

**Archaeological Aerial Survey in the
Northern Mendip Hills:
A Highlight Report for the National Mapping
Programme**



Russell Priest & Amanda Dickson
2009



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**Archaeological Aerial Survey in the
Northern Mendip Hills:
A Highlight Report for the National Mapping
Programme**

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2009

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SUMMARY

This highlight report describes the results of a project to complete an archaeological aerial survey of the Mendip Hills Area of Outstanding Natural Beauty (AONB). The project used National Mapping Programme (NMP) standards. The completion project area lies within the unitary authorities of North Somerset and Bath & North East Somerset, the northern section of the Mendip Hills AONB. It completes the NMP survey of the AONB and immediate environs, as Somerset was covered by an earlier project (Truscoe, 2008).

The NMP survey is part of a wider study by English Heritage in partnership with the Mendip Hills AONB and the relevant local authorities. This project combines analytical earthwork survey, architectural survey, documentary research and aerial survey to examine the archaeological and historical landscape.

Most of the archaeological evidence identified in the project area was of the medieval and post-medieval periods. This included field systems, ridge and furrow, shrunken settlements and associated hollow ways. Industrial activities were a prominent feature with mineral extraction sites visible as distinctive 'gruffy' ground. The higher ground of the Mendip Hills within the project area was characterised by evidence of Iron Age and Roman settlement and agriculture, where substantial earthworks survive. A significant proportion of the recorded archaeology in the project area relates to Second World War military activity, particularly anti-aircraft sites and training camps.

The project identified 152 previously unrecorded sites and amended 162 existing records within the National Monuments Records (NMR) database (AMIE).

ACKNOWLEDGEMENTS

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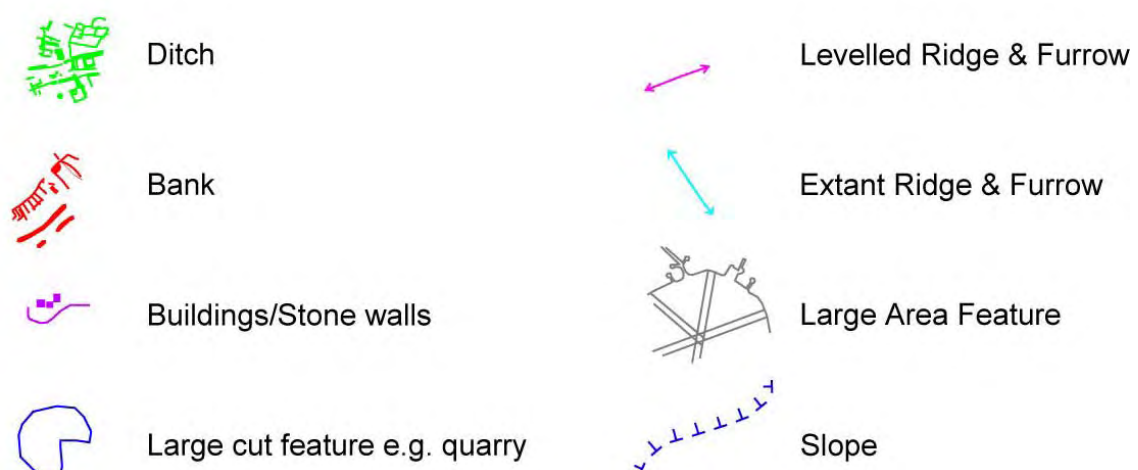
Aerial photographic sources were provided by the National Monuments Record Enquiry and Research Services team, in particular Luke Griffin; and the Cambridge University Unit for Landscape Modelling (ULM). Historic Environment Record data was provided by Sarah MacLean at both North Somerset Council and Bath & North East Somerset Council. Lidar data and advice was provided by Simon Crutchley at English Heritage. Thanks to all.

Thanks go to the Aerial Survey and Investigation staff at English Heritage, in particular Fiona Small and Cathy Stoertz for their expertise, advice and for quality assurance. Thanks also to Archaeological Survey and Investigation staff, also at English Heritage, in particular Mark Bowden, Graham Brown and Elaine Jamieson, for their guidance and assistance with this report. Roger JC Thomas of English Heritage and Donald Brown assisted with information on military sites. Kind thanks also go to Krystyna Truscoe for the use of her material, images and information on the Central Mendip Hills AONB NMP. Thanks to Sharon Bishop and Josephine Janik for their help with formatting.

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MAPPING CONVENTIONS

These mapping conventions are used in illustrations throughout this report unless otherwise stated. See Appendix I for a full explanation of the standard NMP map conventions and layouts. References to Monument Records in the National Monuments Record database (available on the Pastscape website) will be made in the format (NMR: 1234567).



I INTRODUCTION

1.1 General introduction

This report describes the results of the archaeological aerial survey which completes the National Mapping Programme (NMP) for The Mendip Hills Area of Outstanding Natural Beauty (AONB) (Crutchley 2005; Jamieson 2006). The project was carried out by the Archaeology Service of Gloucestershire County Council and conducted to English Heritage NMP standards as set out in the project design (Catchpole & Chadwick 2009). It was funded through the English Heritage Historic Environment Enabling Programme (HEEP), and completes the NMP of the AONB. The NMP survey commenced in February 2009 and was completed in May 2009.

The project area covered by this report comprises those parts of the Mendip Hills AONB within North Somerset and Bath & North East Somerset unitary authorities with the addition of a one kilometre buffer zone (Figure 1). A total of 121 square kilometres were surveyed between February and May 2009. This NMP survey identified 152 new sites and amended 162 existing records within the NMR database. See Appendix 3 for more detail.

Somerset County Council carried out a NMP survey for the part of the Mendip Hills AONB that lies within Somerset. A total of 183 square kilometres were surveyed on the Somerset Central Mendip Hills and the results of the aerial survey are available in the report by Truscoe (2008), as part of an analysis of the archaeology of aggregate producing areas.

1.2 Aims of the NMP survey

The principal aim of the NMP completion project was to inform future planning and management decisions concerning the historic environment within the Mendip Hills AONB through the transcription, recording and interpretation of all archaeological features visible on aerial photographs and lidar data. This included interpretation and mapping of earthworks, cropmarks (buried features) or structures (including buildings) which may date from between the Neolithic period (circa 4000 BC) and the late twentieth century (up to the Cold War era). Archaeological aerial survey can provide a landscape context for individual archaeological sites and this NMP project area contained a significant number of excavated and/or surveyed monuments for which the wider archaeological landscape has been mapped and interpreted.

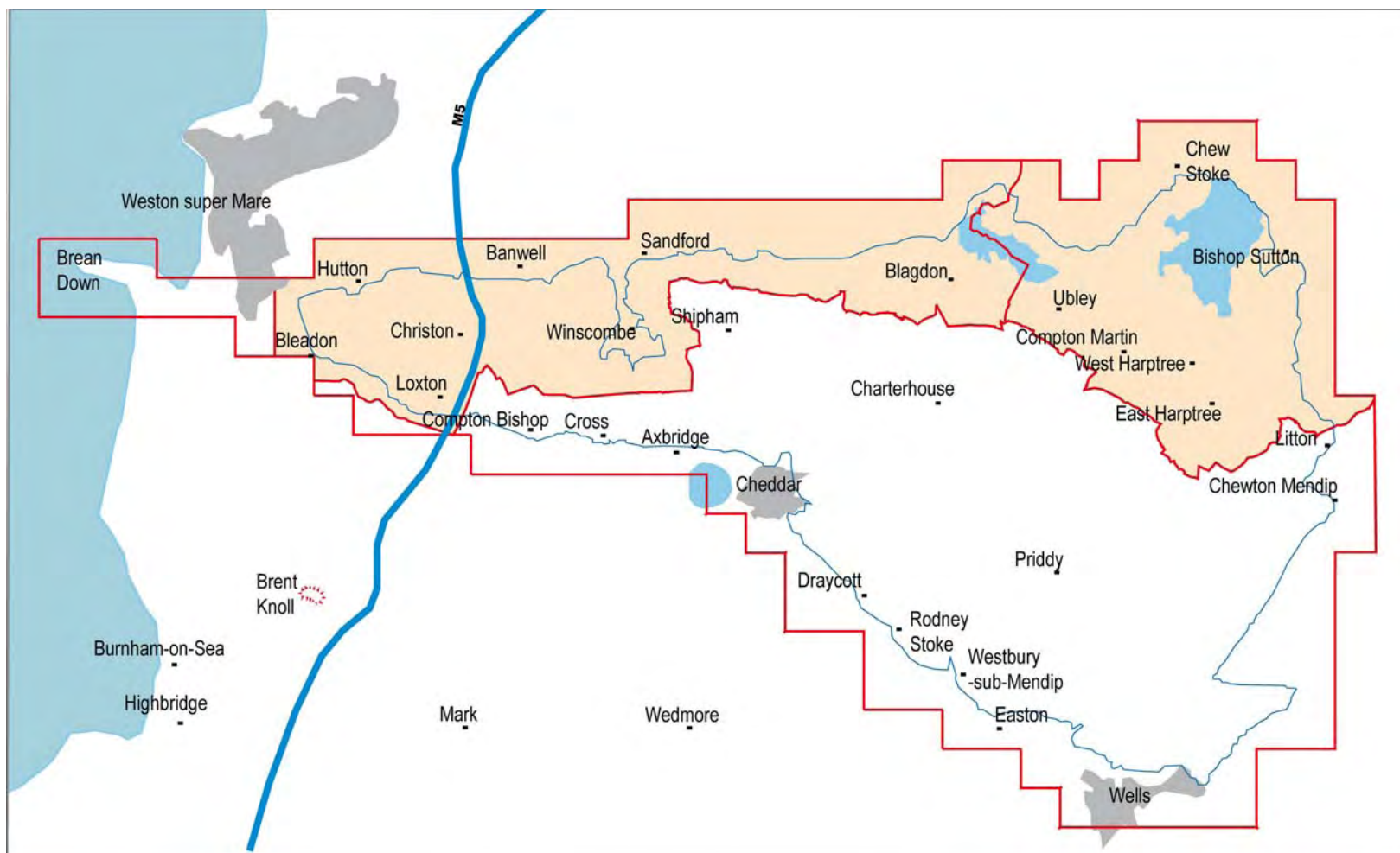


Figure 1: The Mendip Hills AONB NMP completion project area

The Northern AONB completion area is shaded in orange, the AONB is outlined in blue and the complete Mendip Hills AONB NMP project area in red. See Appendix 5 for a more detailed map of the project area. OS Base Map © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009

Another important aim of the aerial survey was to assess the usefulness of lidar data during the mapping phase, alongside conventional aerial photographs. This project was the first NMP project to use this method, although other projects have since made use of lidar (Crutchley & Small 2009). Lidar helped to identify slight earthworks with very low relief in open areas, and can identify features not usually visible on aerial photographs as they are masked by woodland or dense vegetation. Specific examples of the use of lidar in this project are discussed below on page 73.

The Archaeological Aerial Survey in the Northern Mendip Hills project enhanced the existing information in the National Monuments Record (NMR) and Historical Environment Records (HERs) of North Somerset and Bath & North East Somerset. As well as feeding into the wider Mendip Hills AONB Project, the results of the aerial survey will contribute to archaeological research at a national, regional and local level by adding to the large, standardised dataset that is the National Mapping Programme. The records and mapping produced by the National Mapping Programme can be obtained from the NMR and have been supplied to the relevant HERs. The dissemination of the results will also be via this highlight report, via the English Heritage website, on the Aerial Survey pages in the Archaeology and Buildings section. The report and an accompanying event record will be available from the Archaeology Data Service.

1.3 Aims of the Mendip Hills AONB project

The NMP survey is a component of a more extensive programme of work which is currently being undertaken in the whole of the Mendip Hills AONB by English Heritage and their partners. This wider project combines architectural survey, earthwork survey, aerial survey and documentary research. It is designed to examine and define known archaeological sites and assess their significance; collate and interrogate previous archaeological and historic buildings research, and identify gaps in archaeological understanding and focus appropriate resources in these areas. The project will therefore act as a planning and curatorial tool to inform future management decisions in a landscape under increasing pressure from agricultural changes, visitors and leisure activities, and mineral extraction (Jamieson 2006). In addition, the overall English Heritage AONB project is intended to widen participation in archaeological and historical landscape survey and to provide training and outreach opportunities. This will help widen understanding and appreciation of the historic environment of the Mendip Hills AONB. Dissemination of the results of the overall Mendip

Hills AONB project will be via a published synthesis, material for web pages, talks to local societies and other outreach activities.

1.4 NMP methodology

NMP methodology entails the interpretation, digital transcription and recording of all archaeological features, dating from the Neolithic to the 20th Century, visible on aerial photographs and lidar data, to defined English Heritage NMP standards (See Appendix I for more details).

The main source of aerial photographs was the collection at the National Monuments Record (NMR), Swindon. This included vertical photographs taken for non-archaeological purposes between 1941 and 2006 by the RAF, Ordnance Survey and Meridian Airmap Ltd. The NMR also has a collection of specialist oblique aerial photographs which focus on archaeological and architectural sites and landscapes. Aerial photographs from the Cambridge University Collection of Air Photographs (CUCAP) held at Cambridge University's Unit for Landscape Modelling (ULM) were also examined. Online internet sources such as Google Earth (<http://earth.google.com/>), and Live Local (<http://maps.live.com/>) also proved useful in providing recent vertical aerial photographs. A limited coverage of recent false colour infra-red aerial photographs was also available from the Ordnance Survey through the Pan-Government Agreement (PGA).

The lidar data was sourced from a lidar survey commissioned by the Mendip Hills AONB and flown by the Cambridge University Unit for Landscape Modelling in late 2005 and spring 2006. The data was provided as rectified, hill-shaded, greyscale TIFs and 3D rendered landscapes which could be viewed from any angle (See Appendix 2 for more details).

In addition to aerial photographs and lidar data, relevant published material and map sources were consulted. The map sources included all the past editions of Ordnance Survey mapping and geological maps produced by the British Geological Survey.

The photographs were transformed and rectified using specialist rectification software (Aerial 5.29) and Ordnance Survey Mastermap 1:2,500 scale mapping. Archaeological features were traced from the georeferenced rectified photographs and lidar tiles using AutoDesk Map 3D 2007 with standard NMP drawing conventions (See Appendix I for more details).

New sites and amendments to existing sites were recorded in the NMR database known as AMIE, part of which is also available on the English Heritage corporate GIS. A summary description and sources are available on Pastscape (<http://www.pastscape.org.uk/>). This information will also be disseminated electronically to the Heritage Group of the Mendip Hills AONB Partnership, and the relevant councils' Historic Environment Records.

1.5 Light Detection and Ranging (lidar) survey

The lidar survey, flown by the Cambridge University Unit for Landscape Modelling was carried out over the Mendip AONB to provide information on the survival of archaeological earthworks. It was also intended to be a new source for the English Heritage interdisciplinary study of this area.

Lidar is an airborne remote sensing method in which a pulsed laser is used to measure height differences on the land surface. This survey technique results in a detailed digital terrain model in which archaeological features can be identified; sometimes slight earthworks in pasture, arable cultivation, or in woodland can be seen to survive. The Mendip lidar survey was flown with a one metre ground resolution, which provides a ground model of sufficient detail to pick up subtle archaeological earthworks.

