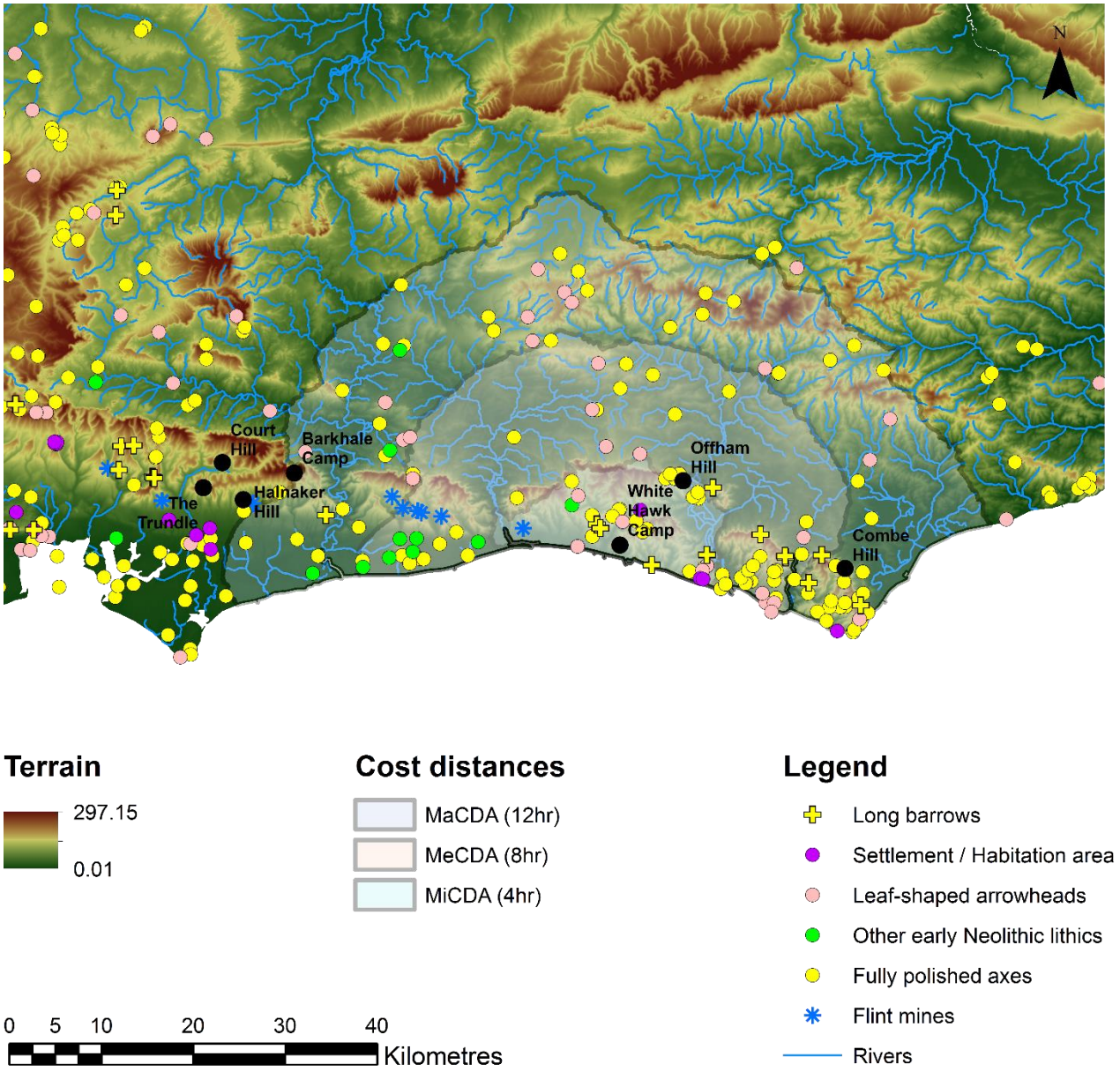


Figure 39: Whitehawk Camp cost models.

The model estimates the degree of access to Whitehawk Camp, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Whitehawk Camp lies on a narrow spur 1.3km from the nearest point of the modern line of the south coast. The cluster of pits and a possible flint mine, 4.4km to the north on the other side of the chalk range, at Falmers Stadium, are the closet known signs of early Neolithic habitation despite considerable development led archaeology in and around modern Brighton.

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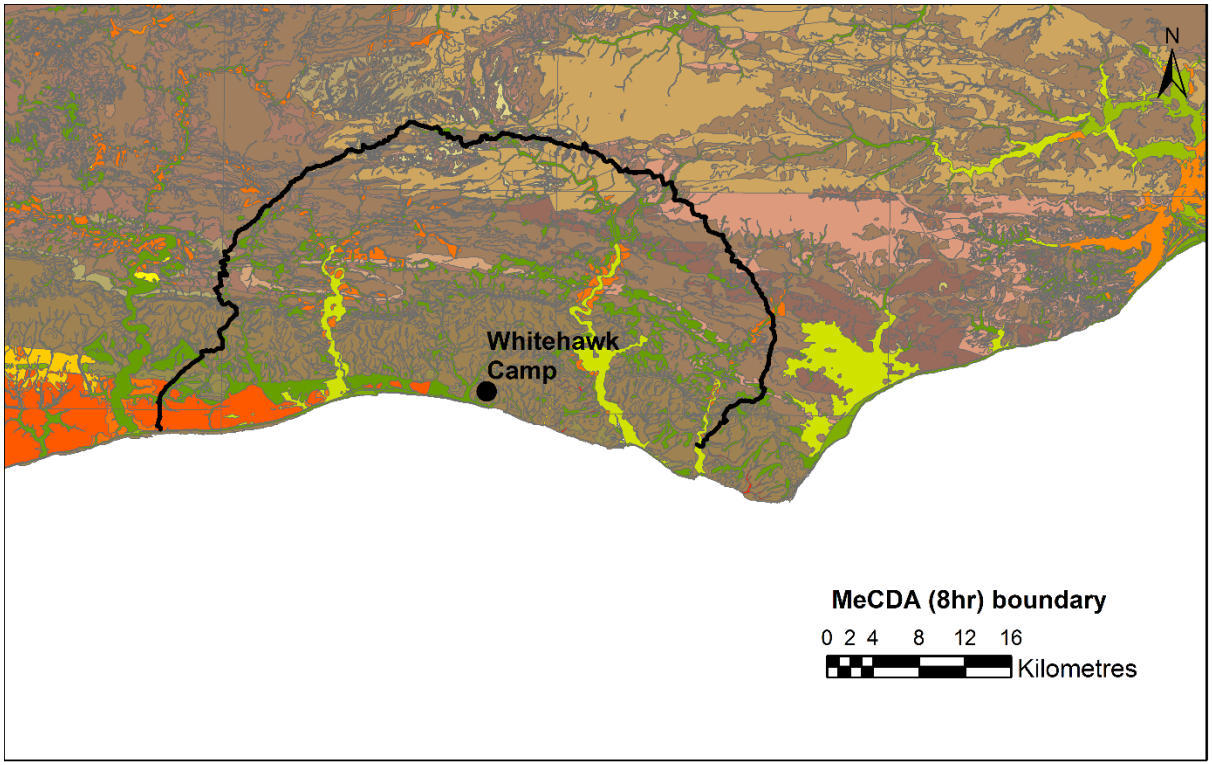


Figure 40: Geology around Whitehawk Camp.

The bedrock and superficial geologies are defined for the MeCDA associated with Whitehawk Camp.
The enclosure lies on an expansive area of the Seaford Chalk Formation interspersed with finger-like tendrils of Head deposits comprising clay, silt, sand and gravels. These deposits are resultant on fragmented materials that have moved downslope along lower lying water cut channels. The area around the enclosure is characterised by very many individual deposits of clay-with-flint, though there are no deposits within 1.9km and most are at least 4.7km distant.

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Bedrock geology

- CALCAREOUS SANDSTONE AND SILTSTONE
- CHALK
- CLAY, SILT AND SAND
- CLAY-IRONSTONE
- IRONSTONE
- LIMESTONE
- LIMESTONE AND [SUBEQUAL/SUBO... ARGILLACEOUS ROCKS, INTERBEDDED
- MUD, CALCAREOUS
- MUDSTONE
- MUDSTONE AND LIMESTONE, INTERBEDDED
- MUDSTONE AND SILTSTONE
- MUDSTONE, CALCAREOUS
- MUDSTONE, SANDSTONE AND LIMESTONE
- SAND
- SAND, SILT AND CLAY
- SANDSTONE
- SANDSTONE AND MUDSTONE
- SANDSTONE AND SILTSTONE, INTERBEDDED
- SANDSTONE AND [SUBEQUAL/SUBO... LIMESTONE, INTERBEDDED
- SANDSTONE, CALCAREOUS
- SANDSTONE, FERRUGINOUS
- SANDSTONE, GLAUCONITIC
- SANDSTONE, PEBBLY (GRAVELLY)
- SANDSTONE, SILTSTONE AND MUDSTONE
- SANDSTONE, SILTY
- SILICATE-CLAYST...
- SILTSTONE
- SILTSTONE AND SANDSTONE
- SILTSTONE, MUDSTONE AND SANDSTONE
- SMECTITE-CLAYST...

Superficial geology

- CLAY AND GRAVEL
- CLAY AND SILT
- CLAY, SILT AND SAND
- CLAY, SILT, SAND AND GRAVEL
- CLAY, SILT, SAND AND PEAT
- CLAY, SILTY, GRAVELLY
- CLAY, SILTY, PEATY, SANDY
- CLAY, SILTY, SANDY
- GRAVEL
- GRAVEL, SAND AND SILT
- GRAVEL, SAND, SILT AND CLAY
- GRAVEL, SANDY
- GRAVEL, SANDY, CLAYEY, SILTY
- PEAT
- SAND
- SAND AND GRAVEL
- SAND WITH CLAY AND GRAVEL
- SAND, SILT AND CLAY
- SILT, SAND AND GRAVEL
- TUFA, CALCAREOUS

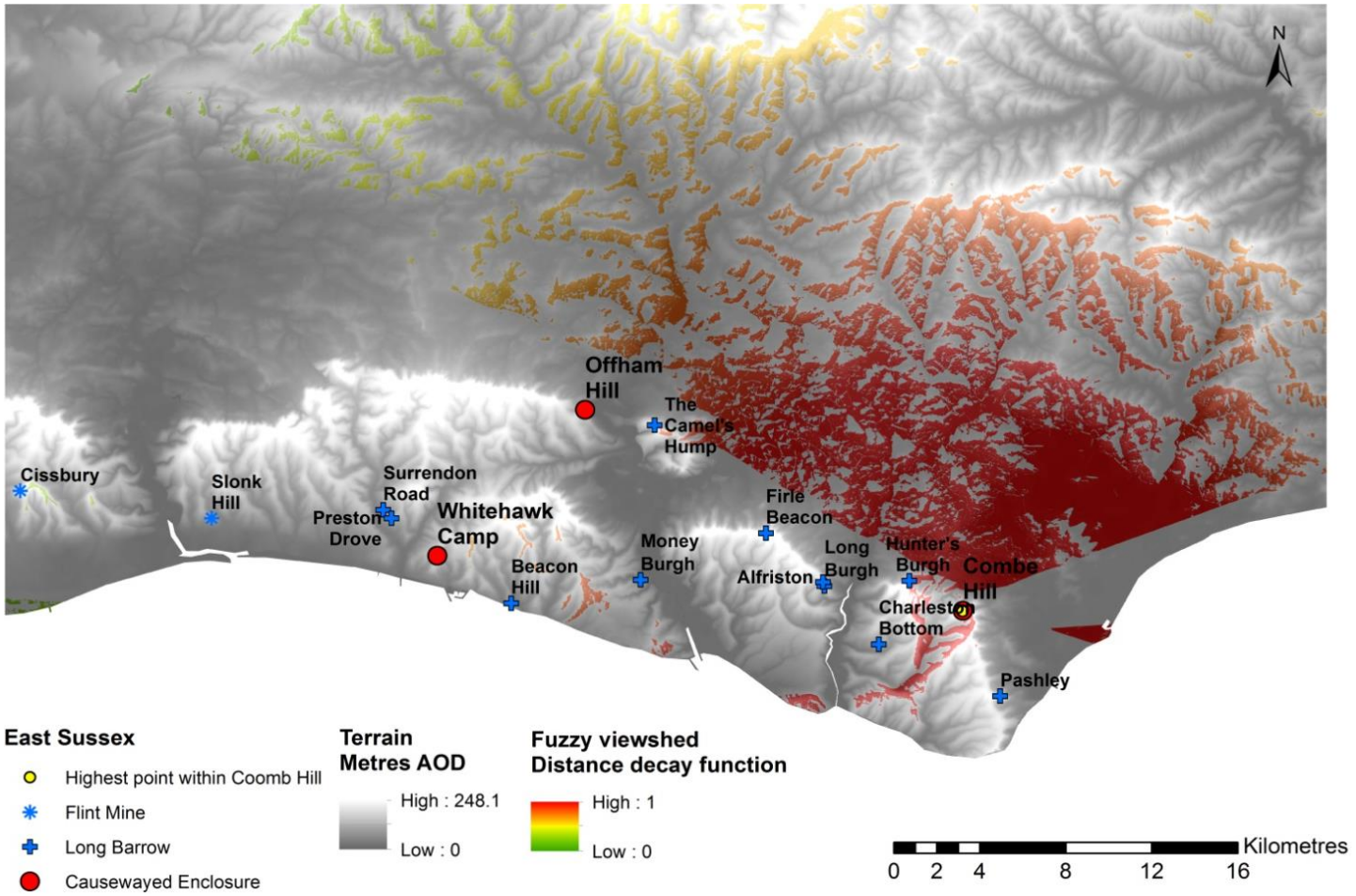


Figure 41: Combe Hill visibilities model.

The model estimates the maximum potential extent of any views to and from the Combe Hill enclosure

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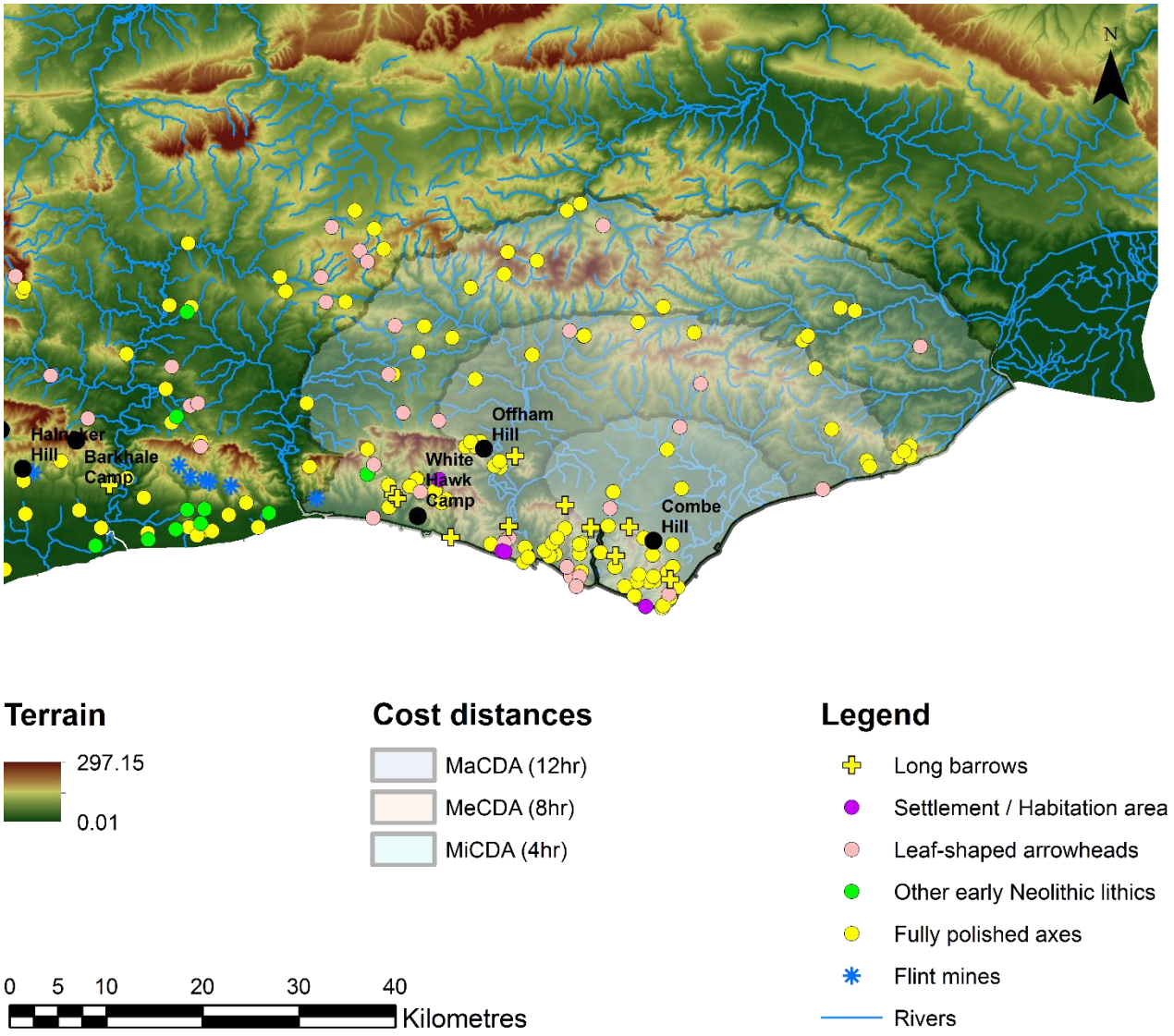


Figure 42: Combe Hill cost models

The model estimates the degree of access to Combe Hill, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined. Combe Hill is located on the northern extent of a chalk range which runs east west. This topography serves to limit the extent of the CDAs to the west, whilst in the eastern direction the boundaries are limited by the coastal fringe.
With four long barrows within, and one on the boundary of the MiCDA, Combe Hill displays a greater spatial association with long barrows than any other enclosure of the Sussex group. However the only evidence for early Neolithic habitation is directly south on the coastal fringe where a small group of pits was discovered at Belle Tout (MES672).

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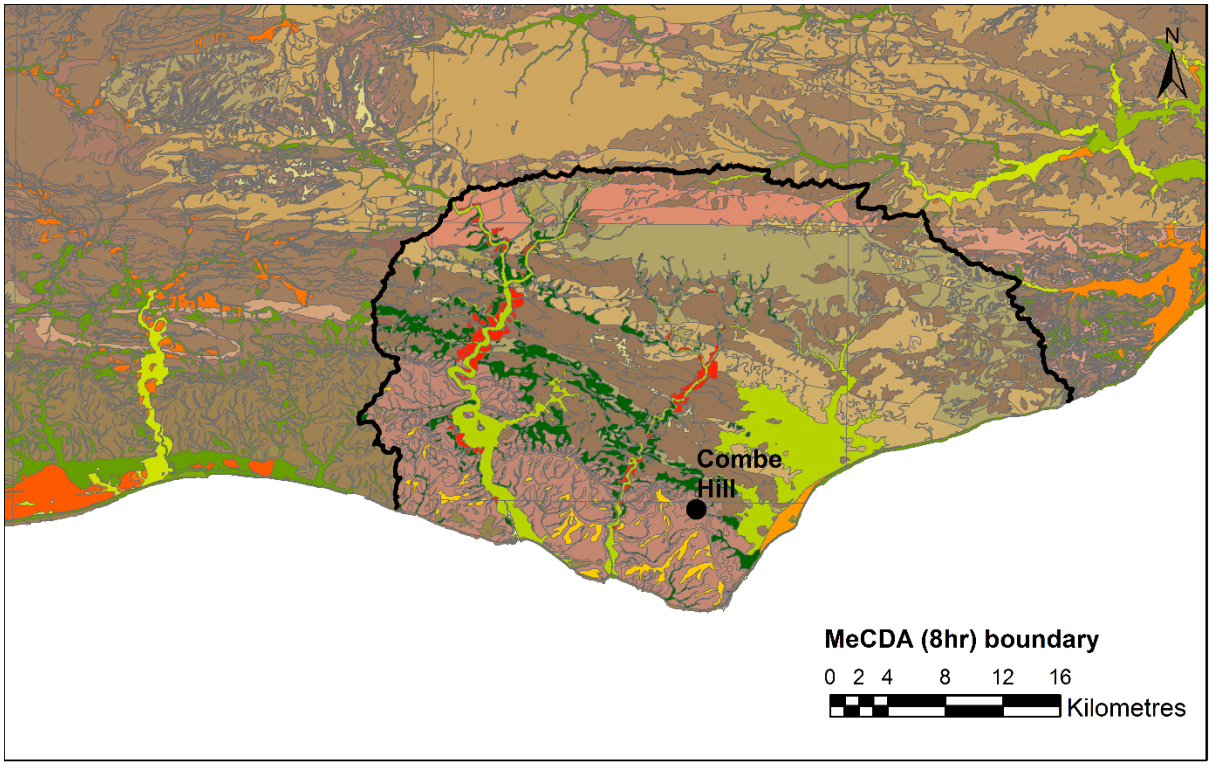


Figure 43: Geology around Combe Hill

The bedrock and superficial geologies are defined for the MeCDA associated with the Offham Hill enclosure.
The alluvial plains of the Pevensey Levels lie 5km to the northeast of Combe Hill and correspond with a significant concentration of polished axes (see figure 42 above). The alluvial plains may have been a significant resource in the early Neolithic and the axes lost as a result of tree clearing or similar activity. Significant deposits of clay-with-flint cap the hills to the southwest which seems also to have witnessed a concentration of early Neolithic activity (see figure 42 above).

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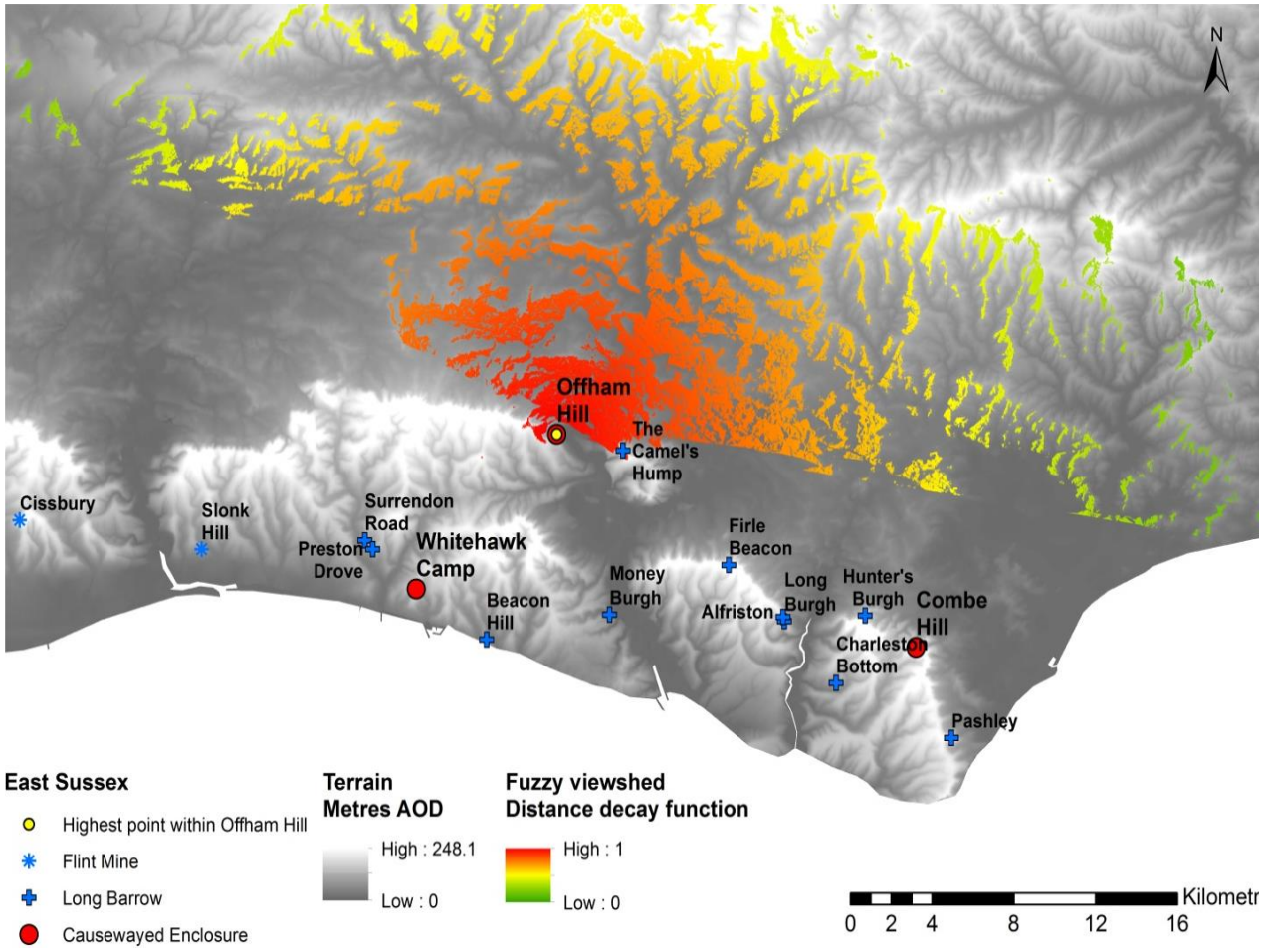


Figure 44: Offham Hill visibilities model

The model estimates the maximum potential extent of any views to and from the (assumed) sub circular enclosure at Offham Hill. Since much of the eastern flank of the enclosure has been lost to quarrying the model makes assumptions concerning the early Neolithic form.
The views have a distinct directional focus to the north and in addition appear to be closely linked to the River Ouse and away from the long barrows and causewayed enclosures to the south.

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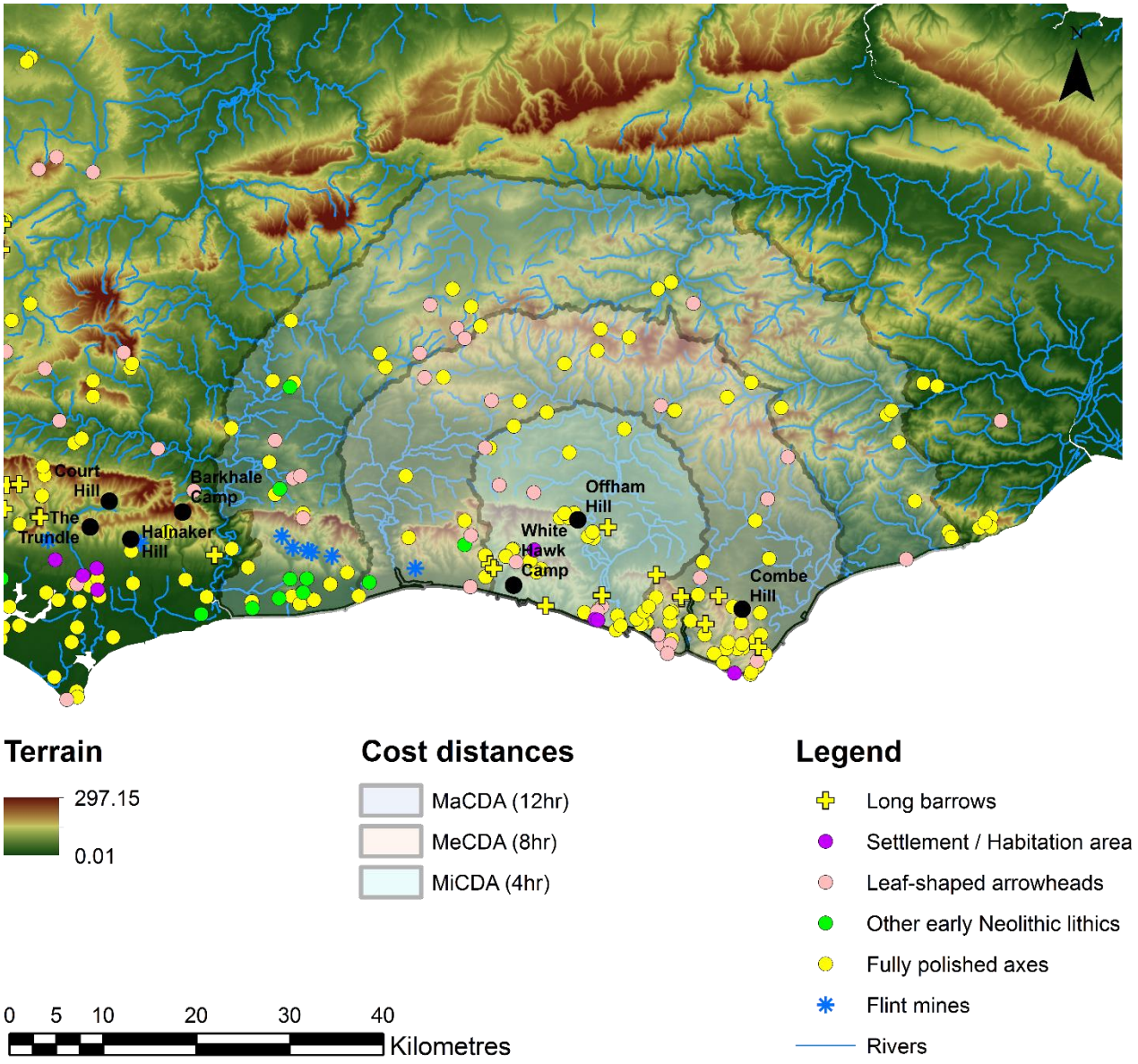


Figure 45: Offham Hill cost models

The model estimates the degree of access to Offham Hill, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.
The MiCDA for Offham Hill contains three known areas of early Neolithic habitation, all to the south. The cluster of pits (MES 18994) at Seaview Avenue are 300m east of a lithic working site at Keymore Avenue. Both are 600m from the modern coastline and 10.7 km south of the Offham Hill enclosure. The third site at Falmers Stadium is 5.6km to the southwest (MES 16396) and is interpreted as a possible flint mine with a number of small early Neolithic pits. A flint mine on the north slope of the chalk would be unique in Sussex, all others being on the south scarp.

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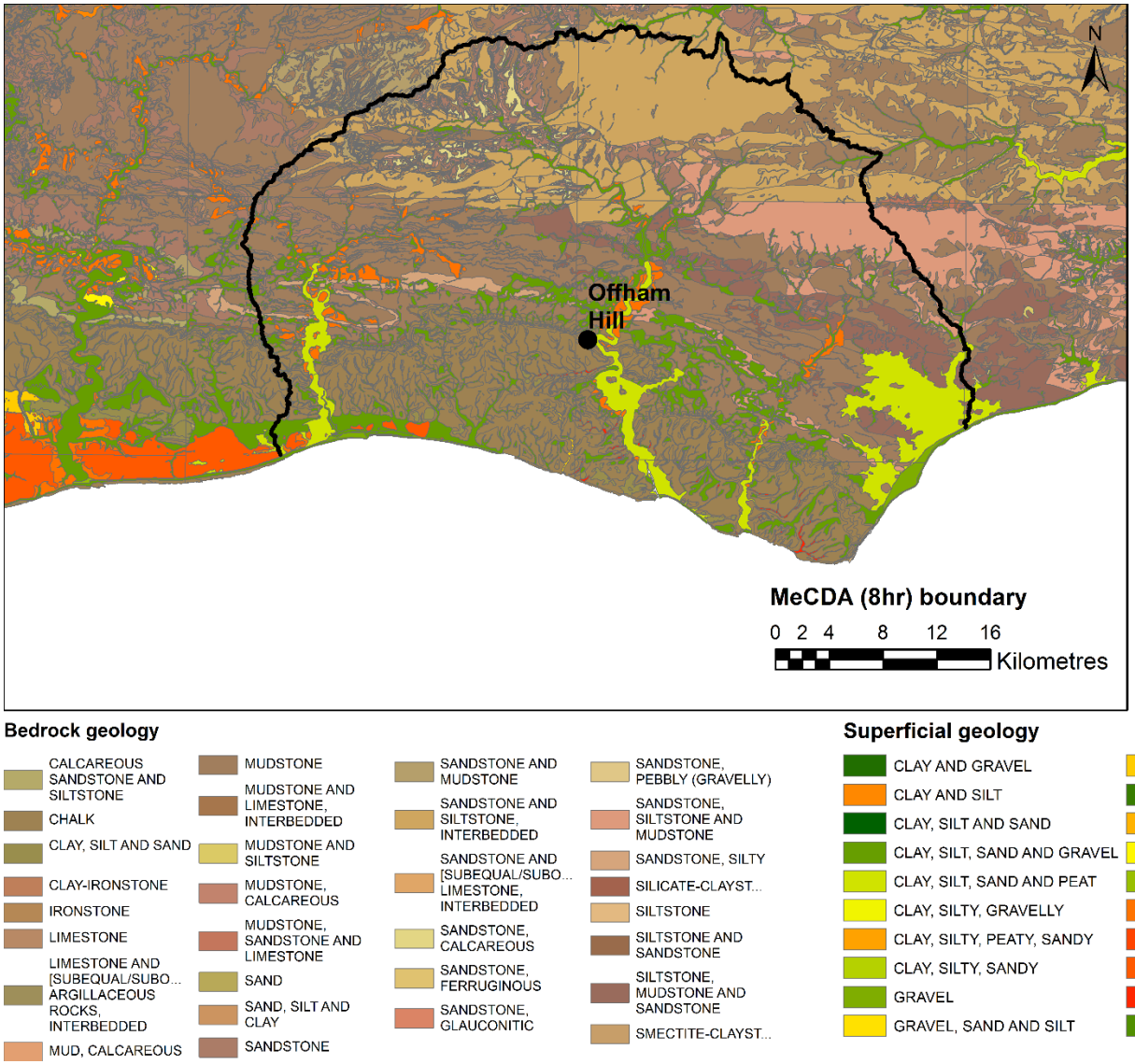


Figure 46: Geology around Offham Hill.

The bedrock and superficial geologies are defined for the MeCDA associated with the Offham Hill enclosure.
The enclosure lies on the very edge of the Lewes nodular Chalk which has been quarried in modern times resulting in the destruction of the eastern section. The enclosure overlooks the River Ouse to the east with significant alluvial deposits of clay, silt, sand and peat. The many, now dry, valleys that immediately surround the enclosure comprise free draining Head deposits of clay, silt, sands and gravels.

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West North East South



Views from Combe Hill

East South



Views from Whitehawk Camp

Northeast East Southeast



Views from Offham Hill.

The remaining section of the enclosure is located in dense scrub and inaccessible. This photograph taken from a disused quarry site some 35m lower in elevation and immediately below the enclosure.

Figure 47: Views from the enclosures of the West Sussex cluster.

Source: Author

3.2.5 **Commentary on the Sussex case study.**

The GIS models provide a different perspective on the situation of causewayed enclosures within the Sussex landscape. Previous models have relied on spatial distribution of monuments, or on broad generalised concepts of 'orientation' and topographical relationships (e.g. Oswald *et al.*, 2001, 99-100) to define territories. The mathematical capabilities within the GIS provide a potential towards a more nuanced consideration. The GIS provides an ability to look more closely, in a pseudo-quantified sense, within the landscape, and although such compensation can never be complete, more easily allows adjustment to be made for contemporary environmental conditions.

The Sussex enclosures display a wide range of visibility characteristics. The views from (or to) Whitehawk and Court Hill, for example, were restricted and the enclosures lay hidden in the Neolithic landscape, whilst others like The Trundle or Combe Hill were probably very visible from a range of directions. The views from and to Offham were intimately associated with the River Ouse.

The 'tree problem' with visibility is previously noted. Environmental studies by Ken Thomas at the Sussex enclosures (Thomas, 1977; 1981; 1983; 1984; 1986; 1992; 1994; 1996) conclude from the molluscan record that all the enclosures were constructed within recently cleared woodland settings, with the possible exception of The Trundle that had been constructed on a previously cleared area. This is important when considering the results of the GIS analysis, not just because vegetation impacts on the visual characteristics, but also because clearing 'for' the enclosure suggests that human agency, phenomenology or other factors played a part in the purposeful selection of a

site and that location hadn't been predetermined by an existing convenient woodland clearing.

The models do not suggest that widescale visibility was a prime determinant of location. Most of the enclosures could be relocated a short distance to 'improve' their viewshed. For example, Court Hill has the most limited viewshed of all the enclosures in the Sussex group yet may have been an early established enclosure, which could have been located on higher ground, both very locally (100-200m), or more distantly (1-2km). The enclosure is not visible from the River Lavant, with which it appears to be spatially related. It may have been that one factor in choosing the location for Court Hill was its ability to lie inconspicuously in the early Neolithic landscape.

Neolithic Sussex exhibits two categories of causewayed enclosure: those with a seaward orientation and those with an inland orientation. In every case, with the possible exception of the visually restricted Court Hill, the visible landscape correlates well with the accessible landscape. This is important because it means that the visible landscape or the landscape over which the enclosures appear to be focused is also the most easily accessible. We can postulate that if the causewayed enclosures are to be associated with territories, then it is the territories aligned with these boundaries that are more likely, than boundaries defined by arbitrary circles, Thiessen polygons, or the 'tilt' of a particular enclosure.

The cumulative viewsheds are worthy of comment since they confirm that the western and eastern sub-groups had very different characteristics. The cumulative viewshed makes a 'count' of the number of enclosures that any

parcel of ground is visible from and, in this analysis, that also equates to the number of enclosures that could be seen from any particular location in the landscape. Here we note that the western enclosures have a distinct seaward orientation, wherein some points of the coastal plain are visible from all four enclosures and nearly all areas are visible from three (Fig.48, p.143). Most of the visible area was viewable from at least two and usually three of the four enclosures.

This differs markedly from the eastern sub-group where the model indicates that Whitehawk is the only enclosure with a seaward viewshed and Combe Hill and Offham have land facing viewshed wherein, despite their close proximity, only 40% of the total visible land is viewable from more than one enclosure (Fig.49, p.144).

The cost distance analysis supports an intentional separation of the eastern and western clusters. It is noteworthy that the MaCDAs associated with the eastern cluster do not include any enclosures of the western cluster. Barkhale represents the most easterly enclosure of the western group, and this enclosure lies just beyond the MaCDA boundary of Whitehawk Camp, which is the most westerly of the eastern cluster of enclosures. Whilst the 12hrs boundary of the cost distance model is arguably somewhat arbitrary, the notion of each cluster being greater than a day's travel from the other, may suggest a degree of intentionality existed in their relative locations.

A pattern also emerges with respect to other early Neolithic components in the area between the two clusters. Erosion of the chalk, caused by the River Arun in the east and the River Adur in the west, had long isolated this range from the

main range of the chalk downland, and this area may have been more inaccessible than the models predict. This area between the clusters contains all of the known Sussex flint mines, and with the single exception of Long Down to the southeast of Halnaker Hill, they all fall within this isolated range of the chalk. Of the 81 known barrows inside the study area only two (Preston Drove and Surrrendon Road) northwest of Whitehawk Camp, and one southeast of Barkhale (Bevis Tomb) are located between the two clusters, and all of these barrows fall east and west of the isolated range of chalk. There are no long barrows located between the Adur and the Arun and 78 of the 81 barrows fall either west of the western cluster, or east of the eastern cluster of enclosures. The CDA models also report that the long barrows are isolated from the enclosures. For example, of the ten long barrows situated within the MaCDA of Offham Hill, only 'The Camel's Hump' and 'Money Burgh' lie within the MiCDA. Similarly, of the sixteen long barrows within the MaCDA of Court Hill, only the two at Blackbush Copse lie within the MiCDA.

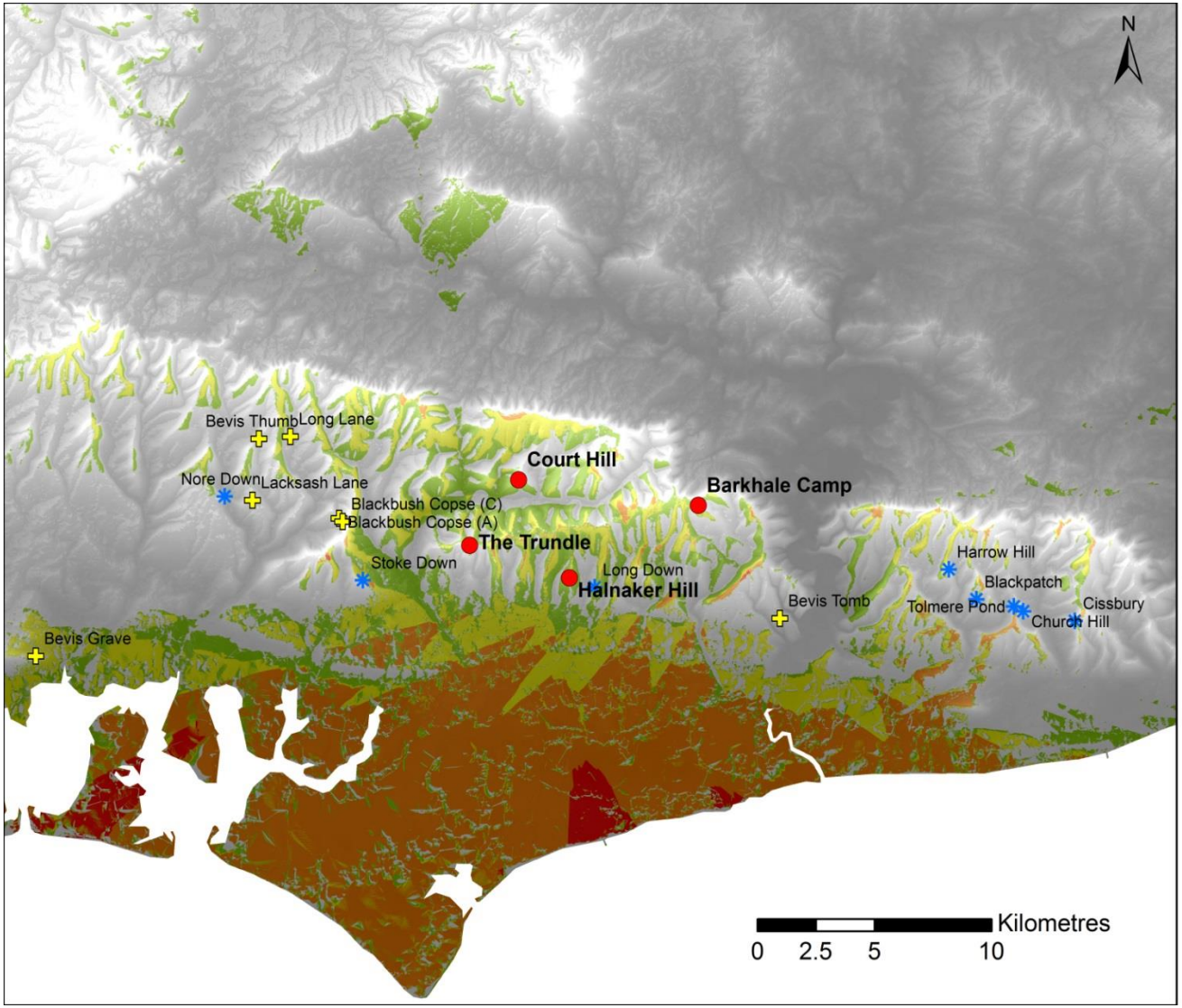


Figure 48: Cumulative visibilities of the West Sussex cluster

The model estimates those areas visible from the each of the West Sussex group and indicates those areas that are visible from 1,2,3 or 4 enclosures.

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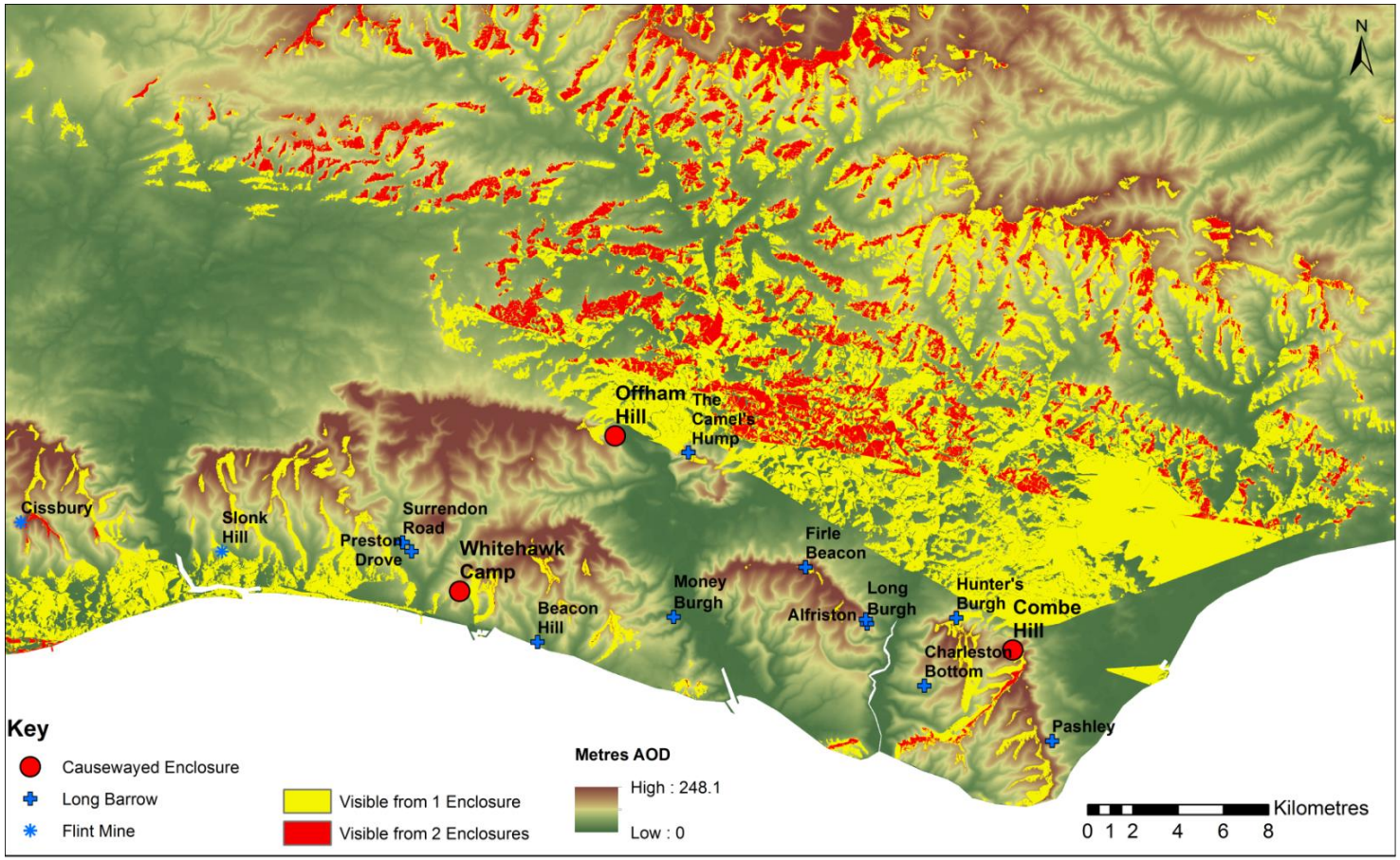


Figure 49: Cumulative visibilities of the East Sussex cluster.

The model estimates those areas visible from the each of the East Sussex group and indicates those areas that are visible from 1or 2 enclosures. The model suggests that there are no areas within view of all three enclosures.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

	Geological deposits within the MeCDA (8hr) boundary Hectares						
	The Trundle	**Court Hill**	**Halnaker Hill**	**Barkhale Camp**	**Whitehawk Camp**	**Offham Hill**	**Combe Hill**
Superficial							
Clay and Gravels	1404	1404	1404	1340	0	0	0
Clay with Flint	7884	8738	1940	1910	1795	1917	1467
Clay, Silt, Sand and Gravel	27193	29075	26683	25958	19330	19811	12882
Clay, Silt , Sand and Peat	189	189	744	1464	3992	8894	7732
Gravel	729	729	729	543	245	689	548
Gravel, Sand and Silt	69	28	28	23	0	0	0
Peat	261	261	261	255	0	3	1
Sand	57	57	57	57	0	0	0
Sand and Gravel	7725	8580	7686	8514	3630	3141	1421
Sand, Silt and Clay	21075	21075	21180	20089	3753	1790	0
Gravel, Sand, Silt and Clay	0	5578	5578	5578	109	109	109
Clay and Silt	0	0	0	71	0	0	0
Silt, Sand and Gravel	0	0	0	0	529	730	730
Bedrock							
Chalk	844492	889736	837240	840109	654544	436875	322050
Clay, Silt and Sand	313167	310805	313352	301777	51776	16148	4220
Clay - Ironston	221	221	221	229	1509	1539	67
Limestone	3860	6945	5430	8201	1715	1750	593
Mudstone	601973	728068	580472	719405	596709	734616	597681
Mudstone and Limestone, interbedded	0	0	0	30607	0	0	3975
Mudstone and Siltstone	0	0	0	0	0	393	1514
Mudstone, Sandstone and Limestone	0	0	0	0	0	80	5815
Sandstone	349401	368007	335494	375458	100031	69200	28652
Sandstone and Siltstone, interbedded	0	0	0	0	237023	309794	111396
Sandstone, Siltstone and Mudstone	12119	26497	4	4	107085	130281	180556
Sandstone, Silty	24544	24544	24544	24544	24547	24547	24544
Silicate Claystone	0	0	0	98	5852	6102	6004
Siltstone	0	0	0	0	0	871	871
Siltstone, Mudstone and Sandstone	0	0	0	0	83937	125538	158083
Sand	19115	19105	14685	9331	108	0	0
Calcareous Sandstone and Siltstone	65639	65642	29418	29418	8122	0	0
Sand, Silt and Clay	42544	38862	38862	26186	0	0	0
Sandstone and Mudstone	21665	21665	21665	21665	3560	16124	0
Sandstone, Glauconitic	1629	1741	1324	1324	0	0	0
Sandstone, Pebbly (Gravelly)	10132	10132	10122	9544	0	0	0
Silstone and Sandstone	2287	2287	2287	3505	3505	3505	0
Smectite Claystone	0	9	9	9	37	37	0
Calcareous Sandstone	0	0	0	0	7019	13047	0
Ironstone	0	0	0	0	0	180	0

Table 7. Geology around the Sussex causewayed enclosures.

The model defines the geology contained within the boundaries of the MeCDA of the Sussex causewayed enclosures. Polygons of Superficial (Drift) Geology have been overlain on Bedrock (Solid) Geology. Where Superficial overlies Bedrock, the underlying Bedrock Geology is removed, hence providing the near surface geological conditions as a proxy for soil types in accordance with Barker and Webley (1978).

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service. Geological data from BGS 1-50000 series data.

The relationship with long barrows is made more complex by the difficulty in precisely dating the enclosures and the long barrows. Where the evidence is better understood, the chronological relationships do not lend support to the early territorial models, for example, in the relationship between the well dated enclosures and the oval barrow at Long Lane. The barrow is constructed after the first circuit, and is broadly contemporary with the second circuit at The Trundle. This barrow then, is known to be contemporary with The Trundle but the visibility analysis and the cost models suggest a degree of intentional separation. The adjacent long barrow, Bevis Thumb, appears to be constructed after the final phase of construction at The Trundle (Tables 8 & 9. p.150 & 151).

More broadly, and irrespective of chronology, the modelling (Figs.21&22, pgs. 102&103 above) suggests that the relationship between the enclosures and the barrows is weak. For example, only five long barrows are within the MiCDA of The Trundle, and all are outside of the visible areas. It may also be significant that with the exception of these five barrows, the known Neolithic barrows also exhibit a different spatial clustering, all being located significant distances to the west of the group of enclosures, with most beyond the furthest extent of the MaCDA.

Furthermore, the results do not suggest that the causewayed enclosures were located such as to provide ready or easy access for a Neolithic society engaged in working flint mines, or that they played any specific role relating to these early features (Table 10, p.152). Rather the indication is that the enclosures were purposefully constructed in locations that were distant (in cost distance terms) and visually isolated from these early sites of activity. If we consider the

long barrows and flint mines to be the focus of a Neolithic territorial construct, then the causewayed enclosures are on the margins.

In this respect the model also contrasts with the argument by Francis Healy (2008, 9), who, with a focus on chronological relationships, suggests that 'it is impossible to assess' the nature of any relationships. The spatial and visibility relationships suggest the relationship was purposefully constructed.

The relationship between enclosures, however, is much stronger and it is noteworthy that the area defined as the MiCDA for, for example, The Trundle, includes all the other causewayed enclosures in that cluster, despite The Trundle being the most westerly of the cluster. It is the case that despite their relative locations on the chalk hills, with undulating dry valley systems between them, the enclosures are all accessible with some ease, from the surrounding landscape. Indeed, from the alluvial plains to the south and to the north of the chalk range, they are all accessible with broadly the same ease, in cost distance terms.

It is unfortunate that the chronological precision (Tables 8, 9 & 10, pgs. 150-152) does not allow a more concise understanding of the temporal relationships between enclosures, enclosures and barrows, and the enclosures and other potential early Neolithic indicators.

Of the eastern enclosures, Whitehawk is probably the earliest and it may be no coincidence that it is both the most developed enclosure of the sub-group and is a seaward facing enclosure with a limited northern extent of the MaCDA. It is not possible to understand the relative chronologies of Offham and Combe Hill due to the lack of dateable material at Combe Hill. It would be plausible to

rationalise the territory around Whitehawk as being part of the earliest Neolithic in the area, resulting, sometime later with the building of the enclosure at Whitehawk to relate to the sea and the coastal area. As the Neolithic becomes more established, then Whitehawk is followed by the construction of the enclosures at Offham and Coombe Hill. These present a more inward-facing perspective relating to the increasing landward impact of Neolithic society.

A similar model works for the Western sub-group. Here we see that the earliest enclosure is probably represented by the inner circuit at The Trundle, which like Whitehawk is the most developed, and has a similar seaward-facing orientation. The western sub-group, however, has better access to the coastal plains and is more constrained by the topography and hydrology to the north. Further enclosures are developed which continue to have a seaward-facing perspective.

The geological analysis, in combination with the cost models and spatial analysis, suggests that the enclosures were not centrally located to extract maximum value from the immediate environs, with the minimum effort. Such a model would place the enclosures further north and off of the chalk uplands, where easier access to the ecologically diverse and resource rich alluvial plains, would have provided better opportunity.

The GIS models weaken the arguments previously made concerning territorial boundaries (Renfrew, 1973; e.g. Drewett, 1977; Barker & Webley, 1978), and indeed offer little support for the notion of fixed territorial boundaries in any sense.

The combination of viewshed, cost distance modelling and the spatial analysis of known habitative sites supports the view of separate groups being responsible for the construction of all the enclosures within each cluster. These group were probably focussed on the alluvial plains to the south of the chalk range, where the evidence of habitation is most compelling, and used the flat river valleys of the rivers Arun, Adur, Ouse and Cuckmere, to access the alluvial plains to the north of the chalk range and exploit the available resource. The models also suggest that these groups exercised a high degree of intentionality in the physical and visual displacement of the long barrows and enclosures, from the early established flint mines in the area.

These groups may have had 'focal areas' in the landscape, that is areas in which they felt most at home and called their own. However, the models could better support a hypothesis whereby early Neolithic groups did not operate only within defined territories, particularly in the earlier period in which the enclosures were beginning to be constructed, and the agricultural development of the landscape was in its infancy. The models suggest a more mobile early Neolithic, where different groups moved through and used the same areas of landscape at different times, coming together occasionally to participate in the ritualised construction of an enclosure, or the development of an existing one.

The causewayed enclosures of Wessex exhibit a different spatial distribution however, and the following section examines nine Wessex enclosures. The same methodology is used to generate a set of models that examine ten primarily, though not exclusively, upland enclosures on the Chalk.

		Causewayed Enclosure constructed				Causewayed Enclosure out of use date				Median indicators			
		Probable date range		Possible date range		Probable date range		Possible date range					
Name	Status	ceconealo	ceconlalo	ceconeahi	ceconlahi	ceendealo	ceendlalo	ceendeahi	ceendlahi	ceconmidhi	ceconmidlo	ceendmidhi	ceendmidlo
Barkhale Camp	Certain	?	?	?	?	?	?	?	?	?	?	?	?
Combe Hill inner circuit	Certain	?	?	3640	3010	?	?	?	?	3325	?	?	?
Combe Hill outer circuit	Certain	?	?	?	?	?	?	?	?	?	?	?	?
Court Hill	Certain	3605	3550	3650	3530	?	?	?	?	3590	3578	?	?
Halnaker Hill	Probable	?	?	?	?	?	?	?	?	?	?	?	?
Offham Hill inner circuit	Certain	3630	3585	3635	3555	3640	3500	3645	3490	3595	3608	3568	3570
Offham Hill outer circuit	Certain	?	?	?	?	?	?	?	?	?	?	?	?
The Trundle inner circuit	Certain	3710	3525	3900	3370	?	?	?	?	3635	3618	?	?
The Trundle second circuit	Certain	3640	3530	3650	3520	?	?	?	?	3585	3585	?	?
The Trundle spiral circuit	Certain	3710	3530	3940	3370	?	?	?	?	3655	3620	?	?
Whitehawk Camp inner circuit 2	Certain	3665	3635	3675	3630	3565	3520	3600	3370	3652	3650	3485	3542
Whitehawk Camp innermost circuit 1	Certain	3635	3580	3635	3560	3535	3465	3560	3300	3598	3608	3430	3500
Whitehawk Camp outer circuit 3	Certain	3650	3600	3660	3560	3550	3485	3585	3340	3610	3625	3462	3518
Whitehawk Camp outermost circuit 4	Certain	3635	3610	3650	3505	3535	3495	3575	3315	3578	3622	3445	3515

Table 8. Sussex enclosures construction and out of use dates.

			Barrow constructed				Barrow – final detectable activity			
Type	Name	Status	~1 Sigma		~2 Sigma					
Long Barrow	Bevis Thumb	Certain	3490	3470	3520	3005	?	?	?	?
Long Barrow	Bevis Tomb	Probable	?	?	?	?	?	?	?	?
Oval Barrow	Lacksash Lane	Certain	?	?	?	?	?	?	?	?
Long Barrow	Blackbush Copse (A)	Certain	?	?	?	?	?	?	?	?
Oval Barrow	Long Lane	Certain	3650	3545	3765	3475	?	?	?	?
Long Barrow	Blackbush Copse (C)	Certain	?	?	?	?	?	?	?	?
Long Barrow	Hunter's Burgh	Probable	?	?	?	?	?	?	?	?
Long Barrow	Long Burgh	Certain	?	?	?	?	?	?	?	?
Long Barrow	Money Burgh	Certain	?	?	?	?	?	?	?	?
Oval Barrow	Firle Beacon	Certain	?	?	?	?	?	?	?	?
Oval Barrow	Alfriston	Certain	?	?	3340	2620	?	?	?	?
Oval Barrow	Charleston Bottom	Probable	?	?	?	?	?	?	?	?
Oval Barrow	Pashley	Probable	?	?	?	?	?	?	?	?
Long Barrow	The Camel's Hump	Certain	?	?	?	?	?	?	?	?

Table 9. Sussex long barrows construction and final activity dates. Cal. BC

Source: Whittle et al, 2011, 207-263

	Flint mine starts				Flint mine ends				Median indicators				
Name	Probable date range		Possible date range		Probable date range		Possible date range						notes
Blackpatch	?	?	3975	3640	?	?	?	?	?	?	?	?	Single sample BM-290
Church Hill	?	?	4025	3690	?	?	?	?	?	?	?	?	Single sample BM-181
Cissbury	4120	3795	4600	3705	3495	3075	3595	2635	4152.5	3957.5	3115	3285	
Harrow Hill	4020	3785	4250	3705	3695	3580	3750	3395	3978	3903	3573	3638	
Long Down	?	?	3955	3650	?	?	?	?	?	?	?	?	Single Sample OxA -1152, though see OxA 1151, 1063 & 1088
Stoke Down	?	?	?	?	?	?	?	?	?	?	?	?	

Table 10. Sussex Flint mines construction and out of use dates.
Dates are cal. BC (after: Whittle *et al.*, 2011, 207-263)

3.3 Case study 2: Causewayed enclosures of the Wessex region.

The imprecisely defined historical area of Wessex dates from the sixth century (Hills, 2003, 52). The region lies towards southwest Britain, comprising parts of the modern counties of Dorset, Somerset, Wiltshire and Hampshire. Within the region there are ten certain causewayed enclosures including the enclosure at Netherfield Farm (Som.) (Mudd *et al.*, 2012) which lies on the western fringes of the Wessex area (Fig.50, p.155) and the recently discovered enclosure at Larkhill (Wilts).

A cluster of three enclosures to the north comprises Windmill Hill (408600, 171400), Rybury Camp (408470, 163720) and Knap Hill (412100, 163650). The twin circuit enclosure of Robin Hood's Ball (410220, 145940) and the single circuit at Larkhill, lie 17km south of the group within the Salisbury Plain Training Area. Westward, on the edge of the Deverills range of hills, lies the enclosure on Whitesheet Hill (380170, 135190).

Further south, Hambledon Hill and the later Stepleton enclosure (Whittle *et al.*, 2011, 136-146), lie in close proximity on the same chalk massif, whilst 40km to the west lies the recently discovered enclosure at Netherfield Farm (343534, 118414). Maiden Castle (369930, 88480) is the most southerly of the nine and lies some 25km southwest of the Hambledon Hill complex.

Four possible causewayed enclosures are excluded from this analysis. The unusually large enclosure at Crofton, 20km southeast of Windmill Hill, has an uncharacteristic 'V' shaped ditch, and excavation (Lobb, 1995) revealed no firmly diagnostic early Neolithic material. The status of Crofton as a causewayed enclosure is therefore considered uncertain (Oswald *et al.*, 2001,

72-73; Whittle *et al.*, 2011, 60-61). Similarly, the enclosure suggested at Cherhill (Pollard, 2005), 20km to the southwest of Windmill Hill, have been dismissed as a possible quarry (Oswald *et al.*, 2001, 157; Whittle *et al.*, 2011, 61). The Flagstones (Woodward, 1988) and Stonehenge I (Cleal *et al.*, 1995, 113) enclosures are also excluded on the basis of their later construction, their circularity and their ditch form (Oswald *et al.*, 2001, 134-5, 150 & 157).

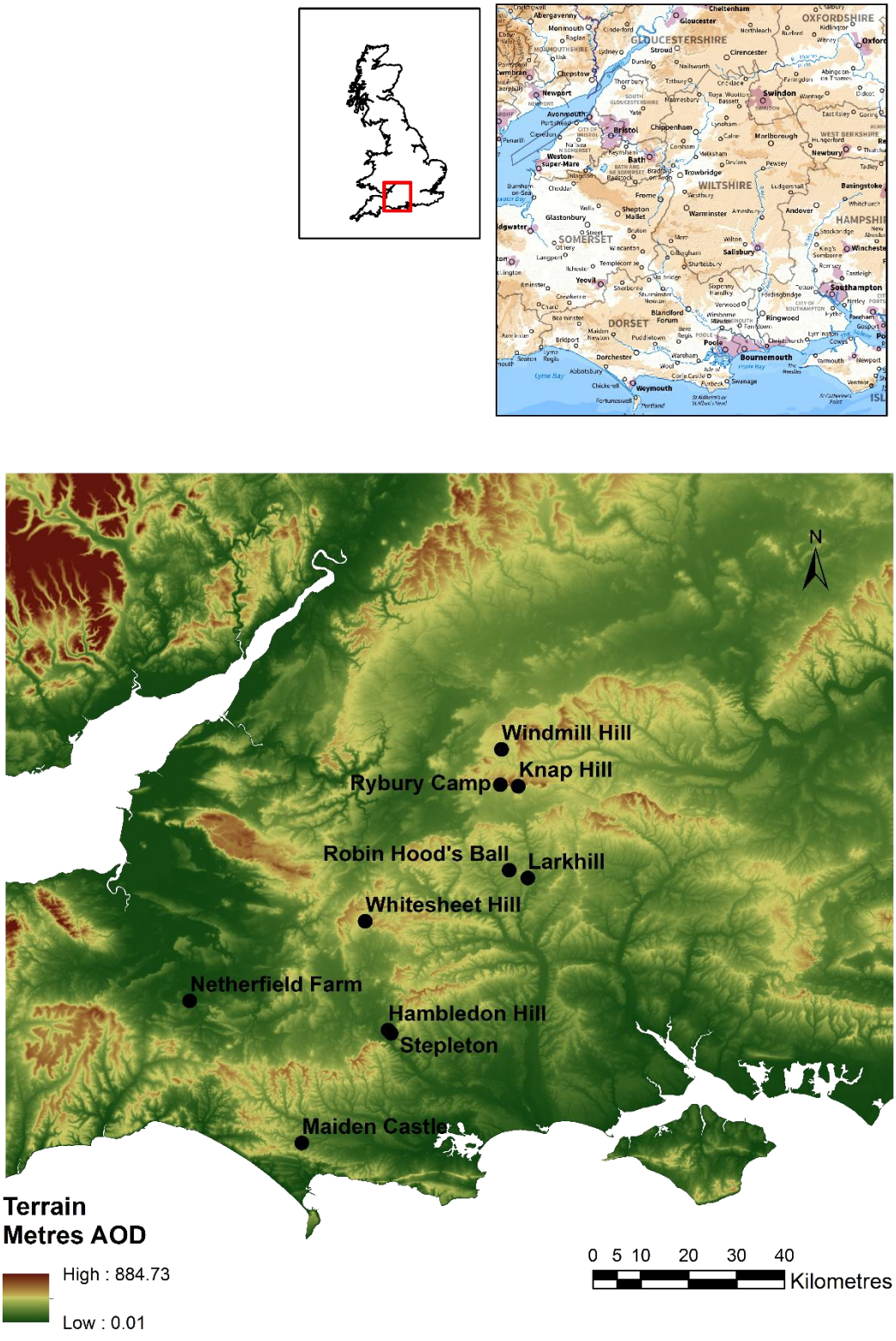


Figure 50: Location and extent of the Wessex study area.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

The dominant geological features are the impressive uplands which strike a swathe through the region. These White-Chalk Downs which run from the Norfolk coast, via the Chilterns and Berkshire Downs, join the Wessex region around Avebury and Marlborough, then continue in a southwest line towards the Dorset ridgeway at Dorchester and the north flank of the Purbecks. For most of its length, the chalk is bounded on its eastern flank by a strike of the Upper Greensand, however west of the chalk the bedrock geology also comprises large, low-lying areas of the Oxford and Kimmeridge clays, particularly around the Blackmore Vale. Deposits of Oolitic Limestones dominate between Yeovil and Bath, then on through Cirencester and towards Northampton. East of the chalk are the sands, silts and gravels of the New Forest area and the Thames Groups of Clays, Sands, Silts and Gravels running northeast from Newbury.

The density of prehistoric monuments on the chalklands, which today are covered with light rendzina soils supporting extensive areas of pasture, has resulted in extensive antiquarian activity, archaeological interest, and investigation. The history of prehistoric archaeological research includes the pioneering work of Augustus Henry Lane Fox Pitt-Rivers (Pitt-Rivers *et al.*, 1887) and OGS Crawford (Crawford & Keiller, 1928; Crawford, 1953), the rigorous surveys of the Royal Commission (e.g. RCHME, 1970), the painstaking work of individual practitioners (e.g. Green, 2000), the field research of combined universities and scholars (e.g. Barrett *et al.*, 1991a; Barrett *et al.*, 1991b; French *et al.*, 2007a), and works of broad synthesis (e.g. Cunliffe, 1993). Off the chalk, the archaeological record is less impressive and

where Neolithic remains have been recorded, they are often found deeply buried under alluvial or colluvial deposits (e.g. Woodward, 2001).

Drainage patterns are complex: the River Kennet drains east and into the Thames. The River (Bristol) Avon, drains westward into the Bristol Channel at Avonmouth, whilst the rivers Yeo, Cary and Parrett drain east to west and also into the Bristol channel, north of Bridgewater. The rivers Stour, Irwerne and Allen drain into the Hampshire Avon, itself discharging into the south coast at Hengisbury Head, whilst the rivers Frome and Piddle which drain west to east, discharge into Poole Harbour at Wareham.

3.3.1 **Netherfield Farm**

The causewayed enclosure at Netherfield Farm (Mudd *et al.*, 2012; Brett & Mudd, 2013) (Fig.51, p.158) represents the smallest of a class of simple single-circuit enclosures and stands in isolation on low-lying ground just off the Somerset Levels at 20m AOD. The enclosure is predated by a single pit, probably 3740-3690 cal BC (p=52%) (Mudd *et al.*, 2012), located 200m to its northeast within the terminal entrance of a later long enclosure constructed in 3460-3345 cal BC (p=76%)[2].

[2] This date taken from the first of two alternative Bayesian models presented for the long enclosures which are dependent on the treatment of a single radiocarbon sample (48614). Dates quoted represent 48614 as a redeposited sample, treatment as a sample in a contemporary context results in a later estimate of 3450-3365 cal BC (p=51%) (Mudd et al. 2013, table 13).

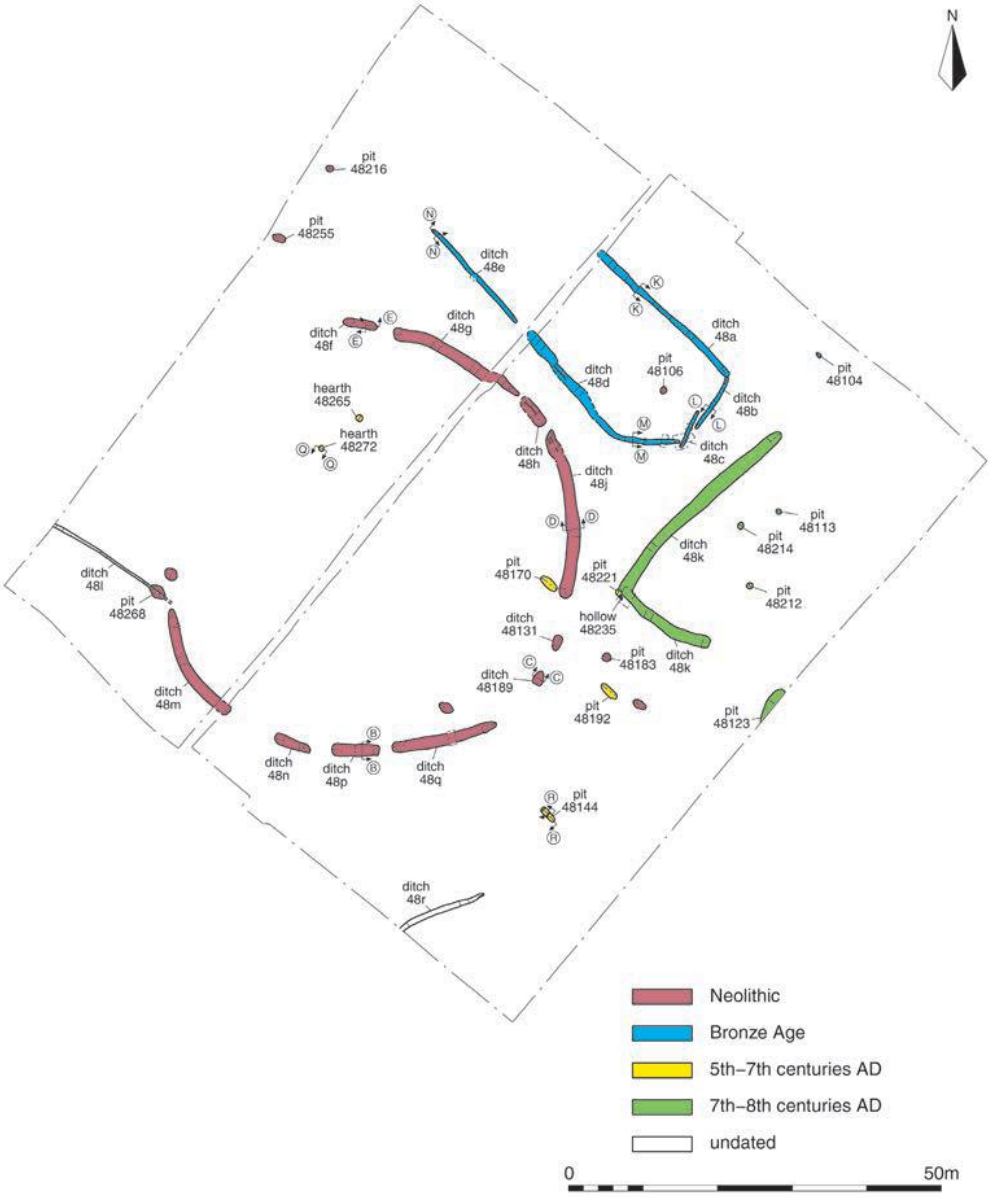


Figure 51: Plan of the Netherfield Farm enclosure.

Source: (Mudd *et al.*, 2012)

The enclosure is situated within 200m of the Lambrook Brook, which drains into the River Parrett 1km to the northeast. A slightly acidic, late Pleistocene colluvial deposits of clay and silt, with small flint pebble inclusions, overly the mudstones and sandstones of the Dyrham formation. These combine to form a slight northwest-facing slope on which the 55m dia. Enclosure was

constructed. The remaining features consisted of 11 substantially truncated ditches that may have originally formed a broadly circular enclosure, though on excavation the northwestern quadrant seems to have been lost to later agricultural activity.

The spatial isolation of the Netherfield Farm causewayed enclosure is represented in both the cost and visibility models. However, it must be recognised that the recent fortuitous discovery of the enclosure at Netherfield Farm highlights the distinct possibility that other similar lowland enclosures may have existed in Wessex and remain undiscovered, buried under alluvial or colluvial deposits.

The visibility model (Fig.66, p.213) predicts that the dominant short-distance views are to the north, with only limited views of higher ground to the west, east and south-southeast. This characteristic is replicated in the middle-distance views and long-distance views, though here we also see visual access along the southwestern flanks of the Mendip Hills. There are no known contemporary earthwork monuments visible from the enclosure. In the near-distance views, the possible early Neolithic indicators includes the find spot of only one leaf-shaped arrowhead, whilst in the mid and far distance views, the count increased to include only two further leaf-shaped arrowheads and one polished axe.

The paucity of flint in Somerset is well attested, with most being derived from fluvial gravels (Mudd *et al.*, 2012, 39). This characteristic is reflected in the lithic assemblages from the enclosure itself where chalk based flint represented only 1.3% of the assemblage. The extreme distant views to the Mendips, point

to a general area with a considerably higher concentration of early Neolithic sites, including long barrows. Though the locations of these sites are not within the boundaries of the visibility model, and the detailed chronology of the area poorly understood, these distant views, towards an area of activity may have been an important factor in the siting of the Netherfield Farm enclosure (Fig.67, p. 214).

The cost distance models (Fig.68, p.215) for Netherfield Farm also reflect the relative isolation of this causewayed enclosure and report a very limited count of early Neolithic indicators (Table 11, p.161). Within the MiCDA the possibly contemporary archaeology may represent the background distribution of the archaeological record and there is no apparent pattern to its distribution.

The same may be concluded for the MeCDA with the exception of the cluster of potential settlement or habitation indicators to the north. These are the preserved trackways and hurdles of the Somerset peat, including: the Sweet Track, the Sutton Hams Track, Baker's Platform and Track, the Honeygore, Honeydew, Honeybee and Honeycat Trackways, Jones Trackway, the Foster-Walton Trackway and the Meare Heath Hurdles (Fig.68, p.215). Constructed from trees felled in 3807-3806 BC (Coles & Coles, 1986; Hillam *et al.*, 1990), the Sweet Track represents an earlier phase of Neolithisation that predates the enclosure construction, probably by at least two centuries. The chronologies of other tracks are less well documented, however we may assume that this area of the Somerset Levels was an important area of activity before, and possibly at the time of, the enclosure's construction.

Netherfield Farm	MiCDA (4hr)	MeCDA(8hr)	MaCDA(12hr)
Causewayed enclosures	0	0	0
Long barrows	0	1	23
Settlement habitation	0	17	22
Leaf-shaped arrowheads	2	9	26
Fully polished axes	3	22	47
Other EN lithics	0	7	9

Table 11. Netherfield Farm summary cost distance data.

The greater distances included within the MaCDA extend the model towards greater concentrations of Neolithic activity, primarily on the Mendip Hills and the Dorset Downs northwest of Dorchester. Also included are a cluster of polished Chert axes from Langford Budville (Som).

The six earthen long barrows on the Mendips plateau and the three further examples on the northern slopes are undated (Lewis, 2011b). These can only be assigned a broad date based on other examples (e.g. Whittle *et al.*, 2007a, 127), possibly beginning from 3750 cal BC with a continuing period of construction that extended into the mid to early 34th century cal BC (Whittle *et al.*, 2007a, 132). Without further work we cannot be sure that the period of use of the Mendip long barrows were contemporary with the enclosure at Netherfield Farm, though it is likely they may have been (Lewis, 2011a, 97).

The cluster of twelve long barrows within the MaCDA to the south is part of a larger collection comprising 21 in total. This group appear to be part of an area of activity that may be more closely associated with the causewayed enclosure at Maiden Castle and are hence considered as part of that analysis.

An interesting possible outlier 20km to the east, and midway between Netherfield Farm and the enclosures at Hambledon Hill, is the isolated pit at Tinney Lane, Sherborne, Dorset. This pit, containing lithics and plain bowl pottery, was ascribed by the excavator to the early Neolithic (Valentin, 1995). No radiocarbon dates are available.

3.3.2 **Maiden Castle.**

The causewayed enclosure at Maiden Castle is the most southerly of the Wessex group, and at 8ha is 30 times the size of the Netherfield Farm enclosure. This enclosure was first identified during a major campaign by Wheeler in 1934-37 (Wheeler, 1935; 1943) when investigating the overlying Iron Age hillfort. A second excavation by Sharples (Sharples, 1991; Sharples & Ambers, 1991) in 1985-6 was successful in further refining the Neolithic complex and in particular recovering a substantial assemblage of material from the ditches.

The highest point of the enclosure lies at 134mAOD, tilting slightly towards the east, on the eastern knoll of an isolated outcrop of the Upper Chalk. To the south is the valley of the south Winterbourne (sic), beyond which lies the Dorset Ridgeway, itself an area of outstanding later prehistoric activity (Woodward, 1990). The 1985-6 project included detailed landscape and environmental surveys (Sharples & Ambers, 1991, chpt. 2) which supplemented the earlier work by Woodward to provide a detailed reconstruction of the prehistoric conditions.

Notwithstanding the relatively low-lying position, the enclosure is well located to enjoy almost 360º of near distance views, the only obscurity being the western

end of the chalk outcrop. The primary focus of view appears to be towards the south east (Fig.69, p.216) where it enjoys extensive views along the Frome Plain towards the Purbeck Hills. To the north and to the west, the near-distant views are interrupted by the Frome and Piddle valleys, beyond which the elevated ground comprising the Dorset Downs defines the limit of view.

Despite the proximity of a number of early Neolithic long barrows, few are within the visual range of the enclosure. The cluster on the Dorset ridgeway, including the Hellstone, the long barrow at Portesham, the Grey Mare and her Colts at Littlebredy, and Beacon Knap, are all out of view. Similarly, those on the Dorset Downs to the west, including the long barrows at Sheep Down, Combe Farm, Winterbourne and Eggerton Hill are not intervisible. On the Downs to the northwest, the cluster of five along the Frome Valley are also obscure, as is Maiden Castle long barrow which is less than 1km from the enclosure. The only two long barrows that the model reports as intervisible with the causewayed enclosure are Bincombe and Culliford Tree, to the south east. As in Sussex, there seemed to have been a preference to place enclosures and long barrows such that they were not intervisible perhaps suggesting a less than intimate relationship (cf. Ashbee, 1970).

This characteristic lack of intervisibility presents a marked contrast with early Neolithic pits most of which the model reports as being within the visible range of the Maiden Hill enclosure. One to the north at Dorchester Middle School, a cluster at Poundbury, one to the northeast at Allington Avenue, and one to the southeast on Bincombe Hill. All the early Neolithic pits recorded in the area are intervisible with the causewayed enclosure.

The molluscan evidence from the pre-enclosure period and the lower fills of the enclosure ditches suggests an area of mixed woodland interspersed with areas of more open country (Evans & Rouse, 1991, 123). The enclosure had been cleared of woodland, whilst the area around was being increasingly cleared during the life of the enclosure (Sharples & Ambers, 1991, 255). The visibility modelling may therefore represent a reasonable approximation to the early Neolithic conditions and whilst the pits themselves may not have been visible, the 'place' of the pits may have been, and the enclosure may have been visible from the pits.

The coastal proximity is apparent and all three CDA's around Maiden Castle extend to include the south coast, which has the notable effect in reducing the land area returned within the CDA models. At first glance the cost distance models reinforce the variation of spatial associations within Wessex and unlike Netherfield Farm, Maiden Castle appears within an area of intense early Neolithic activity (Fig.70, p.217).

Temporal associations with early Neolithic indicators outside the enclosure are made difficult by the very short duration that the enclosure was in use: 1-50 years (p=95%), 1-20 years (p=68%) (Whittle *et al.*, 2011, 188). This, coupled with the paucity of any measurement-based chronological evidence from long barrows in the area (Ashbee, 1970; Whittle *et al.*, 2011) and the wide chronological span assigned to the many pits, reduces the interpretation that may be effectively applied to any spatial analysis.

There are eight pit clusters spatially associated with the Maiden Hill enclosure (Fig.71, p.218). At one of these clusters, excavations by Wessex Archaeology

(Dinwiddy & Bradley, 2011) in 2007 identified 14 early Neolithic pits at Poundbury, Dorchester. All appear to be earlier than the causewayed enclosure, dating from 3770 to 3640 cal. BC (p=95.4%) *probably* from 3680 to 3630 cal. BC (p=86.9%) (Barclay, 2011). A similar picture emerges from the pits within the (late, though interrupted ditch) enclosure at Flagstones (Smith *et al.*, 1997) and the two pits at Rowden (Woodward, 1990, ch. 4), all of which appear to predate the causewayed enclosure (Whittle *et al.*, 2011, 191-2).

Further afield, within the MaCDA, the site at Reap Lane, Portland (Bellamy, 2000a; 2000b) revealed the remains of a rectangular post-built structure interpreted as an early Neolithic building with an external hearth. No radiocarbon dates are available and dating is based on lithics and one sherd of early Neolithic pottery. Similarly, the site at Tinney Lane, Sherborne that yielded 293 sherds of prehistoric pottery, which also included some (unquantified) early Neolithic plain ware amongst the assemblage, could only be dated by vessel form (Valentin, 1995).

Accepting pits as an indicator of settlement or habitation (e.g. Whittle, 1998, 57), then the overall distribution seems to place Maiden Castle at the centre of a pattern of earlier activity (Table 12, p.166). On the basis of evidence of hawthorn, ash and hazel (Woodward, 1990, 129-30), this enclosure may have been a focal point within an open or disturbed landscape, which by the date of the later Flagstones enclosure, the Allington Avenue bank barrow, and the bank barrow on Maiden Castle itself, was being increasingly cleared of woodland.

Maiden Castle	MiCDA	MeCDA	MaCDA
Causewayed enclosures	0	0	2
Long barrows	17	24	31
Settlement / habitation	8	9	15
Leaf-shaped arrowheads	1	1	6
Fully polished axes	1	6	19
Other early Neolithic lithics	0	0	0

Table 12: Maiden Castle summary cost distance data.

The distribution of long barrows, however, is somewhat different. The long barrows of the Dorset ridgeway were subjected to survey in 2006/7 (Riley, 2008). Four groups were identified:

1. Those considered to be of chambered or megalithic construction (5 in number), including the Hellstone, Portesham, and the Grey Mare and Her Colts, lying west-southwest of Maiden Castle.
2. The Long Bredy Group (7). Including Eggarton, Two Gates, and Martins Down.
3. The Maiden Castle Group (3). Including the posited precursor of the bank barrow within Maiden Castle (Bradley, 1984a), the Maiden Castle barrow, and Lanceborough, lying adjacent and north of the Maiden Castle causewayed enclosure.
4. The Broadmayne group (2). Comprising Bincombe Hill and Culiford Tree, lying isolated on the eastern end of the Ridgway to the southeast of the enclosure.
5. The Bradford Peverell group. Lying to the north of the Ridgeway, including some not considered by the survey, positioned northwest of the enclosure, strung along the high ground south of the Frome valley.

None of these long barrows are recently excavated (Ashbee, 1970; Whittle *et al.*, 2011) and hence can only be assigned date ranges based on the more precise chronology attained for other examples (eg. Benson *et al.*, 2007; Whittle *et al.*, 2007a; Whittle *et al.*, 2007b; Whittle *et al.*, 2007c; 2007d; Wysocki *et al.*, 2007; Mercer & Healy, 2008) .

Sharples (Sharples & Ambers, 1991, 54) seems doubtful about the validity of Bradley's suggestion (in 3. above), leaving 17 known long barrows within the MiCDA, of which 15 lie in the quadrant that is northwest to north of Maiden Castle. With the exception of Rowden, and possibly the West Hill pit, these long barrows are all spatially dislocated from areas of known activity which tend to be concentrated in the southeast quadrant.

The MeCDA suggests a possible further six long barrows located within a day's reach, perhaps suggesting a significant degree of mutual influence to have existed between the enclosure and these monuments.

The chambered long barrow at Bere Regis, however, is just outside the MiCDA of the Hambledon Hill and Stepleton enclosures and may be more associated with the early Neolithic complex there. The probable long barrows at Stonehill Down and that on Nine Barrow Down (Corfe Castle) may be more associated with early Neolithic activity around the Purbeck Hills.

If we accept the MaCDA as approximately representative, then the model suggests that travel from the causewayed enclosures on Hambledon Hill to that at Maiden Castle could be achieved within 12 hours and travel from the Netherfield Farm enclosure to Maiden Castle almost achievable within the same period of time. The period of time between the construction date and the

end of activity at Maiden Castle falls within the in-use date of the Hambledon Hill enclosures. The probable construction date at Netherfield Farm just precedes that of Maiden Castle. It is quite possible that all three enclosures were in concurrent use and that, given their relative proximity, all three enclosures were known to the same early Neolithic group or groups. It is conceivable that the same individuals may have contributed to activities at more than one enclosure.

The MaCDA also includes known areas of activity in the form of early Neolithic pits along the Stour Valley at Corfe Mullen, Pamphill, Moortown aerodrome, and Knighton Farm (Fig.68, p.218). The possible relevance of these is later discussed.

3.3.3 **Hambledon Hill main enclosure and the Stepleton enclosure.**

Hambledon Hill is an isolated massif of the Upper, Middle and Lower Chalks with some deposits of clay-with-flints restricted to the dome-like summit. The hill rises to 192m AOD and is located at the junction of the three North Dorset parishes of Hanford to the southwest, Child Okeford to the west, and Iwerne Courtney (or Shroton) to the east. An Ordnance Survey Trig point on the summit is located at NGR ST84828.50,12246.40. To the east the land is drained by the River Iwerne, and to the west and south by the River Stour. Hambledon Hill represents a transition in the landscape between the chalk Downland of the Cranborne Chase and the low-lying Oxford and Kimmeridge clays of the Blackmore Vale.

These characteristics have attracted human activity since the Mesolithic. Prehistoric exploitation of the hill is witnessed in Neolithic causewayed

enclosures and long barrows, Bronze Age round barrows, and a well preserved Iron Age hillfort (Fig.52, p.170) (Oswald, 1997; Mercer & Healy, 2008). The conjunction of the parish boundaries suggest that the hill maintained a prominence in the medieval period. Today the SSSI comprises both farming and wooded areas, and is under the stewardship of Natural England, with some areas under pasture and some arable.

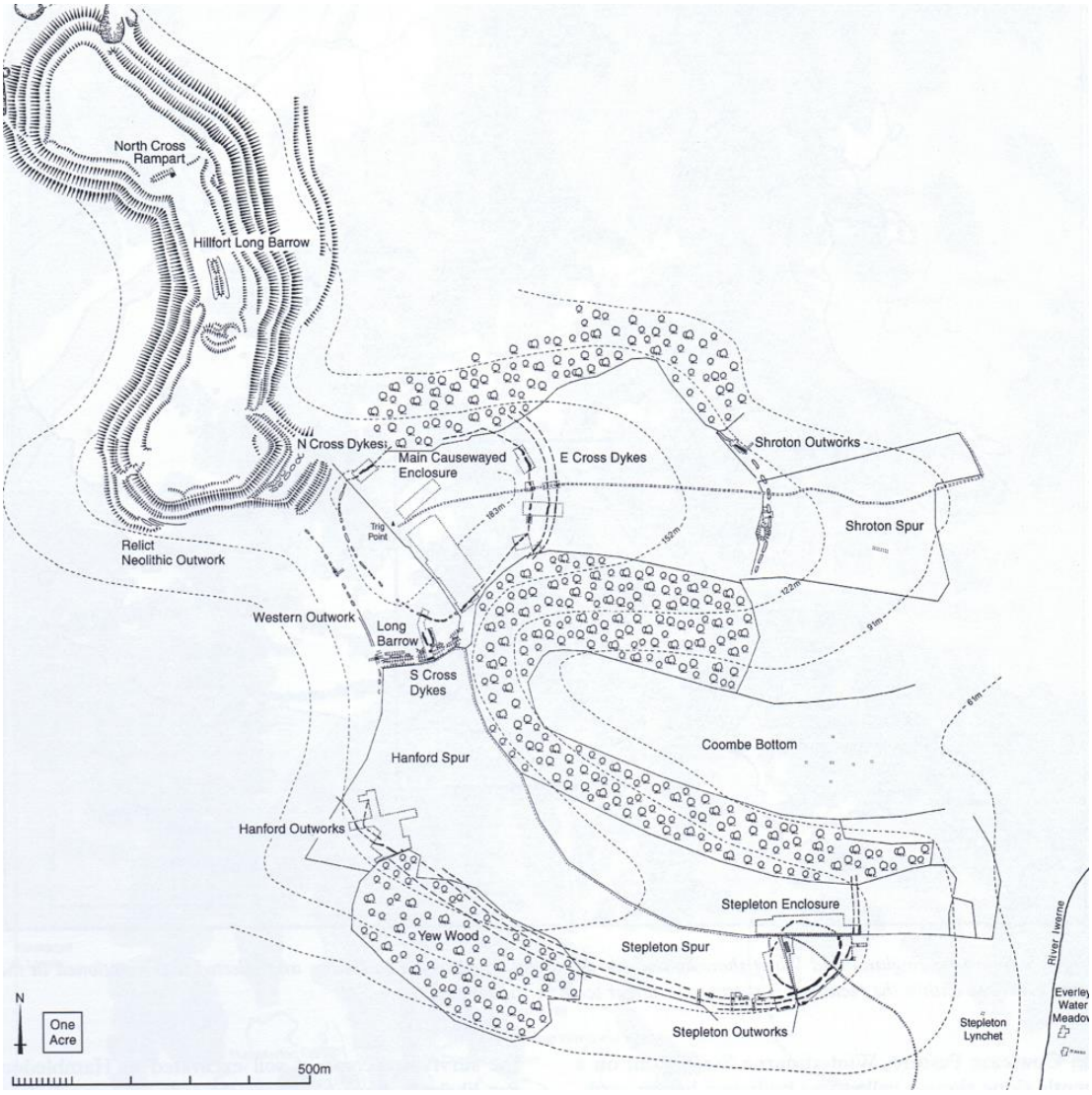


Figure 52: Hambledon Hill Neolithic complex.

Whilst the Iron Age hillfort (top left) overlies some early Neolithic components, the hillfort appears to have been purposefully sited to avoid the main focus of earlier activity and the construction also respects early Neolithic components within the hillfort boundary.

Source: Mercer et. al., (2008), p.5

Hambledon Hill represents a uniquely developed early Neolithic landscape comprising of the main enclosure, a second causewayed enclosure 950m to the southeast on the Stepleton spur, two known long barrows north and south of the main Neolithic enclosure, a succession of cross dykes concentric with the main enclosure on each spur of the hill, and a series of outworks (the Stepleton, Hansford, Western and relic outworks) which may have originally represented a long linear boundary following the south western contour of the hill (Oswald, 1997).

For the GIS model to be valid it was essential to preclude the possibility of a third enclosure on the northern spur of the hill. As part of this research, a geophysical (gradiometry) survey was carried out across the whole hillfort with the objective of establishing whether a third enclosure may have been present on the northernmost point of the hill, and to investigate whether any further possible Neolithic features lay under the hillfort (Durkin, 2012) (Figs. 53, 54 & 55, pgs. 172-4). No additional enclosure was found, though other possible Neolithic features may have been identified.