Lidar has the capacity to penetrate many types of woodland canopy (Devereaux et al 2005), thereby potentially identifying archaeological sites under tree cover. However, in areas covered by very densely planted trees, such as coniferous woodland, the laser pulse may not be able to penetrate the dense canopy to the woodland floor, so only the height of the tops of the trees is recorded (Devereaux et al 2005: 658). Unfortunately this appears to be the case in some parts of the project area, which has both coniferous plantations and broadleaved semi-natural woodland.

On Mendip, another factor influencing the visibility of archaeological sites in woodland, particularly in the eastern half of the area, was the time when the lidar survey was flown. The data for the western half of the lidar survey was captured in autumn and winter when deciduous trees had lost their leaves, while the eastern half was flown in spring, when there was more foliage (Truscoe 2008).

2 CHARACTER OF THE SURVEY AREA

2.1 Landscape character

The project survey area extends from Bleadon Hill, east of Weston-super-Mare in the west, to Chewton in the east, encompassing the contrasting topography of the northern edge of the Mendip Hills and the low-lying North Somerset Levels. The Mendip Hills comprise the southernmost outcrop of Carboniferous Limestone in England and the east-west oriented ridge and northern slopes dominate the project area (Figure 2). The low lying areas to the north of the ridge measure about five metres above Ordnance Datum (AOD), while most of the Mendip ridge measures around 100 metres AOD. The highest point is Burrington Hill at 200 metres AOD.

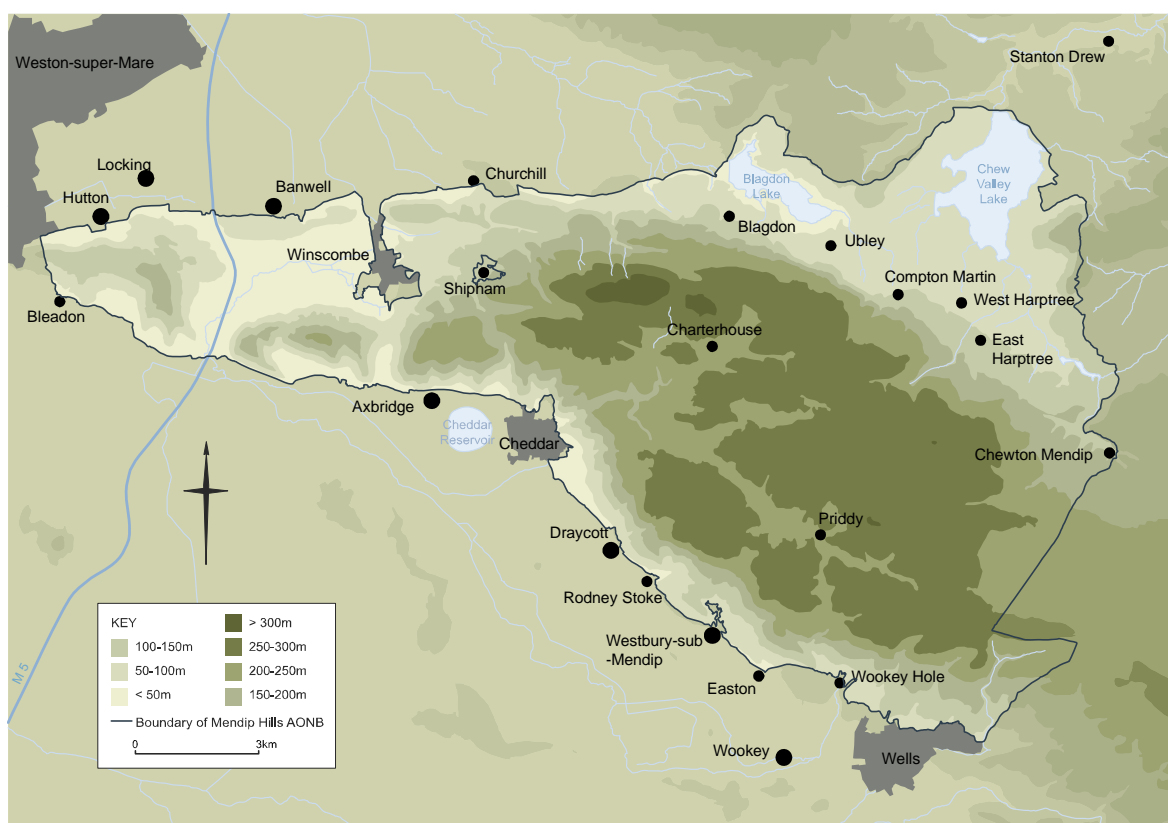


Figure 2: The topography of the Mendip Hills AONB
Image courtesy of Elaine Jamieson, Archaeological Survey & Investigation, English Heritage.
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The limestone geology of Mendip produces the characteristic 'karst' scenery of deep, narrow gorges, steep sided crags, swallets or sink-holes and large cave systems. Rivers and streams

are mainly found along the northern and southern edges of the ridge as ground water permeates easily through the soluble limestone rock on the higher ground and then appears as fast flowing springs at the base of the scarp. The presence of these springs at the base of the hills has played a key factor in the development of settlement along the northern and southern edges of the escarpment. Parish boundaries generally follow the break of slope at the base of the ridges (often marked by roadways) or follow contour lines along the edge of the plateau at the top of some of the ridges (Land Use Consultants 2005: 73).



*Figure 3: View looking east across the northern edge of the Mendip Hills
Banwell Camp is in the foreground with Sandford quarry in the middle distance. Note how
the settlements hug the bottom of the hills following the spring line (left of image). NMR
ST4059/14 NMR 24820/18 12-NOV-2007 © English Heritage. (NMR)*

The limestone geology in the Mendip Hills gives rise to freely draining and loamy soils which vary in depth, from the gentler lower slopes of predominately pasture, becoming shallower on the higher areas and steeper slopes which are less fertile. Here dense woodland, gorse and bracken dominate. Much of the upland at the edges of the main area of the Mendip Hills is pastoral and was divided into regular rectilinear fields during post-medieval enclosure (Land Use Consultants 2005: 73; Williams 1976: 104-105).

The eastern side of the project area, within Bath and North East Somerset, is mostly low-lying, comprising largely Triassic Keuper Marl, a mudstone which produces loamy, clayey soils with impeded drainage. These soils can be fertile and provide good arable land but pasture dominates here. Fields are typically small and regular, resulting from the enclosure of open fields in the late medieval period (Bath & North East Somerset's Planning Services 2003: 28). The boundaries of these fields often preserve the outlines of the earlier strip field system.

The pattern of settlement within the project area therefore appears to be largely dictated by the local topography and geology, with villages and towns located along the base of the east-west scarp and in the valley bottoms, such as Winscombe, near to the more fertile freely draining soils and the spring line. The main settlements also extend outward, ribbon like, along the roads which follow the topographical contours. Some isolated farmsteads are found on the upland plateaus but none are found on the steep-sided slopes.

2.2 Archaeological character

There is a rich archaeological heritage within the project area, as there is in the rest of the Mendip Hills AONB. The Mendip Hills has some of the most significant Mesolithic and Neolithic cave deposits in the country. One of the key differences between the central Mendip plateau and the northern edge of Mendip covered in this report is the preservation of archaeological earthworks. The plateau has a higher proportion of unimproved upland and largely undisturbed pasture, and the northern lowlands have a history of arable cultivation throughout the medieval and post-medieval periods, which continues to the present day. The pattern of settlements and the long history of ploughing associated with them has resulted in the truncation and masking of many of the pre-medieval structures and earthworks in the northern parts of the study area. The extensive Roman settlements and field systems which were excavated on the site of Chew Valley Lake provide evidence for this (Rahtz & Greenfield 1977).

The earliest visible archaeological evidence in the project area dates to the later prehistoric period and includes Bronze Age activity in the form of round barrows, five major Iron Age hillforts surviving as substantial earthworks and extensive Iron Age to Roman field systems on the upland plateaus. These archaeological features mainly survive on the higher ridges but they also imply that organised and populated lowland existed at that time. The archaeological record reflects this idea of widespread pre-medieval activity from the full range of archaeological periods, indicated by small finds and excavations.

Medieval and post-medieval shrunken or deserted settlements and scattered areas of relict field systems are found in the project area along the lower slopes and base of the Mendip ridge, sometimes associated with ridge and furrow and remnants of strip fields. Scattered blocks of probably post-medieval ridge and furrow are found throughout the project area.

The mineral wealth of the Carboniferous Limestone of the Mendip Hills has led to extensive areas of lead, calamine and ochre mining. Mining and mineral extraction is part of the distinctive pattern of the landscape that is still visible today, particularly on the high plateaus. Stone quarrying is also very much in evidence, ranging from small local extractive pits to large scale commercial operations, such as at Sandford Quarry, where operations continued from the mid 19th century until 1993 (BGS 2009).

Second World War military activity has also left its mark in the landscape, particularly in the north-western part of the project area, where RAF Weston-super-Mare and RAF Locking were situated. The features and structures identified mainly relate to the defence of the airfields, including pillboxes, anti-aircraft batteries, barrage balloon sites and a searchlight battery. These wartime features are visible on RAF aerial photographs taken in the 1940s and 1950s but were largely destroyed by the 1960s. Therefore the anti-invasion structures have not had a lasting impact on the landscape of the Mendip Hills.

2.3 Land use

Some evidence of prehistoric cultivation is visible, but from at least the medieval period, much of the Mendip Hills has been pastoral, with large areas given over to grazing sheep (The Countryside Agency 1999: 125). Part of central Mendip around Cheddar was a Royal Forest from before the Norman invasion (Neale 1976: 90-91), with the remainder of the unimproved plateau being used for seasonal grazing. Elsewhere, extensive woodlands, many

of them ancient semi-natural broadleaved woods, occupy the tops and steep slopes of the hills. On the lower slopes to the north of the plateau there has been extensive arable cultivation in the past, as demonstrated by the remains of medieval open field systems. As the land slopes down toward the levels to the north and south of the plateau, the evidence of past arable cultivation becomes rare. Many of these low lying valley bottoms may have never or rarely been cultivated before the post-medieval period due to frequent waterlogging. The Lox Yeo valley is covered with hundreds of drainage channels today, and is very fertile farmland. Another possibility is that the more intensive arable cultivation in the 20th century has removed evidence of medieval ploughing.

After about 1870, arable cultivation on the plateau began to decline and be replaced by pasture (Williams 1976: 118). By 1938 arable farming had declined to its lowest level on the Mendip plateau, although there was a dramatic increase in the acreage of arable land on Mendip during the Second World War (Williams 1976: 121-123). The aerial photographs examined as part of this project seem to indicate an increase in land under the plough during the 1960s, which may be due to the influence of agricultural subsidies.

Intense industrial activities and associated infrastructures have had a dramatic impact on the landscape, affecting roughly 25% of the land area of the AONB. Lead mining has been carried out over the Mendip Hills since at least Roman times, though much of the mining in the current project area is thought to date from the post-medieval period. Miners in the medieval and post-medieval periods would rework earlier extractive pits and spoil heaps, producing the complex multi-phase pockmarked landscape known locally as 'gruffy ground'. Quarrying was carried out in the past as well as mineral extraction, this was often small scale and for local use, although taken cumulatively the quarries cover a massive area, and lime burning was widespread (BGS 2009b). The most recent impact on the landscape from extraction has been late post-medieval and early 20th century stone quarrying. The largest modern industrial site is that at Sandford Quarry which has removed a large part of the western end of Sandford Hill.

The two man-made lakes at Blagdon and Chew Valley (Figure 4) changed the landscape on the north-eastern edge of the project area. These two lakes were created as reservoirs and flooded 6.7 square kilometres of farm land. Blagdon Lake was begun in 1892, with the water reaching its final level in 1904 (Anon. 2005). Unfortunately very little aerial photographic



*Figure 4: Looking northeast across Chew Valley Lake
This reservoir was created in the 1950s and typifies the low-lying landscape of the northern side of the project area. NMR ST5558/1 NMR 24663/48 08-AUG-2007 © English Heritage. (NMR).*

coverage was available showing Chew Valley Lake before it was flooded in the early 1950s. The lakes have significantly altered the character of the north Mendip lowlands, not just through the flooding of farmland but also as both lakes are now used as leisure facilities and nature reserves.

3 FACTORS AFFECTING THE VISIBILITY OF THE ARCHAEOLOGY

The visibility and survival of archaeological sites is affected by geology, soils and land use. The mapping and interpretation of such features from aerial photographs can be limited by a wide range of factors such as the scale of the photography, an unfavourable time of day or year for optimal visibility, or climatic conditions such as haze (Wilson 2000: 47).

Most of the archaeological evidence within the survey area was visible as earthworks; very few features were seen as soilmarks or cropmarks on the available aerial photographs. Although one might expect to find cropmarks in freely draining soils, such as those found in the project area, the predominance of pasture rather than arable land-use is not conducive to cropmark formation except in severe drought, where buried features may form parchmarks within grass.

Most of the earthworks identified and mapped were located on the upland areas at the southern edge of the project area. The southern upland edge is also the location of the earliest archaeological features, particularly of the Iron Age and Roman periods. Their survival is in part due to the historical lack of arable farming on the upland areas, which are mainly under permanent grassland. As the soils tend to be thin in these upland areas, any phase of ploughing would have greatly affected the earthwork remains. However, aerial photographs taken from the 1960s onwards show that arable farming has increased on the upland areas and some sites are already in the process of being levelled. Therefore aerial photographs taken in the 1940s or earlier may sometimes be the only record of the earthworks.

Those earthwork features visible on the lower-lying ground appear to reflect the medieval and post-medieval landscape, with remnants of strip lynchets and field boundaries dominating, particularly around Blagdon, Butcombe and West Harptree. There is little surviving earthwork evidence of earlier periods. This pattern however, is not reflected in the known archaeological record, indicated by small finds and excavations, where there is plenty of evidence for pre-medieval activities on the lower lying ground in the north of the project area. Some of the northwestern project area in the Lox Yeo valley, the Axe valley the Hutton and Locking Rhyne was susceptible to waterlogging, as shown by the numerous post-medieval drainage ditches or 'rhyne' evident in the early 20th century.

The extensive, and in some places dense, woodland and plantations on the slopes and upland areas mask earthwork features, such as field systems, from the air. The substantial remains of the Iron Age hillforts were sometimes heavily obscured on the aerial photographs and could only be partially mapped, such as at Burlledge Hillfort. In some areas, dense scrub and bracken masked any potential archaeological features, not just on conventional aerial photographs but also on lidar images.

Potential archaeological features are obscured by the 19th and 20th century man-made reservoirs located in the east of the survey area. Excavations were carried out prior to the flooding of Chew Valley Lake by the Ministry of Works between 1953 and 1955, which revealed substantial evidence for prehistoric settlement. Roman remains were also uncovered indicating agricultural and industrial activities as well as a large villa (Rahtz and Greenfield 1978). Although relatively extensive, the excavations did not evaluate the whole area of the lake, and further prehistoric, Roman and medieval archaeology is probably now hidden from view. The archaeology under the lake may be better preserved than in adjacent areas of farmland, much of which has had another fifty years of deep ploughing.