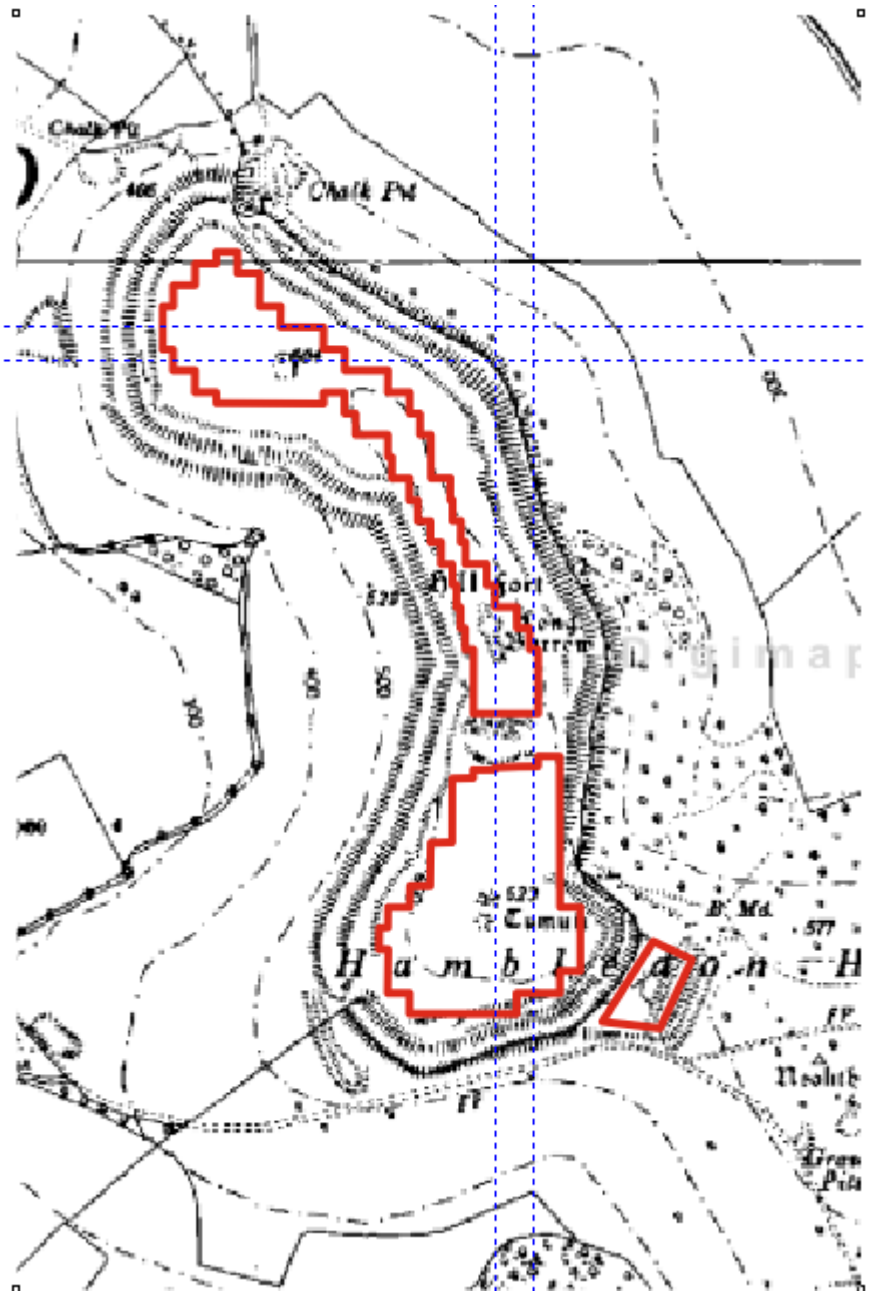


Figure 53: Extent of geophysical survey on Hambledon Hill.

Survey conditions were difficult. The edges of the hill slope away at up to 30 degrees and weather conditions were poor, with rain and high winds.

Source: Durkin, 2012 / Edina Digimap, crown copyright/database right 2012. An ordnance Survey/Edina supplied service

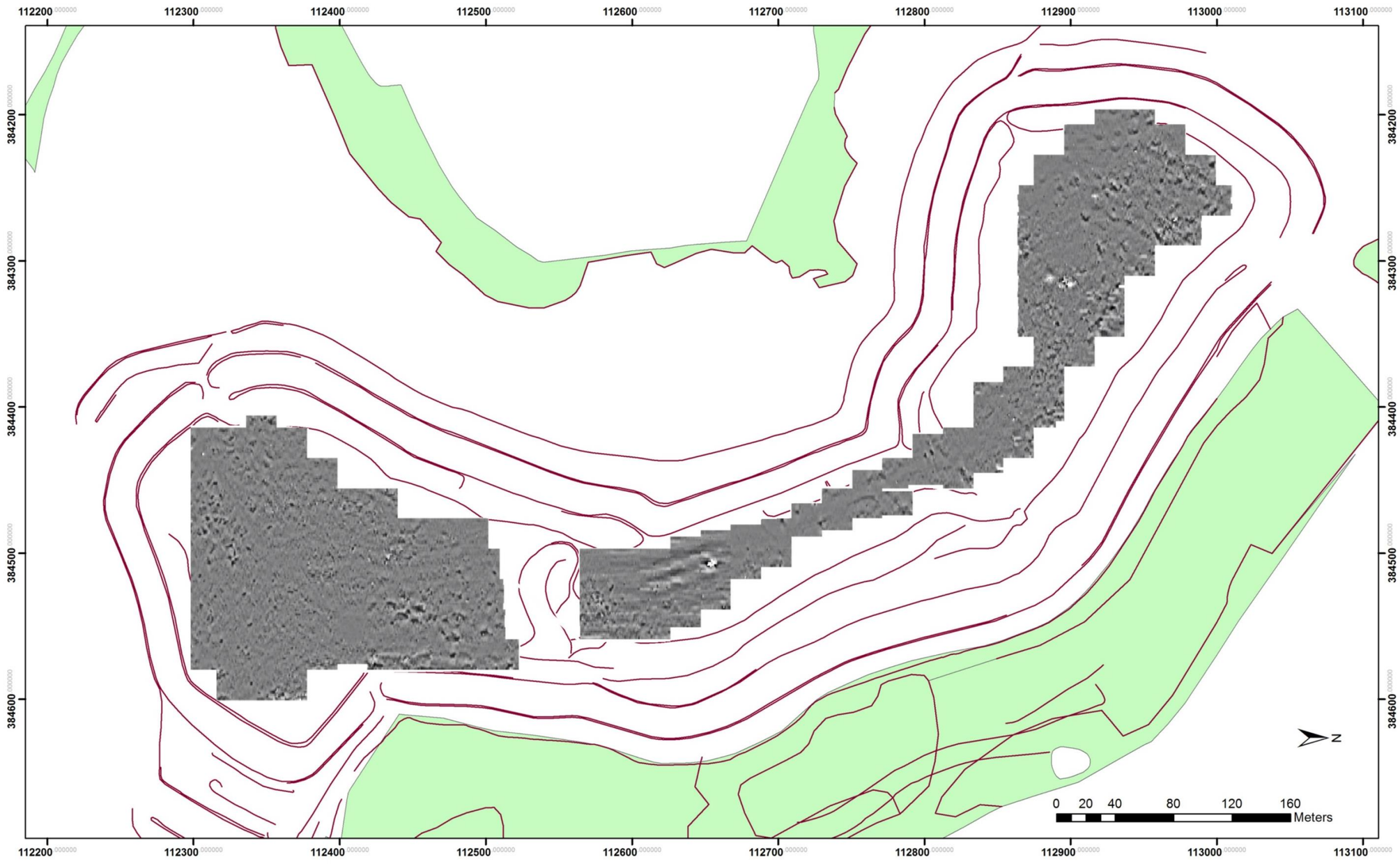


Figure 54: Hambledon Hill geophysical survey results.

Source: Durkin, 2012 / Edina Digimap, crown copyright/database right 2012. An ordnance Survey/Edina supplied service

Figure 54:

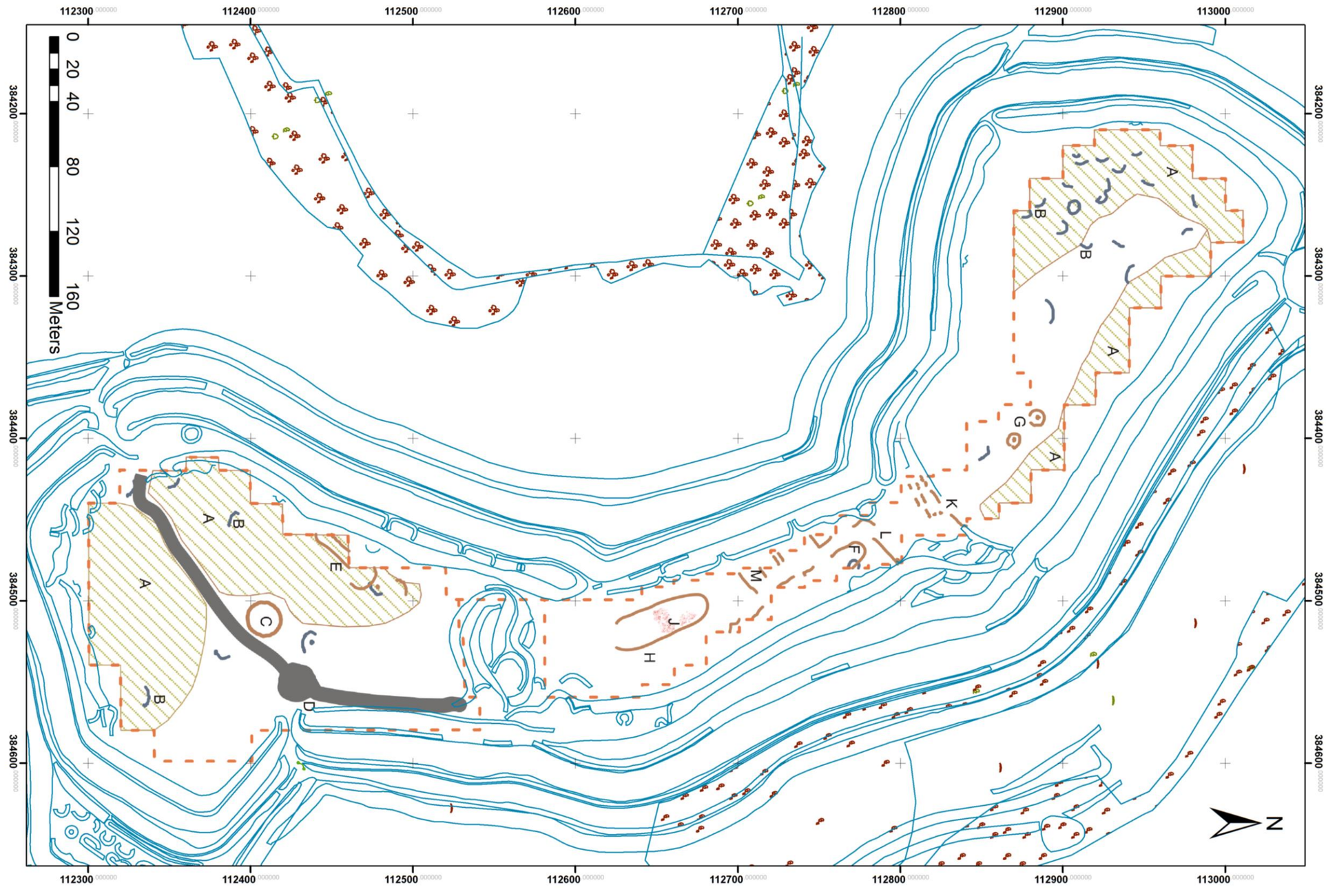


Figure 55: Interpretation of Hambledon Hill geophysical survey results.

Additional potential early Neolithic components with interrupted ditch systems are evident at 'K', 'F' and 'M'.

Source: Durkin, 2012 / Edina Digimap, crown copyright/database right 2012. An ordnance Survey/Edina supplied service

Figure 55:

Excavations by Mercer (Mercer & Healy, 2008) provided radiocarbon samples that enabled an interpretative chronology (Fig.56) with the unfortunate exception of the northern long barrow, which apart from an unrecorded antiquarian intrusion, remains unexcavated.

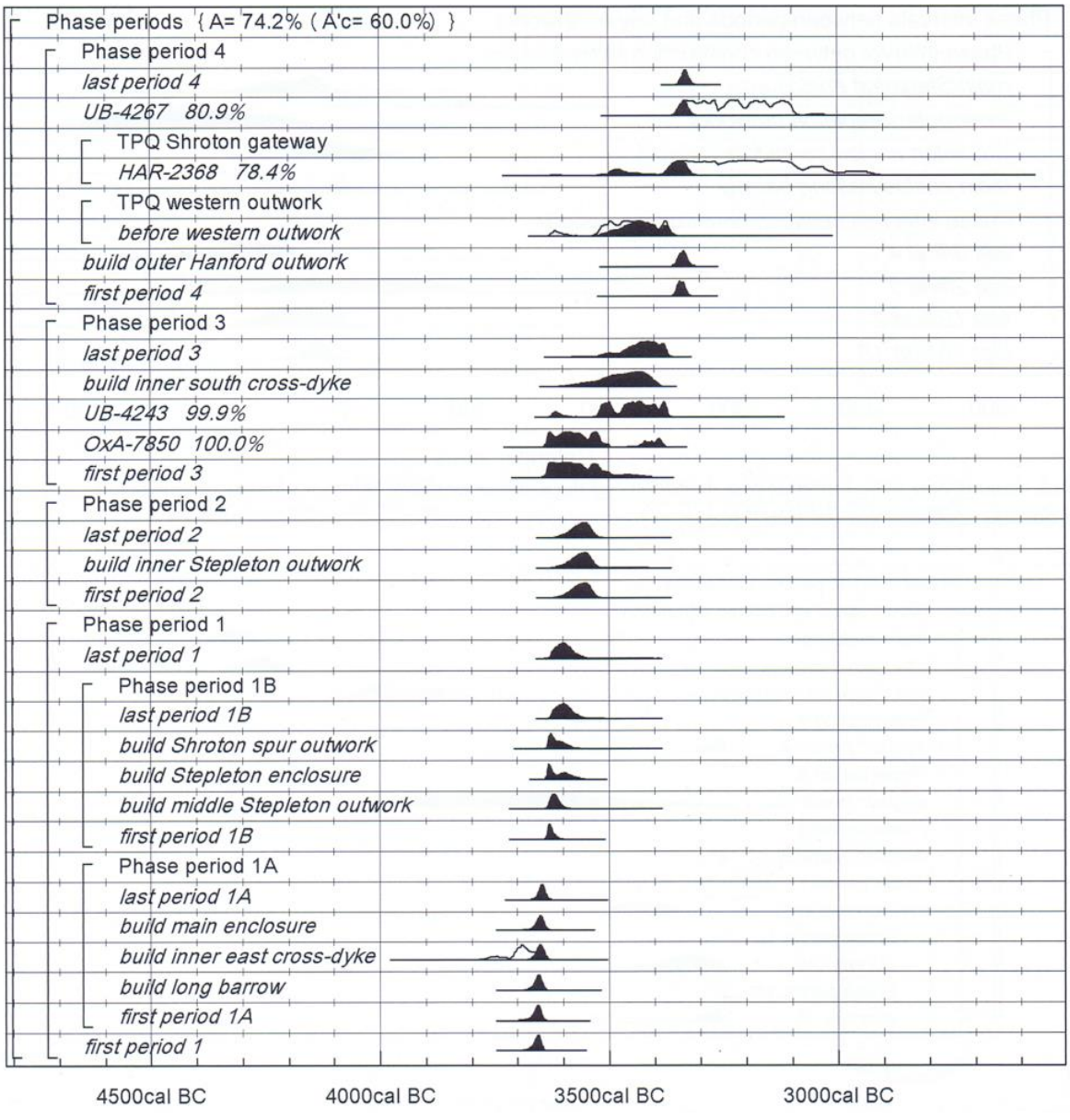


Figure 56: Hambledon hill posterior density estimates.

Source: Whittle et. al., (2011), p.145

The complex seems to have developed firstly as a place of one, possibly two long barrows on the summit, followed by the construction of the main causewayed enclosure (p=67%). The enclosure was then developed by the addition of the (eastern) cross dykes[3], followed some 150 years later by the construction of the independent Stepleton enclosure (p=95%). The two enclosures were then combined by the construction of the various outworks (p=44% to p=100%).(Whittle *et al.*, 2011, 137 table 4.4). The Hambledon Hill complex is unique, not only for the complexity of its development but also in having long barrows within the curtilage of the cross-dyke enclosure.

Although only differing in elevation by 40m, the visibility characteristics of the Hambledon Hill and Stepleton enclosures are very different. The higher main enclosure has striking near-distance views in all directions (Fig.72, p.219) except for two shallow arcs: one to the northwest where visibility is restricted by the slightly higher northern extreme of the hill, and another to the south-southeast where the adjacent Hod Hill also interrupts near-distance views.

Hambledon Hill enjoys commanding mid-distance views over the surrounding landscape, particularly to the north and the west, though a direct view towards the causewayed enclosure at Whitesheet Hill is interrupted at 15km by the Upper Greensand outcrops of Duncliffe Hill and Shaftesbury. To the west and northwest there are extensive views across the Vale of Blackmore, an area which is likely to have been characterised by low-lying clay rich marsh interrupted by occasional outcrops of gravels, sands and Corallian limestone

[3] The chronology of the eastern cross dyke is estimated by Bayesian statistical dating whilst the construction of the other cross dykes are assumed contemporary.

(Durkin, 2014), providing the opportunity of a wide range of resources. In the easterly direction, the rising ground towards the Cranborne Chase limits visibility to approximately 5km, though the area of long barrows on Thickthorn Down and Gussage Hill (Barrett *et al.*, 1991b; Green, 2000) may just have been visible.

The extreme-distance views are also impressive, with visual access to the Purbeck range and the Corfe Gap and along the Stour Valley towards the south coast east of Poole, where on a clear day, the outline of the Isle of Wight is faintly visible.

Though the hillfort may mask earlier features, the lack of any obvious Neolithic component on the northernmost part of the hill is perhaps surprising since near-distance, mid-distance and far-distance views are all improved from this slightly elevated and more prominent position.

The Stepleton enclosure nestles on the lower slopes at the southern end of Hambledon Hill. The viewshed to the north is restricted by the higher ground of Hambledon Hill whilst views to the south are restricted by its close proximity to the more elevated Hod Hill (Fig.73, p.220). Views today are also restricted by vegetation and a farm building; however, the model suggests good near- and mid-distance visibility up the Iwerne Valley, beyond the Shroton spur of the main enclosure and in a quadrant between Hod Hill (south) across the Stour towards the lower parts of the chalk ridge.

The construction of the Stepleton enclosure added very little to the overall area of landscape that may have already been visible from the Neolithic complex further up the hill (Fig.74, p. 221). Nevertheless, the areas that it does add may

have been significant to the complex as a whole. In the near-distance Stepleton improves visibility along the southern flank of the Hill. In particular it affords visibility to and from parts of the Stour and Iwerne Valleys and the lower reaches of Hod Hill, that would not otherwise be intervisible with the complex. These rivers were, by the Iron Age, important communication routes from the south coast (Cunliffe, 2010) and may also have been important in the early Neolithic.

Though Mercer (1980, 59) suggests the felling of some 3000 trees as necessary to build the enclosures, hence implying a substantially cleared landscape in the immediate environs, Bell (2008) interpreting the molluscan evidence, suggests the survival of tree and scrub beyond their construction and into the Neolithic (c.f. French *et al.*, 2007b, 100-1). A wooded environment would have affected visibility at ground level. However, both enclosures are of sufficient elevation to look down over any tree canopy or lower level vegetation. The presence, if not the body, of people moving around the landscape, may have been detectable and the smoke from fires would be evident, certainly in the near- and mid-distance range.

Since the Hambledon Hill and Stepleton enclosures are in such close proximity, the cost models are, for all practical purposes of interpretation, identical (Fig. 75, p.222). Their elliptical form reflects easier access along the Stour floodplains from the coast, and north-westward from the flat clays of the Blackmore Vale.

The relationship between Hambledon Hill and Cranborne Chase was noted by Tilley (1994), and although we now know the Dorset Cursus to be probably

(P=72%) later than the final phase of Hambledon Hill (Whittle *et al.*, 2011, 150), we can only assign approximate early Neolithic dates to the cluster of four long barrows on the periphery of the MiCDA at Thickthorn Down. The evidence from the excavated southern long barrow at Hambledon Hill suggests that the barrow and the main enclosure were built within a single generation (Whittle *et al.*, 2011, 135-6). It may be that the long barrows of Cranborne Chase (French *et al.*, 2007b) were similarly contemporary, and those people that constructed the enclosures on Hambledon Hill were aware of, and may have had interactions with, the constructors of the long barrows on Cranborne Chase.

The distribution of long barrows around the two enclosures on Hambledon Hill is markedly different to that of Maiden Castle (Fig.74, p.221 & Fig. 76, p.223). Despite both enclosures having long barrows in close proximity, the focus of distribution around the Hambledon enclosures lies outside the MiCDA, whereas Maiden Castle seems more intimately related to long barrows which have a distribution focus well within the MiCDA.

More widely, the landscape contained within the MeCDA perhaps begins to draw out some of the difficulty with using datasets derived from the HER. A marked difference in the record is apparent within the Wiltshire and Dorset boundaries, with Wiltshire reflecting a marked increase in the recorded density of fully polished axes. Despite this an interesting pattern emerges of early Neolithic pits, which follow the line of the river Stour, from the estuary at Hengisbury Head, upstream towards Hambledon Hill. This pattern of riverine association is repeated in the recorded locations of fully polished axes, where of the 92 recorded in the MaCDA, 68 have been recovered within 0.5km of the rivers Avon, Brue, Frome, Piddle or Stour, or their tributaries (Table 13, p.180).

Hambledon Hill and Stepleton	MiCDA	MeCDA	MaCDA
Causewayed enclosures	1	1	3
Long barrows	5	28	66
Settlement / habitation	1	7	16
Leaf-shaped arrowheads	1	7	23
Fully polished axes	3	33	92
Other early Neolithic lithics	0	1	5

Table 13.: Hambledon Hill and Stepleton summary cost distance data.

Riverine associations may have persisted from an earlier era witnessed in the clay-with-flint deposits on south facing slopes of the Cranborne Chase where 27 tightly defined concentrations of Mesolithic artefacts (Arnold *et al.*, 1988; Barrett *et al.*, 1991b) can also be shown to have associations with the spring line and the upper reaches of stream and rivers (for a general discussion see: Bradley, 2000).

The cost distance analysis suggests that Hambledon Hill could be accessed from the causewayed enclosure to the north on Whitesheet Hill within approximately eight hours. Similarly a journey from the causewayed enclosures at Maiden Castle (lying within the MaCDA) and indeed Robin Hood's Ball could be achieved in two days. The range of 'in-use' dates for the Hambledon and Stepleton enclosures, suggests that the enclosures on Maiden Castle and Whitesheet Hill were constructed after the enclosures on Hambledon Hill, and fell out of use before activities at Hambledon Hill ceased. The situation at Robin Hood's Ball (though we have no out-of-use estimate) constructed probably (p=68%) between 3635 and 3570 (Whittle *et al.*, 2011, 197) may have been similar.

3.3.4 **Whitesheet Hill.**

The well-preserved causewayed enclosure on Whitesheet Hill is situated at the southwest extreme of a chalk massif that extends over much of modern Wiltshire. Last investigated in 1990 (Corney & McOmish, 2004), the univallate enclosure was probably (p=68%) constructed between 3595 – 3550 cal.BC and was probably (P=68%) in use for 1-55 years (Whittle *et al.*, 2011, 164). Although not proven, there are other earthworks on the hill (Fig.57, p182) which may be related, including cross dykes across the hill top spur, and the possibility of a further causewayed enclosure beneath the hillfort lying to the southeast (Corney & McOmish, 2004, 147-8). An undated uninterrupted ditched enclosure to the northeast may also be early Neolithic, being similar in form to that of Bury Hill (Bedwin, 1981). Molluscan evidence was poor, though may have indicated a local environment consisting of open woodland or shrub at the time of the monument's construction (Corney & McOmish, 2004, 186).

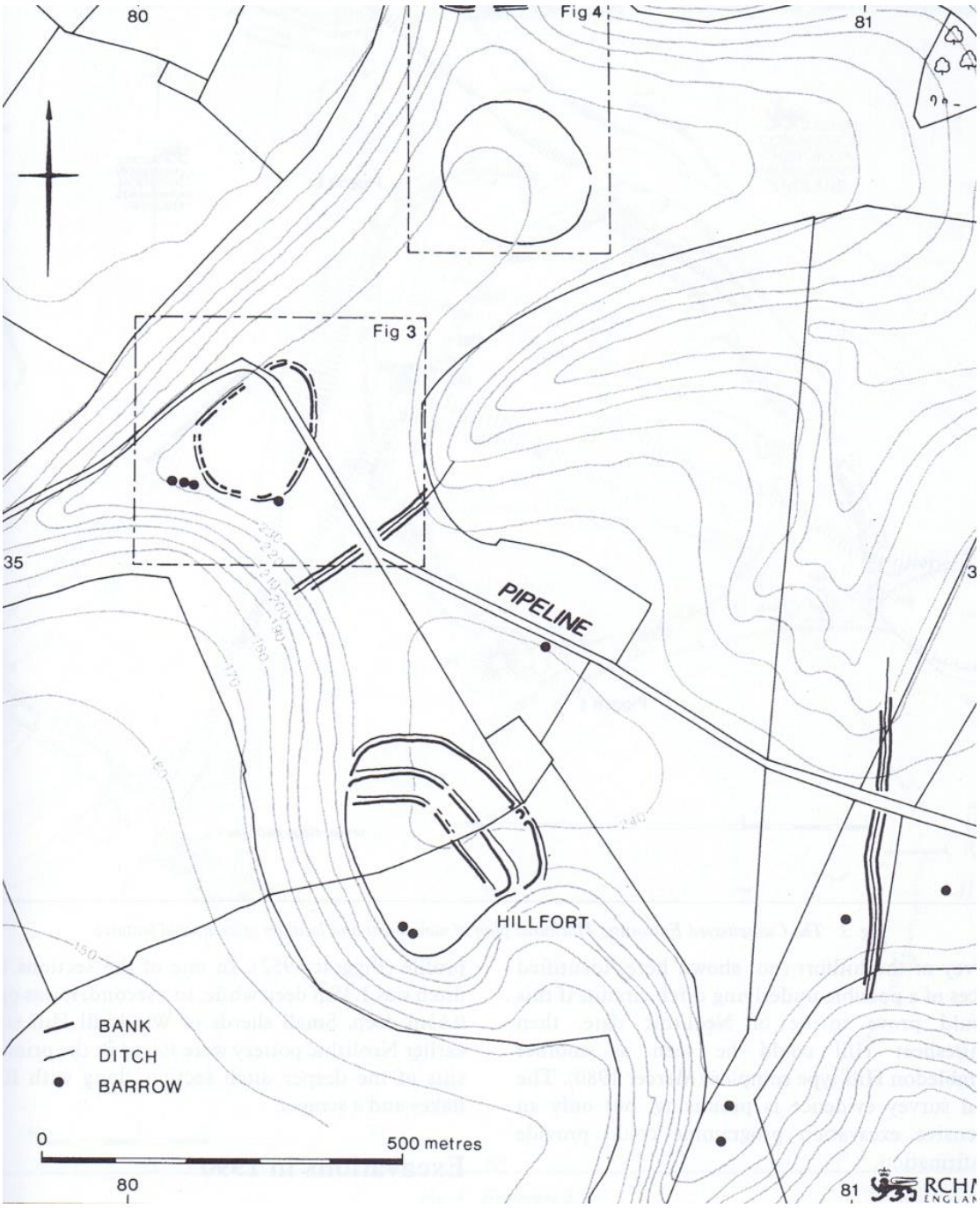


Figure 57: Whitesheet Hill.

The causewayed enclosure lies within the area bounded as 'Fig.3'. The enclosure to the northeast and the cross dykes to the southeast of the enclosure may also be of Neolithic date though the well preserved linear features are more probably associated with the Iron Age enclosure.

Source: Corney and McOmish, (2004)

The Whitesheet Hill causewayed enclosure is situated above steep scarp slopes, which to the north, west and south are immediately outside of the enclosure's ovoid circuit. To the east, some 120m beyond the enclosure, the scarp drops sharply into a dry chalk combe. To the northeast a narrow spur of flat ground runs for 800m towards the undated circular enclosure, beyond which lies the scarp slope. To the southwest a curved and narrow neck of flat land contains the proposed cross dyke outworks 120m from the enclosure and then runs for a further 200m towards the hillfort.

In common with other hilltop enclosures, the view (Fig.77, p.224) from the centre of Whitesheet is less impressive than the view from the circuit. It is also notable that the views in the very near-distance are obscured by the steep scarp which has the effect of removing the immediate landscape from view (Fig. 78, p.225). This effect is particularly marked from the interior of the enclosure, becoming less so as one approaches the ditch circuit. Very different landscapes are visible according to the position of view within the enclosure. Beyond this limitation, the views are striking. The dominant near-distance views, modelled from around the enclosure and from its centre, lie beyond the steep scarp slopes in an arc between the south and the northwest, right across the Blackmore Vale. To the west at 4500m, the view includes the source of the river Stour at Stourhead and the rising ground immediately west of this defines the limit of visibility in this direction. The views are most extensive to the south. Here clear views pertain for some 26000m where they are interrupted beyond Hambledon Hill by the Dorset Downs.

The enclosure is situated in an area with a dearth of early Neolithic indicators. There is very little visual coincidence with those indicators that do exist. A single long barrow at Pertwood Down is intervisible with the enclosure, whilst two others at Willoughby Hedge and Cold Kitchen Hill, despite being of similar distance, are not. As with Maiden Castle a number of long barrows, for example the two at Hambledon Hill, one on Buxbury Hill and Willoughby Hedge and Cold Kitchen Hill previously mentioned, lie just outside of areas that are visible.

The MiCDA model indicates that five long barrows are accessible within a single day's return journey time, and three of these (Willoughby Hedge, Cold Kitchen Hill and Pertwood Down) are probably within half a day (Table 14).

Whitesheet hill	MiCDA	MeCDA	MaCDA
Causewayed enclosures	0	2	4
Long barrows	5	42	118
Settlement / habitation	0	4	27
Leaf-shaped arrowheads	2	18	48
Fully polished axes	9	51	136
Other early Neolithic lithics	0	4	13

Table 14: Whitesheet Hill summary cost distance data.

Two on the periphery of the MiCDA (King Barrow, Boreham and east of St Leonards church, Tytherington) may have been part of an associated cluster strung along the chalk immediately north and south of the river Wylye (Eagles & Field, 2004), which itself rises 1km north of the Whitesheet Hill enclosure (Fig. 79, p.226).

The distribution of other early Neolithic indicators within the MiCDA is limited to nine fully polished axe heads, none of which are within 9km of the enclosure, and two leaf-shaped arrowheads. One found adjacent to the enclosure on Whitesheet Hill and one proximate to the long barrow on Cold Kitchen Hill.

The number of long barrows within the MeCDA (Fig.80, p.227) rises markedly, primarily contained within three spatially associated clusters. Twenty-one lie in a group to the northeast, beyond modern Warminster, within and on the periphery of the Salisbury Plain Training Area (McOmish et al., 2002). Twelve long barrows of the chambered tradition, lie to the northwest, on the fringes of the Mendips beyond modern Frome. A further six, including the two on Hambledon Hill lie to the south and southeast. These spatial associations may be interpreted as representing different cultural groups, all of whom may have been associated with the enclosure on Whitesheet Hill which was within one day's journey time.

Further afield, the MaCDA (Fig.80, p.227) contains 118 long barrows and includes major barrow groups: on the Cranborne Chase (Barrett *et al.*, 1991a; Barrett *et al.*, 1991b; Green, 2000; French *et al.*, 2007a); the Stonehenge area (Long, 1876; Atkinson, 1959; Atkinson, 1978; Richards, 1990; Cleal *et al.*, 1995; Tilley, 2010); the Mendips (Lewis, 2005; 2011a), and two from the Avebury group on the west edge of the Marlborough Downs. Other notable indicators, within the MaCDA, include the earlier Neolithic trackways of the Somerset Levels (Coles & Coles, 1986), leaf-shaped arrowheads clusters in the Cotswolds north of Stroud, whilst concentrations of fully polished axes lie east of the enclosure, particularly in the Vale of Wardour between the rivers Wylye and Nadder. The causewayed enclosures at Netherfield Farm, Hambledon Hill,

and Robin Hood's Ball are within the MaCDA , whilst those at Rybury and Knap Hill lie just beyond.

3.3.5 **Robin Hood's Ball.**

The Robin Hood's Ball causewayed enclosure lies 4km northeast of Shrewton (Wilts) at 135m AOD on the south-facing slope of one of the many low chalk hills that surround the Stonehenge landscape. The nearest rivers are unusually distant (Oswald *et al.*, 2001, 98). The River Avon is 5.5 km to the east, and the River Till 4.5km to the west. The Till drains into the River Wylye at Stapleford, then to the River Nadder at Wilton before joining the Avon at Salisbury.

Robin Hood's Ball comprises two broadly concentric sub circular enclosures defining a total area of 3.5ha. The surface expression, comprising ditches and internal banks, is reasonably well preserved. The inner circuit has a curved, though slightly ovoid outline, flattened on the southeast side. The outer circuit, 30m to 40m beyond, mimics the flattening on the southeast side, though displays a much more irregular form over the rest of the circuit. This irregularity perhaps suggests construction occurred at different times (Oswald *et al.*, 2001, 75; Whittle *et al.*, 2011, 194). Recent earthwork and geophysical surveys (Bayer, 2015) reinforce the earlier view (Whittle *et al.*, 2011, 194) that the western side of this outer circuit may have had an enhanced entranceway (Figs.57 & 58, p.186 & 187).

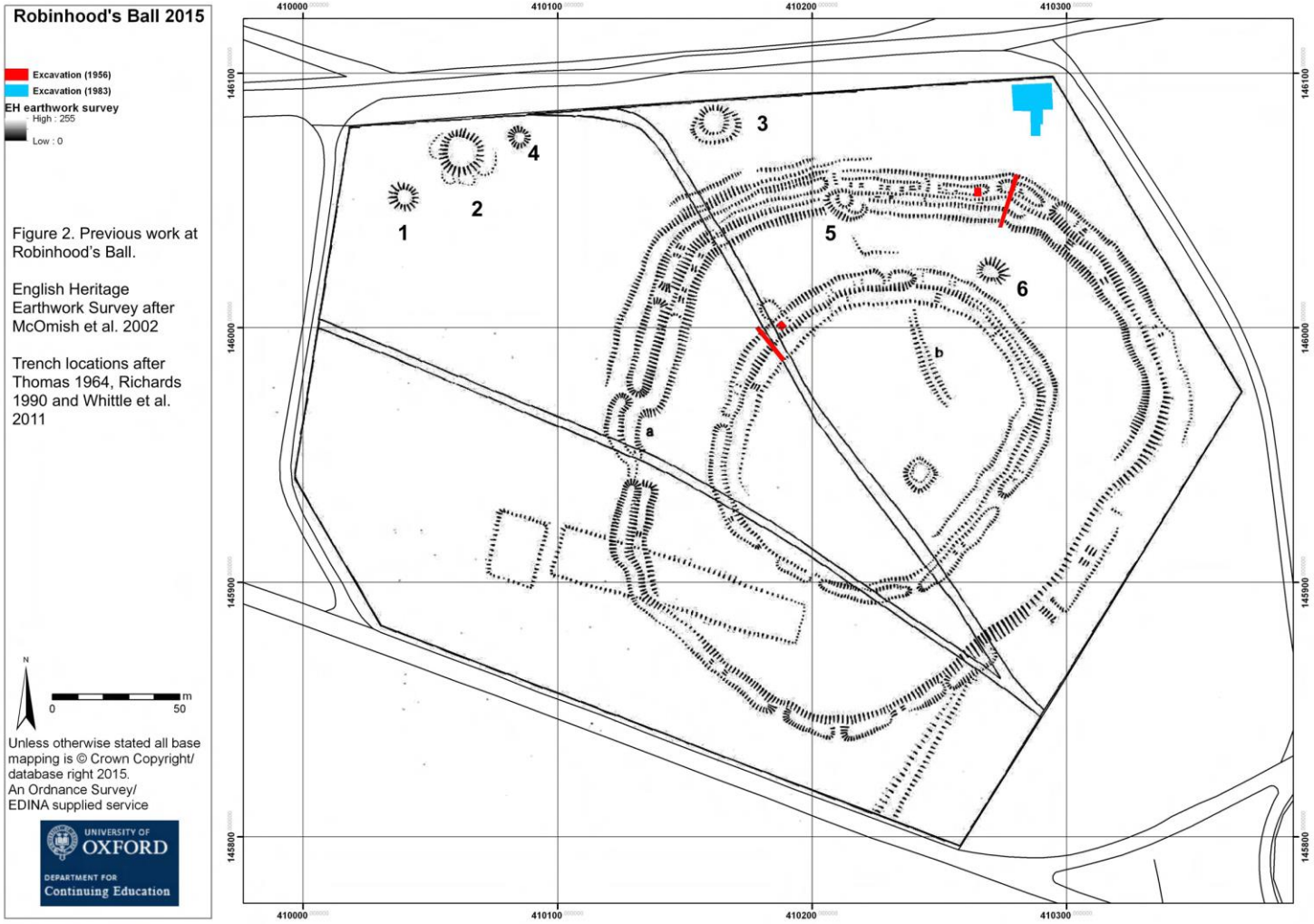


Figure 58: Robin Hood's Ball.

Earthworks and previous excavations.

Source: Bayer 2015

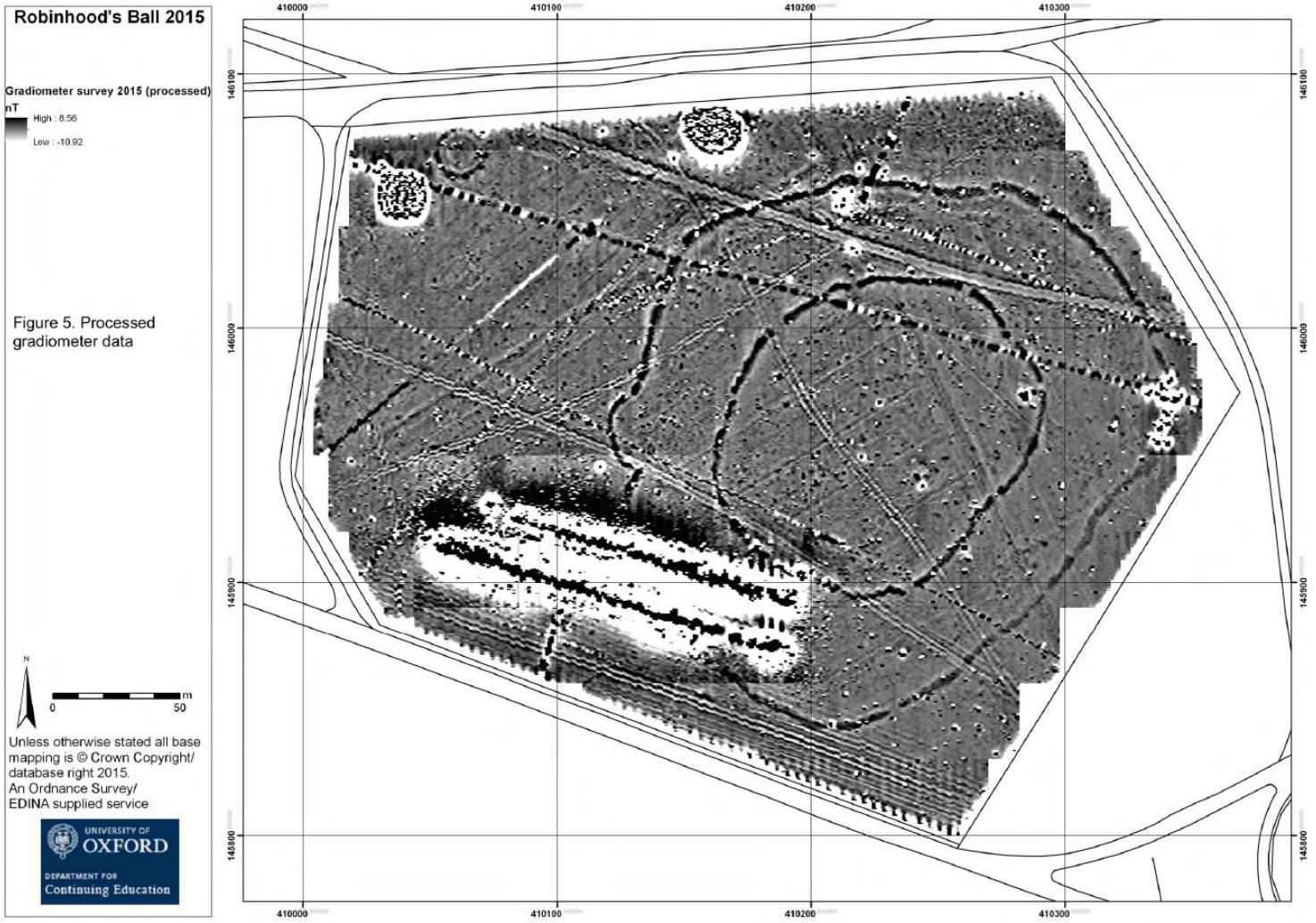


Figure 59: Robin Hood's Ball gradiometer survey.

Source: Bayer 2015

Excavation within the enclosure has been limited to four small trenches opened over two weekends in 1956 (Thomas, 1964) (Fig.58, p.187 above). In addition a circular cluster of shallow pits immediately north of the enclosure were excavated as part of the Stonehenge Environs Project in 1984 (Richards, 1990, 61-65).

A tentative chronology for the inner enclosure was established, based on a limited sample of material still available from the 1956 excavations, suggesting the enclosure was constructed in 3640 – 3500 cal BC (P=91%), probably in 3635 – 3570 cal BC (P=68%) (Whittle *et al.*, 2011, 197).

The visibility model (Fig.81, p.228) reflects the relatively low-lying setting and aspect of Robin Hood's Ball in the undulating landscape of the SPTA and Stonehenge area. Ground-proofing, during geophysical surveys in 2015 (Bayer, 2015), suggest the model is an accurate reflection of the conditions prevalent today. Evidence of early Neolithic environmental conditions is discussed by Allen (Cleal & Allen, 1995) who suggests a changing mosaic of open country had been developing since the Mesolithic, as areas of wildwood were felled, cleared and then regenerated. This has significant implications for any visibility analysis, since as Allen points out (Cleal *et al.*, 1995, 473) the environmental evidence is ‘highly localised’ and poorly dated and it is not possible to draw conclusions regarding the specific conditions pertaining at the time of Robin Hood's Ball’s construction and use. Nevertheless, it is possible to assume from the topographical setting that Robin Hood's Ball resided ‘gently’ in the landscape. The enclosure is unlikely to have been overtly visible from any distance and, unlike, for example, the enclosures on Hambledon Hill or

Whitesheet, cannot be said, on the basis of the viewshed, to dominate the surrounding landscape.

In the near distance the predominant views are contained within a 90degree arc from the southeast to the southwest (Fig.82, p. 229). Within the near range, only the long barrow at Robin Hood's Ball clump, some 672m distance is visible, though further afield and within this arc, the long barrows at Winterbourne Stoke Down (3318m), the Lesser Cursus barrows 1&2 (2531m & 2483m), Knighton Down (2733m) and Knighton Barrow (2633m) are visible. Further still, on the edge of the near-distance range the barrows at Winterbourne Stoke Crossroads (4424m) and New King Barrow (4484m) are visible. Beyond this arc, to the northeast, the barrows Robin Hood's Clump 3 & 4 are visible (1380m & 950m) and towards the middle distance, Sheer Barrow is visible (7021m). It is noteworthy that all these barrows are on the edge of areas that the model reports as visible. The model reports the Coneybury Anomaly (Richards, 1990, 40-65) as being just on the edge of the visible range although other early Neolithic pits in that area are not.

In the extreme distance (17595m), the model reports the causewayed enclosure at Knap Hill as being visible.

The cost models (Fig.84, p.231) reflect Robin Hood's Ball's position at the centre of an active early Neolithic landscape.

Within the MiCDA (Fig.85, p.232) there are 32 long barrows (Table 15, p.192), all undated and with the exception of three to the east, all located on the Avon-Till interfluve. Of these, the model suggests that 20 are within two hours journey time to the enclosure and ten within one hour. The eastern group

(Ashbee, 1970, 9 & 16-7) dominates the distribution within the MiCDA. The pit cluster just outside the enclosure, is one of five areas of habitation defined by pits. Radiocarbon dates, where they are available, have indicated that the pits may be contemporary or slightly earlier than the Robin Hood's Ball causewayed enclosure (Whittle *et al.*, 2011, 199) (Fig.60, p.193). Pottery from these pits, particularly the 1744 sherds of largely south-western style early Neolithic pottery (Richards, 1990, 42-3), representing at least 41 vessels, from the Coneybury Anomaly, and also those recovered by Vatcher from a nearby pit (Richards, 1990, 65-66), suggests a high degree of early Neolithic activity around Robin Hood's Ball. Any relationship with Robin Hood's Ball remains uncertain, particularly since the morphological contrast in pottery, notably the inclusion of Gabbroic wares (Thomas, 1964) in the Robin Hood's Ball pit, may indicate different cultural traditions.

The 16 examples of fully polished axes recorded from within the MiCDA seem randomly distributed, though 14 fall south of the enclosure.

The position of Robin Hood's Ball at the centre of a dynamic early Neolithic landscape is reinforced by the MeCDA. This extends to include the causewayed enclosures at Knap Hill and Rybury to the north. The inclusion of the Cranborne Chase group of long barrows, the north Wiltshire (Avebury) group and the whole of the Salisbury Plain West group brings the total count to 95.

Robin Hood's Ball	MiCDA	MeCDA	MaCDA
Causewayed enclosures	0	2	4
Long barrows	32	95	158
Settlement / habitation	6	14	20
Leaf-shaped arrowheads	1	17	53
Fully polished axes	16	112	207
Other early Neolithic lithics	3	8	11

Table 15: Robin Hood's Ball summary cost distance data.

Fussell's Lodge, 14km to the southeast, is one of the few earthen long barrows to be 'securely' dated. The internal structure enables various interpretations of sequence associated with the early phases of construction, all providing slightly differing chronologies. The model derived from the sequence proposed by Kinnes (1992) suggests construction of the first phase mortuary enclosure begun in 3840-3710 cal BC (p=95%), probably 3805-3730 cal BC (P=68%) and the earthen structure being completed and closed in 3645-3590 cal BC (P=95%), probably 3639-3620 cal BC. Such a chronology would suggest the Fussell's Lodge long barrow to have been out of use for up to a century prior to the construction of Robin Hood's Ball. Whilst the implications for the other long barrows within the MeCDA are unproven, the conclusion drawn by analogy may be that there was a substantial transition of tradition underway.

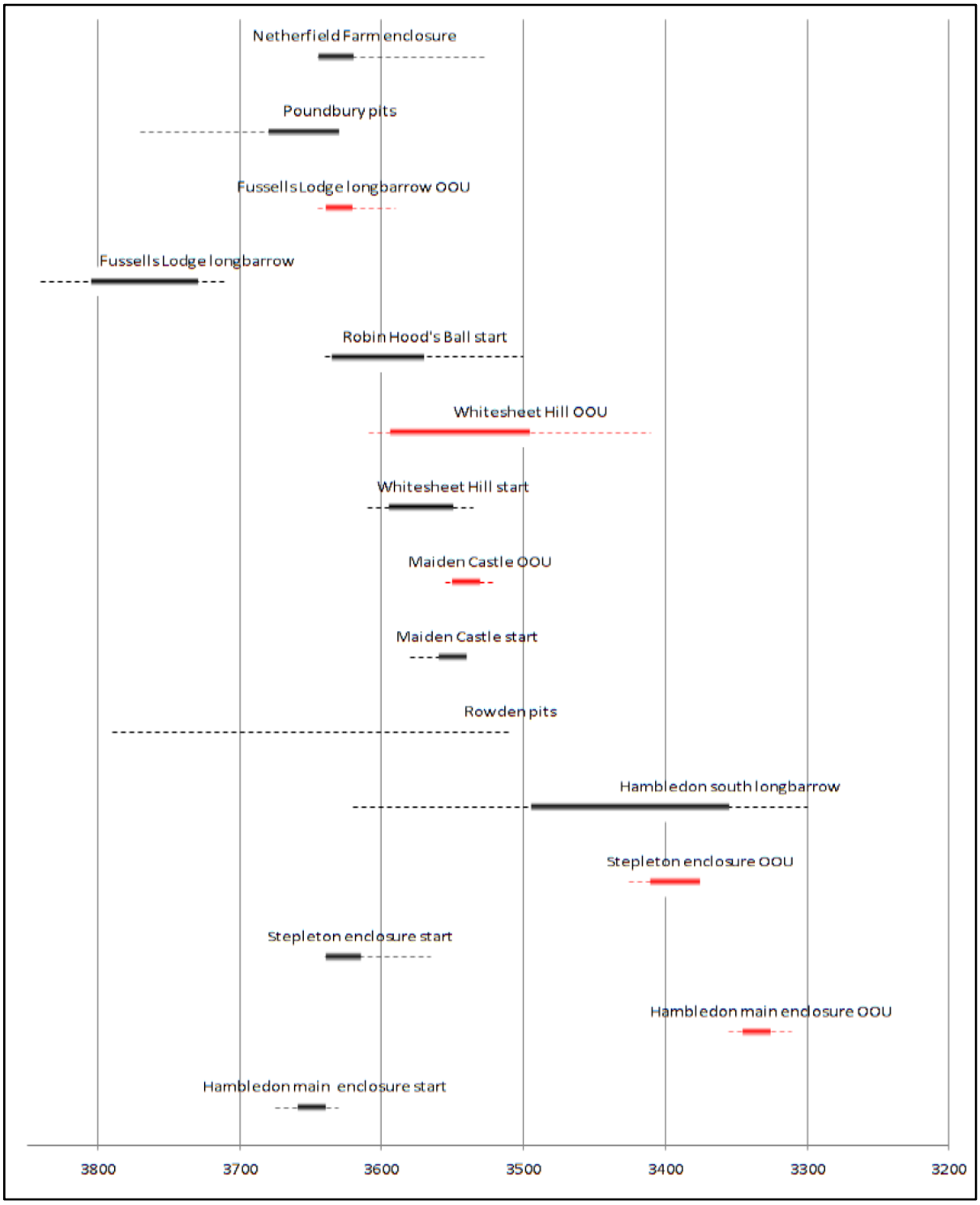


Figure 60: Chronology of Wessex southern enclosures**.**

Black lines are construction dates and red lines are out of use dates. Dashed lines are high probability (typically 95%), solid lines are lower probability (typically 65%). All dates are cal. BC.

Source: Author, after Whittle et. al., (2014) vol.1

The MeCDA may be interpreted as highlighting a long-established view of the relationship between causewayed enclosures and long barrows. The main groups of long barrows lie some distance from the enclosures. For example the Salisbury Plain West group (Ashbee, 1970) lie, in cost distance terms, midway between the causewayed enclosure at Robin Hood's Ball and Whitesheet Hill, whilst the barrow group comprising the north Cranborne Chase, have a similar displaced relationship with Hambledon Hill and Robin Hood's Ball. Notwithstanding these displacements, the cost modelling suggests travel between enclosures was entirely possible with relatively little effort and there is little indication that enclosures were inaccessible or marginal sites.

The MaCDA includes the causewayed enclosures at Windmill Hill and Whitesheet and almost extends to the two enclosures at Hambledon Hill. Furthermore, the boundary includes the Tess estuary and extends down the Avon Valley almost to the coast. Riverine access was hinted at in the Maiden Castle analysis and may have played an important role in facilitating incursion inland.

All the major long barrow groups lie inside the MaCDA suggesting that a journey could be made within about 12 hours by folk groups associated with 158 long barrows and a further 20 habitation sites defined by early Neolithic pits.

3.3.6 **Larkhill.**

The recently discovered enclosure at Larkhill lies 4.2km to the southeast of Robin Hood's Ball with which it may have enjoyed some duality. The enclosure is situated at 129m AOD on the southeast facing slope of a small hillock that

rises to 133m and forms part of a small isolated spur of the Chalk on which the Knighton long barrow is situated. This spur rises to 147m AOD, before dropping back to the level of the Salisbury Plain 1.47km to the northwest. Post excavation analysis continues at the time of writing but cattle bone recovered from the base of the ditch suggest a construction date of 3780-3650 cal. BC (Leivers, 2017). The seven ditch segments discovered formed an arc suggestive of a single circuit of ditches that formed part of a fully sub-circular enclosure approximately 210m in diameter (Fig.61).



Figure 61: Larkhill under excavation**.**

The ditches contained fragments of human skull, arrowheads and scrapers, large quantities of flint debitage, cattle bone and local and southwestern style pottery fragments

Source: Adam Stanford, Aerial-Cam, with permission.

The late discovery of the enclosure has allowed visibility (Figs.86 & 87, pgs. 233 & 234) and cost distance modelling (Fig. 88, p.235), although the pictorial output of models calculated before Larkhill was modelled, have not been updated.

The cost model is similar to that of Robin Hood's Ball, though the Larkhill enclosure, being closer to the Avon Valley, is more accessible from both the south and the north. The relative proximity and overlapping MiCDA of the two enclosures may suggest that the two enclosures were somehow complimentary and constructed by the same folk group. More significantly perhaps, the MeCDA of both Robin Hood's Ball and Larkhill extend northwards to include the enclosures at Knap Hill and Rybury Camp, suggesting a less intimate though perhaps still significant relationship between these four enclosures. The enclosure at Windmill Hill is within the MaCDA, whilst Whitesheet Hill is just beyond (Table 16). Travel between any of these enclosures, and the Robin Hood's Ball and Larkhill enclosures could easily have been achieved within two days walk (Fig.88, p.235).

Larkhill	MiCDA	MeCDA	MaCDA
Causewayed enclosures	1	3	4
Long barrows	34	82	156
Settlement / habitation	6	13	24
Leaf-shaped arrowheads	2	16	50
Fully polished axes	20	109	216
Other early Neolithic lithics	4	8	12

Table 16: Larkhill summary cost distance data.

Larkhill is 2.4km north of a group of pits that includes the Coneybury Anomaly (Richards, 1990) and a small cluster of separate instances of polished axes, all previously noted (pg.182-3 above).

3.3.7 **Knap Hill.**

Knap Hill is one of a series of chalk promontories that protrude from the plateau bordering the Vale of Pewsey. To the south of the univallate enclosure, the ground falls steeply to the Vale below, whilst to the north it falls more gently across the Downs and towards the Kennet Valley. To the west, the ground falls gradually into a valley before rising again as Walkers Hill on which is located, at 900m distance, the chambered long barrow known as Adam's Grave. To the east along the escarpment, the hill is connected with Golden Ball Hill by a narrow neck of the comparatively level ground that is the chalk summit.

The causewayed enclosure, constructed on an area capped in clay-with-flint, comprises a single sub-triangular circuit (Fig.62, p.198) which is, in parts, well preserved and retains the earthwork remnants of a single internal discontinuous bank. The breaks in the bank uniquely (Connah, 1969, 21; Oswald *et al.*, 2001, 14) coincide with the ditch causeways, whilst their location on a break of slope, gives the impression when viewed from below, of constructions considerably larger than the 300mm they are in practice. To the south, a break in the circuit as the ditch system approaches the steep hillside, may indicate that either the enclosure was unfinished (Connah, 1969, 22), not required due to the steepness of the hill (Cunnington, 1912, 45), or is lost through erosion of the chalk.

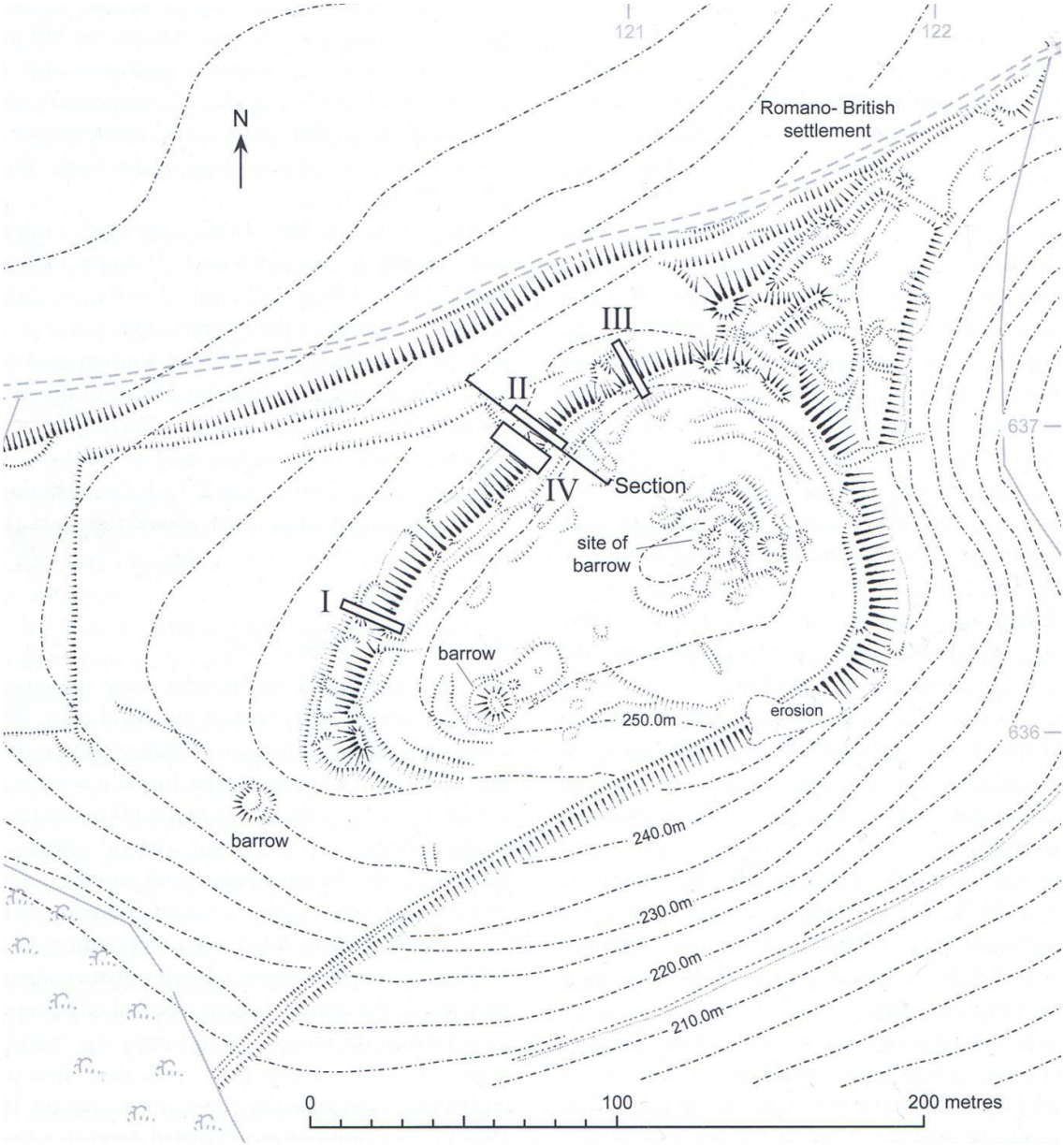


Figure 62: Knap Hill.

Earth work survey and previous excavations.

Source: Whittle et. al. (2011) p.98

The early 20th century excavation by Maud and Ben Cunnnington (1912), first recognised the novel form of the enclosure, assigning it to the Bronze Age or late Neolithic period, though this interpretation was later modified in the light of further evidence, notably that from Windmill Hill. The enclosure was later investigated in 1961 by Connah (1969) through the excavation of three trenches across banks and ditches and the stripping of one causeway (Fig.62, p.198 above). Some useful environmental analysis was included (Sparks, 1969) which has been later developed (Dimbleby & Evans, 1974; Wilkinson, 2011). Shade-loving taxa and fern spores found in a buried 'A' horizon suggest the presence of light woodland or open scrub in the area of the enclosures.

The viewshed model reflects the striking visual characteristics of the Knap Hill enclosure (Figs.89&90, pgs.236&237). To the south the enclosure has commanding views over the Greensand expanses of the Vale of Pewsey with near-complete views comprising a 180 degree arc and extending southwards down the Avon Valley and towards Robin Hood's Ball.

In other directions the views are more restricted. Despite the northward orientation of the enclosure it is notable that neither of the enclosures at Rybury or Windmill Hill are intervisible, though the model reflects the view extending northwards beyond the Kennet Valley and towards the southern fringes of the Marlborough Downs.

Despite the number of long barrows in the vicinity, only two in the near distance are intervisible: Adam's Grave on Walkers Hill 900m to the west and the Giants Grave on Milton Hill 8727m to the southeast. Further afield, in the far distance to the southeast, two long barrows on Tidcombe Down are also intervisible at

16420m and 17699m, and somewhat further two of the long barrows within the Robin Hood's Ball group are also visible at c.17000m.

The cost models (Fig.91, p.238), for the Knap Hill causewayed enclosure indicate the high degree of accessibility of the monument from other areas of early activity (Table 17, p.206). The area appears to have been a regional focal point for the early Neolithic, with an exceptional concentration of long barrows (Whittle *et al.*, 1999; Pollard & Reynolds, 2002; Cleal & Pollard, 2004; Pollard, 2005; 2008b). The enclosures at Windmill Hill and Rybury are both within the MiCDA and the enclosure at Robin Hood's Ball within the MeCDA is just outside, whilst the enclosure at Whitesheet Hill is just beyond the MaCDA.

Within the MiCDA (Fig.92, p.239) 19 of the 22 long barrows lie north of the Knap Hill enclosure. Nine of these are strung along the line of the River Kennet and nine along either side of the Downs midway between the Knap Hill enclosure and the Kennet Valley.

The West Kennet long barrow lies 4407m to the north where the Bayesian analysis of 31 radiocarbon samples (Whittle *et al.*, 2007d, 85) has facilitated a precise interpretative chronology. The construction of the barrow, which has now been determined to have seen the deposition of some 36 individuals in the primary deposits, began in 3670–3635 cal. BC (p=81%), probably 3655–3635 cal. BC (p=68%). The barrow fell out of use quickly and primary activity seems to cease just before the construction of the Knap Hill enclosure, in 3640-3610 cal. BC (p=95%), probably 3635–3615 cal. BC (p=68%) (Whittle *et al.*, 2007d, 93).

Long barrows in the region, from which radiocarbon dates have also been obtained, comprise of Millbarrow, South Street and Horslip, Beckhampton Road, and Easton Down (Whittle *et al.*, 2011, chpt. 3). Here, a different pattern emerges, and although less certainty can be attached to the imprecise chronologies, it would appear that these long barrows may have been constructed whilst there was also activity at the Knap Hill causewayed enclosure.

Despite the 22 long barrows identified within the MiCDA, only Adams Grave, 900m to the west is spatially associated with the Knap Hill enclosure. Beyond this the most proximate known examples are East Kennet, West Woods, West Kennet and Horton Down barrows, lying 3232m to the north, 4092m to the northeast, 4407m to the north and 4920m to the northwest respectively.

Other early Neolithic indicators within the MiCDA include habitation or settlement areas at Easton Down and Windmill Hill. These are more likely to be associated with activities at the Windmill Hill and Rybury enclosures respectively and are discussed in later sections. The high concentration of fully polished axes and leaf-shaped arrowheads are randomly distributed with the MiCDA and little can be said of these except noting the unusually high density.

Extending to the MeCDA, the model includes the long barrow groups on Salisbury Plain, including those on the scarp to the north side of the Wylye Valley towards modern Warminster and Heytesbury, and to the east an important cluster of six around Tidcombe Down. There are 68 known long barrows reported within the bounds of the MeCDA model and 131 in the MaCDA.

3.3.8 **Rybury Camp.**

Rybury lies, with a slight northern orientation, 4000m west of Knap Hill, at 235m AOD, on a short spur of the Middle Chalk projecting southeast and towards the Vale of Pewsey. Overlain by an Iron Age hillfort, the single circuit of the 2ha enclosure is badly degraded and much of the interior has been subjected to later flint mining. The best preserved sections are to the east beyond the ramparts of the hillfort, which more closely than the Neolithic enclosure, follows the contour of the hill (Fig.63, p.203). To the southwest, along a narrow saddle of the level summit, a semi-circular enclosure also appears to have an interrupted ditch system outside of a low bank, suggesting that this may have formed a cross-dyke outworks contemporary with the main early Neolithic component (Curwen, 1930).

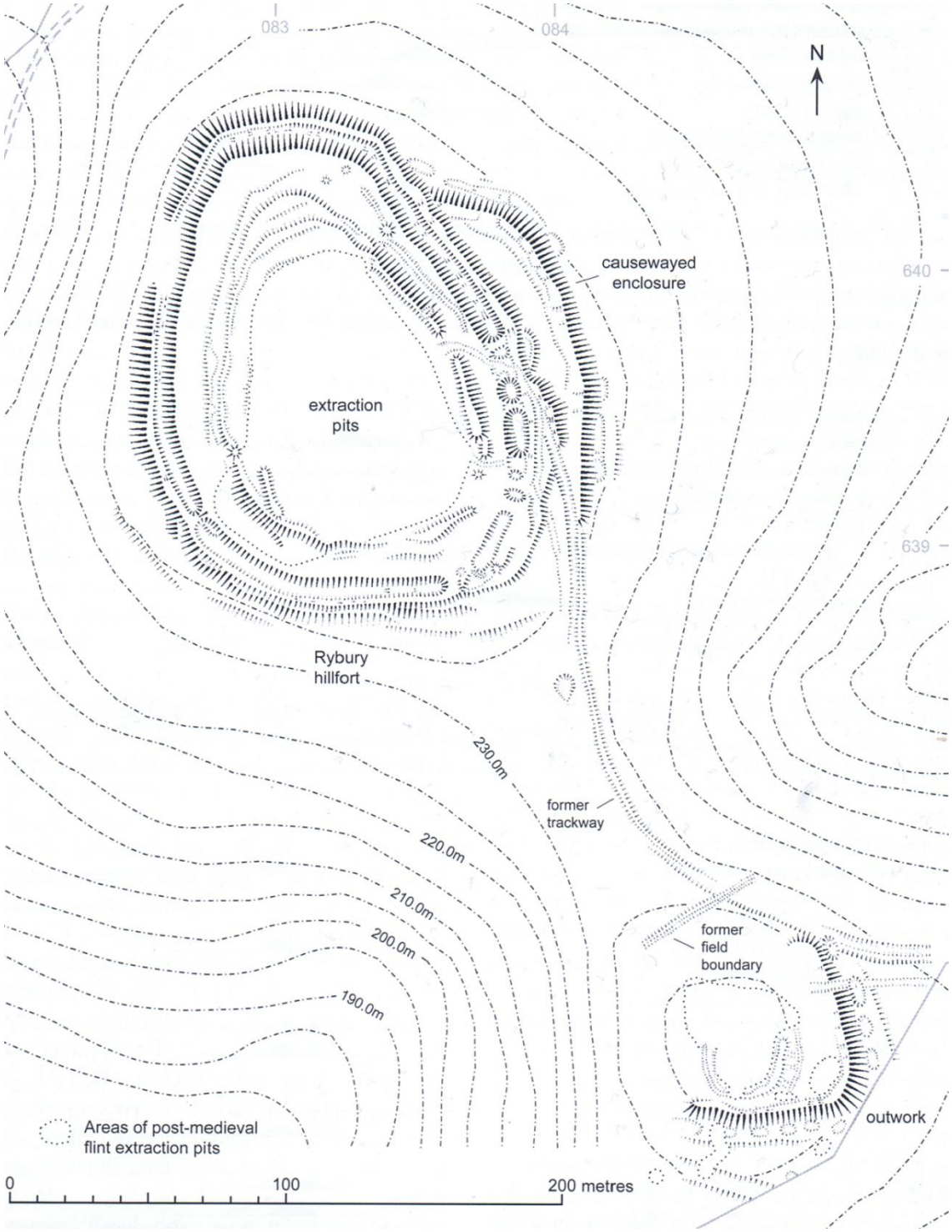


Figure 63: Rybury Camp.

Source: Whittle et. al., (2011), p103

To the southwest, the topography falls immediately and sharply into the Vale of Pewsey. Beyond the enclosure to the northwest, the ground rises towards Tan Hill at 294m AOD before falling gradually northwards towards the Kennet Valley. In other directions, the spur provides a short length of broadly level ground along the outcrop before falling sharply into the vale.

There is little artefactual evidence from the enclosure, though Bonney excavated a small single trench in 1963. The short record reveals a 2m flat bottomed ditch from which some 600 waste flint flakes were recovered with 'a few teeth and some scraps of bone' (Bonney, 1964, 185). A year later Smith recovered a number of sherds of early Neolithic decorated pottery which was eroding from the hillfort ditch (Smith, 1965a, 127). A complete lack of material suitable for radiocarbon analysis means the chronology of the Rybury causewayed enclosure can only be estimated on typological evidence and by comparison with the Windmill Hill and Knap Hill enclosures (Whittle *et al.*, 2011, 102).

The viewshed model graphically indicates the dominant views that the Rybury enclosure enjoys to the southeast, the south and the west, whilst views to the northwest, north and east are sharply interrupted at a short distance by the higher chalk ridge of the Downs (Fig.93, p.240). The primary near-distance viewsheds (Fig.94, p.241), like Knap Hill, are associated with the river Avon over which the enclosure enjoys nearly uninterrupted and commanding views as it drains across the Vale of Pewsey and towards modern Upavon. Despite the enclosure at Rybury having a slightly lower elevation than Knap Hill, the views enjoyed are more complete as a result of the enclosure's location on a protruding chalk spur.

Despite the numerous long barrows in the region, only two may have been visible[4] from the enclosure. It is notable that the model again reports a number of proximate long barrows as being immediately outside the limits of visibility. These include Kitchen barrow (1870m from Rybury Camp), the barrows on Roughridge and King's Play Hills (3416m & 7563m respectively), Adam's Grave (2943m), and the Cat's Brain barrow (6998m). Had Rybury been constructed 800m to the north, on or near the summit of Tan Hill, then these, and other long barrows on the northern slopes of the Downs and along the Kennet Valley would have been visible.

It is notable that neither the causewayed enclosures at Windmill Hill or Knap Hill are visible from Rybury.

In good atmospheric conditions, extreme-distant views to the southwest enable the outline landform of the Mendip Hills to be discerned.

Unsurprisingly the cost models for Rybury are very similar to those for Knap Hill (Fig.95, p.242). Broadly similar in shape and scale, their outline form is determined by the Kennet Valley to the east and the Avon Valley to the south. Whilst there are some minor variations between the two causewayed enclosures in the number of early Neolithic indicators identified in the cost models (Table 17, p.206), these differences are unlikely to be statistically or archaeologically significant.

[4] Kitchen Barrow and King's Play Hill long barrows are both within, though lie on the boundary of an area that the model reports as not visible / visible. Given the assumptions implicit in the model, it is not possible to determine with certainty whether these areas would or would not have been visible from Rybury Camp.

Knap Hill and Rybury	MiCDA		MeCDA		MaCDA	
	Knap Hill	Rybury	Knap Hill	Rybury	Knap Hill	Rybury
Causewayed enclosures	2	2	2	3	3	3
Long barrows	22	22	68	74	131	132
Settlement / habitation	3	3	12	10	21	20
Leaf-shaped arrowheads	8	11	22	25	46	45
Fully polished axes	47	46	112	104	212	207
Other early Neolithic lithics	2	2	7	6	13	13

Table 17 Knap Hill and Rybury summary and comparison of cost distance data.

More significant perhaps are the two early Neolithic pit sites that were investigated by Mrs Proudfoot in 1964. These are situated on the low ground, midway between the long barrows on Roughridge Hill and on Easton Down. The southwest site revealed a single pit containing cremated bone and Windmill Hill pottery, whilst the northeast site revealed a cluster of ten pits, four of which contained 'two cremations, burnt material and Windmill Hill pottery etc'. (Cleal, 2004; Wilts, HER.-a). No further records are available, but the presence of such a substantial number of pits may indicate a settlement site in this area. The site lies within the Rybury MiCDA, 3km northwest of the enclosure and 200m from each of the long barrows (Fig.96, p.243).

3.3.9 **Windmill Hill.**

With the possible exception of Hambledon Hill, Windmill Hill has been the most widely studied of causewayed enclosures. From the sketches of Stukeley in 1724, through the Crawford, Gray, Kendall and Keiller period beginning in the 1920s, the subsequent work by Smith (Smith, 1965b) on the Keiller excavations, and then later the excavations by Whittle in 1988 (Whittle *et al.*,

1999), Windmill Hill has, arisen as the ‘type site’, problematically defining this class of monument.

Indeed the influence of Windmill Hill has extended beyond the monument, describing a ceramic style (e.g. Gibson, 2002; Lang, 2003) and even a cultural tradition (e.g. Piggott, 1954; 1955). Though it is not appropriate to detail these works here, a useful and influential contribution to the societal and landscape context of the Windmill Hill enclosure was provided by Whittle and Pollard (1999). In expressing the ‘meaning’ of the enclosure as ‘that *place* at that *time* where those *people* built and gathered’ (emphasis changed by author) they provided a valuable reminder that causewayed enclosures were an expression of human agency in the landscape (Whittle & Pollard, 1999, 381): an expression that we now understand, was a relatively short-lived and episodic phenomenon.

The Windmill Hill enclosure (Fig.64, p.208) is situated on a low eminence of the Middle Chalk that rises to 195m AOD, and lies northwest of the hill summit on ground sloping gently southeast towards the Kennet Valley. The three sub-circular circuits surviving as an inner ditch with no evidence of a bank (cf. Whittle *et al.*, 2011, 64), and two further ditches, both with slight traces of inner banks, define an area of 8.45ha. The inner ditch, whose centre is 3m northeast of the highest point, has a slightly concave feature to the northeast where the in-turned ditch terminals may represent an entrance (Smith, 1965b, 4). This possible entranceway is also reflected at the same location in the middle ditch though not the outer.

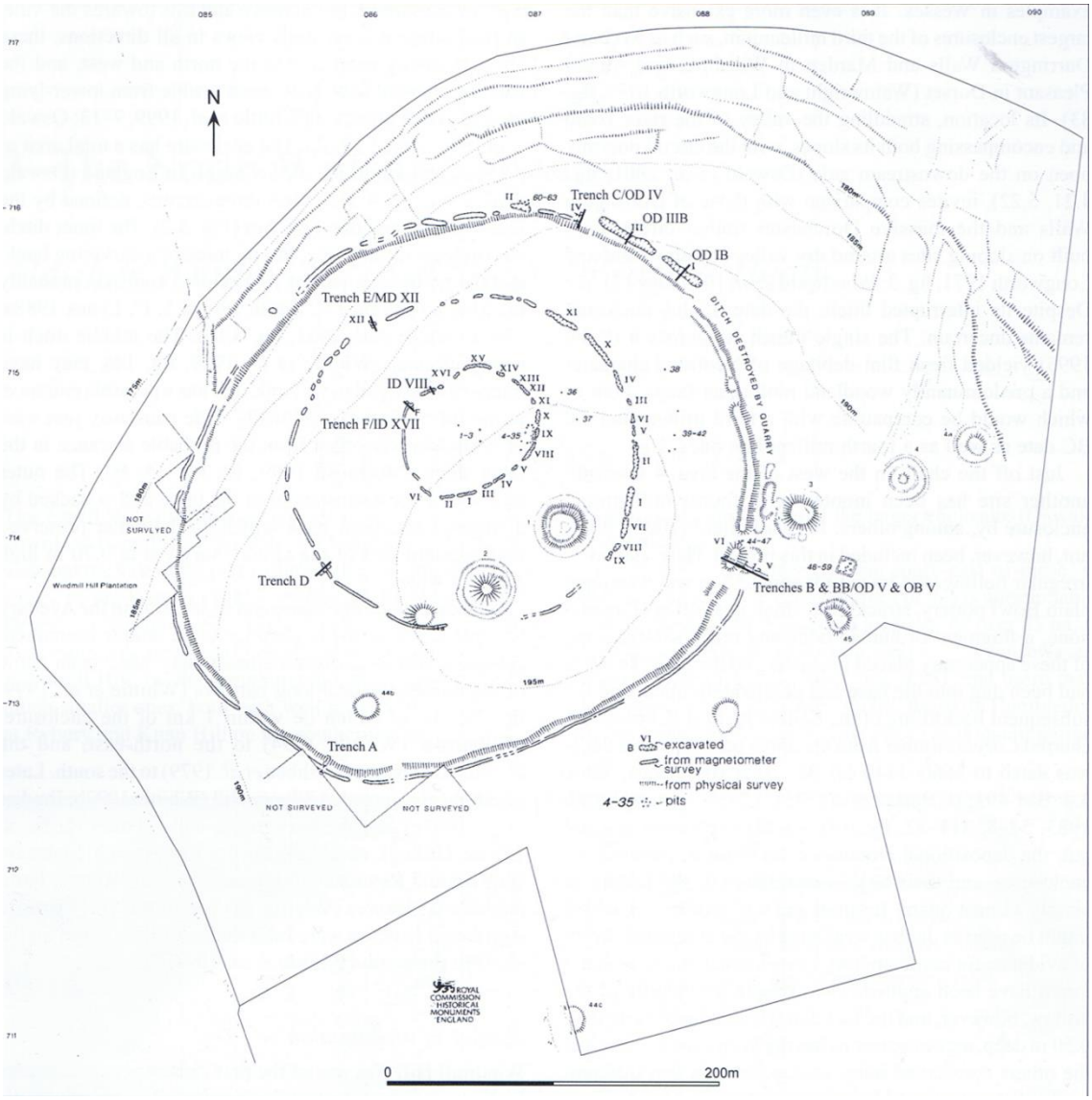


Figure 64: Windmill Hill.

Source: Whittle et. al. (1999), 15

The palaeoenvironmental record suggested a period of use and possible cultivation before the construction of the enclosures' outer bank, and importantly, suggested the surrounding area was predominantly wooded (Evans, 1972; Whittle *et al.*, 1999, 131; Whittle *et al.*, 2011, 66) (Fig. 65).

In considering the visual characteristics of the causewayed enclosure, we must bear in mind the wooded landscape that the palaeoenvironmental evidence suggests for the early Neolithic. The topography on which the enclosure is situated suggests that if woodland consisted of tall trees immediately outside the enclosure, as depicted in the model proposed by Whittle and Pollard (1998, 239; 1999, fig. 227) (Fig. 65), visibility would have been extremely limited. If we allow the tree line to be further downslope from the enclosure, then the visibility model may more accurately approximate to the early Neolithic conditions.

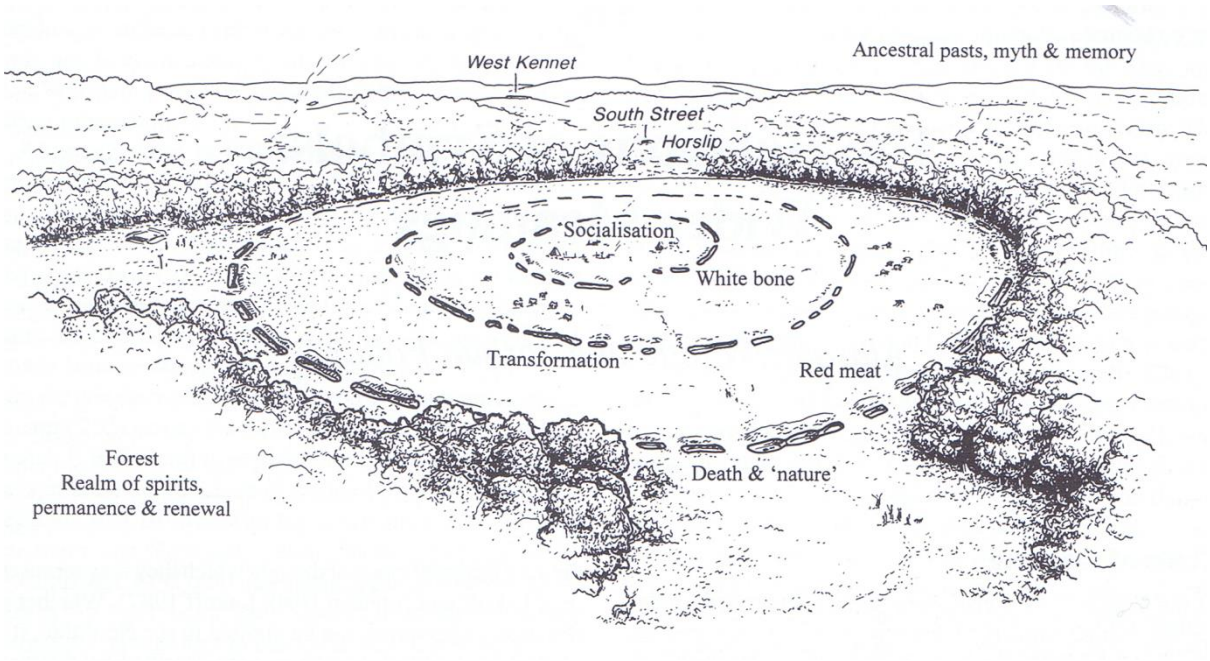


Figure 65: Windmill Hill – cosmological model.

Source: Whittle et. al. (1999), 383

The model (Figs.97&98, pgs.244 & 245) reflects the 360deg. panorama that the enclosure enjoyed over the near distance. Views may have been particularly extensive to the north and the south and the enclosure would have been visible from the lower-lying ground in all directions, though the inner circuit may only have been visible from the north and northwest. The model illustrates the Millbarrow long barrow, 1150m to the northeast as visible, as is the Shelving Stones long barrow 1175m to the east. To the south the Horslip long barrow (899m) is on the cusp of the visible area, whilst further south, the South Street long barrow (2155m) is also visible, though the Long Stones long barrow only 300m further west is not. There are no other causewayed enclosures visible.

Whilst Windmill Hill does not enjoy the continuity of view witnessed by some of the enclosures on higher elevations, in the extreme distance to the northwest, the outline form of the lower reaches of the Cotswold range can be discerned.

The cost models, like those for Rybury and Knap Hill, place Windmill Hill at the centre of an intensively active area of early Neolithic activity (Fig.99, p.246). The 20 long barrows identified as within the MiCDA all fall within 180º of an arc centred on the southeast (Fig.100, p.247). Immediately south are three long barrows including Horslip (898m distant), with an uncertain, though possibly early date (Whittle *et al.*, 2011, 106, fig.3.31), South Street (2155m), probably (p=31%) constructed in 3495 – 3385 cal. BC (Whittle *et al.*, 2011, 105), and Longstones (2255m) (undated). Just over a kilometre (1150m) to the north-northwest of Windmill Hill, Millbarrow has been dated to probably 3390 - 3200 cal. BC therefore seemingly constructed towards the very end of activity at Windmill Hill. The Shelving Stones long barrow, 1775m to the east is undated (Barker, 1983).

Further afield, though still within the MiCDA, construction of the long barrow at Easton Down (5754m) probably (p=68%) dates to 3485 – 3385 cal. BC (Whittle *et al.*, 2011, 105) and is likely to have been constructed well within the period of later activity at Windmill Hill.

The settlement context within the MiCDA is again sparse (Table 18, p.212). Four pits noted within the causewayed enclosure on the east side of the inner circuit, and under the bank of the outer circuit on the east side of the enclosure, may represent pre-enclosure activity (David *et al.*, 1999, 7). The previously noted pits 5952m to the southwest on Roughbridge Hill are also within the MiCDA, whilst the early Neolithic pit at Okus Quarry (Wilts, HER.-c) lies to the north-northwest on the extreme edge of the model. The general level of activity may also be reflected in the scatter of other artefacts. The density of leaf-shaped arrowheads and polished axes within the MiCDA is also significantly higher in the same 180º arc containing the long barrows, though the small cluster of artefacts in the Manor Farm area of Yatesbury (Wilts, HER.-b) may also be significant.

The proximity of the causewayed enclosures at Rybury and Knap Hill has previously been noted. Both lie well within the MiCDA.

The distribution pattern is similar within the MeCDA, with a greater density of contemporary monumentalisation and artefact distribution within the 180º arc, a possible significant exception being the various scatters of lithics and lithic findspots to the northwest and towards the long barrow at Lanhill. The causewayed enclosure at Robin Hood's Ball is also on the edge of the MeCDA.

Further afield, the MaCDA begins to include the more distant long barrows on the Cotswold edge, the flanks of the Wylye Valley, the Salisbury Plain groups and the northern edge of the Cranborne Chase.

Windmill Hill	MiCDA	MeCDA	MaCDA
Causewayed enclosures	2	3	3
Long barrows	20	46	150
Settlement / habitation	3	6	17
Leaf-shaped arrowheads	7	23	41
Fully polished axes	33	93	190
Other early Neolithic lithics	1	5	13

Table 18. Windmill Hill summary cost distance data.

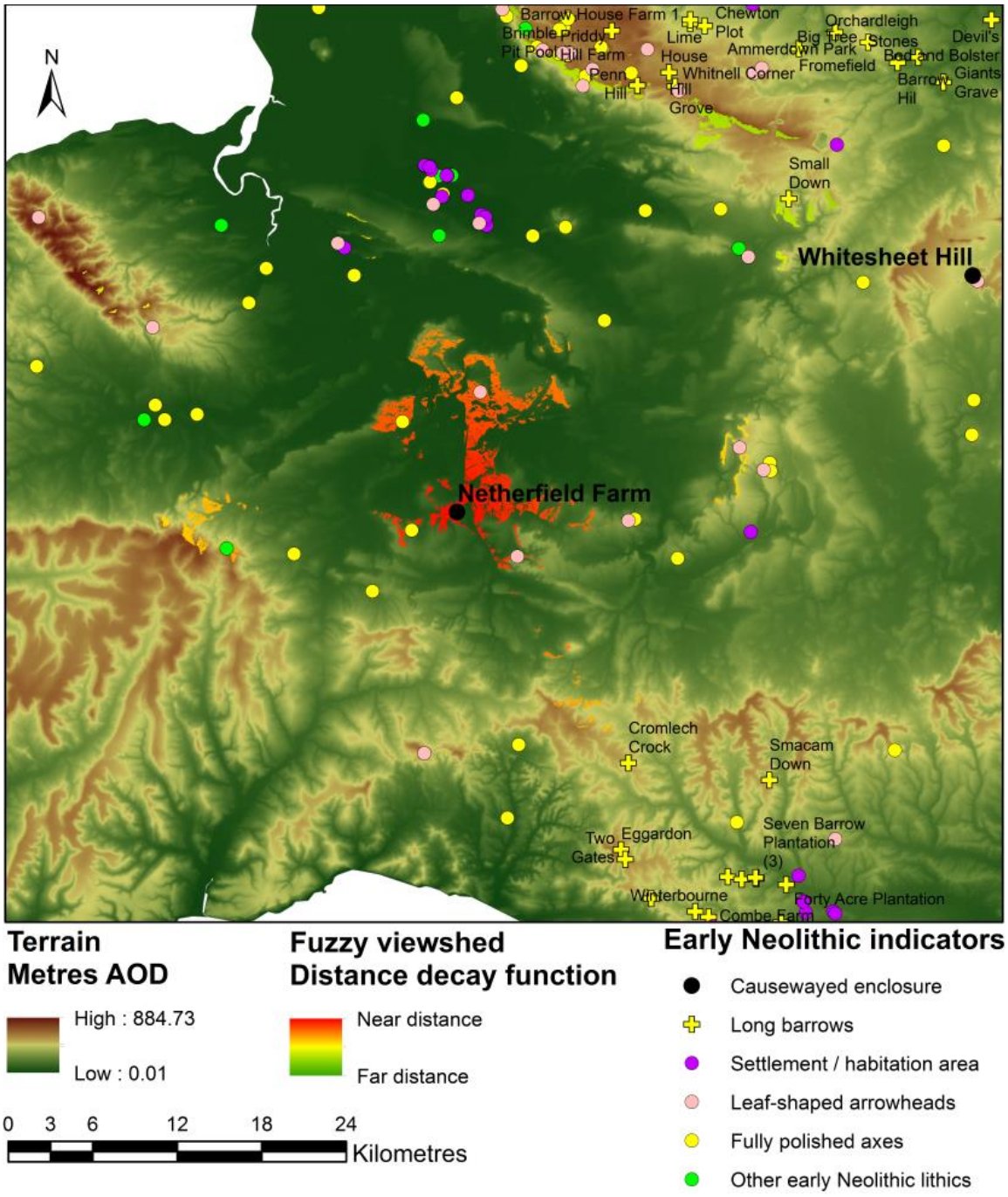


Figure 66: Netherfield Farm visibilities model.

The model estimates the maximum potential extent of any views to and from the Netherfield Farm enclosure

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

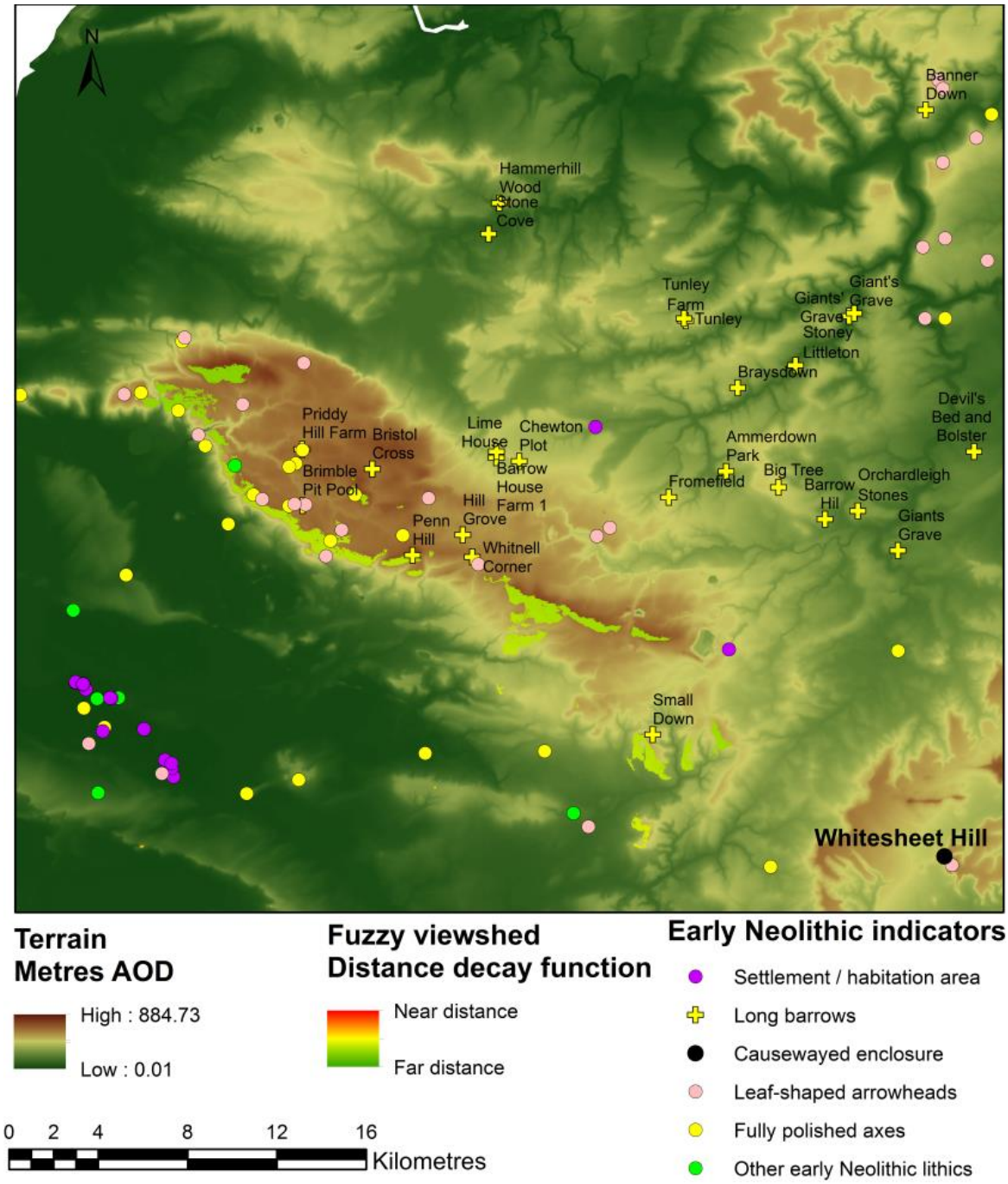


Figure 67: Netherfield Farm distant views to the Mendips.