Mineral extraction has produced its own unique landscape as well as potentially destroying earlier features, notably the possible Iron Age hillfort at Dinghust, which was the site of large-scale quarrying and extraction. None of the Iron Age earthworks are recorded on aerial photographs and the main source of evidence is the 1885 1st edition Ordnance Survey map.

Most of the survey area was well covered by a range of vertical and oblique photography with slightly more towards the western half. Some of the bias in the specialist oblique photographs taken before the 1970s is likely to be due to the many substantial archaeological sites that survive in the west, e.g. Dolebury Hillfort and the Iron Age and Roman field systems on Bleadon Hill, which attracted the aerial archaeologists. Another factor contributing to the lack of oblique cover is the proximity of Bristol airport and the restrictions which this imposes on the airspace around Mendip. This has meant that aerial discovery of new archaeological sites and features has been somewhat restricted, which may account for the lower density of archaeology mapped in the east of the project area. A great deal of archaeological reconnaissance flights have been carried out over Mendip, particularly in the last five years, which has gone a long way towards addressing this imbalance.

4 RESULTS OF THE AERIAL SURVEY: THE LATER PREHISTORIC - THE NEOLITHIC, BRONZE AGE AND IRON AGE

4.1 Neolithic

No new Neolithic sites were positively identified by the aerial survey. Some of the round barrows interpreted as Bronze Age may have their origins in the final phases of the Neolithic, although there is no way of determining this from the aerial photographs alone (Riley & Wilson-North 2001: 21).

It may be that archaeological features are masked by the dense vegetation and have yet to be identified. For example, Fairy Toot long barrow in Nempnett Thrubwell (NMR: 198102) is the most significant Neolithic site in the study area, and unfortunately it was obscured by vegetation on all the available aerial photographs.

There is the potential for discovery of Neolithic sites, however, the dominance of pasture, the general character of the area, and the restricted air traffic zone as discussed above, suggest that exceptional conditions may be required for buried archaeology to show as cropmarks, or for previously unrecorded earthwork sites to be recorded from the air.

4.2 Bronze Age

Bronze Age archaeology in the study area is typically characterised by funerary monuments, flint scatters, isolated artefacts and cave deposits. Several Iron Age or Roman sites had earlier phases of Bronze Age activity revealed through excavation (e.g. Banwell Camp, Pagans Hill Roman temple). The analytical earthwork survey carried out as part of the wider Mendip project found that many of the barrows were multi phase, with groups of barrows being altered and elaborated over time. There are also unusual local variants of barrow forms and monuments which are relatively uncommon in a national context, such as mortuary enclosures (pers comm. Elaine Jamieson).

Mendip as a whole is one of the densest barrow landscapes in Britain, with over 350 barrows, equivalent to Wiltshire or Dorset (Lewis 2007a: 72). Most of the barrows are located on the central Mendip plateau, south of the study area discussed here. Truscoe (2008: 21) recorded 166 barrows in total, although she gives the number of all known barrows in the area as 275. She suggests that some of the barrows which were known on

the HER but could not be recorded as part of the aerial survey may have been levelled by ploughing or industrial activity, or masked by vegetation.

Round barrows in the northern Mendip Hills are typically arranged in groups or cemeteries, with smaller numbers of isolated barrows. In the study area, 13 barrows are grouped into two cemeteries which may be related to each other, while six are distributed across the rest of the study area. Four barrows recorded in the NMP survey were previously unknown to either the NMR or the relevant HER. At least eight round barrows had their grid references updated to a more accurate eight figure grid reference.

Not all of the round mounds recorded in the NMP survey can be confidently classified as barrows. A good example of this is a mound on Bleadon Hill (NMR: 192531). The documentary evidence suggests this may be one of a group of three barrows noted by Colt-Hoare and excavated by local antiquarian the Rev. J. Skinner in 1819. One of the barrows in this group is reported to have had 'a 1ft high urn' found within it, suggesting that at least one of the group was prehistoric.

A probable barrow is located a few metres to the east of the parish boundary. Maps of the area of 1736 and 1760 show a windmill mound on the open hillside just within the parish boundary. Aerial photographs record a mound which has been dug into. This could indicate a round barrow excavated in the typical antiquarian manner, or a medieval or post-medieval windmill mound with the robbed out trench for the cross trees visible at the top, or a combination of both. The possible barrow is located in the middle of a field boundary. This boundary is part of a field system with an unusual form, which (NMR: 192516) could date from the later prehistoric through to the medieval period. Investigation of the stratigraphic relationship between this probable barrow and the field boundary and refining the date of the field system would allow a more definitive interpretation to be made.

The most significant group of barrows in the study area is located at Loxton Hill, Loxton, with a smaller group located next to Christon plantation in the same parish. There are thirteen barrows in total; ten on Loxton Hill (Figure 5) and three at Christon Plantation (Figure 7).



*Figure 5: The Loxton Hill barrow cemetery
The barrows are ringed for clarity, and the findspot of a socketed axe is marked with a red chevron. NMR RAF/TUD/UK/21 5323 14-JAN-1946 English Heritage (NMR) RAF Photography.*

Of the ten barrows on Loxton Hill, the cairn ringed in blue on Figure 5 was first recorded as part of the NMP project. The barrows vary in size from 5.5 metres to 24.5 metres in diameter. Six of the barrows appear to be earth mounds, but with no evidence on the available aerial photographs for encircling ring ditches. Four, in the north-eastern parts of the

cemetery, are smaller and appear to be constructed from stone.

There are considerable numbers of medieval or post-medieval extractive pits and spoil heaps in this area, and it is possible that further barrows have been quarried away or otherwise disturbed. It is unlikely that features identified as barrows are spoil heaps as they have a more regular appearance, and none are immediately adjacent to an extractive pit.

The red chevron on Figure 5 indicates the find spot of a late Bronze Age socketed axe, found 'when hauling away a heap of stones' roughly at the top of the hill in this field in 1913 (NMR: 192428). The provenance of the find spot is not quite accurate enough to work out where this lost barrow was in relation to the rest of this group.

The barrows appear to be arranged in groups, including the four small stone cairns in the north-eastern corner; three barrows to the north-west, including a barrow surmounted by a trig point; and two almost conjoined oval barrows on the southern edge of the group. This variation in construction and use of different areas of Loxton hill might suggest that the barrow group was constructed over a long period of time. This continued reuse and reworking of the site perhaps emphasised its importance (see Lewis 2007a: 78-79, Bradley 1993: Ch. 5).

There has been a great deal of discussion of the phenomenology of round barrows and the landscape setting of barrow cemeteries (Bergh 1995, Tilley 1994, Lewis 2007b: 18-19). Some barrow groups on Mendip, such as the Priddy Nine Barrows, were placed to be visible on the skyline from considerable distances away. The barrow at the highest point of Loxton Hill may have been visible on the skyline from some distance away. The other barrows, however, are generally too small and not conspicuously placed enough to be prominent in the landscape. Figure 6 shows how the group of ten Barrows at Loxton Hill and the group of three barrows at Christon Plantation are located on the western and northern slopes of a broad flat bottomed valley, which may be where the contemporary Bronze Age settlements were. It has been suggested by Truscoe (2008: 21), and it equally applies here, that settlement locations and sites were reused in the Iron Age period possibly obscuring settlement evidence from the Bronze Age and Neolithic periods, skewing the bias towards ritual and religious sites.

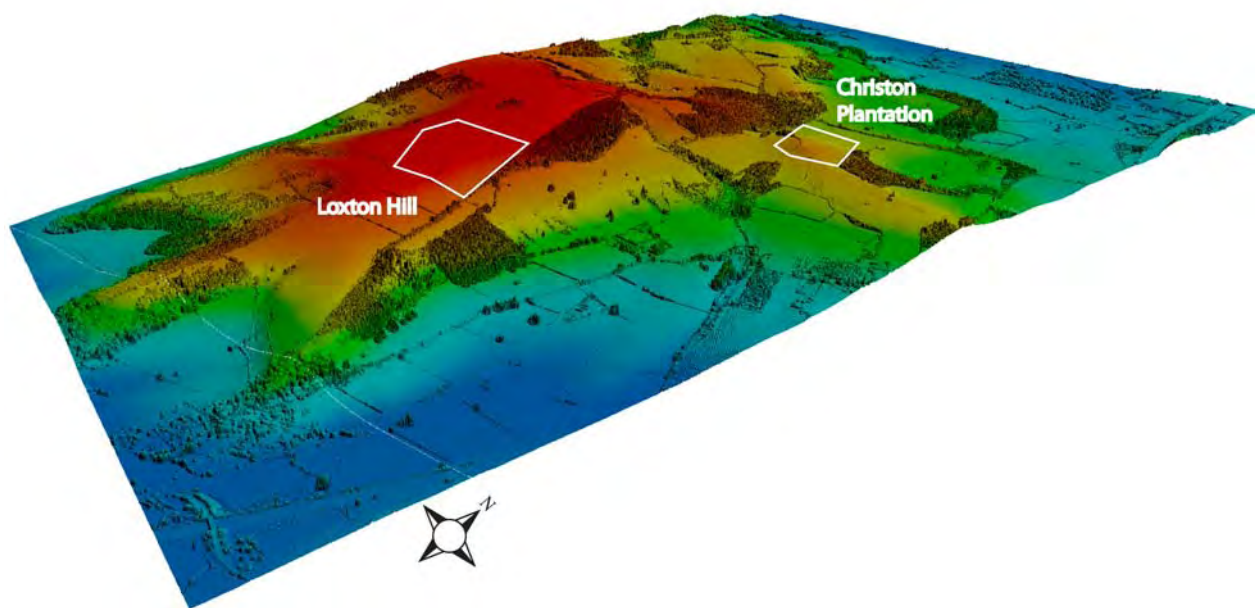


Figure 6: Lidar of the area around Loxton Hill and Christon Plantation. The areas of barrows are indicated in white. LIDAR ST3654/ST3656/ST3658 Cambridge Unit for Landscape Modelling LAST RETURN 01-APR-2006 © English Heritage; source Cambridge Unit for Landscape Modelling

4.3 Barrows in relation to other features

Some of the probable round barrows are located within or very close to field systems, although the relationship between them is often far from clear. It is difficult to draw conclusions about the contemporaneity or otherwise of the barrows and the field systems, and some of the barrows may be clearance cairns or windmill mounds; in no example mentioned below is there evidence from excavation which indicates a Bronze Age date.

The group of three barrows near Christon Hill plantation are located very close to or within field boundaries which are a part of a probably Iron Age or Roman field system (NMR: 1493692), although some elements may be medieval in date. Figure 7 shows a field boundary which appears to divert slightly around barrow 'A' (NMR: 1493706), indicating that the barrow was respected when the field boundary was laid out. Barrows 'B' and 'C' (NMR: 192473 & 1493712) are each a few metres from a field boundary, enclosed within the field. However, this pattern would also fit with the barrows being clearance cairns. At Inwood, just west of Bath, 34 mounds are visible within a Later Prehistoric field system. The cairns measure four to five metres in diameter, comparable with the examples in Figure 7. Although one cairn in the group had been robbed out to reveal a cist (Powlesland 2009: 69), other cairns revealed an upright stone packed with rubble, the morphology of a field

clearance cairn (Underwood 1946: 444 in Powlesland *ibid.*). The newly recorded ring ditch marked as C on Figure 7 indicates that it is likely that at least some of these are barrows.

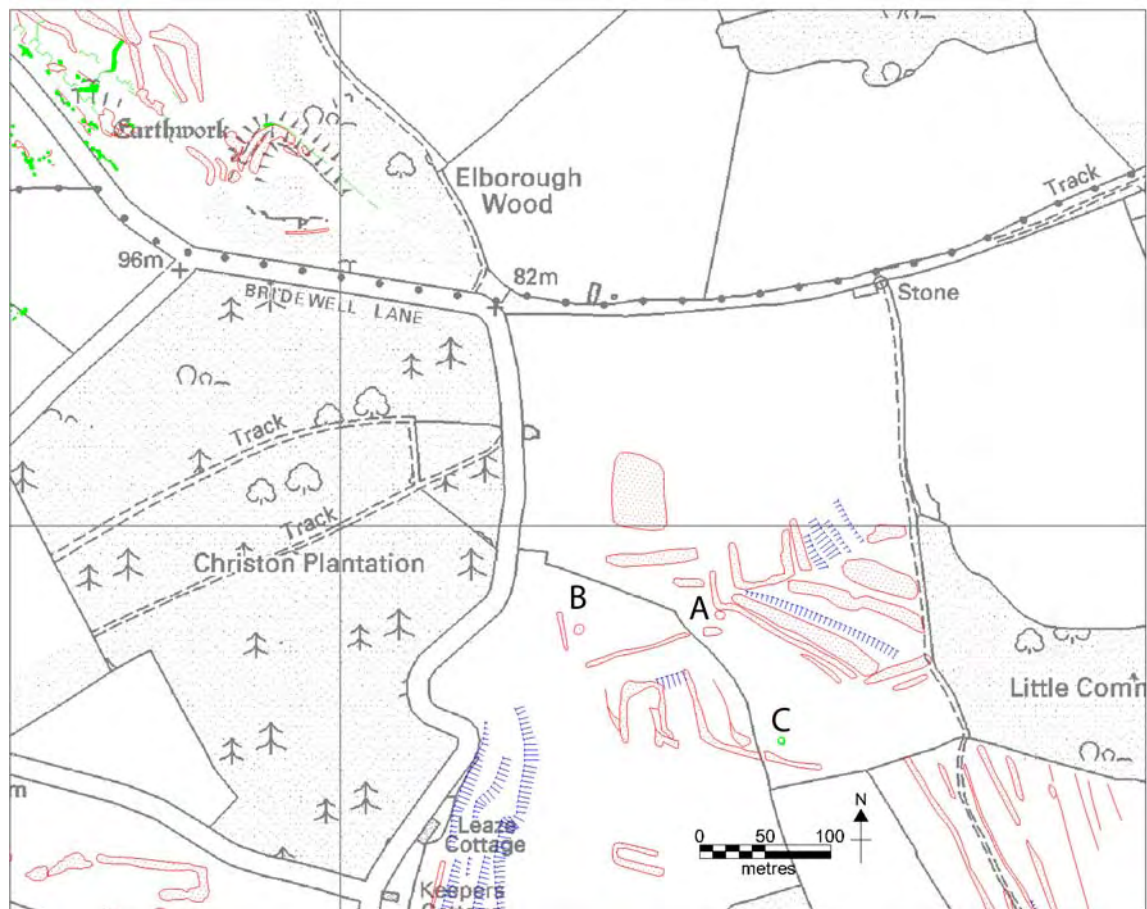


Figure 7: The round barrows at Christon Plantation.
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A number of barrows are located on parish boundaries, suggesting that they were used as significant features in the landscape when parish boundaries were being laid out. The boundary between Bleadon and Loxton extends through the westernmost barrow shown on Figure 5, though this is also the highest point of the hill and has been used as the location for a trig point. The boundary between Nempnett Thrubwell and Butcombe extends through Fairy Toot long barrow and a round barrow which was reused as a windmill mound in the medieval period.