The model estimates the maximum potential extent of any views between Netherfield Farm and the Mendip Hills

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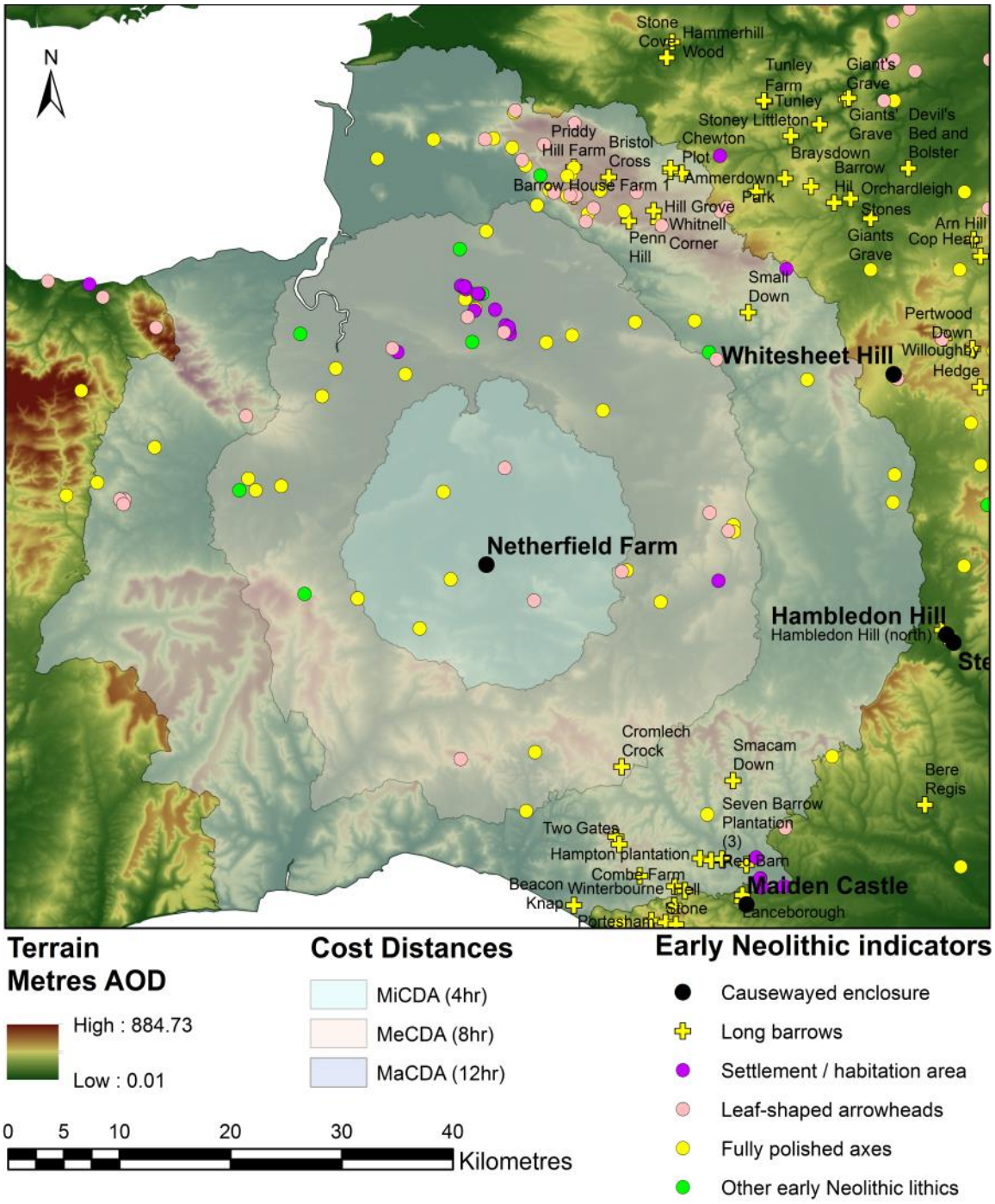


Figure 68: Netherfield Farm cost distance model.

The model estimates the degree of access to the Netherfield Farm enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina

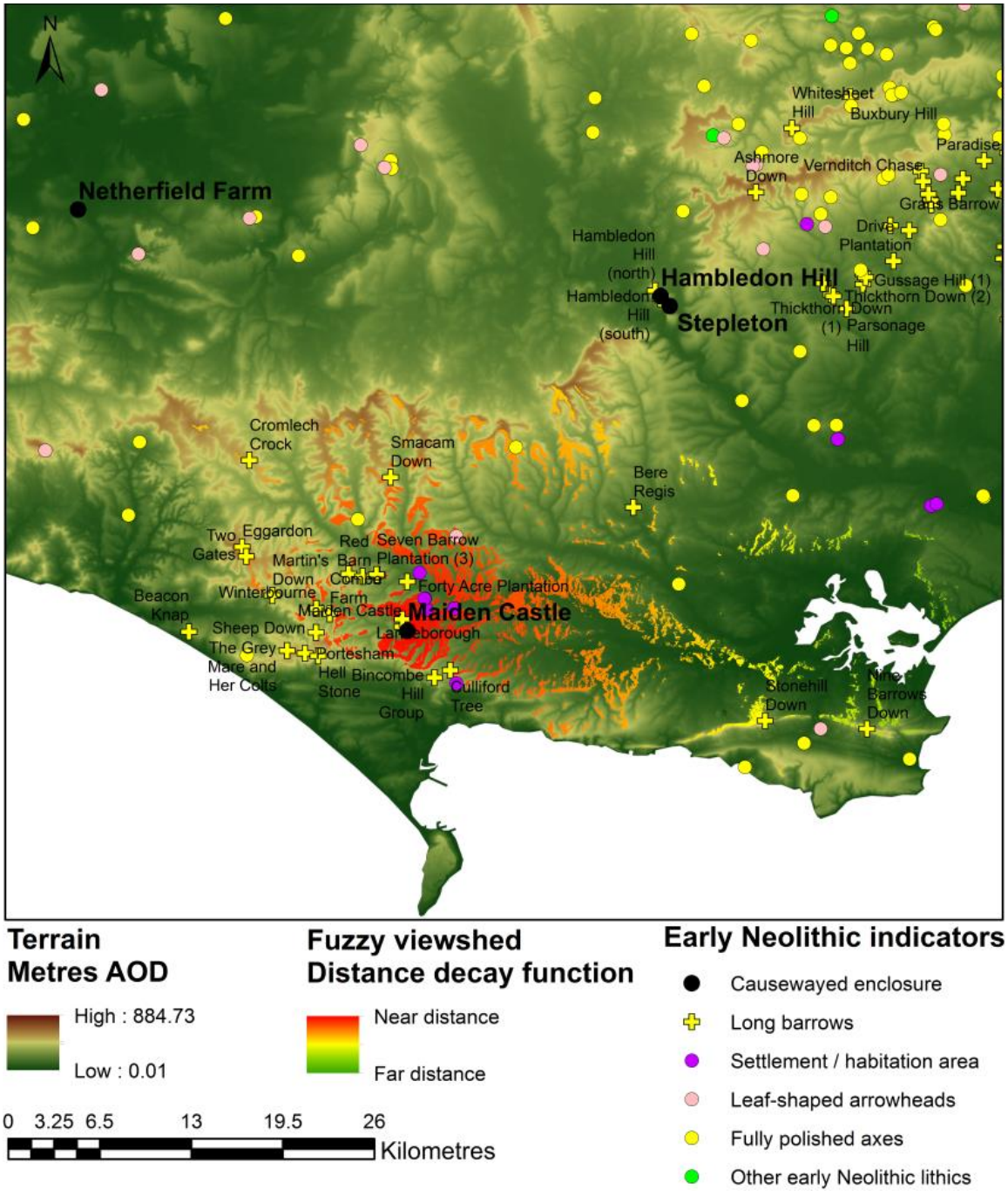


Figure 69: Maiden Castle visibilities model.

The model estimates the maximum potential extent of any views to and from the Maiden Castle enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

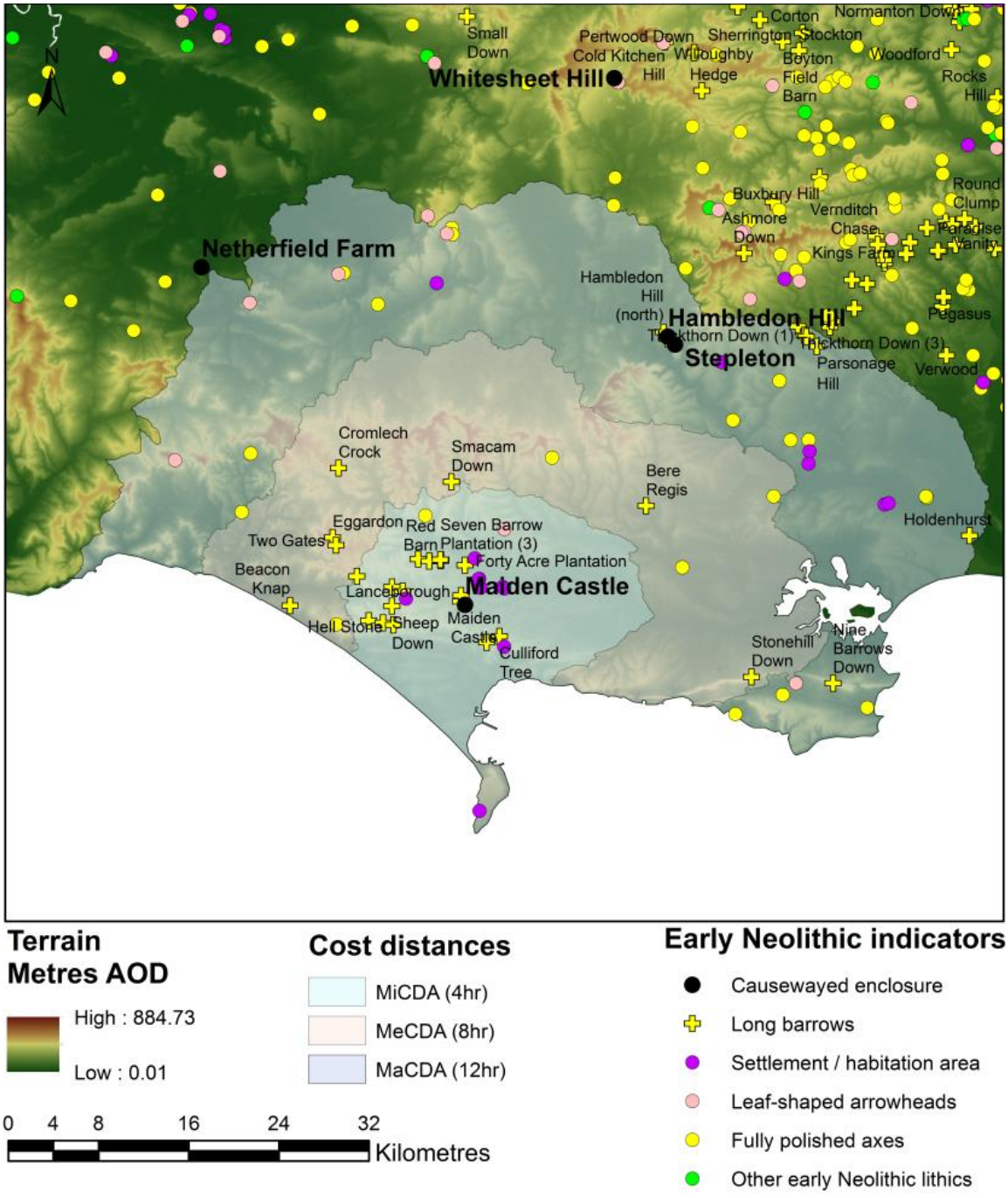


Figure 70: Maiden Castle cost distance model.

The model estimates the degree of access to the Maiden Castle enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

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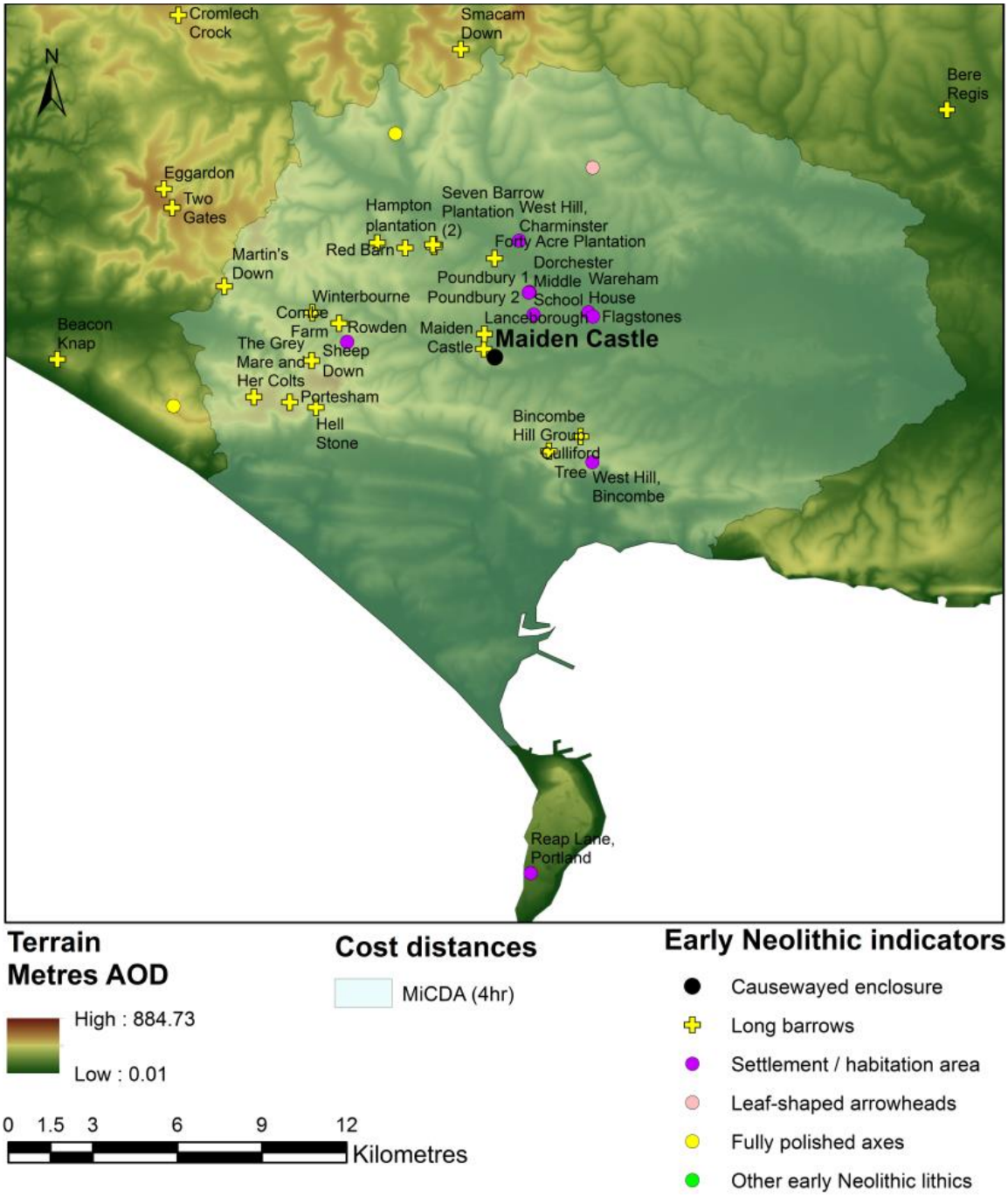


Figure 71: Maiden Castle MiCDA (4hr) cost distance model.

The model estimates the degree of access to the Netherfield Farm enclosure, where the boundaries define the extent of the MiCDA. The distribution of known early Neolithic habitation areas and long barrows are also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

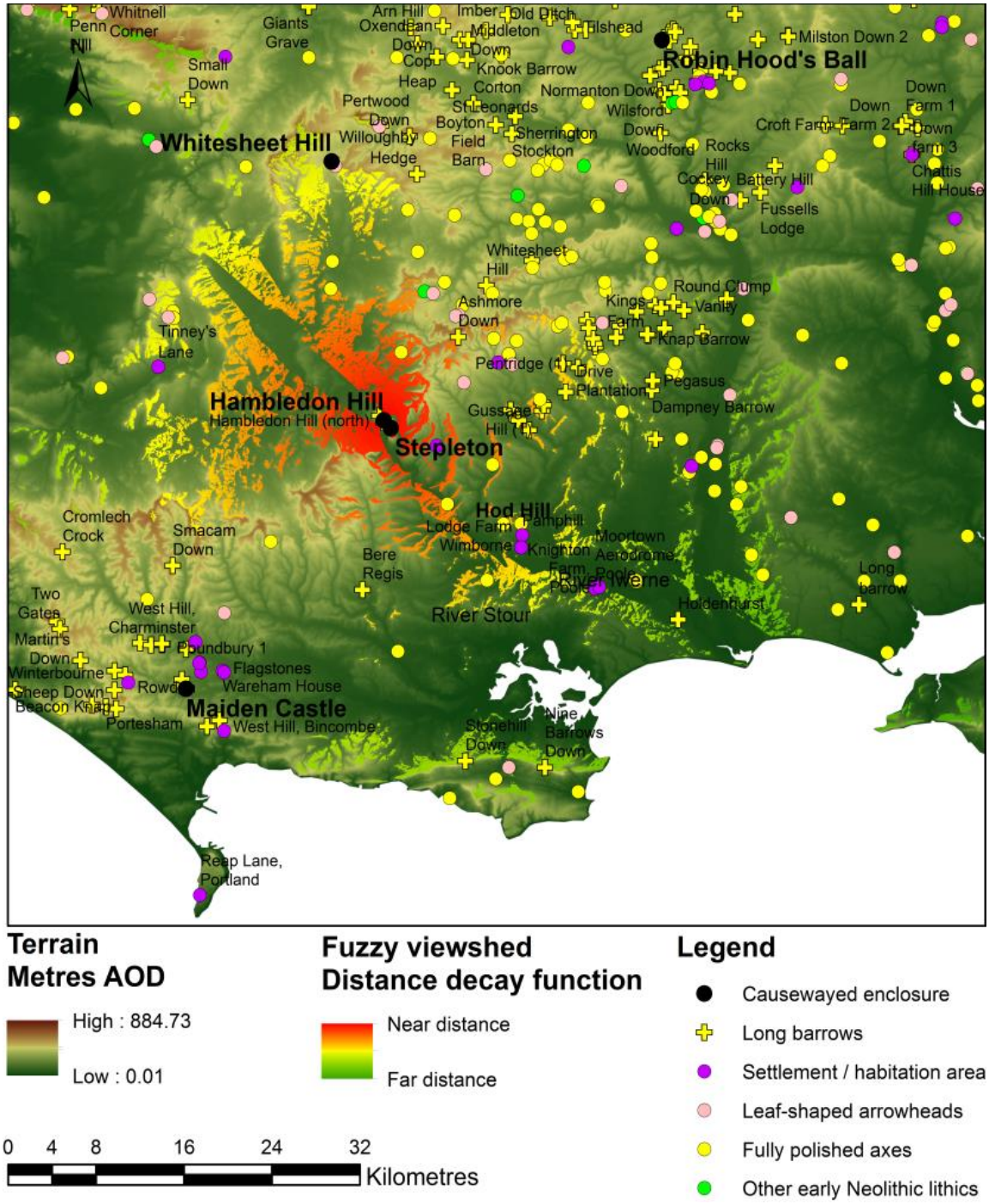


Figure 72: Hambledon Hill visibilities model.

The model estimates the maximum potential extent of any views to and from the Hambledon Hill main enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

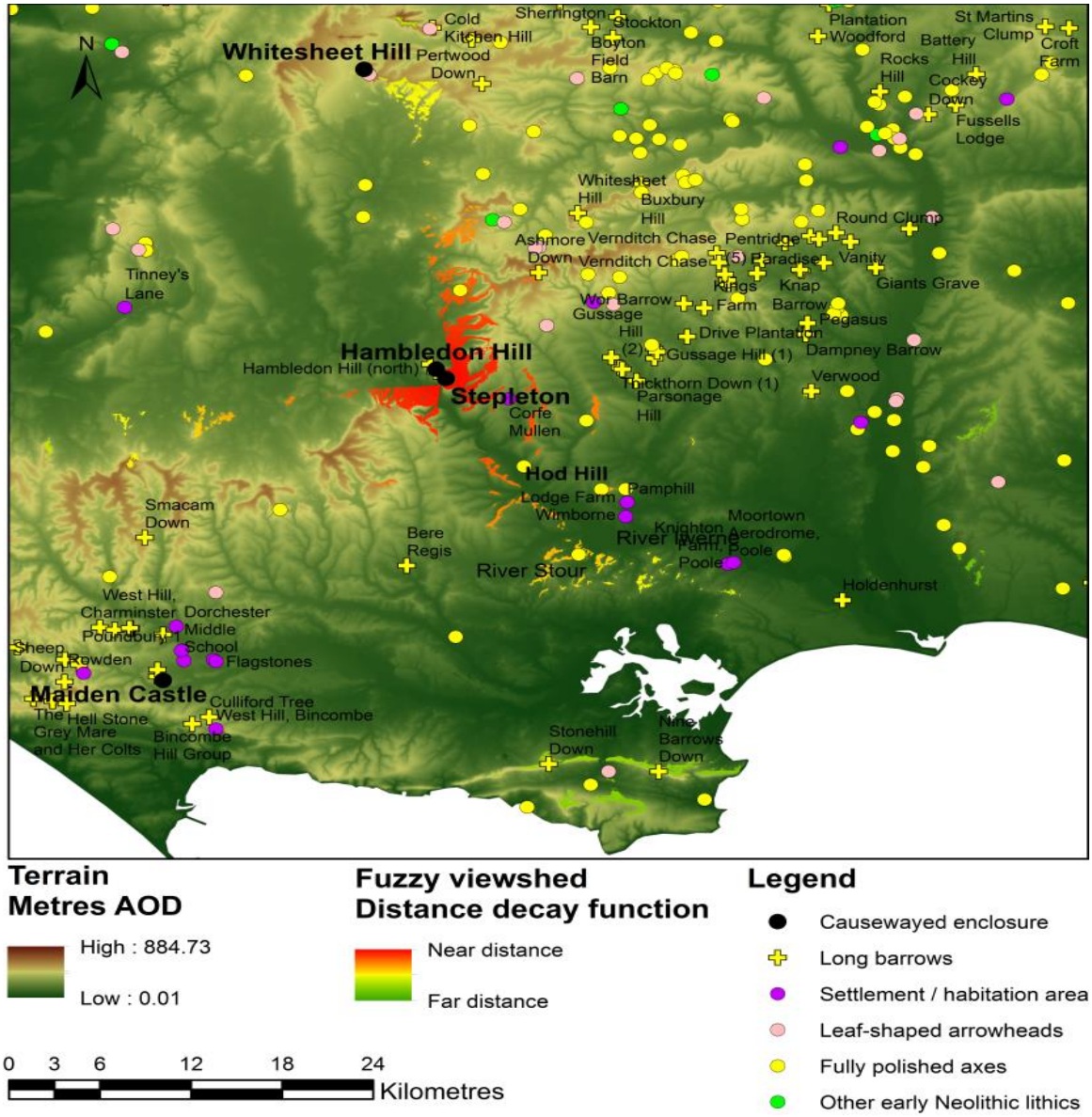


Figure 73: Stepleton visibilities model.

The model estimates the maximum potential extent of any views to and from the Stepleton enclosure on Hambledon Hill

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

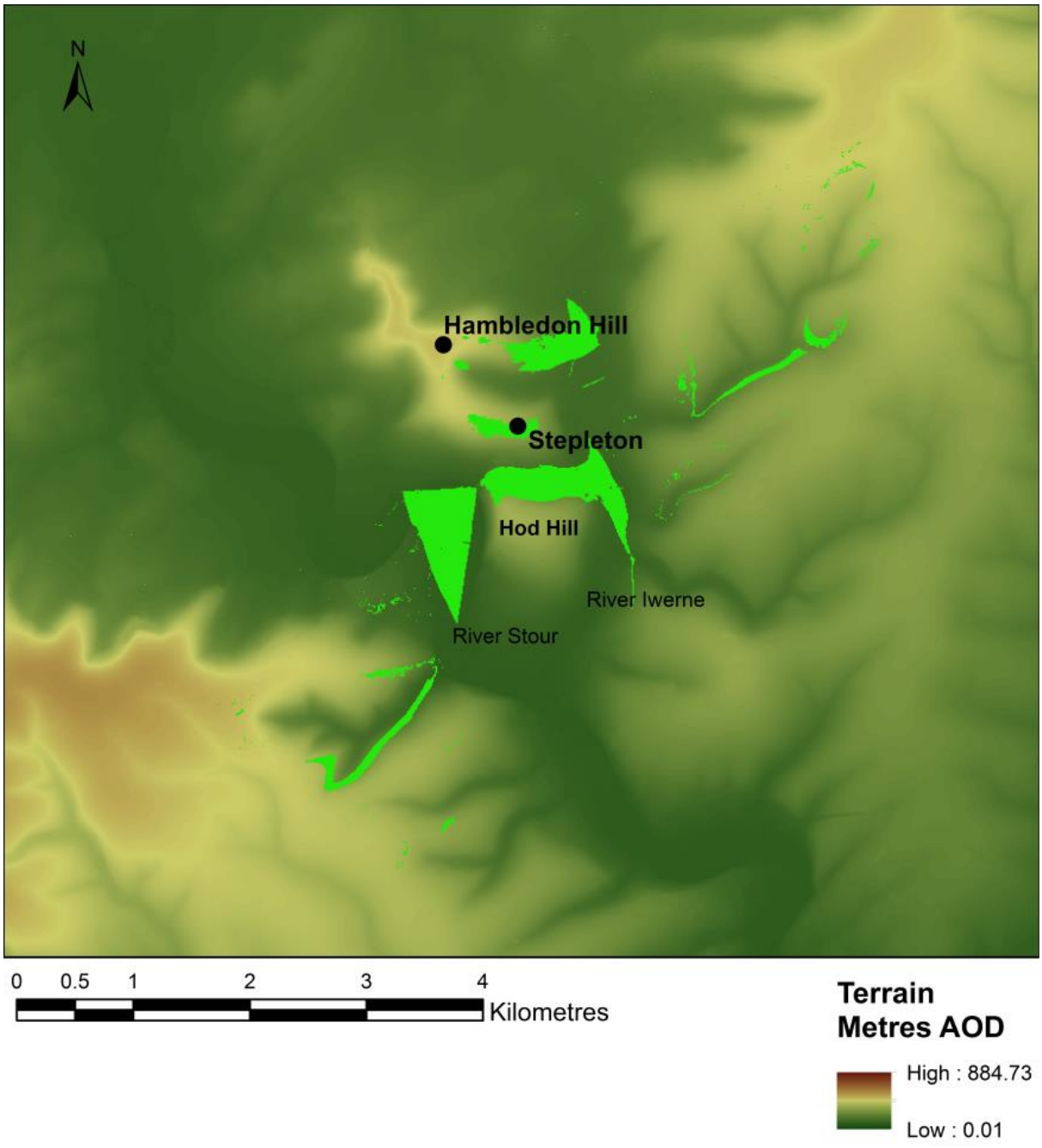


Figure 74: Hambledon less Stepleton visibilities model.

The model estimates the additional views introduced to the Hambledon Hill complex consequent on the construction of the Stepleton enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

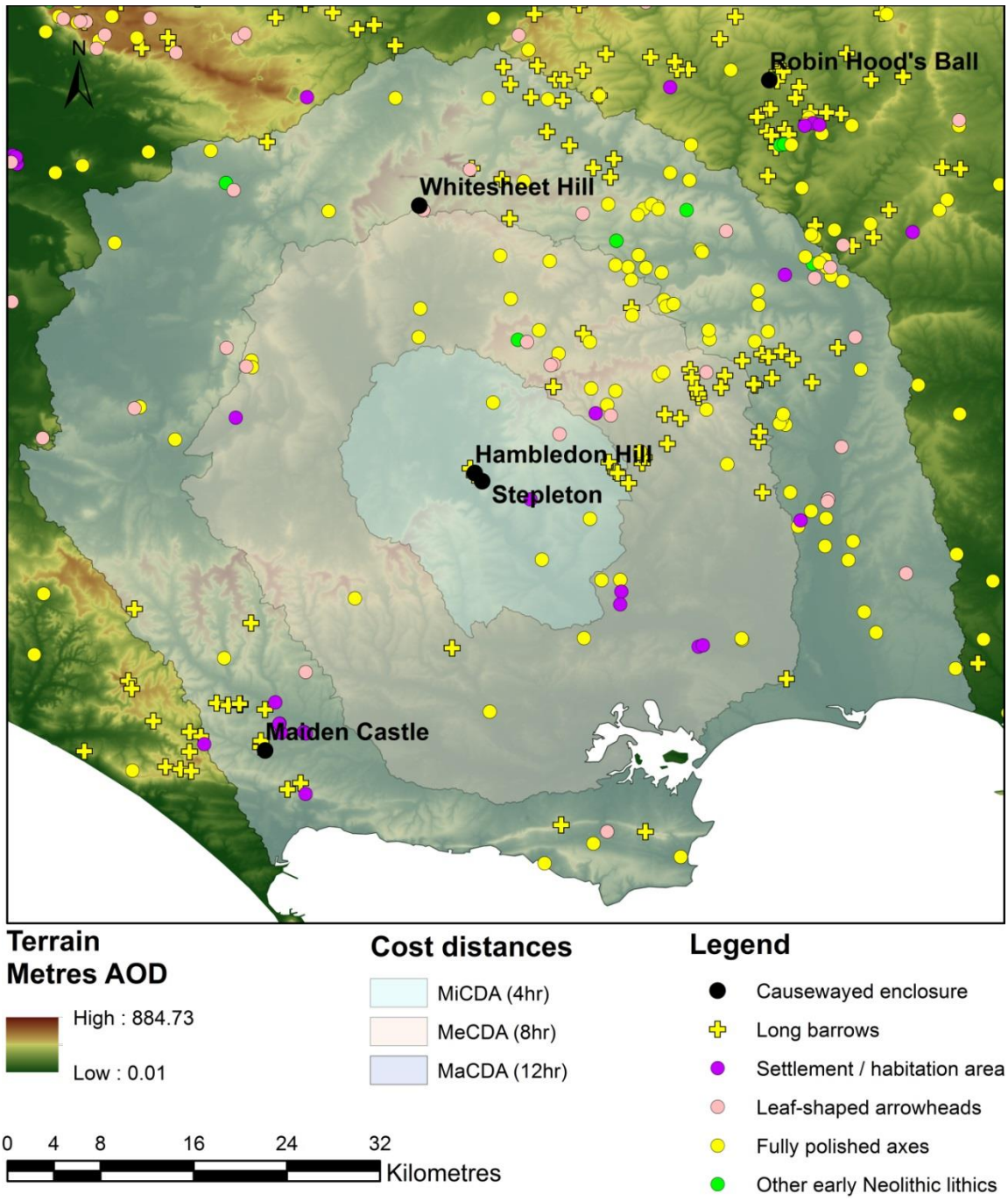


Figure 75: Hambledon and Stepleton cost distance model.

The model estimates the degree of access to the Hambledon and Stepleton enclosures, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

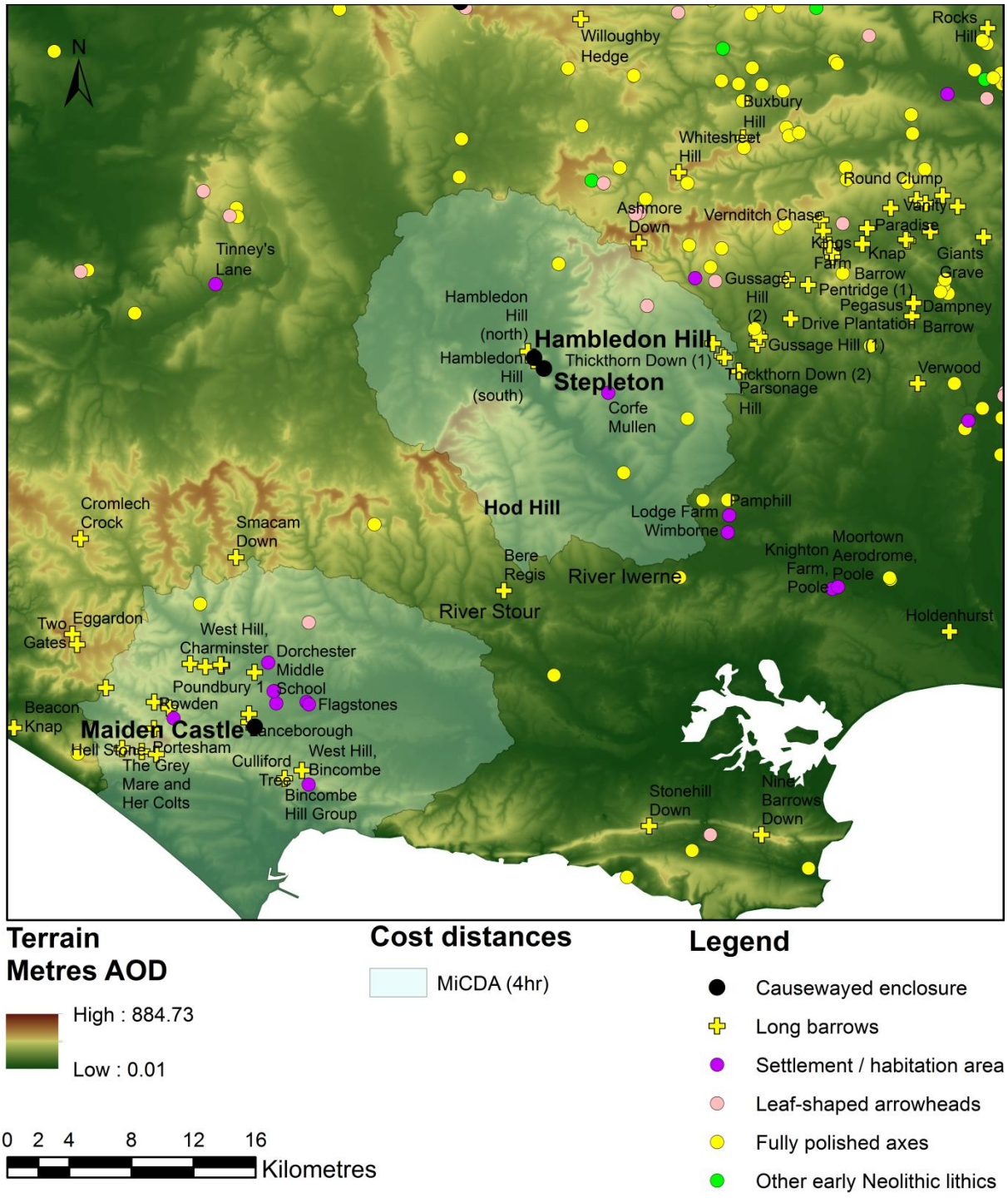


Figure 76: Hambledon and Maiden Castle MiCDA (4hr) model.

The model estimates the degree of access to the Maiden Castle and Hambledon Hill enclosures. enclosure, where the boundaries define the extent of the MiCDA. The distribution of known early Neolithic archaeology is also defined.

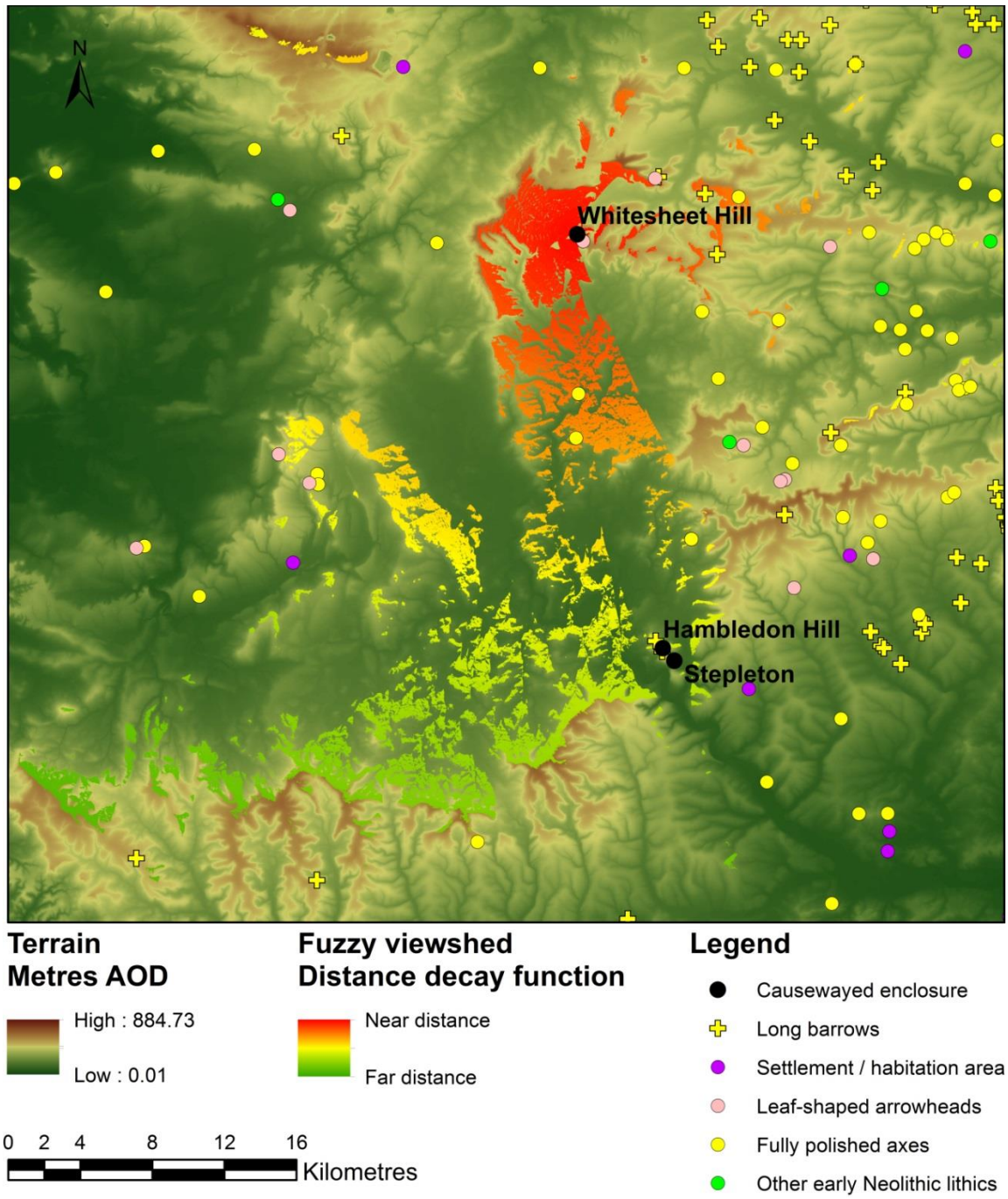


Figure 77: Whitesheet Hill visibilities model.

The model estimates the maximum potential extent of any views to and from the Whitesheet Hill enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

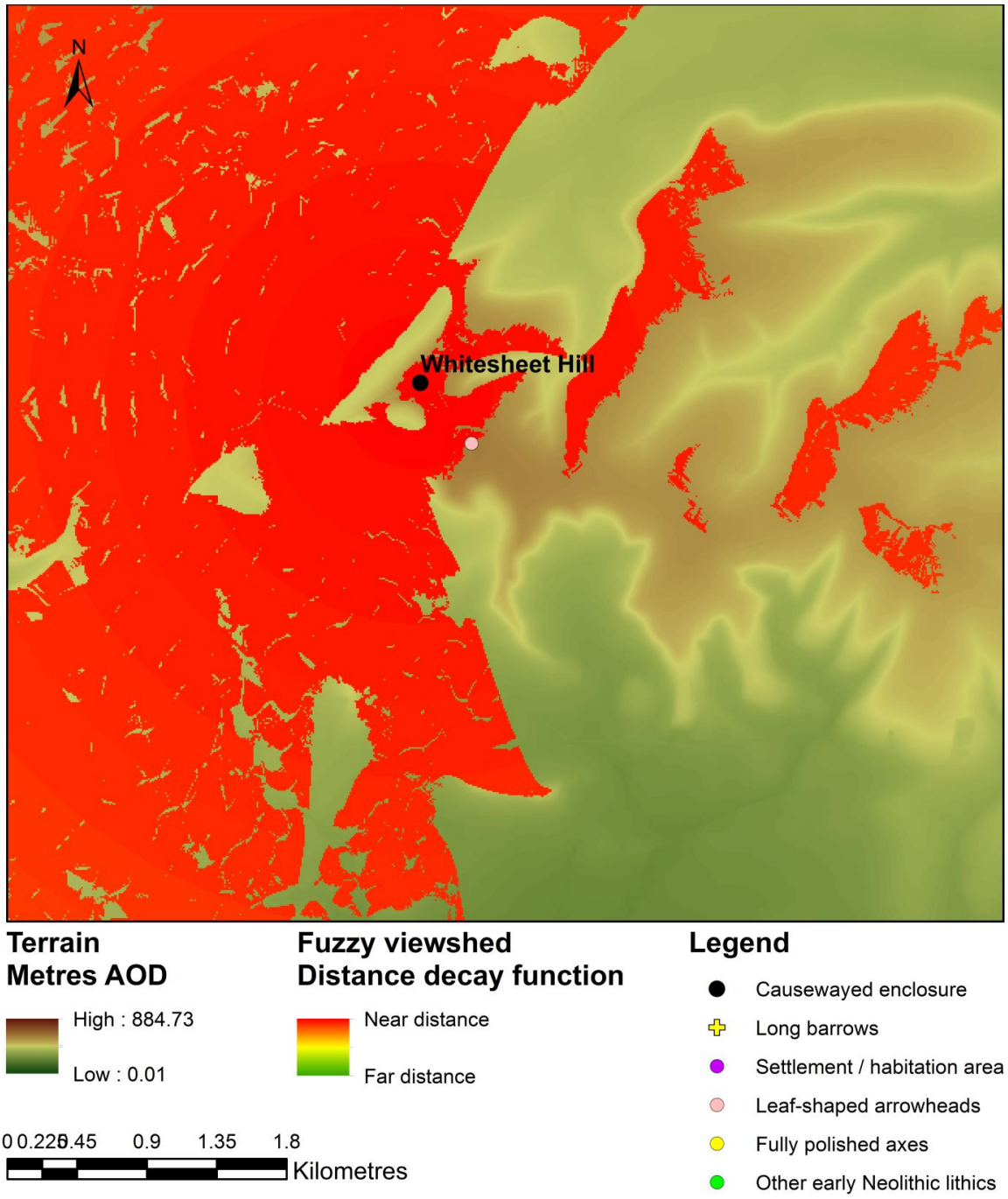


Figure 78: Whitesheet Hill near distance views.

The model estimates the maximum potential extent of any near distance views to and from the Whitesheet enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

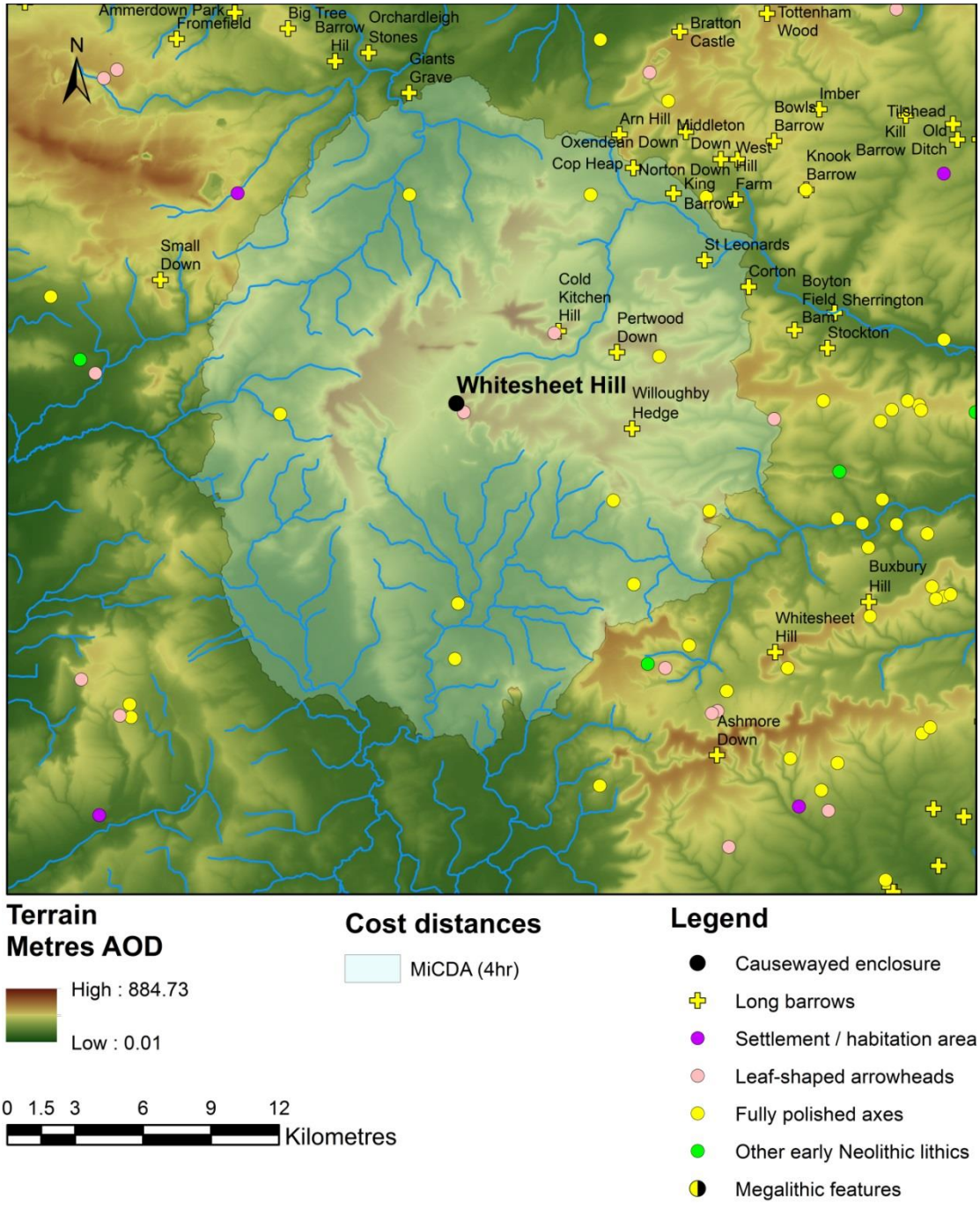


Figure 79: Whitesheet Hill MiCDA (4hr) cost model with hydrology.

The model estimates the degree of access to the Netherfield Farm enclosure, where the boundaries define the extent of the MiCDA. The distribution of known early Neolithic archaeology is also defined, and the relationship with river systems also estimated.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

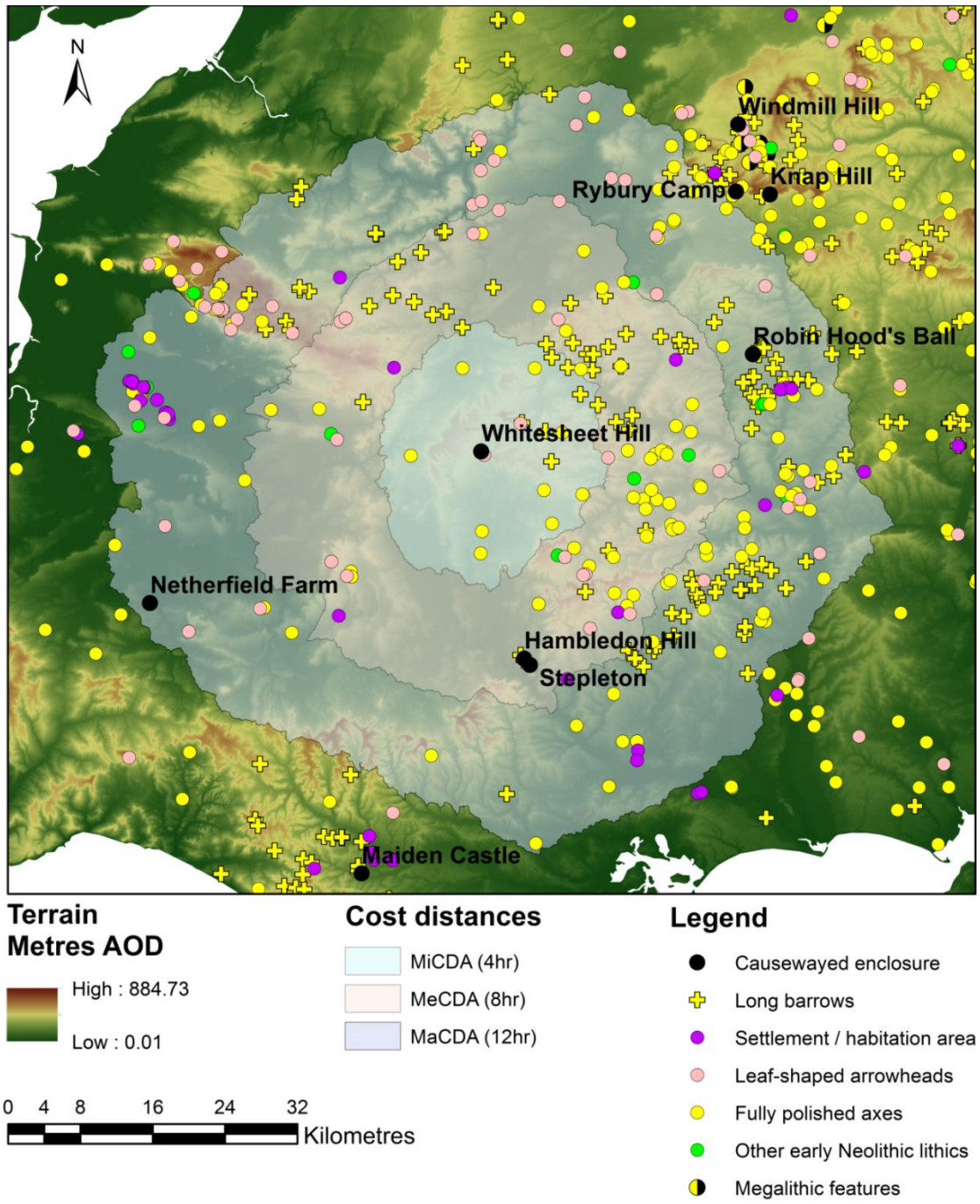


Figure 80: Whitesheet Hill cost distance models.

The model estimates the degree of access to the Netherfield Farm enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

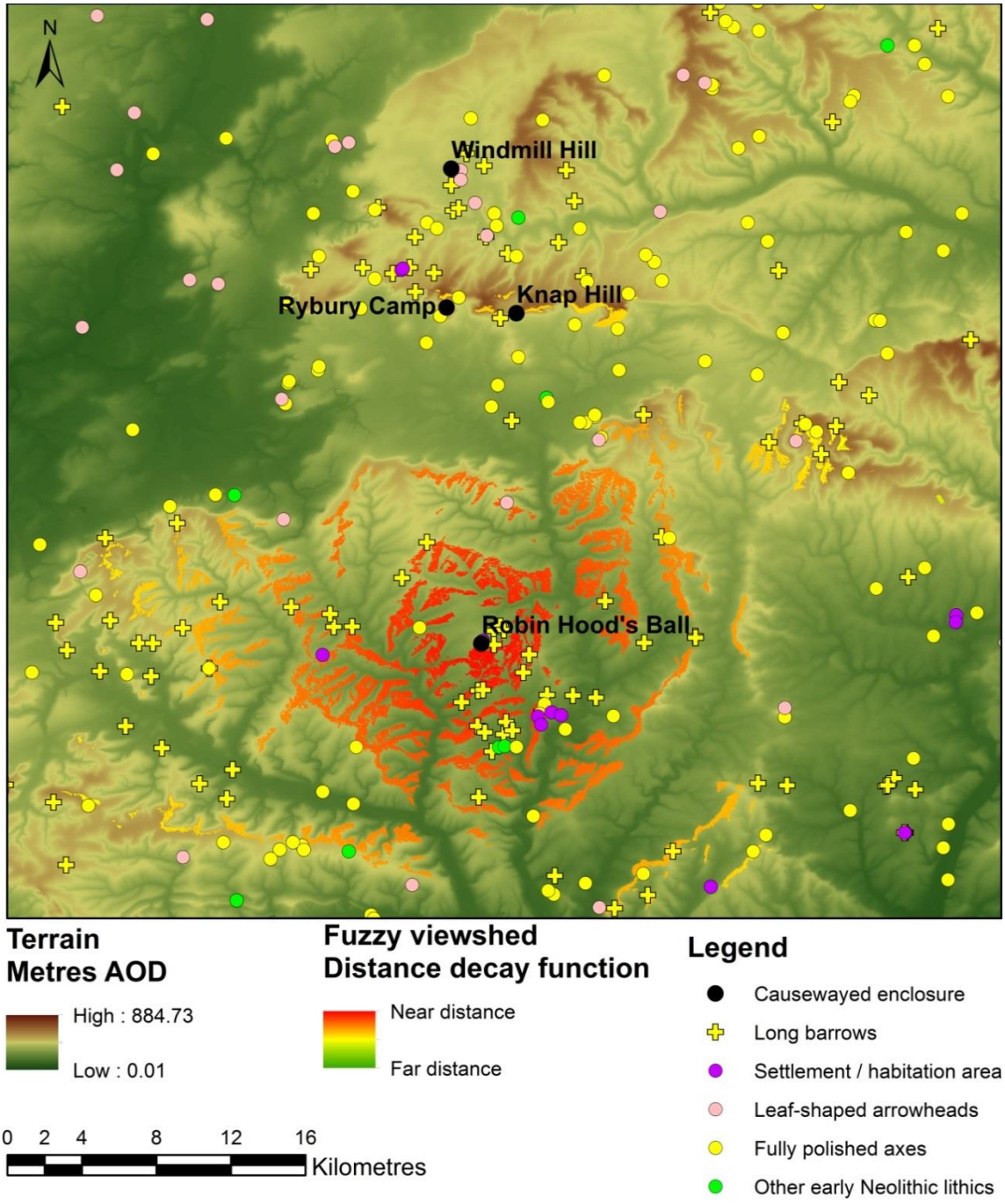


Figure 81: Robin Hood's Ball visibilities model.

The model estimates the maximum potential extent of any views to and from the Robin Hood's Ball enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

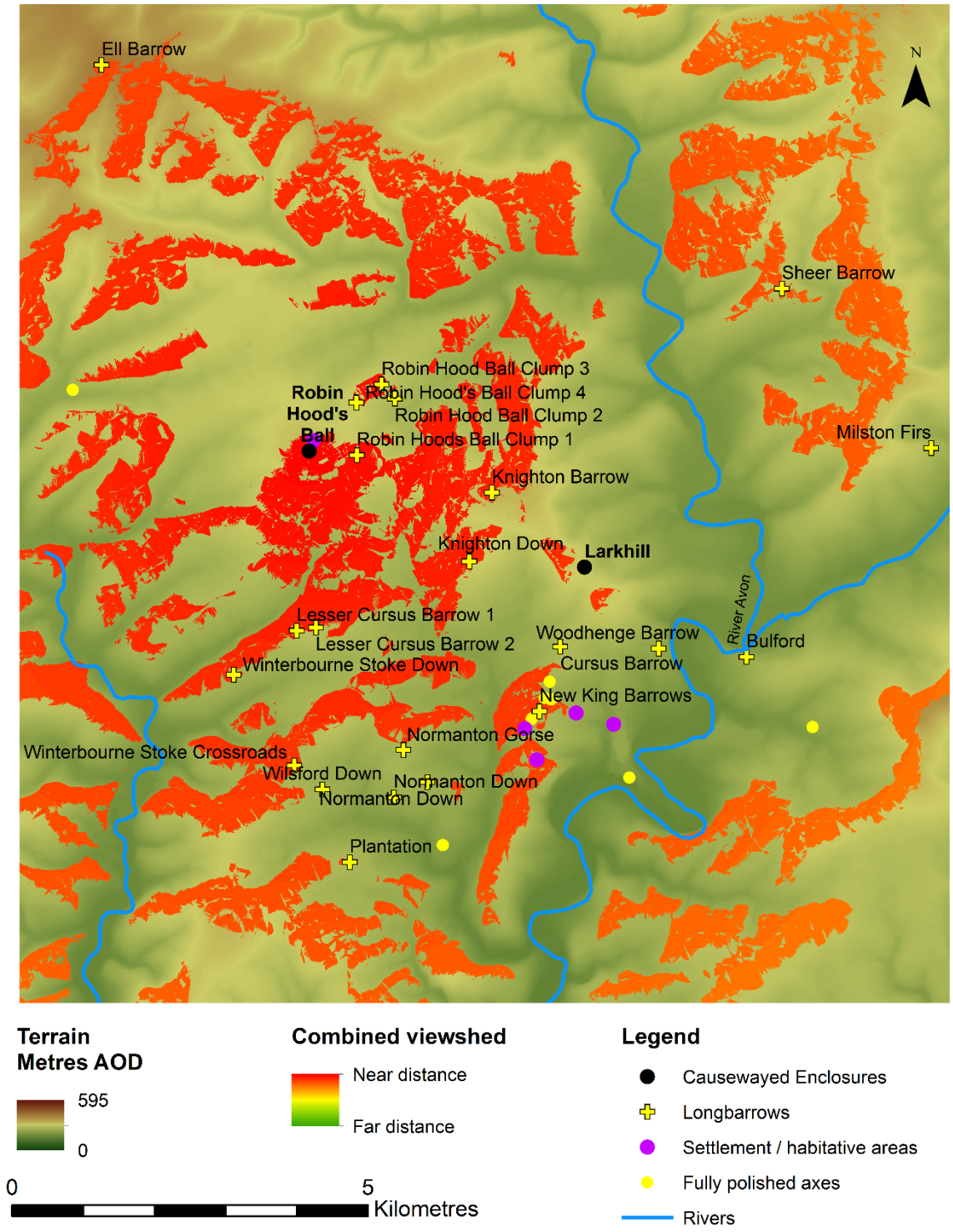


Figure 82: Robin Hood's Ball immediate views.

The model estimates the maximum potential extent of any near distance views to and from the Robin Hood's Ball enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

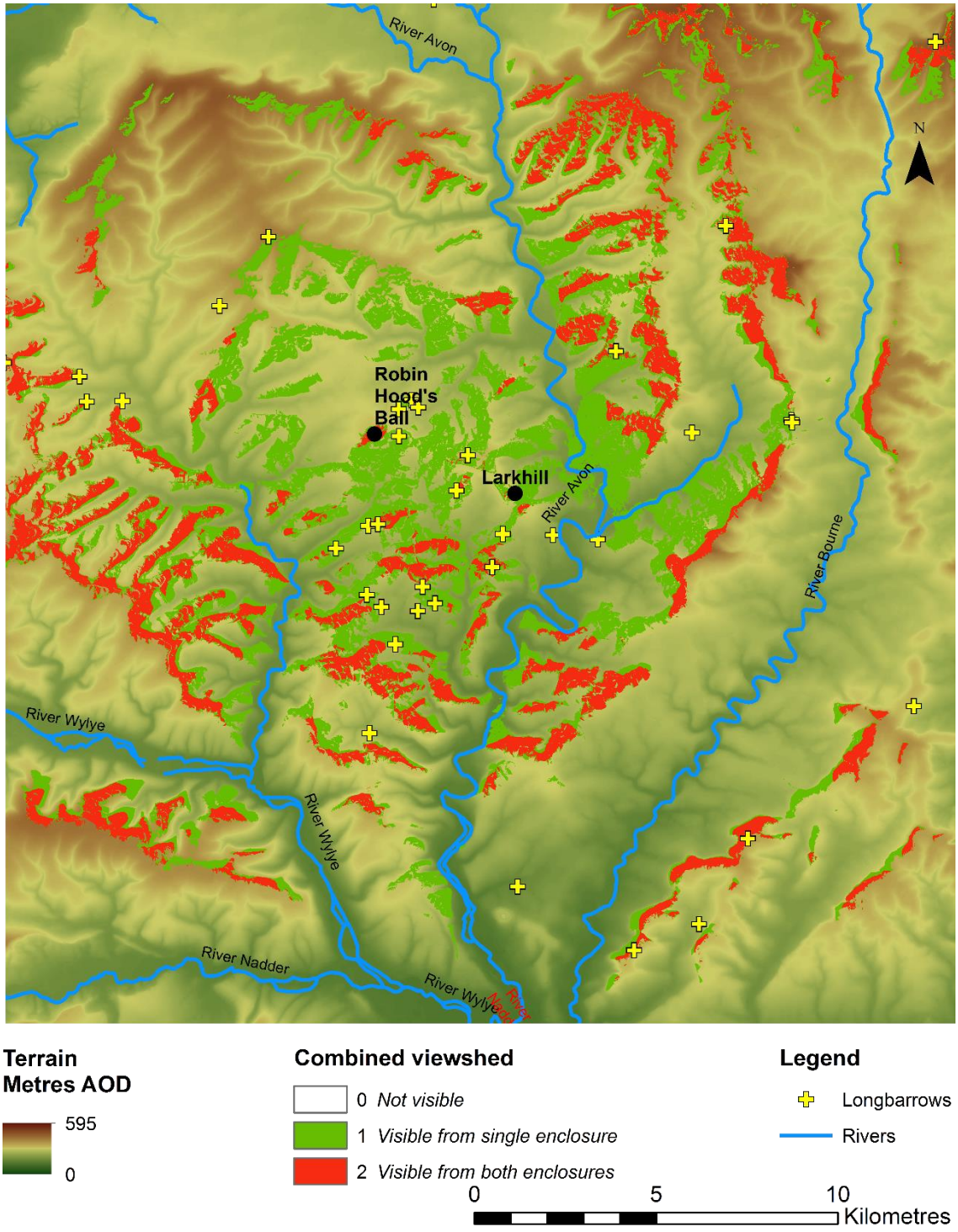


Figure 83: Robin Hood's Ball and Larkhill combined views.

The model estimates the maximum potential extent of any areas in the near distance that may have been intervisible with both the Robin Hood's Ball and Larkhill enclosures. Most of the immediate areas around the enclosures could only have been visible from only a single enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

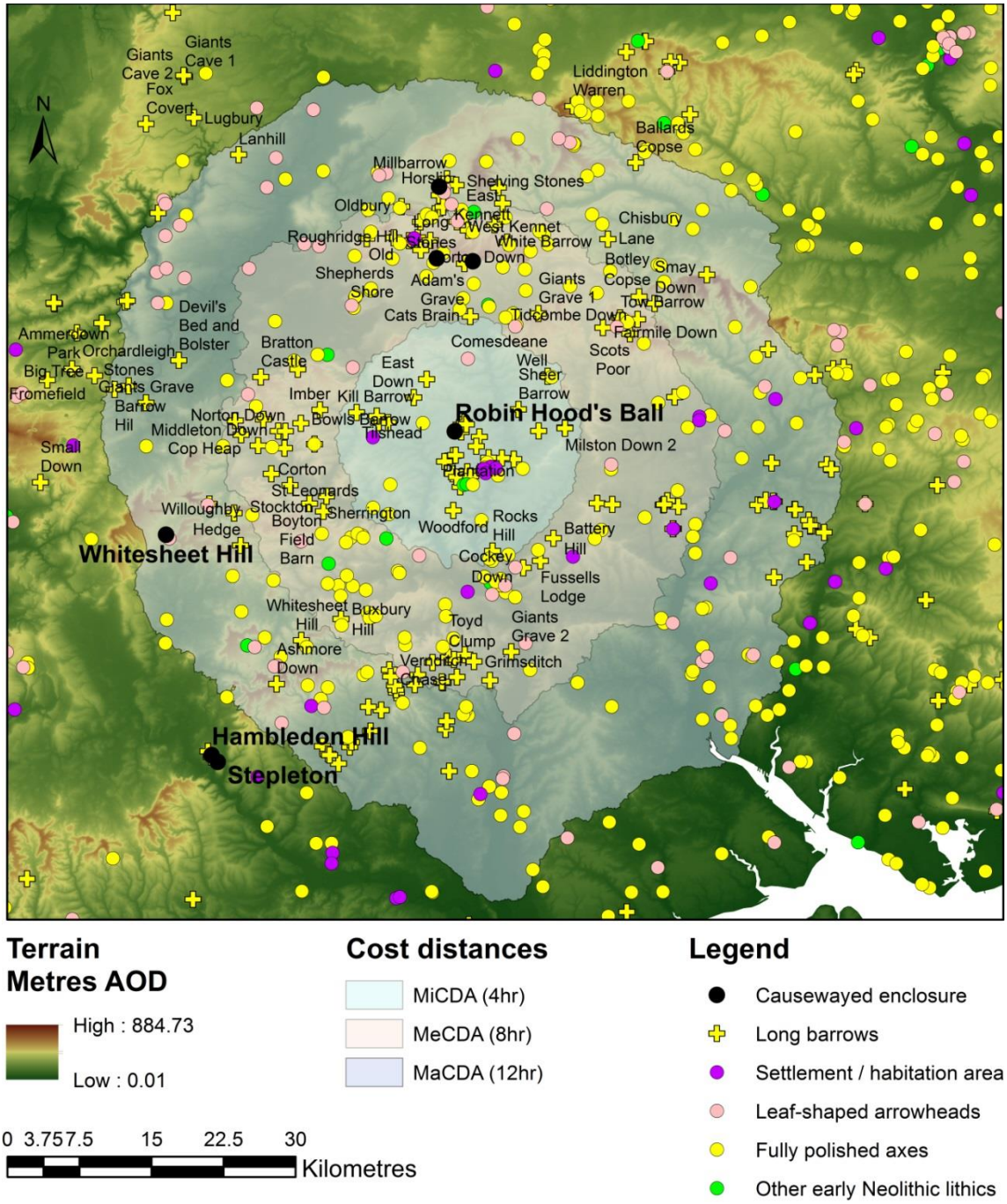


Figure 84: Robin Hood's Ball cost distance model.

The model estimates the degree of access to the Robin Hood's Ball enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

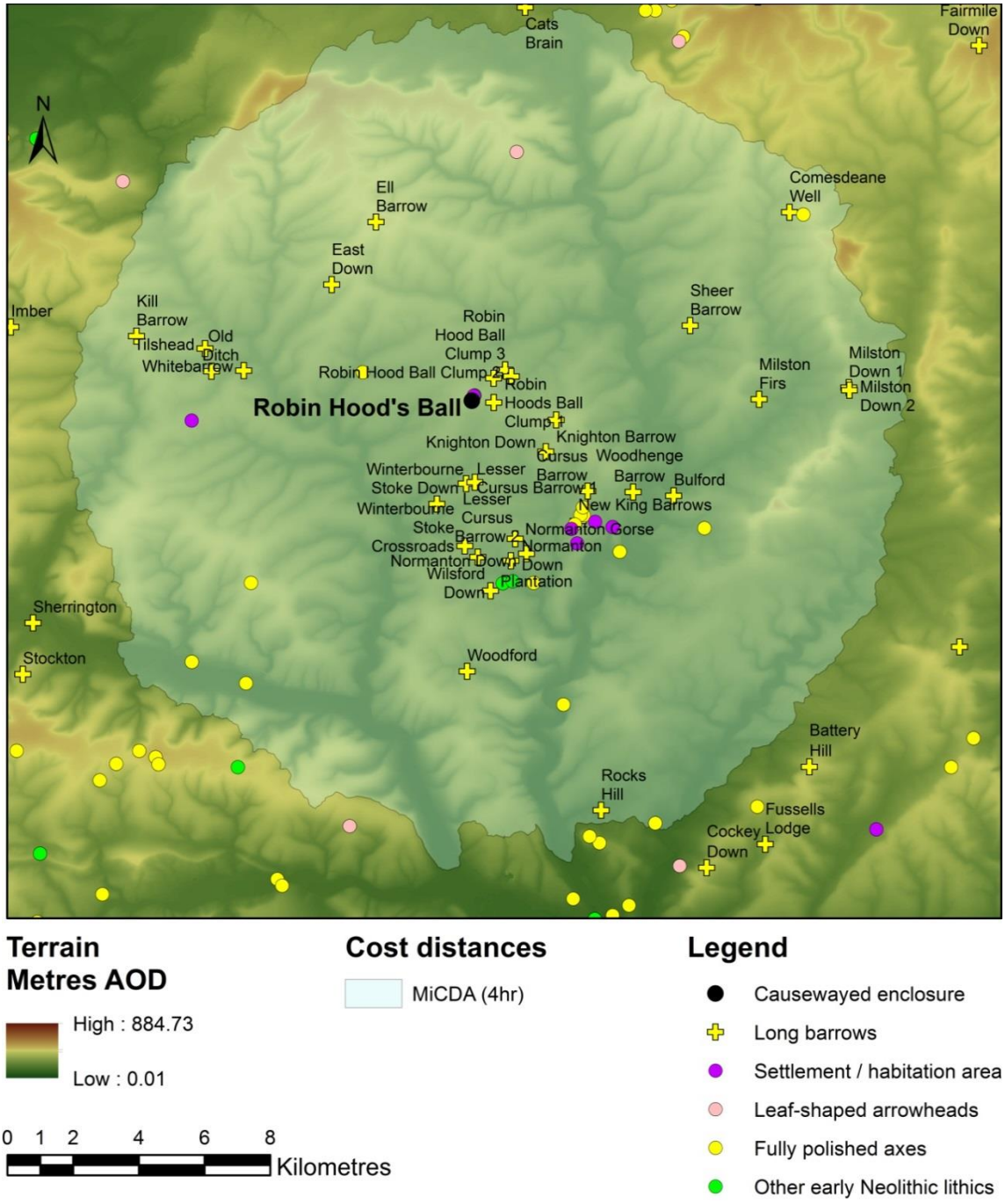


Figure 85: Robin Hood's Ball MiCDA model

The model estimates the degree of access to the Robin Hood's Ball enclosure, where the boundaries define the extent of the MiCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

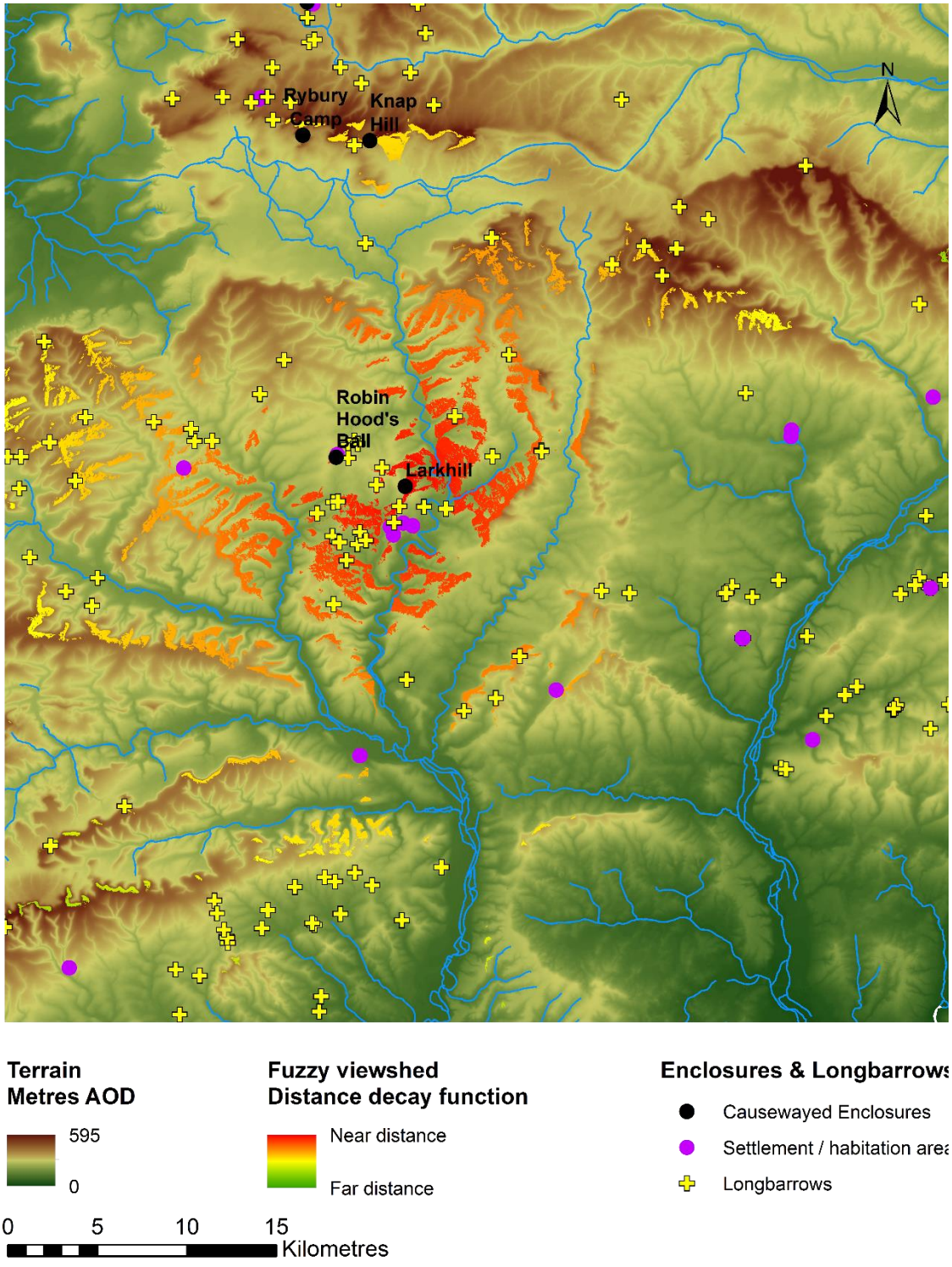


Figure 86: Larkhill visibilities model.

The model estimates the maximum potential extent of any views to and from the Larkhill enclosure. The predominant views appear to focus on the Avon Valley and the Nine Mile River which wind gracefully through an area of significant importance in the early Neolithic.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

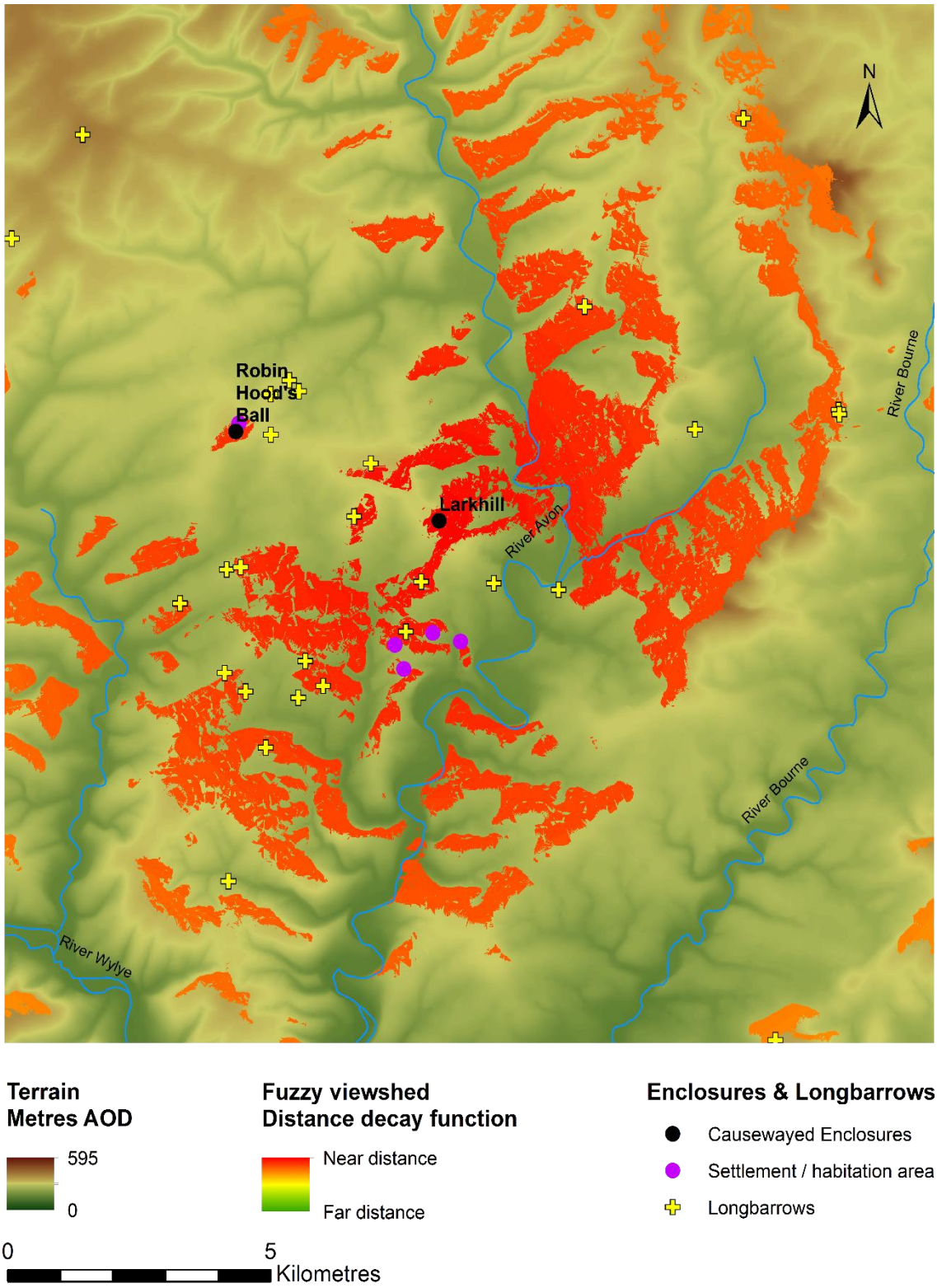


Figure 87: Larkhill near distance visibilities.

The model estimates the maximum potential extent of any views to and from the Larkhill enclosure. Though not apparent at this resolution, only Sheer Barrow, 4.7km to the northeast and the long barrow at the east end of the Stonehenge Cursus could have been visible.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina

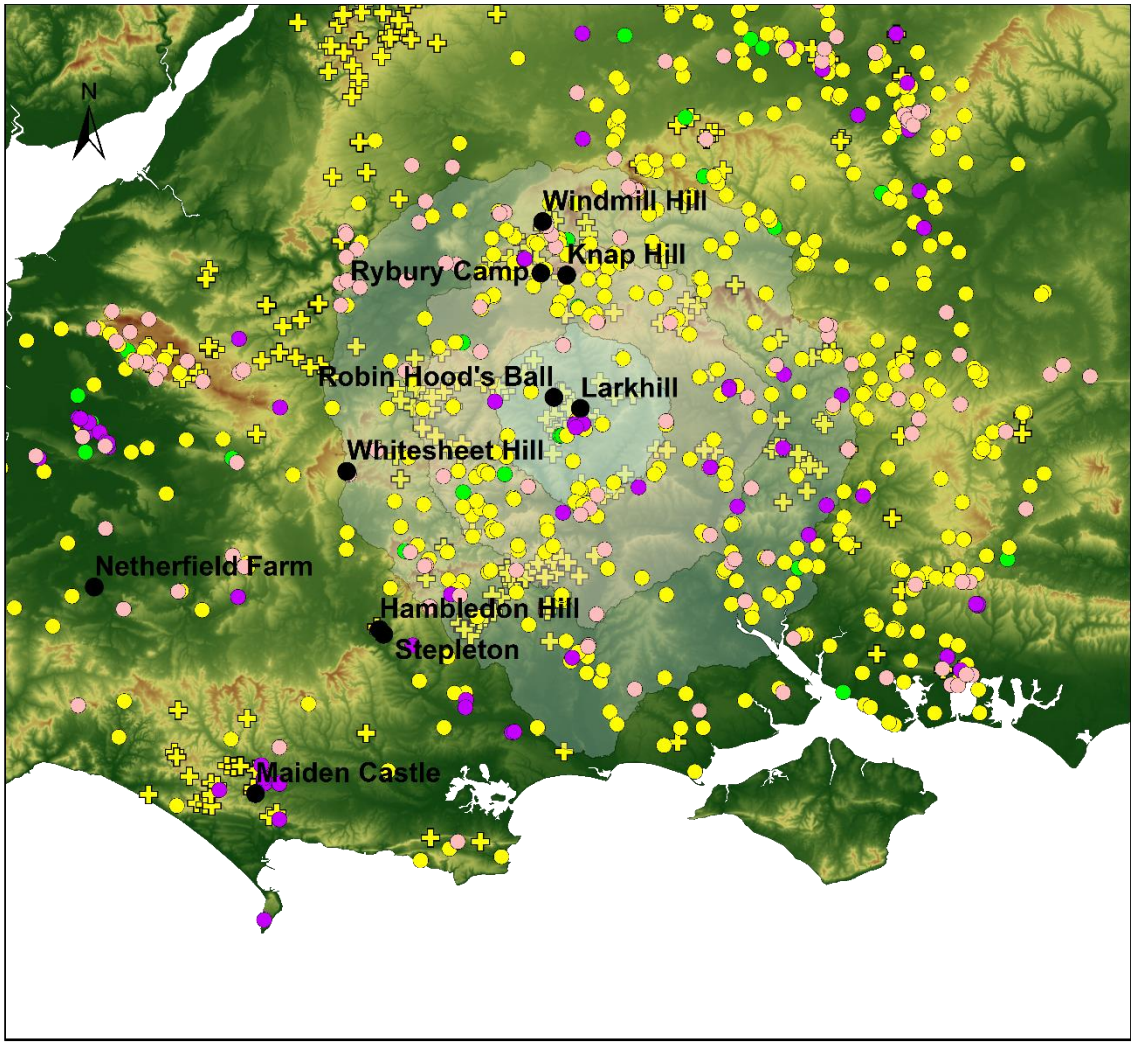


Figure 88: Larkhill cost distance models.

The model estimates the degree of access to the Larkhill enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

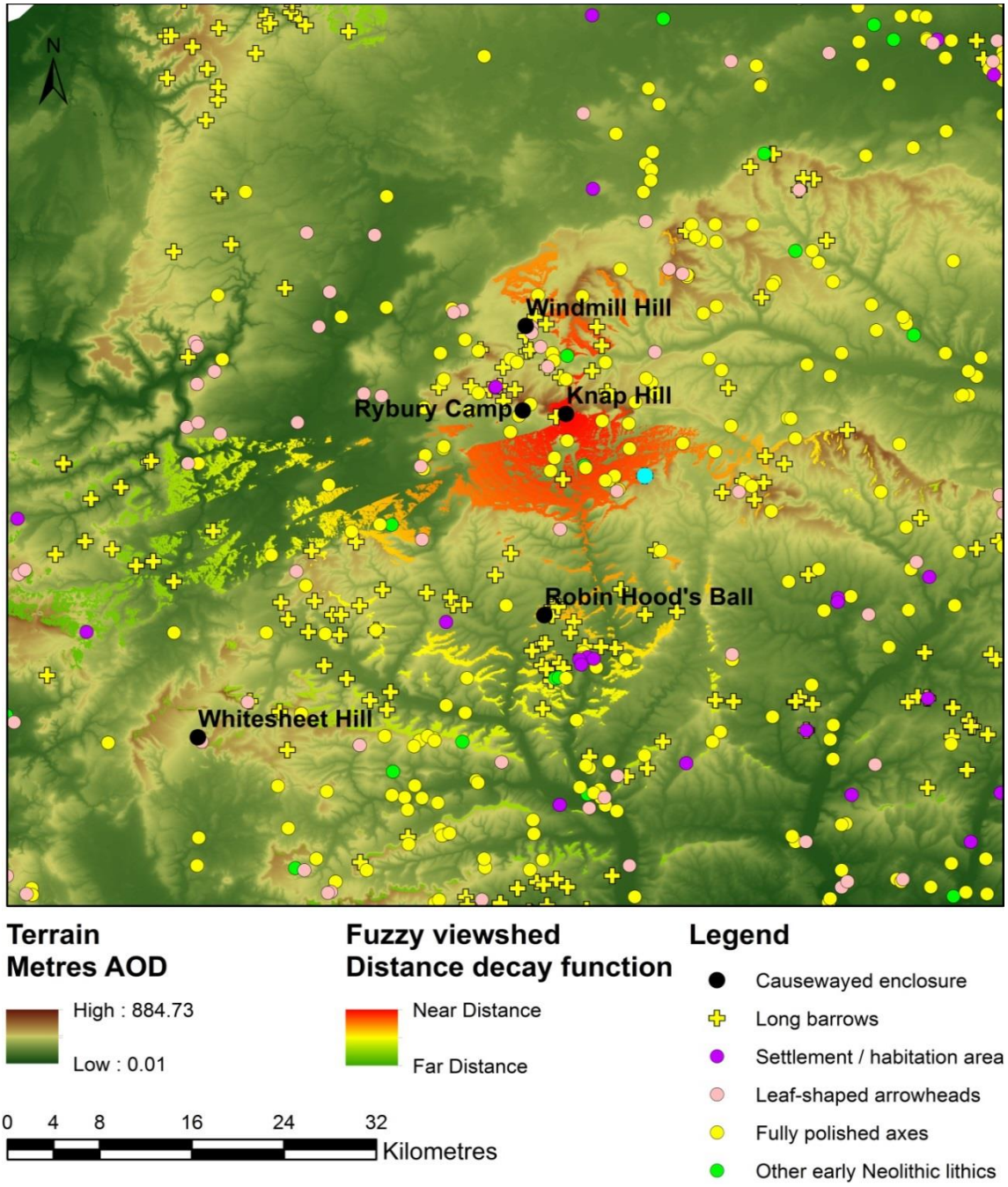


Figure 89: Knap Hill visibilities model

The model estimates the maximum potential extent of any views to and from the Knap Hill enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

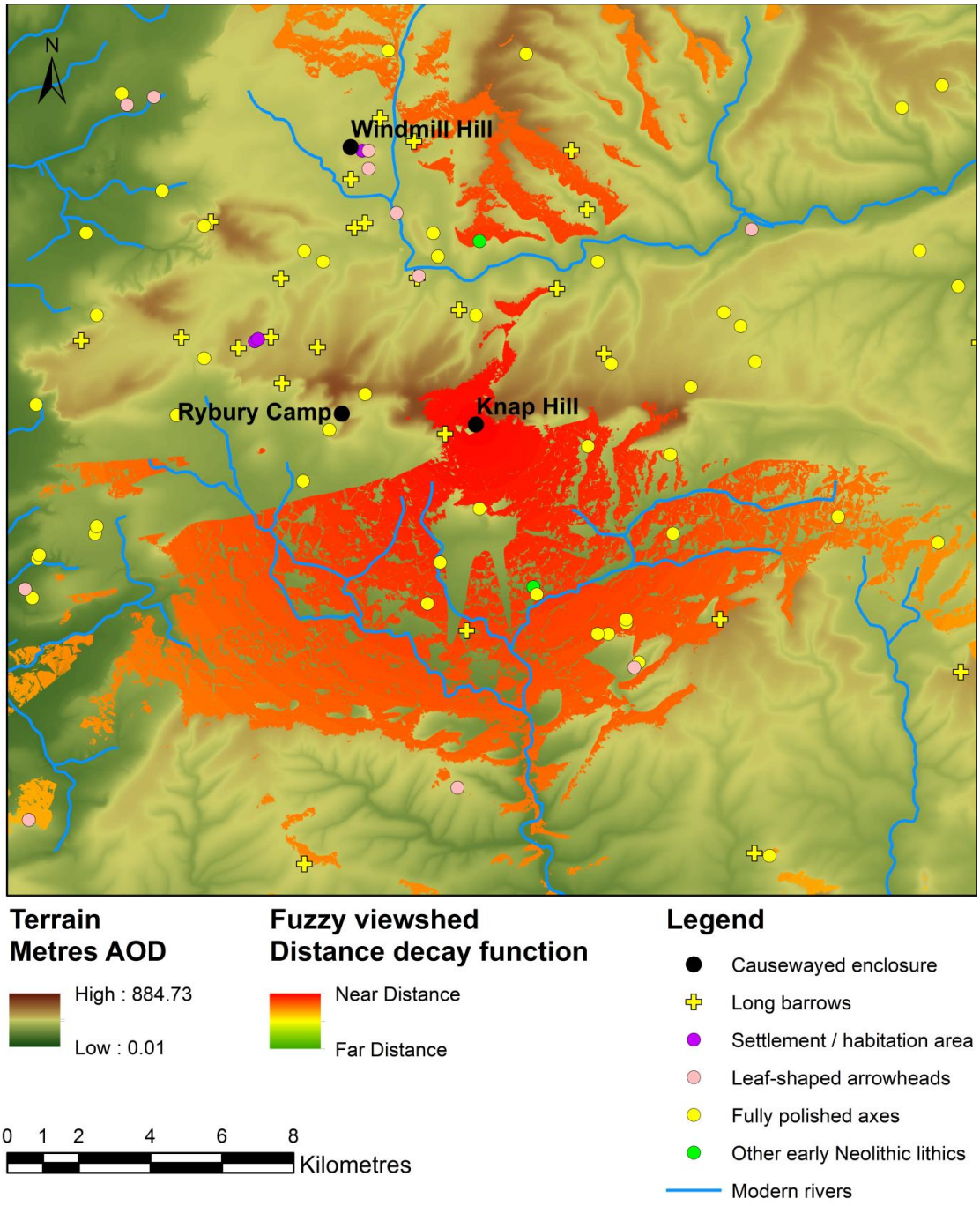


Figure 90: Knap Hill near distance views and hydrology.

The model estimates the maximum potential extent of any views to and from the Knap Hill enclosure

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

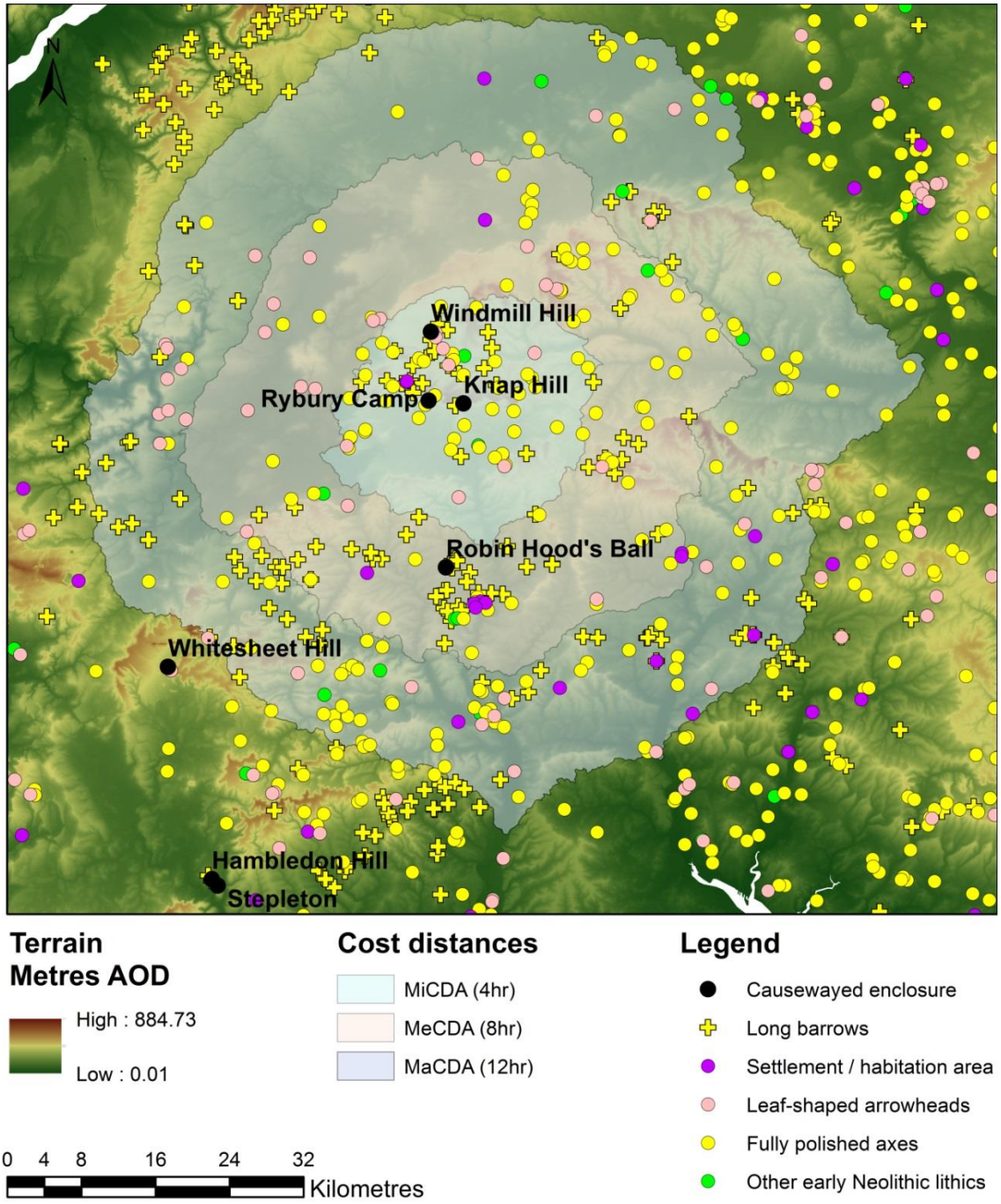


Figure 91: Knap Hill cost distance model.

The model estimates the degree of access to the Knap Hill enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

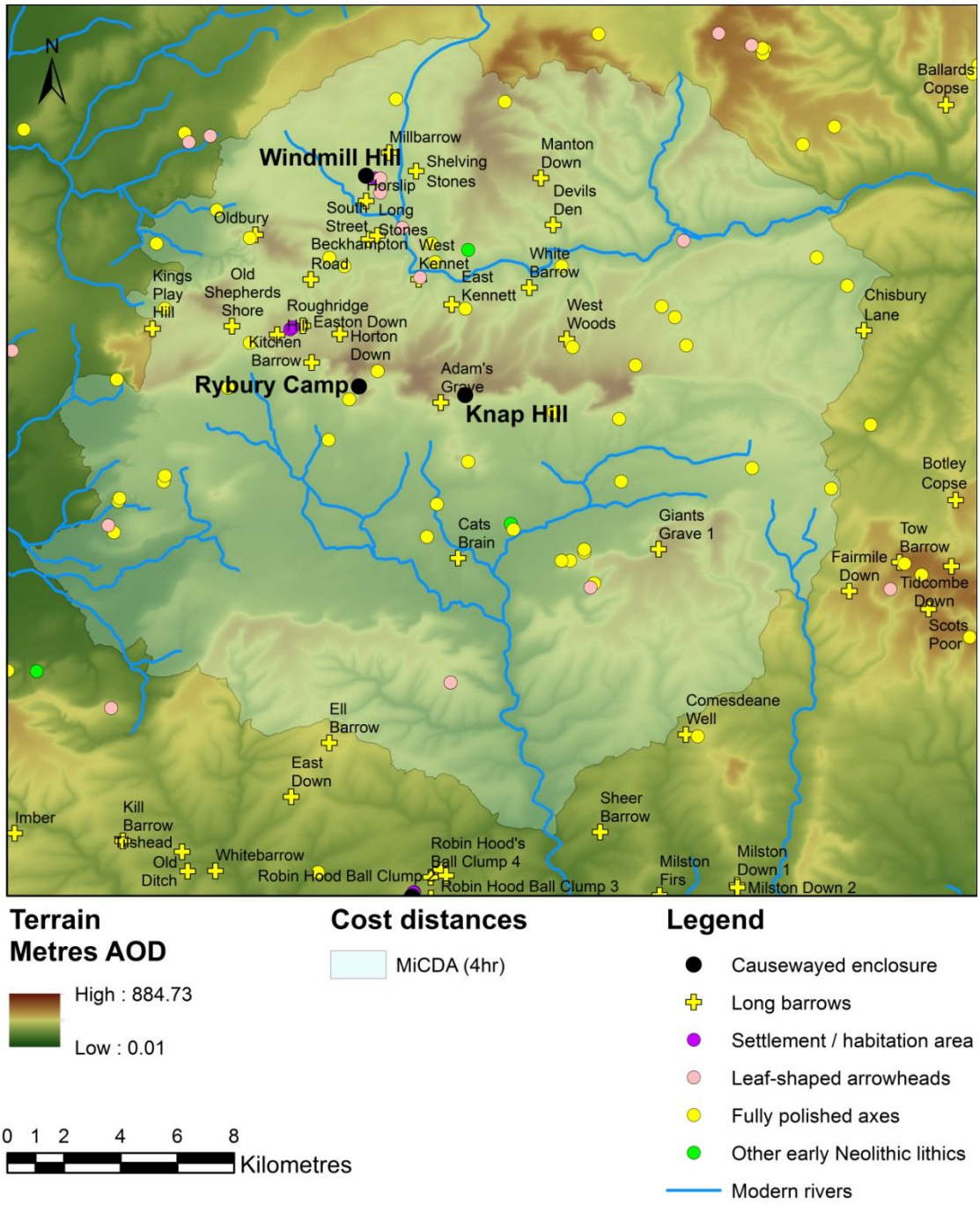


Figure 92: Knap Hill MiCDA and hydrology.