4.4 Iron Age

While the results for the Bronze Age are dominated by ritual or religious practices, the evidence for the Iron Age is overwhelmingly domestic and agricultural in nature. Enclosed settlements and field systems dominate the archaeology on the top and slopes of the northern Mendip hills. There is some evidence that settlement locations and sites which were in use in the Iron Age period had a long history of occupation stretching back into the Bronze Age and Neolithic. For example, small finds of possible Bronze Age or Neolithic date have been found within the Iron Age hillforts of Banwell, Burrington and Dolebury which adds weight to this theory.

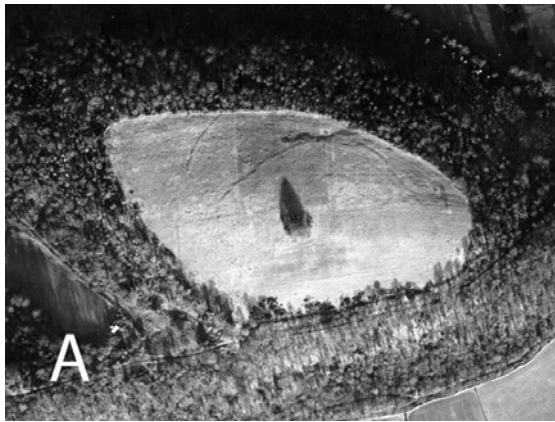
4.4.1 Settlement

There is clear evidence for an Iron Age population in the northern Mendip Hills who created no less than seven hillforts or hilltop enclosures within the project area, compared to four hillforts or hilltop enclosures on the rest of Mendip (Truscoe 2008: 22-23).

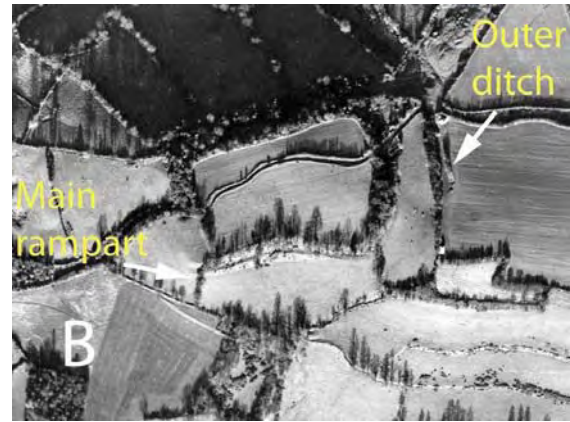
Four examples of these Iron Age settlements are illustrated in Figure 8. All of the identified Iron Age hillforts and enclosures are located on the uplands, with Dolebury hillfort having the most commanding views across the Mendip Hills plateau and westwards along the ridge towards Brean Down and the Severn Estuary. As Truscoe (2008: 22) noted on the central Mendip Hills, further settlements may have existed on the lower ground which are now masked by medieval and post-medieval agricultural activity and modern villages. The upland sites may have been exploiting different resources or may have been seasonally occupied with other settlements located elsewhere. Rowberrow Camp and Longbottom Camp are located on opposite sides of Rowberrow Bottom, a steep sided valley leading down from the plateau. Elaine Jamieson has suggested that this valley may have been used as a natural route for moving stock up and down from the plateau (pers. comm.), and it is noticeable that this routeway would appear to extend below Dolebury Camp. There are a series of probably medieval or post-medieval stock enclosures along this valley, suggesting that this remained a preferred routeway for transhumance.

In most of the hillforts which have been extensively investigated, the most monumental phases of construction date to the Iron Age, but there are often earlier and less substantial phases of hilltop enclosure which date to the Neolithic or Bronze Age. Hillforts can also

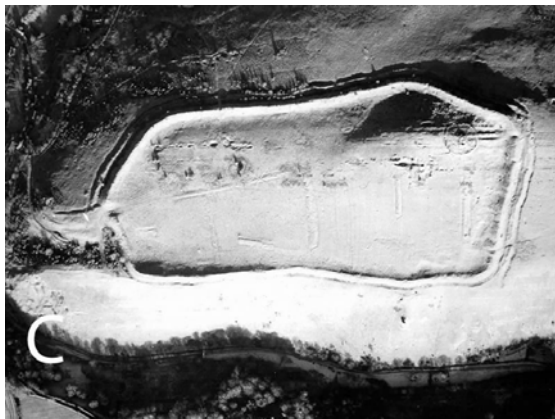
continue as active sites after the Iron Age, with some of them refortified and reoccupied in the early medieval period¹.



*NMR RAF/3G/TUD/UK15/21 (Part III) 5274 13-JAN-1946
English Heritage (NMR) RAF Photography*



*NMR RAF/CPE/UK/1869 3260 04-DEC-1946 English
Heritage (NMR) RAF Photography*



*NMR RAF/3G/TUD/UK15/21 (Part III) 5286 13-JAN-1946
English Heritage (NMR) RAF Photography*



*NMR RAF/3G/TUD/UK15/21 (PART III) 5295 13-JAN-
1946 English Heritage (NMR) RAF Photography*

*Figure 8: Four Iron Age hillforts or enclosures in the project area.
A: Banwell Camp; B: Burlledge Hillfort; C: Dolebury Camp; D: Burrington Camp.*

The small bivallate hillfort to the south of Elborough was identified on the aerial photographs and lidar. The hillfort is oval in shape, with the longer axis oriented WNW-ESE. The entrance faces WNW, and is defined by a triple bank on the northern side and a double out-turned bank on the southern side. The northern and southern sides of the hillfort are almost entirely defined by natural scarps, although a narrow ditch is visible extending along the northern side. Elborough has more in common with promontory forts than with some of the other substantial hillforts in the project area. A section of linear bank, possibly part of

¹ E.g. Cadbury Castle, Somerset, (Barrett et al. 2000), Yeavering Bell, Northumberland, (Hope-Taylor 1977), Dinas Powys, Glamorgan (Alcock 1963).

the main rampart, extends along the southern side of the hillfort. Little of the hillforts' original earthworks remain on the ground, much having been destroyed by the farmer as noted on a field visit by Gordon Pitcher in 1965 (unpublished comments in NMR: 192359). The western defence was bulldozed and used to backfill the outer ditch. The historic aerial photographs taken before this levelling event are therefore an important record of the former extent of this hillfort.

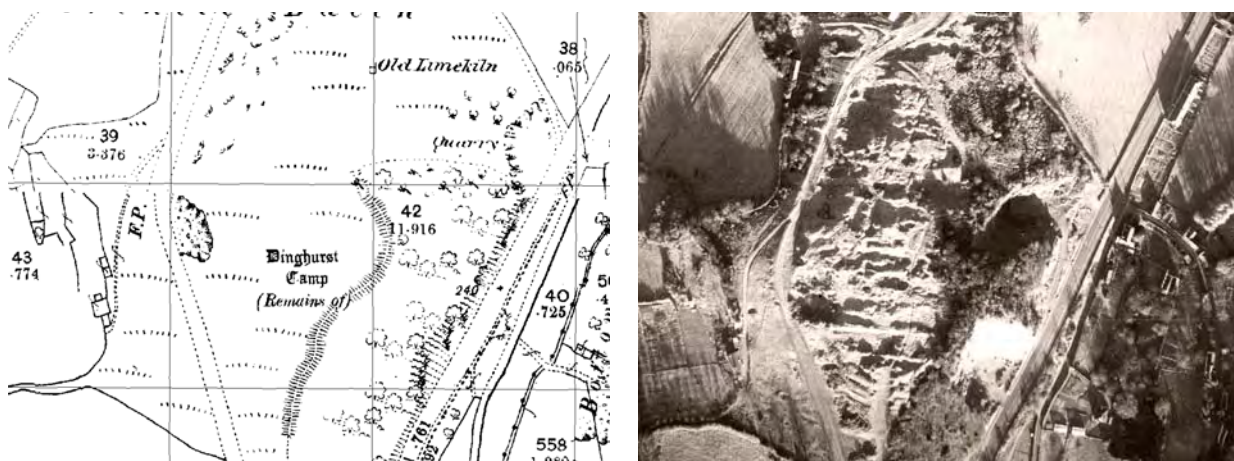


Figure 9: Dinghurst Camp, the possible site of an Iron Age hillfort. NMR RAF-3G-TUD-UK15-21 (Part III) 5220 13-JAN-1946. English Heritage (NMR) RAF Photography. Ordnance Survey Map 1885 Somerset 1:2,500

Dinghurst Camp is a probable hillfort at Churchill, yet nothing was visible of its earthworks on the available aerial photographs (Figure 9). Traces of a linear earthwork were recorded on the 1st edition OS map and described by Phelps (1836: 100) as "...a vallum with double agger and fosse". The aerial photographs show the site to have been used as a post-medieval quarry and all traces of the possible bank described by Phelps to be obliterated.

Another possible Iron Age site is located on Windmill Hill, Churchill (Figure 10). A faint circular feature is defined by two curving ditches, although there were earthworks of a slight internal bank with a possible entrance on the western side on the aerial photographs. The place name evidence would suggest that this may be a possible location for a medieval or post-medieval windmill mound. However, this circular enclosure is too large to be a windmill mound, as it measures circa 50 metres in diameter. It may therefore be a hilltop enclosure of Iron Age date.



Figure 10: The possible Iron Age enclosure identified on the top of Windmill Hill. The entrance is located on the western side. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009

4.4.2 A defended site?

There is some circumstantial and morphological evidence for the site shown in Figure 11 being the bailey of a Norman castle (NMR: 197286). The earthworks are partially covered by woods, marked on maps from the first edition onwards as 'Castle Wood', although this could just as easily be a misnomer or a false interpretation. Crawford visited the site as part of the Ordnance Survey's national archaeology survey, and noted evidence of a motte in 1928, though he thought it 'partially natural' (Crawford unpublished in NMR: 197286). Palmer (unpublished in NMR: 197286) was another OS field archaeologist engaged on a national survey, and stated that there is no evidence of a motte, and commented that the location and morphology of the monument are consistent with an Iron Age ringwork or hilltop enclosure.

A pair of external banks with an internal ditch defines a roughly oval area on top of the hill, with a raised trackway extending towards an entrance on the eastern side. The presence of an internal ditch is problematic, and does not fit with an interpretation of the site as being either a medieval bailey or an Iron Age ringwork, although the first phase of Burrington Camp appears to have had an inner ditch (see Figure 8, D). It may not be a true ditch, but the natural fall of the slope downwards from the crest, a feature also seen at Dolebury Camp (the hachures in the south-eastern corner, Figure 27).



*Figure 11: A possible Iron Age ringwork or medieval bailey.
NMR RAF/CPE/UK/1869 4246 04-DEC-1946 English Heritage (NMR) RAF Photography.*

The lynchets of a probably medieval field system extend north to south immediately below the enclosure, although these cannot be seen in Figure 11. Ascertaining the relationship of the possible castle to the field lynchets may answer some of the questions about this site.

4.4.3 Field systems

The study area contains extensive earthwork remains of later prehistoric field systems, which are difficult to date on the basis of morphology alone. Where there is evidence for features of known dates being superimposed it is possible to build up a relative chronology of field systems, but in many cases this will not be possible. Field systems are also difficult to date because of the long timescales over which they can extend. At Ashton Court, immediately west of the city of Bristol, a field system had previously been dated to the Iron Age and Roman period based on casual finds (Fowler 1978: 60 in Powlesland 2009: 84). However, upon excavation, sherds of late Bronze Age date were recovered from the lynchets, indicating a potentially early date for the laying out and use of this system (Powlesland *ibid.*). There is some evidence for this kind of longevity in the field systems discussed below, although direct dating evidence is often lacking.

The extensive field system on Bleadon Hill (Figure 12) is likely to be Iron Age in date, although the field system continued in use throughout the Roman period. Ellis (1991: 31) suggests that this field system either continued in use into the medieval period, or was brought back into cultivation using the same boundaries. Later field systems from the medieval and post-medieval period appear to overlie and incorporate earlier earthworks and some form long curving field boundaries characteristic of medieval strip fields. As it is difficult to untangle the phasing of such field systems from aerial photographs; for ease of discussion any prehistoric or possible Roman examples are described and discussed in this section.

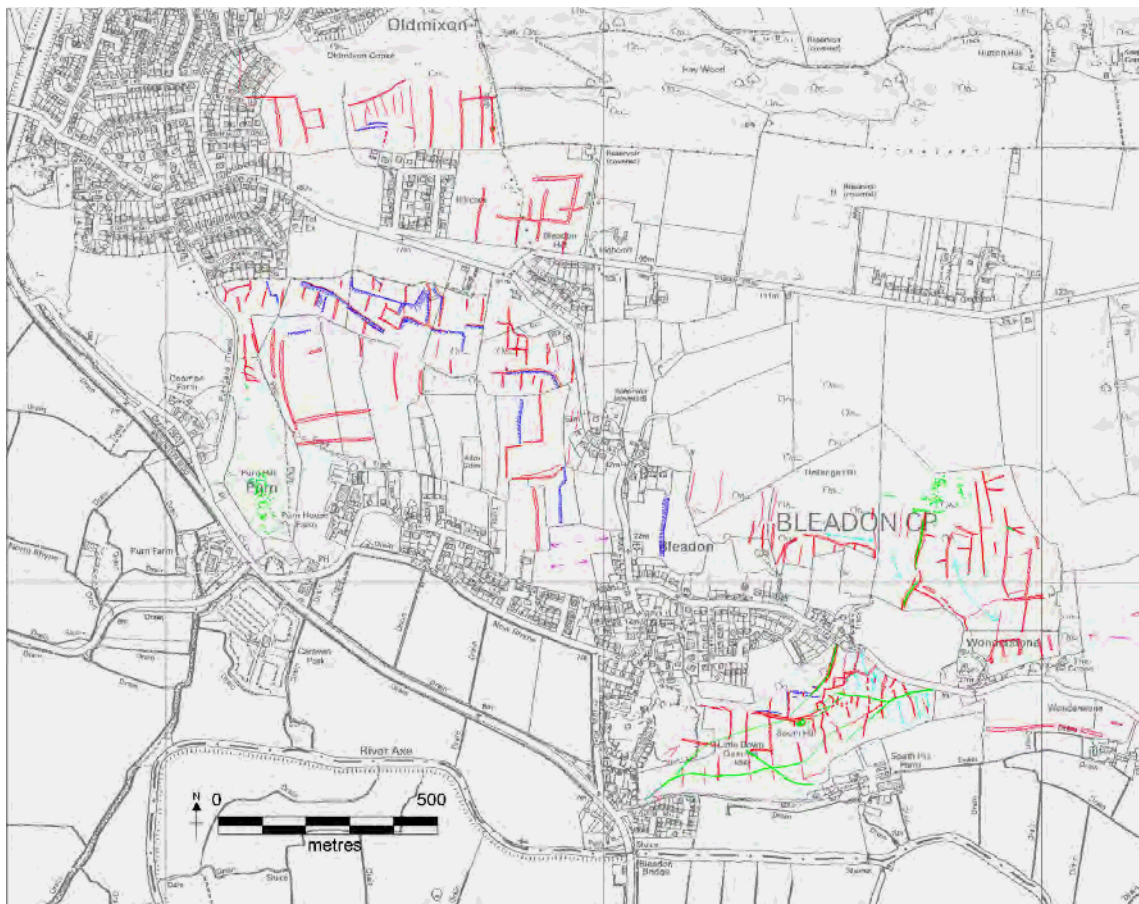


Figure 12: Field systems around Bleadon, showing a similar north to south orientation. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009

On the western side of Bleadon Hill, in the west of the project area, five discrete field systems have been mapped as earthworks and cropmarks. The principle axis of the fields is north to south with shorter banks oriented east to west. It is therefore possible that these five areas of fields are the remnants of a much more extensive co-axial field system that covered much of Bleadon Hill. Post-medieval and modern agriculture and modern

settlement on the flat plateau of Bleadon Hill is likely to have destroyed much of the original extent of the field system.

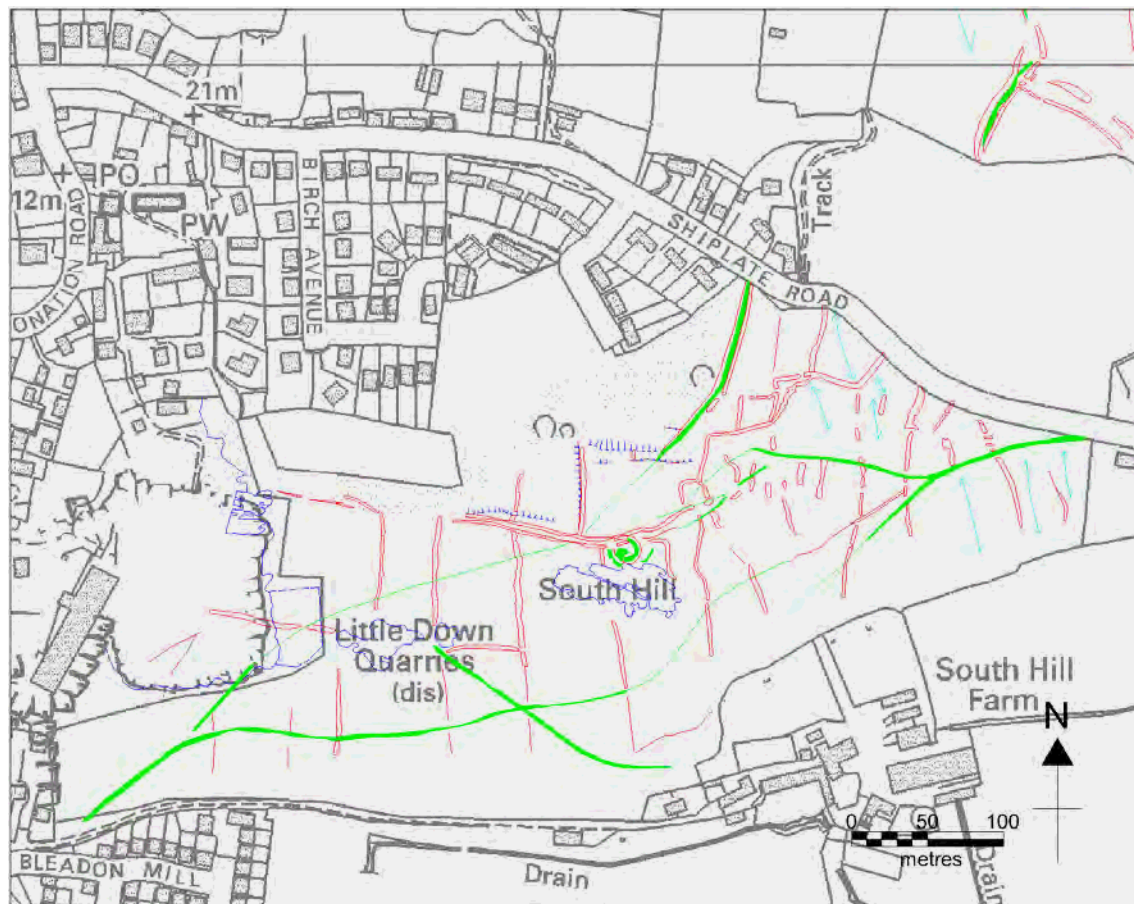


Figure 13: A prehistoric coaxial field system on South Hill, Bleadon. The ridge and furrow indicates that it was reused in the medieval period, and the trackways extending across the site are related to quarrying. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009

On South Hill, Bleadon (Figure 13) medieval and/or post-medieval ridge and furrow appear to overlie and incorporate earlier field boundaries. The field boundaries at the eastern end of the group are oriented in a more north-east to south-west direction than on other areas of Bleadon Hill. They appear to be more disturbed, which is likely to be due to a combination of the medieval cultivation and the post-medieval quarrying. Some of the banks near to the quarry-related trackways shown on Figure 13 may be medieval and/or post-medieval pillow mounds as referred to by the Bath & North East Somerset HER (3596). On the western side of the South Hill group, the field boundaries are less disturbed, and are oriented north to south, in common with the other elements of the Bleadon Hill prehistoric coaxial field system.

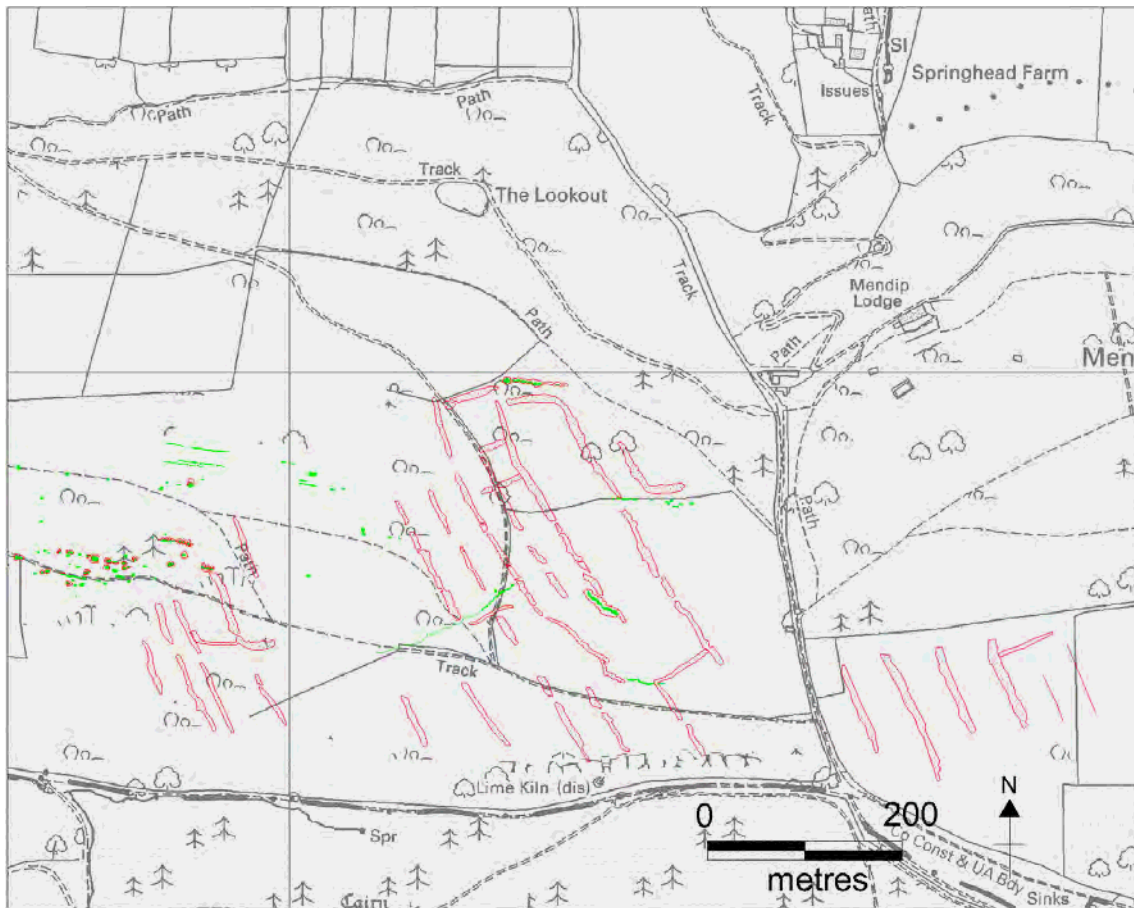


Figure 14: Possible prehistoric co-axial field systems on Dolebury.
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The field system on Dolebury Warren (Figure 14) comprises low parallel banks roughly 25-50 metres apart, in a NW to SE orientation, with some perpendicular banks extending SW to NE. The layout of the field boundaries appears to be arbitrary, with the orientation of the fields not taking account of the topography. For this reason Ellis (1991: 30) suggests that these fields have their origins in the large scale landscape divisions of the Bronze Age. On Dartmoor the reeves which define the boundaries of the Bronze Age landscape were surveyed without accounting for the lay of the land, and in some cases extend across unsuitable ground (Fleming 1988). However, this observation on the Bronze Age origin of these fields is secure for Dartmoor, but less secure for Mendip as these fields have not directly been dated. The fields flank both sides of a valley leading from Burrington up onto Black Down and the central Mendip Plateau, suggesting that they may have had a role in controlling the movement of stock.

Further possible evidence of prehistoric field systems has been identified near Hutton,

Burrington Ham and east of Blagdon Lake (Figure 15). These field systems are more fragmentary and less coherent than the examples discussed above, and are harder to date from their form and size. In some cases, they look very similar to medieval field systems. The possible prehistoric field system at Burrington Ham is only visible as five parallel banks extending upslope and could be fragments of a field system similar to those on Dolebury Warren (Figure 14) and Bleadon Hill (Figure 12). The fields near Hutton and Blagdon Lake (Figure 15) appear to have a mixture of typically prehistoric, Roman and medieval elements.



Figure 15: The remains of two possible later prehistoric field systems. Hutton is on the left, and the northern shore of Blagdon Lake is on the right. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009

At Hutton (Figure 15, left) fragments of a field system comprise circa 13 field boundaries which define about 10 fields. They are mainly oriented north to south, though some of them curve sinuously to the east and west (NMR: 192359, 1494171, 1494161, and 1494197). This orientation is comparable with other probably later prehistoric field systems in the area, including those on Bleadon Hill (Figure 12) and South Hill (Figure 13), although there is insufficient evidence to suggest any direct connection. Lidar was of particular use in mapping the full extent of this field system, as much of the central area was covered in scrubby vegetation and other field boundaries were not clear enough to map from any of the available aerial photographs.

The eastern side of Bleadon Hill is a more atypical example from the study area of a probable Iron Age or Roman field system (NMR: 1493976; Figure 16). The narrow banks look like strip lynchets, although they appear to have been disturbed. They define fields which measure between four metres and 12 metres wide and up to 200 metres long. It is possible that these lynchets were reworked or subdivided in the medieval period. The

eastern edge of these strip lynchets is on the same alignment as and seems to respect a group of coaxial fields, suggesting that the two types of field were in use simultaneously. Lynchets defined by scarps continue this NNW-SSE orientation towards the east.



Figure 16: A probable Iron Age or Roman field system on the eastern side of Bleadon Hill. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009

At Christon there is an example of a settlement and field system where Iron Age elements appear to have been reused and built over in the medieval period (Figure 17). The broad east to west oriented lynchets at A and B, north and south of the main 12th to 14th century settlement have been interpreted as being Iron Age in date on the basis of the morphology of the lynchets. They also have medieval closes overlying them, which seem from pottery evidence, to date to the 12th-14th centuries (NMR: 192356 and pers. comm. Graham Brown).

From the aerial photographs and lidar data, we can map the form and extent of these field systems, some of which have subsequently been destroyed or are at risk, which will aid

future work. Further detailed analysis of these field systems is required to obtain more accurate dates. We can say that the field systems were probably in use by the Iron Age period and continued into the medieval period, or at least were incorporated into later medieval field systems.

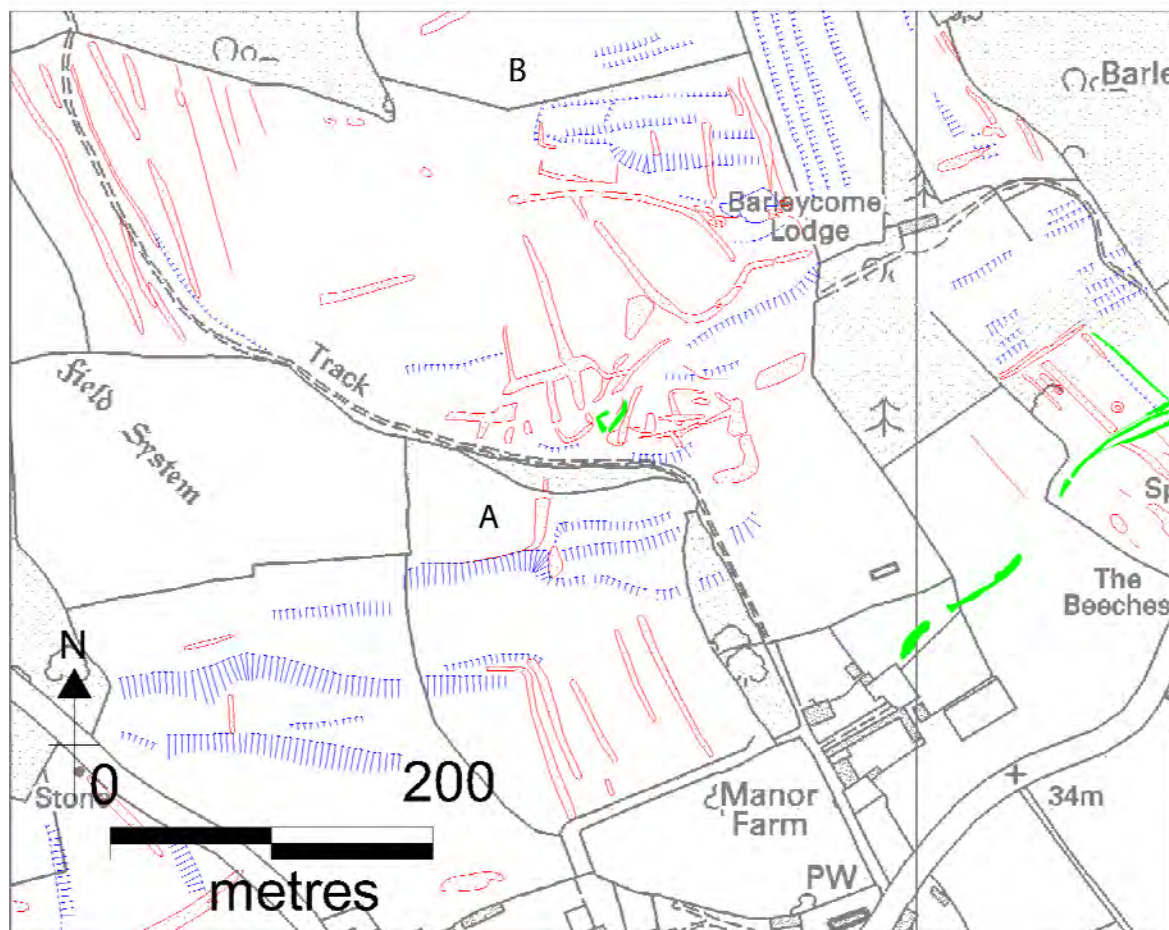


Figure 17: The earthwork remains of the prehistoric and medieval field system at Christon and associated settlement.