The model estimates the degree of access to the Knap Hill enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

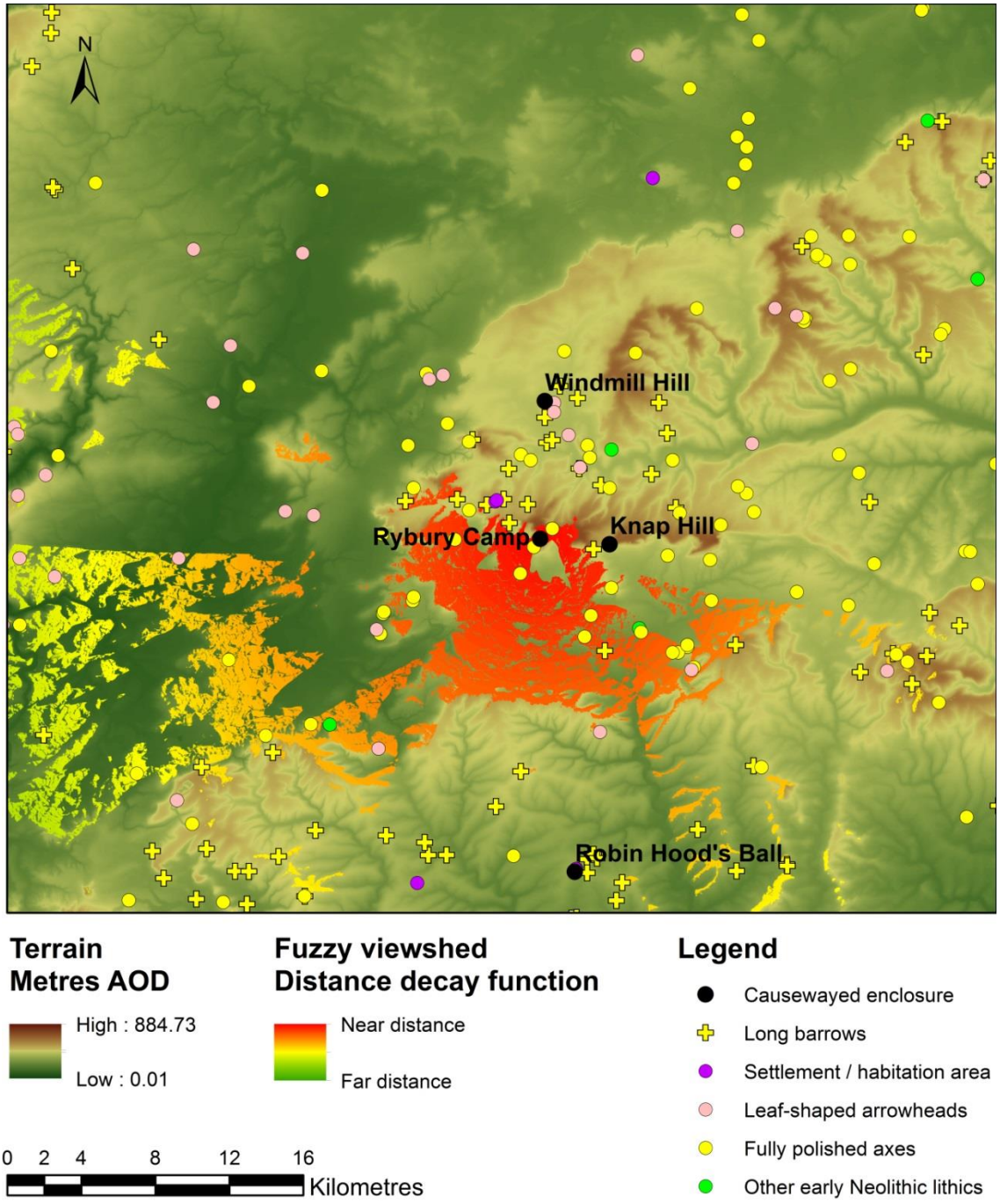


Figure 93: Rybury Camp visibilities model.

The model estimates the maximum potential extent of any views to and from the Rybury Camp enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

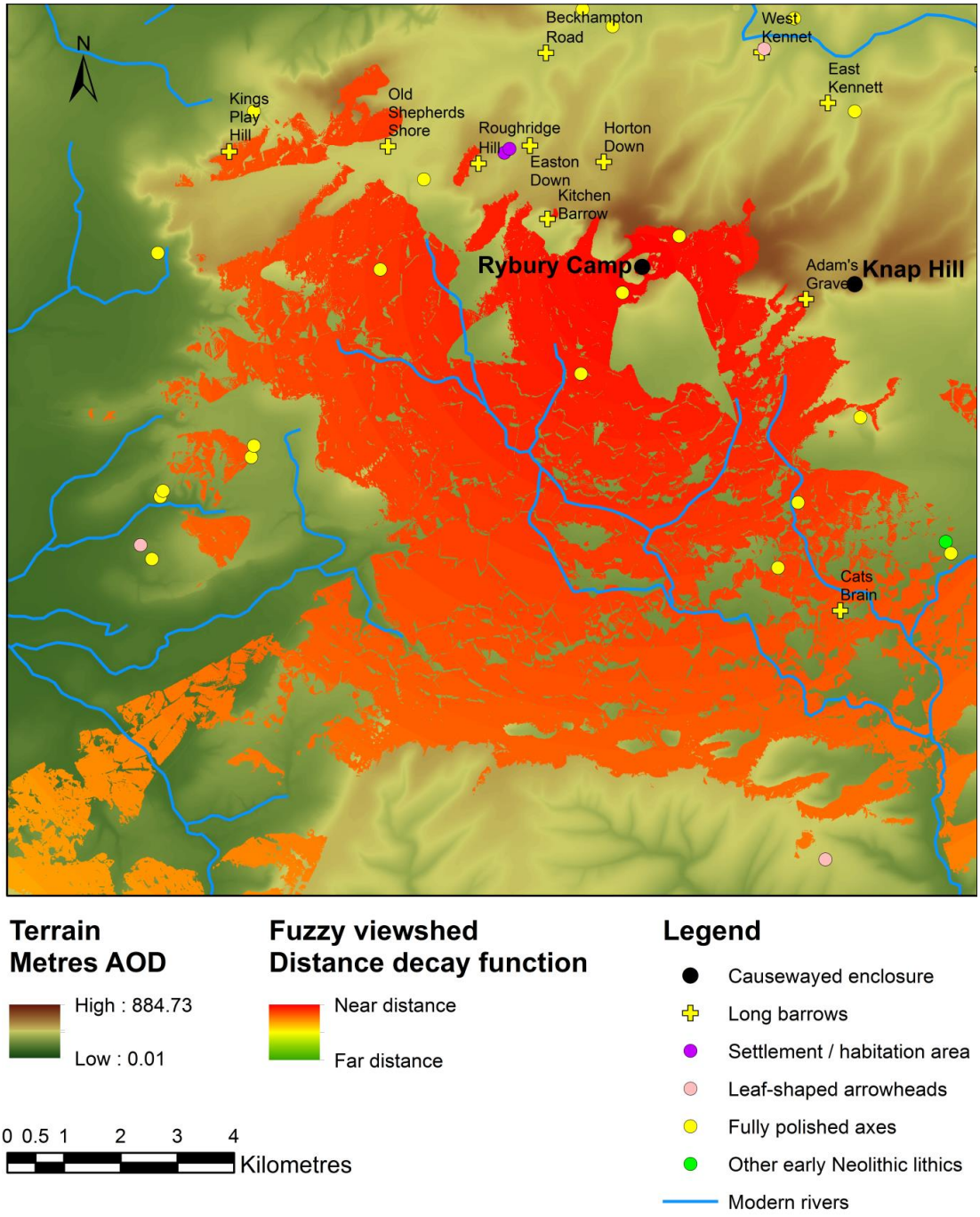


Figure 94: Rybury Camp near distance views and hydrology.

The model estimates the maximum potential extent of the immediate views to and from the Rybury Camp enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

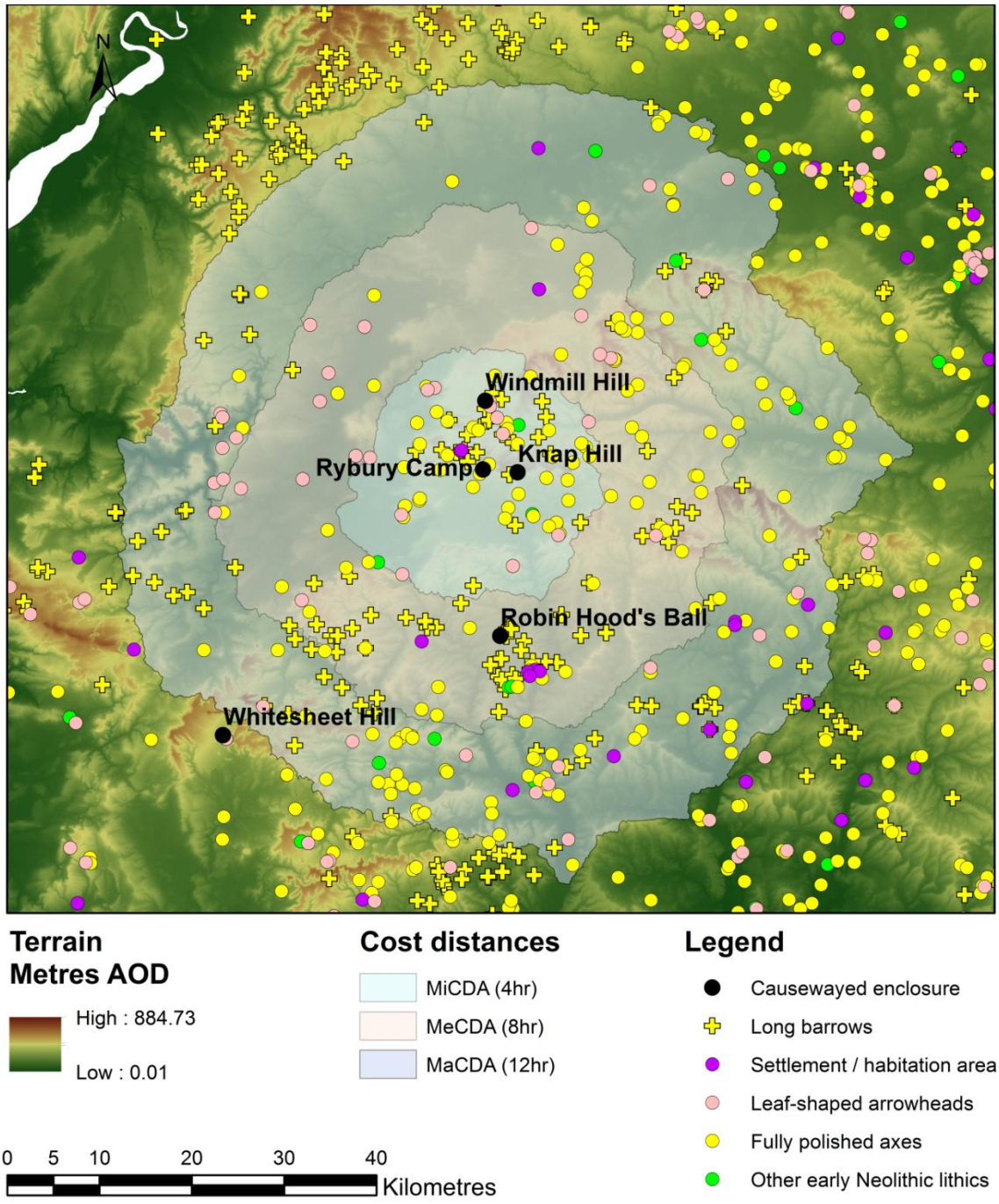


Figure 95: Rybury Camp cost distance models.

The model estimates the degree of access to the Rybury Camp enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

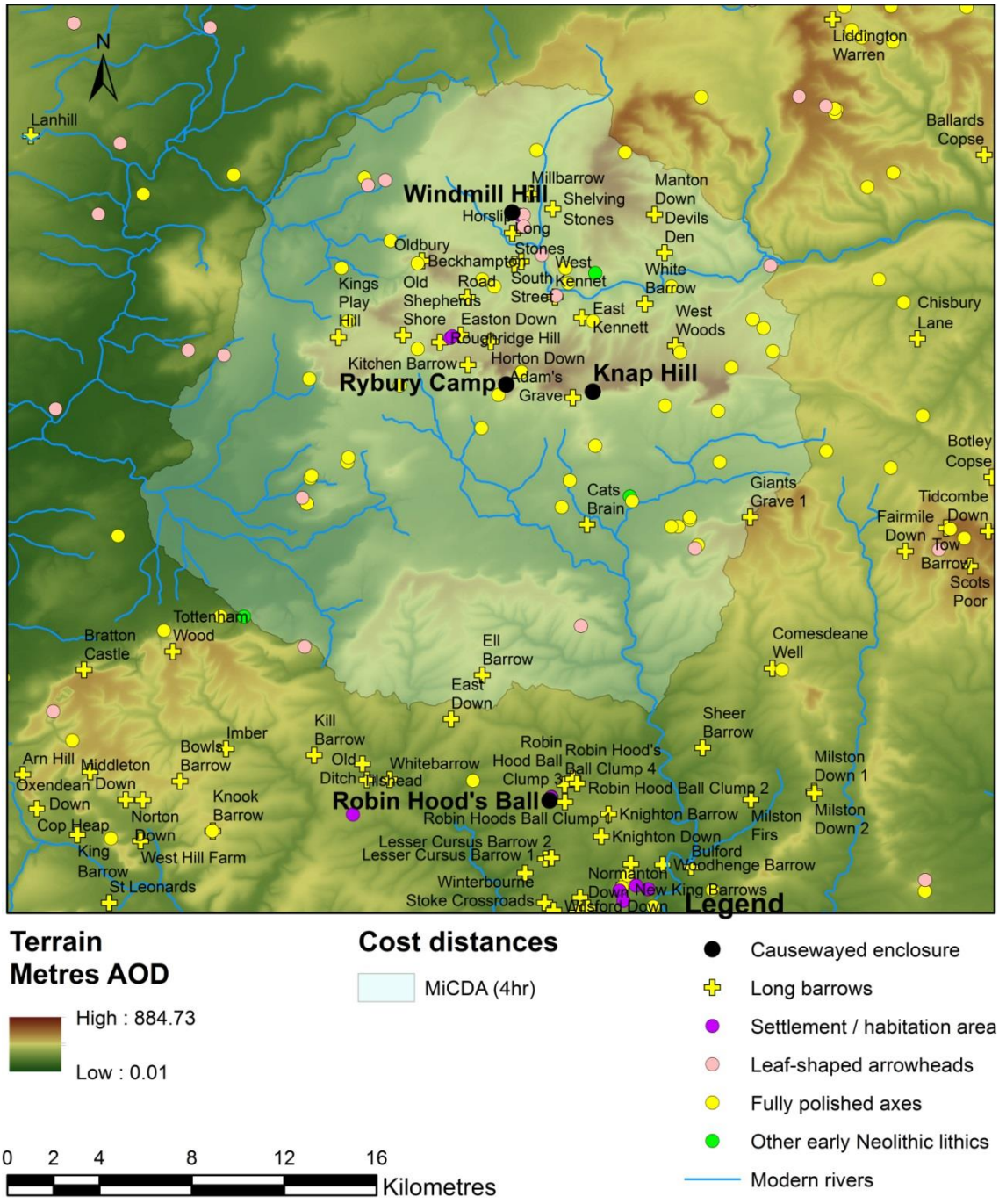


Figure 96: Rybury Camp MiCDA (4hr) and hydrology.

The model estimates the degree of access to the Netherfield Farm enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

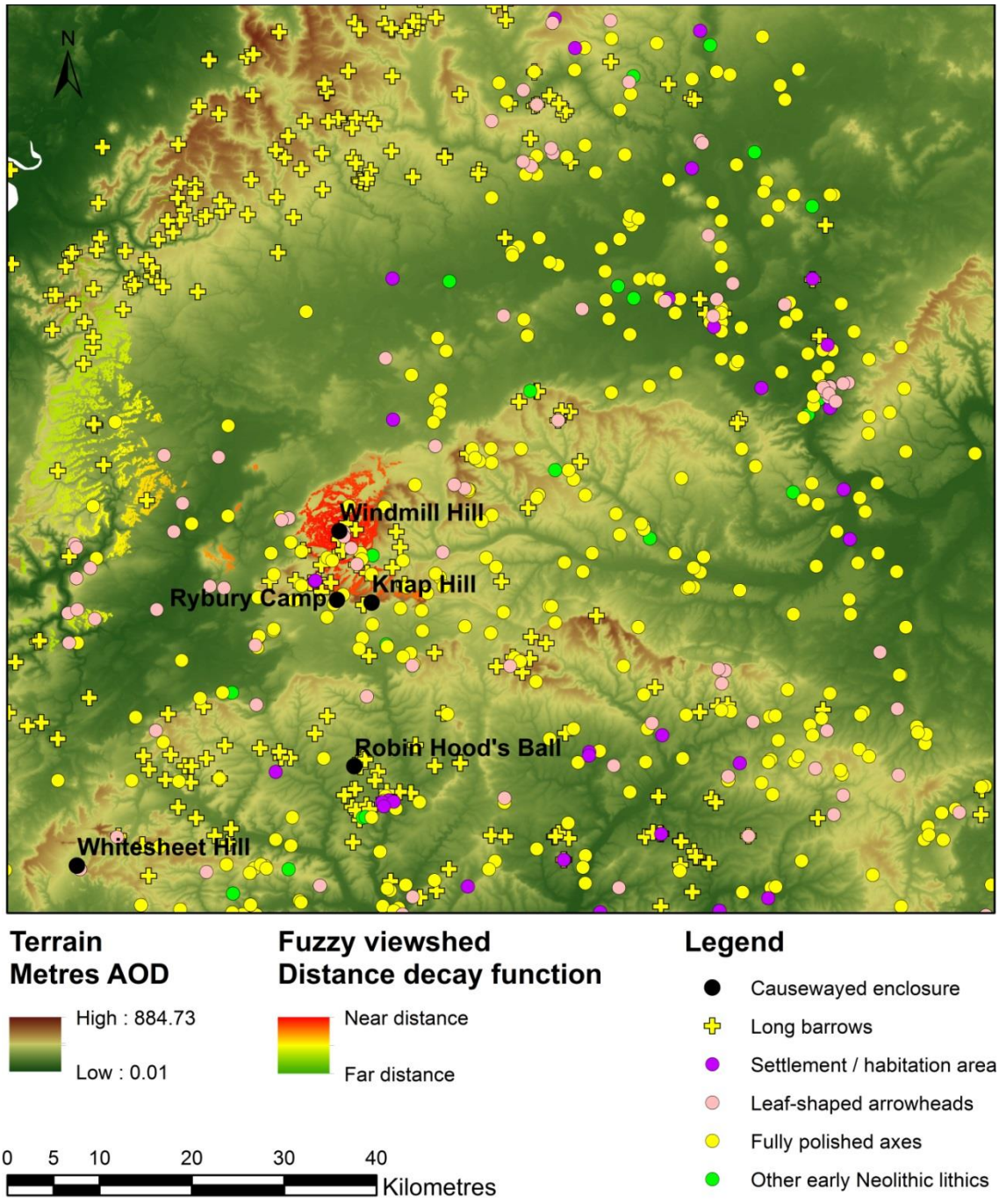


Figure 97: Windmill Hill visibilities model.

The model estimates the maximum potential extent of any views to and from the Windmill Hill enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

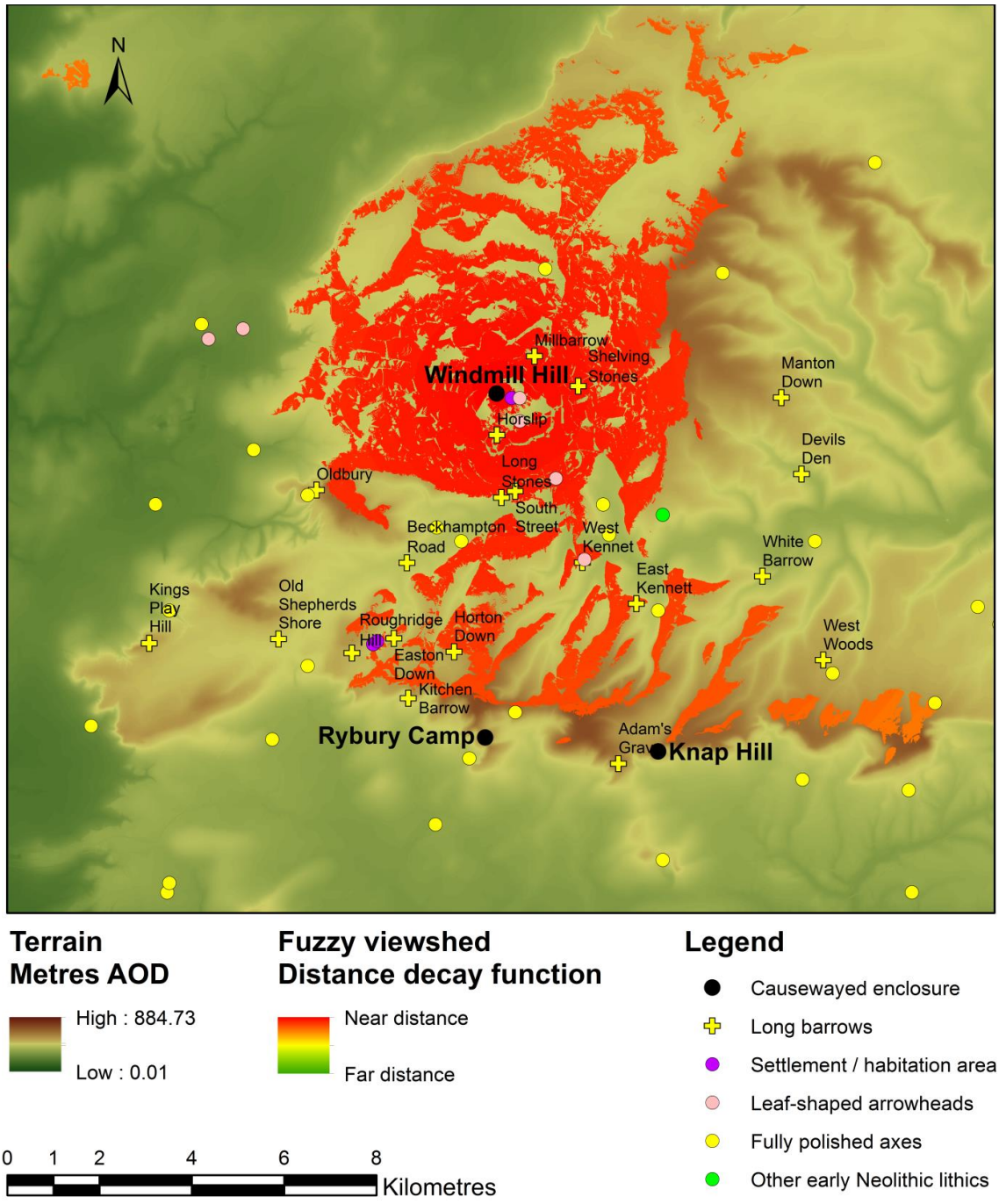


Figure 98: Windmill Hill near distance views.

The model estimates the maximum potential extent of any near distance views to and from the Windmill Hill enclosure.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

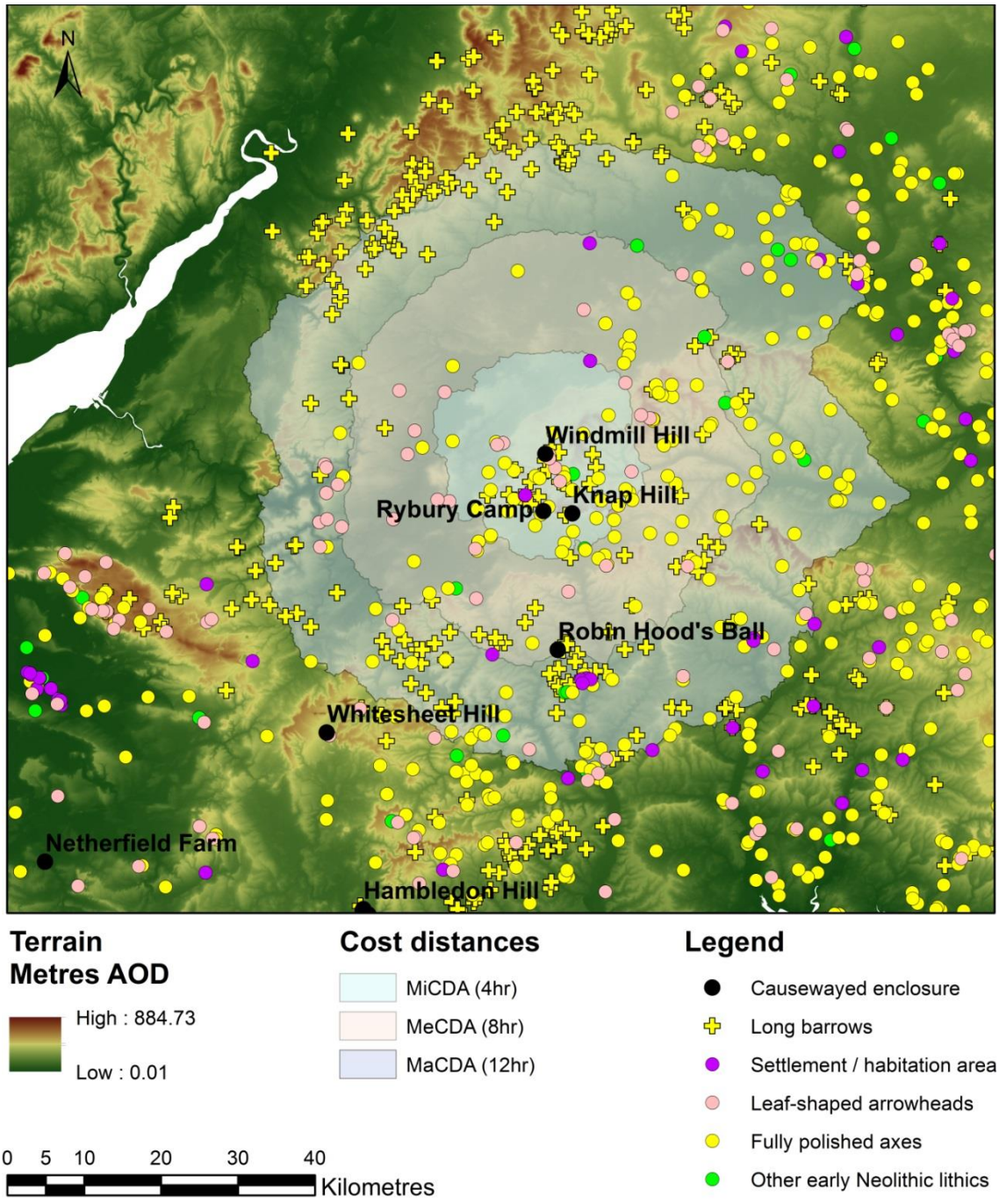


Figure 99: Windmill Hill cost distance models.

The model estimates the degree of access to the Windmill Hill enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina

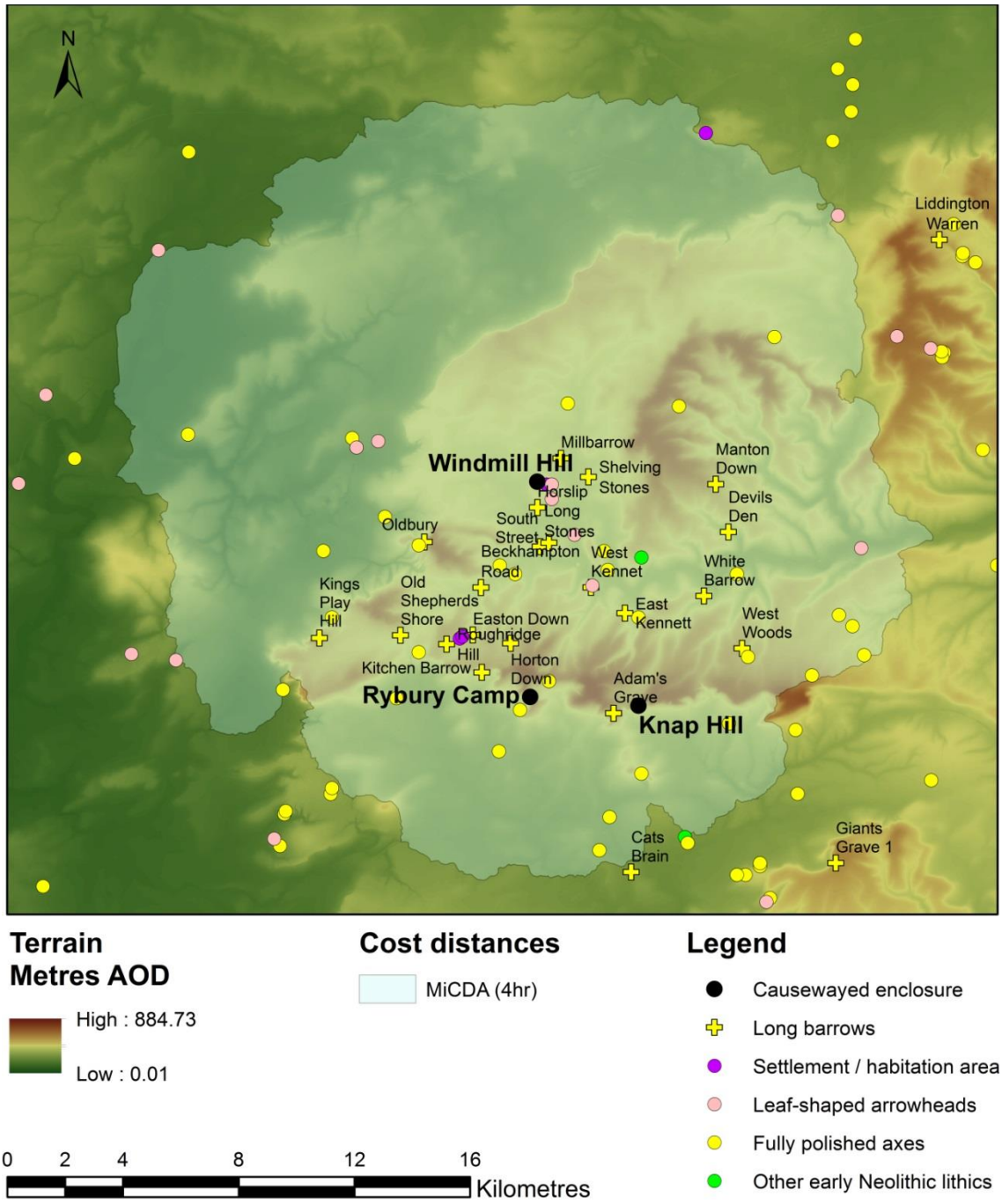


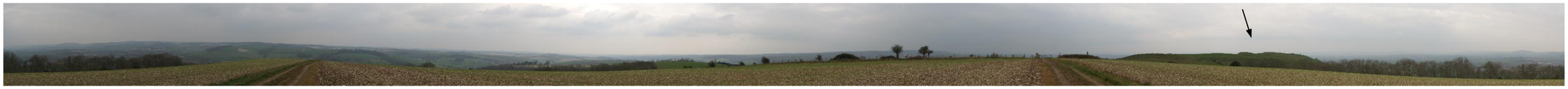
Figure 100: Windmill Hill MiCDA (4hr) model.

The model estimates the degree of access to the Netherfield Farm enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

East South West North

Northern long barrow



View from the eastern side of Hambledon Hill. The view towards the early Neolithic long barrows of the Cranborne Chase, 15km to the east, is interrupted at 8km by the chalk scarp at the western extent of the Chase.

South West North East



View from the western side of Hambledon Hill. The viewshed taken at the western extent of the main enclosure extends across the Stour valley and the Kimmeridge and Oxford clays of the Blackmore Vale. The northern hillfort spur and the higher elevation of the Neolithic enclosure over the summit interrupt views to the north and east.

East South West North

Southern long barrow



View from Hambledon Hill Triangulation point. The highest point of the enclosure. On a fine day the views extend 54km to the Isle of Wight. The position of the southern long barrow is shown, though the feature is not visible.

Figure 101: Views from Hambledon Hill.
Source: Author

South West North

Main enclosure complex



View from the northern extent of the Stepleton Hill enclosure. The main enclosure lies obscured behind the summit of the spur on which it is located.

North East South West

Hod Hill

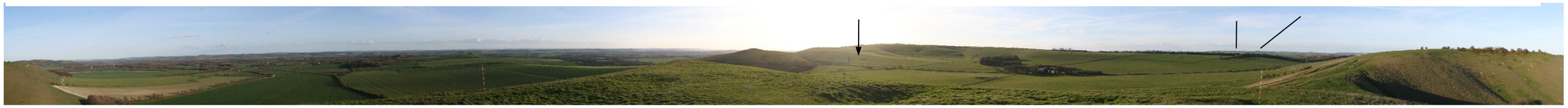


View from the southern extent of the Stepleton Hill enclosure. The views are limited by the chalk hills of the Inner Dorset Ridgeway which rises to 250m AOD beyond Hod Hill.

Figure 102: Views from the Stepleton enclosure.
Source: Author

East | South | West | North

Adam's Grave | West Kennet | East Kennet | long barrows



View from the Knap Hill. Unusually the view includes the nearby 'Giant's Grave' long barrow. The West Kennet and East Kennet long barrows are not visible.

North | East | South | West

Horton Down long barrow | Adam's Grave long barrow



View from the centre of the Rybury Hill enclosure. The long barrows are out of view.

North | East | South | West



View from the highest point of the Windmill Hill enclosure. The Neolithic complex in and surrounding Avebury lies obscured to the south, beyond the ranging pole between the Bronze Age barrows.

Figure 103: Views from Knap Hill, Rybury Camp and Windmill Hill.
Source: Author



View from the centre of Robin Hood's Ball. The nearby enclosure at Larkhill (4km) is not visible

Figure 104: Views from Robin Hood's Ball
Source: Author

3.3.10 **Commentary on the Wessex case study.**

The causewayed enclosures of the Wessex region display considerable variability in their form and topographical setting, and in the spatial characteristics examined during the research.

Netherfield Farm represents an example of a small enclosure, on flat, low-lying ground, isolated from other immediate areas of known early Neolithic activity. The Robin Hood's Ball and Larkhill enclosures are examples of two enclosures that were constructed in close proximity, in an area with evidence of significant early Neolithic activity, and though locally elevated, could not be described as upland enclosures, or as enclosures that visually dominated even their immediate environs. The enclosures at Hambledon Hill, Whitesheet Hill, Knap Hill and Rybury, and to a lesser extent Windmill Hill and Maiden Castle were all constructed on significantly elevated grounds. A common feature, however, is that their locations seem to have been chosen to engender specific affordances and phenomenological experiences.

There may also be evidence in a change of tradition reflected in a shift away from habitation of some permanence, towards a more mobile tradition, around the time the enclosures began to be constructed.

For example, the pre-enclosure activity north of Netherfield Farm evident in the trackways of the Somerset Levels, represented a significant investment, and may imply a degree of permanence across a discrete area comprising large tracts of saltmarsh and freshwater wetlands, interspersed with dry prominences (Brunning & Bronk Ramsey, 2013). This permanence may not have been in the form of earth-fast buildings and settled villages, but rather more defined by a

permanent, if shifting, occupation within a small geographic area. Similarly, the extensive cluster of pits at Poundbury (Barclay, 2011; Dinwiddy & Bradley, 2011), that also predate the Maiden Castle enclosure, points to habitative rather than more transient activities, though the lack of evidence of any earth-fast structures from this period still suggests an ephemeral tradition of occupation. These activities, including the pre-enclosure pit at Netherfield Farm, also suggest the general areas of the enclosures were known and visited, prior to the construction of the enclosures. However, it may be significant there is no similar evidence of permanence by the time the enclosures at Netherfield Farm and Maiden Castle were being constructed, or for the period that they were in use.

This, combined with the spatial analysis, and the relative isolation of Netherfield Farm and Maiden Castle from the other early Neolithic indicators, particularly long barrows, may suggest that the permanence of the very early Neolithic was supplemented by an increase in mobility, at or about the time the enclosures began to be constructed, and that this heightened capacity for mobility persisted throughout the lifetime of the enclosures.

Despite this mobility and the enactment of tradition in more remote locations, there may still have been a desire to maintain visual reference to areas of symbolic importance. The Netherfield Farm enclosure, which could not have been visible from most of its surrounding environs, may still have enabled an important visual link beyond the inhabited landscape of the Somerset Levels, towards the distant Mendip Hills, resonating the symbolism argued for The Trundle and the links to the sea. Whilst there may have been purposeful intent to preclude direct visual links between the enclosure and any of the many long

barrows (Lewis, 2005) present on these hills, it may have been important to have been able to sight the general area on which they had been, or were being, constructed. The southern flank of the Mendip Hills lie on the northern limit of the MaCDA for Netherfield Farm, and if activities at the enclosure were linked to events at long barrows on these hills, then the implications are that travel times in excess of a single day were necessary to reach the enclosure from the area of long barrows. Such journey times are not beyond that which could reasonably be expected for an episodic activity. However, if we assume that the areas of habitation remained focused on the Somerset levels, which lie in between the two monument sites, then journey times to either the long barrows or the enclosure could be easily achieved in less than a day.

The causewayed enclosure at Netherfield Farm appears to be a unique example, within Wessex, in its isolation from any substantial presence of other contemporary early Neolithic indicators. Whilst all the other enclosures demonstrate the same preference for a visual restriction between enclosures and long barrows, most enclosures had at least one long barrow potentially within sight and all had long barrows within the distance here defined by the MiCDA boundary.

For example, the Maiden Castle enclosure has 17 long barrows identified within the MiCDA of which two are visible, Hambledon Hill has five, of which only the two within the Hambledon Hill complex could have been visible, whilst Whitesheet has five, of which none could have been visible.

The density of long barrows around Stonehenge and the SPTA (McOmish *et al.*, 2002), and further north towards the Avebury region maintain the notion of

visual separation, though the results for some enclosures reinforce the argument more comprehensively than others. For example, the location of the Robin Hood's Ball enclosure may have allowed five of the 32 long barrows to have potentially been visible. Though we should recognise that, of these, four are on the boundaries of the areas that the model estimates as being potentially within view, and therefore may not have been so in the early Neolithic. We must also acknowledge that the visible area within the MiCDA comprises only 11% of the total area and therefore the model output can only be said to be statistically representative of random location. At Knap Hill, however, of the 23 long barrows within the MiCDA only two, probably only one, could potentially have been visible, whilst from the Rybury Camp enclosure none of the 22 long barrows in the MiCDA were likely to have been visible, despite, in both cases, the visible area comprising some 30% of the total area of the MiCDA.

The visual relationships with long barrows, however, is not the only common visibility characteristic, and the results demonstrate a relationship with riverine systems and commonly, with the upper reaches and heads of these systems.

This may also have been important and may even have resulted in the modification of enclosure design. At Hambledon Hill, the results indicated the improved visual access along the valley of the River Iwerne, afforded to the complex through the addition of the Stepleton enclosure into the complex. Locating a second enclosure at this southern end of the hill, did less to ‘improve’ views than if the second enclosure had been constructed on the northern end of the hill, and, though Stepleton helps isolate one of the three spurs beyond which the main enclosure had already been constructed, the additional enclosure did little to add to any controlling or defensive capability of

the complex. We should consider the addition of the Stepleton enclosure as the purposeful expression of early Neolithic agency and it may that be that it was the riverine associations that determined the choice of location. A similar argument can be made for the extension of the enclosure at Windmill Hill, though here facilitated by the construction of additional circuits.

The enclosure at Windmill Hill was constructed midway between two winterbournes that combine, just west of modern Avebury, to form the head of the River Kennet. The early constructed inner enclosure affords views to the west and northeast, across the upper reaches of these two winterbournes. However the confluence and much of the Kennet Valley is not within the visible field of view. The model also estimates that only the long barrows at Millbarrow and West Kennet, could potentially have been in view. The later addition of the outer enclosure significantly improves the visual access across the head of the Kennet Valley. The confluence of the two streams becomes visible and the visible range may also now have included the South Street and Shelving Stone long barrows (Fig.105, p.257).

The following two case studies investigate very different landscapes to those of Sussex and Wessex, where riverine associations are arguably more explicit, and the enclosures are more intimately associated with water courses. The first of these investigates the enclosures of the upper Thames Valley.

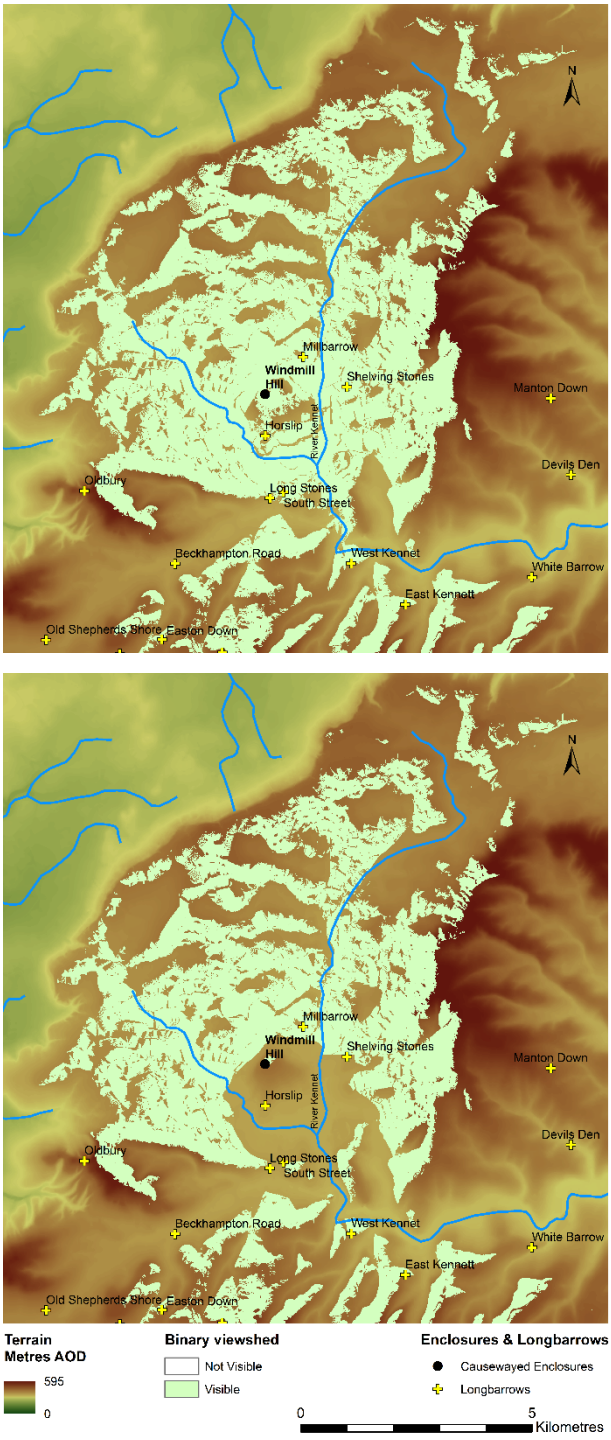


Figure 105: Changing visibilities at Windmill Hill.

Views from the outer enclosure (top) and inner enclosure (lower). Whilst the topography of the hill may explain the non-concentric form of the three enclosures, a desire to improve visual access to the head of the River Kennet and the valley may also have been a factor.

Source: Author, Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

Gathering Space

Landscape and Enclosure in the Early Neolithic of Southern Britain

Volume 2 of 2

Thesis submitted for the degree of Doctorate of Philosophy

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3.4 **Case study 3: Causewayed enclosures of the Upper Thames Valley.**

This case study considers enclosures located along the course of the Thames Valley, west of the Goring Gap (Oxfordshire / Berkshire) (Fig.106, p.261). The thirteen enclosures include those at Thame, Abingdon, Lower Radley, Eynsham, Aston Cote, Buckland, Broadwell, Langford, Eastleach, Burford, Salmonsbury Camp, Down Ampney and Southmore Grove. The two enclosures west of this set, at Birdlip Camp and Crickley Hill, may be more closely associated with the Severn estuary than the Thames. For this reason, and since their upland location is more similar to the Sussex and Wessex enclosures, they are not included.

With the exception of the excavated enclosure at Abingdon, and interim results from Thame, the enclosures lack any form of certain chronology and are morphologically identified through crop marks on aerial photographs or geophysical survey. The defining characteristics of the upper Thames enclosures are the apparent association with the river Thames and minor tributaries of that river, and the low-lying nature of their situation. With the exception of the enclosures at Abingdon and Buckland, all lie north of the river Thames, on the edge of the scarp rising gently towards the Cotswold Hills.

This case study provides an opportunity to investigate a set of enclosures markedly different to those on the upland Chalk of Wessex and Sussex. The relationship with the river Thames and its tributaries is more apparent, though as we shall see, many of the landscape relationships and characteristics are similar to the upland enclosures. Though the density of enclosures is greater,

their individual size is smaller and the landscape setting suggests the enclosures were less visually striking.

There is a notable absence of enclosures on the higher ground despite the proliferation of long barrows and other early Neolithic indicators at the higher elevations.



Figure 106: Location and extent of the Thames Valley study area.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

3.4.1 **Thame**

Discovered in 2015, the excavated north-eastern quadrant of what is possibly a large three circuit enclosure, revealed substantial quantities of plain and decorated bowl pottery, lithics, and evidence of food in the form of hazelnut and wheat.

Geophysics has shown the inner circuit to be of sub-circular form with a diameter of some 230m, though the outer circuits have yet to be proven complete (Fig.107, p.264). If the outer ditches form a complete circuit, then the enclosure appears morphologically similar, though larger, to the Orsett (Essex) enclosure in having a single sub-circular inner circuit set at some distance (52m) within the inner of two closely (7m) spaced outer circuits. On the eastern side the outer circuits appear to have slightly in-turned ditches that coincide with a wider causeway in the inner ditch. The arrangement may represent a particular entranceway to the enclosure.

The enclosure is located on a gentle northeast-facing slope lying at 76m AOD, 500m northeast of the highest point of the rise. The solid geology mainly comprises the Kimmeridge Clay Formation, though a short strike of the Gault Mudstone is apparent, beneath a short section to the south. Overlying this are residual River Terrace 4 deposits of gravely clay, whilst further down the slope just beyond the enclosure's outer ditches, are alluvial deposits of fine silty clays and gravel, that may have provided an important local resource.

Initial radiocarbon measurements place the enclosure between 3660-3370 cal BC (Table 19, p.264) though activity on the site seems to predate this. Two

samples from pits yielded dates between 3710–3520 (cal. BC). No modelled dates are yet available

Calibrated radiocarbon date (95% confidence)	
Early Neolithic pit deposit 5805 (PC3)	
SUERC-69140 (GU41781)	3660-3520 (cal BC)
Early Neolithic pit deposit 7166 (PC2)	
SUERC-69144 (GU41785)	3710-3630 (cal BC)
Causewayed Enclosure C1 pit 8349	
SUERC-69141 (GU41782)	3640-3370 (cal BC)
Causewayed Enclosure C3 Pit 10039	
SUERC-69145 (GU41786)	3660-3520 (cal BC)
Causewayed Enclosure C2 Pit 9936	
SUERC-69142 (GU41783)	20-220 (cal AD) (presumed intrusive)

Table 19. Preliminary radiocarbon dates for the Thame enclosure.

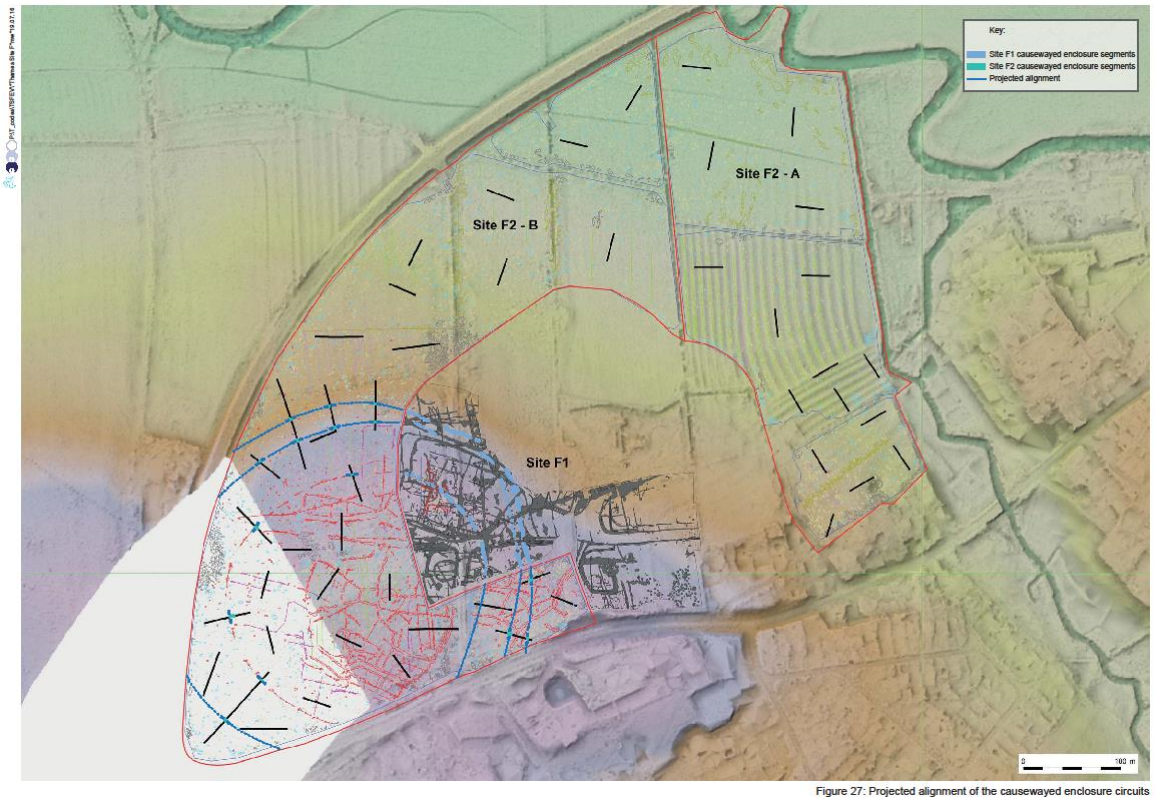


Figure 107: Thame causewayed enclosure.

Source: Welsh, K. Oxford Archaeology, 2017

The viewshed model for Thame (Fig.121, p.303) suggests that the foremost views were to the northeast, reflecting the tilt of the enclosure. At this point the River Thames flows east to west and the model suggests that there may have been good views along the river valley for 2.7km in a downstream direction and some 1.5km upstream. Also reported visible is the Cuttle Brook and other small streams that drain the Chiltern Hills some 9km distant. These small streams join the main course of the river immediately upstream of the enclosure. These hills must have been the maximum extent of any possible views from the enclosure in a south-through-easterly direction.

With the exception of a narrow corridor of view through to the north edge of the Cotswold Hills, the low-lying position of the Thame enclosure limits any substantial vista and even the immediate environs have broken views. The nearest long barrow near Great Milton (Oxf. HER MOX5882), is some 8.3km distant and well outside any potential field of view. Thame enjoys no intervisibility with any other enclosure or certain long barrow, and the enclosure seems positioned with respect to natural waterine features rather than areas of human activity. The excavated long barrow on Whiteleaf Hill (Childe & Smith, 1954) lies 12.3km to the east, and being on very edge of the area that the model reports as visible, is unlikely to have been so.

The cost models (Figs.122&123, pgs.304&305) suggest that although the Thame enclosure is located in an area of significant early Neolithic activity, the majority is at some distance from the enclosure, with only a limited density of material recorded within the MiCDA. The count of long barrows is also low within the whole MaCDA when compared with other enclosures of the Upper Thames Valley. The only certain long barrow within the MiCDA is the example

near Great Milton. In addition, there is a potential long barrow, and an oval barrow, east of Chilselhampton, and a further potential long barrow west of Drayton St. Leonard. The Whiteleaf Hill barrow is just beyond the boundary of the MiCDA.

Within the MaCDA (Fig.122, p.304) there are 34 potential early Neolithic barrows (Table 20), compared with, for example, 134 in the same area associated with the enclosure at Salmonsbury (Table 31, p.299). Notwithstanding this, the count of other early Neolithic indicators is high, for example there are a total of 312 leaf-shaped arrowhead and polished axes, compared with 185 at Salmonsbury. The different emphasis is interesting and may suggest that the Thame enclosure was located in an area less associated with the construction of long barrows, though nevertheless still an area of significant early Neolithic activity.

Thame	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	1	4	11
Long barrows	3	19	35
Settlement habitation	2	9	14
Leaf-shaped arrowheads	4	53	109
Fully polished axes	17	113	203
Other EN lithics	1	6	11

Table 20. Thame summary cost distance data.

3.4.2 **Abingdon**

(e451090, n198280)

The enclosure is located on a slight spur of second terrace gravels bounded by the valleys of two small streams that drain into the Thames 1000m to the south.

The area has been subject to modern development; initially gravel quarrying and later, housing (Fig. 108). Excavations, concentrated on the northern arc, were carried out in 1926-27 (Leeds, 1927; 1928), 1954 (Case, 1956), and 1963 (Avery, 1982) confirming the monument as a causewayed enclosure. Though the full extent of the enclosure has not been determined, the evidence suggests a promontory between two streams was enclosed by two arc-like ditch systems.

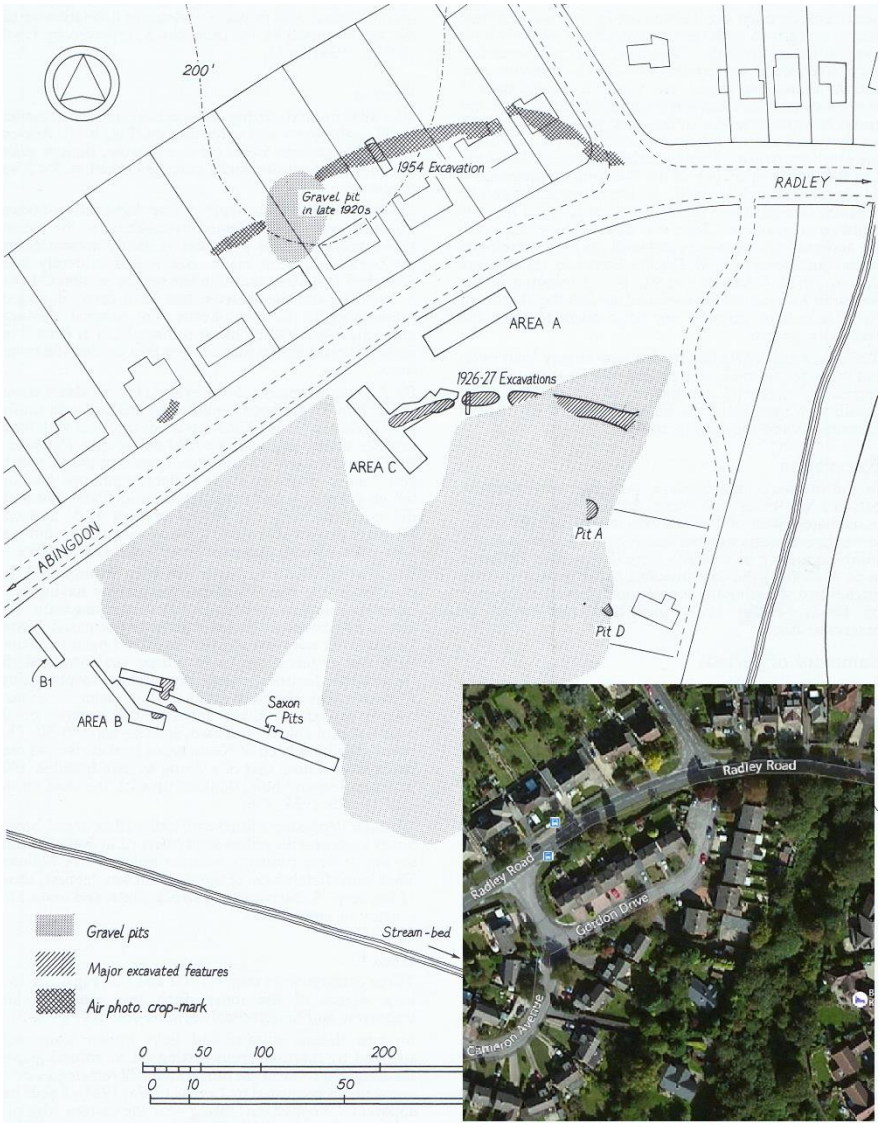


Figure 108: Abingdon causewayed enclosure.

Very little remains of the enclosure which has suffered both through gravel extraction and later development.

Source: after, Case and Whittle, 1982, p.11

The inner circuit was constructed in 3655 to 3630 cal BC (55% probability) or 3580 to 3570 cal BC (3% probability), or 3560-3535 cal BC (37% probability) or 3640s or 3630s (44% probability), or 3540s cal BC (24% probability).

The outer circuit was constructed in 3660-3630 cal BC (55% probability) or 3580-3570 cal BC (3% probability) or 3560-3535 cal BC (37% probability), probably in the 3640s or 3630s cal BC (42% probability) or in 3550-3535 cal BC (26% probability).

The statistical dating cannot determine whether the outer or inner ditch was constructed first hence the visibility model uses the inner ditch system and the boundary streams to define the polygon for the visibility analysis.

The Abingdon enclosure was constructed in a landscape that appears to have been subject to tree clearance by the time enclosure construction had begun (Robinson, 1999; Whittle *et al.*, 2011, 423).

The visibility model (Fig.124, p.306), as with all the models for lowland sites, is unlikely to present a realistic picture of early Neolithic conditions, since remaining vegetation is likely to have significantly restricted views, both to and from the enclosure. Long distance views from (for example) clearings in higher ground may be more representative than those over shorter distances. From a distance, the enclosures may have been identifiable as 'notches' in the tree line (Oswald, pers. comm. 12th Nov. 2017).

Notwithstanding this, it is notable that the Abingdon enclosure has no views that could have included other enclosures, despite the relatively close proximity of the enclosure at Lower Radley (2773m). Depending on the tree cover, the

enclosure may have had good near distance views over the gravel terraces, particularly to the north and across the Thames to the south. Although the barrows at the adjacent barrow cemetery at Barrow Hills (Barclay & Halpin, 1999) are demonstrable later, some possible evidence of contemporary activity less than 200m southeast of the enclosure may be indicated by the contents of a pit which appears to predate the later oval enclosure (Bradley, 1992a).

The long barrow at Drayton (448289, 194906) which lies 4.37km to the southwest is the only barrow that may have been intervisible with the enclosure. No dates are available for this monument.

The visibility model (Fig.124, p.306) suggests distant views may have been present to the north side of the Berkshire Downs to a point almost as far west as Waylands Smithy. However, it is noteworthy that Waylands Smithy (428096, 185365) and the two, possibly contemporary, barrows on Whitehorse Hill (429998, 186519 & 430085, 185513) are all beyond the theoretical extent of views. In particular, the barrows on Whitehorse Hill, located 24km to the southwest, seem to have been constructed a few tens of metres beyond the limits of view. The strongest visual characteristic of the Abingdon enclosure relates to the southwest distant views along the River Ock and other minor streams draining the north Berkshire Downs. The apparent proximity of the long barrow at Abingdon Common to the visual landscape of the Abingdon enclosure (447699, 196503), is consequent on an artefact within the DTM reflecting an elevated section of the A34 road.

The relative intensity of early Neolithic activity and the relationship with the riverine system is reflected in the cost models (Figs.125&126, pgs.307&308).

Two other causewayed enclosures at Lower Radley and Eynsham are both within the MiCDA suggesting that even if they were not contemporary, there may be a high likelihood these three were well known to the same folk groups. There are ten potential long barrows, the closest being the potential long barrow at Culham Manor (450238, 194961), 3450m to the south, and the furthest, though this may be a later feature, being the Oval Barrow at Culham Park (461880,190066),13600m to the southeast. Of particular interest is the number of settlement / habitation sites, which themselves are characterised by a strong affinity to the riverine systems. There are seven such sites within the MiCDA and with the exception of the immediately adjacent pit at Barrow Hills, all are at some distance, falling within a range of 5140m to 12412m.

Abingdon	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	2	7	10
Long barrows	10	26	50
Settlement habitation	7	10	17
Leaf-shaped arrowheads	12	25	33
Fully polished axes	57	122	211
Other EN lithics	7	9	16

Table 21. Abingdon summary cost distance data

The distribution of other potential early Neolithic indicators is more random. In the MiCDA (Table 21, p.270 above), there are eight recorded finds of leaf-shaped arrowheads and four other lithic types recorded as early Neolithic. Whilst the general distribution pattern of these finds does follow the river systems, the associations tend to be rather more spatially dislocated from the water courses than is the case with the enclosures or the settlement sites.

The inclusion of the higher grounds within the MeCDA and MaCDA begins to increase the number of long barrows that may have been within a day or two's travel from the Abingdon enclosure. There are 26 potential long barrows within the MeCDA and 50 within the MaCDA located with a distinct north easterly bias. This pattern is reflected in the distribution of habitation or settlement areas, where we see 17 located within the MaCDA of which 12 are to the north and east.

The cluster of eight leaf-shaped arrowheads found east of the Thames on the slopes of Wicks Hill (centered on 462180, 186535) perhaps distorts an analysis which otherwise also reflects the same bias. Of 25 arrowheads within in the MeCDA, 16 are located north or east of Abingdon whilst 24 of the 33 in the MaCDA are similarly located. The distribution of other early Neolithic lithics is similarly biased. The ubiquitous distribution of polished axes throughout the area defined by the model may reflect the extent of tree clearance through the region.

The enclosure at Lower Radley is located less than 3000m from the Abingdon enclosure and this spatial proximity unsurprisingly results in the Radley cost model providing similar results.

3.4.3 **Lower Radley.**

(e453410, n199800)

The small (0.22ha) enclosure is located on a small gravel island within the flood plain. With no extant earthworks, the enclosure is represented on aerial photographs by two arcs of ditches and pits forming the south, north and eastern boundaries (Fig.109). Though appearing incomplete, the enclosure is probably of full sub-oval form and the breaks in the circuit explained by the gravel dipping under the alluvial deposits at the northeast quadrant and to the west (Dyer (Dyer, 1997), 1997, 5).

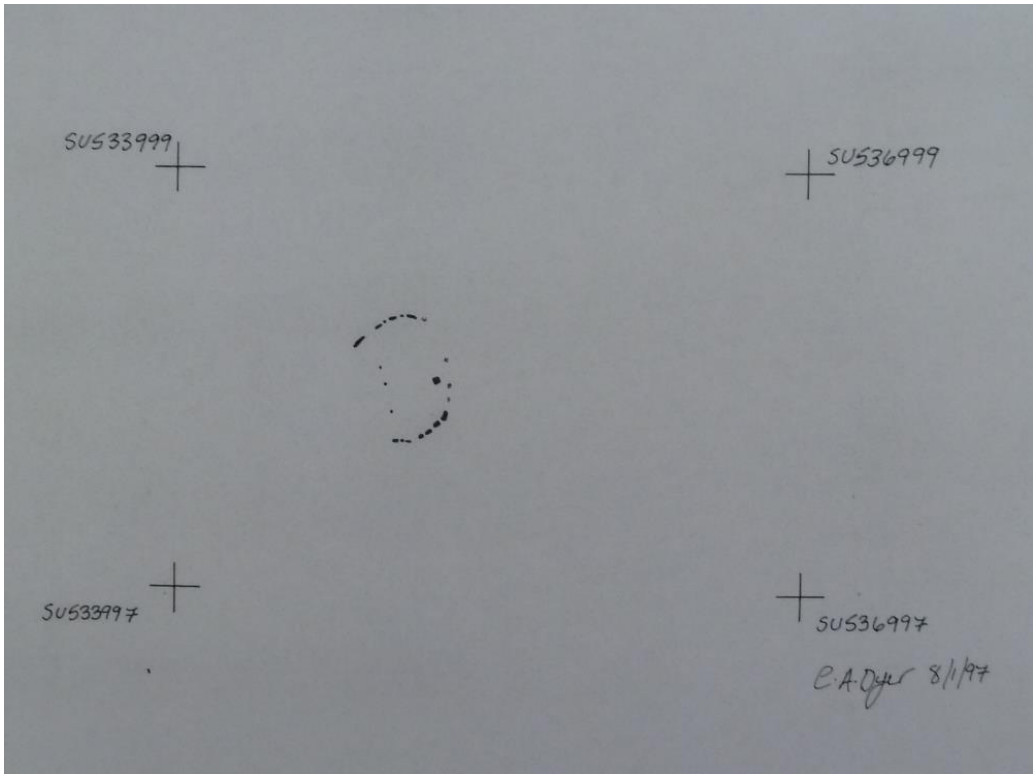


Figure 109: Lower Radley causewayed enclosure.

The transcript of an aerial photograph (not available at the NMR at the time of visiting)

Source: Dyer, 1997

The solid geology comprises the Kimmeridge Clay underlying the first gravel terrace over which lies a narrow band of stone-less calcareous alluvial soil of the Thames Formation (NSRI, 1983; DigMapGB-10, 2016).

Despite the proximity to Abingdon, the visibility model for Lower Radley is significantly different (Fig.127, p.309). Near-distance views are limited to a narrow arc following the path of the Thames for a short (c.2800m) distance to the north and south and although the model shows some expansion of this arc in the immediate vicinity of the enclosure and to the north, views could not have exceeded a radius of 1300m, even if unrestricted by vegetation. Mid- and far-distance views are also more constrained with only a short and narrow section of the north face of the higher elevations of the Berkshire Downs being potentially visible and a very limited area of higher ground to the north east towards modern Wheatley. There are no barrows or known settlement areas within the visible limits and as with Abingdon, the two potential barrows at Whitehorse Hill are immediately beyond the visible limit and on the boundary of the MiCDA (Fig.128, p.310) (Table 22).

Lower Radley	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	2	7	10
Long barrows	11	21	53
Settlement habitation	7	9	18
Leaf-shaped arrowheads	12	29	69
Fully polished axes	54	118	213
Other EN lithics	4	10	15

Table 22. Lower Radley summary cost distance data

3.4.4 **Eynsham.**

(e442588, n207931)

The 1.3ha enclosure is identified through aerial photography as two concentric cropmarks, situated on a low rise, with the two circuits separated by 29m. Only the northwest quadrants are defined (Fig.110). A possible entrance is suggested by in-turned ditches on the western side of the inner enclosure which are aligned to pit-like ditches and a gap in the outer enclosure (Winton, 1997). The underlying geology is the Oxford clay, above which are the river gravel deposits of the Kelmscott association and the alluvial deposits of loamy calcareous and non-calcareous soils of the Badsey 1 association (NSRI, 1983).

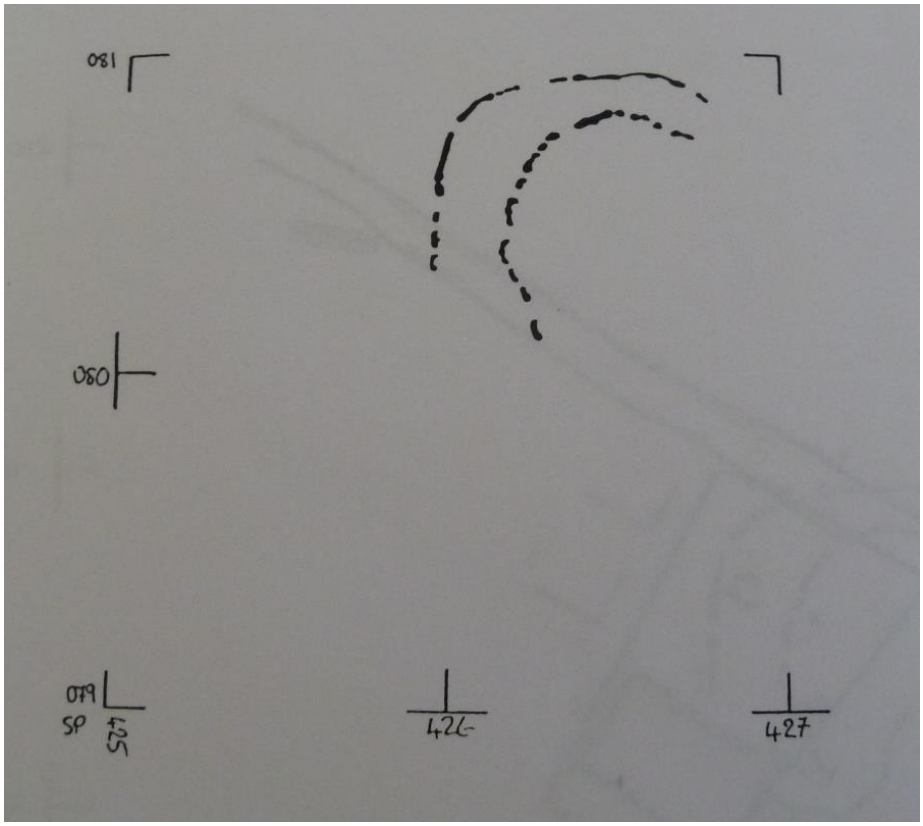


Figure 110: Eynsham causewayed enclosure.

The transcript of an aerial photograph (not available at the NMR at the time of visiting)

Source: Winton, 1997

The important settlement site at Yarnton (Hey *et al.*, 2016) lies 5km to the northeast, and whilst the visibility model defines mid-distance views extending this far and beyond, Yarnton and the Eynsham enclosure are not defined as intervisible by the model (Fig.129, p.311). Indeed, there is no evidence of any early Neolithic activity in any area identified as visible from the enclosure. The dominant views are towards the south and follow the river upstream for some 7000m and are mainly focused along the river and the south bank, whilst in the far distance the views are interrupted by the North Berkshire Downs. The two potential barrows on Whitehorse Hill lie on the far boundary of an area the model defines as visible. The long barrow lies 17m within the theoretical bounds of visibility and the adjacent bowl barrow (which may be later) lies 1m outside. Such distances cannot be considered to be within the limits of accuracy of the GIS modelling, are unlikely to have been visible in practice. The causewayed enclosure at Aston Cote is 10km upstream and well beyond the visible limits defined by the model.

The cost models (Fig.130, p.312) provide evidence of the potential level of early Neolithic activity within a short distance of the enclosure. Other enclosures at Buckland, Aston Cote, Abingdon and Radley all lie within the MiCDA suggesting perhaps a high degree of intra communal and social relationships existing between enclosures. Extending outwards, the MeCDA also includes the enclosures at Burford, Eastleach, Broadwell, Langford and Thame, whilst Down Ampney and Thame both fall within the MaCDA (Table 23, p.276).

The large number of long barrows within the cost distance boundaries and the lack of intervisibility between these and the enclosure suggests an intentionality of design.

Eynsham	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	4	10	12
Long barrows	14	56	101
Settlement habitation	9	22	31
Leaf-shaped arrowheads	13	40	72
Fully polished axes	50	120	200
Other EN lithics	8	21	27

Table 23. Eynsham summary cost distance data

3.4.5 **Aston Cote.**

(e434863, n200726)

The multi circuit enclosure lies above the Oxford clay. The drift geology comprises the alluvial deposits of the Thames (type 814a) affected by ground water and subject to inundation. The air photographs suggest a three-circuit enclosure with the outermost circuit enclosing an area of approximately 1.35ha (Fig. 111). Only 60% of the inner, 25% of the middle and 20% of the outer circuits can be positively identified. Though Fiona Small suggests a 'roughly pear like' form (Small, 1994), the enclosure may have been sub-circular with the undefined western sections now buried below deeper alluvial deposits.



Figure 111: Aston Cote causewayed enclosure.

Source: NMR

The model suggests much of the surrounding flat ground in the near distance (≤2500m) is visible, including a substantial stretch on the south side of the river (Fig.131, p.313). The adjacent enclosure at Buckland, 2800m to the west, would not have been visible; indeed, the model suggests that no other enclosures would have been intervisible. The middle-distance views are mainly to the northwest beyond Burford and towards but not including the enclosure at Salmonsbury Camp, and to the east towards Eynsham and Abingdon, though this and the views along the river to the east are very likely to have been restricted by vegetation. There are no long barrows within the field of view.

The cost models (Fig.132, p.314) suggest that the four enclosures at Broadwell, Buckland, Langford and Eynsham are all within the MiCDA whilst the enclosure at Abingdon is just outside the theoretical MiCDA boundary. The MeCDA therefore includes this and the enclosures at Burford, Eastleach, Down Ampney and Lower Radley. Salmonsbury Camp and Thame lie within the MaCDA, with Southmore Grove just outside (287m) the theoretical limit.

The density of other potential early Neolithic indicators within the CDAs (Table 24, p.279) are very similar to that noted at Eynsham. In both cases, the relatively high density of fully polished axes may indicate a substantial amount of tree clearance in the period, though high levels of other activity could account for the characteristic. Whilst the lack of axes from the immediate environs may mirror the lack of archaeological interventions in pastoral areas, the characteristic may also be a genuine reflection of lower levels of early Neolithic activity here.

Aston Cote	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	5	10	12
Long barrows	7	47	104
Settlement habitation	3	10	16
Leaf-shaped arrowheads	7	29	42
Fully polished axes	46	125	191
Other EN lithics	2	12	15

Table 24. Aston Cote summary cost distance data.

3.4.6 **Buckland.**

(e432143, n200071)

Aerial photographs suggest a single sub-circular enclosure of up to 3.85ha. The underlying geology comprises the Oxford clay formation and the enclosure lies mainly on alluvial deposits of Clay, Silt, Sand and Gravel (DigMapGB-10, 2016; DigMapGB-25, 2016). The enclosure is defined by an arc extending from the west to the southeast with a possible ‘entrance’ defined by a gap in the ditches to the south (Fig. 112, p280). If the early Neolithic form were fully sub-circular, then the north-eastern section has been lost due to the southward migration of the course of the River Thames which now bisects the assumed circuit (Small, 1994).



Figure 112: Buckland causewayed enclosure.

The transcript of an aerial photograph (not available at the NMR at the time of visiting)

Source: Small, 1994

The flat terrain in the immediate environs results in a 360 viewshed extending a minimum of 1500m (east) and 2300m (south) (Fig.133, p.315). The possible mortuary enclosure and round barrow (MOX9699, 432304, 199917) lie 182m to the southeast and a single fully polished stone axe (MOX1870, 432299, 200198) found 255m to the northeast are both well within view, and though neither may be contemporary with the enclosure, make Buckland unique (in this case study) in having such proximate early Neolithic activity in evidence. As

would be expected, Buckland may have enjoyed good near-distance views across both sides of the Thames and the dominant longer-distance views are in a north, north-westerly direction beyond the enclosures at Eastleach and Burford. Though the model suggests views potentially extended as far west as Southmore Grove and as far north as Salmonsbury Camp, neither of these enclosures, nor those at Burford or Eastleach, could have been visible. A further barrow northwest of Clanfield (246546, 203103) is within the theoretical limits of view. Though initially interpreted as a long barrow, it is now re-interpreted as a round barrow (MOX 2235) and hence is unlikely to be contemporary. No other long barrows fall within the theoretical limits of view.

The cost distance modelling (Fig.134, p.316) reports the enclosures at Eastleach, Broadwell, Langford, Buckland and Eynsham as lying within the MiCDA, whilst Down Ampney, Burford, Abingdon, and Lower Radley lie within the MeCDA. The enclosures at Southmore Grove, Salmonsbury Camp and Thame are within the MaCDA. Excluding the two possible later barrows previously identified, there are 10, 94, and 166 long barrows in the respective CDA's lying mainly in two swathes on the south side of the Cotswolds and on the Berkshire Downs 12 km to the south (Table 25).

Buckland	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	5	9	12
Long barrows	6	55	121
Settlement habitation	1	10	15
Leaf-shaped arrowheads	6	26	44
Fully polished axes	40	123	200
Other EN lithics	3	10	16

Table 25. Buckland summary cost distance data.

3.4.7 **Broadwell.**

(e426500, n201800)

Aerial photographs reveal half of a three circuit, sub-circular enclosure (Fig.113). The visible components comprise three semi-circular ditch systems to the western side, whilst the eastern sections are assumed buried beneath deeper alluvial deposits (Dyer, 1994a). The geology comprises Oxford clay overlain by terrace gravels of the Kelmscott formation, above which are deposits of fine calcareous, loamy river soils (DigMapGB-10, 2016).

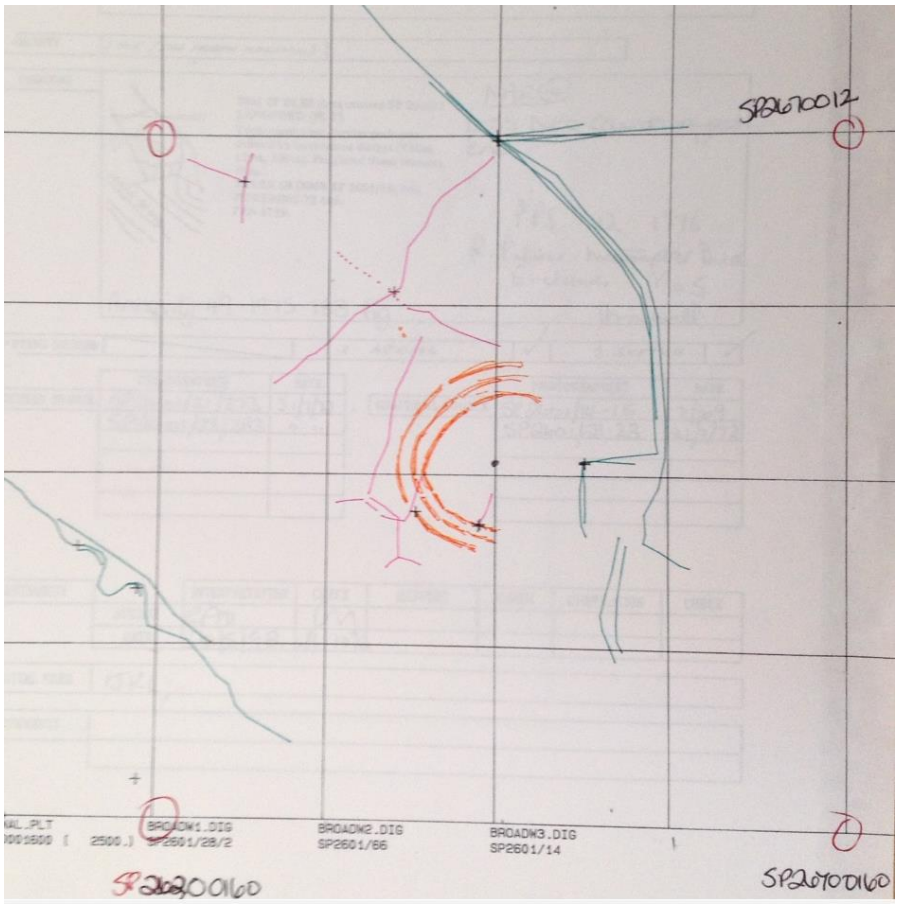


Figure 113: Broadwell causewayed enclosure.

The transcript of an aerial photograph (not available at the NMR at the time of visiting)

Source: Dyer, 1994a

The visibility model (Fig.135, p.317) suggests that Broadwell could only ever have had limited visibility beyond an immediate radius of c.470m. It may have had visual access along a narrow corridor to the Thames before the viewshed opens out on the south side of the river. The adjacent enclosure at Langford (2000m west-southwest) could not have been visible and the slightly more elevated enclosure at Eastleach (5700m northwest), although surrounded by potentially visible territories, was also hidden in the landscape. No other enclosures could have been visible. The Clanfield barrow (1300m north) lies just outside the visible zone and no other long barrows could have been visible.

The cost models (Fig.136, p.318) reflect the topography and are markedly sub-ovoid, movement being more limited by the additional effort required to access the higher reaches of the Cotswolds and the north Berkshire Downs. Crickley Hill and Birdlip Camp are both beyond the MaCDA which includes Thame and Southmore Grove. Salmonsbury, Down Ampney, Lower Radley and Abingdon lie within the MeCDA whilst others lie within the MiCDA (Table 26).

Broadwell	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	7	10	12
Long barrows	6	58	140
Settlement habitation	1	8	14
Leaf-shaped arrowheads	5	21	44
Fully polished axes	38	101	194
Other EN lithics	5	18	27

Table 26. Broadwell summary cost distance data.

3.4.8 **Langford.**

(e424580, n200800)

Aerial photographs suggest the possibility of a four-circuit enclosure of sub-circular form (Fig.114). The three outermost circuits are clearly defined on the northern side, whilst only two are also apparent on the southern side. A smaller inner circuit is suggested by two separate arcs of ditches: one section on the northwest side and the other on the southeast.

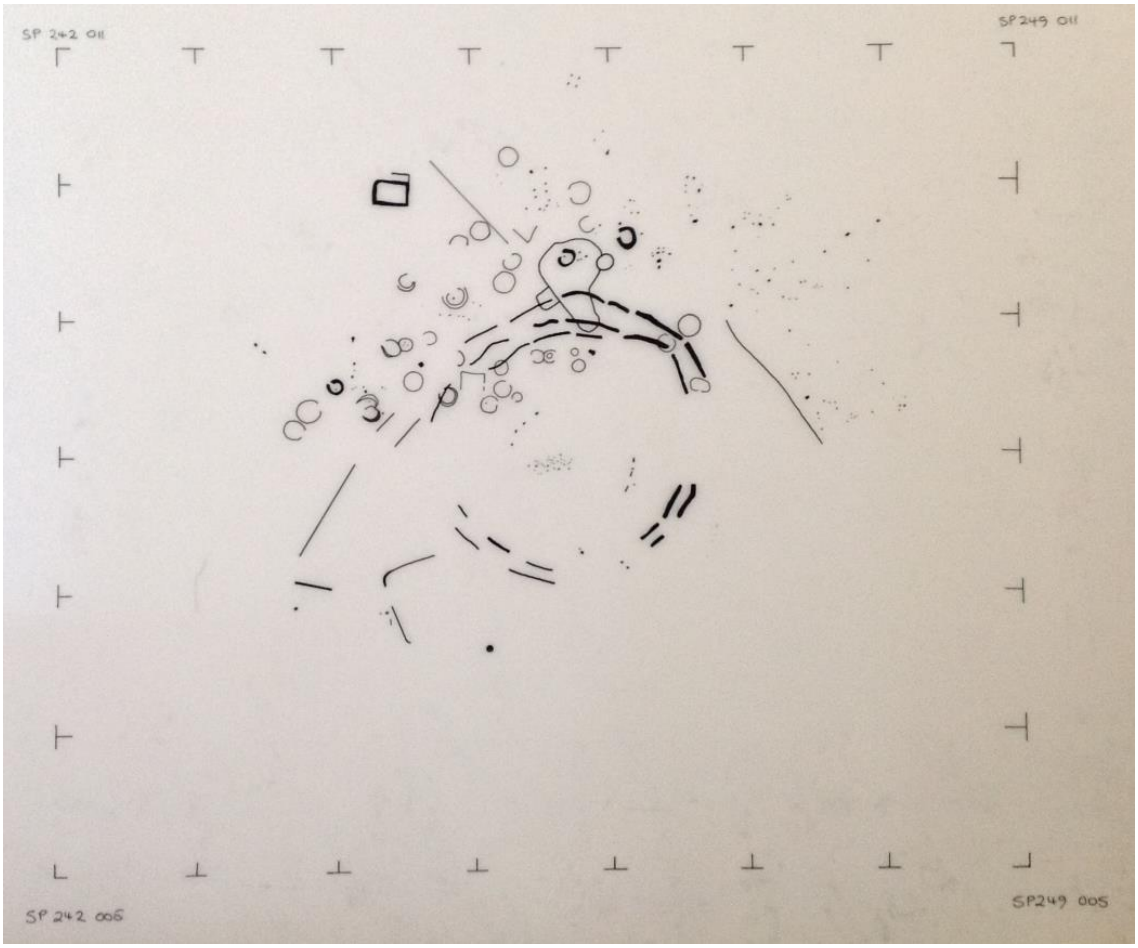


Figure 114: Langford causewayed enclosure.

The transcript of an aerial photograph (not available at the NMR at the time of visiting)

Source: Fenner, 1995

The geology is complex. The solid geology comprises the Oxford Clay and the enclosure lies above the second gravel terrace, with a small area of alluvium to the west, a finger of which also runs through the centre of the enclosure, east to west, obscuring part of the ditch system. The enclosure itself lies on the boundary of two other fine loamy soil systems. On the east are the brown calcareous earths of the Badsey series, whilst to the west is the calcarocambic gley soil of the Kelmscott (BGS, 2003a; DigMapGB-10, 2016). There are a number of pits, inside and outside the enclosure, identified on the aerial photograph transcripts. Some may be contemporary whilst the morphology of some appears later (Fenner, 1995).

The enclosure at Langford may have enjoyed 360-degree near distant views (Fig.137, p.319) which included a long section of the Langford Brook with which it appears to be associated. The nearest enclosures at Broadwell (2km) and Eastleach (5km), and the possible long barrows at Clanfield (3km) and Buscot (3.6km), could not have been in view. Views may have extended southwards along a 7km section of the Thames, some 2.3km distant and here running east to west. This multi circuit enclosure potentially had a greater visibility of the surrounding landscape than any other of the Upper Thames enclosures and yet no long barrows or areas of known settlement could have been visible, with the possible exception of the Whitehorse Hill long barrow, some 15.2km to the south.

As with the adjacent enclosure at Broadwell the cost models (Fig.138, p.320) are sub-ovoid and confirm Lanford as an enclosure with markedly little known early Neolithic activity in the MiCDA: the six early Neolithic pits excavated in 2002-3 (Gloucester HER, 41332), and found containing plain bowl pottery and

lithics (Anderson-Whymark, 2013) being the only known evidence. Further afield, two clusters of long barrows on the lower reaches of the Cotswold Hills, nine north of Bibury, and six north of Northleach, are within the MeCDA, whilst some 49 certain and probable long barrows are stretched along the higher elevations of the Cotswolds within the MaCDA (Table 27). Of these, only one potential long barrow at Edgeworth (n394150, e205520) could have been visible from the Langford enclosure 31km to the east.

Langford	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	6	11	14
Long barrows	5	59	152
Settlement habitation	1	7	16
Leaf-shaped arrowheads	4	21	45
Fully polished axes	30	99	189
Other EN lithics	3	7	15

Table 27. Langford summary cost distance data.

3.4.9 **Eastleach.**

(e421560, n204720)

The enclosure comprises four concentric ditch systems (Fig.115, p.288). The two inner systems are sub-ovoid with a concave or in-turned western edge. The third ditch system appears sub-square with rounded corners and a

concave southwestern edge. The outer system appears sub-circular with a flattened northwestern edge. The enclosure is well defined on the aerial photographs though all four circuits have areas that are incompletely defined, particularly on the eastern side where the enclosure is overlain by a field boundary whilst some components of the southern parts of the ditches appear obscured by thin alluvial deposits. There are a number of other features beyond the enclosure which appear to be later (Dyer, 1994a). The enclosure lies above the intersection of beds of Forest Marble and Cornbrash. Above this are the Brown rendzina soils of the Elmton association (BGS, 2003a; 2003b).



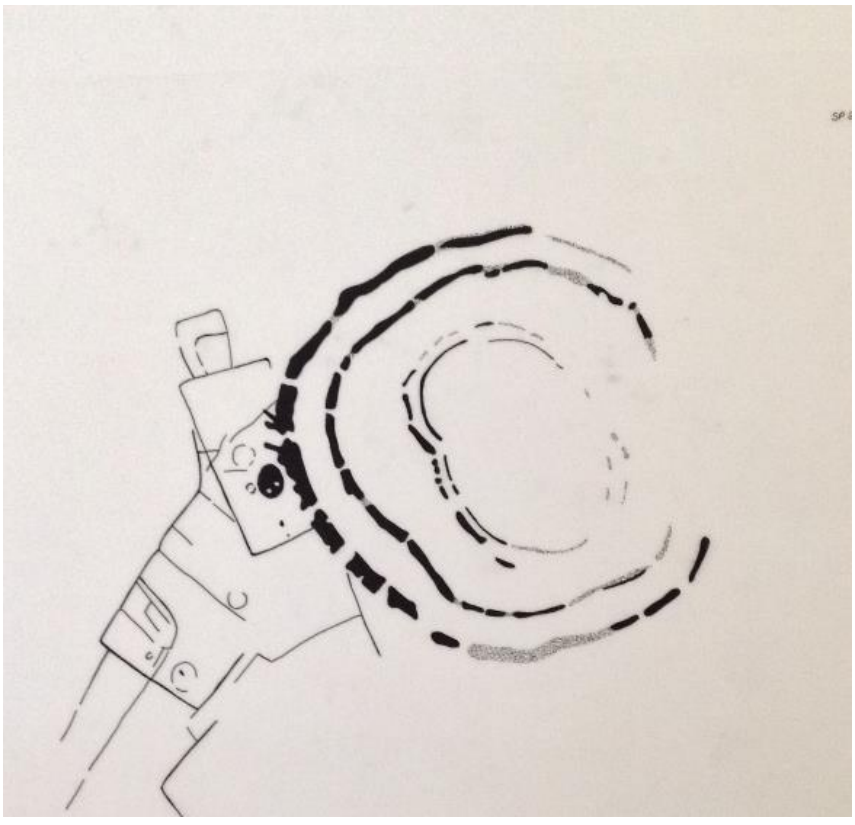


Figure 115: Eastleach causewayed enclosure.

Source: Historic England.

The enclosure sits at 100m AOD on a slight incline towards the southeast. On a landscape that is relatively flat, Eastleach is significantly higher than the two adjacent enclosures at Langford (75m AOD) and Broadwell (72m OD). This higher elevation results in the model returning a near distance vista that is appreciably broader and more complete than that enjoyed by the other two enclosures. The enclosure is particularly well located for views along the Thames. The enclosure is located close to the source of the Broadwell Brook and may have enjoyed views down the north side of this stream, beyond the enclosure at Broadwell, until the stream drains into the Thames near Grafton. The view continues along the Thames in both a westerly and easterly direction. To the east, the distance views extend beyond the enclosures at Broadwell and Aston Cote (that cannot have been visible), almost as far as modern Botley, some 25km distant. To the west, the views along the Thames extend towards modern Lechlade (5.8km).

As with other enclosures of the Thames Valley the distant views to the north must have been interrupted by the North Wessex Downs which preclude views of the long barrows situated along these hills, though it is just possible that the distant (20km) long barrow at Whitehorse Hill (429995, 186514) may have been visible (Fig.139, p.321). The land gently rises to the north and to the west and the immediate topography severely limits views in this direction, precluding the Cotswold long barrows from view. Of the 161 potential long barrows identified within the MaCDA, only the Whitehorse Hill and Liddingdon Warren long barrows were potentially visible, lying on the very edge of the landscape that the model reports as in view. Both lie at some distance (20.6km and 25km respectively) and were probably not visible in practice.

Despite the proximity of Eastleach to Broadwell and Langford, the cost model is subtly different (Fig.140, p.322). Whilst both the MiCDA and the MeCDA are broadly similar with the same sub-oval form, the MaCDA is sub-circular and of greater area, now including all of the Cotswold long barrows, except those that lie west of the modern A46 (Table 28). A small protuberance in the MaCDA across the Severn levels towards modern Deerhurst, includes barrows around Cheltenham and the enclosures at Birdlip and Crickley Hill. In the east, the enclosure at Thame falls just within the MaCDA and in the southeast, another small topographically generated protuberance includes the Goring Gap.

Eastleach	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	7	11	16
Long barrows	14	74	161
Settlement habitation	1	7	14
Leaf-shaped arrowheads	5	20	45
Fully polished axes	25	93	167
Other EN lithics	1	5	15

Table 28. Eastleach summary cost distance data.

3.4.10 **Burford.**

(e423183, n210726)

The enclosure comprises a complete single circuit ditch system and is well defined on aerial photographs (Fig.116). The enclosure is of sub-circular form, measuring 84 x 96m, slightly flattened on the southwest side and is situated at 129m AOD on a gentle northeast slope. The underlying geology is limestone, capped by calcareous loamy soils (Small, 1995a) and the enclosure lies above a branch of the Shill Brook that drains southwards, eventually meeting the Thames at Rushey Lock. The segments vary in size from 2 - 3.5m wide and 8 - 22m long. Two of the ditch segment terminals on the southern side appear to be in-turned, possibly suggesting an entrance to the enclosure.

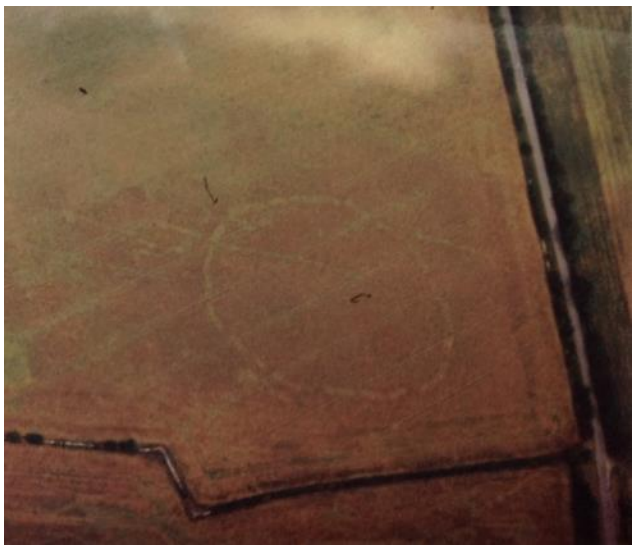


Figure 116: Burford causewayed enclosure.

Source: Historic England.

The potential near-distance views are constrained and just extend to the head of the branch of the brook at 2km distance. They do not reach the River Windrush 2.3km to the northeast. Within a 3km radius there are four potential long barrows recorded on the HER, one of which the visibility model (Fig.141, p.323) unusually reports as potentially visible from the enclosure. The discontinuous ditches flanking the long barrow may suggest an early construction date and the two monuments may have been contemporary.

Long-distance views are even more constrained. Burford appears to have been constructed to lie discretely in the landscape and there are no potential views beyond 1.7km to the north, 5.5km to the northeast and east, 2.7 km to the southwest and 4.2km to the west. To the south a very small strip of the north Wessex Downs may have comprised the horizon at 25.5km. The cost models return sub-circular forms with the MaCDA extending beyond the Cotswolds, where it follows the line of the river Avon, though constrained by Bredon Hill and the high grounds of Birdlip Camp and Crickley Hill, which are just within the defined model (Fig.142, p.324). To the south the MaCDA extends beyond the north Wessex Downs to the River Kennet, whilst to the east the enclosure at Thame is also just within the model. The MaCDA for Burford thus contains all the causewayed enclosures of the Upper Thames Valley and the enclosure at Windmill Hill (Table 29).

Burford	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	7	11	16
Long barrows	24	88	146
Settlement habitation	1	8	18
Leaf-shaped arrowheads	7	22	48
Fully polished axes	21	87	163
Other EN lithics	1	6	12

Table 29. Burford summary cost distance data.

3.4.11 **Down Ampney.**

(e410400, n196025)

The enclosure was surveyed in 1994 and the aerial photographs transcribed as part of the 'Industry and Enclosure in the Neolithic Project' (Dyer, 1994b). Down Ampney comprises a single near-circular ditch system of which only the (complete) southern half is visible on aerial photographs. The 80m diameter enclosure lies on a low, flat terrace of the Northmore Sand and Gravels, immediately east of the Ampney Brook. The enclosure is likely to have suffered periodic inundation, whilst the small brook which drains into the Thames three kilometres to the east is unlikely ever to have been navigable.

The enclosure lies at 82.5mAOD and, for some 1.5km in any direction, the terrain varies less than +/- c.1m. Down Ampney hence enjoys consistent near-distant views over 360deg. of arc. and near complete views down the Ampney Brook until it joins the Thames. Mid-distance views are interrupted by the slightly lower ground associated with the River Churn to the west, the Thames itself to the south and further small brooks to the west. Extensive gravel extraction near Fairford and Lechlade has disrupted the DTM but views beyond the river Colne, 8.5km to the east are always likely to have been very limited. Good views may have extended north, along the line of the Ampney Brook, for up to 10km.

Although the far-distance views extend beyond the long barrow rich environs along the southeast flank of the Cotswolds (Fig.117, p.294), only the Hoar Stone chambered barrow at Duntisbourne Abbots could have been visible.

However, though the visibility model reports this barrow, at some 17.3km distant, as just on the fringes of the visible aspect, it is unlikely to have been so.

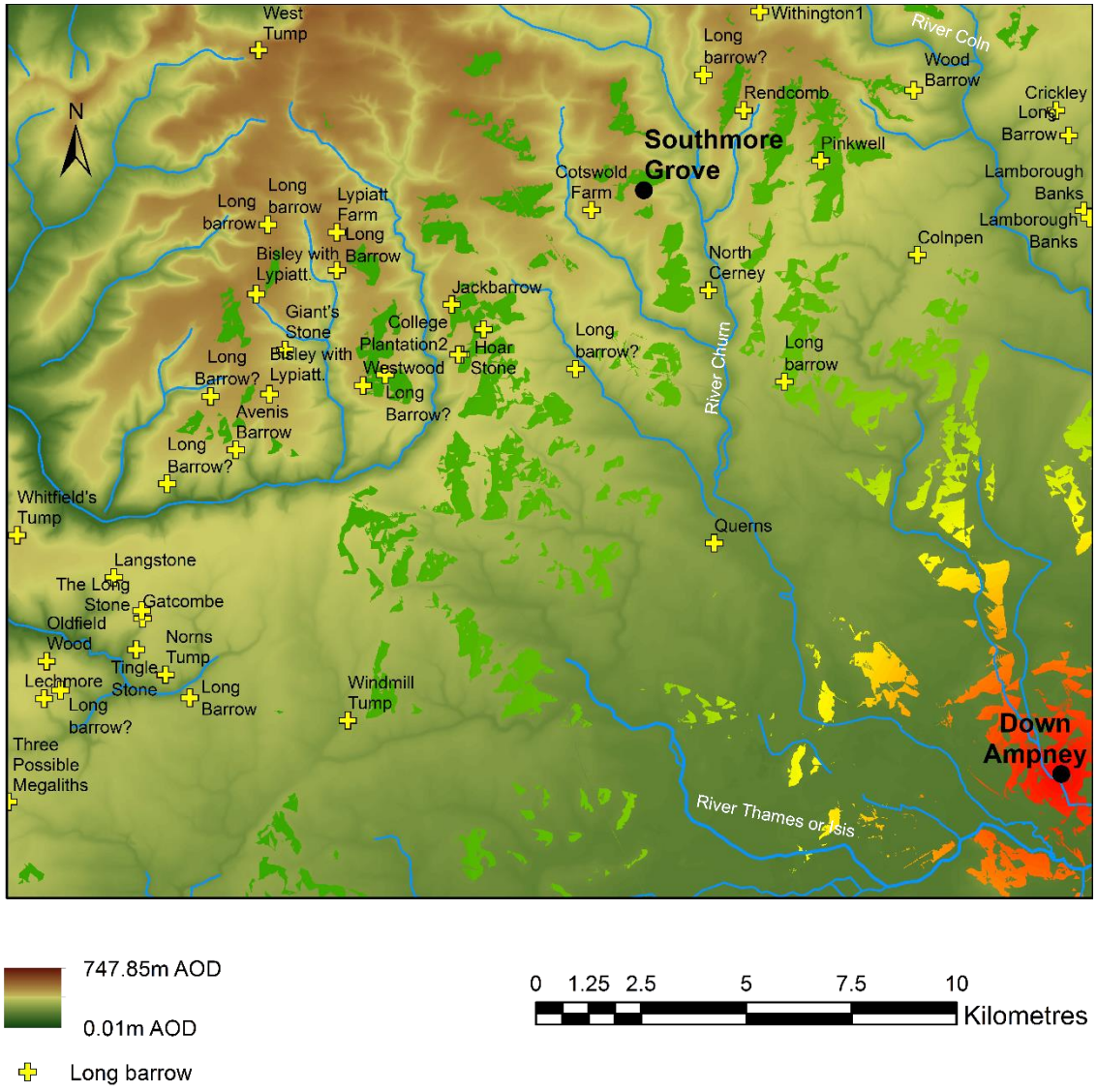


Figure 117: Down Ampney views towards the Cotswolds.

The model estimates the maximum potential extent of any views to and from the enclosure at Down Ampney. Despite the proliferation of long barrows along the southeast flanks of the Cotswold Hills only the Hoar Stone barrow could ever have been visible.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

In terms of cost distance, Down Ampney is relatively isolated from other causewayed enclosures compared to other enclosures of the Upper Thames. The enclosures at Eastleach and Langford are just within the MiCDA, whilst those at Southmore Grove, Burford, Broadwell, Eynsham, Aston Cote and Buckland also fall within the MeCDA. The MaCDA extends to also include Birdlip Camp, Crickley Hill, Abingdon and Lower Radley, whilst the enclosure at Thame lies someway beyond. The low count of other potential early Neolithic indicators in the MiCDA may be further reinforcement of the enclosure isolation (Table 30).

Down Ampney	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	3	9	17
Long barrows	2	73	175
Settlement habitation	1	3	12
Leaf-shaped arrowheads	1	20	40
Fully polished axes	9	68	178
Other EN lithics	1	4	10

Table 30. Down Ampney summary cost distance data.

The high count of long barrows within the MaCDA reflects the inclusion of all the Cotswold groups south of Moreton-in-Marsh, the Vale of Berkeley to the west of Stroud, and those towards the Vale of Pewsey to the south, including the Avebury area, and the Marlborough Downs.

3.4.12 **Salmonsbury Camp.**

(e417430, n220786)

An enclosure at Keystone Farm was first suggested in 1994 (Marshall, 1995 185), and confirmed by geophysical survey in 2004 (Stoten, 2005). The survey indicates two, possibly three circuits of which approximately one third was within the survey area. Assuming a broadly concentric form, the inner enclosure has a diameter of 200 - 250m and the outer circuit 350 – 400m.

Salmonsbury Camp (Fig.118&119, p.298) lies in the confluence of the rivers Windrush and Eye. The River Eye joins the Windrush some 2km to the south and meanders for a further 34km in a south easterly direction before draining into the Thames. The enclosure ditches coincide with the course of a small stream which in pre-modern times would have fed into the River Eye, though now contributes to the lakes of former gravel quarries. These lakes, the northern extremes of which, are within 700m of the enclosure, extend for 1km in a southerly direction and though apparent on the DTM, are unlikely to affect the model significantly, since the prehistoric terrain, like the surrounding environs, is also likely to have been relatively flat.

The model suggests that the enclosure may have enjoyed a substantially complete 360 view which extended for up to two kilometres in the easterly and westerly directions, and for four kilometres in a northerly and southerly direction (Fig.143, p.325). The mid-distant view follows the line of the Windrush and extends for nine kilometres ending just short of the location of two possible long barrows at Barrington (Glouc. HER 37518 & 9). The model reports that the long barrow at Polewood East (Glouc. HER 230) (one of a group of up to four at

Swell) may have been viewable. However the barrow lies on the edge of an isolated outlier of the viewshed, at 5.6km to the north, on the lower eastern flank of the Cotswolds and is unlikely to have been visible in the early Neolithic.



Figure 118: Aerial view of Salmonsbury Camp.

Pencil indicates location of enclosure.

Source: Historic England aerial photograph



Figure 119: Salmonsbury Camp Geophysical Survey.

Source: Stoten, 2005 fig.19

Most of the potential early Neolithic activity within the MaCDA, with the exception of the long barrows of the Cotswolds, falls to the east of the enclosure at some distance (Fig.144, p.326). Notwithstanding the enclosure, there are no known sites of early Neolithic habitation, with only the enclosure at Burford within the Salmonsbury MiCDA (Table 31), and the enclosure at Eastleach exactly on the boundary. All the potential views from Salmonsbury are contained well within the MiCDA, but, with the exception of long barrows, there is very little other evidence of any potential early Neolithic activity within the MiCDA, all being represented by isolated finds of three leaf-shaped arrowheads and four polished axes.

The cost models are constrained by the Cotswold Hills in a northerly and westerly direction where the MaCDA is limited to 38km. The MaCDA extends further, up to 50km, along the flatter terrain to the southeast. The enclosures at Thame, Windmill Hill, Knap Hill and Rybury are beyond the extent of the MaCDA, though the enclosure at Banbury is within.

Salmonsbury Camp	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	3	10	15
Long barrows	38	89	134
Settlement habitation	0	4	20
Leaf-shaped arrowheads	3	15	39
Fully polished axes	4	51	146
Other EN lithics	0	4	9

Table 31. Salmonsbury Camp summary cost distance data.

3.4.13 **Southmore Grove.**

(e400166, n209872)

The enclosure has been constructed on a gently sloping shoulder of a south-facing spur with a steep-sided valley immediately to the south. The northern half of the enclosure is visible on air photographs as two broadly concentric sub-circular circuits (Fig.120). How far the enclosures extended to the north is uncertain though it is unlikely that it extended down the steep valley side and hence may have been either ovoid or of promontory form (Small, 1995b). The enclosure lies on Oolitic Limestone capped by shallow well drained brashy calcareous clayey soils and is situated at 220m AOD overlooking the River Churn one kilometre to the east which drains into the Thames 22km to the south.



Figure 120: Aerial view of Southmore Grove.

Source: Historic England aerial photograph collection SP0009/3

Despite the elevated position (223m AOD) of the enclosure, Southmore Grove could only have enjoyed very limited near-distance views west of the River Churn which lies 1.5km to the east (Fig.143, p.327). The immediate view is restricted by topography to less than 400m in all directions except directly east, where it may have extended to a maximum of 900m. The dominant views are along the east side of the Churn Valley although the river itself is not reported as visible by the model. It is just possible, though unlikely, that the long barrow at Pinkwell (Glou. HER 158) 4.25km to the east was visible although four, more immediate long barrows, definitely could not have been. Further afield, the enclosure may have enjoyed good long-distance views along the east side of the Ampney Brook and both sides of the Thames Valley between Cricklade and Kempsford, and the south side of the valley between Kempsford and Buckland. Despite this, no other enclosures are reported as visible. Of particular note is the siting of the enclosure at Down Ampney. Down Ampney lies within the visual range (17km), and much of the Down Ampney surrounding landscape could have been visible. The enclosure itself lies in a very particular, small isolated area, within this landscape, that could not have been visible. The far-distance views are interrupted by the plateau of the north Wessex (Marlborough) Downs, some 37km distance.

Despite the 38 long barrows within the MiCDA and 163 in the MaCDA reported by the cost models, within a radius of approximately 10km and 37km respectively, around Southmore Grove, only the Pinkwell barrow could have been visible.

The cost models report that three other enclosures at Crickley, Birdlip and Down Ampney lie at the northwest and southeast extremes of the MiCDA,

whilst Eastleach, Broadwell, Salmonsbury, Burford, Langford and Buckland are also included in the MeCDA (Fig.146, p.328). Beyond this, the MaCDA also includes the enclosures at Aston Cote and Eynsham, whilst at the south and southwestern extremes of the cost area, the two Wiltshire enclosures at Windmill Hill and West Kingston are also included. The enclosures at Lower Radley and Thame are beyond the defined area. Habitation evidence is sparse, with no evidence reported in the MiCDA, the previously noted cluster of pits at Fairford, an isolated pit at Okus Quarry (Swindon: Wilts. HER MWI16424) and the possible mortuary enclosure at Beckford (Worc. HER 1052334) within the MeCDA (Table 32).

The paucity of potential early Neolithic indicators on the upper reaches of the Thames is also apparent and despite the frailties previously noted, cannot be wholly explained by the development-driven nature of the archaeological record. With the single exception of one stray leaf-shaped arrowhead recorded near Cerney Wick (Wilts. HER MWI 9426), all the finds reported in the cost models lie on landscapes downstream of the confluence of the rivers Thames and Colne. There is no known settlement and very little evidence of activity, excepting long barrows, within the MiCDA associated with Southmore Grove.

Southmore Grove	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	4	10	14
Long barrows	38	90	163
Settlement habitation	0	2	12
Leaf-shaped arrowheads	0	2	30
Fully polished axes	1	20	104
Other EN lithics	0	1	6

Table 32. Southmore Grove summary cost distance data.

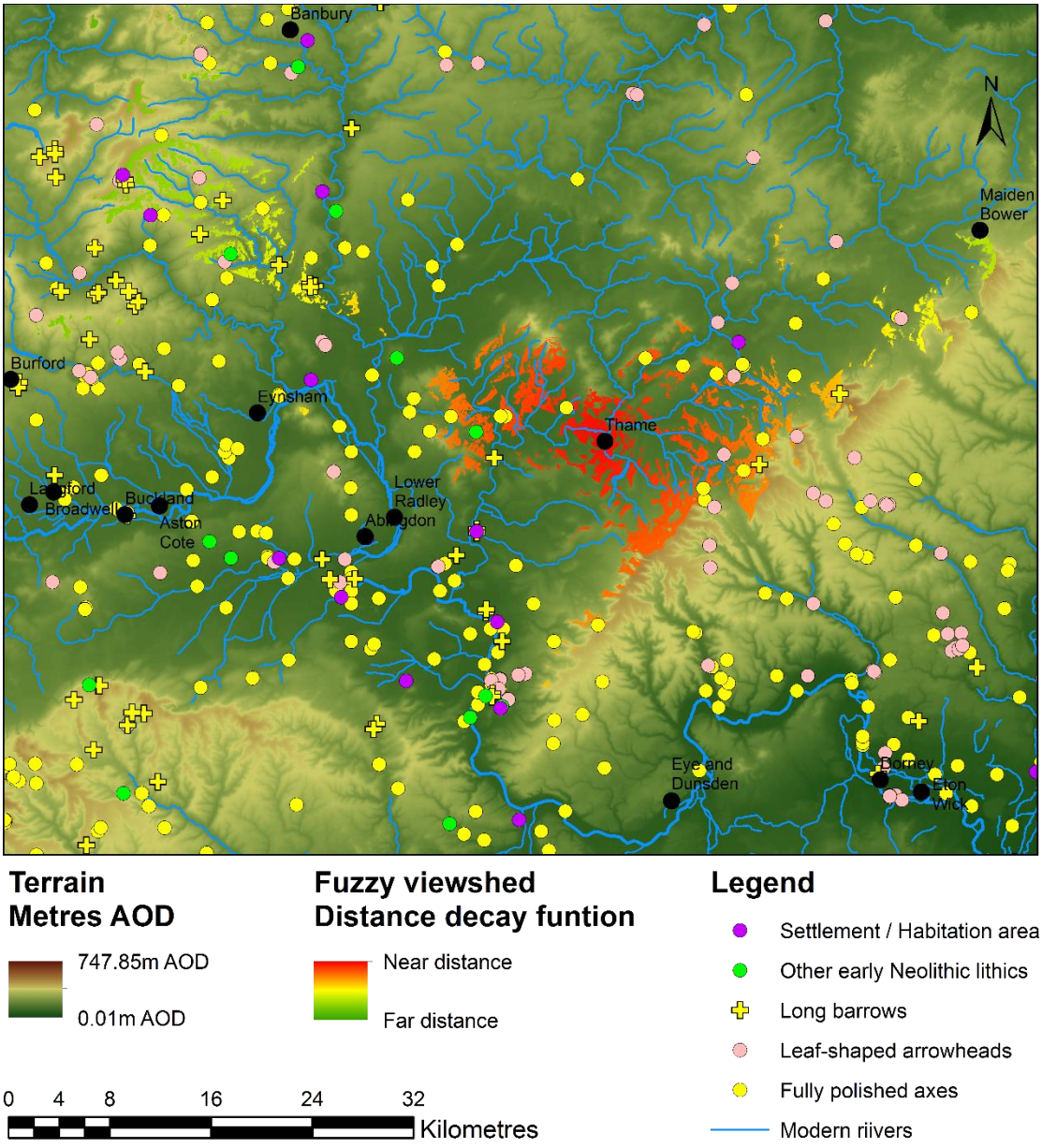


Figure 121: Thame visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Thame enclosure.

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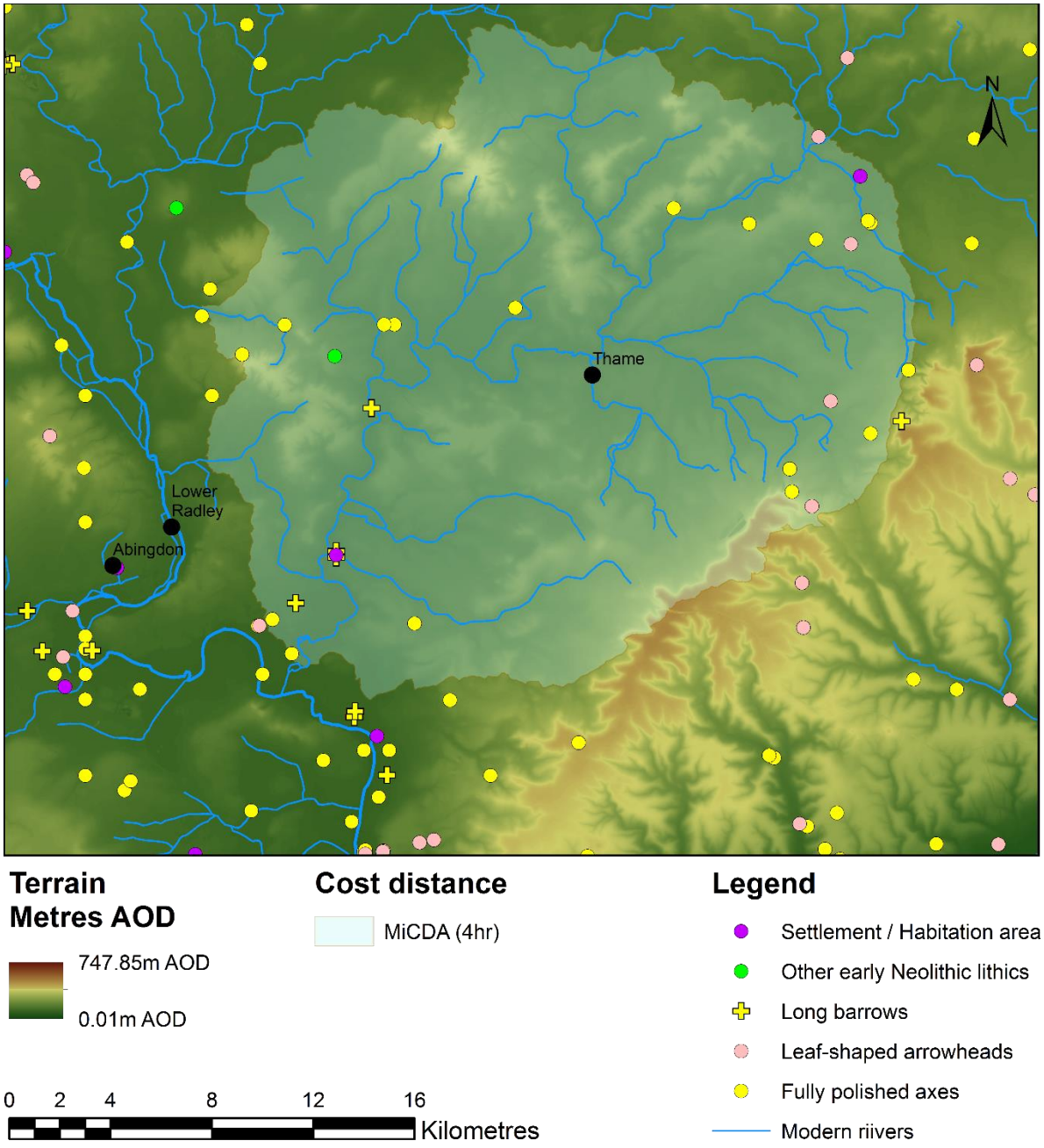


Figure 122: Thame MiCDA (4hr) model with hydrology.

The model estimates the degree of access to the Thame enclosure, where the boundaries define the extent of the MiCDA. The distribution of known early Neolithic archaeology is also defined.

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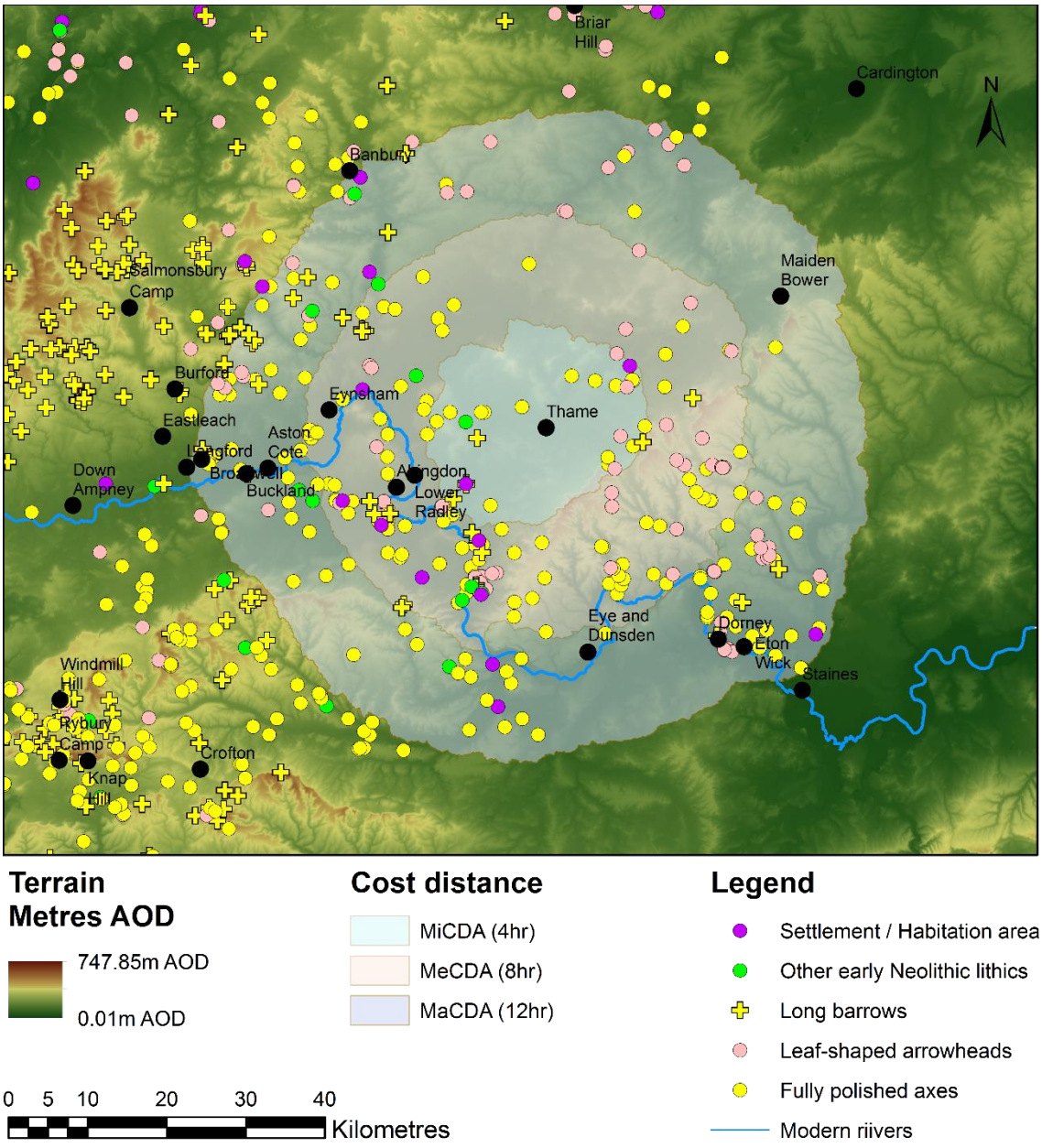


Figure 123: Thame cost distance models.

The model estimates the degree of access to the Thame enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

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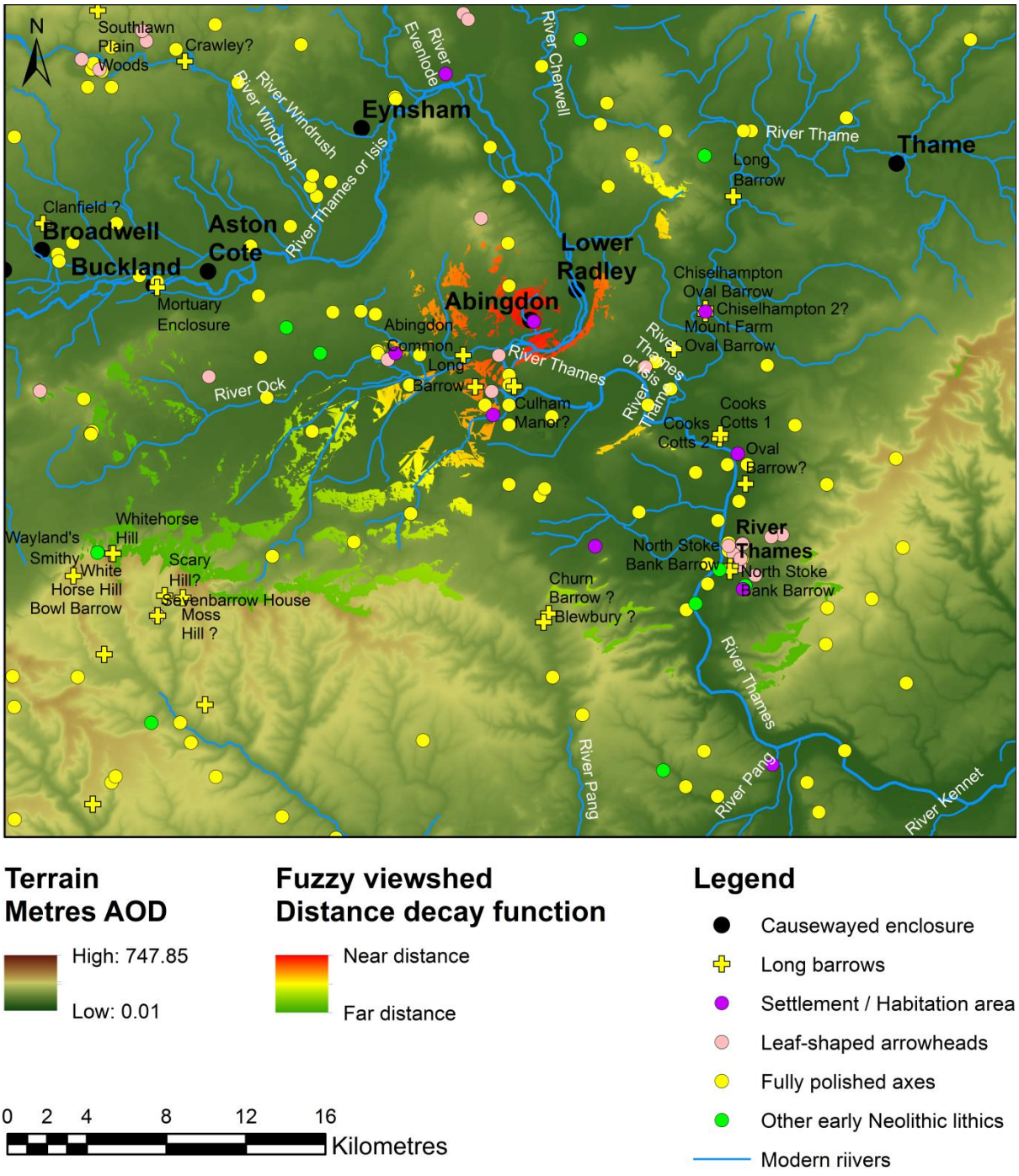


Figure 124: Abingdon visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Abingdon enclosure.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service

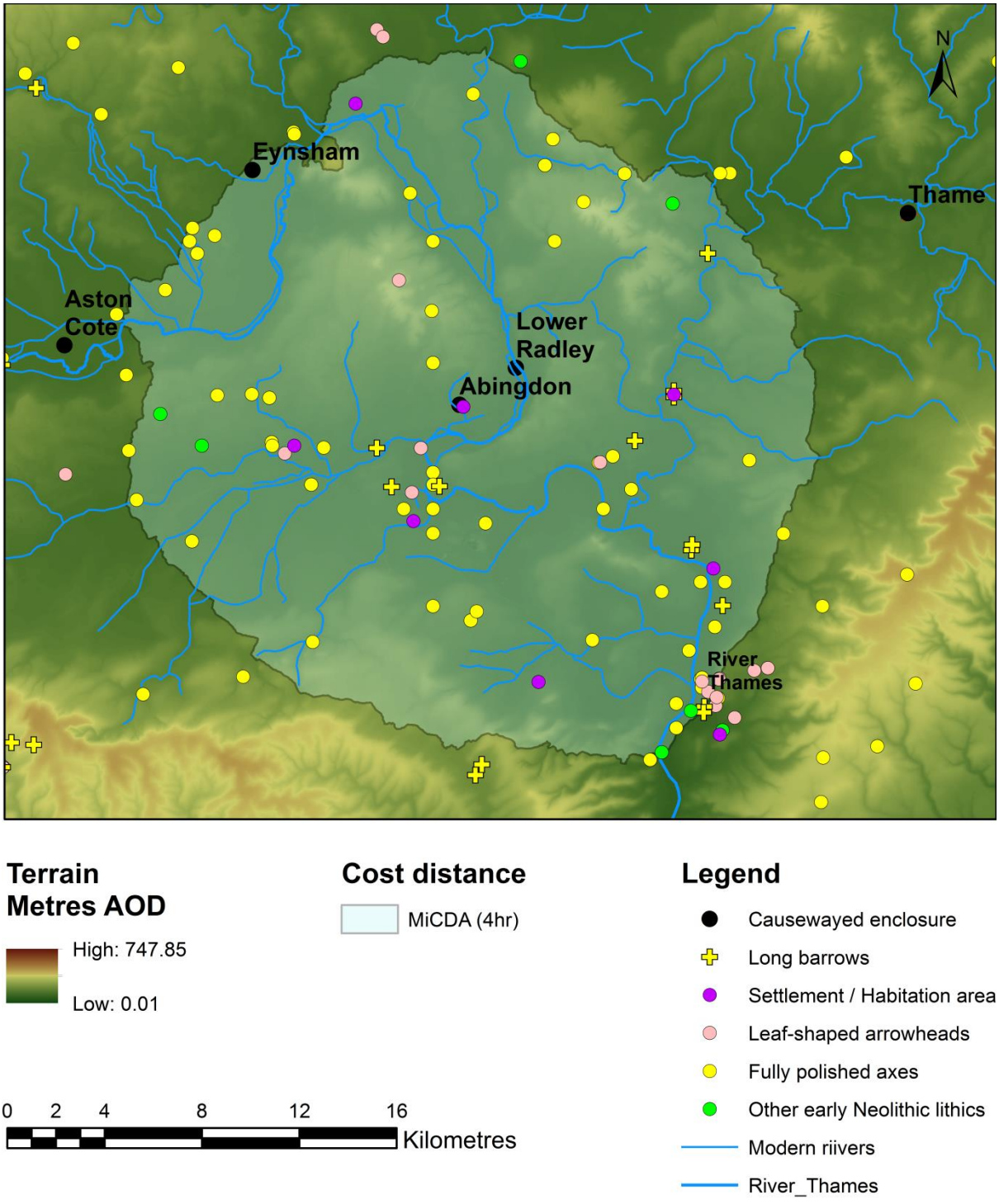


Figure 125: Abingdon MiCDA (4hr) model with hydrology.

The model estimates the degree of access to the Abindon enclosure, where the boundaries define the extent of the MiCDA. The distribution of known early Neolithic archaeology is also defined.

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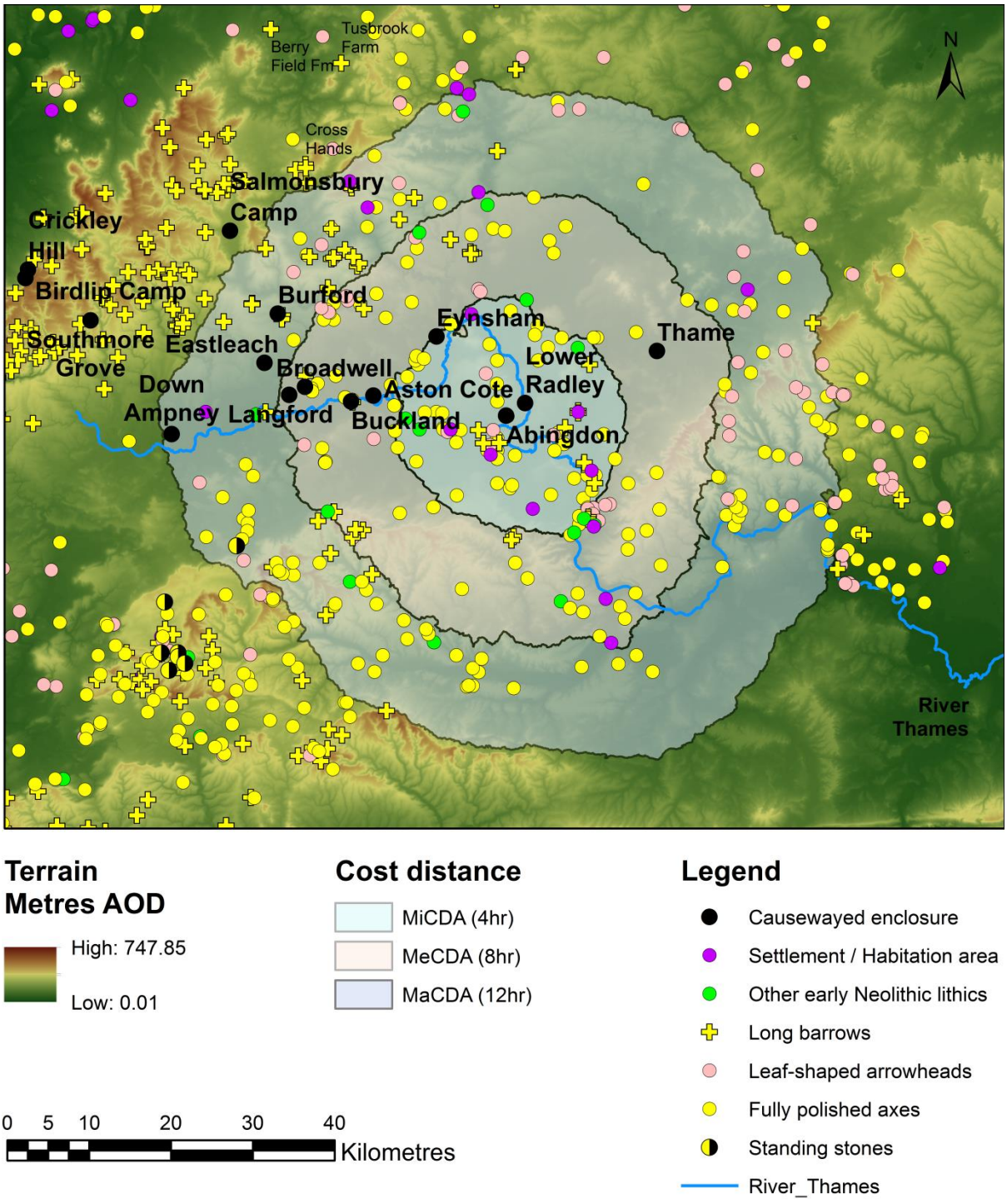


Figure 126: Abingdon cost distance models.

The model estimates the degree of access to the Abingdon enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

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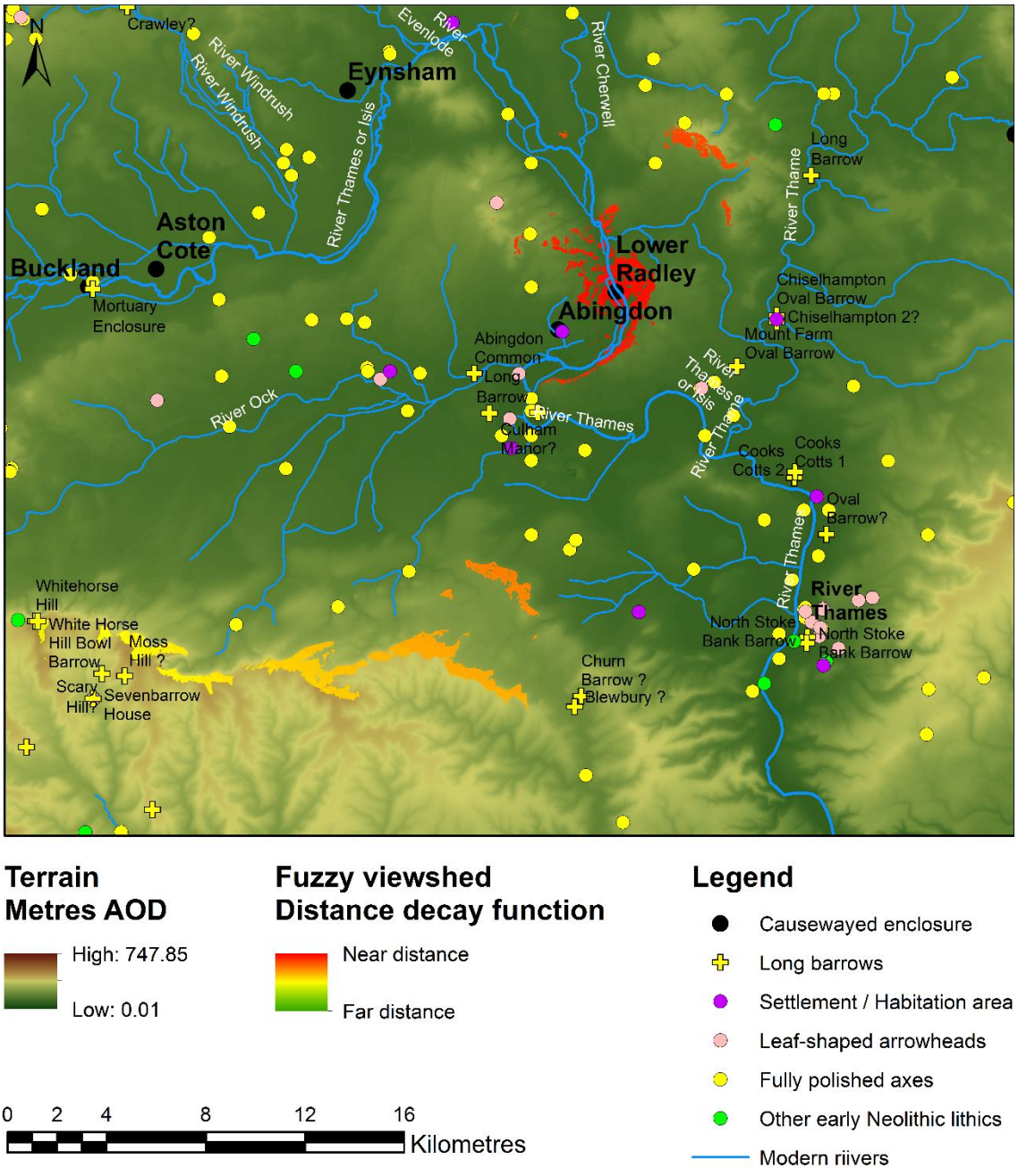


Figure 127: Lower Radley visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Lower Radley enclosure.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service

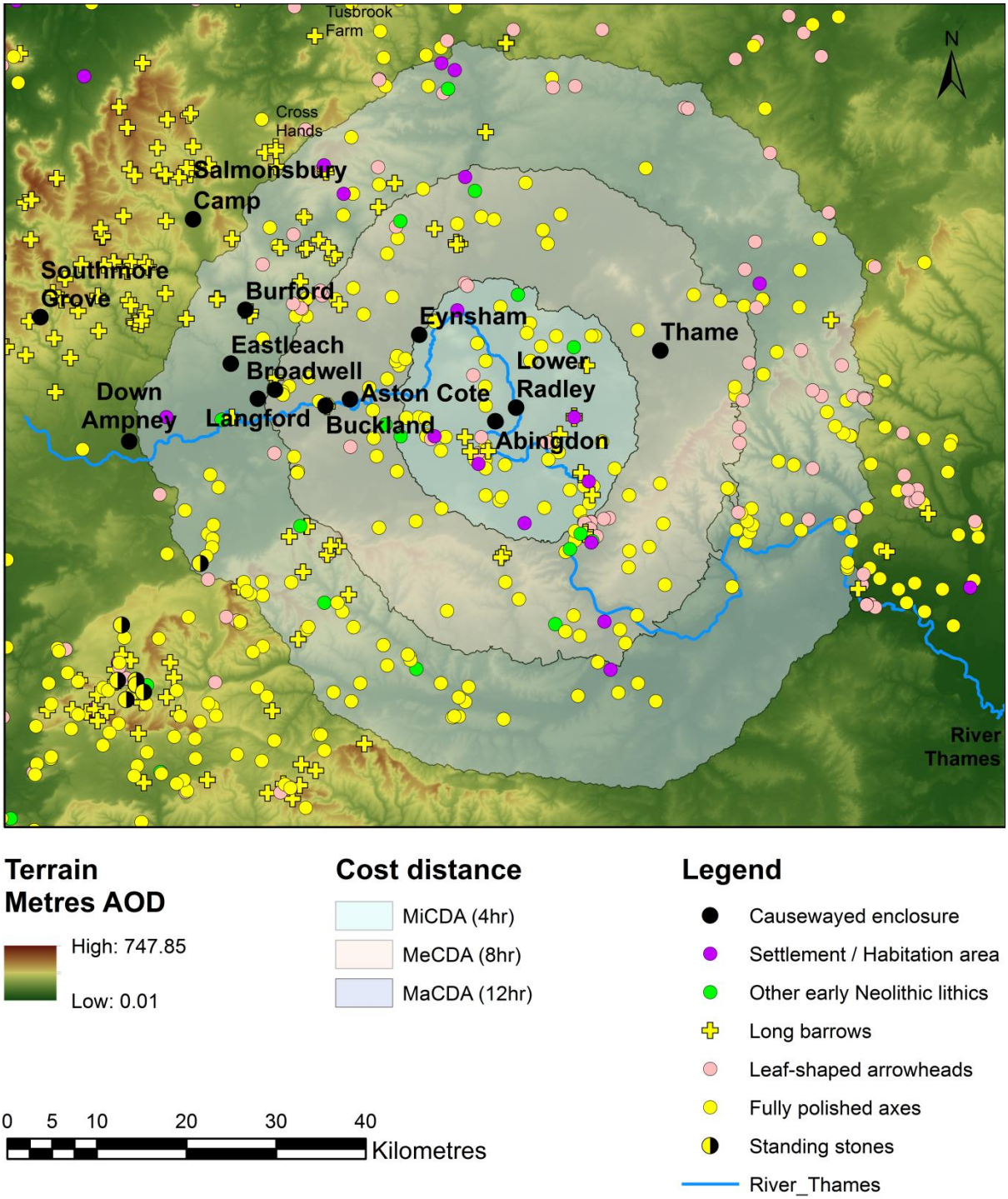


Figure 128: Lower Radley cost distance models.

The model estimates the degree of access to the Lower Radley enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

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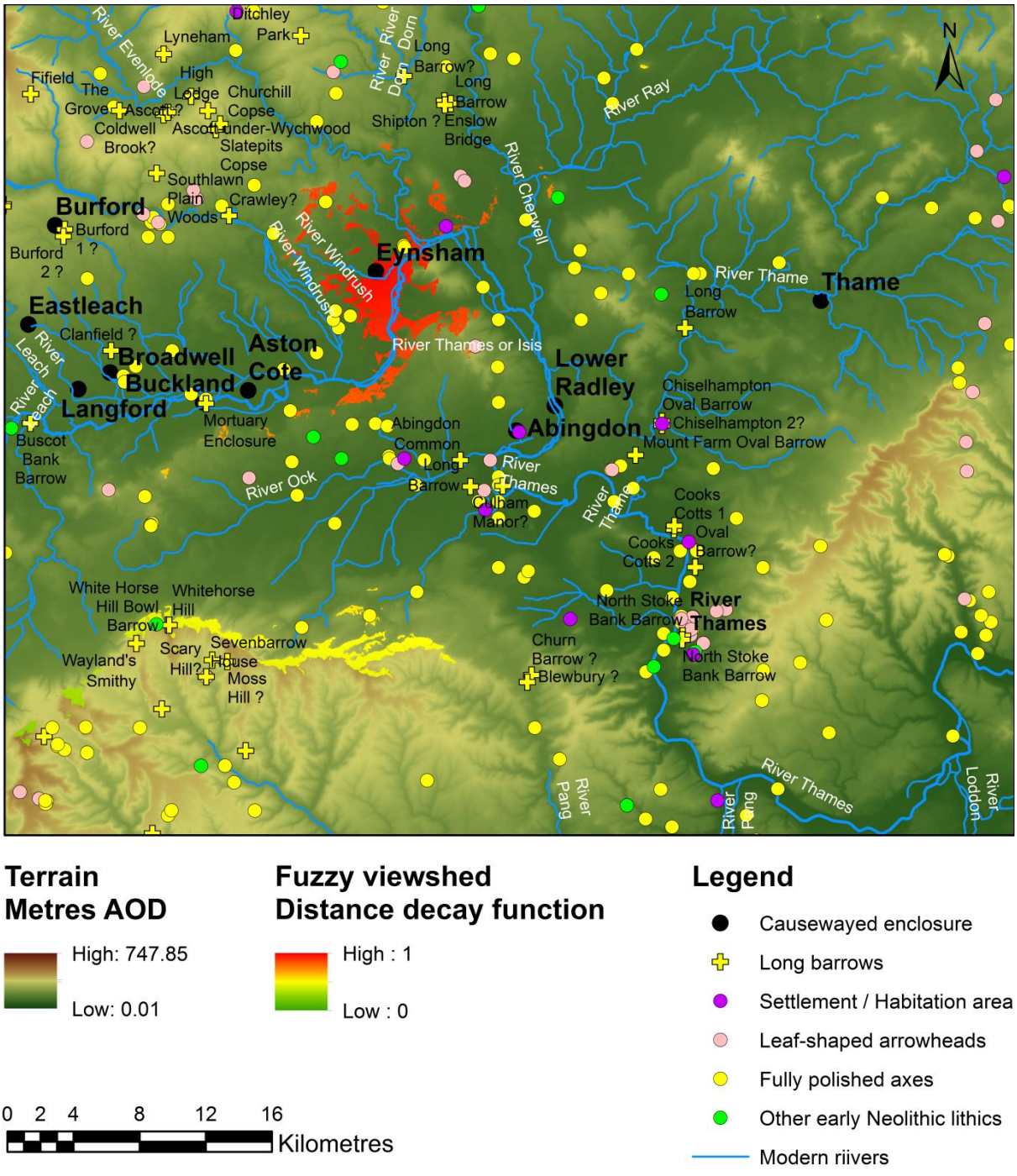


Figure 129: Eynsham visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Eynsham enclosure.

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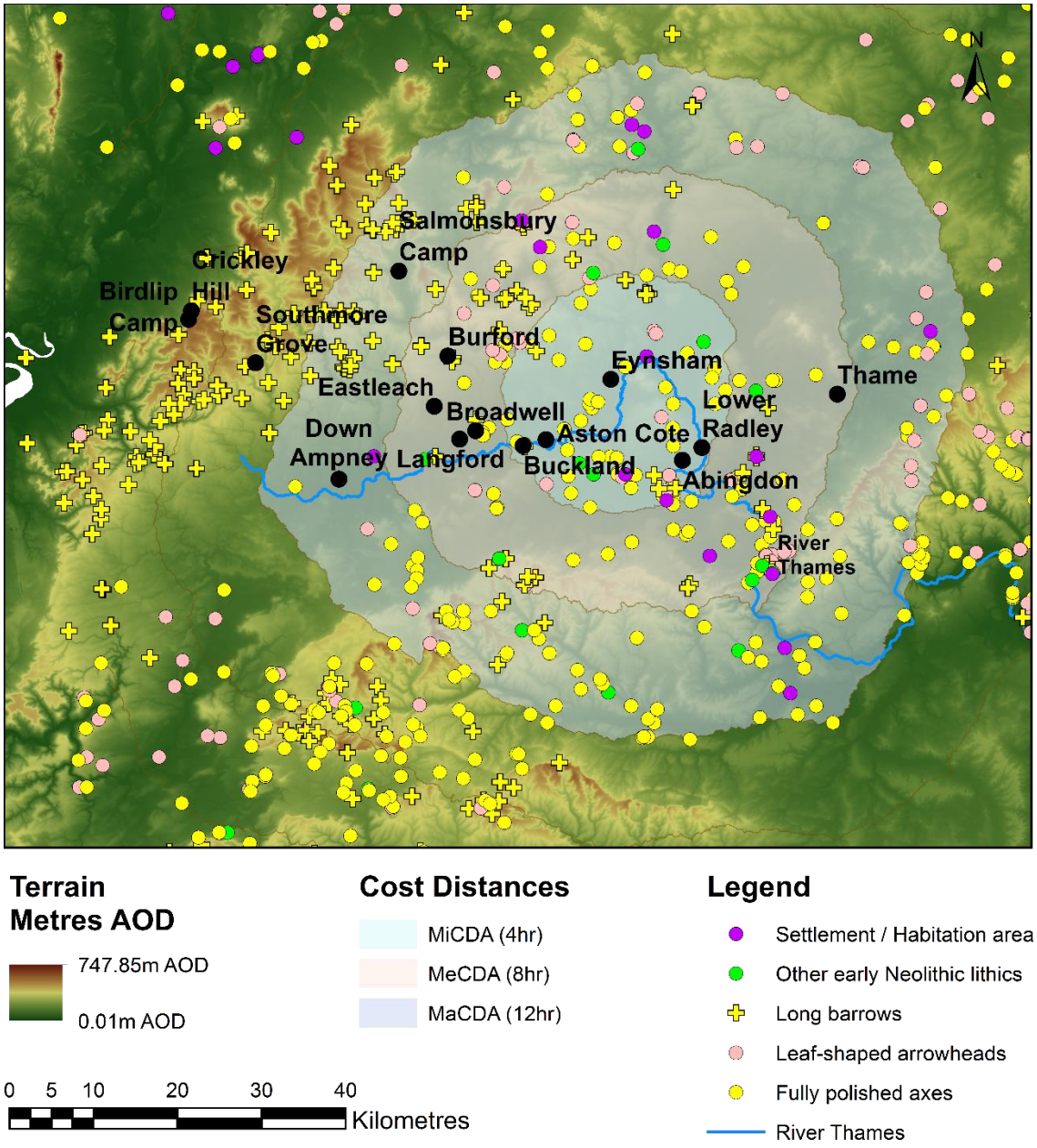


Figure 130: Eynsham cost distance models.

The model estimates the degree of access to the Eynsham enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

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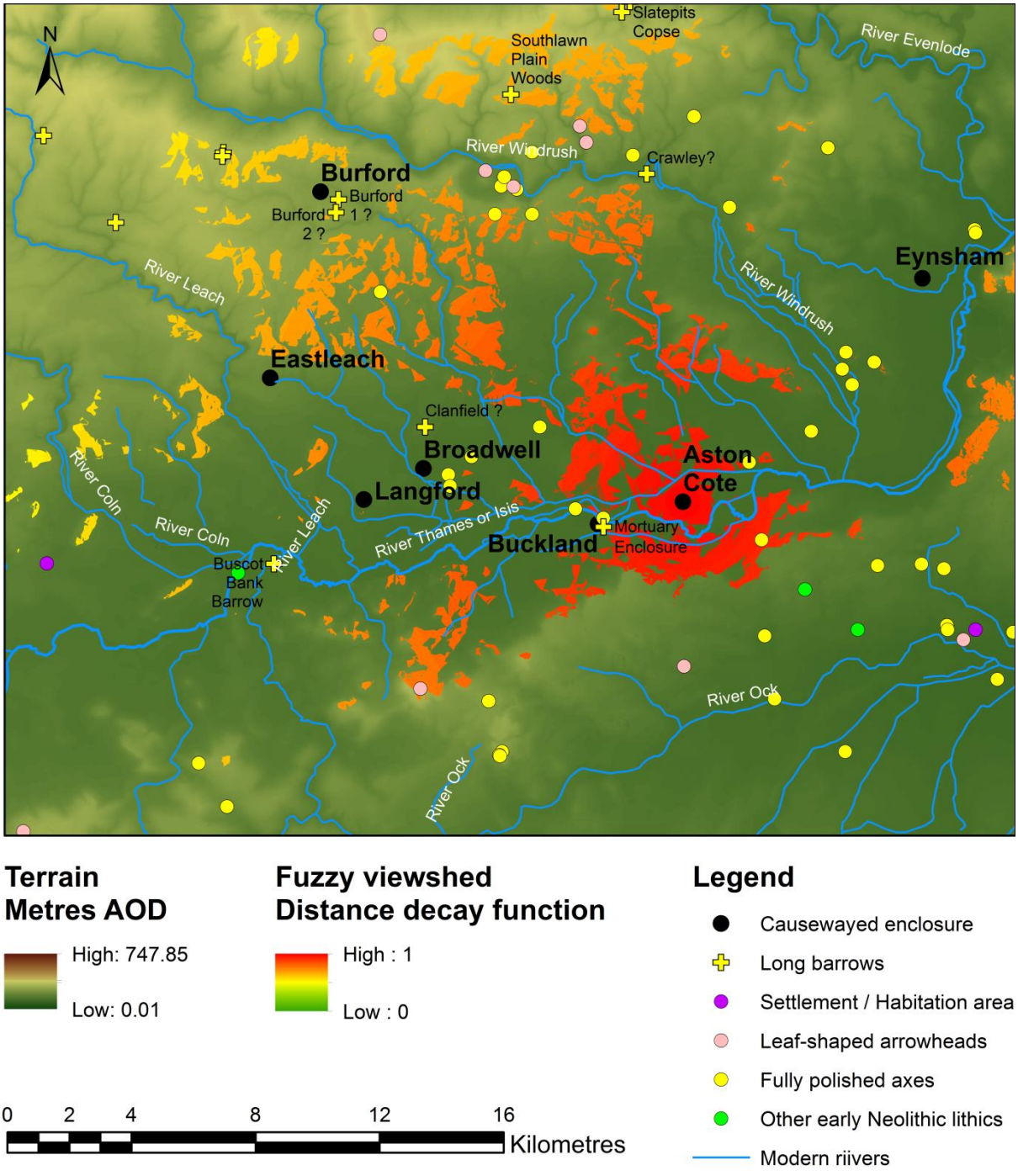


Figure 131: Aston Cote visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Aston Cote enclosure.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service

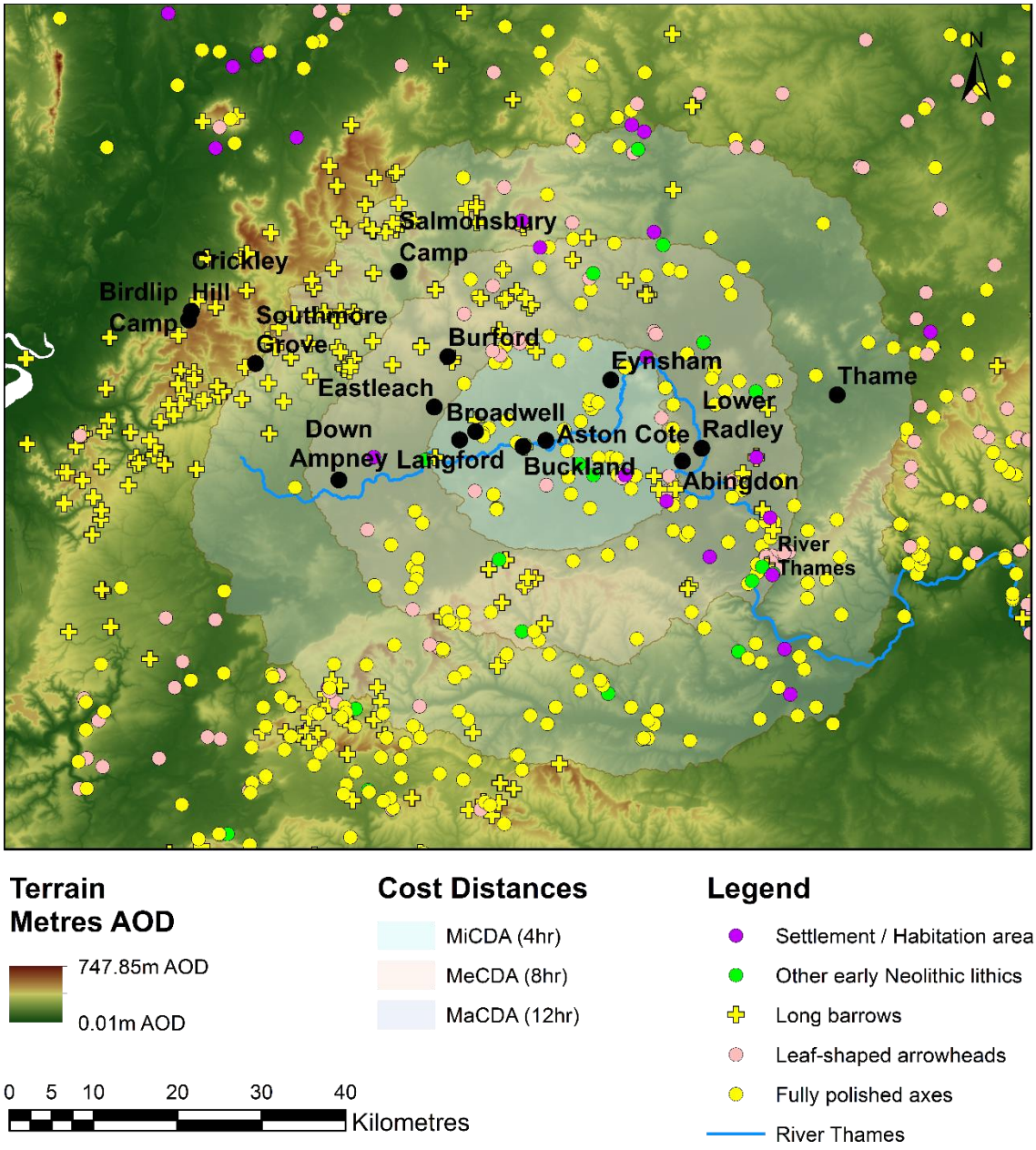


Figure 132: Aston Cote cost distance models.

The model estimates the degree of access to the Aston Cote enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service

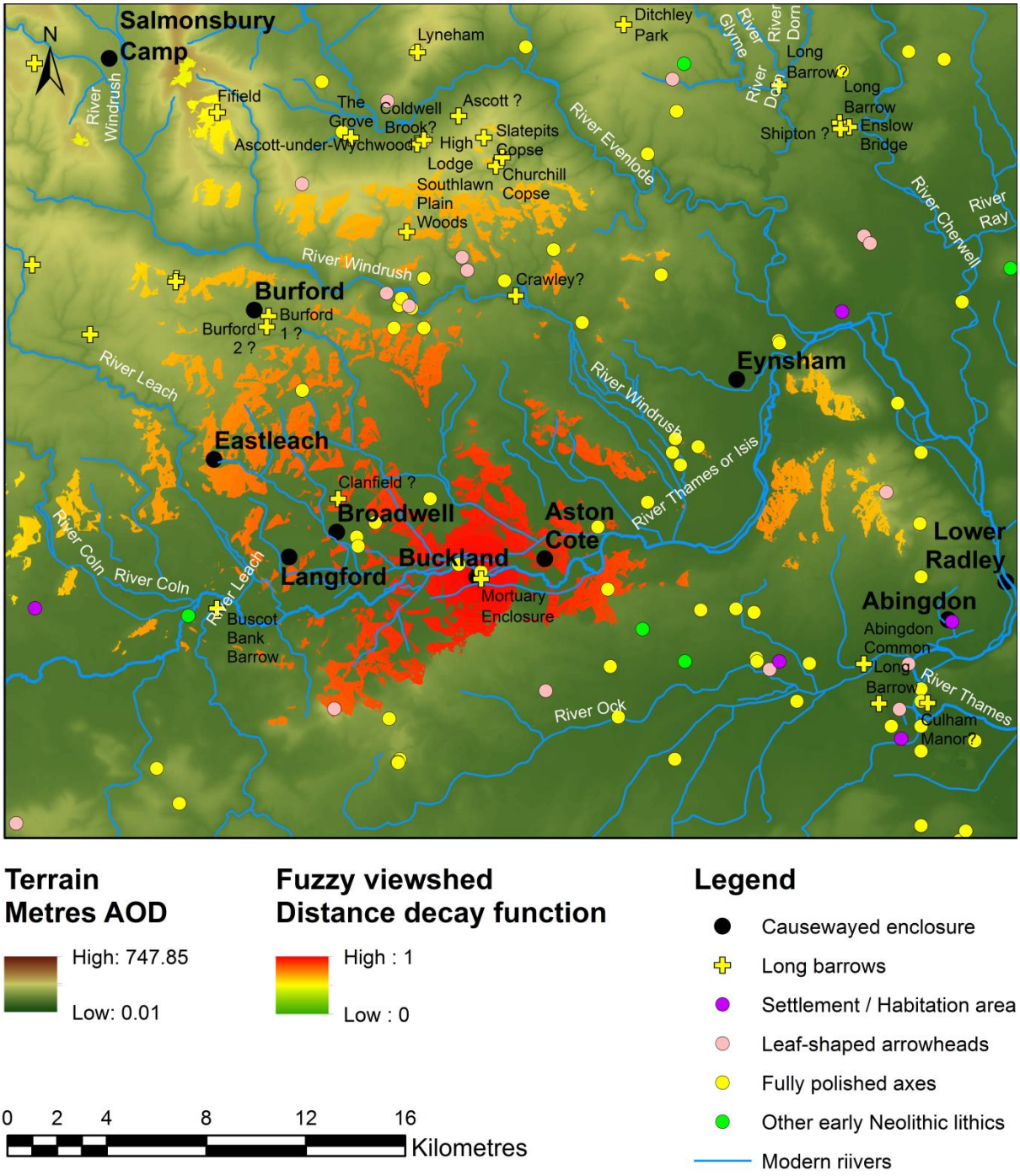


Figure 133: Buckland visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Buckland enclosure.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

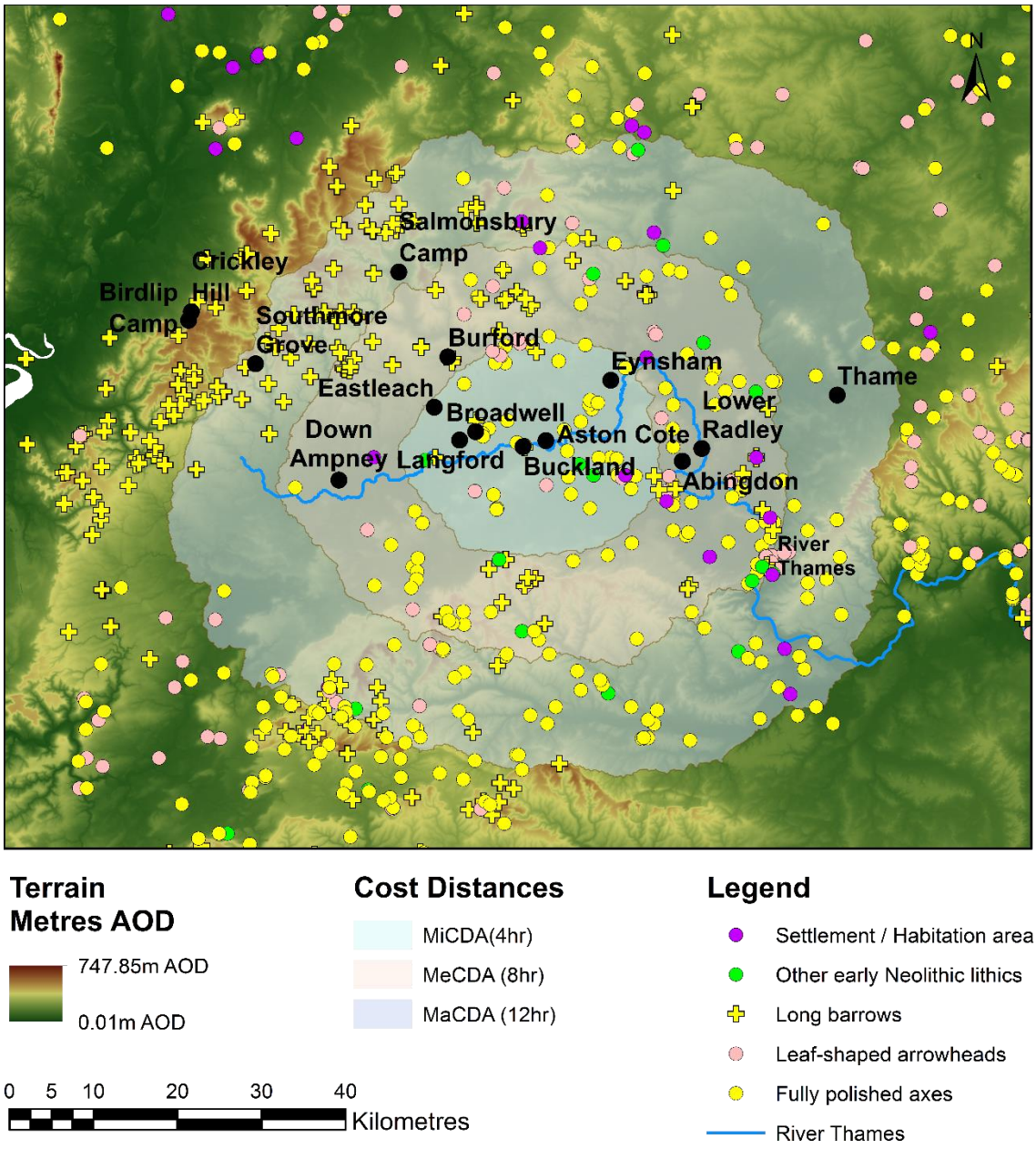


Figure 134: Buckland cost distance models.

The model estimates the degree of access to the Buckland enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service

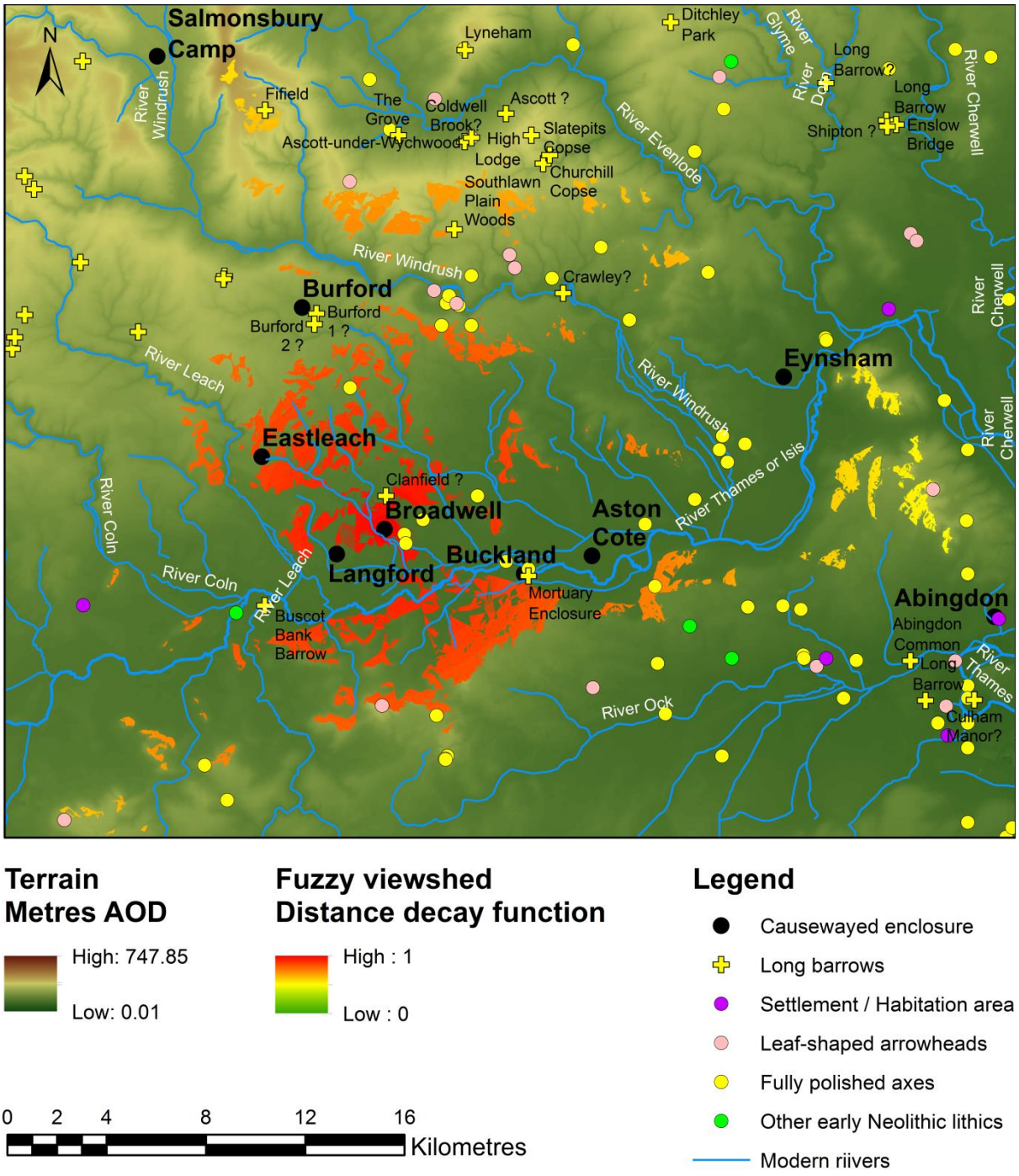


Figure 135: Broadwell visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Broadwell enclosure.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service

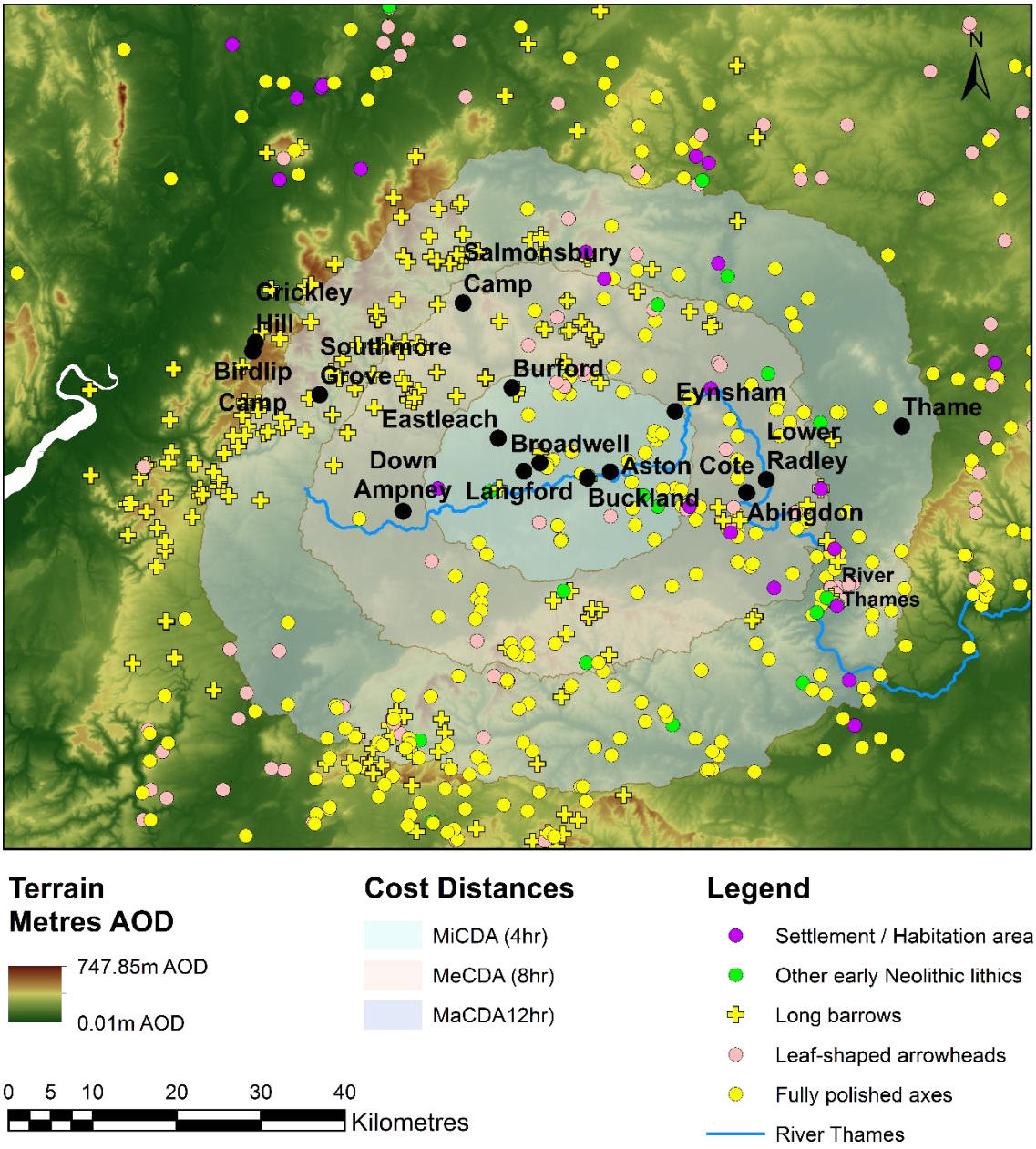


Figure 136: Broadwell cost distance models.

The model estimates the degree of access to the Broadwell enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service

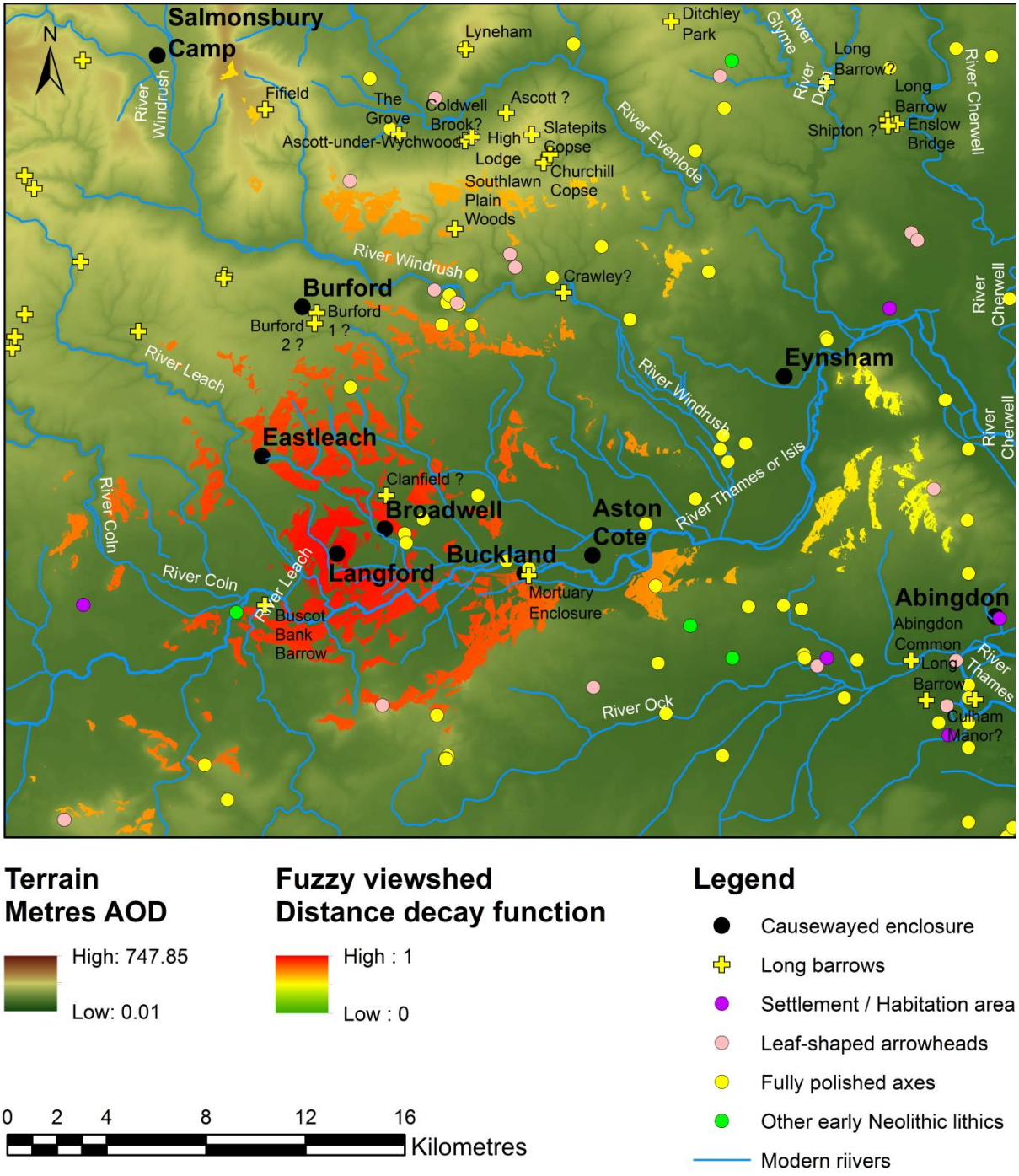


Figure 137: Langford visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Langford enclosure.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

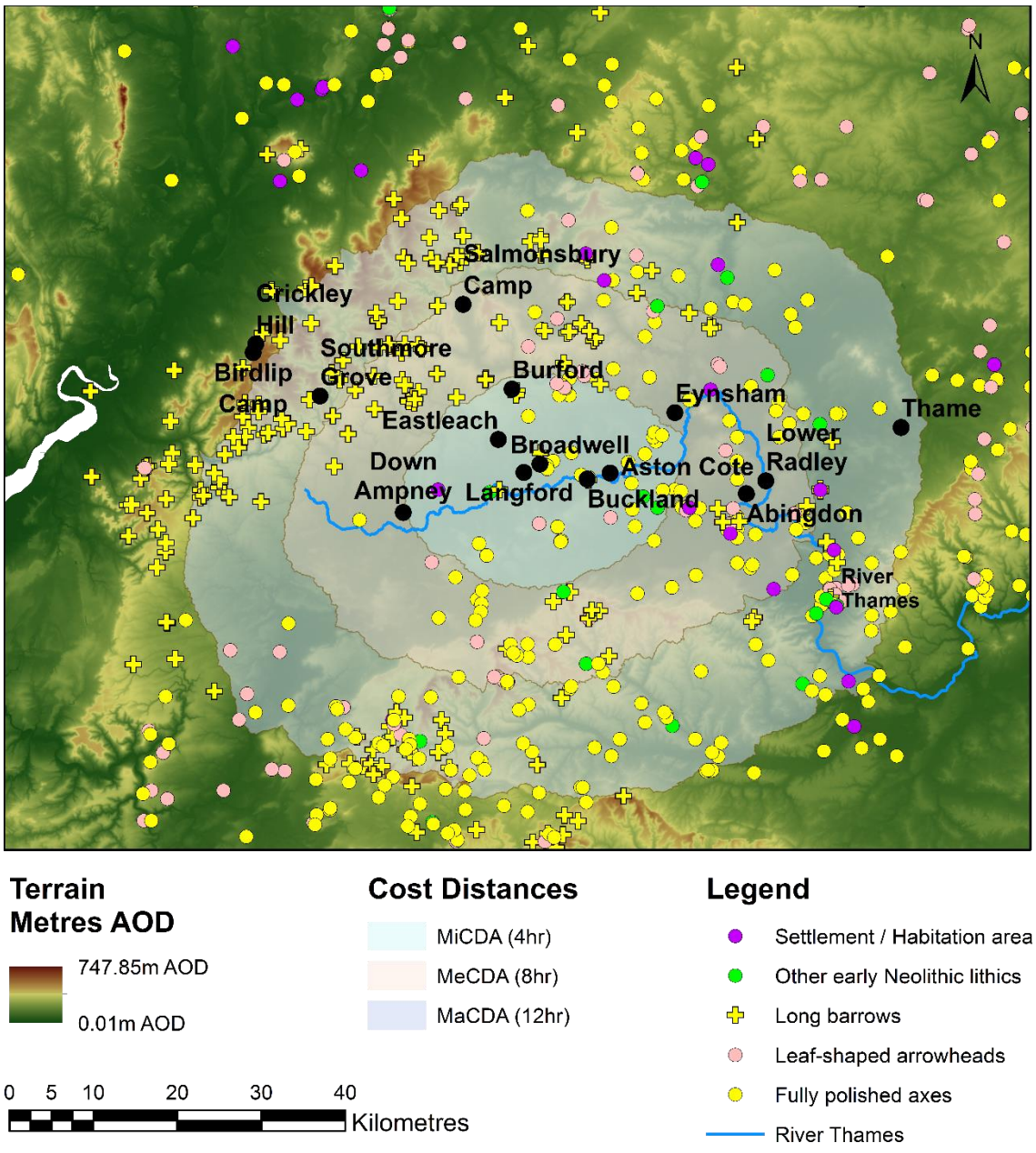


Figure 138: Langford cost distance models.

The model estimates the degree of access to the Langford enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

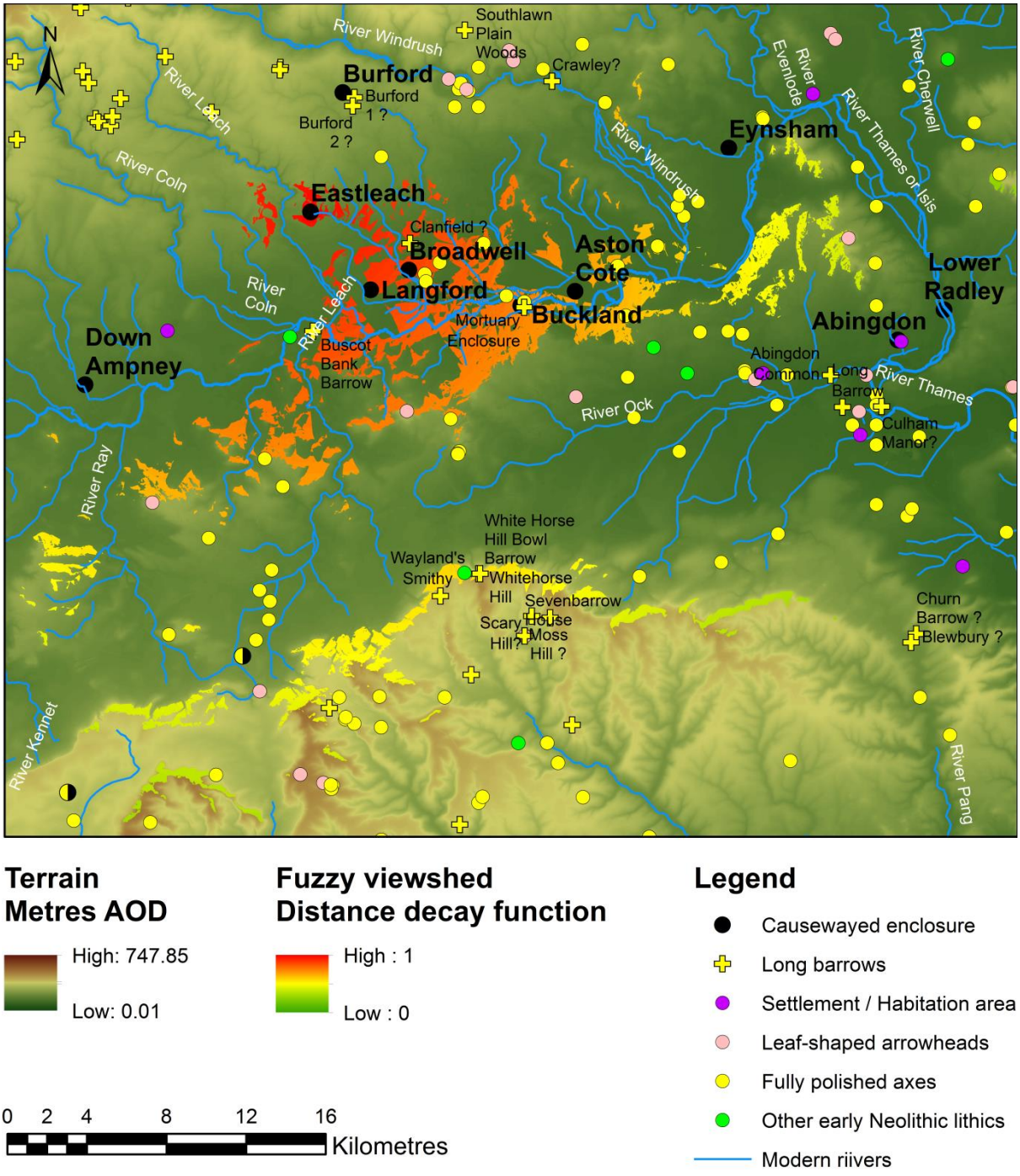


Figure 139: Eastleach visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Eastleach enclosure.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

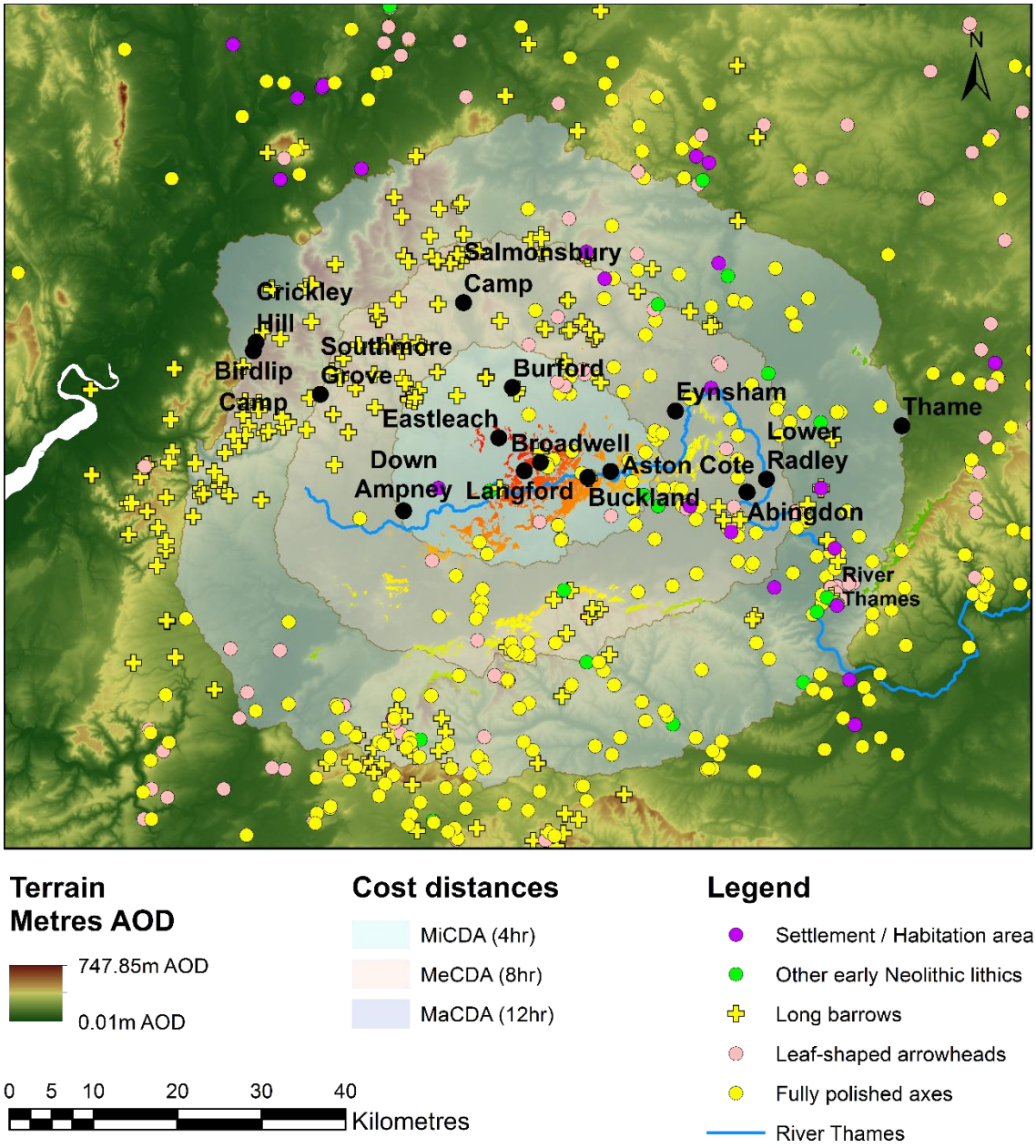


Figure 140: Eastleach cost distance models.