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5 RESULTS OF THE AERIAL SURVEY: ROMAN

The Roman period is defined by the National Monuments Record as the period between Caesar's invasion in 43 AD, and the withdrawal of the legions in 410 AD. Lead and silver deposits at Charterhouse were being worked under military supervision within a few years of the Roman conquest, as stamped ingots have been found which date to 49 AD (Todd 1999: 111). However, Millett (2003: 41) indicates that there is little evidence in contemporary sources for the prospects of controlling British mineral wealth being the primary motivating factor in the conquest.

Although there was a Roman presence in the Mendip Hills soon after 43 AD, there is very little visible diagnostic archaeological evidence for the Roman period on the aerial photographs within the project area. There are field systems and enclosures which have been dated to the Iron Age or Roman periods on the basis of their morphology (See 4.4.3). Sites such as these could date to either period, or could be occupied over several hundred years. There appears to have been continuity of land use from the Iron Age into the Roman period in the north Somerset and Avon region, with plenty of evidence for this in field systems and settlements (Powlesland 2009: 86-87). Rahtz and Greenfield (1977: 15), state that there is no clear archaeologically visible distinction between the two periods in Somerset, except changes in the pottery. Therefore it is difficult to determine via aerial photographs alone whether the sites identified are Iron Age or early Roman in date.

5.1 Settlements, agriculture and transport

Most of the evidence for the Roman period in the study area comes from surface finds and excavations. There is a complex multi-phase settlement at Winthill which certainly has its origins in the Roman period or before, and has several phases of settlement and lead extraction in the medieval and post-medieval periods, producing a complex pattern of earthworks (NMR: 192386 and pers comm. Elaine Jamieson). There are some settlement sites, however, which have been recorded by the aerial survey and interpreted as Roman or earlier in date.

Three rectilinear enclosures, identified from the aerial photographs, are located in close proximity to each other, near Yarberry on the banks of the Lox Yeo (Figure 18, left). A similar rectilinear enclosure is located near Havyatt (Figure 18, right). They are defined by a

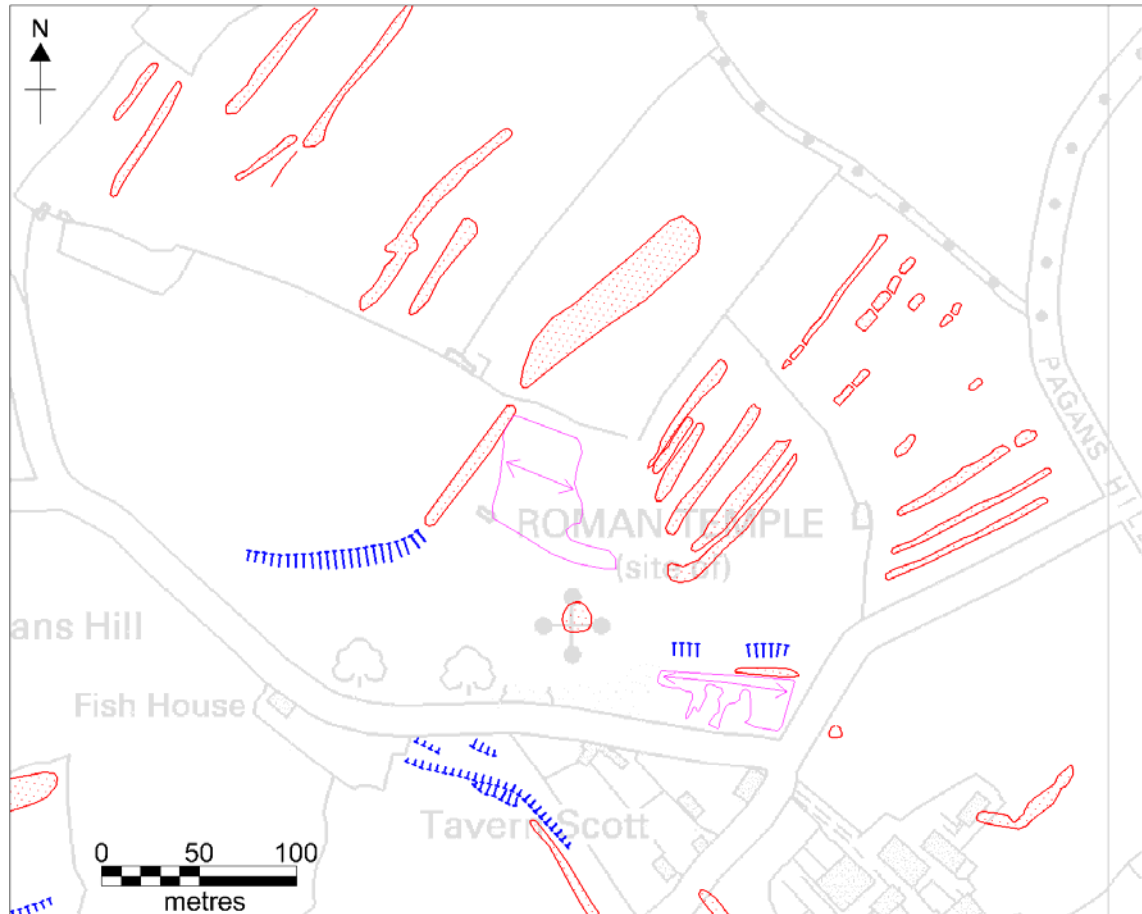
bank and/or outer ditch and are of a similar size, measuring between 25 metres and 50 metres across. These enclosures may be the compounds surrounding Roman farmsteads, as they are similar in size and layout to later Iron Age or Roman enclosures known elsewhere, some of which have indications of being used as settlements (RCHME 1976: xxxix, 117-119, Miles 1978: 84-85, Riley 1978: 106; Stoertz 1997: 49-51). Kemp (1984: 37) states that the valley bottoms and lower slopes were populated in the Roman period with a variety of single farms and small settlements, engaged in pastoral and arable farming. These compounds, containing the farmstead buildings, were a common feature of this landscape which may have origins in the Iron Age (Hingley 1989: 56). These enclosures cannot be dated with any certainty, or their function clearly established; therefore a later date or different function, such as stock enclosures, must also be considered.



Figure 18: Possible Roman rectilinear enclosures at Yarberry and Havyatt. Yarberry is on the left and Havyatt is on the right. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009.

Studies of Roman settlement patterns by Kemp (1984: 37) in the Chew Valley, indicate that there was some continuity from the Roman into the medieval period. Examples of this continuity of settlement includes the use of the Roman temple site on Pagans Hill, Chew Stoke (NMR: 198024) into the 7th and 8th centuries as well as several Roman roads which have continued into medieval and modern usage. It also appears that the Roman settlement pattern is similar to the medieval and thus the modern patterns, in many cases using the same sites (Aston 1988: 69-70). This is seen at Moreton where excavations in advance of the flooding of Chew Lake revealed a Roman settlement underneath the medieval village (Rahtz & Greenfield 1977: 108-14). If many Roman settlement sites are underneath medieval or modern villages, towns and farms, this would help explain the lack of evidence

visible on aerial photographs. It may also explain why most of the evidence for the Roman period is visible in more upland areas, where little medieval or modern settlement has taken place.



*Figure 19: The Roman temple at Pagans Hill.
The circular mound under the cross indicates the position of the Roman temple. The lynchets and field boundaries surrounding it are likely to be medieval in date. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009.*

The aerial photographs of the temple on Pagans Hill, Chew Stoke (NMR: 198024) indicate a probable building platform visible as an earthwork, which is defined by a sub circular mound measuring 15 metres in diameter (see Figure 19). The excavated sections of this mound (Rahtz & Harris 1956-57: plate 6) indicate that it is almost entirely composed of Roman deposits.

The field system surrounding the site on Figure 19 is likely to be medieval in date, and may possibly be contemporary with the robbing of the stonework from the temple in the 12th century AD. The lynchets are typical of medieval strip fields in the area.

A network of Roman roads has been suggested for the area; Bitton to the Mendip Hills, Sea Mills to Gatcombe and Hornblotton and the possible route from Charterhouse to Uphill; but no clear evidence for them was identified on the aerial photographs. The road from Bitton to the Mendip Hills runs partly under a modern road and the others may have been affected by ploughing and/or robbed of stone in the past. The suggested route for the Charterhouse to Uphill road was mapped by Sir Richard Colt Hoare (1975: 38-45) in 1821 but there was no evidence from the aerial photographs to support or discount this route. However, it is likely that there was a route which provided communications between the lead mines of Charterhouse and the probable port at Uphill on the banks of the Severn Estuary. Tratman (1962: 162-163) suggested that the large Roman villa site at Star; the Roman building at Winthill; the Roman building at Locking; the Roman temple at Brean Down and the Roman sites at Weston-super-Mare, indicate that this road existed.

6 RESULTS OF THE AERIAL SURVEY: THE MEDIEVAL AND POST-MEDIEVAL PERIODS

6.1 Introduction

Distinguishing between sites of the medieval and post-medieval periods can be difficult based on aerial photographic evidence alone, and so will be considered together in this report. Records of sites which have been recorded as medieval and/or post-medieval comprise 69% of the total (see Appendix 3). This figure may include some duplication, and includes all sites which have a probable medieval or post-medieval phase, but it certainly reflects the predominance of medieval and post-medieval archaeology in the northern Mendip Hills.

6.2 The development of the landscape and pattern of settlement

Aston (1988: 69) pointed out that many medieval settlements may well be on the site of Roman settlements: the Romans chose favourable areas for settlement in terms of access to water and good farm land, and these sites were favoured in later periods for the same reasons.

Seventy seven Anglo-Saxon charters with written descriptions of the boundaries of an estate survive for the county of Somerset, of which three dating to after 900 AD are in the study area covered by this report (Costen 1988: Fig. 2.2). Chew Magna and Banwell appear to have been the centre of large estates of over 30 hides and 30 ploughlands in the Domesday Book (Costen 1988: 36-37). Costen suggests that these estates may have been fragmented, with a central authority being served by a variety of smaller hamlets or individual farms. The boundaries of these estates may have remained the same throughout the early medieval pre-conquest period due to being owned by conservative landlords, such as bishops or the crown (Costen 1988: 35).

Although the evidence from Anglo-Saxon charters is not conclusive, open field agriculture does not seem to have developed by the 10th century in the historic county of Somerset. A number of charters refer to the 'field' associated with a particular settlement in contexts which appear to refer to pastoralism, rather than a pattern of infield-outfield crop rotation known from other areas of western England at this time (Costen 1988: 42-43). The available evidence seems to indicate that Somerset is not really an area of villages, although they certainly do occur, but an area characterised by isolated farmsteads and small hamlets (Aston

1988: 67) until at least the 14th century (ibid.: 71).

Topography, communication and water access appear to have been significant factors in structuring the pattern of settlement in the study area. Figure 20 below shows the parish boundaries of Mendip, the green shaded area of the AONB roughly correlates with the uplands. Many of the settlements in these parishes are located at or just down-slope of the spring line, a pattern also seen on the southern edge of Mendip (Truscoe 2008: 36). While the central Mendip parishes of Priddy, Cheddar and Chewton Mendip are large, the clusters of parishes extending along the northern slope of Mendip tend to be smaller. This arrangement of parishes appears to be designed to encourage equal shares of the upland resources of summer grazing and mineral extraction, with lowland arable and winter pasture. A similar arrangement of parishes can be seen on the Uffington scarp on the Oxfordshire-Wiltshire border (Rackham 1986: 20), and in the Avon Valley on Salisbury Plain (Aston 1985: 40-41; McOmish et al. 2002: 110).

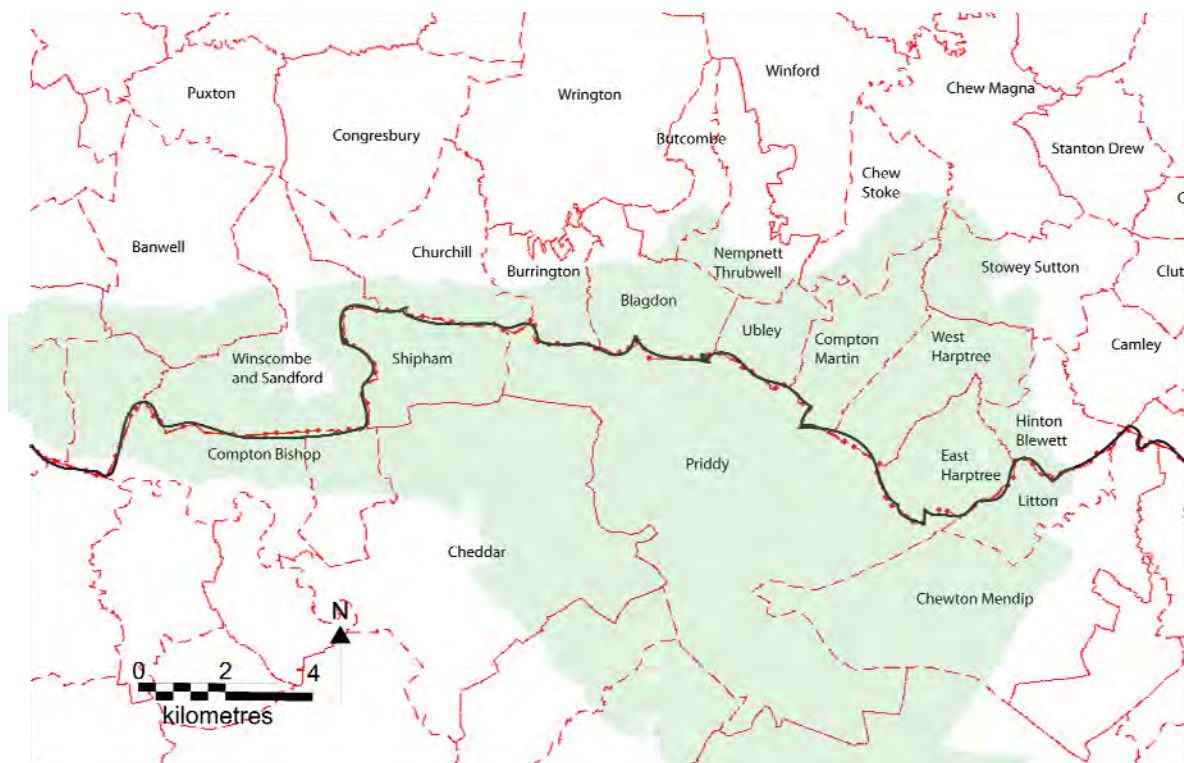
The four parishes of Ubley, Compton Martin, West and East Harptree use round barrows as their upslope boundary markers (Neale 1976: 79, Fig. 13). This can be a possible indication of an early date for these parish boundaries. Barrows became a special focus of activities in the late Saxon period, with secondary burials being inserted into extant burials. This is a widespread pattern in Britain (Williams 1997), although there are no known secondary burials on Mendip. However, the barrows could still have been regarded as special, and the evidence indicates that they were used to define tenorial or territorial arrangements, some of which became the parish boundaries. (McOmish et al. 2002: 110).