The model estimates the degree of access to the Eastleach enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

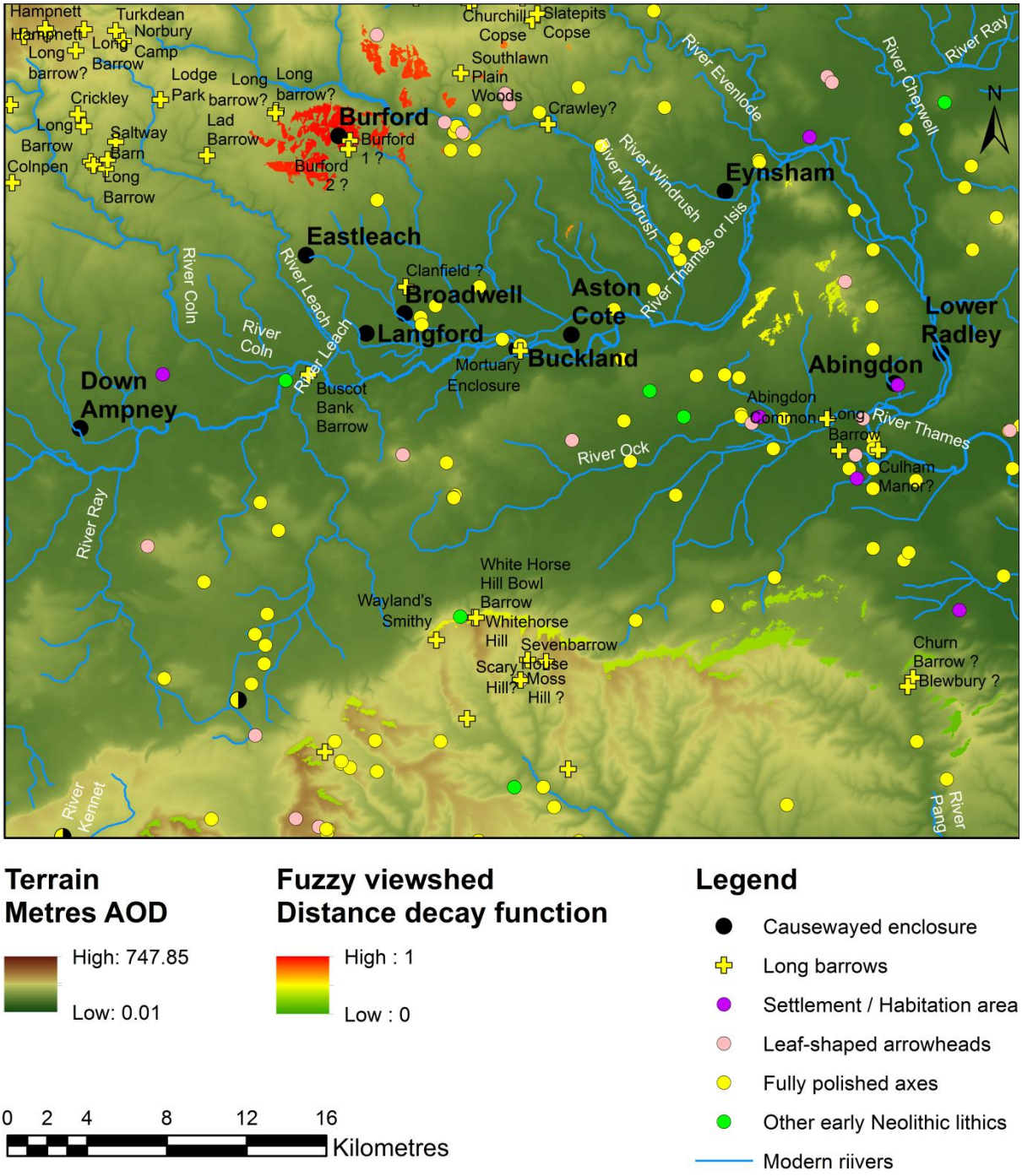


Figure 141: Burford visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Burford enclosure.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

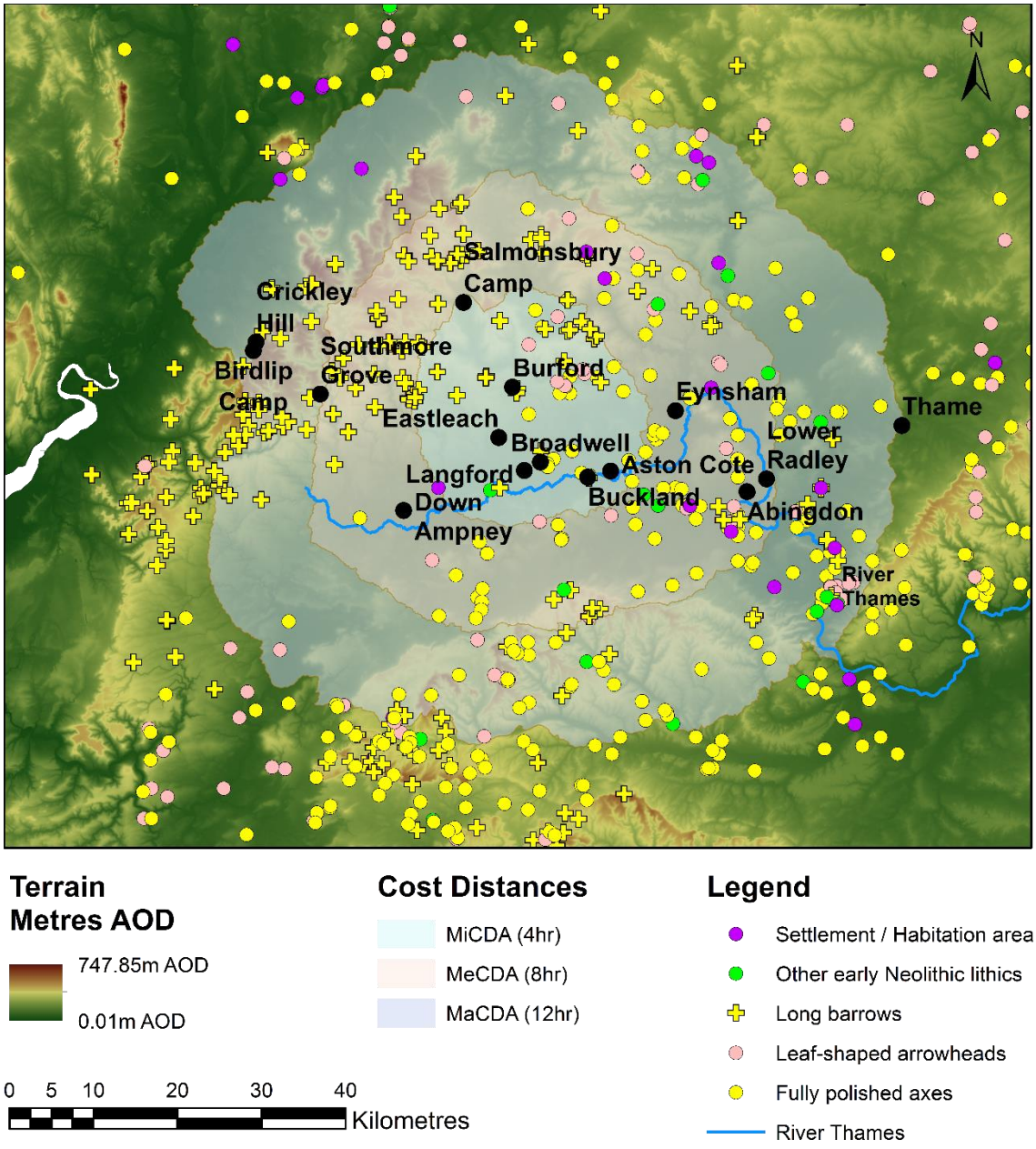


Figure 142: Burford cost distance models.

The model estimates the degree of access to the Burford enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

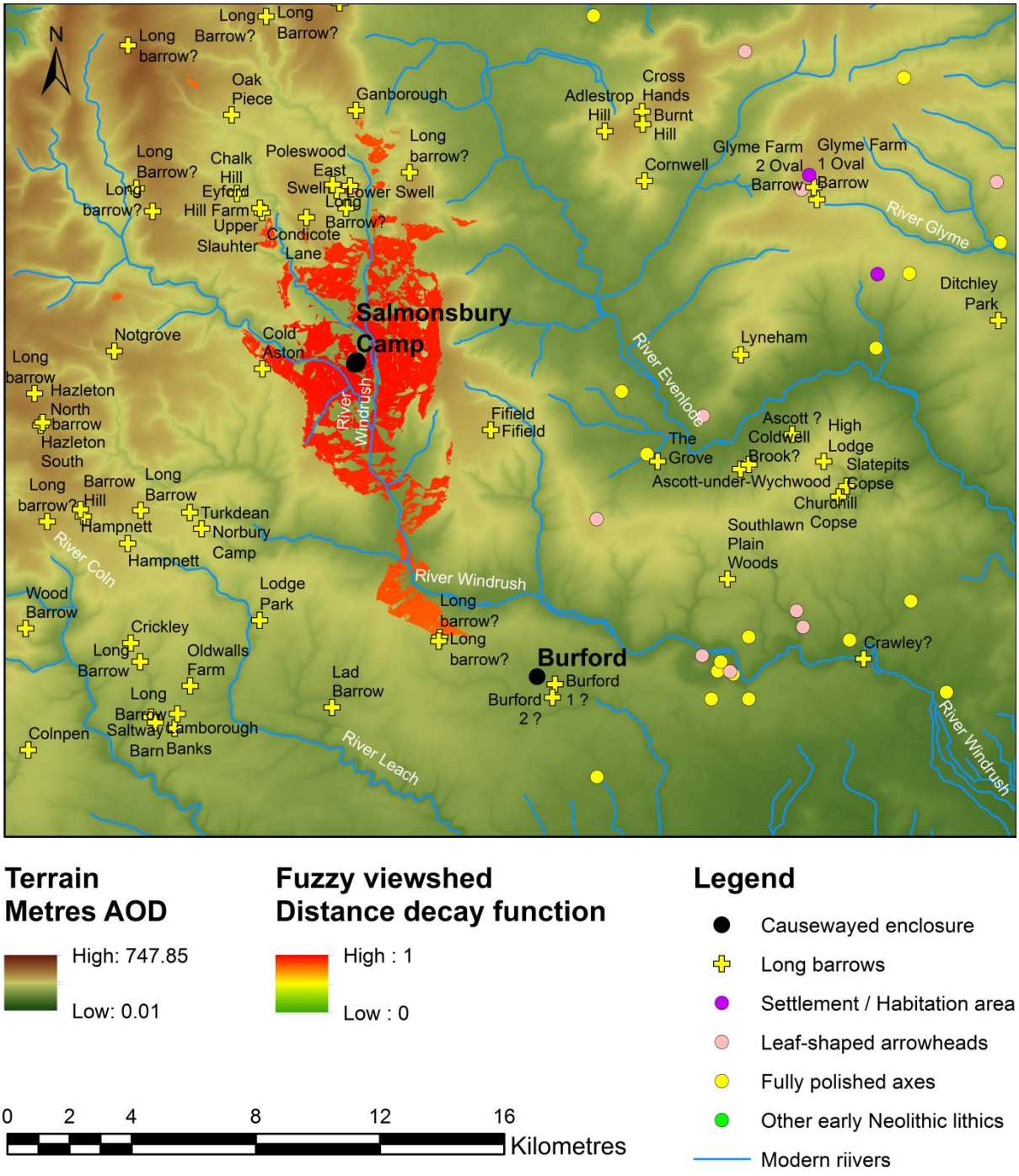


Figure 143: Salmonsbury Camp visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Salmonsbury Camp enclosure.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service

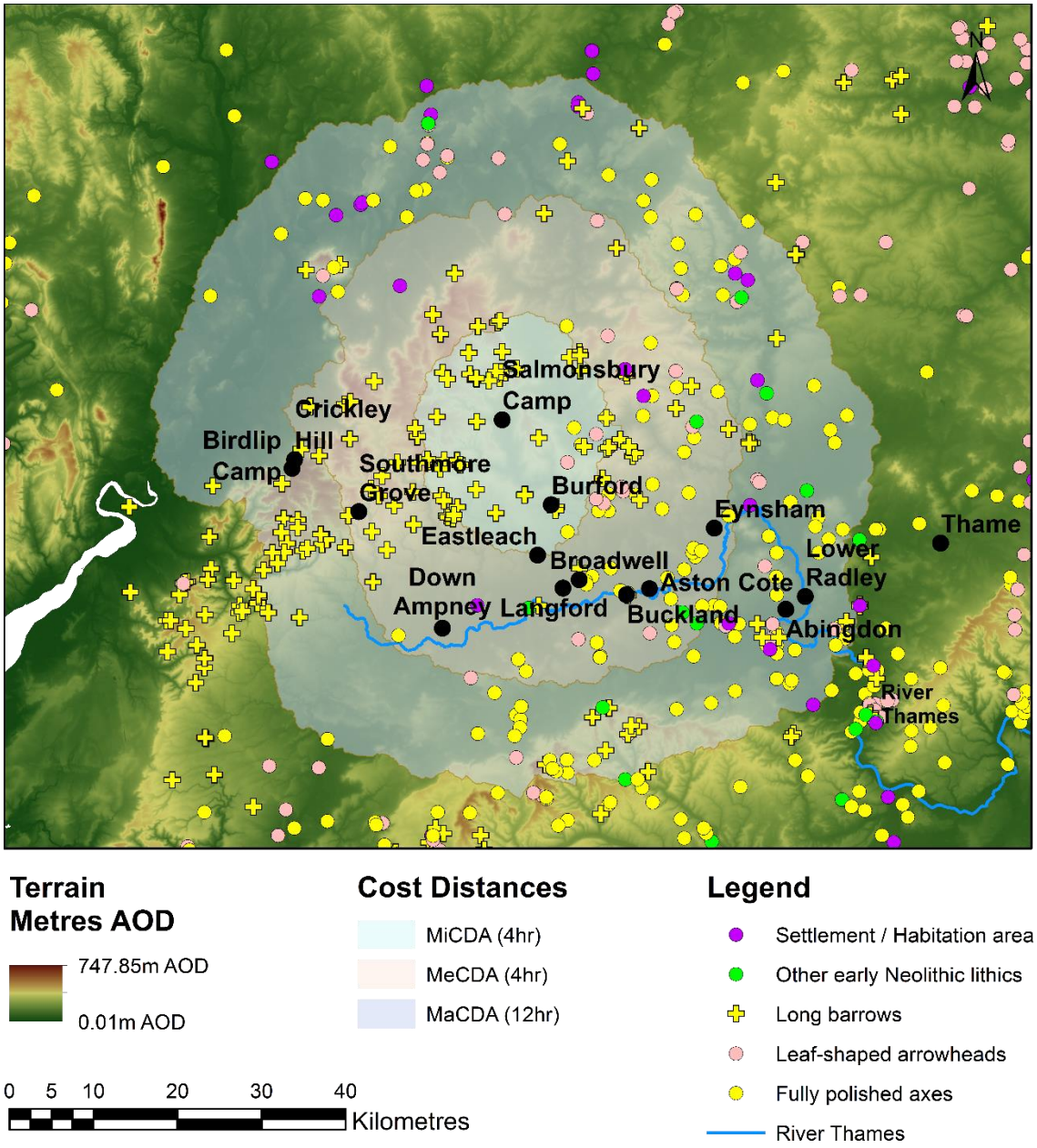


Figure 144: Salmonsbury Camp cost distance models.

The model estimates the degree of access to the Salmonsbury enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service

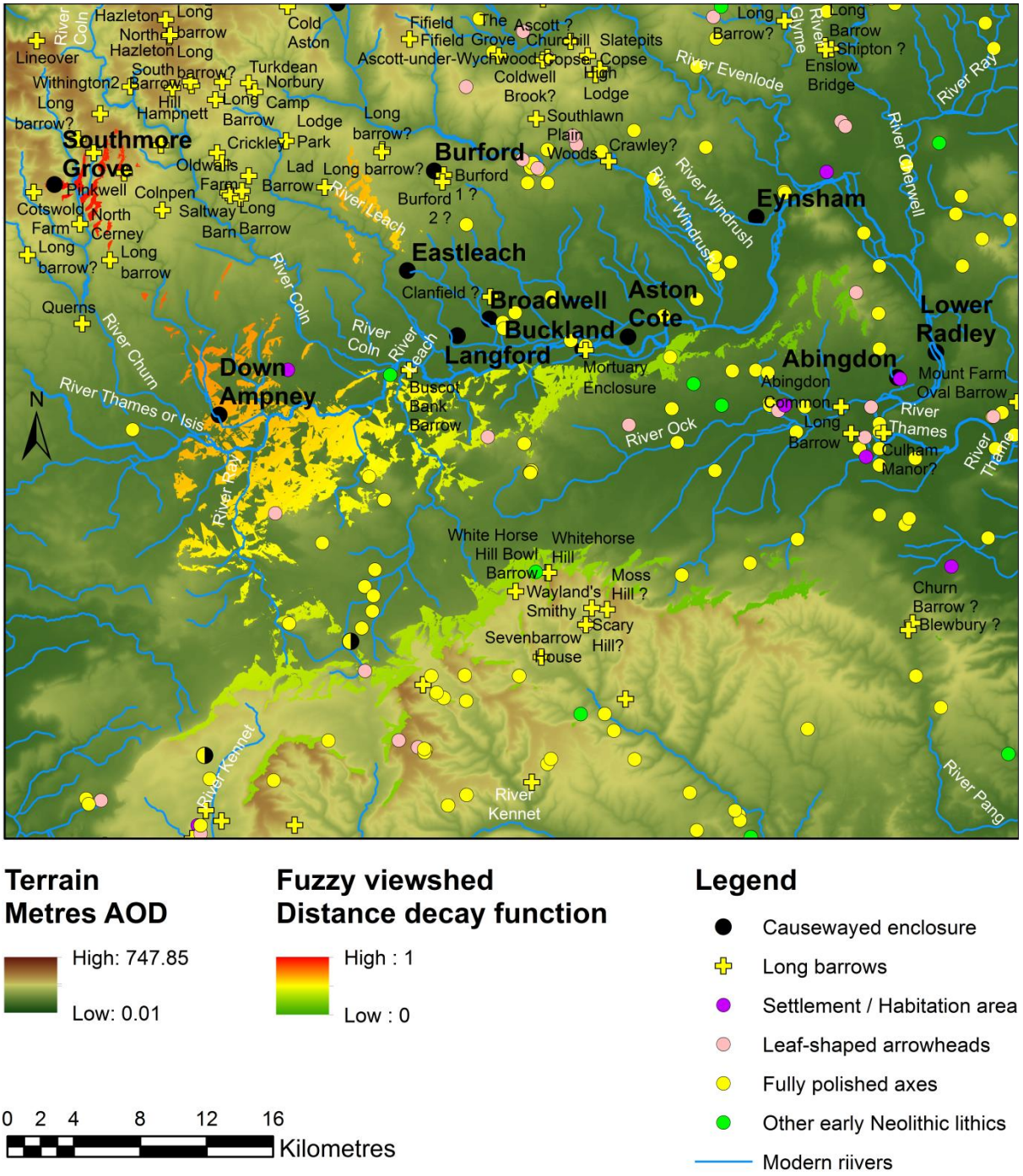


Figure 145: Southmore Grove visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Southmore Grove enclosure.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

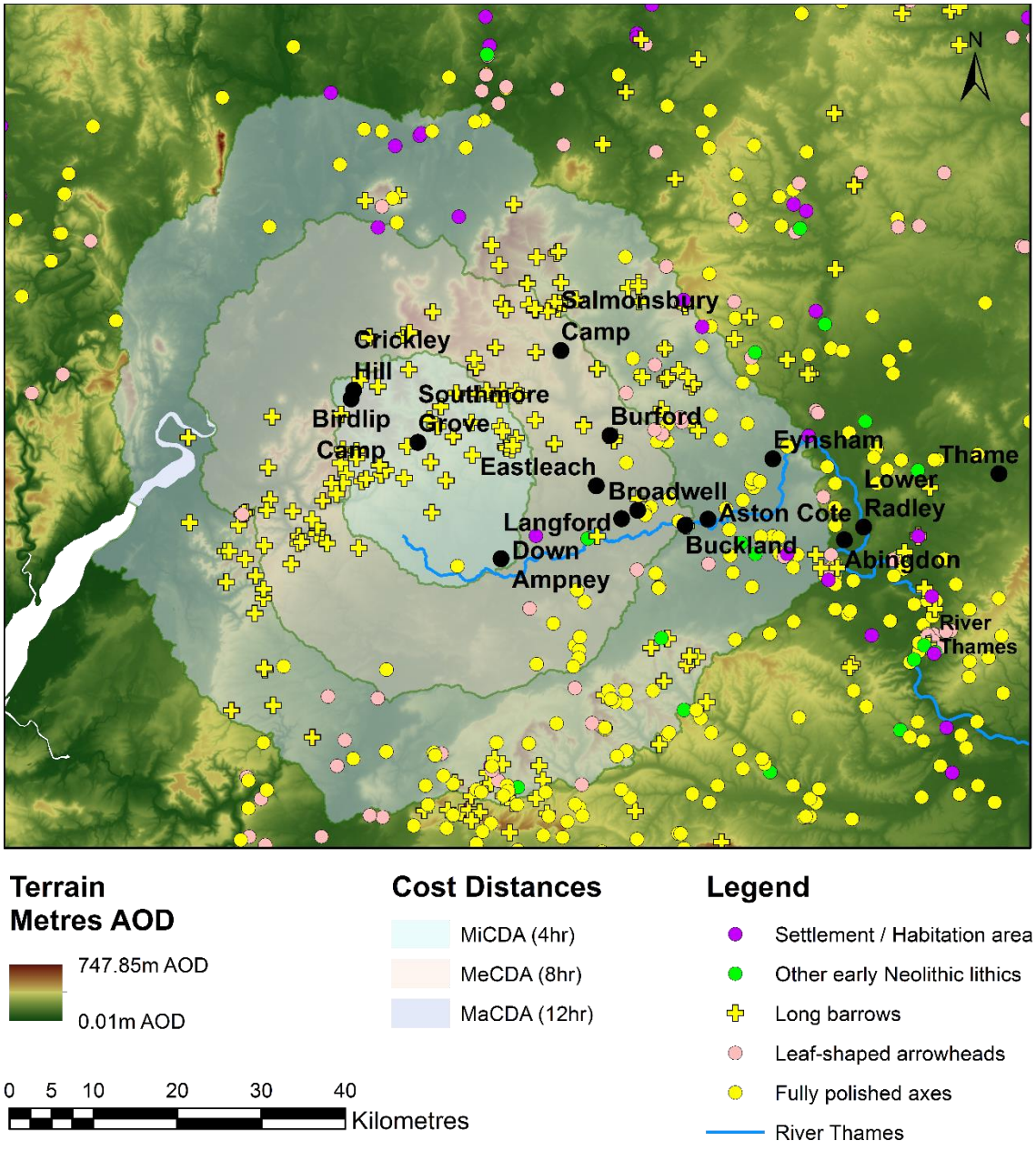


Figure 146: Southmore Grove cost distance models.

The model estimates the degree of access to the Southmore Grove enclosure, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA. The distribution of known early Neolithic archaeology is also defined.

Spatial data: Edina Digimap, Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

South West North East



View across the excavations at the Thame causewayed enclosure. By author: with permission of Ken Welsh, Oxford Archaeology

East South West



View from the Towpath just beyond the eastern extent of the Lower Radley enclosure. Vegetation obscured the views to the north.

Figure 147: Views from Thame and Lower Radley
Source: Author

East

South



North

East



Two view across the environs of the Eynsham causewayed enclosure. The field was under crop at the time of survey and the photographs are taken from the B4499 roadside 450m west of the enclosure. The flat landscape is apparent with the slight rise of Wytham Hill (to the east) being the only local prominence.

Figure 148: Views from Eynsham
Source: Author

Northwest North East



View across the environs of the Aston Cote causewayed enclosure. The field was under crop at the time of survey and the photographs are taken from the field boundary 100m south of the

Northeast East South



South North



View across the environs of the Buckland causewayed enclosure. The enclosure at this point is bisected by the River Thames, which can be seen to the northeast (the crane is repairing the weir sluices) and to the right on the lower views. The two views were taken either side of a field boundary hedge which also bisects the enclosure

Figure 149: Views from Aston Cote and Buckland
Source: Author

Southwest West Northwest North Northeast

Enclosure



View to the west and north across the Broadwell causewayed enclosure. The enclosure has three concentric ‘egg shaped’ circuits and lies 100m east of the Broadwell Brook.

Northwest North Northeast

East

View across the flat environs of the Langford causewayed enclosure. The enclosure has three concentric circuits and a possible forth has been postulated. None exceed 200m in diameter. The

Figure 150: Views from Broadwell and Langford
Source: Author

West North East South



View across the Eastleach causewayed enclosure. A twin circuit enclosure of some 213m maximum diameter.

Southeast South Southwest Northwest Northeast



View across the Burford enclosure environs

Figure 151: Views from Eastleach and Burford. **Source**: Author

3.4.14 **Commentary on the upper Thames Valley case study.**

The enclosures of the upper Thames valley could be considered to fall into three categories in respect of their relationship with the river. The enclosures at Thame, Salmonsbury Camp and Southmore Grove all lie adjacent to tributaries, some distance upstream of the main river. Abingdon, Lower Radley, Eynsham, Aston Cote, Buckland, Broadwell, Langford, and Down Ampney all appear more directly associated with the course of the river, lying no more than 2.6km from the Thames, whilst Burford and Eastleach appear to be at an intermediate distance. Other characteristics are also apparent in their relationship with the Thames. With the exception of Buckland (which though now bisected by the Thames could only ever have been on the south of the river), and Lower Radley (which lies only 96m from the Thames), all the enclosures on tributaries, lie adjacent to tributaries on the northern side of the main river. That is, on travelling upstream along the Thames, one would always have 'turned right'. This characteristic is further explored in chapter 4.

It may also be significant that Lower Radley and Buckland, being the only two enclosures directly adjacent to the river (and hence not accessed or directed by tributaries), both lie south of the river Thames, and very close to it. This may represent a purposeful choice and it is notable that the four enclosures immediately downstream of the Goring Gap share a similar characteristic. Here we see the Eye and Dunsden, Dorney, Eton Wick, and Staines enclosures, all close to the course of the modern river, though all constructed on the northern side. Eye and Dunsden, though today lying 936m from the modern course of the River Thames, may in fact have been closer in the early Neolithic, when the Thames was more sinuous, and the geology and topography suggests at one

time the river had a course that meandered further to the northwest and closer to the enclosure.

Other spatial characteristics also emerge from the modelling. Southmore Grove, Salmonsbury Camp and possibly Burford are uncharacteristic. Other enclosures in the study lie visually and spatially isolated from the significant clusters of long barrows, on the Cotswolds to the northwest and on the north Wessex Downs, to the south. Both of these enclosures may have been purposefully constructed to facilitate southward focused near-distance views, orientated along the valleys of their respective tributaries. The site of the enclosure at Southmore Grove may also have been visible from much of the south side of the Thames Valley, between the Down Ampney and Aston Cote enclosures. Though the model reports that much of the area around the Down Ampney enclosure may have been intervisible with Southmore Grove, the enclosures could not have been.

The most striking characteristic, however, and a consistent theme of all the enclosures of the upper Thames Valley, is their visual separation from long barrows.

For example, Salmonsbury Camp, has 46 potential long barrows within the MiCDA associated with the enclosure, some as close as 3km. Of these only the chambered barrow at Poleswood East could have been intervisible, though at 5.5km, and lying on the very edge of a small isolated area that the model reports as just visible, is unlikely to have been so. Similarly, the more elevated enclosure at Southmore Grove has 38 long barrows within the MiCDA and only the Pinkwell long barrow, 4.25km to the East, could have been intervisible.

Though again, this barrow lies on the edge of the potentially visible area, and is unlikely to have been intervisible in the early Neolithic. Southmore Grove also enjoys far-distant views to the south along the northern flank of the north Wessex Downs, though none of the 12 barrows that flank these hills could have been intervisible. The enclosure at Burford, has two potential long barrows (Burford 1 & 2; MOX 2404 & 24479) in close proximity. Burford 1 lies 700m east-southeast of the enclosure on the edge of the potentially visible area and was probably not visible, whilst Burford 2 lies 871m to the southeast and could not have been. The model reports no other intervisibilities between the Burford enclosure and long barrows. Similarly, the enclosure at Abingdon has four long barrows within a 4.5km radius, three of which could not have been visible, and one of which, being within an area of 'patchy' visibility, is unlikely to have been.

We may conclude that an intentionality was expressed in the relative siting of enclosures and long barrows. The cost modelling suggests that enclosures were constructed in areas that were remote (in cost distant terms) from long barrows and, where they were less distant, care was still taken to ensure they could not be intervisible. Though detailed work is required to understand the nature of, and indeed if there were any relationship between the lowland enclosures and the long barrows of the Cotswolds and North Wessex Downs, these landscapes were seemingly used for different domains of sociality. The uplands were used in activities that included an association with the dead whilst the lowlands areas were utilised for a sociality expressed amongst the living.

The difficulty with chronology in the upper Thames Valley is most stark and more investigation is required on long barrows and enclosures to develop this argument further.

A lack of chronological precision also hinders a better understanding of mobility and sociality. The limited evidence for substantive permanence, for example, the building at Yarnton (Hey *et al.*, 2016), seems to predate the enclosures at Abingdon and Thame, by some 200 years. A similar circumstance was noted in Sussex and Wessex, where again there is no such evidence of permanent occupation once enclosure-building gets underway. This may suggest an increased mobility and a return to a more peripatetic lifestyle after the earlier phase of the early Neolithic.

Likewise, the density of causewayed enclosures, particularly those focused in the areas around the Broadwell and Langford enclosures, may suggest the communal building of multiple enclosures organised by the same nuclear family. A similar argument could be expressed for the enclosures at Abindon and Lower Radley (c.f. Case & Whittle, 1982, 1-2), and the idea extended towards suggesting that the more isolated enclosures, such as Thame, Southmore Grove, and Salmonsbury Camp were constructed as competitive enclosures by descent groups, or unrelated groups. Whilst there is currently too little evidence to make substantial claims surrounding the social structure responsible for enclosure-building in the upper Thames Valley, the evidence from the models, if the constructions are contemporary, does suggests involvement or participation of the same group(s) of people, was practical at more than one enclosure.

The final case study examines a second set of five lowland enclosures that were constructed on the northern fringes of the known distribution in Britain.

3.5 **Case Study 4: Causewayed enclosures of the Fen area.**

The analysis centres on the enclosures of the lower Welland Valley, a group of five proximate enclosures comprising: Etton(1), Etton(2), Northborough, Uffington and Barholm that form the densest known concentration of causewayed enclosures in northern Europe. Beyond this grouping, the wider area (Figs.152&153, pgs.339&340) includes 16 enclosures of which eight are associated with the Nene and Welland.

The distance from the enclosure at Uffington in the west, to the easternmost at Northborough, is a little over 10km and none of the five chosen are more than 4.2km from an adjacent enclosure. The time of travel between enclosures is likely to have been little more than an hour across easily traversed flat terrain. Two of the enclosures have been recently examined and have provided material suitable for radiocarbon dating. Examination of these characteristics and their integration into the overall model is an important facet of the research, particularly since they otherwise share similar characteristics to the undated enclosures of the upper Thames Valley, where enclosures are also intimately related to water courses and located on localised prominences.

Though Oswald *et al* (2001) suggest Etton (1) to be the only 'certain' enclosure of the group, the multi-circuit system of interrupted ditches at Northborough, evident in aerial photographs (Oswald *et al.*, 2001, fig 5.15; Whittle *et al.*, 2011, 329), was later confirmed as a causewayed enclosure through excavation in 2004 (Wessex Archaeology, 2005). A second 'probable' enclosure, Etton (2), is located 872m south of Etton (1), whilst Uffington and Barholm, are both classified as 'very probable' (Oswald *et al.*, 2001).

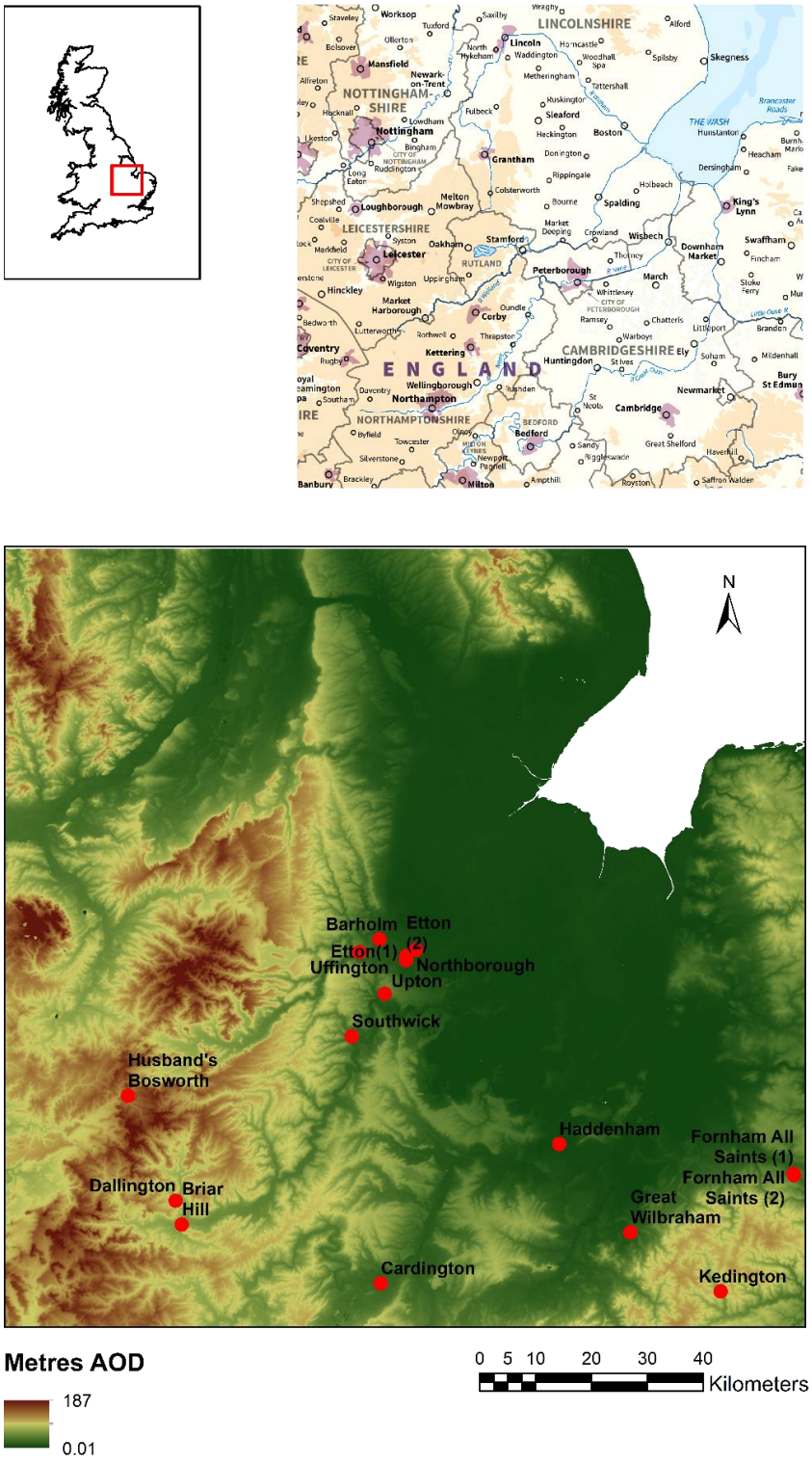


Figure 152: The Fens study area.

A 60km radius buffer around the five enclosures of the Welland valley was used to ensure that the MaCDA's are completely contained within the study area.

Sources: Author, Historic Environment Records (various). **Digital Data**: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service

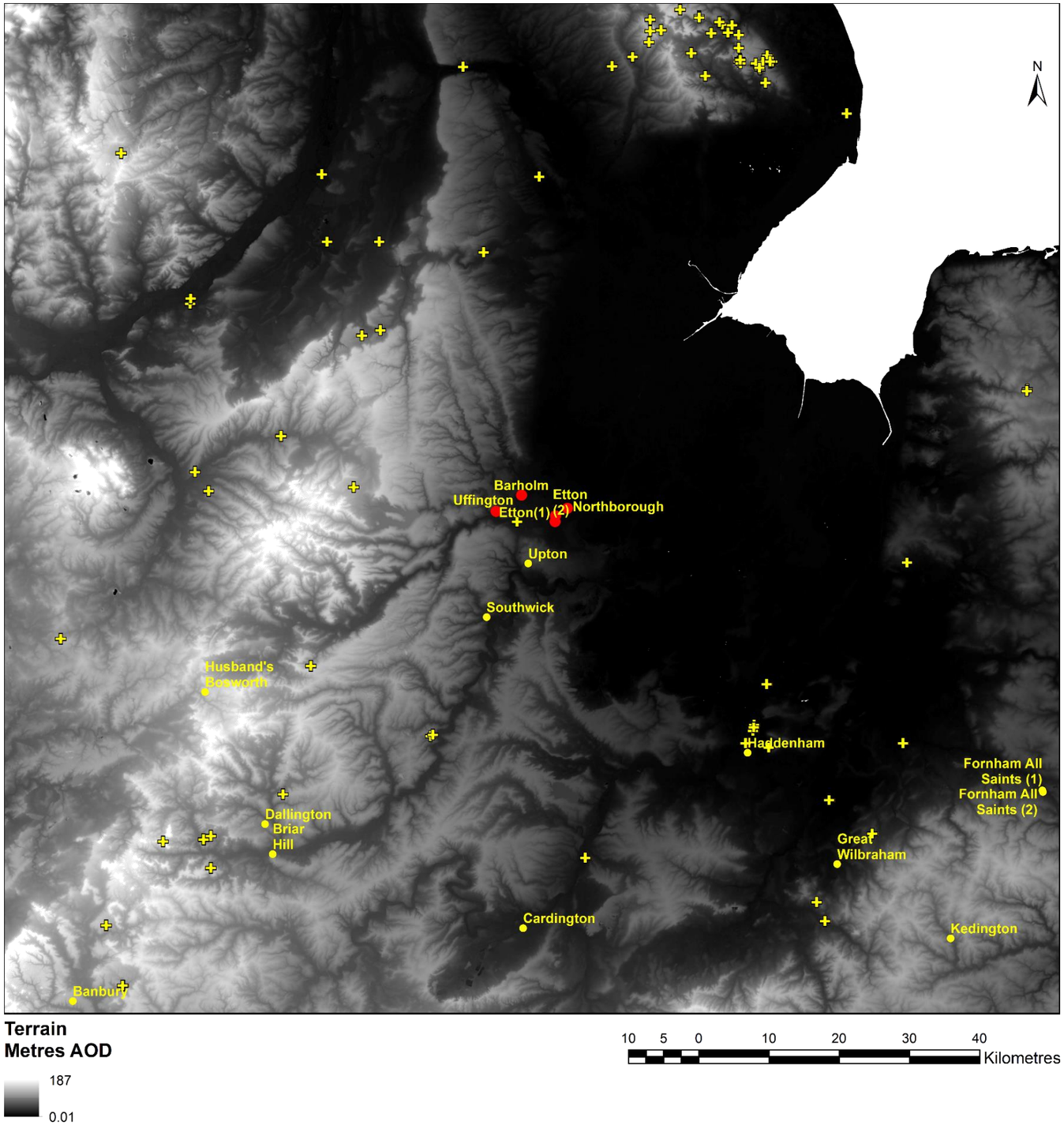


Figure 153: Distribution of causewayed enclosures and long barrows across the Fens study area.

The five enclosures under study are highlighted as red and situated on the western fringe of the Fens.

Sources: Historic Environment Records (various). **Digital data:** Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service

Figure 153 – Distribution of causewayed enclosures and long barrows across the Fens study area

3.5.1 **Etton (1) & (2) (Cambs).**

(1) (e513840, n307350)

(2) (e513780, n306579)

Excavated between 1982 and 1987 (Pryor & Kinnes, 1982; Pryor *et al.*, 1985; Pryor, 1987; Pryor, 1998a) the Etton (1) enclosure was found to comprise a single sub-ovoid circuit, with a long (east-west) axis of 187m and a shorter (north-south) axis of 145-155m that, at the southern extreme, underlies the bank of the 'Maxey Cut' drain. Etton (2), is known only from a length of ditch evident through crop marks recorded by Palmer in 1998. If Etton (2) is indeed a causewayed enclosure, the pair would represent an unusual circumstance, with only Hambledon Hill and the Stepleton enclosure, and the two enclosures at Fornham All Saints displaying such close spatial relationships. Immediately (80m) west of the Etton (1) enclosure, is an arc comprising a pair of interrupted diches which skirt the edge of the terrace gravels. The 2.75m causewayed 'entrance' faced east towards the Etton (1) enclosure prompting Pryor to suggest that this feature, known as Etton Woodgate, was 'closely associated' with the causewayed enclosure (Pryor *et al.*, 1985; Pryor, 1998a, fig.4). Much is now lost to gravel quarrying.

The topography is flat, characterised by relic paleochannels of earlier sinuous and braided river systems that have more recently been replaced with systems of artificial drains and flood relief. The Maxey Cut, constructed in the 1950s and which bisects the southern end of the Etton (1) enclosure, is one example (Pryor *et al.*, 1985, 3) (Fig.154, p.343). Within these flat floodplains are small rises of gravels and sands, forming slightly elevated 'islands', which have been

the focus of activity and settlement from the prehistoric period to the modern. Work by Charlie French (French, 1985; 1990; French *et al.*, 1992) has demonstrated that, although some of these paleochannels are part of earlier systems (10070 +/- 190 BP & 10900 +/- 200 BP), an east west channel of the Welland was active during and after the construction of the Etton (1) enclosure. For at least the latter part of the period for which it was in use, a section of the enclosure was under water, having been purposefully constructed within a wider area previously cleared of trees and with arable crops and grasslands nearby (French & Pryor, 2005, 163-165; Whittle *et al.*, 2011, 315).

The causewayed enclosures at Etton were part of a wider more complex and temporally extensive Neolithic landscape, which as well as the early Neolithic component, also included two later Cursuses, a large henge, and numerous smaller hengiform monuments (Pryor *et al.*, 1985; Pryor, 1998a; French & Pryor, 2005).

An intermittent pattern of occupancy was convincingly argued by Pryor (1998a, 361) on the basis of a range of evidence, and later supported by Beadsmoore *et al.* (2010), on the basis of detailed spatial analysis of lithics and pottery, and comparisons with the early Neolithic site at Kilverstone.

The survival of organic material at Etton (1) and Etton Woodgate, and the evidence for in-situ woodworking, remains unique amongst excavated causewayed enclosures. Materials that included wooden tools, bowls, bark, planks, woodworking and coppicing debris, and flax twine, remind us that we should be cautious in interpreting causewayed enclosures, and the early Neolithic more generally, on the basis of lithics, pottery and bone.

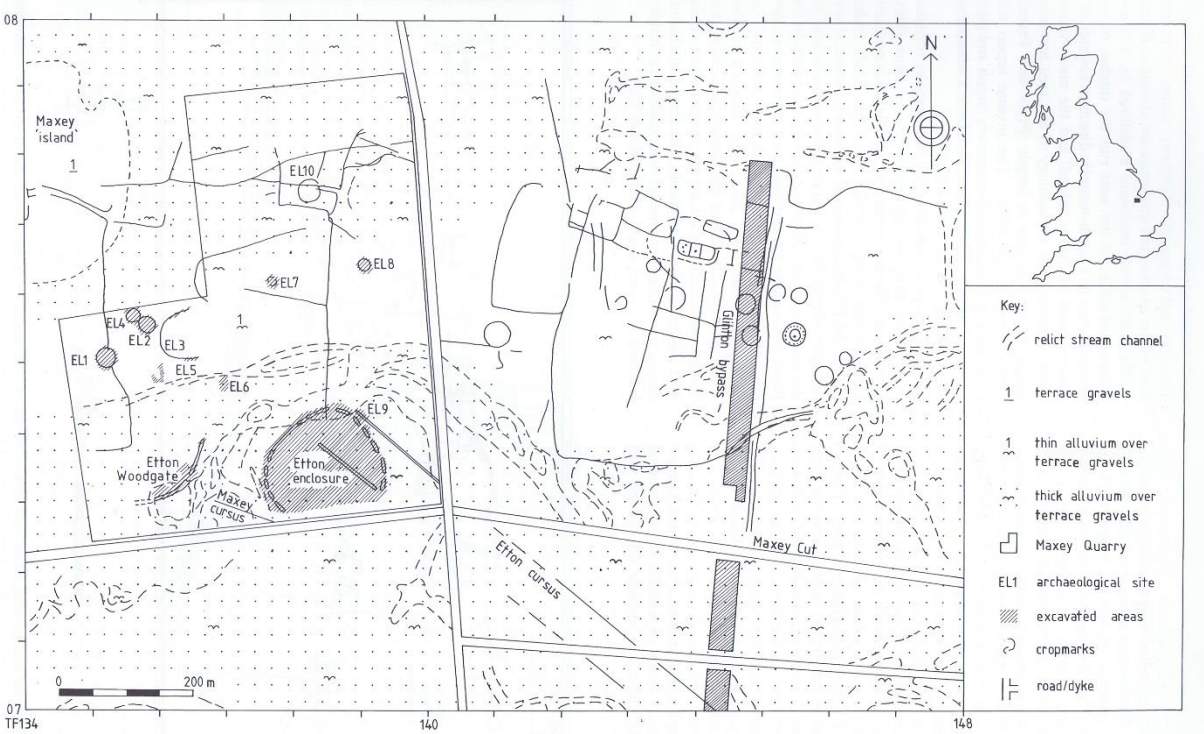


Figure 154: Etton landscape.

Etton (1) Causewayed Enclosure, Etton Woodgate and later cursus monuments are set in a landscape comprising relic stream channels underlying alluvium and terrace gravels.

Source: Pryor, 1998, 2

3.5.2 **Northborough (Cambs).**

(e515570, n308450)

The Northborough enclosure, identified by Jim Pickering in 1996, lies 1.8km east of the Etton (1) enclosure, on flat ground, at 6m AOD. Pickering's aerial photography of cropmarks revealed ellipsoidal ditched circuits, with the longer axis aligned approximately east-west, though with the north-western portion dipping under and hidden by deeper alluvial deposits.

The enclosure is situated on a low alluvium 'island' between the first gravel terraces (BGS, 2003a; 2003b) of the River Welland whose present course is some 800m to the north and the east.

Northborough is the most developed enclosure of this case study (Fig.155, p.345). There appear to be two distinct pairs of concentric egg-shaped enclosures, with faint traces of a possible third ditch to the southwest and a potential 'Briar Hill like spiral arm to the west'. The inner enclosures, comprising ditches of between four and eighteen metres, measure 170m by 130m with between four and six metres between each circuit. The outer enclosures measure 230m by 180m and are between 14m and 26m apart. Oswald suggests each pair of ditches may represent a single enclosure with a central bank between each pair of ditches (Oswald *et al.*, 2001, 69 & 75), implying that each of the ditch pairs was constructed as one, but there was no evidence of banks uncovered during excavation (Wessex Archaeology, 2005). Entranceways may be detectable as discontinuities within the ditch systems to the north-northwest and the south-southwest, though a Romano-British canal bisecting the enclosure on the same alignment makes this uncertain. The

apparent alignment of entranceways in both sets of ditch systems suggests some characteristics of the enclosure may have remained visible and were carried forward from the earliest phase to later phases.

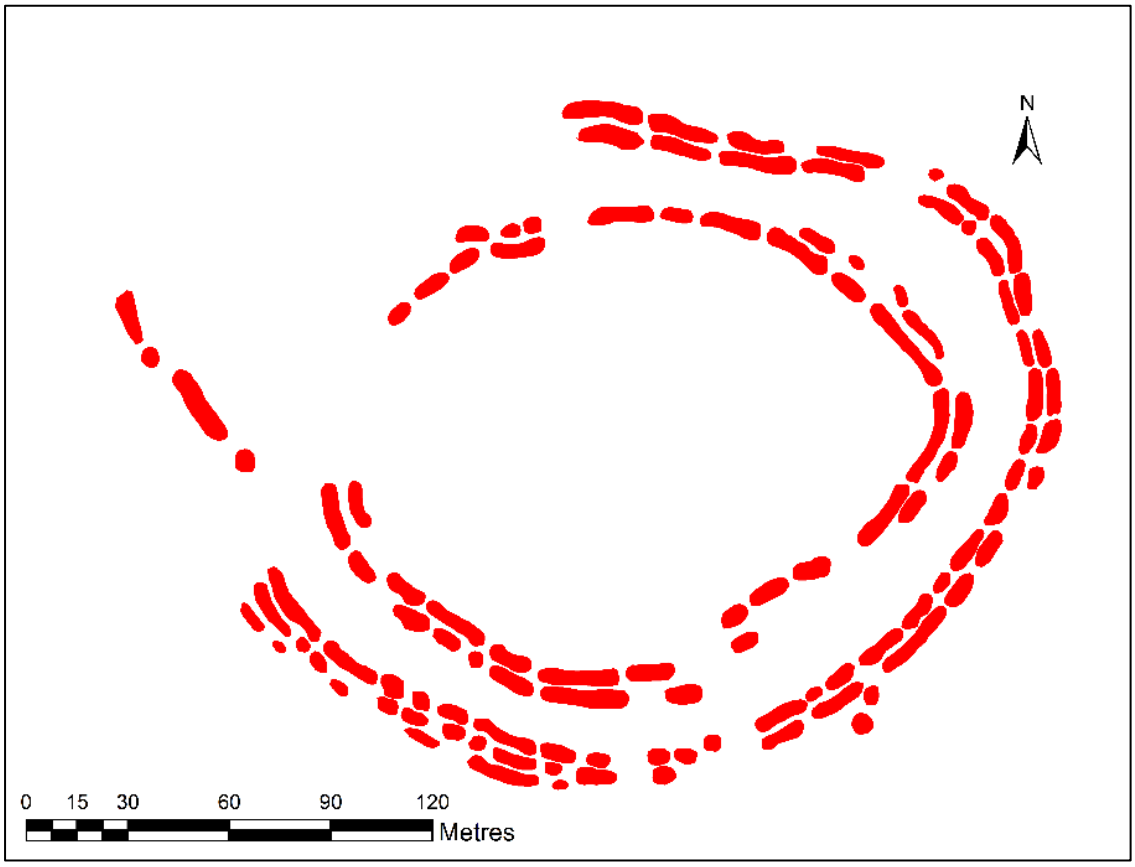


Figure 155: Northborough causewayed enclosure.

Reconstruction of the ditch systems of the Northborough enclosure.

Source: Author, after Wessex Archaeology 2005

3.5.3 **Barholm (Lincs.)**

(e509030, n310296)

The unexcavated Barholm enclosure is situated on the almost level ground on a slight rise associated with the margins of the floodplain. The River Welland is 2.6km to the south and the River Glen, a tributary to the Welland, 1.0km to the north and to the east, where the Glen is largely canalised. A small unnavigable brook flowing west-east into the Greatford Cut drain, lies circa 100 metres south of the enclosure. Barholm was identified from aerial photographs taken in 1962 (St Joseph, 1970, 144-145). Cropmarks suggested an incomplete oval enclosure, consisting of two concentric circuits of segmented ditches with internal dimensions of 132m by 180m and external dimensions of 157.5 by an estimated 195m (Fig.156, p.347) The site was surveyed by RCHME in 1996 (Boutwood, 1996) and no extant remains were identified. The immediate superficial geology comprises the well-drained sand and gravel soils of the Fen Gravel series, which are locally quarried, particularly to the south east where a large extractive quarry is likely to have effected water tables and the preservation of archaeological remains.



Figure 156: Aerial views of the Barholm enclosure.

The small oval form of the Barholm Causewayed Enclosure corresponds with other enclosures in the area and seems to be a 'local style'.

Source: J.K St Joseph, 1970, Google Earth.

3.5.4 **Uffington (Lincs).**

(505417, 307998)

The ‘very probable’ (Oswald *et al.*, 2001) enclosure at Uffington lies on a slight slope dipping towards the River Gwash, which draining north-south, 500m to the west, joins the Welland. The confluence of the Gwash and Welland (which here drains west-east) is 800m to the southwest. The geology comprises thin deposits of well-drained fine loamy soils over Mudstone of the Blisworth Clay Formation. The river terrace deposits associated with the confluence of the two rivers extend to within 200m of the enclosure, to the southwest.

The enclosure, known only from aerial photographs was transcribed as part of the ‘Monuments and Enclosure in the Neolithic’ Project (Winton & Carter, 1996) (Fig.157, p.349). The visible cropmarks identify the northern half of what is probably a complete, slightly ovoid, double circuit with a diameter of 130m to 150m and an internal area of just over a hectare. To the south, approximately 180m from the main enclosure, is an outlying interrupted linear ditch feature, currently interpreted as a contemporary outwork (Winton & Carter, 1996).

The shape of the enclosure seems to mark a regional style. Etton, Uffington, Northborough and Barholm all share an ovoid characteristic. An intentionality of planning which purposefully defined long and short axes, and placed special emphasis on particular spaces within the enclosure (Flemming, 1972, fig.1; Evans, 1988) .

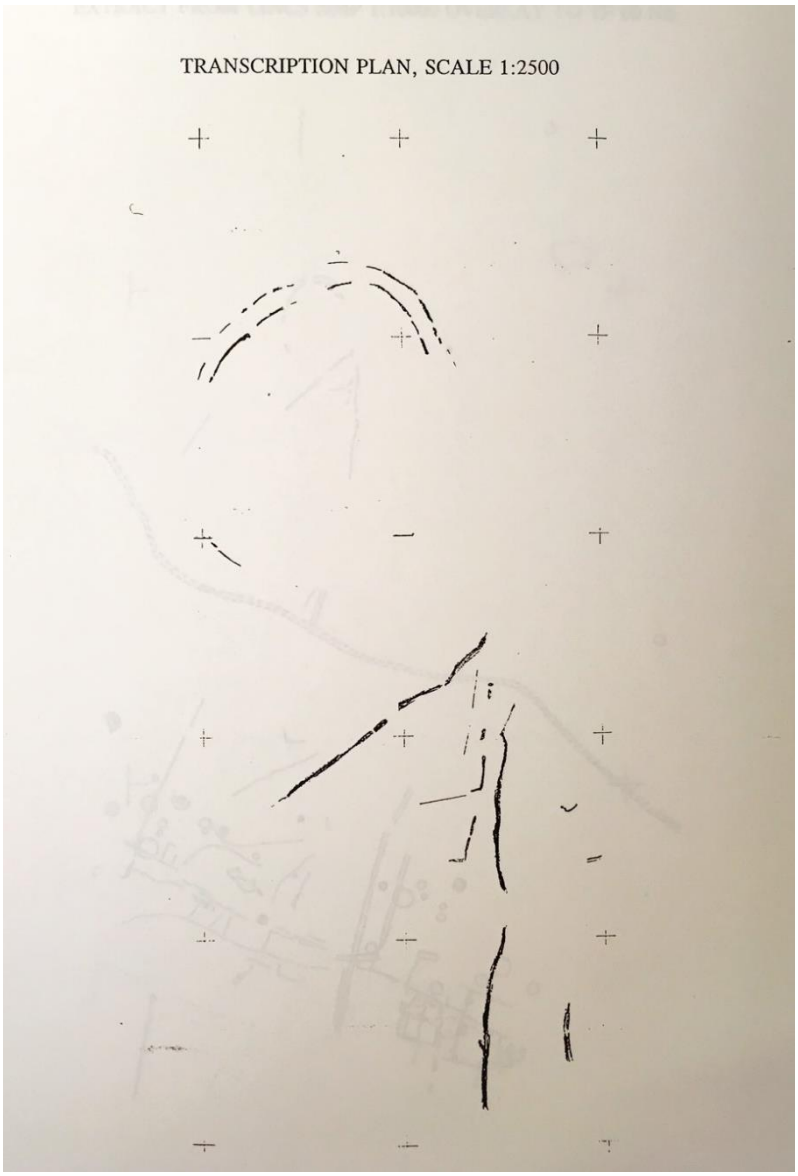


Figure 157: The Uffington causewayed enclosure.

Transcription from aerial photographs of the Uffington enclosure.

Source: Industry and Enclosure in the Neolithic (Winton & Carter, 1996)

3.5.5 **Cost modelling of Fenland dataset.**

The models for each of the five enclosures display a distinctly ovoid form (Fig.158, p.352). To the west and to the southwest the effort to travel is greater, particularly for the MeCDA and the MaCDA, where the boundaries are foreshortened by the northern extreme of the Cotswold Hills. To the northeast, across the flat plains of the Fens, the cost distance models are extended, reflecting the theoretically easier travel the model calculates. For example, the distance from the enclosure at Northborough to the furthermost boundary of the MaCDA travelling in a south-westerly direction is 35.6km, whilst in a north-westerly direction the same boundary is reached in 53km and 54km in a south-easterly direction. All the enclosures, the models being dominated by the same topographic characteristics, report similarly, with the boundaries offset by their geographic relationship.

The dataset suggests that the level of early Neolithic activity in the immediate vicinity of the enclosures, represented by the indicators in the cost models, is higher than in the other case studies. However, the greatest levels of early Neolithic activity still took place at some distance from the enclosures (Fig.159, p.353). For example, to the south, mortuary enclosures and leaf-shaped arrowheads occur in the Biddenham Loop (Bradley, 1992b; Allen *et al.*, 2008a). To the east, Duncan Garrow highlights 537 early Neolithic pits at Kilverstone, Hurst Fen, Spong Hill and seven other sites in East Anglia (Garrow, 2006) published over the past 40 years. Whilst to the north, concentrations of long barrows occur on the Limestone uplands of Lincolnshire (Fig.158, p.352). All these areas of high density are beyond the furthest extent of the MaCDA. The data corresponding to the five enclosures is presented in Table 33, p.354.

The only long barrow in the MiCDA is the probable long barrow near Uffington, east of Barnack Station. Noted from crop marks, no measured dates are available. The presence of Peterborough Ware style pottery in various pits to the west and south of the Etton enclosures suggest these either coincide with the final phases of enclosure building or must post-date it (Whittle *et al.*, 2011). A notable characteristic may be that although many of these pits fall within the MiCDA of the enclosures, none would have been visible from any of the enclosures.

The MaCDA extends to include the coastal regions around the Wash which may have been an important factor in terms of mobility and networks. It does not, however, extend sufficiently northwards to the dense concentration of long barrows constructed on the range of hills between the Tees and the Wash, which would represent another day or two's journey time. The barrows of the East Anglian Ridge are also a similar distance beyond the MaCDA, to the southeast.

Figure 158: Cost models for the Fenland enclosures.

The model estimates the degree of access to the enclosures, where the boundaries define the extent of the MiCDA, MeCDA and MaCDA.

The models relate the enclosures at Etton, Uffington, Northborough and Barholm to the distribution of certain and possible long barrows.

The enclosures are characterised by a dearth of long barrows in the immediate proximity. Within the MiCDA, the single potential long barrow east of Barnack Station, is identified through aerial photographs of crop marks (Peterborough HER, 00083g).

Cost models for Etton (1) & (2) are considered identical.

Sources: Author, Historic Environment record (various). Digital data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service

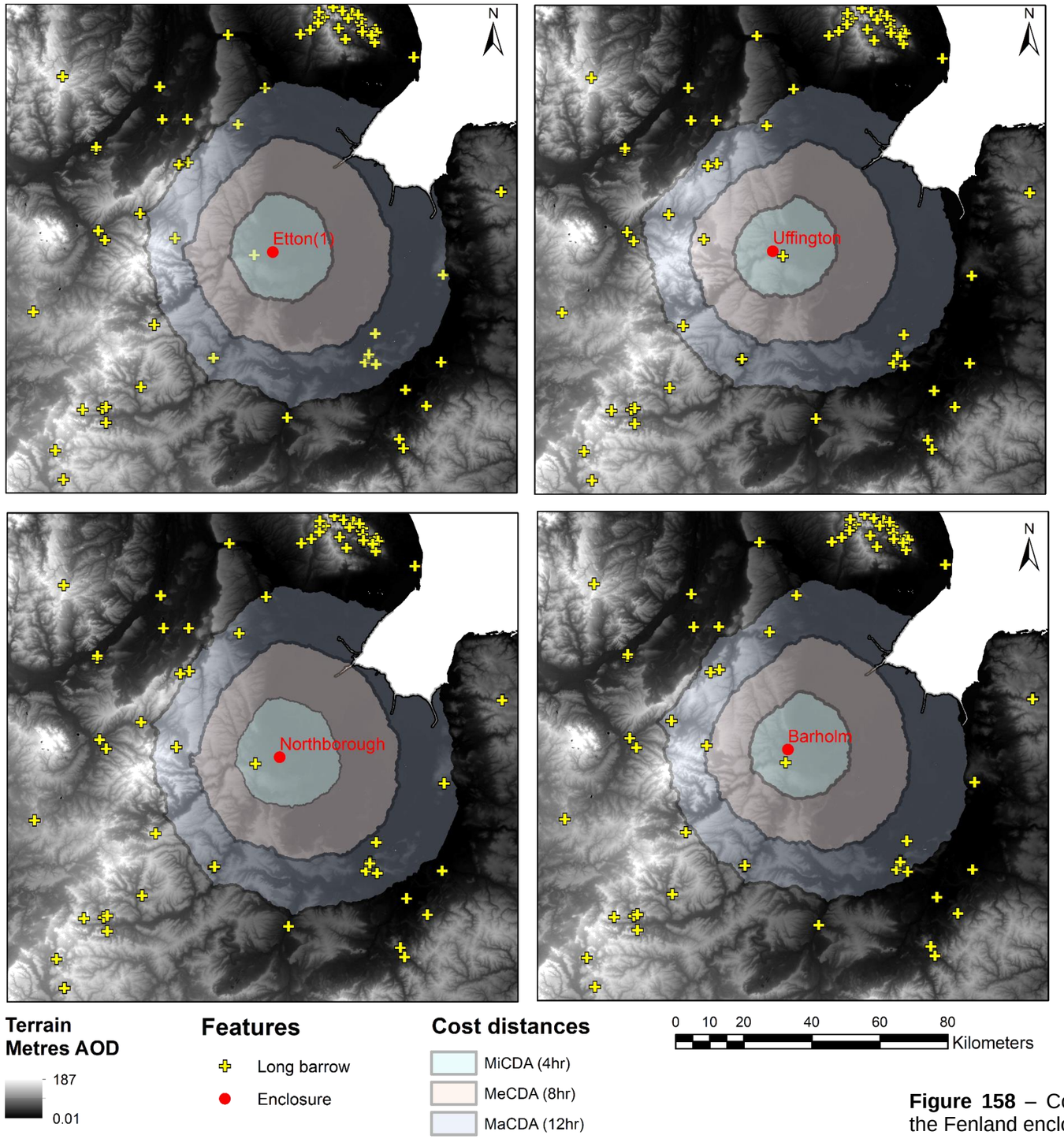


Figure 158 – Cost models for the Fenland enclosures

Figure 159: Early Neolithic indicators surrounding the Fenland enclosures.

Sources: Author, Historic Environment record (various), Digital Mapping data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service

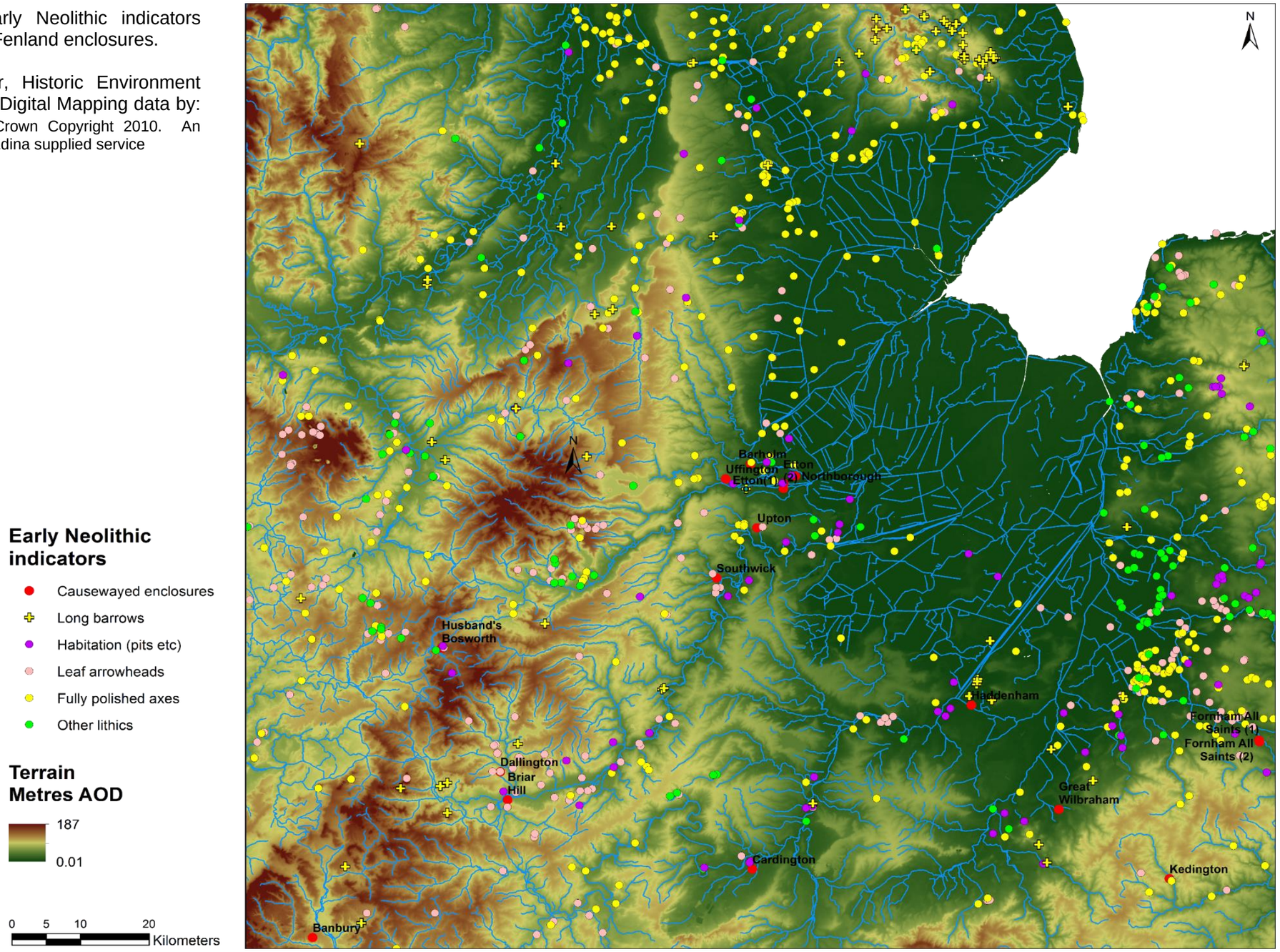


Figure 159 – Early Neolithic indicators surrounding the Fenland enclosures

Etton (1) & (2)	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	6	7	8
Long barrows	1	1	14
Settlement habitation	10	14	24
Leaf-shaped arrowheads	7	18	51
Fully polished axes	21	40	145
Other EN lithics	4	5	25

Barholm	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	6	7	8
Long barrows	1	1	15
Settlement habitation	10	13	25
Leaf-shaped arrowheads	7	20	51
Fully polished axes	26	42	106
Other EN lithics	3	5	22

Northborough	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	6	7	8
Long barrows	1	1	14
Settlement habitation	10	14	23
Leaf-shaped arrowheads	7	18	51
Fully polished axes	22	40	108
Other EN lithics	4	5	24

Uffington	MiCDA (4hr)	MeCDA (8hr)	MaCDA (12hr)
Causewayed enclosures	6	7	8
Long barrows	1	2	14
Settlement habitation	7	13	26
Leaf-shaped arrowheads	6	30	55
Fully polished axes	24	43	98
Other EN lithics	3	7	22

Table 33. Early Neolithic indicators surrounding the Fenland enclosures.

Source: Author, Historic Environment record (various), Digital Mapping data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service

3.5.6 **Viewshed analysis of the Fenland dataset.**

Modelling visibility in this landscape is particularly problematic. Modern features, of sufficient height to obscure views, are evident on the 5m DTM since spot data is derived from remote sensing techniques (John Pouncett, pers comm. 9/11/2018) before processing as a triangulated irregular network (TIN) (Ordnance Survey, 2017a). Deployment of a lower-resolution DTM generated through 10m contours (Ordnance Survey, 2017b) reduced the obscuring effect of man-made features such as quarry banks, elevated sections of road and railways and the many banks containing the drains and canalised rivers of the area. This problem was most evident at Etton (1), which today is bounded on four sides by these elevated modern constructs (Fig.160, p.359). The 'certainty quotient', that is, the degree to which a non-visible target landform must be raised before it becomes visible, or the height that a visible target landform must be lowered before it becomes non-visible, is low. The model, particularly on gentle rises, is also susceptible to artefacts generated by the TIN algorithm. Hence, even the model generated by the 10m DTM must be interpreted with some caution.

3.5.7 **Views from Etton (1) & (2).**

The models predict a significant difference in the visual characteristics of the two enclosures, which although less than 1km distance, were unlikely to have been intervisible. Etton (1) may have enjoyed potentially broad, though locally interrupted views in all directions (Fig.160, p.359), and the focus appears to have been the River Welland to the north, the east towards the Wash, and to the west. Etton (2) has a much more restricted visual characteristic which does not extend to include the river Welland (Fig.161, p.360), The visual aspect of

this enclosure focuses south, across a flat landscape interspersed with minor streams that drain into the Welland, around 5km east of the enclosure. Any view to the west must have been very limited and could not have extended beyond 11km irrespective of any vegetation.

The addition of the Etton (2) viewshed to the first enclosure does little to add to the wider visual perspective (Fig. 162, p.361). However, the near distance views may suggest a complimentary visual relationship existed, similar to that of the Hambledon Hill and Stepleton enclosures.

Little of the potential early Neolithic surrounding the Etton enclosures lies within view of either enclosure. No long barrows could have been visible, the nearest candidate being the potential long barrow east of Barnack Station (508380, 306480), 5.5km to the west. Further afield, the next candidates lie at least 37km distant and none could have been visible.

3.5.8 Views from Northborough.

The enclosure may have had views to the river Welland which curves around the enclosure some 980m to the north and east, and to the south towards the small streams some 1200m distant. The Etton enclosures lie 2km and 2.5km to the southwest and could not have been visible (Fig.163, p.362).

The site (Peterborough HER, 51445) at Deeping St. James Road (514990, 308560), 750m to the west, is evidence of early Neolithic activity within view. Here, excavation of a small pit recovered animal remains, a polished axe, and other lithic implements.

Beyond the immediate views, which are interrupted by lower grounds all around the enclosure, the middle and long-distance views are limited to the east and to the south, where they could not have extended beyond 8km. To the west, they could not have extended beyond 14km, and could not have included the long barrow east of Barnack station and no other early Neolithic indicators are within the possible limits of view.

3.5.9 **Views from Barholm.**

Views from Barholm are more restricted than other enclosures. Whilst interrupted views may have been possible all around the enclosure, these cannot have extended for more than 1100m in any direction and to the southeast are limited to 479m. Views may have extended to the River Glen, 1100m to the northeast and a small isolated island of view may have afforded visual contact with the River Welland 2800m to the south. No early Neolithic indicators are recorded within the visual range. A small polished axe head found 232m to the north-northwest (509132, 310507) appears to be contained within an isolated area that could not have been seen (Fig.164, p.363).

3.5.10 **Views from Uffington.**

Uffington is situated on a gentle slope, 700m from the confluence of the rivers Welland and Gwash. The enclosure's position on the valley side results in all the near distance views being limited to a 180deg arc. The views focus on the confluence, then continue for 2km upstream, in a south-westerly direction, on either side of the shallow Welland Valley. There are no early Neolithic indicators within the viewable range and the focus of view seems distinctly away from the long barrow east of Barnack station and the pit site at Uffington Estate Golf Course (506453, 307230; Lincs HER, MLI35083). Middle- and far-distance

views are limited to isolated areas of the scarp slopes at the northern extreme of the Cotswold range, north of the Welland. An area of potential early Neolithic activity along the Welland Valley, west of the Eye Brook, indicated by finds of axes and other lithics, is beyond the visible limit (Fig.165, p.364).

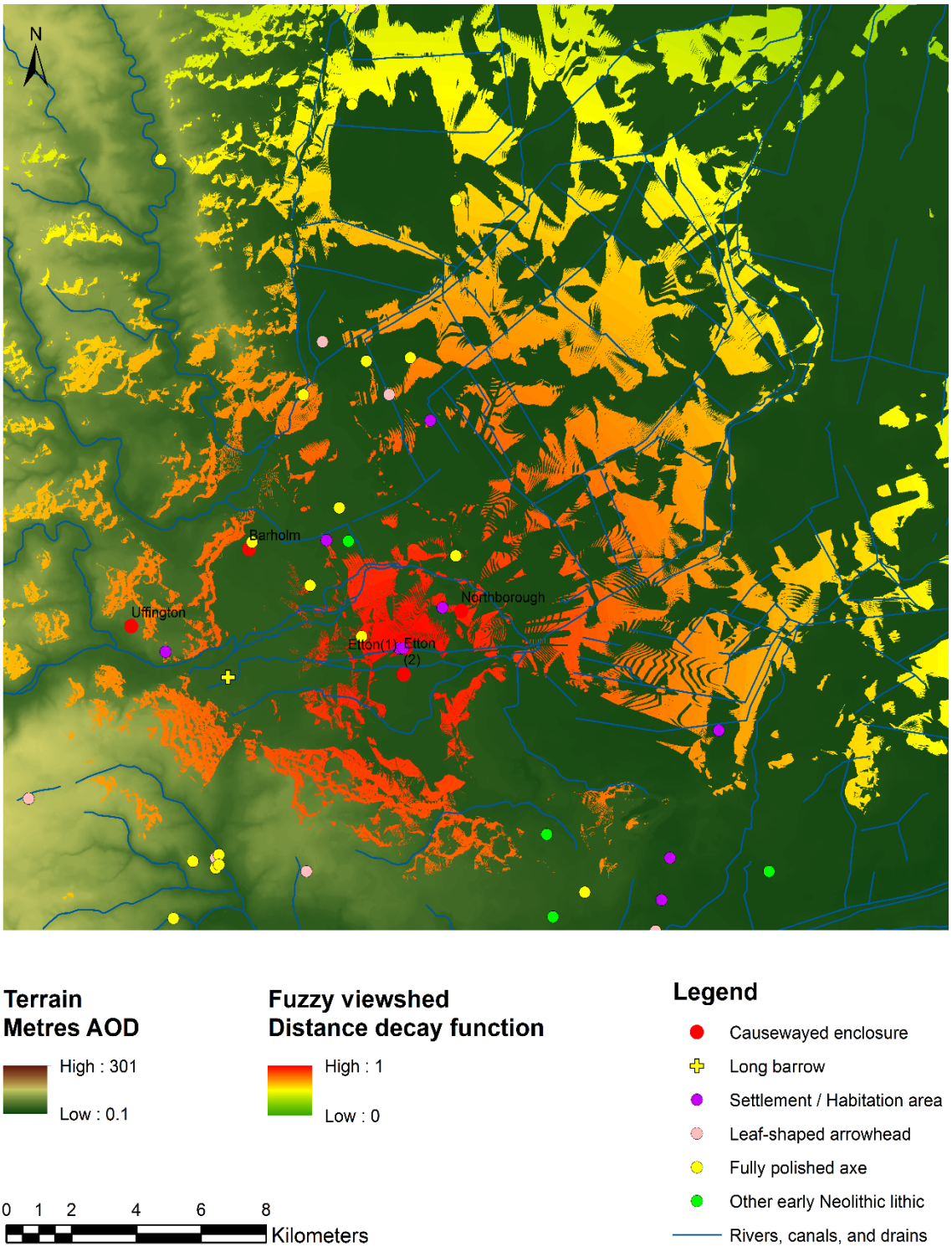


Figure 160: Etton (1) visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Etton (1) enclosure.

Sources: Author, Historic Environment Record (various), Digital Mapping data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service

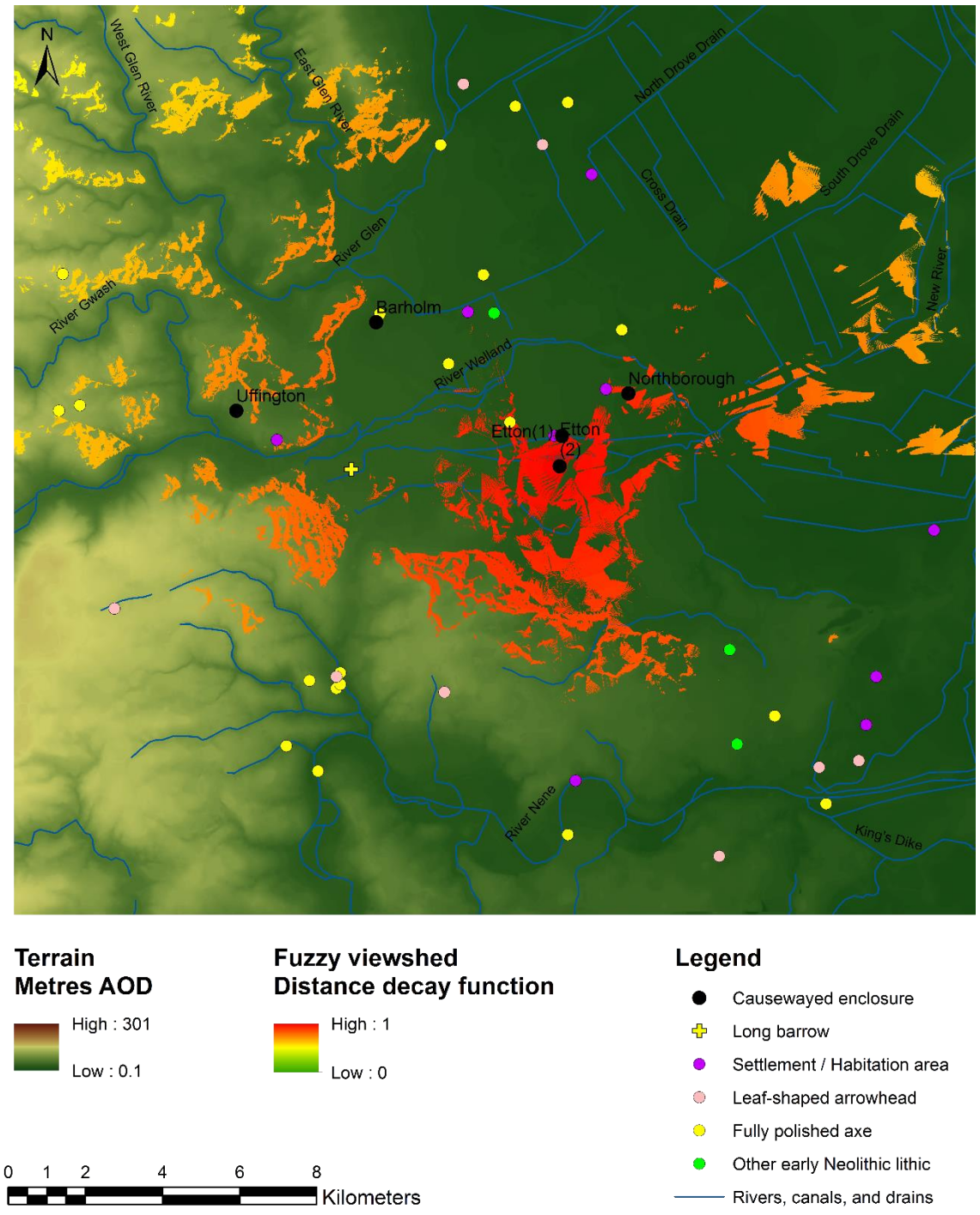


Figure 161: Etton (2) visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Etton (2) enclosure.

Sources: Author, Historic Environment Record (various), Digital Mapping data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

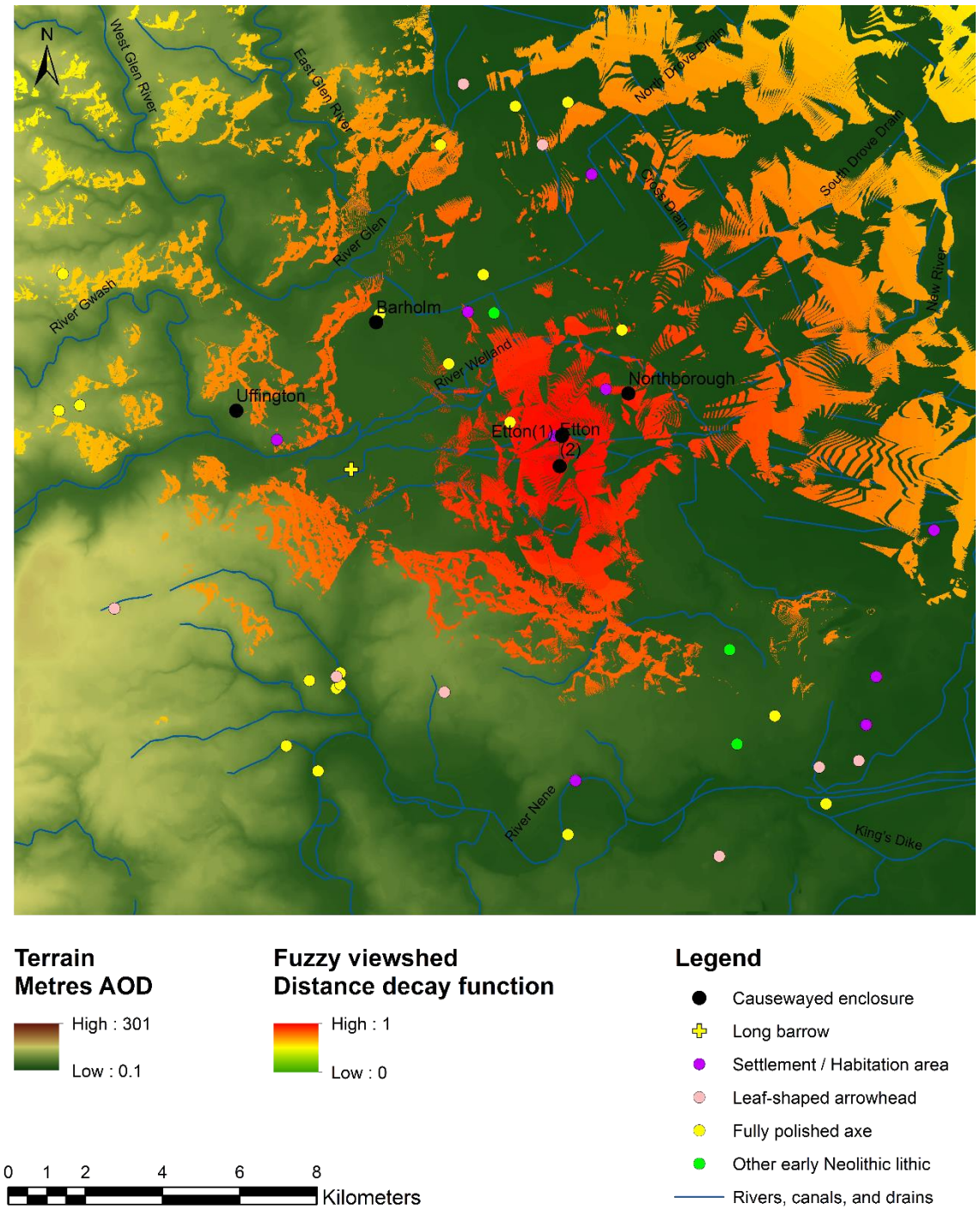


Figure 162: Etton (1) and (2) combined visibilities models and hydrology.

The model estimates the maximum potential extent of any views to and from the Etton enclosures.

Source: Author, Historic Environment Record (various), Digital Mapping data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service

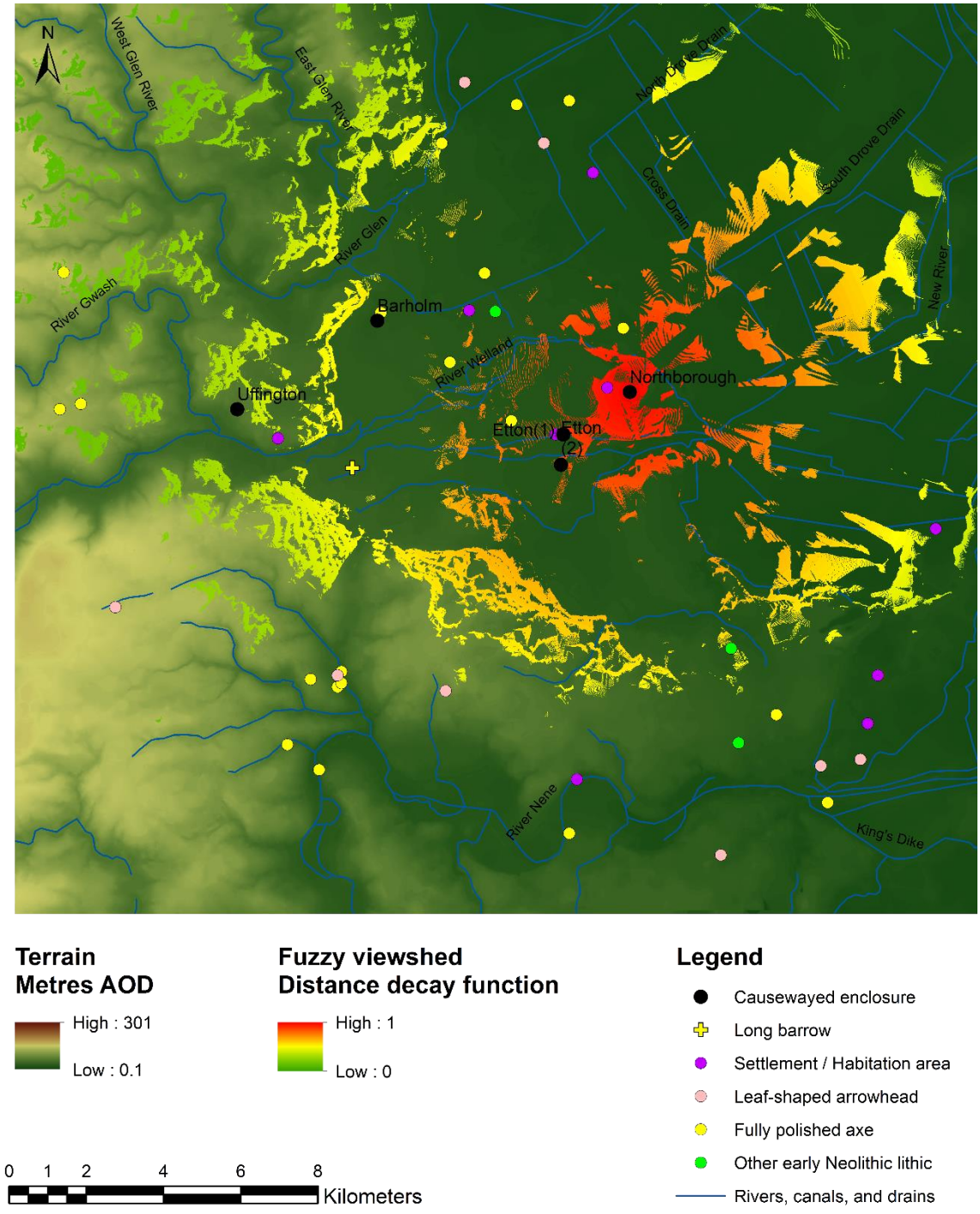


Figure 163: Northborough visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Northborough enclosure.

Sources: Author, Historic Environment Record (various). Digital data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

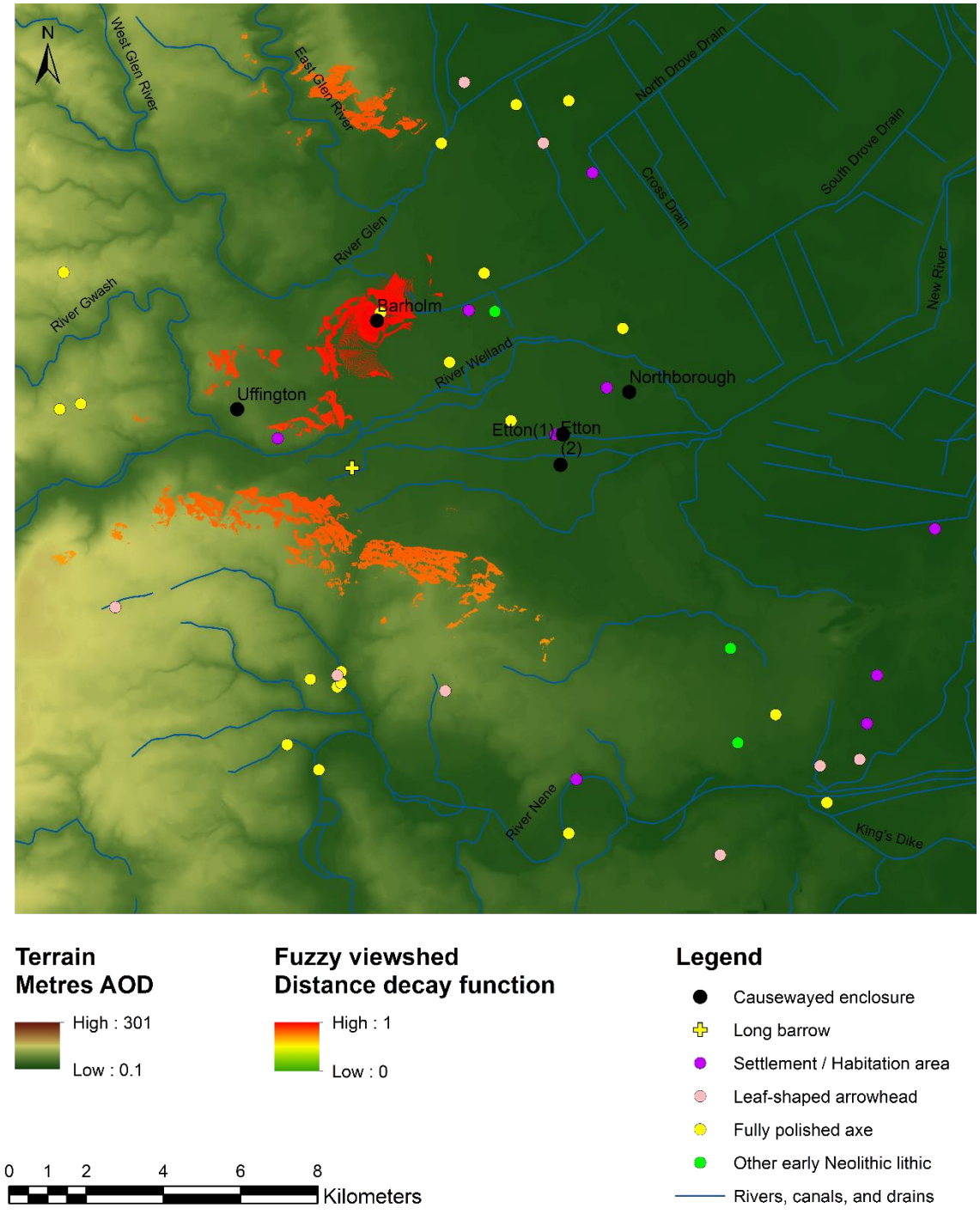


Figure 164: Barholm visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Barholm enclosure.

Source: Author, Historic Environment Record (various), Digital Mapping data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service

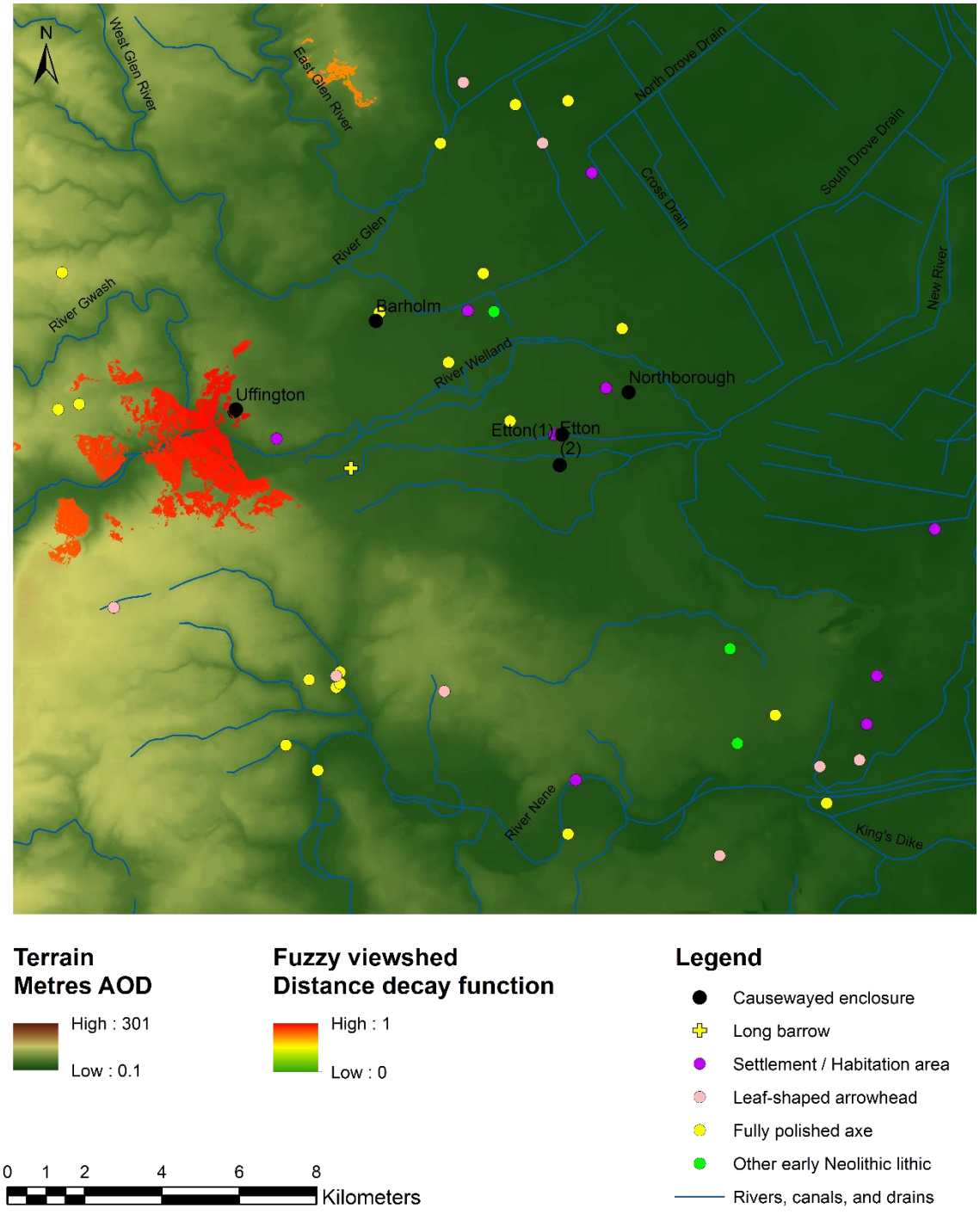


Figure 165: Uffington visibilities model and hydrology.

The model estimates the maximum potential extent of any views to and from the Uffington enclosure.

Source: Author, Historic Environment Record (various), Digital Mapping data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

South West North East

Northborough Eton (2)



View across the Etton (1) environs. The Etton enclosure has been consumed by quarrying and is almost entirely surrounded by elevated man-made structures. This photograph was taken on the boundary banks of the quarry some 15m higher than the elevation of the enclosure. The enclosure at Etton (2) is not visible. 200m in diameter.

East South West North

Etton (1)



View across the site of the Northborough causewayed enclosure. The Etton enclosure could not have been visible.

Figure 166: Views around Etton and Northborough.
Source: Author

South West North

Enclosure



View across the west side of the Barholm road over the site of the Barholm causewayed enclosure.

North East South



View across the east side of the Barholm road and the continuation of the flat low-lying landscape around the Barholm enclosure

Figure 167: Views around Barholm.
Source: Author

North East South



View across the Uffington enclosure environs to the east side of the field boundary. The enclosure sits in a slight bowl. The lands are relatively flat to the south and west, though rise to

South West North



View across the Uffington enclosure environs. West side of the track and field boundary

Figure 168: Views around Uffington.
Source: Author

3.5.11 **Commentary on the fenland case study.**

The enclosures are constructed on locally elevated grounds, though none occupy the highest ground in the immediate vicinity. Etton and Northborough were constructed on small gravel rises, Barholm is on the alluvial floodplain, whilst Uffington is on a westerly facing slope. Despite their relative proximity, none of the enclosures could have been intervisible or could have been intervisible with the only known long barrow in the immediate area. Had the Uffington enclosure been constructed at the apex of the rise only 400m to the southeast, then occupants would have enjoyed views across the other enclosures and the long barrow.

The enclosures seem purposefully situated to avoid visual contact, though since only Northborough and Etton (1) have firm dates (Whittle *et al.*, 2011, 322-329) (Fig.169, p.367) we cannot be certain whether any intent reflected a contemporaneous endeavour to 'segregate' activities, or a symbolic respect or isolation, of earlier traditions. Since the long-lived enclosure at Etton was almost certainly constructed before the earliest phase of the Northborough enclosure, and Etton persisted in use long after the final phase of Northborough, we may conclude, that for these two enclosures at least, any intentionality was contemporary.

Whilst Etton is certainly an early enclosure, a lack of dates for Barholm, Uffington, and two circuits at Northborough makes it impossible to establish a more complete chronology for the causewayed enclosures to better relate the spatial analysis. It should also be noted that much of the area has been subject to deep alluvial deposits since at least the Roman period which may account for

the relative paucity of early Neolithic evidence beyond the Maxey gravel islands (French & Pryor, 2005).

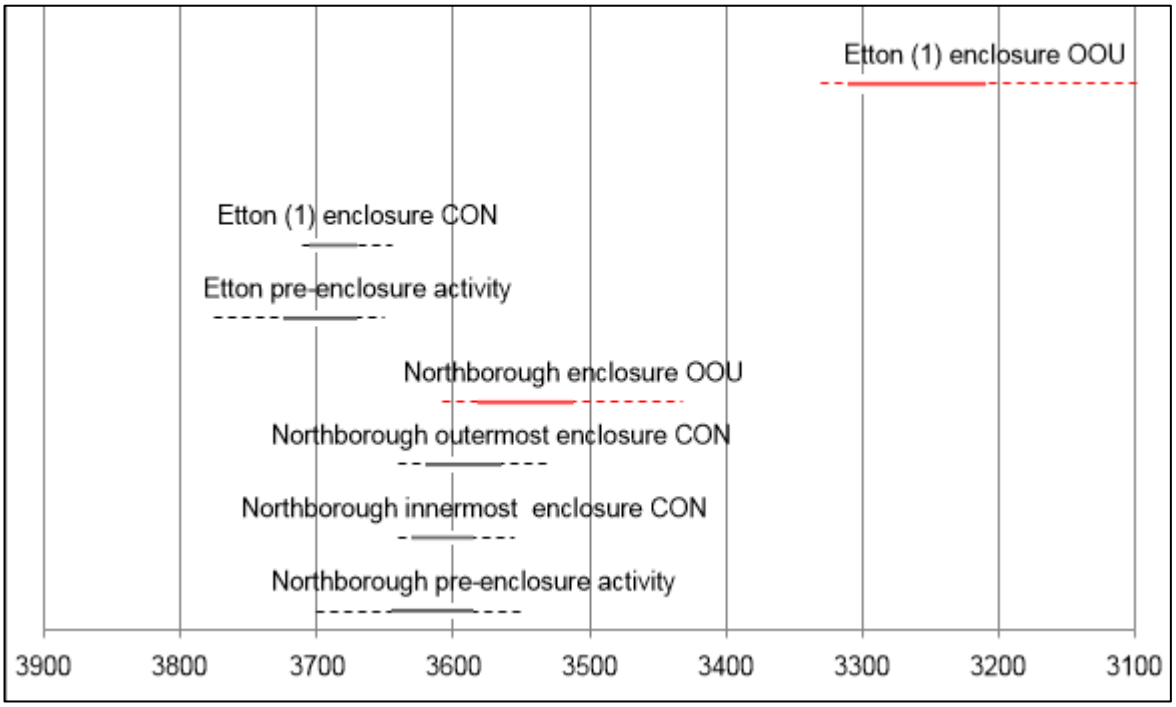


Figure 169: Summary chronology of Etton and Northborough enclosures**.**

Black lines describe the predicted range of construction dates (CON) and red lines out of use (OOU) dates. Dashed lines define highest certainty (typically 95% probability), whilst solid lines are lower certainty (typically 65% probability). All dates are cal. BC.

Etton (1) represents an early and long-lived enclosure which we may expect to mark the foundation enclosure for the area. However, the lack of measured dates for two circuits at the more developed Northborough enclosure, coupled with a lack of measured dates for Barholm and Etton (2), leads Whittle et al (2011), to urge caution in interpreting Etton as anything other than a secondary enclosure

Source: Author, after Whittle et. al., (2011) vol.1

4 Case studies – summary commentary

A consistent methodology has been applied to 35 causewayed enclosures in four geographically dispersed areas. The benefit of a consistent analytical approach has allowed common themes and characteristics to be identified, whilst highlighting variability between enclosures, and across and within regions. The selection of these particular case study areas has allowed a multi-level examination across similar topographies, and across dissimilar topographies.

This chapter summarises some of the main characteristics identified and relates these to the aim and objectives stated in chapter one. Chapter five further develops these themes and considers the findings of the research in terms of the wider literature.

4.1 Causewayed enclosures, mobility, and early Neolithic farming practices.

The apparent contradiction between the sedentary lifestyle implied by farming, and a more mobile early Neolithic, was tested, particularly in the Sussex case study, where the relationship with geology was examined in some detail.

A number of problems were identified which meant the usefulness of geology proved to be of limited value in providing any further understanding. Firstly, the use of geology as a proxy for soil type was not considered a sufficiently accurate reflection of the early Neolithic conditions. This is further developed in chapter 5.1, with particular regard to the clay-with-flint deposits. Secondly, If the concept of ‘catchment’ areas was to be properly developed, then these catchments would have best been focused around ‘centres’ of early Neolithic

activity. There is little evidence for such centres, and this dearth of evidence for permanent settlement sites has led the cost distance analysis to be centred around the causewayed enclosures. Lastly and importantly, the cost distance analysis, though centred on the enclosures, did reveal that even the minimum and mean cost distance areas included such a range of geological characteristics that most soil types and conditions could have been readily accessed. Geological analysis was hence excluded from the subsequent case studies.

There is little indication from any of the case studies that causewayed enclosures played any significant role in agricultural practices and indeed may have been visited only when the main activities associated with farming were coming to a seasonal end. However, the spatial analysis strongly indicates that one of their functions was the gathering together of different folk groups for their construction and their episodic use, and a role in animal husbandry could be suggested.

The need for separate communities to cooperate for livestock management would have been understood. Whilst horticultural production could have been organised within a single group or community, the long-term viability of livestock must have been ensured through the breeding of animals carried out across a wider, perhaps regional level (Halstead, 1992). This would have driven a need for mobility across a wide geographic area, beyond the domain of a single enclosure, or even cluster of enclosures. Two areas are attested in the literature.

Firstly, continued inbreeding would have led to genetic mutation, and a reduction in reproductive fitness and a reduced ability to withstand disease and environmental conditions (Frankham, 1995). This would have ultimately led quite rapidly to the loss or degrading of a valuable, mobile, storage resource unless frequent and substantial exchange of livestock took place (Pryor, 1998b).

Secondly, the desirability of selective breeding, to produce animals of particular characteristics, may also have been important. The need for docile animals or animals that did well in particular environmental conditions, may have led to a desire to manage the breeding or 'experiment' with bi-parental reproduction (Wright, 1932).

Neither of these, however, present a case for such activities being carried out within causewayed enclosures. Indeed, the location of upland enclosures, some distance away from the substantial quantities of water that would have been necessary for the convenient watering of cattle, tends towards a contrary argument. Contact, however, between different groups, exchanging information and agreements concerning these practices may well have been important, hence the implications of the spatial analysis for farming practices within a semi-mobile society are further developed in Chapter 5.1 below.

4.2 **Causewayed enclosures and riverine mobility.**

A relationship with rivers has been demonstrated for all the enclosures within the case studies.

In the case of the upland enclosures, the relationship is demonstrated both by the cost distance analysis and by the visibility analysis. The cost-distance

models, demonstrate that the enclosures were located in areas that were close to a river system and the visibility analysis has shown that the enclosures were located to reference specific riverine features of particular river systems. In the case of Whitehawk and The Trundle, this may also have included a reference to the sea. Both forms of analysis are important with these enclosures and the visibility analysis can be seen as supporting the cost-distance models. The distribution of enclosures, coupled with the dispersed and ubiquitous nature of rivers across the landscape could be argued to render a spatial relationship inevitable. However the visibility analysis predicts that the enclosures were particularly positioned to exact particular characteristics.

In the case of the lowland enclosures, the visibility analysis must be of less validity since the results predict more constrained views and, where views are predicted, they are less consistent across the landscape and are intermittent and broken. The models are also less robust, being more subject to small variations in topography and in particular vegetative conditions.

Enclosures such as Offham, like Crickley Hill and Birdlip Camp, seem sited to exact a high degree of visual control over what may have been important systems of riverine communication, focused particularly on access to upstream areas of large alluvial flood plains. For other enclosures the research suggests a more discrete relationships with the rivers. This is further developed in chapters 5.2 and 5.3, where the importance of rivers, overland pathways, and the role of rivers in overland navigation is considered.

4.3 **Causewayed enclosures, rivers, and overland mobility.**

The models demonstrate that, if pathways across the landscape had been developed, then access to sometimes multiple enclosures, would have been achieved with relative ease.

Some regionally variable patterns are notable. The MiCDA (4hr) models suggest a strong relationship may have existed between enclosures within each of the Sussex clusters, whilst suggesting a weaker relationship may have existed between the clusters. The Netherfield Farm enclosure reminds us that further enclosures may yet be discovered under the deep alluvial deposits that characterise much of the south Wessex and Sussex areas, whilst the newly discovered enclosures at Thame and Larkhill suggest further enclosures may also remain undiscovered elsewhere. However, the evidence we have suggests that the enclosures of the south Wessex region appear more isolated with only single enclosures contained within the MiCDA. The north Wessex enclosures, the upper Thames Valley (with the single exception of the enclosure at Thame) and the Fens, like west Sussex, all have multiple enclosures within their respective MiCDA (4hr) (Fig 170, pg. 375).

This pattern is also reflected in the MeCDA (8hr) models (Fig 171, pg. 376). Whilst the enclosures of the east Sussex cluster are on the boundaries of this model, the enclosures at Netherfield Farm, Maiden Castle, Hambledon Hill, Stepleton, and Whitesheet Hill, all remain isolated. Although we cannot argue that travel times between enclosures was a more important factor than travel times from places in the landscape around enclosures, the pattern does imply a variance. This may be evidence that a different societal practice existed in the

south Wessex area, resulting in a different tradition surrounding enclosure construction. A characteristic further discussed in Chapter 5.7.

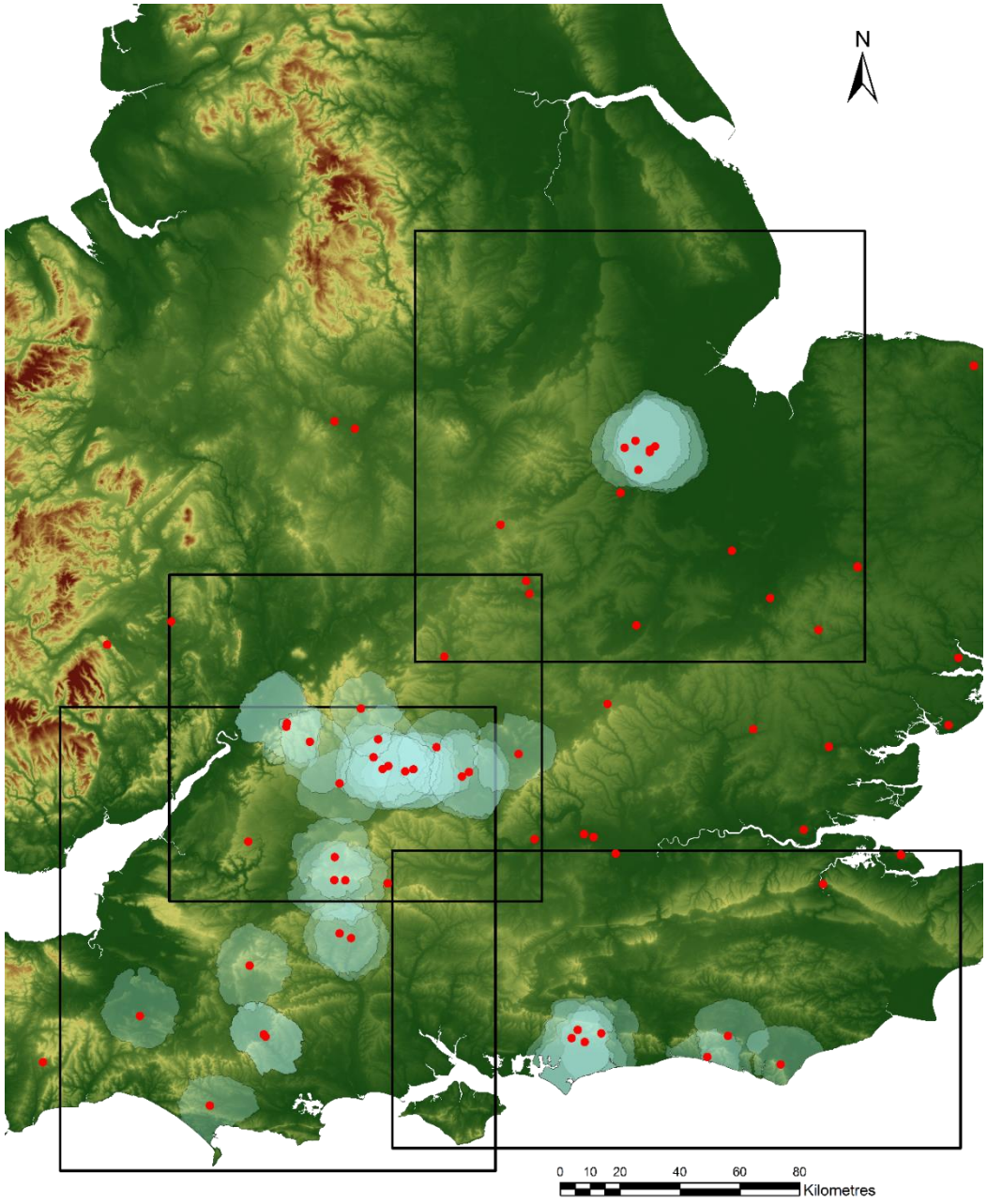


Figure 170: Combined MiCDA models for the study areas**.**

The model estimates the degree of access to the causewayed enclosure, where the boundaries define the extent of the MiCDA. The black boxes define the case study boundaries. Models for Birdlip Camp and Crickley Hill are included though not discussed in the text, the Isle of Wight was omitted from the case study and the case study boundaries define the extent of early Neolithic indicators considered, though not the number of causewayed enclosures.

Source: Author, Historic Environment Record (various), Digital Mapping data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service

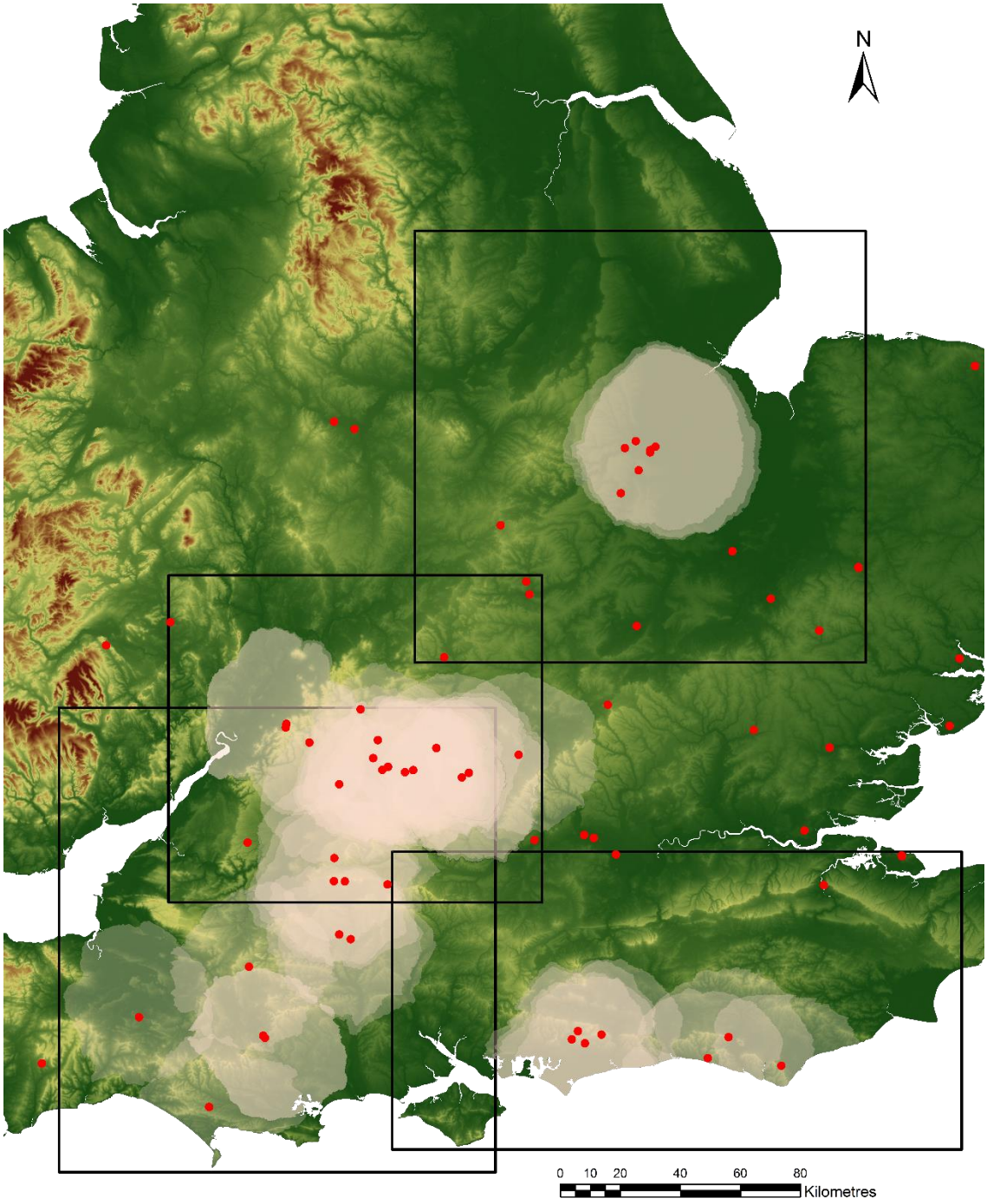


Figure 171: Combined MeCDA models for the study areas**.**

The model estimates the degree of access to the causewayed enclosure, where the boundaries define the extent of the MeCDA. The black boxes define the case study boundaries.

The model suggests that the distribution of causewayed enclosures in the South Wessex region display a degree of isolation that is not apparent elsewhere. Although travel between the enclosures may well have been practical, travel time would have exceeded a single day.

Source: Author, Historic Environment Record (various), Digital Mapping data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service

4.4 **Causewayed enclosures, mobility, contact and exchange.**

Whilst the artefact evidence has been cited to assert that causewayed enclosures played a significant role in the distribution of materials (Edmonds, 1993a, 119), the spatial analysis does little to support the notion that this was a significant factor in determining their location or distribution. Whilst some degree of exchange would have been an inevitable consequence of people gathering at an enclosure, the spatial evidence cannot support the enclosures as acting as important nodes on a distribution system (Bradley & Edmonds, 1993, 51). Significant arguments can be suggested.

Firstly, that the overall pattern of distribution contains significant 'gaps' where one might expect enclosures were needed to support this role. For example, the models relate the enclosures to systems of rivers. But, although the River Medway has a possible enclosure at Burham, 10km upstream from the estuary, there are no known enclosures further upstream despite a significant early Neolithic presence. This presence, indicated by significant monumentality and other indicators, would suggest the area was well established by the early Neolithic (Cotton & Field, 2004). The Thames and Medway join at the Thames estuary yet have a very different pattern and distribution of causewayed enclosures. The absence of enclosures along the Medway, and in the landscape either side suggests a different tradition, and causewayed enclosures cannot have been a component of a distribution system.

Secondly, the spatial and visibility analysis, suggests that multiple enclosures, in close spatial proximity, had differing characteristics. If the control of (for example) the distribution of axes was an important factor, we might expect fewer enclosures, with similar characteristics.

The models can be shown to support a case for a mobile early Neolithic, and for the enclosures to be important in terms of inter and intra group contact, though not necessarily for the 'purpose' of the exchange of material and exotic objects. The matter is more fully discussed in Chapter 5.4 below.

4.5 Causewayed enclosures and their visual characteristics

The case studies have demonstrated that conscious choices were exercised in the careful placement of causewayed enclosures to exact particular visual characteristics. Whilst the visibility models have been constructed using observer positions at points within and around the enclosures for all practical purposes the visibility models report bi-directional views. These models suggest that the more important factor may have been the ability or inability to 'see' the enclosure, or the area of the enclosure, from particular space(s) within the landscape.

This visual relationship has repeatable themes which although differ in their scale in considering upland and lowland enclosures do suggest intentionality.

Firstly, although the enclosures are, in most cases, visually disconnected with long barrows (see 4.6 and 5.6 below) the models report that enclosures are visible from areas adjacent to long barrows. For example, the Lower Radley enclosure could not have been intervisible with any long barrows, but could have been visible from other areas along the north scarp of the Berkshire Downs, in the vicinity of the long barrows. The enclosure at Abingdon has similar characteristics, though having a much stronger visual relationship with these hills still could not have enjoyed any intervisibility with the barrows located on them.

Where habitation areas could be defined in the models, usually through early Neolithic pits, then these areas of landscape were potentially intervisible with the enclosure, perhaps suggesting that a desire to reference the enclosure, albeit from some distance, from the areas of habitation. For example, the Maiden Castle enclosure, although some 2.1km from the pit site at Dorchester Middle School and 2.5km from the extensive pit site at Poundbury, may have been intervisible with these sites, and indeed all six sites south of the River Frome. Whilst the precise locations of the early Neolithic pits along the Stour Valley, at Corfe Mullen, Pamphill, Wimborne and Poole were probably not intervisible with Hambledon Hill, the model does report that Hambledon Hill may have had substantial views along the south flank of the Stour Valley all the way to the confluence with the River Avon at Bournemouth. The area of the pits may have been visible, and the pit at Nea Farm, an area along the Avon Valley, with evidence of activity since the early Mesolithic (Barton *et al.*, 2009) likewise.

The characteristic of viewing along river valleys has also been shown to be a common feature and in many cases this can be related to sites of early Neolithic habitation or activity. The HER and other data incorporated in the models confirms that sites of habitation, where they can be identified, and other early Neolithic indicators, show strong correlation with riverine courses (and see for example: Cooper & Edmonds, 2007; Hey & Robinson, 2011, chptr.11). Enclosures appear to have been located such as to provide views in particular directions along these rivers. For example, the causewayed enclosure at Offham was sited such that the enclosure was hidden from points downstream of the River Ouse, whilst providing comprehensive views upstream.

In some cases, proximate enclosures appear to have been sited with a focus on different river systems. For example, the enclosures at Rybury and Knap Hill exhibit strong visual linkages to the upper reaches of the River Avon, draining southwards, whilst the Windmill Hill enclosure, 7.5km to the north, looks out over the upper reaches of the River Kennet, draining eastwards. This is unlikely to be without intent, since had Rybury and Knap Hill been located on the northern flank of the Pewsey Downs, then these enclosures would have shared the views across the upper Kennet Valley.

In other cases, enclosures seem to have been extended in a manner that purposefully improved views over these river systems. The addition of the Stepleton enclosure to the complex on Hambledon Hill gathers in views along the valley of the River Irwerne, whilst the addition of the outer circuit at Windmill Hill improves views across the Kennet Valley.

These themes are further developed in chapter 5.5

4.6 **Causewayed enclosures and long barrows.**

With few exceptions the models highlight the separation of long barrows from causewayed enclosures, to a degree that suggests a purposeful intentionality.

The cost models consistently show causewayed enclosures to be located in areas that contain the sparsest concentration of long barrows. Whilst the visibility models demonstrate that even where many long barrows lie within a range that could have been intervisible with an enclosure, the particular locations chosen for their construction, prevent a visual connection.

The exceptions, particularly notable at Hambledon Hill, where the long barrows are contained within the enclosure complex, and Knap Hill, where the single barrow is very close to the enclosure, may be best viewed as isolated examples of a localised break with a more widespread tradition. In the case of Hambledon Hill, the design intent appears to have been different from that of other enclosures, and a more complete early Neolithic architectural repertoire was conceived from the start.

The notion of visual separation is further supported by the number of long barrows that are just beyond, or on the boundaries of areas that the model reports as visible/not visible.

By focusing on what could not have been visible, rather than what may have been, many of the criticisms of visibility analysis noted in the literature become less valid. In fact, the DTM being a reflection of present-day conditions, takes no account of differences of height between the monuments or vegetative conditions in the early Neolithic, both of which could only have served to reduce or constrain the areas that the model now reports as intervisible. Questions surrounding the relative chronologies of long barrows and enclosure construction are also more limited since the tradition seems to have pertained irrespective of whether the first phase of long barrow activities precedes or postdates the initial construction of the enclosure. Whilst the dates from Hambledon Hill suggest the contrary tradition pertained here, even though the southern long barrow construction may have slightly preceded the first construction activity associated with the enclosure.

4.7 **Restricted visual access between enclosures.**

Visual separation is an important finding of the research and as well as pertaining between enclosures and long barrows, is also demonstrated between enclosures. With the exception of the enclosures of the West Sussex cluster, which may have enjoyed a degree of intervisibility, none of the other enclosures tested could have, despite the density of enclosures along the rivers Thames and Welland.

It may be relevant that visual separation was an important factor in the early Neolithic. The concept has been noted before within individual early Neolithic monuments (Nash, 2008), and the arguments for a broader spatial separation are also well rehearsed for the later Neolithic (Parker Pearson & Ramilisonina, 1998a; 1998b). Notwithstanding this, the cost models also indicate that causewayed enclosures were sited in places that were physically accessible from areas of habitation and activity, and importantly, that travel times between enclosures and long barrows were not excessive. The careful positioning of enclosures, out of sight from these arenas of the dead, may have been an important factor in deciding their location. The concept is further explored in Chapter 5.6

Chapter five develops the themes summarised in chapter 4. In utilising the literature as the backdrop, the outputs of the research are used to explore and highlight how far the investigation has enabled the aim and objectives, defined in chapter one above, to be achieved.

5 Space, place and time.

5.1 Causewayed enclosures, mobility, and early Neolithic farming practices

The research suggests that the models introduced by Piggott (Piggott, 1970), and later developed by Renfrew and Drewett (Figs.1,2&4, pgs. 12,14&16 above) can now be seen as somewhat deterministic and arbitrarily defined. However, the research also suggests that the exploitation of the landscape posited by Barker and Webley (1978) (Fig., p.15 above) some 40 years ago, still resonates, and without their stating it, their 'satisficer' model even predicts the mobility and the increasing scale of social networks now recognised to be part of the early Neolithic way of life (Thomas, 2013, 430).

Though the case studies recognise limited evidence for permanence in some regions, and at a very early phase, most notably the large timber building at Yarnton, constructed around 3800 cal BC (Hey *et al.*, 2016, 25 & 635-48), permanence is less evident by the time the enclosures were being constructed. By this time, and through the lifetime of the enclosures, the evidence from the case studies points to small dispersed and mobile groups who, although they may have had 'spaces of residence', were in essence, at least partly, peripatetic and their dwelling places ephemeral. An increase in permanence may be suggested after this early phase, though within the lifetime of the longer-lived enclosures.

The ability of small, dispersed communities to utilise different aspect of landscape as part of a cycle, that included cultivation though also encompassed a more complex mosaic of activities, such as animal husbandry, the gathering

and use of wild and natural resources, and the need to satisfy symbolic and ritual activity, was an important facet of early Neolithic life (Edmonds *et al.*, 1999).

In addition, the satisficer model of agricultural exploitation (Barker & Webley, 1978, 173) appears a better fit than models of economic optimisation (e.g. Chisholm, 1969). Focus would have been on areas of landscape that were less challenging and easier to cultivate, with the tools and resources that were available, rather than on those areas that were more attractive from the point of view of logistical efficiency (Barker & Webley, 1978, 168). We can expect that these repeated patterns of mobility involved people moving between the lowlands and the uplands, to and from rivers and the sea, into the forest and into forest clearings, and into and out of wetland areas.

A criticism of the Barker and Webley model may be that, although it offers no dimensions, the implicit assumption is that all forms of landscape were available within a convenient distance. Whilst it may be true that upland and lowland locations are immediately adjacent to the causewayed enclosures of Sussex and Wessex, the distances between a Fenland enclosure and the nearest upland are significantly greater.

A second criticism is that the explicit assumption of the model is that the enclosure represents the 'central place' (Barker & Webley, 1978, 161), and the modelling earlier in this thesis supports the causewayed enclosures occupying a more peripheral place in space.

The first criticism is of less concern, since the cost modelling generally, and the geological analysis in the Sussex case study, supports the view that a semi-

mobile early Neolithic had the capacity to mobilise over a sufficiently wide area to enable the extraction of resource across the full range of paleoenvironmental conditions available.

We can offset the second frailty if we accept the concept of tethered mobility (Whittle, 1997) (and see p.430 below), recognising that there may have been no 'central place', and folk groups were mobile around a core area of foci. This core area now replacing the position of the causewayed enclosure defined in the Barker and Webley model.

The validity of the satisfier model is wholly dependent on the nature of the landscape and in particular the nature of vegetation in the early Neolithic. Importantly, recent work is now indicating that the assumptions Barker and Webley offered in support of their model are increasingly valid. We can now demonstrate that woodland cover, particularly on the chalk hills, is likely to have been less dense than previous ecological models assumed for this period. Results from Cranborne Chase, for example, are indicating that light Rendzina soils, may have been established from the beginning of the Holocene, supporting areas of naturally open grassland in the early Neolithic, which had been supplemented and extended by the clearance of other areas in the late 4th millennium BC. (French *et al.*, 2003b; French *et al.*, 2005). This provides an important contrast with the lower levels where annual inundations would have resulted in a rich biodiversity and a range of habitats that would have been exploited for hunting and short-term occupancy, a seasonal tradition which may have had antecedents in the Mesolithic (e.g. Ellis *et al.*, 2003).

The superficial clays and gravels of the lower plains overlie the Clays, Mudstones, and Sandstones that represent the dominant geology for all the Sussex enclosures (Table 7, p.145 above). This needs recognising, since the dominant phenomenological characteristics of upland enclosures seem more in tune with the chalk, their elevation and their striking views, than with the resource-rich lower plains.

It is also important to reflect that, despite the elevated location of the Sussex enclosures, a characteristic shared with the lowland enclosures is ready access to or from the nearby fertile plains, and it is on these flat lowland plains that all of the demonstrably early Neolithic habitation lies. For example, south of The Trundle (Fig.22, p.103 above) a cluster of four sites, with multiple pits containing early Neolithic ceramic and lithics (West Sussex HER records, 4576, 4629, 8382, 9994), suggest short-term settlement on the colluvial deposits at the base of the chalk. South of Offham Hill a similar pattern emerges. Here a group of small pits and a possible flint mine at Falmer Stadium (East Sussex HER 16396) represent possibly more permanent settlement just below the chalk, whilst the two settlement sites at Seaview Avenue contained multiple pits, again with ceramic and lithics similar in form to those found at Whitehawk and The Trundle (East Sussex HER 18989 &18994), and were located on the clay and gravel plain.

Whilst it is difficult to draw conclusions based on such a small sample of known habitation sites, the only evidence we have is that, whilst the enclosures may have been constructed on the chalk uplands, the main areas of early Neolithic settlement were on the lowland plains, particularly near the base of the chalk. Though even here, with the possible exception of the potential flint mine, which

itself may be earlier than the enclosures, none of these sites seem to be representative of any substantial long-term presence. The limited evidence from these dispersed and isolated pits may represent the remains of specific short-duration activities, such as hunting or foraging camps, or the ephemeral places of residence noted above.

A contrasting picture emerges in Wessex around Maiden Castle. Here an extensive area of early Neolithic settlement is represented by 14 pits, some 3km north of the enclosure and overlooking the Frome Valley (Dinwiddy & Bradley, 2011). Here we might interpret the more substantial evidence as longer-term, semi-permanent habitation.

These lowland areas, which comprised flood plains and gravel islands would have provided the ecosystem that would have been essential to the early Neolithic inhabitants so reliant on early crops, livestock and other foodstuffs (Tafuri *et al.*, 2014).

It is noticeable that with the single exception of Halnaker Hill, none of the Sussex enclosures are located in areas of clay-with-flint, despite this occurring abundantly across the wider area (Fig. 16, p.84 above), and including on top of the Downs at the same elevation as the enclosures. The enclosures seem to be purposefully located in areas away from clay-with-flint despite activity, indicated by leaf-shaped arrowheads, occurring on or close to these deposits. This characteristic was first noticed by Julie Gardiner (Bradley & Gardiner, 1984, 21 & fig.3.4) who advanced an argument that the clay-with-flint represented the remnants of a fine Loess soil that would have been ideally suited to early Neolithic agricultural endeavour.

The argument is later extended to Wessex and Cranborne Chase (Bradley *et al.*, 1984, 89) where it is argued that the material would have also been a good source of important raw material before the Loess soil was eroded and the clay-with-flint became the intractable material we recognise today.

A more definitive understanding of this is important since much of the clay-with-flint lies on the crest of the Downs, west of The Trundle. Although, some distance from the enclosures, this would place significant elements of early Neolithic agricultural activity on the Downs as well as on the lowlands. The cost modelling suggests that The Trundle and Court Hill had 7884ha and 8738ha of clay-with-flint within the MeCDA (Table 7, p.145 above), which indicates the potential capacity for agricultural activity on the hills, and it may be significant to recognise the spatial displacement of the enclosures from these areas of potential early Neolithic activity.

Whilst the fertile lowlands may have provided non-domesticated resources in animals and plants, they would also provide opportunity for the grazing of domesticated animals and the establishment of early crops. Cultivated plots are increasingly recognised to have been small-scale 'garden' farms, with a mixed crop (Bogaard, 2014) opportunistically seeded in natural clearings rather than permanent field systems and harvested as part of a cycle of mobility which included hunting, gathering and collecting (Thomas, 1999).

Despite this, we should be cautious in viewing these plots as untended or transient. Recent work by Amy Bogaard[5] has demonstrated that a substantial

[5] Though much of Professor Bogaard's work is based on examples from the European mainland, and the detailed widescale analysis has yet to be carried out in Britain, her work has important implications in developing an interpretation for the development of farming practice here.

and routine investment of labour in the form of manuring and water management was carried out, and that the plots once established, were long lived, passed down through generations, and resulted in social differentiation with the potential for violent competition (Bogaard *et al.*, 2013). However, one conclusion pertinent to this study was that the cereals deposited at Hambledon Hill resulted from less intensive management regimes than those cereals found at other (albeit European mainland) settlement sites (Bogaard *et al.*, 2013, 12591). If we can extend the evidence from Hambledon Hill beyond Wessex, this may imply that during the period of enclosure construction small-scale 'garden farms' were the norm and that more permanent farming practices subsequently developed during the early Neolithic, at the time the enclosures were in use.

Perhaps another useful analogy in considering the nature of farming mobility is the recent analytical work on the earlier Neolithic 'Coneybury Anomaly' (Wilts). Although this large pit predates causewayed enclosures, the analysis may allow some insight, since the site shares some characteristics of animal husbandry with that occurring at causewayed enclosures some three centuries later. Using a combination of Sulphur and Strontium isotope analysis, the authors conclude that the young cattle feasted on were brought to the site 'on the hoof', from three or four different locations between 15 and 20km away (Gron *et al.*, 2018). Some other useful results emerge: the cattle seem to have been grazed on open ground that had not been previously manured, only young female cattle were killed, and, the cattle were all born in the same season (Gron *et al.*, 2018, 136). The authors conclude that the contents of the pit were the results

of a feast intended to gather together farming communities to reinforce ties and relations.

The application of these recent works to the mobility of the early Neolithic, from the point at which the enclosures began to be constructed to the point at which they begin to go out of use, suggests that a number of conclusions can be drawn relating the geological and topographical conditions to early Neolithic society around the enclosure.

Firstly, different communities were mobile across at least the areas defined by the MeCDA and networked with other communities for the purpose of feasting.

Secondly, that although light manuring was being carried out on the field systems, the practice had yet to become fully established and intensive. However, the investment of labour in a cultivated field would have led to a desire to protect the crop, at least towards harvest time. Further, once established the grazing areas had significant value and may have been subject to hereditary ownership and societal tension. Both are factors that tend towards limiting mobility.

Thirdly, the practice of manuring implies that cattle must have been co-located with the arable crop at some point to avoid the laborious task of transporting manure. These locations must have had access to water, and grazing seems to have been carried out in open areas. The Loess soils postulated on the clay-with-flint uplands may have provided for the autumn grazing of cereal stands under a practice of transhumance.

Fourthly, some form of animal husbandry was carried out to ensure that cattle were only born at appropriate times, presumably when food was available, and the killing of young females may suggest that the number of cattle being bred was in excess of that required to produce milk.

The case study concludes that, despite the vintage of Barker and Webley's satisficer model, their construct can be demonstrated to reflect current interpretations of mobility in the early Neolithic. With an adaptation concerning the centralist role of the enclosures, and a modification to include areas without ready access to upland locations, their model can be shown to offer some useful insight into the generality of the mobility surrounding farming practices around causewayed enclosures. The much more precise data emerging from isotope analysis promises to close the gap between the general case and the specific.

Having established something of the nature of mobility, the following chapters consider how this may have been achieved and offer some implications.

5.2 **Causewayed enclosures and riverine mobility.**

Christopher Tilley begins his definition of a landscape as:

'*a series of named locales, a set of relational places linked by paths movements and narratives*…….*a cultural code for living, ……...invested with powers*……..and……..*above all, represents a means of conceptual ordering that stresses relations'*. (Tilley, 1994, 35).

All the causewayed enclosures tested display some form of relationship with water. Whilst this relationship is subject to variation, and the water may be either maritime or riverine, the carefully chosen location and situation of causewayed enclosures suggests that this relationship is unlikely to be accidental.

The early Neolithic experience of waterine systems is likely to have been very different to the modern one. Whereas we now benefit from cartography, aerial views and satellite imagery, and the ability to travel from the source of a river to the mouth in hours, the early Neolithic perspective would have been very different. Today, we 'understand' the tamed and canalised rivers of Britain. However, in the early Neolithic, beyond the immediately apparent, these same rivers would have been experienced in a much more personal sense; 'different landscapes for different people and reflecting their own personal biographies' (Brück, 1999a).

Richard Muir argues for two landscapes: the 'real' and the 'perceived' (Muir, 1999, 115). The first he defines as the rocks, water, vegetation and soil beneath our feet, whilst the latter comprised the sensed, the remembered and the hypothesised landscape: a landscape sometimes mythical and symbolic, imbued with legend, ritual and meaning. Both categories were real, co-existed and acted as one, to form part of the early Neolithic cosmology.

Muir's first landscape is exemplified by the analytical scholars including Michael Aston and Muir himself (eg: Hoskins, 1955; Aston, 1985; Rackham, 1986; Aston & Lewis, 1994; Muir, 1999; 2000; Aston, 2003), whilst the latter category is echoed in more reflective studies (e.g. Tilley, 1994; Ashmore & Knapp, 1999; Ingold, 2000; Johnson, 2006; Tilley, 2007; Tilley, 2008; 2010).

In all these works, the consideration given to the significance of hydrological features is limited. Tilley (1994), for example, after clearing the way following a sophisticated treatment in part one, largely ignores the challenge in part two of the same volume. Whilst announcing that streams of Cranborne Chase are incorporated within the architectural design of the Dorset Cursus, his commentary is limited to the experience of '*walking down to the boggy depths of the valley'* (p.181) and the contribution of the streams towards a '*series of contrasts and surprises'* encountered whilst walking the cursus line (p.199).

Criticisms of phenomenology (and in particular Tilley's fieldwork) (e.g. Fleming, 1999; though also: Liliana, 1999; Fleming, 2005) are well rehearsed, and though not repeated here, are centred around the very nature of phenomenology and the subjectivity inherent in Tilley's approach. A more structured approach to interpretation is offered by Sue Hamilton and Ruth Whitehouse (2006) and a phenomenological consideration of water can be built into this framework. Noteworthy, also, is that unlike most studies that concentrate on the visual, Hamilton and Whitehouse also include acoustic characteristics which may also have been important.

Alasdair Whittle (2003) largely ignores watery matters, save a brief discussion of forager activities in the Carpathian Basin and along the Danube, despite

having previously noted the effect of river flood waters on some causewayed enclosures and offering limited discussion of riverine locations as a resource for hunting (Whittle, 1996).

Richard Bradley (Bradley, 1998b) limits discussion to instances of bog-bodies and votive deposits in rivers, and argues against other mechanisms for artefact deposition in rivers. We might expect Bradley's ground-breaking work on 'natural places' to introduce balance but, again, discussion is largely limited to votive deposits in watery places (Bradley, 2000). However in later work he does note a pattern of Neolithic settlement along river margins (Bradley, 2005, 143), thereby also accepting a complimentary, more functional role for the river.

The Neolithic Studies Group (NSG) volume 2 (Topping, 1997) sticks literally to the 'land' in landscape, whilst Mark Edmonds (1999) also limits his discussion to Ancestral Geographies of the 'solid state'.

Despite the lack of detailed analysis in the literature, the broader relationships between rivers and Neolithic lifeways is well attested (e.g. Barrett *et al.*, 1991b; Tilley, 1994; Richards, 1996; Barclay & Harding, 1999; Cummings, 2008) and a preference for early Neolithic settlement on gently sloping loess or river gravels associated with minor water courses rather than major river systems can be traced back to the LBK traditions of Central Europe (Thomas, 2013, 51).

The spatial relationships, cost distances and visibilities highlighted by the case studies all suggest that water played a significant role in the experientiality associated with a causewayed enclosure and a welcome correction is introduced by Fiona Haughey (Haughey, 2016).

In an insightful paper based on her PhD research (Haughey, 2009), Haughey fills a gap in the emerging theme of Neolithic mobility (Leary, 2014; Gannon, 2016; Leary & Kador, 2016) through a detailed consideration of movement along inland waterways. Drawing on a combination of ethnographic and ethnohistorical analogy and archaeological data, primarily though not exclusively from the Thames basin, she paints a picture where riverine travel is at least as important in the Neolithic as travel overland. Though acknowledging rivers as economic resources, her work concludes that functionalist opportunity was not the primary reason for early Neolithic activity frequently occurring at particular points on the river systems. Haughey develops an argument that rivers are *'core'* to the experiential and symbolic relationships between humans and the landscape (Haughey, 2009, 205).

The symbolic nature of the river is developed and she describes rivers as providing routeways with both '*purpose and meaning'*. Whilst Haughey suggests that rivers were central to Neolithic lifeways (Haughey, 2009, 282), others also assign rivers a role in the disposal of the dead (Cummings, 2009, 149; Lewis-Williams & Pearce, 2009, 201,284; Ray & Thomas, 2018). With this backdrop, and a society where experiential and everyday matters were inextricably linked, we begin to understand the extent to which the myths and legend introduced by Tilley and Muir may have played out in the early Neolithic relationships with rivers.

Though noting the attraction in the early Neolithic to particular features, such as loops, bends, islands, peninsulas, confluences and gravel terraces Haughey rejects, as a modern notion, that rivers represented territorial boundaries (Haughey, 2009, 253 & 269). She presents an argument that crossing rivers

was less problematic in the early Neolithic than it has become in later eras, with more mechanised forms of transport. Rivers in the early Neolithic were different. The evidence from the Thames, the flood plains of the upper Stour and the sinuous paleochannels of the Welland suggests a greater propensity for river systems to have been wider, shallower and multi-channelled. For example, around Colne Brook (Brown, 2003) and around Dorney and Runnymede, multiple channels seem to be consolidating from the Neolithic (Robinson, 2011; Allen *et al.*, 2013, 2-6,10).

The waterways were important avenues because, as well as providing opportunities for communication across landscapes to facilitate intra and inter-group networks, they also provided a valuable resource. Congregating animals were exploited for food and raw materials, and this activity resulted in occasional short-term occupation evidenced by the presence of pits, pottery and lithics (Sturt, 2010). These areas may also have been modified, both to further encourage grazing for wild animals and provide for early domesticates (Asouti & Fairbairn, 2010). Animals may have had a ritual or symbolic element associated with prestige, rites of passage and other social valences, as well as providing meat, fur and feathers (Robb, 2014). This could have further elevated the importance of rivers beyond the mundane and it is hence to be expected that we find them associated with monumentalisation and settlement (Mallim, 2000).

For example, the views from Whitehawk appear focused towards the west, along the fringes of the south coast. The visible belt comprises an area, that extends for some 18km, though can never have extended more than 3km inland. The model predicts that the estuarial reaches of the river Adur, some

12km to the west, may have been visible. The Adur here flows north to south and has cut through the chalk of the South Downs to form a wide and flat-bottomed valley. This channel could have provided a means of easier passage, either by waterborne craft or on foot, as well as providing a means of guidance, from the ocean, through the hills, to the flatter fertile areas beyond.

The viewshed, in combination with Fig.35 (p.117 above), suggests the enclosure is sited carefully. The general location is on a saddle of ground, that isolates the knoll of higher ground to the south, and this may have been an intentional act. However, being situated below the summit, on a hill that falls gently from south to north, and from east to west, also isolates the enclosure in a visual sense, limiting and accentuating views to and from particular directions. Views inland and to the east are isolated by the higher topography and limited to discontinuous belts along the flanks of the chalk Downs. It may be that the oceanic view and in particular the views towards the Adur estuary were also a significant factor in siting the enclosure.

The Trundle and Barkhale, as well as the probable enclosure on Halnaker Hill, also display a distinct seaward focus, but the views from this group and Whitehawk are mutually exclusive. This characteristic would not exist if Whitehawk, for example, were located on the higher elevations one kilometre to the northeast.

The sea views may have afforded an acknowledgment to a seafaring past, towards a place from which one's ancestors were known to have originated, whilst at the same providing a degree of visual control of incoming migrants and their passage inland. Conversely, the views afforded towards the enclosure,

possibly seen as a ‘notch’ in the canopy (Oswald, pers. comm.) from these areas, may have been important to locate the enclosure from a distance.

In Sussex we also see a different emphasis between the western and eastern groups of enclosures. All the western group, including the visually restricted enclosure at Court Hill, had the potential for some visual access to the coastal plain, whereas in the eastern group, only Whitehawk, which itself has limited visibility, could have had visual access to the coast.

Away from the coast the relationship with water is demonstrated through the riverine associations. For example, the siting of the enclosures at Offham and Combe Hill appears to reflect a deliberate attempt to secure a unidirectional view along the upstream river valley and plain and, with each having wide-ranging visibilities, they exhibit a 40% overlap between the two potentially visible locals.

The Knap Hill and Rybury enclosures have the potential to have had impressive views across the upper reaches of the river Avon which drains in a southerly direction towards the south coast. The river bifurcates, 1km north of modern Upavon, into east and west drainage systems. Rybury is, both spatially and in terms of its viewsheds, more closely associated with the western system, whilst Knap Hill appears more allied to the eastern system.

Windmill Hill lies on a prominence between two small tributaries of the Upper Kennet. Here the visual focus is to the north, towards the heads of these two tributaries where the enclosure has impressive views over the immediate riverine landscape. The Kennet drains eastwards before joining the Thames at modern Reading.

The Hambledon Hill enclosures may relate to the upper reaches of the Stour and Iwerne rivers where the main enclosure has extensive views along the Stour floodplains, whilst the Stepleton enclosure is more directly associated with the Iwerne. The later amalgamation of the enclosures, through the development of the linear bank system, may then have consolidated the visual control of the two territories.

The Maiden Castle enclosure displays a similar characteristic. Here the visual dominance is apparent over the South Winterbourne river, a small tributary of the River Frome. Additionally, although the Frome itself is not visible, the areas either side of it are intervisible and well within the visual range. Longer distance views down the Frome Valley are also apparent in the visibility model. Netherfield Farm lies on a small tributary of the River Parrett and displays similar characteristics along the Parrett floodplains, whilst Whitesheet dominates the area around the source of the River Stour. Robin Hood's Ball, located equidistance between the upper reaches of the Till and Avon rivers, and Larkhill, much closer to the River Avon, both enjoy views over the land either side of these river systems.

The Wessex enclosures all appear to be visually associated with the confluence, or heads, of river systems or tributaries (and see, for example: Hey & Robinson, 2011)

The enclosures of the Upper Thames Valley are intimately associated with the Thames, or more usually the tributaries of the river. The most distant enclosure lies 1067m from the nearest river whilst the remaining twelve lie within 600m.

With the exception of Southmore Grove at 64m above river level, all lie at or about the same elevation as the adjacent river system (Table 34).

Rather than constructing enclosures along the course of the main river there seems to have been a preference to locate enclosures alongside the tributaries of the river Thames. Of the thirteen enclosures, only Radley, Buckland and possibly Aston Cote appear directly associated with the main course of the Thames. These seem exceptional. Lower Radley lies only 70m from the current course of the river, whilst Buckland is today bisected by the Thames. More typical are enclosures such as Abingdon (Radley Brook) and Eynsham (Limb Brook) which are located adjacent to small watercourses that drain into the Thames within two kilometres, whilst others, including the enclosures at Burford and Eastleach are on more substantial watercourses which run for up to 17km before joining the Thames.

Enclosure	Shortest distance from enclosure perimeter to river (m)	Position of enclosure relative to river	Metres above mean (local) river level
Southmore Grove	1067	west	+ 64.0
Aston Cote	571	north	- 0.18
Thame	420	west	+ 7
Eynsham	368	north	+ 0.3
Salmondsbury Camp	350	west	+ 2.0
Burford	273[#1]	northeast	+ 8.4
Langford	264	east	+ 2.7
Broadwell	231	northeast	- 0.26
Eastleach	84	northwest	- 0.04
Lower Radley	70	Southwest	- 0.2
Down Ampney	70	southwest	+ 0.5
Abingdon	17	southeast	- 0.27
Buckland	0	southwest[#2]	0
[#1] Burford is 273m from what today is a dry valley and 2115m from the nearest modern river. The valley may have been wet or a winterbourne in the early Neolithic.			
[#2] Buckland is bisected by the modern course of the Thames. The remaining component lies to the southwest.			

Table 34. Upper Thames enclosures and the nearest waterway.

The reason for this is unclear. However, the Thames and the floodplains may have represented a well utilised economic resource. A frequent presence and the absence of spatial isolation rendered the construction of a causewayed enclosure inappropriate for reasons of tradition or function. Causewayed enclosures do not appear to have been regularly attended and this in itself may suggest that they were not situated in areas where matters of everyday life were played out. The uncertain archaeology, environmental data, and chronology associated with the upper Thames enclosures is insufficient to enable the further analysis that would be necessary to determine the construction sequences, and the associated land use and condition.

With the possible exception of Abingdon, all the Thames enclosures associated with tributary streams lie north of the Thames. Radley and Buckland are exceptions, though both of these enclosures are associated with the main course of the River Thames and not with tributaries.

Abingdon, which occupies a space between two small tributary streams, may not be exceptional since, although the Abingdon enclosure lies on the opposite bank (of the Thames) to the other enclosures, it lies in a loop of the river. The Abingdon enclosure is north of the Thames at the point where the Thames is closest to the enclosure.

This may be significant since, if Abingdon is considered in this manner, all the enclosures situated on tributaries of the Thames are signposted by the tributaries on the north side of the main river course, rather than on the left or right side (see section 4.3 below).

Intentionality behind positioning enclosures on the north side seems probable. The area to the south enjoys a similar pattern of landscape, geology and hydrology (though most tributary streams drain into the River Ock and thence to the Thames) and the archaeological dataset suggests the locale was subject to a significant level of early Neolithic exploitation.

Despite Fiona Haughey's reluctance to accept river systems as boundaries, considering the Thames as forming some sort of border does seem the most likely explanation. This may imply that the activity evident south of the Thames was more associated with the early Neolithic of the upland Wessex enclosures, than it was with the lowland enclosures of the Thames. Extending this argument might suggest that the highland enclosures at Salmonsbury Camp and Southmore Grove were part of a separate tradition and associated with Birdlip Camp and Crickley Hill.

The cost models suggest that travelling times between the enclosures of the upper Thames Valley were low and the travelling times to enclosures from any point in the landscape defined within the MiCDA were lower still. Access to more than one enclosure was easily achievable within four hours (Fig.172, p.403). In the case of Eastleach, Langford, Broadwell, Buckland and Aston Cote, all five could be reached from the same areas of the upper Thames Valley within a day.

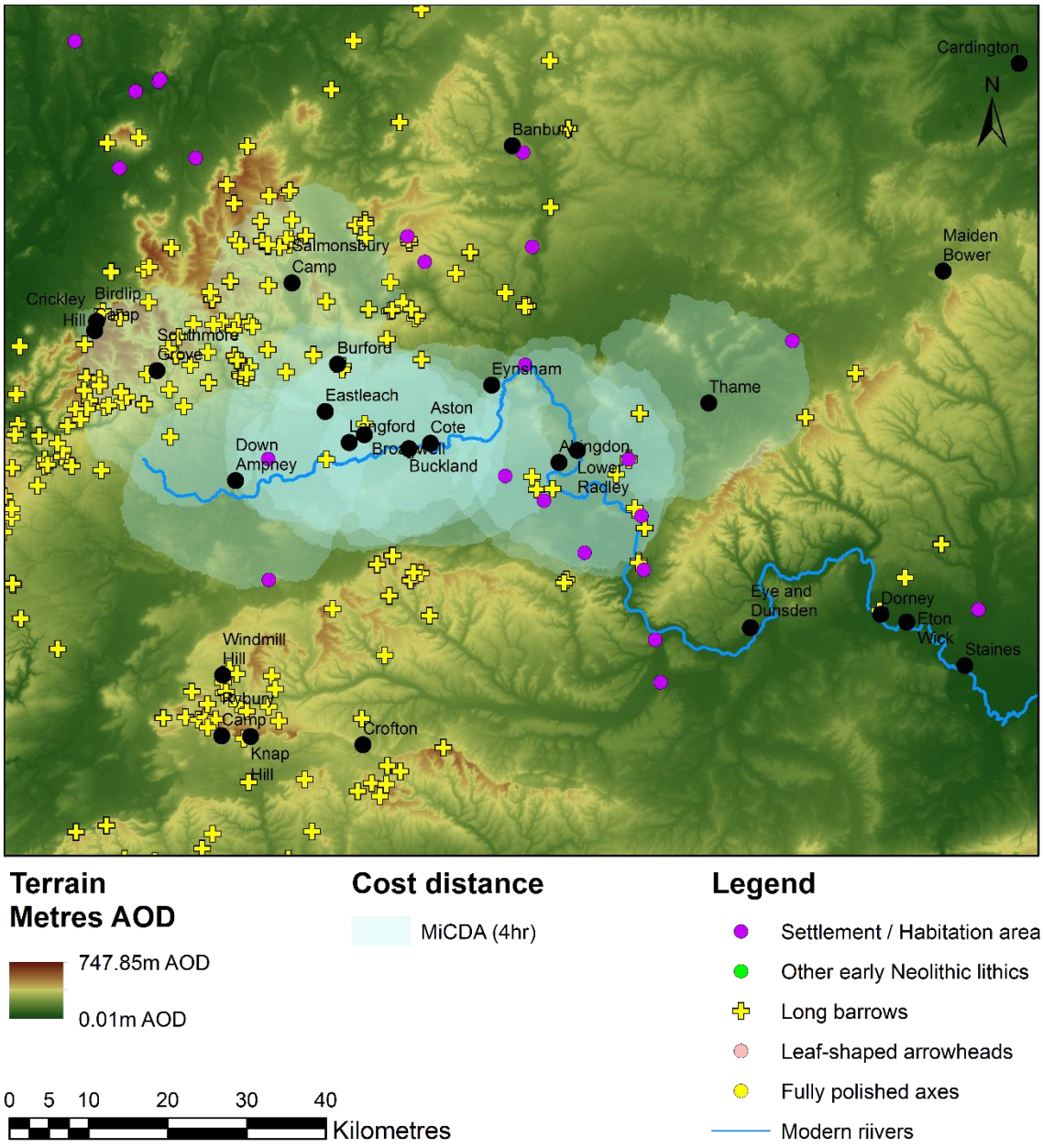


Figure 172: Thames enclosures MiCDA(4hr) combined cost models

The model estimates the degree of access to the Thames enclosures, where the boundaries define the extent of the MiCDA. The distribution of known long barrows and habitative sites is also defined.

Source: Author, Historic Environment Record (various), Digital Mapping data by: Edina Digimap Crown Copyright 2010. An Ordnance Survey / Edina supplied service.

The ease of travelling between points in the landscape to multiple enclosures does suggest that the enclosures were constructed and used by the same groups of people. Furthermore, the construction choices evident in the enclosure design, including their position with respect to waterways, and the constructional elements of the enclosures themselves, formed part of a tradition associated with groups with close affinities and similar traditions. There are obvious outliers, and we may interpret Thame, Salmonsbury Camp, and Southmore Grove, none of which are so intimately tied to the Thames, as belonging to different kin groups, whilst the enclosures at Abingdon and Lower Radley may also be representative of separate groups.

The evidence elsewhere in this study may suggest a common tradition in that early Neolithic folk groups were closely bound to the river systems which still provided a rich resource, particularly for livestock grazing (Bogaard, 2011). The clustering of causewayed enclosures of the Avebury, South Wessex, the East and West Sussex regions, and the Fens, may all be allied to discrete folk groups utilising resources associated with these areas. However, the scarcity of archaeological evidence immediately surrounding the enclosures suggests other traditional practices were also important.

The presence of long barrows, including Wayland's Smithy, Liddington and possibly Whitehorse Hill, confirm the landscape south of the River Thames, particularly along the Ridgeway, as important areas of early Neolithic activity. It is also important to recognise that, although there appears to have been no tradition of enclosure building on the tributaries of the Thames draining from the south side, the concentrations of lithics do indicate important sites of early Neolithic activity. For example, the upper reaches of the River Cole, which

joins the Thames near Lechlade, may have witnessed a significant degree of early Neolithic activity, evidenced particularly in the form of polished axes including a Gp. VI Great Langdale axe at Marston Farm (431447,168335).

There are no known enclosures between the Thames and the enclosure at Windmill Hill which lies 23km to the south. The preference for constructing enclosures on tributaries north of the river Thames and not to the south, and in particular a lack of any known enclosure associated with the River Colne and River Ock, which joins the Thames southeast of Abingdon, is difficult to explain, but we must remember that the recent discoveries of new enclosures at Thame and Larkhill does suggest other examples may yet emerge.

One possible explanation is that the river systems did act as forms of prescribed or informal boundaries (cf. Haughey, 2009) and that some areas of landscape were less inhabited or not inhabited at all. We have already noted that the Wessex enclosures, with the exception of Windmill Hill, are visually and spatially connected with the river systems draining to the south. Windmill Hill is the only causewayed enclosure associated with the River Kennet, which drains eastwards into the Thames downstream of the Goring Gap on a broadly parallel trajectory to the Thames upstream of Eynsham.

The cost models suggest travel between the two river systems would take between at least six to eight hours and a return trip is unlikely to have been possible within a day. This may suggest that the long barrows to the north of the Thames on the southern scarp of the Cotswolds are associated with the upper Thames Valley enclosures, the long barrows south of the River Kennet associated with the Windmill Hill enclosure, and those barrows south of the

Kennet associated with Rybury and Knap Hill. The lack of a similar association between rivers and enclosures of Sussex may be explained by the proximity of the Sussex enclosures to the sea, hence the rivers played a less important role in accessing or locating the enclosures.

If we accept riverine travel as a likely means of moving groups and their belongings around in the landscape, then it may well be that the models help identify routes into the landscape in the general direction of the trend of Neolithisation identified by Whittle (Whittle *et al.*, 2011), in addition to aiding a continuity of tradition and practice.

A particular difficulty is the lack of chronological certainty associated particularly with the Upper Thames enclosures, though also with the inherent lack of precision still evident in the enclosures dated by Bayesian techniques. We cannot be sure if many or all of the enclosures in a given area were in concurrent use, or whether single enclosures were in use sequentially. Indeed, it may be that some were in concurrent use whilst others are not. More work is needed, particularly on the unexcavated enclosures of the upper Thames, where the waterlogged conditions of some enclosures may have preserved wood that could offer a high degree of chronological precision.

For the present we can only state that the early Neolithic traditions on the north side of the Berkshire Downs did not necessitate the construction of enclosures, despite the opportunity for utilising relatively higher and potentially attractive plateau landscapes with riverine systems very similar to that north of the river Thames.

We should consider the riverine systems as providing important routes of travel (Hey *et al.*, 2011; Hoffman *et al.*, 2013, 205) which may have persisted since the later Mesolithic (Allen *et al.*, 2013, 483-507).

Fiona Haughey suggests;

'*modern thinking of landscape tends to distort our view of what it was like to inhabit, in the past, that landscape with all that it entailed. …they* (the rivers) *are often defined as barriers (where they inhibit passage), boundaries (which divide one side or people from another), liminal spaces (that are at the extremities of being) and sites for sacred deposition (that involve setting apart items from the common or secular*). *They are seen as a passive part of the background to a landscape in which humans hunted, walked, knapped, built fires, erected monuments and eventually began to deliberately plant seeds' (Haughey, 2009).*

The duality existing between prehistoric mobility and water travel is expressed by Mark Dunkley (Dunkley, 2014) who views the early Neolithic people as accomplished seafarers, reminding us of the trade (c.f. Sheridan, 2007) in jadeite axes from the Italian Alps, and the likelihood that pottery and axes from Cornwall and Cumbria were transported by coastal and riverine navigation.

Direct archaeological evidence for watercraft remains very slight in the early Neolithic. The four imprecisely dated logboats from Bexley (Greater London, discovered in 1885), Jaywick (Essex,1936), Whittlesey (Camb., 1979) and East Rea (Peterborough, 1979) (Dunkley, 2014) confirm the presence of vessels for the broader Neolithic period, whilst the fragmentary example of a logboat cremation burial dating to 4035 – 3705 cal. BC at St. Albans (Herts) (Niblett, 2001), remains the only mainland example excavated under modern conditions and certainly attributable to the early Neolithic.

The well preserved Greyabbey Bay logboat, dated to 3499-3022 cal BC (Forsythe & Gregory, 2007) was probably designed for the inland waterway of Strangford Lough and provides a potential model for the construction of vessels that may have been used to access causewayed enclosures in southern Britain (Fig. 173, p.410). The vessel was fabricated from the heartwood of a single oak (*Quercus* sp.) trunk with integral design features that included possible foot rests and internal partitions, perhaps to provide separation of space within the vessel. The excavators suggest the original external dimensions, before erosion, to have been 9.35m long, 0.95m wide and up to 0.65m high, the internal space being 8.8mlong and 0.85m wide. Such a vessel could carry a crew of five persons paddling and a total load of 3.837 +/- 0.133 tonnes (Forsythe & Gregory, 2007, 9), which could have included more people, livestock and other cargo. Such a large vessel may have been designed to operate and remain stable in the strong tidal currents of the lough. The St. Albans vessel at 5.3m long (Niblett, 2001, 159) may have been more typical on the inland waterways of southern Britain.

We can expect rafts, skin crafts, as well as dugout canoes to all have been used for inland transport (Robert, 2015), with Dunkley (2014, 190) suggesting that progress made on water would have been of similar magnitude to the velocity obtainable on land (cf. Wheatley, 1996, 100).

Whilst sites such as causewayed enclosures and long barrows provide ideal loci for considering riverine mobility, the matter has to be considered in the context of known settlement patterns and other early Neolithic indicators. The paucity and quality of the evidence for both of these remains problematic, but the location of causewayed enclosures (see 5.3 below for a discussion of

riverine affinities in the Fenland case study), strongly suggests that rivers were either an important means of accessing the landscape towards an enclosure, or that the rivers provided ‘signposts’ in the landscape (Haughey, 2016) which enabled the enclosure to be episodically relocated. For the developed enclosures, towards the end of the first half of the fourth millennium, this may have progressed towards a need to exercise control or oversight over riverine access. The evidence from Crickley Hill and Hambledon Hill may suggest that this control was subject to violent challenge (see section 5.7 below).

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Figure 173: Greyabbey Neolithic logboat.

The logboat in-situ on the foreshore of Strangford Lough

Source: Forsythe and Gregory, 2007, pl.1

Despite a paucity of direct evidence, the range of imported materials, animals and ‘culture’ is sufficient to confirm that a craft-building tradition (and see: Lanting, 2000, 627-631), which enabled both marine and riverine travel, was well established in the fourth millennium BC. Indeed Cummins supported the notion of sophisticated riverine trade systems with organised distribution, including the seaborne transportation of Gp.I and VI axes to secondary distribution centres in the Thames Valley and then onwards through the river systems (Clough & Cummins, 1979; Cummins, 1980; Bradley & Edmonds, 1993).

Whilst it is commonly accepted that the distribution of early Neolithic monuments and artefacts infers portage (e.g. Hey & Robinson, 2011, 221-2), there may also be additional explanations for the apparent relationship that do not involve riverine transport.

5.3 **Causewayed enclosures, rivers, and overland mobility.**

Whilst the rivers may have provided an efficient means of travel through a landscape otherwise difficult to traverse, they may also have provided a reliable means of guidance for people moving overland (Haughey, 2016).

For example, it may be relevant that, of the eight upper Thames Valley enclosures that can truly be described as lowland, the enclosures at Abingdon, Eynsham, Aston, Broadwell, Langford and Eastleach are all constructed on the western side of their respective tributaries. This may suggest a long-term continuity of tracks and pathways, with groups repeatedly using the same routes to approach enclosures, and where direction is provided through oral tradition, by reference to the river systems. If we accept that the enclosures

were visited episodically (e.g. Edmonds, 1999; Harding *et al.*, 2007, 280), then following prescribed paths to causewayed enclosures may imply more than simply acting in preference to the increased difficulty of making new paths. Paths enabled prescribed actions to be repeated, and groups to move and coalesce for the reinforcement of social relations. It is also possible that the journey itself was important *(*Tilley, 1994, 31*)* and people travelling along well-established routeways referenced long established traditions with significant ancestral linkages and symbolic potency.

The concept of rivers representing a form of guidance is reinforced by the construction of causewayed enclosures along the tributaries of the Thames. Eastleach, Burford, Salmonsbury and Southmore Grove are all some distance from the main course of the River Thames. Both Burford and Eastleach are near the source of the tributary whilst Salmonsbury and Southmore lie within a confluence on the extreme eastern flank of the Cotswolds. We may conceive that the pathways along the Upper Thames and its tributaries acted as 'corridors in the memory' providing surety and an ontological security through the reinforcement of earlier traditions and the re-enactment of folk memories.

Rivers provide fixed points in a wider landscape with the additional helpful characteristic of having a general direction of flow which, coupled with other components, help provide a pre-compass geographic orientation (Nelson, 1986, cited in Haughey, 2016). Such markers in the landscape may have enabled the re-enactment of traditional practices and may have provided the 'specialised techniques' argued to have been necessary to maintain oral traditions for longer than the 200 years otherwise suggested by Bradley (2002, 14). In this way the 'function' of the causewayed enclosure becomes less important than the 'space'

and such episodic pilgrimages may offer some insight as to why function is so difficult to establish, seems to vary between enclosures, changes over time, and why enclosures are repeatedly filled in and re-cut.

If such diachronic transformation took place over the lifetime of the practice of enclosure building, then viewing enclosures as providing a link to past agency through their persistence of the past, itself becomes the function, without necessitating similarities in form or materiality (for example see: Thomas, 1998, 51). Dusán Boric describes this as a discursive remembrance and the invention of culture and tradition through the reshaping of meaning. He writes:

the invention of tradition can be described as the intentional act of renewing certain practices and customs, sticking to particular materials and aesthetic forms ……with roots in the past in new temporal contexts. In such new contexts, these old-new practices can have a different function and significance and are associated with different meanings'. (Boric, 2010, 49-50).

Court Hill in Sussex provides another example. Here the enclosure could not have been visible from the valley of the River Lavant, the source of which lies 700m broadly south of the enclosure. Following the course of the Lavant upstream, one passes a series of deep coombs formed by periglacial activity (Robinson *et al.*, 2013) and which were substantially dry valleys in the Neolithic. The last and largest of these coombs joins the Lavant Valley from the north as the Lavant peters out. Following this coomb for 700m, the enclosure complex at Court Hill may have been visible on the hill side. In this way Court Hill remains visually isolated from the surrounding area, though the location is signposted on a riverine route that in the Neolithic extended to the south coast

at Pagham[6]. We need not argue that the route was necessarily from the coast 17km to the south, simply that the river was easily located within the landscape and could have provided direction from any point along its 25km course through the Neolithic landscape. In this way, an enclosure infrequently visited, can be reliably located or relocated by individuals or groups, through past experience or folk memory, even if they were not familiar with the landscape.

A similar interpretation for the Fenland landscape is complicated by cuts and drains that have replaced and redirected the earlier river systems. Nevertheless, a similar argument can be constructed.

Uffington and Northborough are within 500m and 800m respectively of the River Welland and within 200m of the earlier courses of the river (these relic paleochannels channels remain undated). The location at Uffington is further signposted by the confluence with the Welland, of the River Gwash, 800m to the southwest of the enclosure.

The Etton(1) enclosure was constructed on a floodplain within a major loop of a relic paleochannel, itself draining to the Welland, and being active until the early Bronze Age, is known to have been water-carrying for at least part of the year in the early Neolithic (French, 1998). The Etton(2) enclosure is located 300m south of a similar tributary brook of the Welland.

The enclosure at Barholm also displays a similar characteristic. The small brook by which the enclosure was constructed drains into a canalised section of the River Glen. The Glen is a tributary of the River Welland, but the two rivers

[6] The River Lavant was redirected to its present course in the Roman period and now drains to the harbour south west of Chichester.

bifurcate 7.5km northeast of modern Spalding where the Glen took a more northerly, though broadly parallel course through the Fenland landscape.

Despite the modern disruption, enough remains or is known of the earlier river systems to construct an argument, that the Welland provided a means of navigation to all the enclosures in this study.

The Welland provided an inland routeway across the inhospitable fen landscape from the North Sea and the northwest extreme of the Wash. Following the Welland from the source, or from any point along its length, would allow the enclosures to be located on the basis of a simple memorised set of instructions.

The dearth of archaeological evidence, not directly associated with the early Neolithic monumentality, immediately surrounding enclosures and the dislocation with other forms of early Neolithic monumentality, may suggest enclosures were deliberately located away from areas of other activity. This implies some directional instruction would have been beneficial in occasionally locating and relocating enclosures. Whilst paths directed by riverine features cannot have been the only early Neolithic paths through the landscape (and any one path may not have been exclusively defined by reference to a river), the rivers do provide a fixed frame of reference. These paths may or may not have transgressed areas of special or symbolic importance. They do provide a means of gathering together and subsequent direction. It would not have been possible to cross one of the major river systems unintentionally, and once located, following the river upstream until the right tributary is reached becomes an act that can be repeated, reinforcing spatiotemporal social linkages.

Having postulated that enclosures were made accessible through paths that, at least in part, took their direction through features of the riverine landscape, the next sections explore the extent of mobility. Without trying to define the 'function' of causewayed enclosures, we look at some of the indicators of mobility.

5.4 Causewayed enclosures, mobility, contact, and exchange.

This chapter considers the spatial relationships between enclosures and other contemporary early Neolithic activity and asks what the spatial analysis suggests about a Neolithic society towards the end of a process of significant transition.

At the time causewayed enclosures were constructed, some practices and traditions more traditionally associated with the mobile lifestyle of a Mesolithic hunter-gatherer-forager may still have persisted (e.g. Barrett, 1994, 143; Whittle, 1998; Whittle & Bickle, 2014, 33). We can perhaps envisage a semi-sedentary society where groups were beginning to express a greater degree of static permanence, though were still quite at ease with moving around in the landscape as need or tradition dictated.

The broad distribution of known causewayed enclosures is characterised by a regionally variable clustering, or localised groupings (Oswald *et al.*, 2001). In Sussex, for example, whilst there appear to be two distinct clusters, both are a significant distance from, for example, other distinct groups on the Wessex chalk or the Cotswold area. Similar clusters appear on the Kent and Essex coastline and these are spatially isolated from the Suffolk enclosures and those further north on the Fens and in the Midlands. This characteristic may be

significant and offer some insight into the nature, pattern and extent of mobility in the early Neolithic.

The interpretation of causewayed enclosures has often focused on their relationship with respect to other contemporary early Neolithic activity (e.g. Piggott, 1954; Smith, 1965b; Renfrew, 1973; Edmonds, 1993a, 129), in particular long barrows. Much of the current literature also treats causewayed enclosures as special places, on the edge of society and away from habitation (e.g. Thomas, 1982; Bradley, 1984a; Robertson-Mackay, 1987; Edmonds, 1993a, 115; Bradley, 1998a, 190).

Whilst the case studies all support the notion of causewayed enclosures being located away from the main arenas of Neolithic activity, the short journey times indicated also demonstrate the danger of treating causewayed enclosures as isolated constructs, remote from early Neolithic society. Indeed, the models suggest, that although causewayed enclosures may have been 'on the edge', they were unlikely to have been 'out of mind'. Despite this, there is less consideration given in the literature to inter-enclosure mobility than the subject deserves.

Paths and routeways are an important and inadequately researched facet of Neolithic life. Mobility and strategies for mobility also remain poorly understood (Leary, 2014), with a focus on 'place' rather than connectivity between places. This may not be an ideal viewpoint for a semi-mobile society. Pathways may have enjoyed more permanence than some 'places' (Ingold, 2009; 2011), and furthermore are likely to have initiated the control of (some) space and the establishment of place (Lee & Ingold, 2006).

Recognising that some established paths and corridors through the landscape existed (Austin, 2000), the cost models indicate the relative ease with which travel between enclosures could be established. Some pathways may have been established early with origins as far back as the late Mesolithic. Certainly by the early Neolithic, formally constructed paths had begun to appear, including, for example, across the Somerset Levels (Coles & Coles, 1986). The network gradually evolved and extended through the primary phase of the Neolithic and into the era of enclosure construction. Such pathways may have been a valuable, hard-won resource and, once established were subsequently maintained by continued renewal, clearance and re-use. They may also have enjoyed some form of control, whereby individual groups exercised influence over who could and could not use the path, or they may have extracted some form of tribute to allow onward passage. Under these circumstances, pathways would persist in the landscape for generations (e.g. see Tilley, 2010, 41-52) and increasingly carry significant traditional and symbolic importance, as well as playing a functional role in linking places, people, animals and resources.

The distribution of causewayed enclosures and the archaeological evidence suggest that mobility may be considered at broadly discrete levels. For example, Clive Gamble's study of Palaeolithic mobility suggests a 'local' level, where activities relate to the environment within five kilometres, a 'regional' level extending to a distance of twenty kilometres, and an 'exotic' level describing mobility between thirty and eighty kilometres (Gamble, 1993, 36). For the purposes of mobility in the early Neolithic, the models defined on page

64 (above) suggest different boundaries of affordance, better reflecting the greater demonstration of mobility at this time.

To these three we ought to add the European level, since it is clear that such connections had previously, and presumably continued to have, existed in this phase of the early Neolithic. Furthermore, we can identify from the models that even at the local level, and probably beyond this, mobility was subject to regional variation. Such variability, reflected in the different cost of movements across each cluster, may reflect different traditions and practices of mobility, or may more simply be consequent on the relative ease of travel through that particular landscape.

There is a fifth level. Etton reminds us that mobility *within* the enclosure can be also be theorised (Pryor, 1998a) and David Wheatley's (Wheatley, 2014) discussion on proxemics reinforces the validity of Jim Leary's argument (Leary, 2014) that mobility can also exist at the micro level. Although such limited consideration of mobility is outside the scope of this research, Wheatley's work is important to this study. If we exclude the auditory, haptic and olfactory components, and accept his argument that the visual is the dominant sense in relation to landscape and hence mobility, then we can extend proxemics to include viewsheds, and interpretation can be derived from both the cost and the visibility models.

In considering the implications for mobility, we must also recognise that even where we have statistically derived chronological data that suggests overlapping periods of 'in-use', we cannot be sure that enclosures were in exact concurrent use. We can only model the start of construction, the abandonment

of the enclosure and specific intermediate events. For example, the recutting of ditches. Recognising that activity was periodic or episodic (Edmonds, 1993b, 80; Pryor, 1998a, 361) and continued for relatively short durations at many enclosures, with some ditches filled in purposefully after only a short period, and some later recut (Whittle *et al.*, 2011, 703), imposes a significant challenge to understanding mobility. The precision of the chronological dataset simply does not allow yet interpretations to be made surrounding contemporaneity at (say) the annual or seasonal level. This is a significant limitation, where further investigation of waterlogged enclosures containing material suitable for dendrochronological analysis could help.

Only perhaps the Hambledon and Stepleton enclosures, which are intimately bound by other earthworks (Oswald, 1997; Mercer & Healy, 2008) indicate with certainty that a close spatial relationship implied such a contemporary inter-enclosure social system. Though even here the earthworks are a later addition to the early Neolithic complex. We may assume that the traditions surrounding the use of the two enclosures would have changed during the 300 to 355 years (68% probability) that the main enclosure was in use. It is perfectly possible that after the first enclosure was constructed in 3660-3650 cal. BC (68% probability), activity switched to the Stepleton enclosure constructed in 3640–3615 cal. BC (42% probability) (Whittle *et al.*, 2011, 145-147), and henceforth the two enclosures coexisted with the focus of activity transferring between them frequently. Only in the last 1-16 years (68% probability) of early Neolithic activity on the hill are the two enclosures bound together by the later earthen banks (Whittle *et al.*, 2011, 144). Prior to this final phase of consolidation

mobility could have been reflected by, for example, visiting one of the enclosures one year, and the other, the next year.

5.4.1 **Over land at the local level.**

Considering the local level, it is possible to reach any of the fenland enclosures from any other of the fenland enclosures within four hours. Although such close proximity of multiple enclosures is atypical, we must also note the close spatial relationships that exist between some enclosures. The enclosure at Robin Hood's Ball is adjacent to the recently discovered enclosure at Larkhill, 4km to the east. Rybury and Knap Hill, and, Briar Hill and Dallington, are separated by a similar distance, whilst Crickley Hill and Birdlip Camp lie within 2km, and the Stepleton enclosure is separated from the main enclosure on Hambledon Hill by 1km. Nevertheless, the distribution of enclosures does imply a mobility at the local level. Along the Thames Valley, Eynsham, for example, has four enclosures within four hours walk, ten within eight hours, and twelve within twelve hours. Whilst other enclosures such as Netherfield Farm may appear to be more remote, journeying the twelve hours overland to Maiden Castle or Hambledon Hill is unlikely to have been an obstacle.

The cost models suggest that it is not unreasonable to expect that folk groups associated with the construction of, and the activities at, one causewayed enclosure, were familiar with the existence of other broadly contemporaneous enclosures. We might further propose that the two apparent clusters evident in Sussex may be an indication that a single folk group was responsible for the construction of more than one enclosure. It is perfectly possible that each of the two clusters represents the combined organisational efforts of distinct groups, who, over time, constructed enclosures at different points in the

landscape as an event, occasionally returning to them in a symbolic gesture to renew and refresh past traditions. Similar arguments may be made for the enclosures of the Thames Valley, the Fens and some northern Wessex enclosures, where they are also separated by relatively low cost-distances. The more isolated southern Wessex enclosures at Maiden Castle, the Hambledon Hill complex and Whitesheet Hill may reflect a regional variation in the tradition associated with enclosure building, and a more isolationist approach may be responsible for the enclosures ultimately being more substantially developed, and in the case of Hambledon Hill, more enduring.

This, coupled with the notion that different folk groups may have contributed to the construction by the digging of their own ditch, may suggest that events in the enclosures were 'hosted' by different folk groups at different times. Each group possibly organised the construction of an enclosure within its own territory and invited other groups to participate in the ceremony and ritual of construction as part of a region-wide tradition of re-establishing social relations, dues and bonds which Roger Mercer argues were set within a complex hierarchy of settlements and social structure (Mercer, 2003, 69).

Just as the spatial distribution of causewayed enclosures was not arbitrary, but defined by cognitive processes (Edmonds & Richards, 1998, 206), their position in the landscape may also be a result of social processes.

The preference for locating causewayed enclosures on the higher ground, where higher ground exists, and for selecting their exact location and orientation to focus on selected planes of visibility may also relate to mobility. Whilst it is difficult to construct an argument that suggests mobile groups were

overtly visible, through a largely wooded landscape, it is possible to theorise that the movement of people through selected areas of the landscape was detectable. Smoke from fires, auditory signals from hunting, even the sound of knapping activities from within these groups could be assembled and processed from an upland enclosure, to observe and understand mobility from distant points in the landscape. This ability to identify, from great distance, the presence and movement of people in specific spaces across the landscape may have been an important, even decisive, factor in the siting of upland enclosures. Similarly, the ability to identify the location of the enclosure, from distance and a particular space, may account for the carefully chosen location and orientation (Oswald *et al.*, 2001) of a particular enclosure on a particular hill.

The extent to which this can be argued is, to a large degree, determined by the prevailing vegetative conditions immediately surrounding a particular enclosure. The widescale clearance of forest, particularly on the chalk, has long been noted (Evans, 1975) (and see p.355 above for more recent evidence). Whilst detailed environmental data is available for some specific 'sites', the broader picture between the monuments remains much more obscure. Furthermore, the degree to which the immediate environs of some enclosures were cleared of tree cover is particularly difficult to establish. For example, the construction of the timber palisade enclosure at Hambledon Hill consumed some 3000 large trees (Mercer, 1988; Mercer & Healy, 2008). This suggests that the hill and immediate surroundings were substantially cleared as the palisade was constructed. Though we have to assume that the location and orientation of the enclosure had been chosen before the landscape was cleared for timber,

mobility here, after the construction of the palisade, will have been through a cleared or semi-cleared landscape, possibly one of apparent destruction and regeneration (Thomas, 2013, 390). The visual characteristics would have changed markedly, following the decision to site the enclosure across the south flank of the hill.

These local distances contrast markedly with the mobility associated with some early Neolithic artefacts. Often cited are the presence of jadeite axes in early Neolithic contexts, but the evidence of axes from the European mainland, directly associated with causewayed enclosures in southern Britain, is lacking. Of the 119 jadeite type axes found in the UK (Walker, 2018, fig. A1.1) from, for example, the Monte Viso region on the French / Italian border (Edmonds, 1995), only one found at the Sweet Track (Somerset) is from a secure context (3807-06 cal. BC). Only two are directly associated with causewayed enclosures, at Hambledon Hill (Dorset) (Mercer & Healy, 2008) and High Peak (Devon) (Smith, 1965b), and both of these are from unstratified deposits, possibly associated with a primary, pre-enclosure Neolithic horizon. No jadeite axes yet found at causewayed enclosures have been extracted from within sealed contexts (Thomas, 2013, 278).

A mobile, migratory early Neolithic is argued by Alison Sheridan. Grossly simplifying her argument, Sheridan associates jadeite axes with either the Carinated Bowl tradition of Neolithisation, with western Britain influenced by a migration-based affiliation with the Paris Basin and the Low Countries (Sheridan, 2007; 2010) in the early fourth millennium; or her slightly later 'trans-Manche west' tradition (Sheridan, 2011) with southwest Britain influenced by a migration based affiliation with Normandy and perhaps the Channel Islands.

Furthermore, there is increasing evidence that these exotic items were highly prized and may have been curated for hundreds of years before final deposition or loss (Walker, 2018). The key point for this study is that, although a continental mobility may be demonstrated by the movement of jadeite axes, all these axes seem associated with a point in time prior to the establishment of causewayed enclosures on the British mainland[7] and cannot therefore be used to demonstrate mobility at the time that enclosures were constructed and used.

Furthermore, the nature of mobility is not necessarily proven by the transmission of ideas or artefacts as more complex patterns of exchange are likely to have existed. Some artefacts (and ideas) were probably distributed over many generations, via networks of transferred ownership (Smith, 1979; Edmonds, 1993b; Anderson-Whymark *et al.*, 2015, 67) within an overall mobility network. Such practices may have served to limit the distance any one individual travelled in the transmission of the axe or idea from one place to the next. We cannot be certain how the long-distance transmission of such 'things and practices' translated to the mobility of an individual person. Whilst the increasing body of isotope evidence is suggesting very long-distance travel was not uncommon (Ray & Thomas, 2018, 129), recent work on the remains of individuals recovered from the Hambledon Hill excavations, suggests that although some of the stone and ceramic assemblage appears to originate from Somerset, Devon and Cornwall, the majority of the individuals tested appear to have had more local origins. Only one of the individuals tested appears to originate from the far southwest (Neil *et al.*, 2018) and none from overseas.

[7] The causewayed enclosure at Magheraboy (Co. Sligo ROI) is an early established enclosure (4065-3945 cal. BC at 68% probability) that Sheridan directly associates with the Carinated Bowl tradition.

Notwithstanding the limitations of the direct evidence, it is difficult to argue that, with long-distance mobility being demonstrated in the primary phase of Neolithisation, such a mobility would halt in the following phase (cf. Scarre, 2015, 79). We may presume that, if a continental mobility is known to have existed prior to the establishment of causewayed enclosures, and if the tradition of enclosure building was influenced by similar constructs in western Europe, then such long-distance mobility continued throughout the period in which enclosures began to be constructed (Anderson-Whymark *et al.*, 2015, 70). The assertion made above concerning views from the Trundle, Halnaker Hill, Barkhale and Whitehawk may support a link between this long-distance seafaring mobility and the visual characteristics afforded to these enclosures.

We should also not forget that the geopolitical boundaries we are familiar with today may not have been apparent in the early Neolithic. Whilst travel to the island of Britain from mainland Europe could only have been achieved by waterborne craft, the early Neolithic people of Britain may not have distinguished themselves as having significantly different cultural identities to those from continental Europe (Walker, 2018). In these circumstances it would not be surprising that some causewayed enclosures were inclined towards, and provided a view towards, the sea.

5.4.2 **Over land at the level of the British mainland**

Detailed evidence supporting a mid-range mobility in the early Neolithic remains somewhat scarce. For example, the comprehensive strontium isotopic evidence supporting mobility analysis in later Neolithic contexts (French *et al.*, 2003a; Viner *et al.*, 2010) or LBK settlements (Bentley *et al.*, 2003) is not yet fully replicated for the material recovered from British enclosure ditches (for

examples see: Legge, 2008; McKinley, 2008, though cf.; Neil *et al.*, 2018). However, the evidence offered by artefacts found in secure contexts, within the ditches surrounding causewayed enclosures, does provide ample evidence for mobility, and movements (of artefacts) of significant distance within the British mainland.

For example, Gp.IVa greenstone axes and other stone artefacts, probably from near Callington, Cornwall, were recovered at Maiden Castle (Sharples & Ambers, 1991, 231-2). Polished Gp.VI and VII axes, recovered at Etton, originated in Cumbria and North Wales (Edmonds & Roe, 1998). The gabbroic pottery at Hambledon Hill, Windmill Hill and Robin Hood's Ball originated on the Lizard peninsula (Peacock, 1988; Darvill, 2008), suggesting other westward contact. At Etton, Alan Dawn records segments of quern from non-local stone probably '*imported from some distance*' (Dawn, 1998, 259).

Control over the distribution, of axes in particular, has been offered as one of the social customs played out within causewayed enclosures, leading to the enclosures to be considered as nodes of a distribution network where tokens, including livestock and people, were offered, extracted, and exchanged (Edmonds, 1995) .

A shift over time in the materiality of axes had previously led Mark Edmonds (Edmonds, 1993a, 122-125) to argue that enclosures played a role in providing a changing attitude towards their 'value'. Edmonds suggests a switch in preference, away from axes manufactured from locally sourced flint to those made of more distant and exotic materials, was enacted through the control of their exchange at causewayed enclosures. Whilst this raises an interesting

perspective on the role of enclosures, the complex argument offered by Edmonds does not support the assertion that acting as a node of exchange was a defining feature in deciding a causewayed enclosure's location. Further, the spatial distribution, and in particular the clustering of enclosures coupled with a lack of known enclosures across some parts of Britain, does not lend support to an argument that causewayed enclosures acted as nodes in a distribution network, excepting perhaps at a very local and geographically selective level. That is not to say exchange was not one of the activities carried out; simply that the models do not support the concept of a significant role for causewayed enclosures in the politics of wide-scale systems of distribution, a position also supported by the material evidence. Rather than being 'moved on', the prevalence of axes found in enclosure ditches points towards them being brought to causewayed enclosures in order to purposefully end their use (Walker, 2018, 96).

The spatial models could support the notion of long-distance travel for the acquisition or giving of exotic goods. If we accept that the causewayed enclosures were constructed closely adjacent to (in cost-distance terms) the foci of early Neolithic activity, as indicated by the models, then we might envisage travel to or from remote parts, and the giving of gifts, as an important symbolic gesture in the creation of solidarity, obligation and alliances (Walker, 2018, 17).

The cost models certainly support local exchange, and Stuart Needham (Needham, 2008) offers ten reasons for the exchange of goods, which could have included axes amongst other chattels and, for example, livestock. The need to travel was expressed by Colin Renfrew (Renfrew, 1993) and there is

some overlap between Needham's and Renfrew's contributions. Most notable perhaps, in the context of middle distance travel, is what Needham describes as 'pilgrimage' (Needham, 2008).

We might infer then, that the spatial distribution of causewayed enclosures suggests an early Neolithic society consisting of groups that functioned within loosely defined geographic areas. These groups consisting of semi-mobile, dispersed bands of extended families bound by tradition, bonds, debts and obligations, who moved around in the landscape within prescribed, or mutually understood, boundaries. These kin groups then, could each have been responsible for the construction of multiple enclosures that are now represented by the clustered nature of their spatial distribution.

The following chapter considers how particular visual characteristics influenced the establishment of a causewayed enclosure and the perception of the enclosures within a semi-mobile early Neolithic society.

5.5 **Causewayed enclosures and their visual characteristics.**

The visibility models suggest that the locations of causewayed enclosures were deliberately and carefully chosen to exercise, though not maximise, control over their visual characteristics. By careful arrangement in the landscape, topographic features were exploited that controlled the visual range and directions of view. These characteristics were an important, if not decisive, factor in siting an enclosure and decisions were taken to exclude, as well as include, other landscape features and areas.

Whilst many of the causewayed enclosures located on the uplands enjoy dramatic views over extensive landscapes, it is difficult to conclude that simply

maximising the panoramic view played a defining role in their siting (cf. Klassen, 2014, 111).

The Sussex and Wessex evidence suggests that, where high ground was available, there was a preference for the construction of enclosures in upland locations. However, the proliferation of enclosures on the low-lying areas of the Thames Valley, the Fens and the single example at Netherfield Farm demonstrate that low ground would also be exploited if no high ground were available. This suggests that high ground and dramatic settings were not prerequisites for enclosure construction. Furthermore, the models from Sussex and Wessex suggest that, even on the uplands, higher and arguably more dramatic views were available nearby. For example, at Hambledon Hill no enclosure was constructed on the north spur (cf. Ray & Thomas, 2018, 143), where views could have been considerably more wide-ranging. No causewayed enclosures are known on the chalk immediately to the north and southwest, which at 240m AOD is some 60m higher in elevation than Hambledon Hill, with both locations providing the opportunity for more expansive views.