The southern slope of Mendip has much more extensive evidence of medieval farmsteads and field systems, with lynchets which cover at least five square kilometres extending from Wells in the east to Westbury-sub-Mendip in the west (Truscoe 2008: 17). There is a much larger number of deserted settlements on the southern scarp edge of Mendip compared to the north, most of which were found upslope of the associated field systems.

Some of the less complex sites may have been sheilings for summer grazing, while others may have been more extensive mixed farms, such as the series of farmsteads at Hope and Dursden, northeast of Westbury-sub-Mendip (Brown 2008). A group of farmsteads at Ramspits shows a series of different sites being occupied over the medieval and post-

medieval period (Pattinson 1991).

Mendip's northern slope may have had a more stable pattern of settlement than the south, and on the northern slopes the mid-slope locations are generally still occupied. The different pattern here may also be due to differences in the visibility of deserted settlements along the northern edge. The northern slope of Mendip appears to have more woodland, which may mask abandoned farmsteads and sheilings. The differences in the settlement pattern between the northern and southern Mendip slopes may also have been due to the planning and reorganisation of towns which caused the desertion or shrinkage of more of the rural settlement to the south of Mendip. Draycott, located to the south east of Cheddar is likely to be a planned settlement of the late 13th century when St Augustine's abbey in Bristol acquired an estate in the area. There are at least two deserted settlements to the north of Draycott which could have been abandoned during this phase of estate reorganisation (Truscoe 2008: 39).



*Figure 20: The parish boundaries of Mendip.
The AONB is shown in green, and the modern county boundary in black. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009*

The church was a driving force in medieval Mendip; the Bishop of Wells, Glastonbury Abbey and most of the monastic orders acquired estates here during the medieval period by grant, exchange or purchase. By the end of the 13th century, most parishes in Mendip had some form of ecclesiastical landholding (Brown pers. comm.). The estates of these ecclesiastical institutions were focused on large scale sheep farming, the careful use of the arable land, lead mining on the plateau and deer parks (Betley 1988: 63-65). Because most of the estates on Mendip were run by literate monks and clerics, there are many detailed records of medieval estate management (Neale 1977: 90).

The pastoral system on Mendip involved herds and flocks grazed on the largely unimproved and unenclosed upland in the summer and on the more sheltered and enclosed lowland during the winter months (Aston 1985: 114). Each of the lowland parishes had grazing rights on the plateau, which was open and unenclosed until the end of the 18th century (Williams 1971: 66). This pattern of movement, and concentration on different resources at different times of the year influenced the pattern of medieval settlement, particularly as the pastoral system intensified over the course of the medieval period (Truscoe 2008: 36-38). Trackways and roads extend along the base of the escarpment, with the more substantial hamlets and farmsteads located just upslope of the roads (Brown 2006: 26). A series of droveways, sometimes now defined by modern roads and sometimes defined by trackways and hollow ways extended up the valleys past stock enclosures to the open plateau.

The overall pattern of settlement in the study area appears to have been relatively stable throughout the medieval period. The pattern of seasonal transhumance was sustainably maintained by the secular and ecclesiastical estate managers. There are relatively few examples of deserted settlements in the study area, although there are a number of examples of abandoned building platforms, crofts and paddocks within existing settlements. Truscoe (2008: 38) found that deserted settlement tended to be relatively small and typically clustered at the edge of the central Mendip plateau, at the edge of the marginal ground. If these farms were less fertile and therefore less profitable, an estate may be more likely to relocate tenants to lower ground, or to newly founded settlements.

Although settlement may have remained relatively stable, the landscape was significantly altered in the post-medieval period. The agricultural revolution of the late 18th century was stimulated by a number of factors, but on Mendip it has been suggested it was principally a

shortage of land and rising food prices at a time of rising demand and increased uncertainty of overseas food supplies (Williams 1976: 105). The low lying marshy land in the Lox Yeo valley was progressively drained, and is now a fertile landscape cut by large numbers of drainage ditches or 'rhynes'. The formerly open grazing land on the Mendip plateau was enclosed from the 1770s onwards, and much of the current field systems and roads were laid out then. Agricultural improvers like Billingsley conducted experiments in an attempt to increase yields from unproductive Mendip soils (Williams 1976: 106-108), leading to far more land being cultivated in the 1820s and 1830s. By the end of the nineteenth century, the Mendip plateau was mainly used for summer grazing (ibid.: 111), with large numbers of new farmsteads created (ibid.: 115).

6.3 The early medieval period

There is characteristically very little evidence visible on aerial photographs of the early medieval period, defined as the period between 410 AD and the Norman invasion in 1066 AD. Archaeological evidence from this period is relatively rare in southern Britain, with place name evidence, parish boundaries and written records such as charters forming the bulk of the evidence. In other areas, developer-funded fieldwork carried out as a requirement of the planning system has significantly increased the state of current knowledge about the early medieval period. However, due to the relatively small amount of development on Mendip, no new sites dating to the early medieval period have been discovered by modern fieldwork.

6.4 The medieval and/or post-medieval periods

The medieval period is defined by the National Monuments Record as the period between the Norman invasion in 1066 and the dissolution of the monasteries in 1540. The post-medieval period is defined by the National Monuments Record as the period from 1540 to the death of Queen Victoria in 1901. These long periods of history are more conventionally divided into centuries, reigns or according to other significant events, but more precision in the chronology is not usually possible for the purposes of aerial survey. The written evidence for this period is quite extensive, and it is in this period that much of Mendip is divided between the major estates, both secular and ecclesiastical. The evidence recorded in north Mendip as part of this aerial survey comprises field systems, a small number of deserted or shrunken settlements and some pillow mounds.

6.4.1 Field systems

Medieval field systems in the arable lowlands are the most numerous record type in the study area.

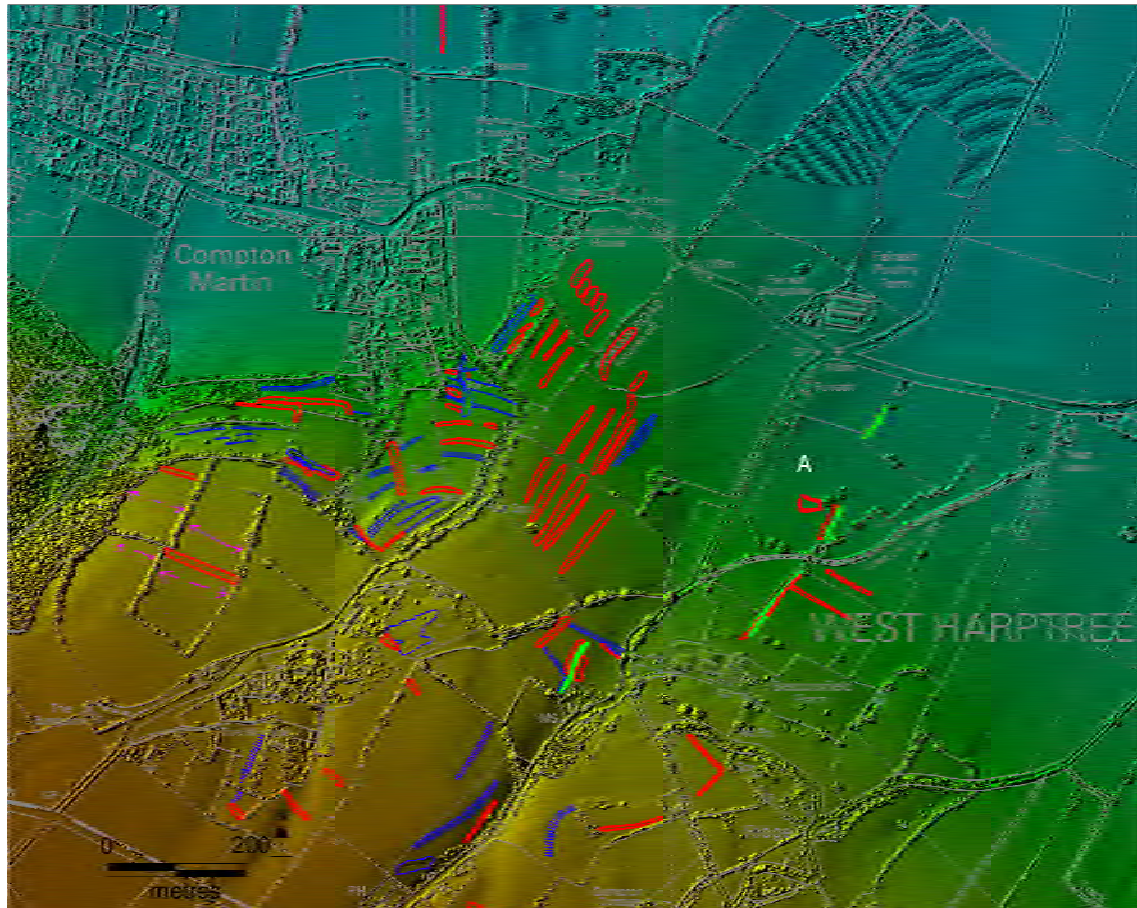
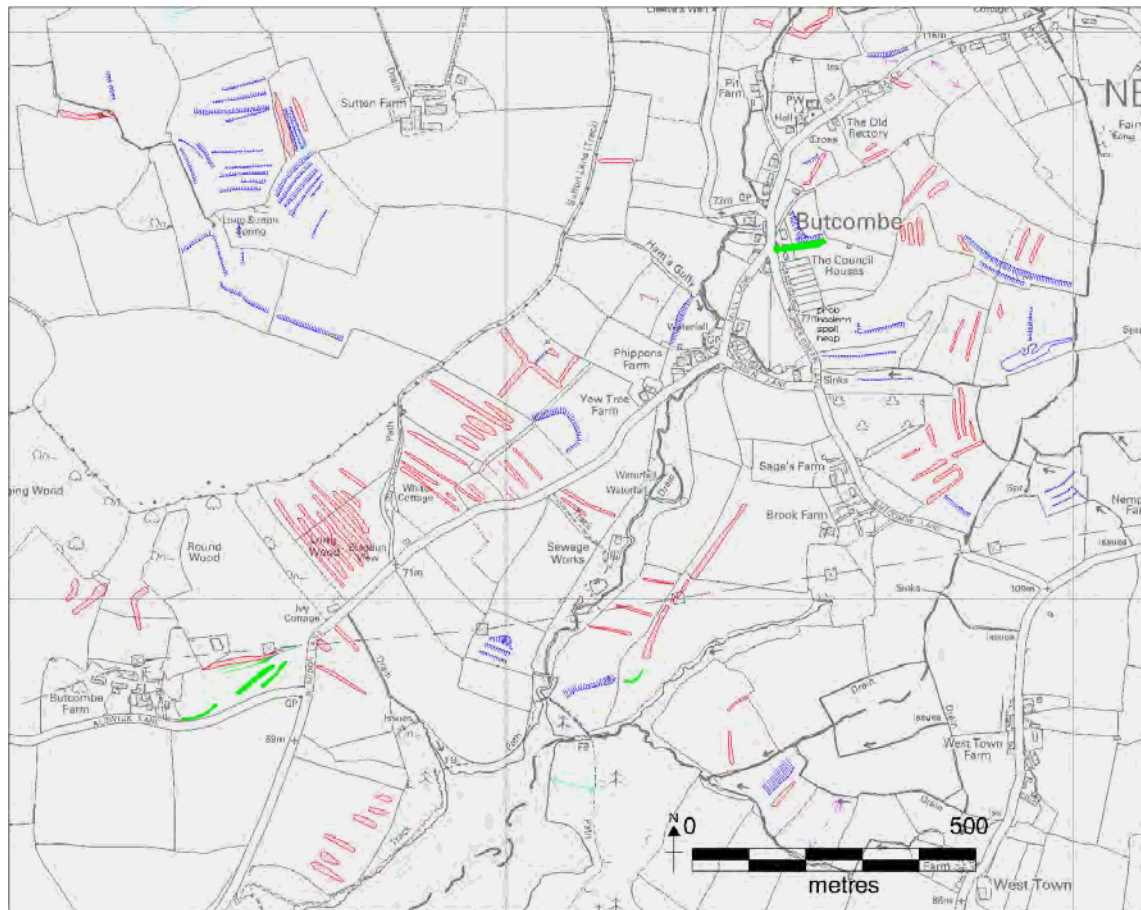


Figure 21: Lynchets and field boundaries of the medieval field system between West Harptree and Compton Martin.

The lidar below the map layer is coloured according to its elevation. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009 LIDAR ST5252 Cambridge Unit for Landscape Modelling LAST RETURN 01-APR-2006 © English Heritage; source Cambridge Unit for Landscape Modelling

The field system between the parishes of Compton Martin and West Harptree (NMR: I495997) is a typical example recorded in the study area. It comprises lynchets, most oriented at right angles to the slope, which define a series of long and narrow strip fields (Figure 21). Medieval or post-medieval hollow ways (the ditches on Figure 21) possibly indicate the routes for taking stock up to and down from the top of the plateau. A rectilinear enclosure marked as 'A' on Figure 21 (NMR: I496301) may therefore be a stock enclosure.



*Figure 22: The medieval or post-medieval field system around Butcombe.
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The parish of Butcombe is located at the northern edge of the study area, to the north of Blagdon Lake, the edge of which is on the lower half of Figure 22. The parish has a typical pattern of settlement, with a small nucleus around the church and several dispersed hamlets and individual farms set along a large number of lanes. Much of the parish is covered with the earthwork remnants of its medieval field systems, typically defined by banks and lynchets forming narrow fields and cultivation terraces (NMR: I494595, I494643, I494631, I494610 and I494687). The 'U' shaped scarp to the SW of Yew tree farm in the centre of Figure 22 may be a building platform (NMR: I494613). This is one of the few indicators of settlement sites being abandoned or moved. The fertile east and west facing slopes seem to have been intensively ploughed in the medieval period, creating the lynchets. Typically for the study area, there is very little ridge and furrow, and what there is tends to be in small blocks and probably of post-medieval date.

6.4.2 Settlements

There is a low density of shrunken and deserted settlements in the study area, which may be the result of settlements persisting in the same location for long periods. Analytical earthwork survey has been carried out on settlements at Chewton Mendip on the western end of the escarpment, and at Ellick, located between Blagdon and Black Down. The few deserted and shrunken settlements which have been recorded in the survey area appear to have been located and perhaps preserved due to their setting in the landscape. One reason for preservation can be that the deserted elements of a settlement are located within an existing settlement, as in Shipham. Other settlements have been preserved from being ploughed level by being located in areas unsuitable for arable cultivation, such as Winthill which is on a relatively steep slope. The features on Winthill have been scheduled for the last fifty years, a period when many unprotected earthworks have been ploughed level.