Suggestions that the tops of hills were to be avoided as '*sacred spaces'* (Oswald *et al.*, 2001, 98) or too important to be '*defiled with earthworks'* (Field, 1998, 320), could be supported, but it may also be that the objective of locating enclosures on tilts in the landscape (Figs.174-176, pgs.432-4), or where higher grounds were immediately adjacent to enclosures, was to control their visual characteristics. For example, high ground adjacent to an enclosure, restricts visibility beyond that point, and also serves to hide the enclosure from an observer approaching from that direction.

Rybury (244m AOD) and Knap Hill (258m AOD) are important examples in this respect. Both are located on the crest of their respective hill-spurs on the south side of the main chalk massif. Surrounding Rybury, to the north and to the east, are higher elevations of the massif (260–270m AOD) which serve to limit views to and from the enclosure, to between 500m and 1000m. Similarly views from and to Knap Hill are largely controlled by the adjacent higher ground, restricting views (with the exception of a small coombe) to the south.

Whilst both Rybury and Knap Hill enjoy expansive views to the south, the views from these enclosures in a northerly direction are very limited. This 'specificity of view' can be argued for many of the upland enclosures in the Wessex and Sussex regions. This characteristic was previously noted by Alastair Oswald for Coombe Hill and Whitehawk (Oswald *et al.*, 2001, fig. 5.25), but is also apparent at Maiden Castle, the Hambledon Hill and Stepleton enclosures, Offham Hill, The Trundle, Halnaker Hill, and Barkhale Camp.

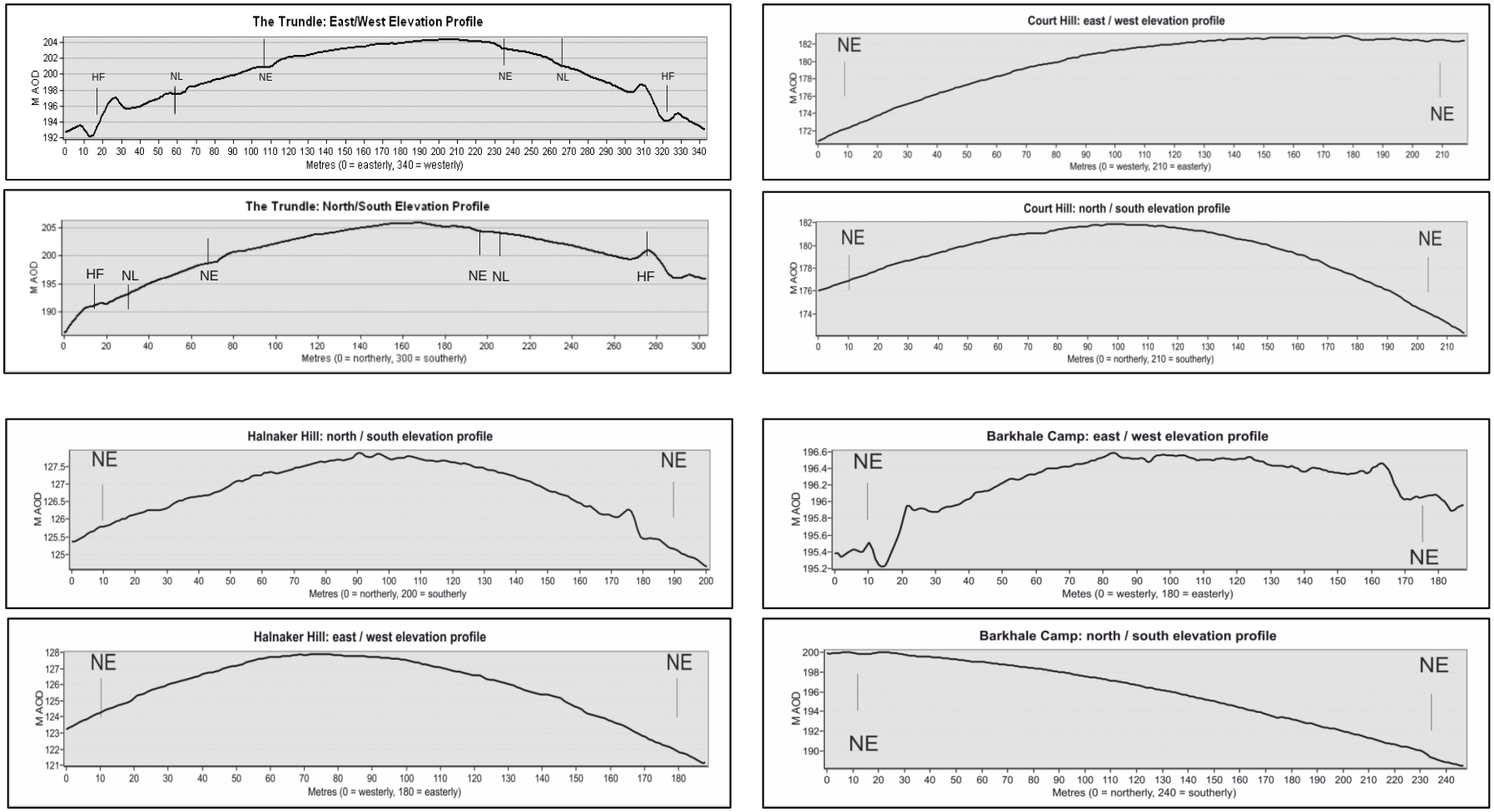
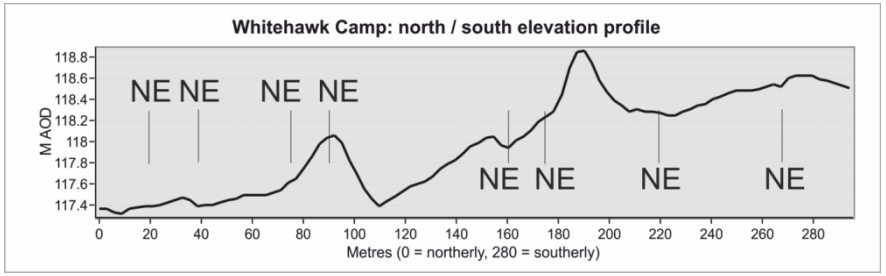
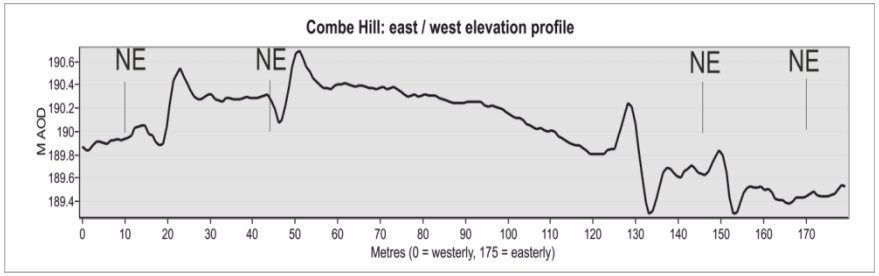
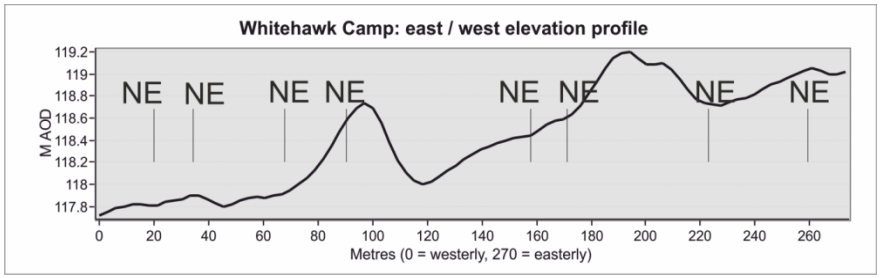
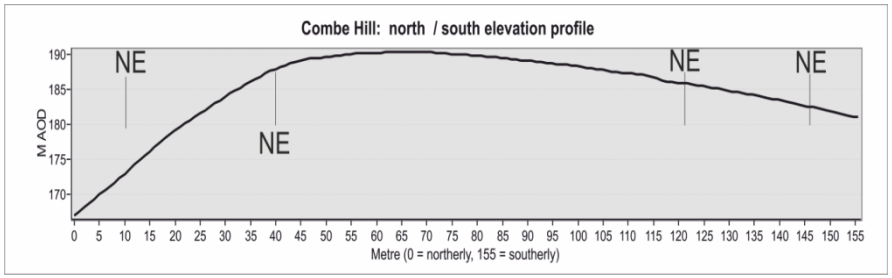


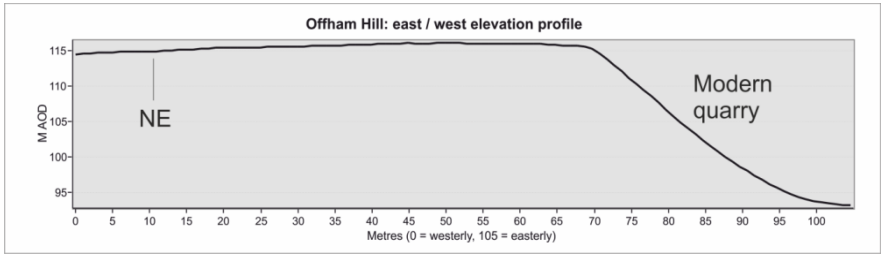
Figure 174: Elevation profiles for Sussex (western cluster) enclosures.
The enclosures are apparent on the high resolution DTM. The 'Y' axis is exaggerated to show the early Neolithic circuits and features, and the slant or tilt of the landscape on which the enclosure was constructed. Of the four only Halnaker Hill is situated centrally across the domed summit.
NE= causewayed enclosure: NL = potential early Neolithic linears HF= Iron Age hillfort earthworks,
Spatial data: 1m resolution Lidar data, Geomatics – The Environment Agency











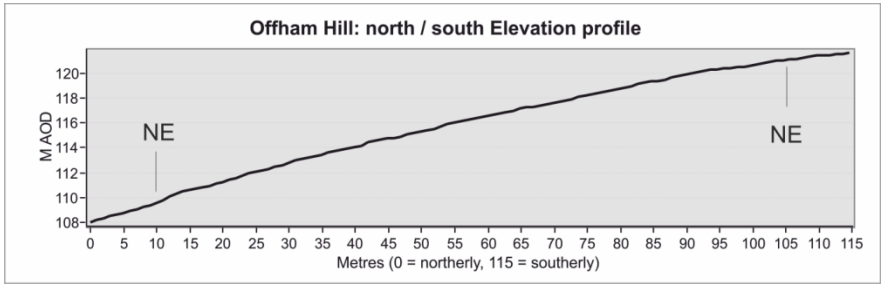


Figure 175: Elevation profiles for Sussex (eastern cluster) enclosures.

The complex arrangement of ditch circuits at Whitehawk contrasts with the simplicity of the single circuit at Offham. Nevertheless, the tilt in the landscape can still be observed with Whitehawk and Offham dipping to the north and east. The inner circuit at Combe Hill dips to the south and the west though the outer circuit is more 'balanced' across the summit. NE= causewayed enclosure earthwork:

Spatial data: 1m resolution Lidar data, Geomatics – The Environment Agency

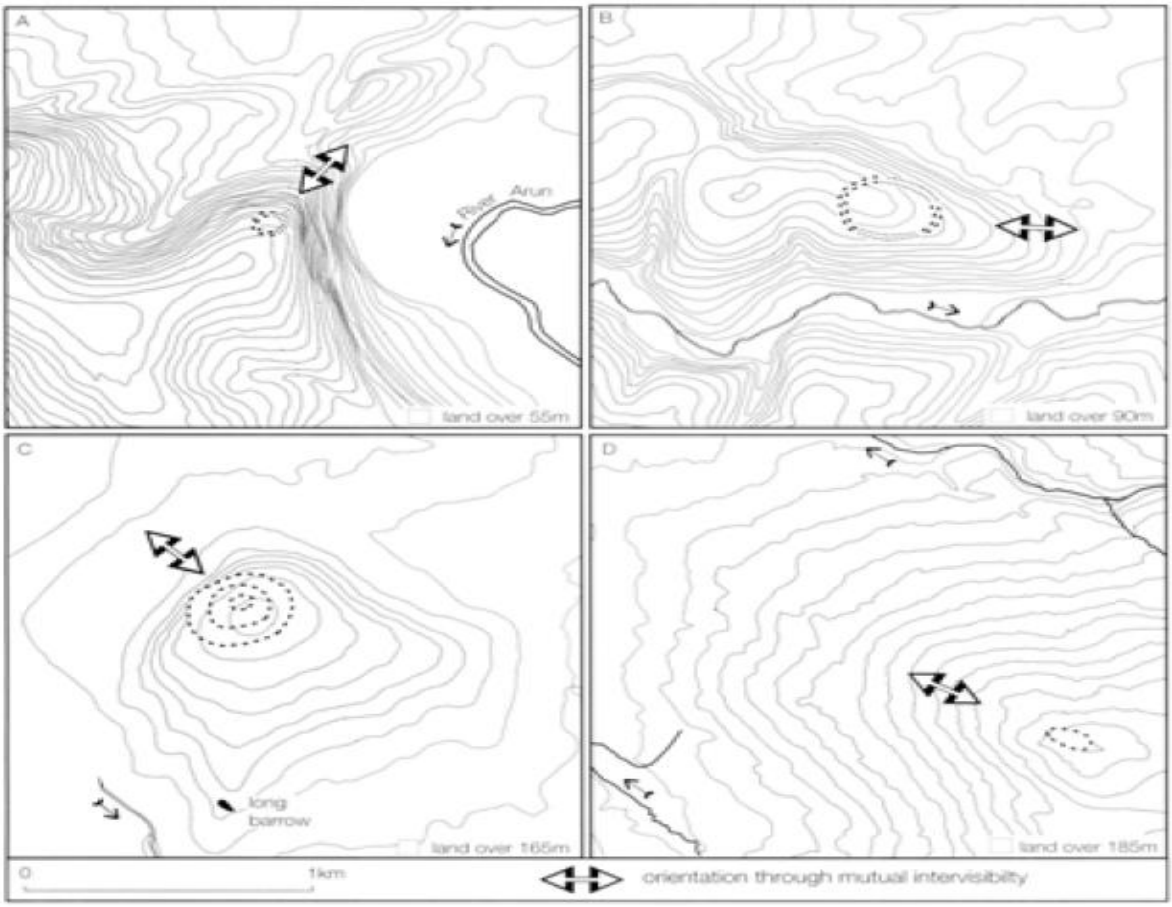


Figure 176: Oswald's model of orientation through intervisibility with topographical features of the landscape.

Oswald notes the tilt of enclosures which he links to immediate topographical features of the landscape. The enclosures shown here at A., Ofham, B., Maiden Castle, C., Windmill Hill, D., Green How, are, he implies, designed to be apparent from the adjacent lower ground, whilst he also defines a second class designed to be seen from the adjacent higher ground.

Source: Oswald et al. 2001, 99

The lowland enclosure at Netherfield Farm also displays similar characteristics. Here there is a focus on long-distance views to the north, towards areas of known and expansive early Neolithic activity on the Mendip Hills (Lewis, 2005; 2011b; 2011a), and in the shorter distance across the Somerset Levels where again, considerable early Neolithic activity is apparent. Exceptions may be identified in the causewayed enclosures at Robin Hood's Ball, Larkhill and Windmill Hill. Here the enclosures lie more subtly in the landscape and a directionality of view is less obvious.

Rarely are causewayed enclosures intervisible. Two possible exceptions are the Hambledon and Stepleton enclosures, and The Trundle in the West Sussex group.

The relationship between the Hambledon and Stepleton enclosures is worthy of consideration. Despite their proximity relationship, and being later combined by other shared earthworks, the view from the inner circuit of the Hambledon Hill enclosure could only ever have included a small section of the Stepleton enclosure, and probably did not include it at all. Whilst the model reports that the northern quadrant of the Stepleton enclosure may 'just' have been visible from the main enclosure on Hambledon Hill, too little data is available on the early Neolithic ground conditions and elevations to be more certain. It is quite likely that the contemporary elevations prevented such intervisibility.

The relative situation of the Hambledon and the nearby Whitesheet enclosures also seems purposefully designed. Whilst the position of Hambledon Hill may have been chosen for very specific reasons relating to a particularly attractive topography and for the views over sources of the raw materials used in the

production of ceramics recovered from the ditches (Smith *et al.*, 2008), the particular choice of location for Whitesheet is not so apparent. The precise point chosen results in an arrangement whereby intervisibility with Hambledon Hill could never have been achieved in the early Neolithic due to the position of Duncliffe Hill, an intervening isolated hillock located midway between the two enclosures. Had, for example, the Whitesheet enclosure been located 500m further east, or 1500m further west, both of which locations offered higher elevations, then Whitesheet would have been intervisible with Hambledon. The particular point in space at which the Whitesheet causewayed enclosure was constructed seems to have been purposefully chosen to avoid an intervisibility with the earlier and prominent enclosure at Hambledon.

A similar relationship exists between the Rybury and Knap Hill enclosures. Knap Hill is situated 3700m to the east of Rybury and hence well within the visual range. The position of Knap Hill on an inward curving edge of the chalk scarp, with higher elevations to the west, results in the two enclosures being out of view. However, unlike the relationship between Whitesheet and Hambledon, the topography dictates that the relative positions of Rybury and Knap Hill would have had to have been carefully selected to obtain an intervisibility with this degree of spatial separation. The minimum distance Knap Hill would have to have been relocated to have been intervisible with Rybury is 900m to the southwest or 2000m to the west.

The relationship between the visible range of Windmill Hill and the Rybury and Knap Hill enclosures is also worthy of note. The outer enclosure at Windmill Hill is unusual in not expressing a directionality of view. Near-distance (<5000m) views are near continuous across 360 degrees of arc, particularly in

the north, east and west directions. In the southerly direction, views are less continuous, being interrupted by the valley of the River Kennet, but do coalesce to form a near continuous view along the northern scarp of the Pewsey Downs. The Rybury and Knap Hill enclosures, being located on the southern flank of these downs, at slightly reduced elevation are hidden from an observer at Windmill Hill. The visual characteristics are marked. An intervisibility between Windmill Hill and Rybury could have been achieved by locating Rybury on higher ground 900m to the north, whilst an intervisibility between Windmill Hill and Knap Hill might have been achieved by locating Knap Hill 350m to the northeast. Had both of these enclosures been thus located, an intervisibility could have been achieved between all three. In the locations chosen for these enclosures, none could have been intervisible.

An argument against inter-enclosure visibility was also made for the fenland enclosures. None of the four enclosures chosen for the case study were separated by more than 4200m, and all were contained within 10000m. Despite their proximity, none could have been intervisible. Similarly, none of the thirteen enclosures comprising the Upper Thames Valley case study could have been intervisible. Whilst it is more difficult to construct an argument in a flat landscape, where vegetation would have the defining role in patterns of visibility, it may be useful to note the characteristic pertained even in these areas.

An exception occurs in the four enclosures comprising the West Sussex group. Whilst the models predict that none of the Court Hill, Barkhale and Halnaker Hill enclosures are likely to have have been intervisible, The Trundle, however, may have been. The Trundle represents the single example in this study that

displays an intervisibility with another enclosure and the models predict that The Trundle could have been intervisible with all three of the West Sussex enclosures (Fig.177). In today's landscape it is possible to view Court Hill and Halnaker Hill from The Trundle, but the view towards Barkhale is less certain and was not possible at the time of the field survey.

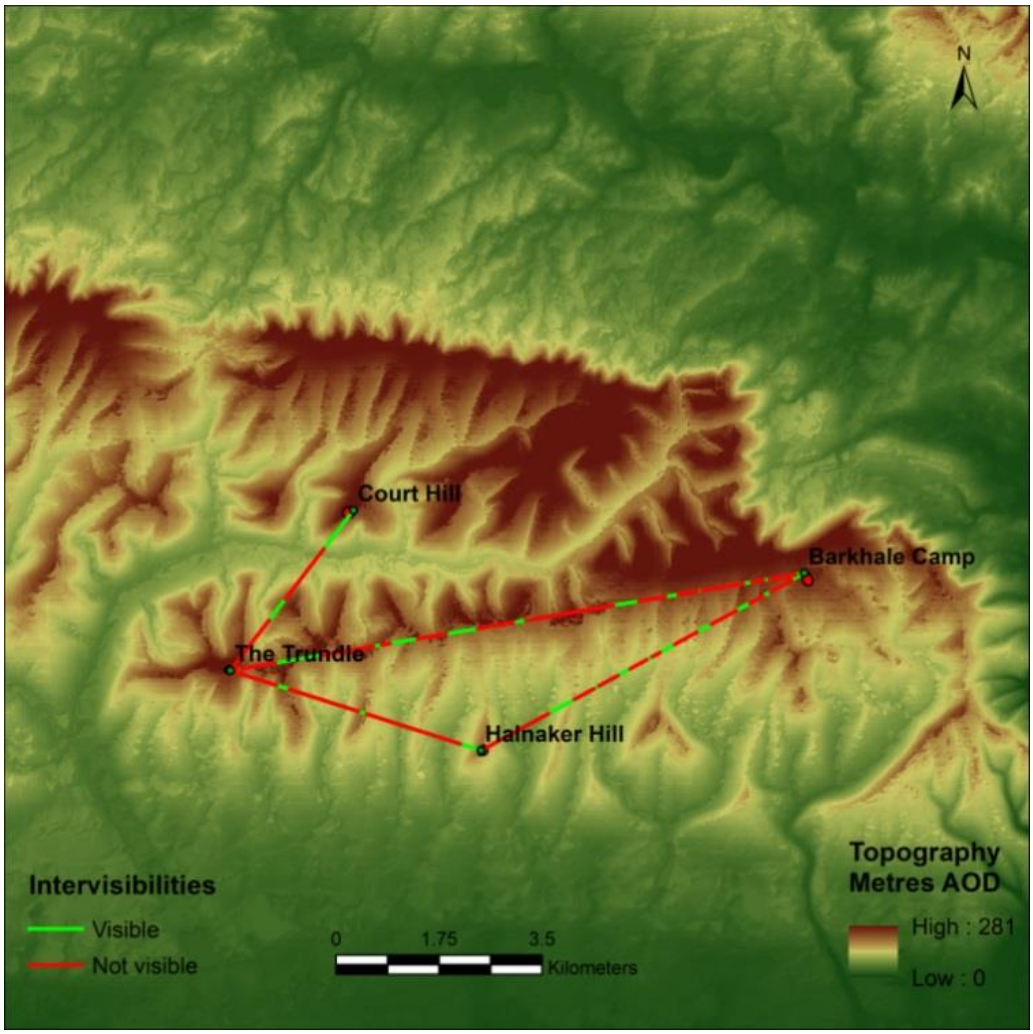


Figure 177: Visibility network for the enclosures of the West Sussex cluster.

The model predicts that Court Hill, Barkhale Camp and Halnaker Hill are all visible from the Trundle. Whilst the model also predicts an intervisibility between Halnaker Hill and Barkhale Camp, this can only be achieved at the extreme south-east of the Halnaker Hill circuit. The model is frail, and under early Neolithic ground and vegetative conditions, such intervisibility is unlikely to have existed.

Spatial data: Edina Digimap, Crown Copyright/database right 2010. An Ordnance Survey/ Edina supplied service.

The legitimacy of the model's results do warrant some consideration. The distance between The Trundle and Barkhale is 10km and the view crosses the undulating landscape on the south face of the Downs resulting in a discontinuous visual pathway. Relatively small changes in elevation along this pathway, for example elevation changes resultant on chalk solution losses, could impact the validity of the model. Nevertheless, the views towards Halnaker and Court Hill are more robust and The Trundle may serve as an unusual example of a causewayed enclosure that is intervisible with others. The reason for this is unclear, but the spiral circuit forming the first phase of The Trundle may be the earliest component of all the Sussex enclosures (Whittle *et al.*, 2011, 251). An explanation may lie in the symbolic importance of The Trundle as a foundation enclosure with a symbolic focus back towards the coast, later enclosures being designed to reflect this symbolism through a visual association with The Trundle thus providing an ontological continuity with a maritime past.

With the exception of The Trundle, the deliberate care taken to 'exclude' rather than 'include' is characterised by all the causewayed enclosures tested. The next chapter considers how this characteristic relates to long barrows and other foci of early Neolithic activity.

5.6 **Causewayed enclosures and long barrows.**

The relationship between long barrows and causewayed enclosures has been discussed since 1962 when Stuart Piggott and Isobel Smith noted that the skeletal remains found at causewayed enclosures and long barrows comprised typically different elements (Piggott, 1962; Smith, 1965b). Later scholars have suggested the purposeful transportation of disarticulated remains from causewayed enclosures to long barrows, in part at least to explain a lack of evidence for the small bones being found within long barrows (Mercer, 1980; Bradley, 1984b; Thorpe, 1984; Edmonds, 1993a; Thomas, 2000). Bradley reflected on the prominence given by Richard Huntington and Peter Metcalf to the defleshing of human bodies as a rite of passage (Huntingdon & Metcalf, 1979) and developing this theme, suggested that the 'preliminary treatment' of bodies was carried out at the enclosure and selected bones, of selected individuals, were transported to long barrows for interment (Bradley, 1984b).

We might expect then that this would result in a close spatial relationship between the two monument types and that this would also be reflected in the visual relationship. For example, a desire to recollect and reinforce traditions of ancestry and hierarchy might result in a high degree of intervisibility between causewayed enclosures and long barrows. Whilst there are exceptions and a degree of regional variability, the modelling suggests the converse was the norm. The locations of long barrows and causewayed enclosures seem to be carefully chosen to avoid such characteristics.

The variability is most pronounced in the Wessex case study, though does occur elsewhere.

Variability is unsurprising: Gibson has remarked:

"*no matter how much we may categorise, quantify, 'typologise', 'chronologise' seriate or regionalise, we are dealing with people*" (Gibson, 2003, 136).

The dissimilarities expressed in the monuments we collectively identify as causewayed enclosures and the relationships between causewayed enclosures and other contemporary early Neolithic indicators in Wessex are a reflection of the outward expression of difference introduced by human agency in structuring the landscape (Johnson, 1987). For this reason, and for reasons of survival and chronology, we cannot expect perfectly repeatable patterns. Furthermore, doubt surrounds the authenticity of some long barrows such as at Maiden Castle, whilst others certainly remain unrecorded.

However, this chapter argues that, despite variability, some striking patterns emerge in the relationships between causewayed enclosures and long barrows that reflect an intentionality and preference in tradition.

Analysis of the cost-distance models in respect of long barrows and causewayed enclosures reflects a general variability, whilst analysis of the visibility models demonstrates a much stronger pattern of relative locations.

A pattern of spatial distribution of Wessex long barrows has been noted for some time. Grinsell (1958; 1959), and later Ashbee (1970) both record clustering in the vicinity of the Dorset Ridgeway, Cranborne Chase, and the two areas around Stonehenge and Avebury. Beyond Wessex, O.G.S. Crawford noted similar distribution patterns centring on the Swell and Avening regions of the Cotswolds (Crawford, 1925, 5)

Long barrows themselves exhibit a significant diversity of form that may have reflected a diversity of function (Pollard & Reynolds, 2002, 63). For example, the number of individuals interred can range from many, for example 14 individuals at Millbarrow (Whittle *et al.*, 1994), 34 at Fussell's Lodge (cf. Ashbee, 1957; Wysocki *et al.*, 2007) and 36 at West Kennet (cf. Piggott, 1962; Whittle *et al.*, 2007d), to none, for example at Horslip, Beckhampton Road, South Street (Ashbee *et al.*, 1979), and Thickford Down (Ashbee, 1970).

Wheatley (1996, 80) develops the spatial distribution argument, suggesting a divide in tradition at Avebury with only earthen barrows to the south of the Avebury region. Such a simple model cannot be sustained. The Somerset HER contains many examples of lost long barrows of probable megalithic chambered construction, with a surviving example at Stoney Littleton (373500, 157200). Yet further south in Dorset, less well preserved instances exist, for example the 'Grey Mare and her Colts' (358390, 087060) (RCHME, 1952, 43), and the 'Hellstone' (360580, 086700) at Portesham.

Within the MiCDA for Wessex, the count of long barrows ranges from Netherfield Farm which has none to Larkhill which has 34 (Fig. 178, p.443). There is a marked difference between the north Wessex enclosures and those in the central area, whilst further south, the number of long barrows proximate to Maiden Castle rises to approximately the same numbers close to Knap Hill, Rybury Camp and Windmill Hill. A different pattern emerges within the MeCDA and MaCDA. Here the models report a distinct north–south divide. For example, the count of long barrows within the MaCDA for Windmill Hill (count = 150) is more than double that of Hambledon Hill (count = 66). The change seems occur with the enclosures at Larkhill and Robin Hood's Ball. South of

Salisbury Plain there are fewer long barrows and hence fewer that can be associated with causewayed enclosures, despite these southern enclosures being the largest and most developed.

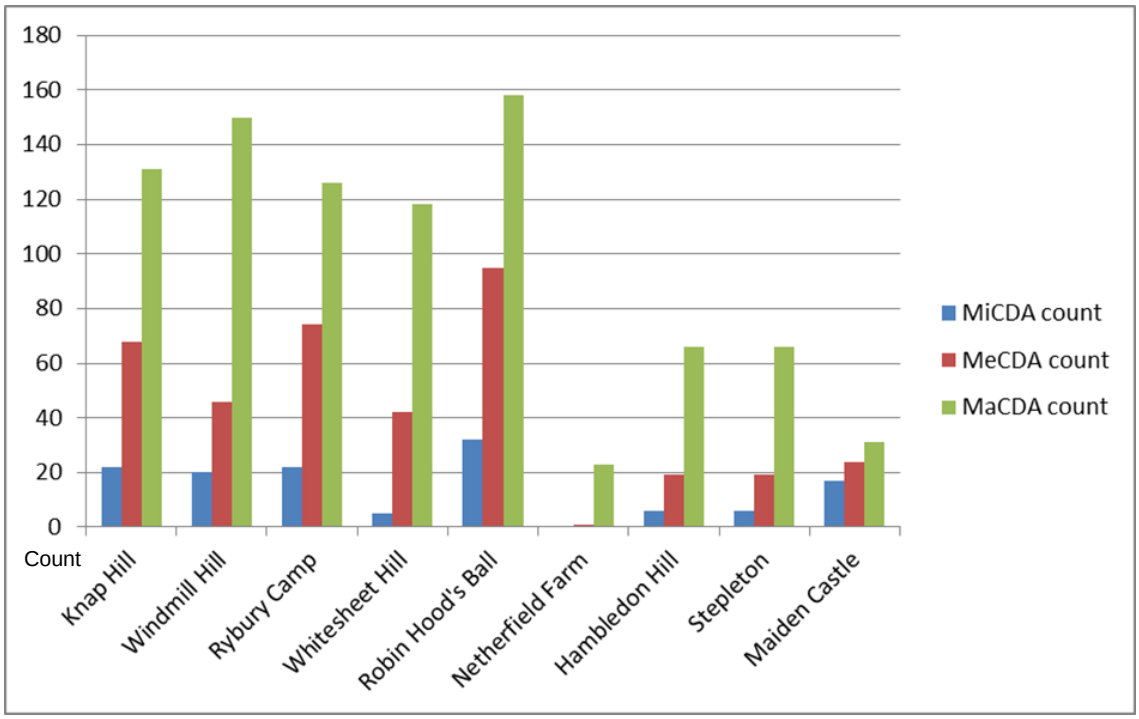


Figure 178: Count of Wessex long barrows by enclosure.

Known long barrows in the MiCDA, MeCDA, and MaCDA of each causewayed enclosure. A significant variation in density exists between the long barrows associated with the cost distance areas of the northern Wessex enclosures, and those to the south. The total count in both regions contrasts markedly with the number of long barrows that are intervisible with causewayed enclosures.

Source: author

If the processing of human remains was the primary aim in locating an enclosure, then we might expect these larger, better developed and, in the case of Hambledon Hill, more enduring enclosures, to have had a higher investment in more long barrows, more closely associated with the enclosures.

Hambledon Hill is unique amongst the sample in that the enclosure has two long barrows adjacent to the main enclosure and, indeed, inside the cross dykes of the early Neolithic complex (Oswald, 1997). Whilst the chronology of the northern barrow remains uncertain, the south barrow has been shown to be contemporary, constructed perhaps less than 30 years earlier than the main enclosure (Whittle *et al.*, 2011, 136-138). This is important, since such a close relationship demonstrates that this unique characteristic of tradition was a designed feature right from the start of the enclosure's construction. It is quite possible that the two architectural forms were designed and constructed by the same individuals. This is perhaps what we might expect if one of the primary functions of the enclosures were the processing of cadaveric remains prior to their being deposited in a long barrow. However, even the nearby causewayed enclosures at Maiden Castle and Whitesheet Hill, or the adjacent Stepleton enclosure, all of which we may expect to have been built under the same traditions, do not share this characteristic. In this respect Hambledon Hill demonstrates a more complete repertoire of early Neolithic 'things and practices'.

The spatial separation of long barrows and enclosures varies significantly, even in areas where long barrows are common. The enclosure at Netherfield Farm is situated in an area devoid of long barrows, and the nearest are towards the South Dorset Ridgeway (Woodward, 1990) and on the Mendip Hills to the

north (Lewis, 2005; 2011a; Pearce *et al.*, 2011). This accounts for the high maximum distances (Fig. 179) recorded for Netherfield Farm. In the modelling the maximum distance between an enclosure and a long barrow is dictated by the extent of the MaCDA and the position of the most distant long barrow within it. It may be argued that this is largely fortuitous and takes no account of the 'accuracy' of the model nor any long barrow that may be just beyond the calculated boundary. Nevertheless, the low distances recorded for the two enclosures of the Hambledon Hill complex (Fig.179) may suggest that most of the activity that may be associated with this enclosure was concentrated in a smaller area than was the case with the enclosures further north.

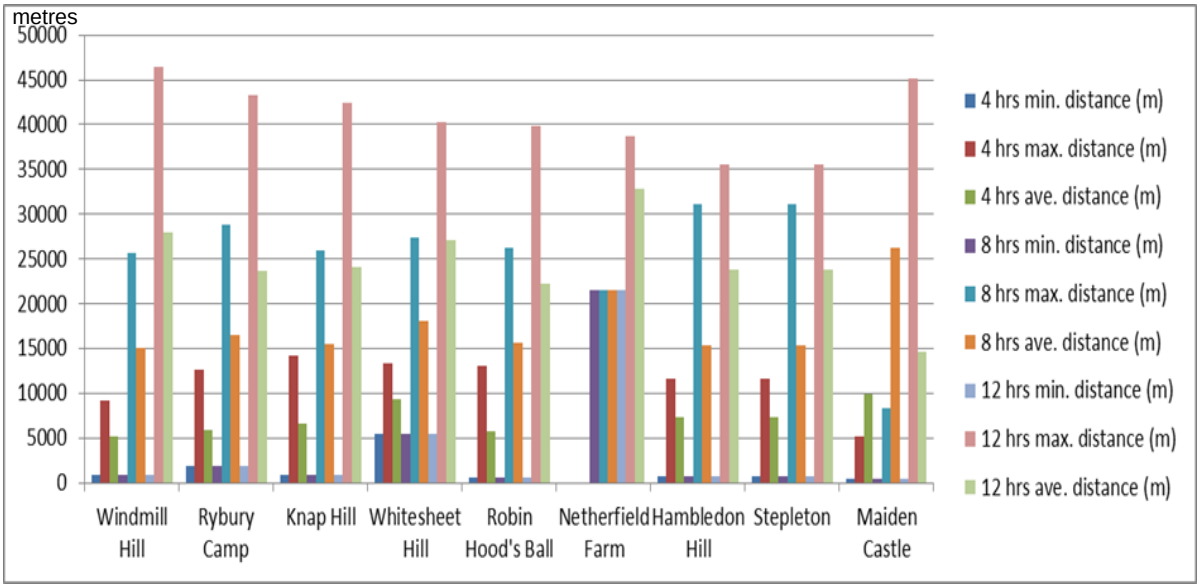


Figure 179: Relative distances of long barrows defined by cost-distance models for the enclosures of the Wessex group.

Minimum, average and maximum Euclidean distances to long barrows in the MiCDA, MeCDA and MaCDA of each enclosure. Whilst the maximum distances to long barrows on the boundaries reflect the extent of the MaCDA, and hence we can expect a degree of uniformity, a consistency on the average distances (with the exception of the isolated enclosure at Netherfield Farm and Maiden Castle with a low overall count) and the low count of enclosures immediately proximate to long barrows may suggest a degree of spatial intentionality across the region.

Source: author.

Differences are apparent between the enclosures. For example, the nearest long barrow to the Whitesheet enclosure is 5524m distant whilst all other enclosures have at least one long barrow within 1870m and all but Rybury have one within 900m (Fig.179, p.445 above). This may be significant with regard to the transmission of skeletal remains, following activities at these enclosures and deposition events at long barrows. The Whitesheet and Netherfield Farm enclosures would require travel of significantly greater distance, and either the 'territory' associated with these two enclosures was larger, or this practice was not carried out here.

The number of long barrows within the 'area of significant influence' also varies considerably. The relatively isolated Netherfield Farm enclosure reports only 23 long barrows within the MaCDA and Maiden Castle has only 31. Despite the size, longevity and development of the Hambledon Hill enclosures, the MaCDA model reports 66 long barrows, whilst the more modest Robin Hood's Ball enclosure reports 158 (Fig.179, p.445). If this spatial distribution is to be developed, and recognising the difficulty in identifying funerary monuments in lowland areas, more work is required on the relative chronologies to determine the number of long barrows that may have been earlier, contemporary, or later than the enclosures.

More useful is the average distance between enclosure and long barrows, and this also demonstrates a regional variability. Despite Maiden Castle having the highest maximum distance value (Fig 179, p.445), the average distance, at 14.7km, is much lower than all the other enclosures, suggesting again that the action of long barrow construction was constrained to a smaller geographic area for the southernmost enclosure.

The pattern is different in the more immediate environs. Rybury, for example, has an average distance of 5957m to the 22 long barrows in the MiCDA, whilst Maiden Castle averages 9923m (Fig.180, p.448).

Despite the variability, with the exception of the Hambledon Hill complex, and possibly Knap Hill, the results from the models suggest that enclosure construction was an activity that was spatially disassociated with areas considered suitable for long barrow construction.

This spatial separation is also evident in other areas. In West Sussex, the pair of long barrows at Blackbush Copse lie 5.5km west of The Trundle and are the closest representatives of a group of five that occupy the same Chalk Downs as the four causewayed enclosures (Fig.22, p.103 above). In the other direction, Bevis Thumb lies 9.1km east of Halnaker Hill and 5.4km southeast of Barkdale, the most easterly enclosure of the group. In the East Sussex cluster, the Preston Road and Surrenden Road long barrows are 2.8km and 3.2 km respectively, west of Whitehawk Camp, whilst Offham and Court Hill are further still from the nearest long barrows (Fig. 45 p.136 above). In the Thames Valley, two possible but uncertain barrows lie 800m east of Burford, whilst another uncertain long or round barrow lies 1.4km north of Broadwell. The only certain long barrow within 1.5km of a causewayed enclosure is the North Cerney barrow, 1.4km southwest of Southmore Grove. The unnamed long barrow east of Barnack Station is the only long barrow in the Fens group and lies 3.8km from the nearest enclosure at Uffington, beyond this the nearest long barrows are over 20km and lie in an arc, distributed on the higher grounds to the west and south of the Fens. At Haddenham a cluster of long barrows to the north are a minimum of 1.4km from the enclosure (Fig. 153, p.340 above).

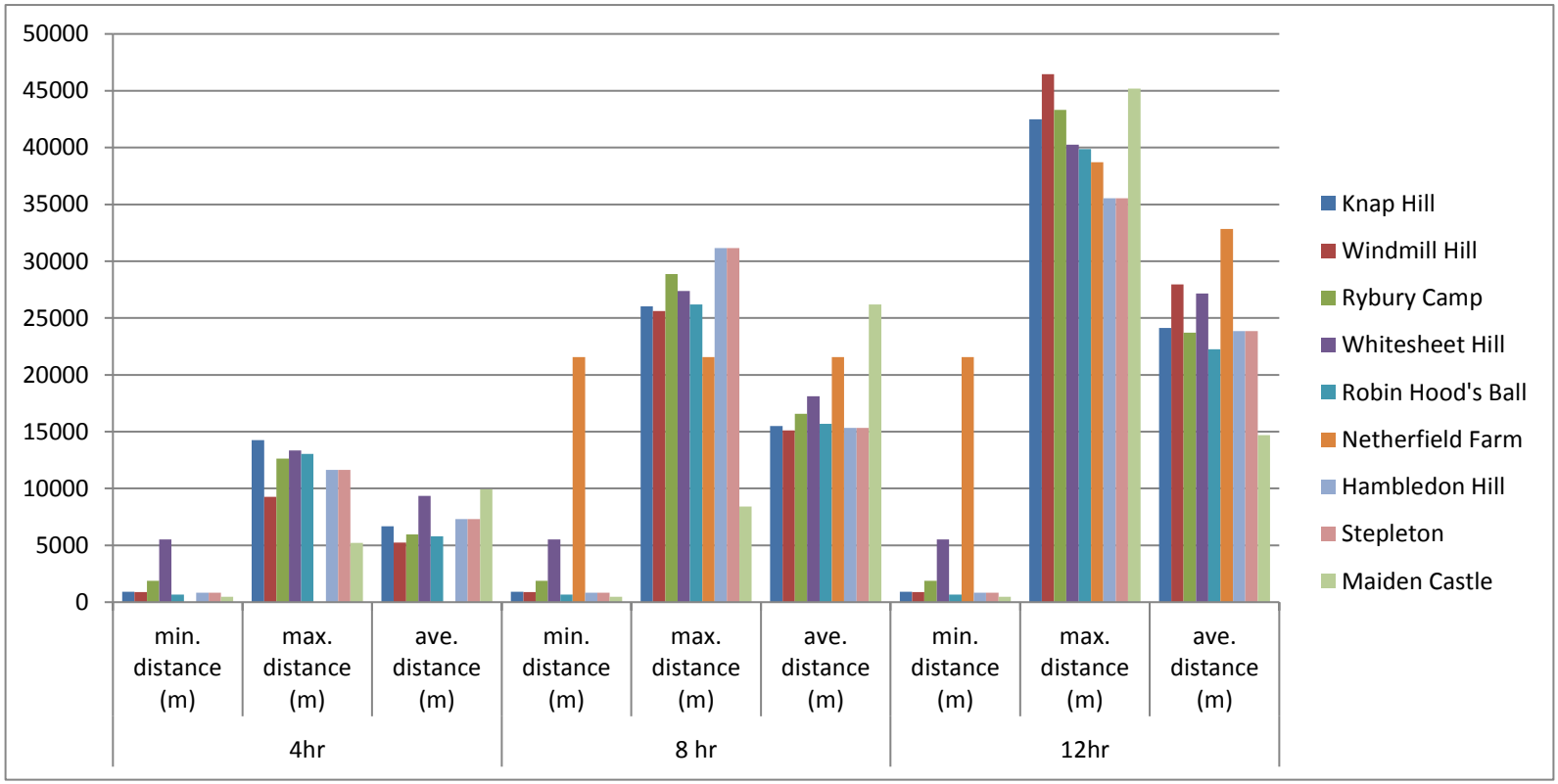


Figure 180: Comparison of distances between enclosures and long barrows in the Wessex group.

The minimum, maximum and average distances between causewayed enclosures and long barrows are plotted for the MiCDA (4hr) and MeCDA (8hr) and MaCDA (12hr) models. The plot again highlights the relative isolation of the Netherfield Farm enclosure with the nearest long barrow lying some 21572 metres distant. Whitesheet Hill may also be an outlier, with the nearest long barrow 5524m distant and a high average distance (9360m) in the MiCDA.

Source: author.

With few exceptions, and notwithstanding the limitations of chronology and survival, the cost models suggest that causewayed enclosures were purposefully isolated in space, away from the long barrows with which they have traditionally been associated. That is not to say that they are not associated, but simply that there was a preference for locating them at some distance.

The visibility models, however, in defining what could not have been be visible, display a more consistent pattern. These models strongly suggest that, despite large number of long barrows being situated within the practical limits of human visibility (say, 50km), there was a deliberate 'tradition of preference' in locating them where intervisibility cannot have been achieved.

Intervisibility between long barrows and enclosures can only be demonstrated in a very limited number of examples. In Sussex, Wessex and on the Upper Thames, long barrows seem placed at a particular point on the landscape beyond, often just beyond, the limit of intervisibility, perhaps indicating a purposeful intent to separate the domains of the dead from corporeal activity in the enclosure, a phenomenon noted later in the Neolithic. (e.g. Parker Pearson & Ramilisonina, 1998b; 1998a). The processing of the dead at the causewayed enclosure may have been seen as a transitional activity, whereas the deposition of remains in the long barrow was seen as the end of life, or entry into the ancestral domain. Alternatively, if we accept the causewayed enclosures as places of occasional inter-communal gatherings, and long barrows as indicators of land or territory tenure, then the positioning of causewayed enclosures at points in the landscape where they cannot see or be

seen from the territorial marker may suggest the enclosures were purposefully located in areas between territories, within an early Neolithic ‘no man’s land’.

The pattern is best presented by considering some examples from the visibility models. Analysis is expressed in terms of a circle of 16km radius drawn around the enclosures, the dimension chosen to approximately represent the boundary surrounding the MiCDA

There are 22 long barrows within a 16km radius of the Maiden Castle enclosure. Of these, only the Lanceborough barrow is likely to have been potentially visible, and the Culliford Tree barrow is reported in the model as just on the verge of visibility and, considering the error inherent in the DTM, may not in fact have been so.

There are no long barrows visible (or present) within a 16km radius of Netherfield Farm.

There are 11 long barrows around the Hambledon Hill and Stepleton enclosures. The Southern Barrow on Hambledon Hill is just beyond the visible range of the Stepleton enclosure, and there are no other long barrows visible from Stepleton. The model reports seven long barrows as exactly on the boundary of the visible range from Hambledon Hill’s main enclosure, and all are located on the east-facing slope of hills within Cranborne Chase. These are not visible today and almost certainly would not have been in the early Neolithic. The only certainly visible barrows from Hambledon Hill are likely to have been the two long barrows on the hill itself. The southern long barrow is within the curtilage defined by the southern Cross Dykes and the northern long barrow within the proposed northern Cross Ramparts (Mercer & Healy, 2008, fig. 1.4).

The long barrow is excluded from the main enclosure, though is very obviously an integral part of the complex. However, I would argue that Hambledon Hill is *different.* The complexity of the early Neolithic construction and the range of earthworks on the hill, the longevity of the enclosure and the nature of its final demise, represent an atypical early Neolithic society, with a combination of characteristics not apparent elsewhere.

Whitesheet Hill has eight long barrows within the prescribed circle and none could have been visible.

Robin Hood's Ball presents 39 long barrows with only two potentially visible. Again, many appear to be located just beyond the visible range, on the boundary of what may have been and may not have been visible. Of the 30 long barrows reported around Larkhill only three may have been visible despite the visible range from Larkhill occupying 30% of the area encircled.

Of the 27 long barrows reported for the Knap Hill enclosure, only Adam's Grave, 900m to the west, could have been visible, whilst Rybury camp reports 22 of which only the long barrow on King's Play Hill could have been visible. Again, this barrow is on a scarp facing northwest, away from Rybury to the southeast, and is reported as being on the edge of the visible range.

Lastly, in Wessex, Windmill Hill has 20 long barrows reported, of which eight are within 5km. The long barrows at South Street, Shelving Stones, and Millbarrow are reported as having been potentially visible. Many, including the Horslip, Longstones, West and East Kennet, Easton Down, and Oldbury long barrows are on the boundary of what may have been visible.

This pattern is repeated in Sussex and, although the Thames Valley and Fenland landscapes are very different, with very different visibility characteristics, the preference for placing long barrows and causewayed enclosures in areas where they cannot have been intervisible remains apparent.

The lack of detailed chronology, relating the causewayed enclosures to the long barrows more explicitly, makes further analysis speculative. Traditions changed over time, and with the exception of the Hambledon Hill South Barrow, which has been shown to be contemporary, other exceptions such as the visual relationship between the Knap Hill enclosure and Adam's Grave require further excavation and better radiocarbon dates, to properly test and understand the relative chronologies and associations.

There seems also to have been a preference for locating enclosures where they cannot have been intervisible with other enclosures.

Though the characteristics from The Trundle in Sussex have previously been noted (sect. 4.2.3 above) and the visibility models indicate that some visual relationship may have existed within the West Sussex cluster (Fig.177, p.438 above), this is unusual. Even the two enclosures on Hambledon Hill are unlikely to have been mutually intervisible. The visual relationship between Hambledon Hill and Whitesheet (sect. 4.3.4 above) also supports a purposeful intentionality towards obscuring what, with minor adjustment to the location of either enclosure, could have been quite clear views between the two.

The model reveals that Robin Hood's Ball lies within a general area of land that may have been visible from Larkhill, but the exact location of Robin Hood's Ball

corresponds to a small parcel of land within this general area, that could not have been visible.

Similar intentionality seems to have been expressed towards the Rybury, Knap Hill, and Windmill Hill enclosures. All were situated in locations where they could not have been intervisible with any other of the proximate enclosures. Had Rybury been located on the higher ground 1km to the north, and Knap Hill 450m to the northeast, then all three would have been intervisible.

All the modelling results support the presumption that causewayed enclosures were purposefully located in areas that were liminal to early Neolithic society and this purposeful separation, particularly from long barrows, may signal that the role of the enclosure differed from the day-to-day activities of everyday life. However, the implications of the cost modelling suggest that the enclosures were not physically isolated, and access to them from other areas of settlement and habitation was not beyond the capacity of a mobile early Neolithic society. Some, like Maiden Castle, are considerable more accessible from the known and extensive areas of early Neolithic settlement that has recently been excavated at Poundbury (Green, 1975; Barclay, 2011; Dinwiddy & Bradley, 2011), yet remain out of sight.

The next sections review in more detail how a developing early Neolithic society may have viewed the causewayed enclosures and why they were disassociated from other activities.

5.7 **Causewayed enclosures and their spatiotemporal development.**

The pattern of causewayed enclosure construction and their placement may suggest an organised, possibly structured early Neolithic society, acting in a coordinated manner according to developing societal rules and traditions. Such a notion supports Roger Mercer's firm assertion (2003, 69) that society in early Neolithic southwest England was represented in a '*complex hierarchy and series of settlements'* (c.f. Chapman, 1988, 21). However, the pattern is multifarious and variable and, as Julian Thomas advocates, we should treat this ordered view of settlement cautiously. His notion of 'compound temporality' (Thomas, 2013, 226-9) introduces a more dynamic process of Neolithisation. A process moving in time and space where some components of the 'things and practices' (Whittle *et al.*, 2011) that constitute our definition of the early Neolithic are picked up, then some dropped, and some returned to, and some not.

In considering this variability we should also recognise the idea of a more mobile Neolithic, particularly in the period following the beginning of enclosure construction. Whittle's concept of 'tethered mobility' (Whittle, 1997, 21), using 'anchors' in a pattern of circulating mobility, precedes McFadyen's (2008, 131) recognition that *'it is not simply that landscapes did not emerge from fixed locations, but that they did not have centres at all'*. If we fuse these concepts, the case studies suggest a techno-pioneering, semi-sedentary early Neolithic society where individual groups may have had some form of intra- and inter-hierarchical structure that played out in the use and monumentalisation of the landscape: a 'fluid landscape' with multiple and dynamic frontiers (Bailey *et al.*, 2005) where monumentalisation of the landscape provides a focus of

permanence; a surrogate for settlement (Sherratt, 1990), visited occasionally and sporadically (Whittle, 2003, 155).

The mobility and movement of people, ideas and objects is central in considering Neolithic relationships (Gannon, 2016). The interpretation of causewayed enclosures as entities on the periphery of early Neolithic society (Edmonds, 1993a, 104) seems difficult to sustain on the basis of the cost models, but more plausible on the basis of visibility. Not only do Hambledon Hill, Robins Hood's Ball, and possibly Maiden Castle all have proximate long barrows, but the effort necessary to move from region to region or from one enclosure to another is relatively slight. Access to any enclosure from much of the central Wessex area would have been achievable within about four hours walking time, and from all of the central area within eight (Fig.181, p.456).

Essential to a better understanding is an improved chronological dataset. Julian Thomas reminds us of the dangers of assuming that long barrows of similar external morphology are of similar date (Thomas, 2013, 218) A key question surrounds the contemporaneity of the enclosures. Although paths following the routes of rivers, or using the rivers themselves as a mode of transport, both provide explanations of access, the idea offers little in the way of understanding early Neolithic society and the potentially contrasting social dynamics.

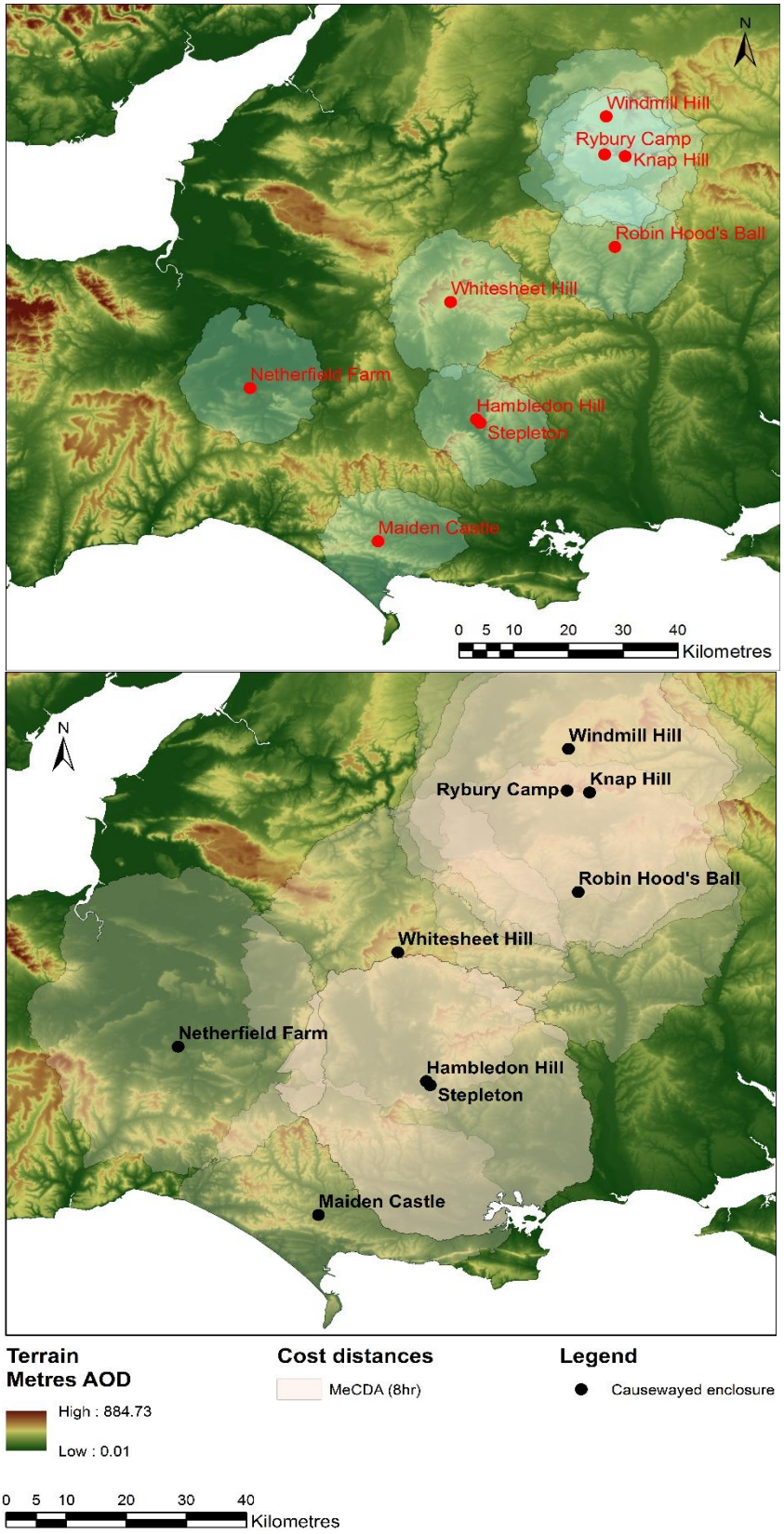


Figure 181: Access to the Wessex enclosures.

The model estimates the degree of access to the Wessex enclosures, where the boundaries define the extent of the MiCDA (above) and the MeCDA (below).

Source: author.

If we consider these monuments as concurrent enclosures, then they may reflect the creation of separate structural foci and different strands of early Neolithic society. The enclosures become important 'centres', where trade, alliances and identities are defined. However, if we interpret these enclosures with in-use periods that are not contemporary then we may be witnessing the output of more intimately related groups of people exercising small-scale episodic building activity. In this latter model the enclosures represent the cumulative labour of the same social group, or a combination of different groups, inscribing their biography into the landscape in different places and at different times.

A combination of both models may have existed, arising out of particular social and material conditions in an essentially unstable, mobile early Neolithic society (Thomas, 2013). Aston Cote, Buckland, Broadwell, Eastleach and Langford can be enclosed within a radius of less than seven kilometres. Similarly, the enclosures at Abingdon and Lower Radley are separated by less than three kilometres and the enclosures at Crickley Hill and Birdlip Camp are one kilometre distant. This may suggest a single group was responsible for initiating their construction.

The evidence from Sussex supports the same model. We can view the West and East Sussex clusters as being part of the same territorial construct (c.f. Renfrew, 1973; Drewett, 1977; Barker & Webley, 1978), whereby loosely connected groups, each tethered to an area and mobile within a larger overall geographic area, came together episodically to celebrate, exchange and enact tradition.

Within Wessex, the models may indicate a duality. The Netherfield Farm enclosure, stands isolated, on the edge of the Somerset Levels without any apparent early Neolithic activity closely associated with it. Here we perhaps see more remote groups, enacting traditions they know to be carried on elsewhere. Similarly, for Maiden Castle, which is also remote from other known enclosures, though on the fringes of a substantial early Neolithic presence and area of activity (Wainwright, 1979; Harding, 2010; Dinwiddy & Bradley, 2011). The Maiden Castle enclosure was short-lived. The length of time between the first ditch being cut and the final filling of the last ditch is likely to have been as little as 1-20 years (68% probability) and almost certainly less than 50 years (95% probability) (Whittle *et al.*, 2011, 188). The reasons for this are unclear, but the short life span may suggest that sustaining the necessary communal endeavour required to repeatedly renew the enclosure was beyond the ability of a single group, and the nearby presence of a developing Hambledon Hill proved more attractive.

The Hambledon Hill and the Stepleton enclosures are clearly linked. The Stepleton enclosure lying on the easiest route up the hill was constructed perhaps as little as 10 to 60 years after the main enclosure (Whittle *et al.*, 2011, 145-6), and served to ensure that the whole spur was included in the monumentalisation of the hill. Later developments linked the two enclosures, and the hill may have transitioned from a symbolic and occasionally visited place to a defended enclosure (Mercer & Healy, 2008, 775). Despite the scale and complexity of the Hambledon Hill complex, we might envisage that the initial phase of construction represented the single focus of early Neolithic groups coming together. The visual isolation from the Whitesheet Hill

enclosure may also suggest that the two enclosures were separate entities, constructed and used by different groups.

The Robin Hood's Ball and Larkhill enclosures, and the Windmill Hill, Rybury and Knap Hill enclosures may represent two separate entities in much the same way as the two clusters in Sussex, with the Robin Hood's Ball and Larkhill enclosures serving one territory and the more northerly enclosures serving another.

The cost models suggest that we should not consider an early Neolithic where folk were limited to these groups and not willing or able to visit the enclosures primarily of another territorial area. Julian Thomas paints a picture of a complex, regionally variable early Neolithic (Thomas, 2013) where allegiances and obligations may have been negotiated and renegotiated, with interactions consistently changing.

The next section explores how the spatial distribution of causewayed enclosures may have supported the necessary interactions between different folk groups.

5.8 Causewayed enclosures and their role in alliances, memory, and the family.

On the basis of the materials recovered from the ditch systems, Brian G. Albrecht offers a detailed analysis of the activities carried out at causewayed enclosures (Albrecht, 2012). Further, on the basis of similarities in the materials found within enclosures and other monuments, he draws associations between causewayed enclosures and other early Neolithic architectures.

For example, he links the Sussex flint mines to the Sussex enclosures. Recognising that the chronological evidence suggests that the two may not have been contemporary (Whittle *et al.*, 2011), he suggests that this relationship may have been one of a *'knowledge of (common) practices'* that is an expression of a similarity of custom and tradition across '*two seemingly different sites*' (Albrecht, 2012, 225). This is an important insight, since the work explicitly links the activities of a social group operating at some distance from, and beyond the visible range of the enclosures, to specific activity at the enclosures. Whilst most of Albrecht's analysis argues these linkages existed between the flint mines and the eastern cluster of enclosures, he also links The Trundle, through the similarity expressed in apparently common mortuary practices.

Albrecht draws attention to how the ditch deposits indicate the wide range of activities that may have been carried out at an enclosure. He includes: woodworking, flint knapping, feasting, the preparation of hides, the storage and processing of food, and the processing of the dead. He also notes the dissimilarities of material culture and how some appears to have been brought from a distance (Albrecht, 2012, chtp.6).

Most of these activities could be argued to be secondary. That is, if people were attending an enclosure, then one could expect some time to be spent making tools, eating, storing and processing food stuff, and in exchanging materials, tools and other chattels brought from outside. If we are to develop an argument for the presence of early Neolithic people, from different cultural groups, at regionally and culturally different points on a journey of transition, then we should perhaps look towards more primary motives.

There may have been a cultural and practical necessity for interactions between groups. As early as 1949 Claude Lévi-Strauss had published Les Structures élémentaires de la Parenté, in which he offered his 'general theory of exchanges' (Lévi-Strauss, 1971). In this he suggested exogamy as providing a driver for seeking marriage partners from beyond the immediate kin group. Lévi-Strauss argues that the need to partner outside the kin group was necessary for a group to flourish (Lévi-Strauss, 1971), and that this may have been a practice forced on group members by a strong cultural tradition. He argued, on the basis of ethnographic evidence, that this practice involved the exchange of females, and that the enforcement rules surrounding the practice were dictated by tradition and biological necessity.

Social biology recognises two complimentary explanations for partnering beyond the immediate kin group: incest avoidance and exogamy. The first which is often expressed in terms of incest taboos has very early phylogeny and may predate modern humans. The mating of individuals from outside the family group increases the genetic diversity within the group, reducing the chance of deleterious genes being replicated and passed down, hence improving survival rates amongst offspring. Exogamy, however, is a cultural tradition which Pierre L. Van de Berghe suggests evolved with uni-linear descent *'a few thousand years ago along with the domestication of plants and animals'* (Berghe, 1980, 151).

Lévi-Strauss, however, emphasised the importance of alliances and the establishment of stronger social structures, through the introduction of allegiances and obligations of reciprocity. Since rules around reproduction tend to define '*who not to mate with rather than who to mate with*' (Chapman, 1988,

32), there would have been ample opportunity for the development of these inter-group relationships to have led to more exchange opportunity, less inter-group violence, and better opportunity for cultural exchange (Lévi-Strauss, 1971).

Chapman (1988) reflects on the importance of agricultural practice in determining the mobility of early Neolithic groups. Whilst he accepts that territoriality may have been important in supporting small groups and their need for basic foodstuffs, he argues that the need to successfully breed was a more important determinant in driving mobility (Chapman, 1988, 32).

Chapman's model of small dispersed groups, comprising alliances between extended families reinforced by exogamous partnering, fits well with a model of distributed territories, with causewayed enclosures at their fringes. Such a model does not need to imply the even distribution of causewayed enclosures across the landscape as may be expected if the primary purpose was to control the distribution of axes, for example (and see: Thomas, 2013, 218). Indeed, the argument may be better supported with a more uneven distribution and the presence of clusters and pairs.

Chapman draws on the work of Wobst (1974, 168) who calculates the minimum size of a social network necessary to guarantee a suitable mate to be around 475 persons. Causewayed enclosures may have been a place for the occasional gathering together for the purposes of negotiating relationships, treaties and exchanges for the purposes of social alliances (Chapman, 1988, 34).

Causewayed enclosures are believed to have been visited episodically and the importance of repeated cycles or patterns of movement has also been linked to memory and social reproduction, and the renegotiation of relations between communities (Edmonds, 1993a, 107). These cycles, propelled by the changing seasons, and the availability of food and the breeding cycles of animals, which may include occasional activities at causewayed enclosures add a sense of ontological security (Whittle, 2003, 23), thereby enhancing continuity through the repetition of shared practices between alliances of unstable and shifting composition (Whittle, 2003, 72).

Neolithic lifeways are unlikely to have differentiated 'practical actions' from the ritual and the symbolic (Brück, 1999b; Bradley, 2005; Thomas, 2011). Utilitarian models are challenged by the non-utilitarian, or 'ritual' and 'symbolic' models (e.g. Edmonds, 1993a; Whittle & Pollard, 1998). As well as the practical action of 'marriage', causewayed enclosures have long been associated with the symbolism of death.

Though Mercer (1980, 63; 1985) provides a vivid description of the excarnation rituals suggested for Hambledon Hill, the evidence for the mass-processing of human remains at causewayed enclosures more generally is somewhat lacking, particularly since the instances of the symbolic processing of remains and the instances due to violent action, need separate consideration.

The single mature male and thirteen skull fragments from Windmill Hill (Brothwell, 1999), a total of 15 bones, including femur and skull fragments at Etton (Armour-Chelu, 1998), one articulated skeleton, two skull fragments, two long bones and two other bones at Offham (Drewett, 1977), one articulated

burial at Knap Hill (Connah, 1969) and a few bones at Maiden Castle (Wheeler, 1943) do not seem to support a theory of wide-scale processing of the dead, and the practice may have been afforded only to individuals of elevated status.

Though the evidence of gnawing by canids may be evidence of excarnation (Smith, 2005), the quantity, with the exception of Hambledon Hill with up to 77 individuals represented by a range of skeletal remains (McKinley, 2008, p.490 table 7.2), is limited to less than 10 individuals.

The cost modelling suggests that, if networks of paths existed across the landscape, then they, coupled with communication afforded by riverine transport, would have enabled significant levels of interaction across wide areas.

We could interpret the clustering of enclosures in, say, West and East Sussex, or the northern Wessex set, the Fenland group, or those of the Thames Valley, to represent a set of enclosures whose construction was led by a single group, perhaps a group at the top of Roger Mercers hierarchical and ordered society. Seasonally, or episodically as tradition dictated, this group led the construction of a new enclosure, or the renewal of an existing one through the recutting of ditches, or the extension and elaboration of an existing enclosure through the cutting of further circuits. If these occasional works were carried out by members of different kin groups from within a wider overall territory, then social strategy, expressed in participation and segregation, can begin to explain the subtle differences in ceramic types present (Thomas, 1999, 80), patterns of animal bone deposits (Whittle, 2003, 96), the interrupted nature of the

construction, and perhaps the irregular forms of the enclosure (Ray & Thomas, 2018, 306).

This model begins to dilute the concept of 'territories', and in particular the idea that there were fixed territories in the early Neolithic. Certainly, the evidence points to 'operating foci', where specific kin groups based an otherwise semi-mobile lifestyle. However, beyond the foci, these operating areas may have changed with time, even overlapped, and been negotiated and shared. Furthermore, there is no reason to assume that extended kin groups, or groups bound by other social allegiances, all operated within small and adjacent areas. It is quite possible to envisage an early Neolithic where, for example, social ties and bonds were established between groups in Sussex and those on the southwest peninsula, or in Cumbria. Such long distance cooperation and common endeavour has certainly been demonstrated in the later Neolithic (Viner *et al.*, 2010; Parker Pearson, 2013; Darvill, 2014) and these distant relationships may have earlier roots.

The model also works for the Wessex enclosures, which appear more isolated and substantial. Here we could interpret the Hambledon Hill, Whitesheet Hill and Maiden Castle enclosures in much the same way, except that the renewal effort, instead of being invested in new enclosure building, was focused on developing these existing enclosures. The initial development of the Hambledon Hill enclosure, beginning around 3650 cal. BC (Fig.60, p.193 above), having been initiated by one group, perhaps with a foci on the clay vale to the west, was followed by the competitive establishment of the Whitesheet enclosure around 3570 cal. BC. and the Maiden Castle enclosure around 3550

cal. BC. Maiden Castle may have been in use for no more than one or two generations, beginning and ending in the middle part of the 36th century BC.

The earlier establishment of the Hambledon Hill enclosure may have facilitated the group responsible in establishing a more complex, comprehensive and wider-ranging network of allegiances than was possible for the later established enclosures in the south Wessex area. The greater cooperative resources may have allowed Hambledon Hill to develop, whilst the two later enclosures were less successful and ultimately declined. Hambledon Hill, having established itself as the dominant enclosure, continued to thrive and ultimately developed a more comprehensive architecture with a greater range of mortuary and other practices, and later a shift in exchange practices (Ray & Thomas, 2018, 102) and a change in emphasis and outlook, developing a defensive posture towards the west and the clay vales (Mercer & Healy, 2008, 767-8) before ultimately coming to a violent end.

A similar model can be suggested for the enclosures in the Avebury region of the north Wiltshire Downs. The highly developed enclosure on Windmill Hill begins early in the middle part of the 37th century cal. BC and appears to have a long period of use until the late part of the 34th century cal. BC. We may view this centre, towards the head of a different river system, as another foundational enclosure which existed in isolation for several centuries, and may have served a population active over a wide regional area. The simple, late established enclosure at Knap Hill, and possibly the undated Rybury enclosure, may have been developed, probably in the later part of the 36th century, by the same kin group responding to a particular set of socio-political conditions, as an alternative to continued expansion at Windmill Hill. This expansion was short

lived, as these new enclosures went out of use probably in the mid to late 36th century cal. BC when activities consolidated around the continued use of the Windmill Hill enclosure which continued to play a significant role until its demise, probably in the mid to late 34th century cal. BC.

The model works well for the Fenland enclosure group. The spatial proximity and the resultant low cost-distances involved in travelling, over what was flat terrain, almost certainly resulted in a commonality of interest and knowledge of all four enclosures would likely have been maintained (Fig.182, p.468). The Etton (1) enclosure, probably established by around 3725-3670 cal. BC and, being joined later by the Northborough enclosure around 3645-3585 cal. BC (Fig.158, p.352 above), suggests as little as two generations between the beginnings of construction of Etton and the establishment of Northborough. Again, the earliest enclosure seems to have been the most resilient, with Etton (1) continuing in use long after the demise of Northborough, probably around 3580 - 3510 cal. BC. The chronology for the enclosures at Barholm and Etton (2), and the outer two circuits at Northborough have yet to be established, reinforces the warning by Whittle *et. al. (2011, 329)* surrounding the assumption of Etton(1) as a foundation enclosure. However, on the basis of what we now know, the model is valid. All of the Fenland group of enclosures occupy a central position on what are overlapping MiCDA and it is quite possible that their construction was initiated by succeeding generations of the same kin group. Their relative proximity, like the enclosures that form the constituent parts of the West and East Sussex clusters, suggest that it is also possible that they were used successively; that is, activity took place at one enclosure one

year, and this was followed the next year by celebration at another, with each enclosure being renewed or extended as necessary.

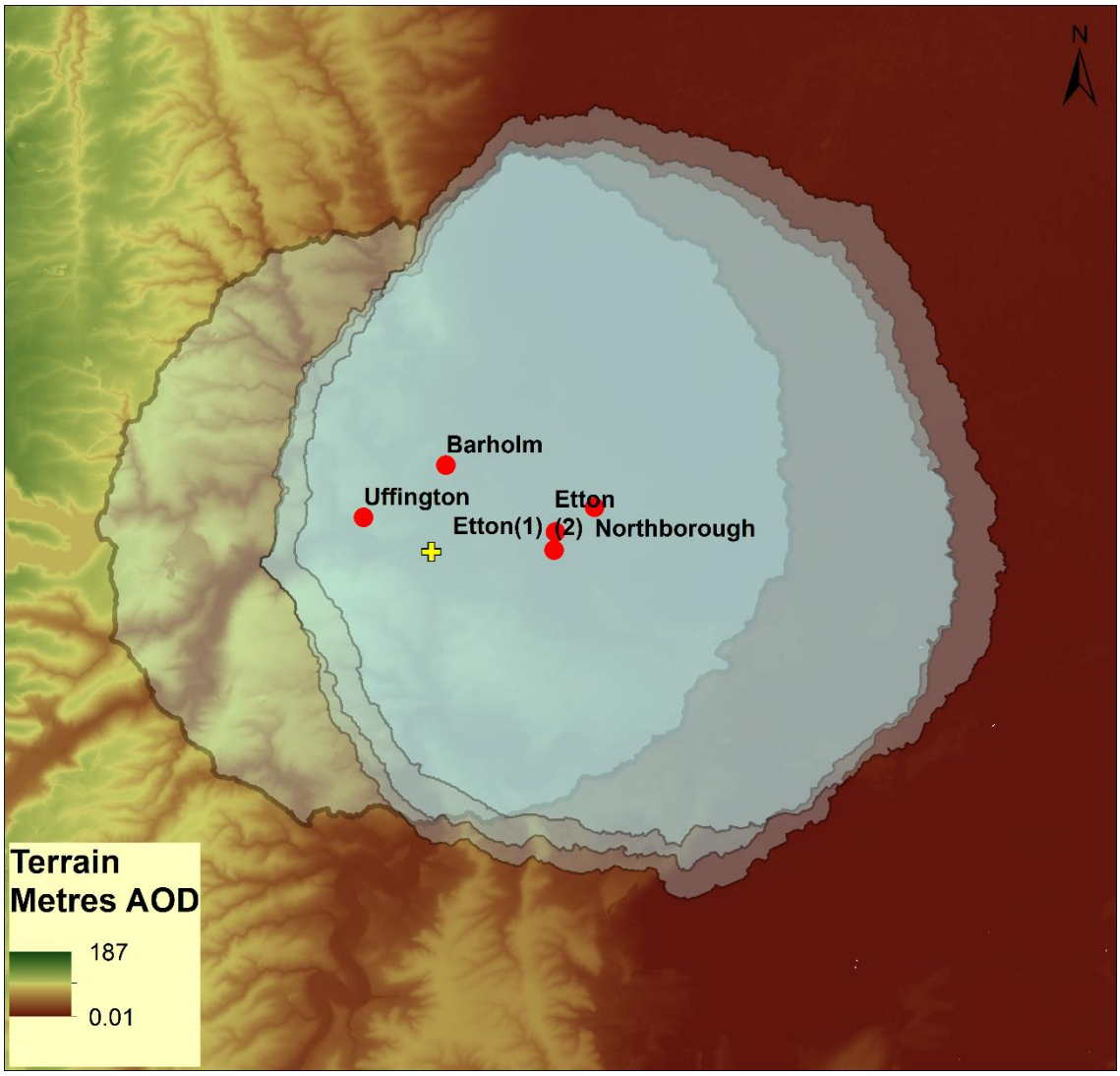


Figure 182: Fen enclosures MiCDA (4hr) models.

The model estimates the degree of access to the Fen enclosures, where the boundaries define the extent of the MiCDA. The single isolated long barrow east of Barnack Station is not visible from any of the four enclosures, but the travel time between this and any enclosure may have been less than 2 hours. The travel time between the westernmost enclosure at Uffington, and the easternmost enclosure at Northborough is likely to have been of the same order.

Source: author.

The validity of this social model may be reinforced by the presence and the nature of large quantities of cattle (and other) bone deposits at some causewayed enclosures. The importance of cattle, and the traditions associated with their treatment is noted by Mike Parker Pearson in respect of funerary traditions (Parker Pearson, 1999, 37-44). However, in this context their prime importance may lay in the creation and maintenance of social relations through their value as a medium of exchange, as an entity of intrinsic value and status, through sacrifice, in the payment of bride dues, and in feasting (Ray & Thomas, 2003; Marciniak & Pollard, 2015; Ray & Thomas, 2018). The conspicuous consumption of cattle at Hambledon Hill was indicated by a higher than expected percentage of unbroken bones, with whole limbs discarded and recovered as articulated skeletal remains, and the evidence suggests that both meat and cereals were brought to the hill for consumption, having been prepared elsewhere (Rowley-Conwy & Legge, 2015).

The large deposits of cattle bone at some causewayed enclosures suggest the gathering of significant numbers of people. A single adult cow can supply some 300kg of meat and offal and this is enough to have fed possibly hundreds of people (Ray & Thomas, 2018, 178), thereby facilitating the feeding of the minimum number of adults suggested by Wobst (1974).

Such festivals of celebration may have been carried out at particular events in the celestial calendar or may have been associated with cyclic activities in the farming calendar, and the ceremonial consumption of food important in re-establishing hierarchies, relationships, alliances, and differentiating and integrating folk groups (Dietler, 1996; Hayden, 1996; Cross, 2001; Whittle, 2003, 31; Marciniak & Pollard, 2015).

Causewayed enclosures may have been more to do with the celebration of life and living, and with other rites of passage, rather than death (Edmonds, 1993a, 113) and the processing of cadaveric remains. Though much would be invisible in the archaeological record, the presence of quantities of animal bone, particularly cattle, indicates these festivals were accompanied by feasting and celebration (Ray & Thomas, 2003; Pollard, 2004; 2008a) where celebration played a significant role in the structuring of social relations between otherwise distinct folk groups.

In this sense, the spatial models, coupled with the other archaeological evidence suggest that we might interpret causewayed enclosures as fulfilling an important societal role. This was not in organising networks of distribution, or in the control of axes and other exotics, but as places where early Neolithic people came to observe tradition, to reinforce old relationships and build new social networks through ‘marriage’, celebration, the giving and receiving of gifts and obligations, and the conspicuous consumption of food.

6 Concluding discussion.

The research

The aim of this thesis was to better understand concepts of movement, mobility, and society in the early Neolithic period. These concepts were investigated through the locational and spatial characteristics of causewayed enclosures and their association with other early Neolithic indicators.

Four objectives were stated.

- The first asked what a detailed spatial analysis might predict about causewayed enclosures and other contemporary activity, and in particular, long barrows.
- The second objective combined spatial analysis with the improved chronological resolution now available for some of the early Neolithic components, and asked if this could offer any new interpretations about causewayed enclosures and early Neolithic society.
- The third considered landscape features including rivers and geology. I sought to investigate how causewayed enclosures should now be considered in terms of the earlier and current literature surrounding early Neolithic society, and in particular mobility, territories, and farming practices.
- The last asked if the evidence could offer any further interpretations concerning the role played by causewayed enclosures, and how these might weave into developing academic notions concerning the structure of early Neolithic society.

Three key decisions influenced the nature of the research.

Firstly, a broad approach was taken. Causewayed enclosures are considered from a southern British regional perspective, at the expense of detailed analysis of any individual enclosure or set of enclosures. Since the aims related to causewayed enclosures and early Neolithic practices in their generality, a regional treatment was justified and necessary. Further, the wider treatment allowed for a more complete consideration of regional patterns and variability.

Secondly, the adoption of a consistent methodology was considered best able to elucidate wider regional patterns and variability. More directed enquiries could have asked specific questions of individual enclosures or groups of enclosures, but this would have been to the detriment of the wider study.

Lastly, as the depth and breadth of the dataset became apparent, the decision to use GIS as a methodological tool was taken. Despite the criticisms of GIS in the literature, there seemed no other mechanism that would facilitate the extent of analysis necessary to meet the objectives. Once the decision to use GIS was taken, the task then became one of designing a simple and repeatable methodology that could be applied to all the examples.

One frailty, not envisaged at the start, is the difficulty in transporting images from the screen to paper. The resolution available through on-screen presentation of the GIS models is at the level of the pixel. Committing the output of a wide-area analysis to paper cannot hope to achieve anything like the same definition. In many cases, however, this is considered a measure of the success of the methodology. For example, the number of long barrows

seen to be just outside the limits of visibility was striking and many examples could not have been identified outside a GIS model.

Recognising the limitations of the GIS has been an important facet. The project has applied a fusion of GIS, the application of archaeological theory, current academic thought and research, and the personal field survey of some sixty causewayed enclosures, including every enclosure in the four case studies. This has enabled some new insight and the affirmation and challenge to old models of land use and territory. Additionally, the work has shown how the causewayed enclosure fits within contemporary models of early Neolithic social practices and Neolithic development suggested by current scholars.

The methodology employed in the course of this research has involved the assimilation and manipulation of large archaeological datasets and extremely large spatial datasets. The technological challenge associated with big data was underestimated at the beginning of the research, and has been overcome using a combination of improved computing performance, and the addition of faster and large-capacity solid-state memory. Network Assisted Storage and Cloud-based storage have also been utilised to increase capacity where processing operations did not require immediate access to data. Notwithstanding these challenges, a methodology has been developed that has successfully compared and contrasted characteristics of causewayed enclosures across a large geographic area. The methodology can be adapted and improved to investigate archaeological questions across a broad temporal range. The use of a standardised methodology has highlighted where the landscape characteristics of causewayed enclosures can be shown to be similar and where they diverge.

Causewayed enclosures and other contemporary activity.

The early models that described causewayed enclosures as being at the centre of territories have been challenged for some years. These monuments are now considered to have occupied liminal spaces, on the margins of, or in between territories. The analysis both refutes and confirms this position and suggests that, although the enclosures were easily accessible from the landscape surrounding them, their locations were carefully chosen to facilitate particular characteristics. These characteristics include the restriction of visual access to long barrows, and a preference to locate enclosures where they were not intervisible with other enclosures, as well as positions where they could maintain particular affinities with particular components of river systems or the sea.

The visibility analysis with respect to long barrows is unambiguous and the visual dissociation is a pattern repeated in all the case studies. The rare exceptions fall into two categories.

The first is where the long barrow is part, or could have been part of the early Neolithic complex. Examples include Hambledon Hill, where the two long barrows are within the curtilage of cross dykes that define the circuit of a further enclosure, and Knap Hill where the long barrow ‘Adam’s Grave’ overtly displays to the enclosure across a narrow valley.

The Hambledon Hill complex was designed differently from its very earliest phase. The northern long barrow probably predates the enclosure and so was included within the structural planning of the complex from a very early stage. The causewayed enclosure could equally have been constructed on the

adjacent Hod Hill, or the more elevated Melbury Hill, and thereby achieved a visual separation from the existing northern long barrow. This suggests a consideration of other factors, such as the particular visual characteristics available to Hambledon Hill, outweighing the tradition of restricting visual access to the long barrow. Once the relationship between the northern long barrow and causewayed enclosure was established, then the addition of the southern long barrow, probably dating to slightly later than the main enclosure, was an easier design decision.

Adam's Grave, however, is undated, and though we cannot be sure of the chronological association with the enclosure, we might advance the same arguments. The research has determined that, to displace the enclosure further along the ridgeway, would have resulted in intervisibilities between Knap Hill and Rybury Camp, or with Windmill Hill, and this may have been less desirable than accepting an intervisibility between the enclosure and the long barrow.

Secondly, where the model reports that intervisibilities between enclosures and long barrows do exist, they exist only at some distance. These appear only on the very margins of the landscape that the model reports as 'in-view', or are on small isolated patches of land within a wider area that the model reveals as out of view. In particular, many long barrows occur at the top of the scarp of distant hills, facing away from the enclosure. An argument could be advanced that whilst the model indicates them as in-view, they may not have been in the early Neolithic. The research has noted the criticisms regarding vegetation and the degree of tree cover pertaining in the period and, since the DTM defines only the modern landform, vegetation could only have served to have hidden

these marginally visible long barrows from enclosures. In addition, the research has also reflected on the reduction in hill height since the Neolithic, due to soil erosion and solution of the chalk. Where this loss was known, usually through excavation of an enclosure, accommodation has been estimated and included in the model at the observation point. However, on the landform between an enclosure and a long barrow, no such accommodation was made. The marginal intervisibilities that, for example, the model reports between enclosures in the Sussex areas may not have in fact existed in the early Neolithic, being obscured by a combination of vegetation and the increased elevation of intermediate landforms. This remains a question that could be better answered if a more detailed GIS model were constructed for a particular enclosure and long barrow, with well-defined chronologies and better environmental data.

The visibility modelling, as it pertains to sites of early Neolithic habitation, is more ambiguous and is also problematic in that there are so few sites interpreted as places of habitation. In the Fens for example, pits appear either spatially associated with the enclosure (or relate to pre-enclosure activity on the Etton site) or are located on small isolated islands of visible land that the model reports as in-view. Again, vegetation may well have obscured these views in practice. In Sussex there is a clear visual separation between habitative sites and enclosures, whilst around Hambledon Hill, Maiden Castle and Netherfield Farm, much of the evidence for any early Neolithic habitation lies deeply buried beneath the superficial clays and silty deposits of, for example, the Blackmore Vale.

The spatial models are sufficiently conclusive to be able to challenge the early models of Renfrew, Drewett, and Barker and Webley. If the concept of territories existed at the time the enclosures were constructed, the modelling suggests more diffuse territorial boundaries, that perhaps consolidated during this period as farming practice developed. It may be that one of the reasons that causewayed enclosures display such a short lifespan was that their function became less important as territories and land tenure consolidated.

Contrary to the early models the research suggests that 'territories' contained more than one enclosure. The spatial distribution and the cost distance modelling suggest that it was very likely that the same kin group was responsible for, or at least involved in, the construction of more than one enclosure. The East and West Sussex clusters can be seen as particular examples, as are others in Wessex, the Thames Valley and the Fens. More chronological resolution is necessary across a broader range of enclosures, however where we have sufficient data the research has suggested an interpretation that accords with both the spatial analysis and the chronological data.

Temporospatial patterns

The chronological evidence suggests that, in each cluster, it is the earliest enclosure that has become the most developed and persisted in use for the longest period. Examples include Whitehawk Camp for the east Sussex cluster, The Trundle for the western cluster, with Hambledon Hill and Windmill Hill being the earliest of the two groups postulated for Wessex.

The research suggests that these foundational enclosures became the first in a cluster of enclosures, and further enclosures were initiated as the influence and ambition of the responsible kin group grew. This may have occurred as a result of the internal social dynamics of a single group expressing growing capacity and influence. Alternatively, the research has introduced a concept of 'competitive enclosures' which may have been established as rivalries between related or proximate groups surfaced. These tensions may have resulted in the construction of these new competitive enclosures, which may have been, like Maiden Castle, established at some distance from the primary or founding enclosure. I have argued that the benefit gained by an individual folk group, in establishing, renewing, or extending an enclosure, has been mimicked by competitive groups to facilitate the advantage in social connections, gained though activities carried out within an enclosure. In some cases, these secondary enclosures have persisted and appear to have been successful, with extended periods of use, whilst in other cases they have been less successful and have not persisted.

I have argued that the 'gang' like construction of enclosures reflects the participation of different, though related, social groups and, that these groups could have been related by 'marriage' or by other ties of obligation and dues. Further, I have argued that these groups may have been spread widely across Britain, with particular reference to the southwest and Cumbrian regions.

The cost modelling suggests a degree of regional variability. The close spatial proximity and low cost of travel, characteristic of the Fenland and Sussex enclosures, strongly favour an argument that multiple enclosures were constructed by the same folk group at different times. That is, that the

enclosures in these groups were initiated, in successive generations, by a single group with the same ancestral lineage. Over time, the group develops a choice: activity in any given year can focus on building a new enclosure, recutting and thereby renewing the ditches of a former enclosure, or by extending an earlier enclosure through the construction of additional circuits or other earthworks.

In south Wessex I have suggested the competitive model. The greater cost distances between enclosures may point to the establishment of competitive enclosures, where the ties between the builders of Hambledon Hill, Maiden Castle and Whitesheet for example, were less close, and these large enclosures represent the attempted reinforcement of separate foci.

In both cases I have argued that the eventual outcome is that the groups consolidate around, or retrench to, the foundational enclosure. I have suggested, that this may have been resultant on the earlier established enclosures having had greater capacity to develop ties with other social groups, and that this has facilitated a stronger relationship and a greater degree of obligation, which has ultimately proved more enduring.

Mobility, farming and geology

The geological analysis has proved the least successful avenue of the research. There were two reasons for this. Firstly, as the research progressed, there was more capacity for mobility identified, both through the cost modelling, and importantly also in the literature. Most current scholars accept a greater degree of early Neolithic mobility than was implied by the earlier models, and certainly a capacity that was within the definitions of the MiCDA, MeCDA and

MaCDA (p.59 above). Secondly, the geology within the CDAs varies significantly between the upland enclosures of the Wessex and Sussex chalk, and that of the Thames Valley and Fenlands. It became apparent that the defining characteristic was not the elevation, the chalk, or the clay-with-flint that may lie on the chalk, but the lowland areas that represented the areas of habitation, settlement and other early Neolithic activity.

The research suggests that early Neolithic people and their settlement and habitative activities in these lowland areas, particularly involving early farming activities, determined and defined the construction of enclosures, and that this happened irrespective of the geology relating to upland or lowland areas. A brief review of all the known enclosures suggests, for example, that over two thirds are constructed in areas dominated by clays, silts and alluvial gravels.

For these reasons, and because of the inherent difficulty in relating geology to early Neolithic land conditions, the geological analysis was not continued beyond the first case study carried out for the Sussex enclosures.

Nevertheless, the Sussex analysis did respond well to contemporary thought around mobility and the developing characteristics inherent in a semi-mobile early Neolithic farming society.

The role of rivers was explored, through their spatial relationships, visibility relationships and cost distances. A strong pattern emerged that suggested the careful positioning of causewayed enclosures on particular topographical features, related the enclosures to specific areas of landscape and riverine features, particularly their heads and tributaries.

The role of rivers was considered in some depth and the research suggests that rivers were not only important in facilitating mobility through a landscape, some parts of which remained difficult to traverse, but that they also provided a geographic frame of reference. I argue that rivers formed part of a system of navigation that also included long-established networks of paths and places. I suggest that this would have allowed the linking of locales, landscapes, mythology, and tradition, through narration and storytelling, and thereby stimulated an ontological significance that could be passed on to succeeding generations. Contrary to Fiona Haughey's view, I argued that the spatial location of the enclosures along the upper Thames Valley did indeed suggest the River Thames as some form of boundary, that disassociated many of the enclosures from the early Neolithic activity south of the river.

The research has challenged the notion of fixed territories and suggested instead that the spatial patterns, cost models, and the conclusions surrounding mobility, better support conditions where territories were not fixed. Instead I argue that folk groups were tethered to small areas, away from enclosures, where small-scale farming activity took place. Whilst a limited, near-permanent presence, may have been necessary to protect and maintain crops, many of the groups mobilised more widely across the landscape, returning from time to time to these foci. These farming activities may also have been transient, persisting in any one location for perhaps two or three years, before the group relocated, established a new focus, and a new causewayed enclosure, resulting in the spatial clustering of enclosures that we now recognise.

The research therefore supports the tethered mobility model postulated by Whittle in terms of farming, which I suggest was undergoing significant

development at the time the enclosures were in use. The early, more transient 'garden farms' witnessed increasing levels of investment, both in their maintenance and the prevention of their regeneration as scrubland, and importantly, growing investment in the soil, in the form of manuring and soil conditioning. I suggest that this investment and the consequent conditions of tenure contributed to increasing social differentiation and stress as the Neolithic developed. These tensions were a factor in the development of competitive enclosures, the retrenchment to founding enclosures and, ultimately, the violent end of some causewayed enclosures, some of which, in their final phases, had become defended enclosures.

The role of enclosures.

The research did not set out to explore the role or roles of enclosures since this has witnessed much commentary in the literature, and most scholars suggest multifarious roles that changed over time. Nevertheless, it seems somewhat obtuse to carry out a study of causewayed enclosures without some commentary on their function or functions, and so this was purposefully left as an adjunct to the main theme. In investigating the previous three themes I had hoped that some new light could be shed on function. Whilst all the evidence points in different directions, for different roles, at different times, and for different enclosures, there did seem to be one argument that was underexplored in the literature. I suggest that some of the roles previously assigned to causewayed enclosures are the secondary consequences indicated by the material evidence inevitably left when many people gather together. Acts of exchange, the structured deposition of lithics, ceramics, and bone, and the woodworking evidently carried on at Etton, could all be assigned

to this class of secondary activity. Human bone may either be carried in from elsewhere as a symbolic act, or be simply a consequence of many people gathering together in acts of celebration, show and contest. Even today, people die at festivals. Roger Mercer's interpretation of Hambledon Hill initially focused on the hill as a place for processing of the dead, though this emphasis later swayed towards its role as an east / west geopolitical boundary. It may be that Hambledon Hill was indeed different, particularly noting the inclusion of the long barrows and the structured deposition of human skulls. However, the MNI count is around 75 individuals from two enclosures and one long barrow. Even here, then, whilst not all of the enclosure was excavated, the human remains recovered represent the accumulation of some 340 years (68% probability) of activity, or about one individual every four to five years.

I suggest a celebratory role for the enclosures: a 'gathering space' where people came together, to partner, to re-energise old relationships and forge new associations, to re-establish old allegiances and develop new bonds, and to establish new dues and obligations.

Such an interpretation fits well with the conclusions of this research, particularly surrounding mobility and the spatiotemporal evidence. In particular, the interpretation corresponds with a developing mode of thought, a new thinking which, perhaps more than 'things and practices' or 'packages', defined the early Neolithic.

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