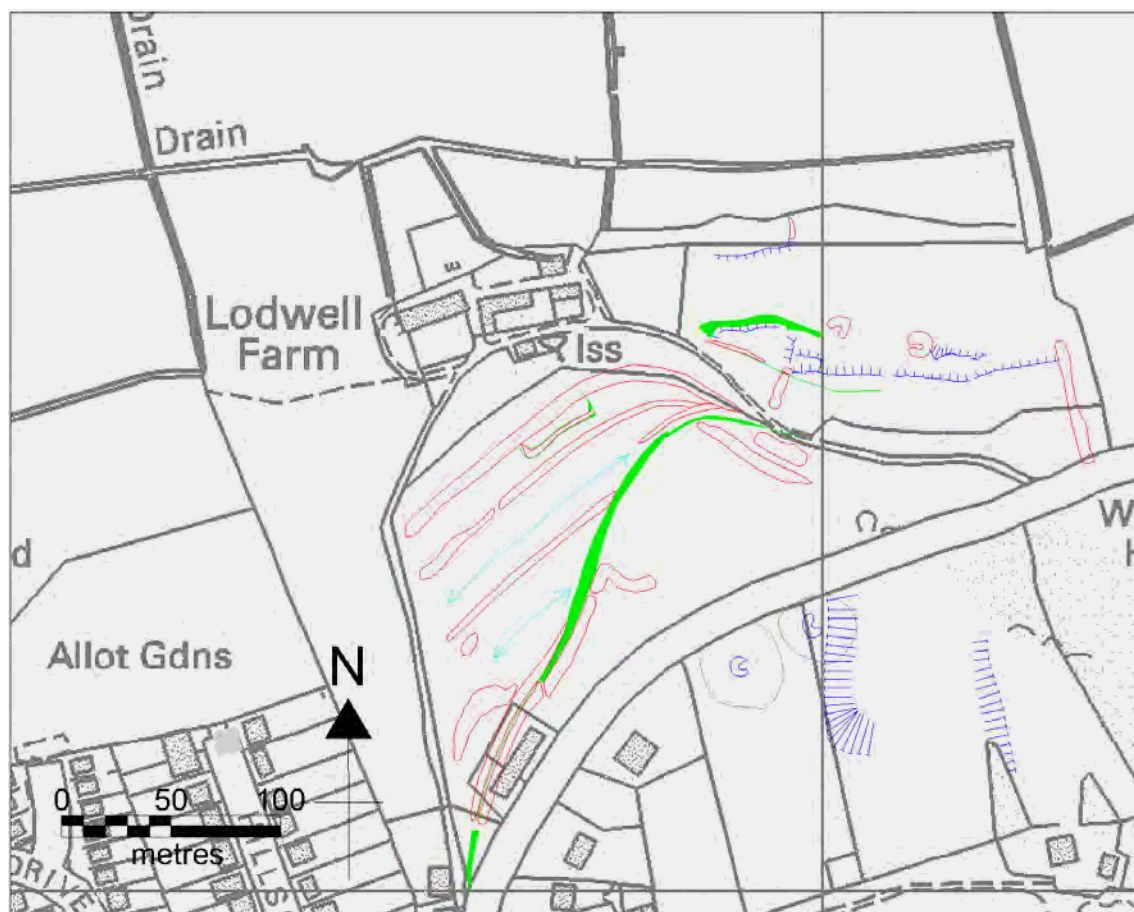


Figure 23: A probable medieval field system and adjacent settlement earthworks at Hutton. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009

The settlement at Hutton comprises several terraces and possible building platforms, and a pair of hollow ways. The accompanying field system (NMR: 192477; Figure 23) is one of the few examples with extant ridge and furrow, evidence of the contour ploughing which probably terraced the hillside. A possible stock enclosure is located on the lowest, northernmost terrace. A hollow way defined by a ditch and flanked by upcast material seems to lead from the modern road into the area of possible settlement earthworks. The penannular banks may be building platforms, or possibly the remains of buildings. This settlement, now levelled, was located on the higher ground. The northern area of Figure 23 is low lying and marshy, and is cut by a number of post-medieval drainage ditches leading into the Hutton and Locking Rhyne. Roman pottery was recovered from the re-cutting of one of the drainage ditches on this farm. Although the provenance of the find spot is not exact, this settlement could possibly be reusing a Roman site.

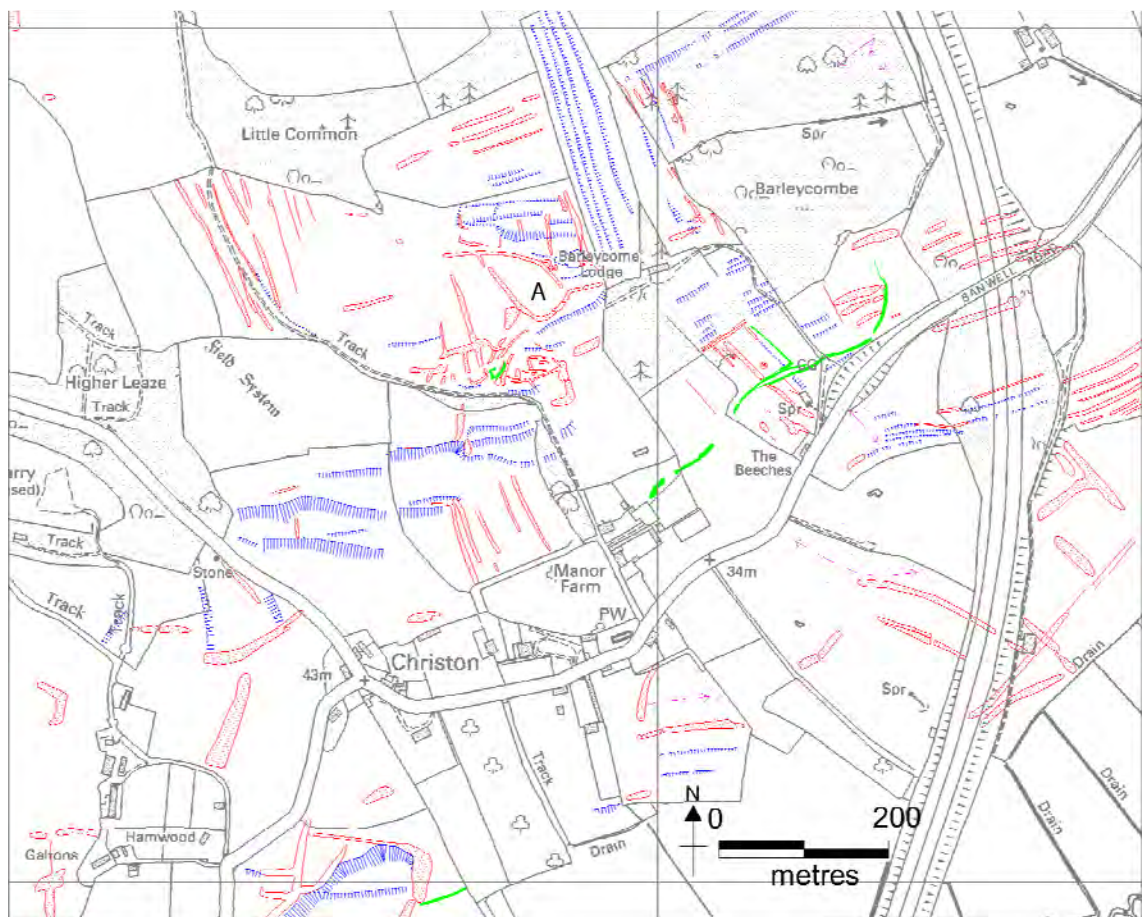


Figure 24: The medieval settlement of Christon and its surrounding field system.
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The largest area of medieval earthworks recorded is at Christon (NMR: 192356; Figure 24). Settlement remains are situated to the south and north of a possible oval stock enclosure or pound, indicated by the 'A' on Figure 24. These remains comprise a number of crofts and building platforms, although it is difficult to tell exactly how many from aerial photographs alone. The Christon area has been extensively investigated by the earthwork and architectural survey teams. Although Christon has all the features of a successful medieval manor, for some reason the settlement did not thrive and was largely abandoned in the post-medieval period (pers. comm. Elaine Jamieson). The central area of earthworks has a suggested 12th-13th century date from pottery found on the surface (Clarke 1973: 16; Iles 1980: 129). Some of the croft banks appear to be overlying broad east to west aligned lynchets which have been suggested to be Iron Age on the basis of their morphology (Quinnell 1965 in NMR: 192356; Iles 1980: 129) and scattered sherds of Iron Age pot (Clarke 1969: 17). A scatter of Romano-British pottery in the garden of manor farm, near the centre of Figure 24, may also indicate a Roman phase of settlement at Christon.

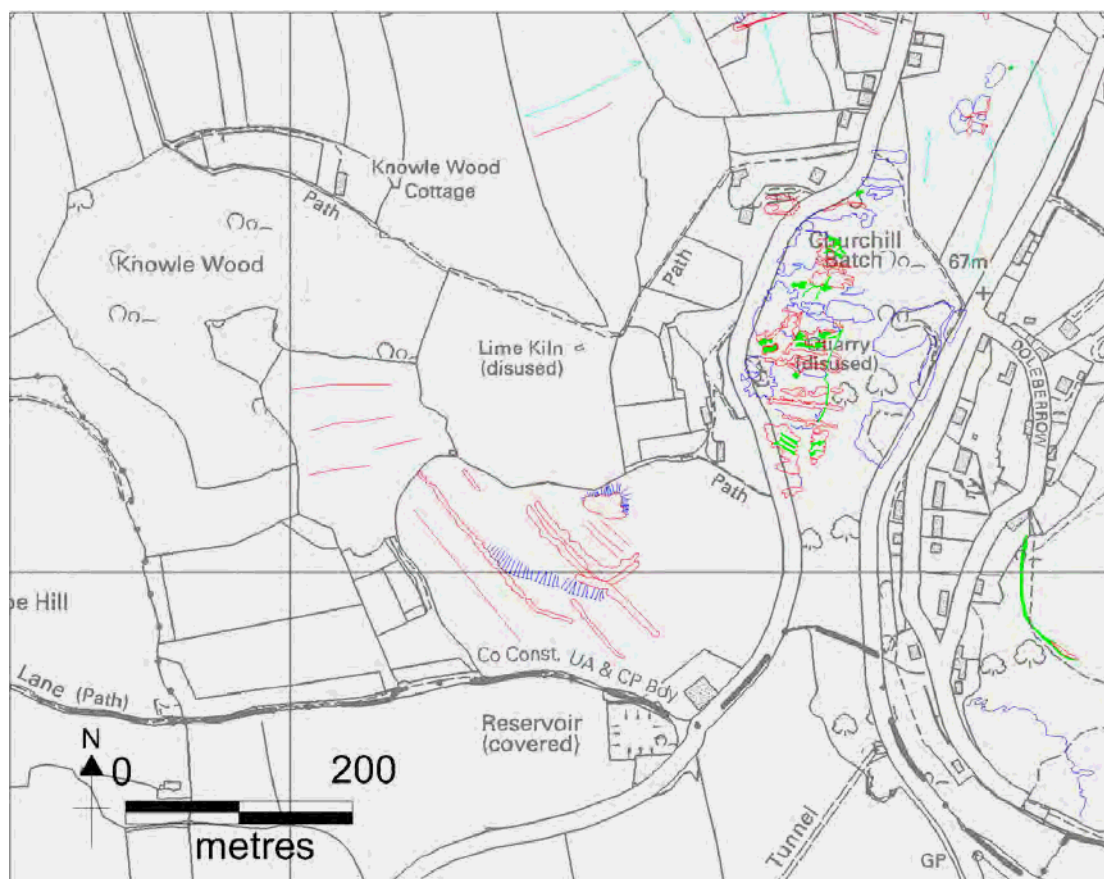


Figure 25: A possible medieval settlement or field system to the north of Lyncombe Lane, Churchill.

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The field system surrounding Christon is extensive, covering 1.5 kilometres east to west and 1.1 kilometres north to south. The well defined NNW to SSE lynchets (NMR: 192479) on the northern edge of the field system (top edge of Figure 24) may post-date the 10th century because they overlie an earlier phase of lynchets which are morphologically similar to 10th century lynchets elsewhere (Clarke 1970: 9). This dating is only approximate, but the field systems are likely to be contemporary with the medieval settlement.

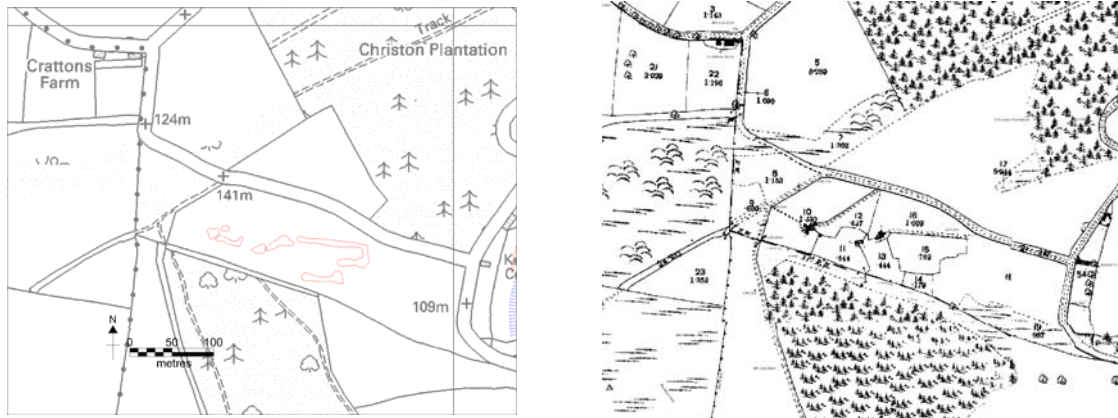


Figure 26: Field boundaries and the spoil heaps indicating the sites of former buildings near Christon and an extract from the 1885 OS map, not to scale.

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The linear banks and scarps in the centre of Figure 25 above may be elements of a deserted medieval settlement, or part of a field system. The North Somerset HER records 'Pre-medieval field system east of Knowle Wood' (NSOM HER: 250). The earthworks comprise a hollow way, several field boundaries and possibly crofts and a building platform. The HER suggests a deserted medieval settlement to the north of Knowle Wood, opening the possibility that this is a continuation of this site (NSOM HER: 243). This site is recorded as a settlement based on records from the library of Wells Cathedral, although its location is uncertain. The topographical writer F.A. Knight reported that he could see 'the ruins of small buildings' sometime before 1915 (Knight 1915: 105), while an Ordnance Survey field investigator reported in 1966 that the foundations could not be identified on the ground (unpublished comment in NMR: 194506). As the area is presently under arable cultivation, all surface indications of this settlement could have been destroyed.

Figure 26 below shows an example of a recent change in the pattern of settlement which is relatively rare for the study area. At Christon plantation in the parish of Loxton there are

three farm buildings or cottages marked on the 1885 Ordnance Survey map. The field boundaries are still marked on the 1962 1:10,560 map; although the buildings had been demolished or collapsed before the first aerial photographs were taken in 1946.

6.4.3 Rabbit farming

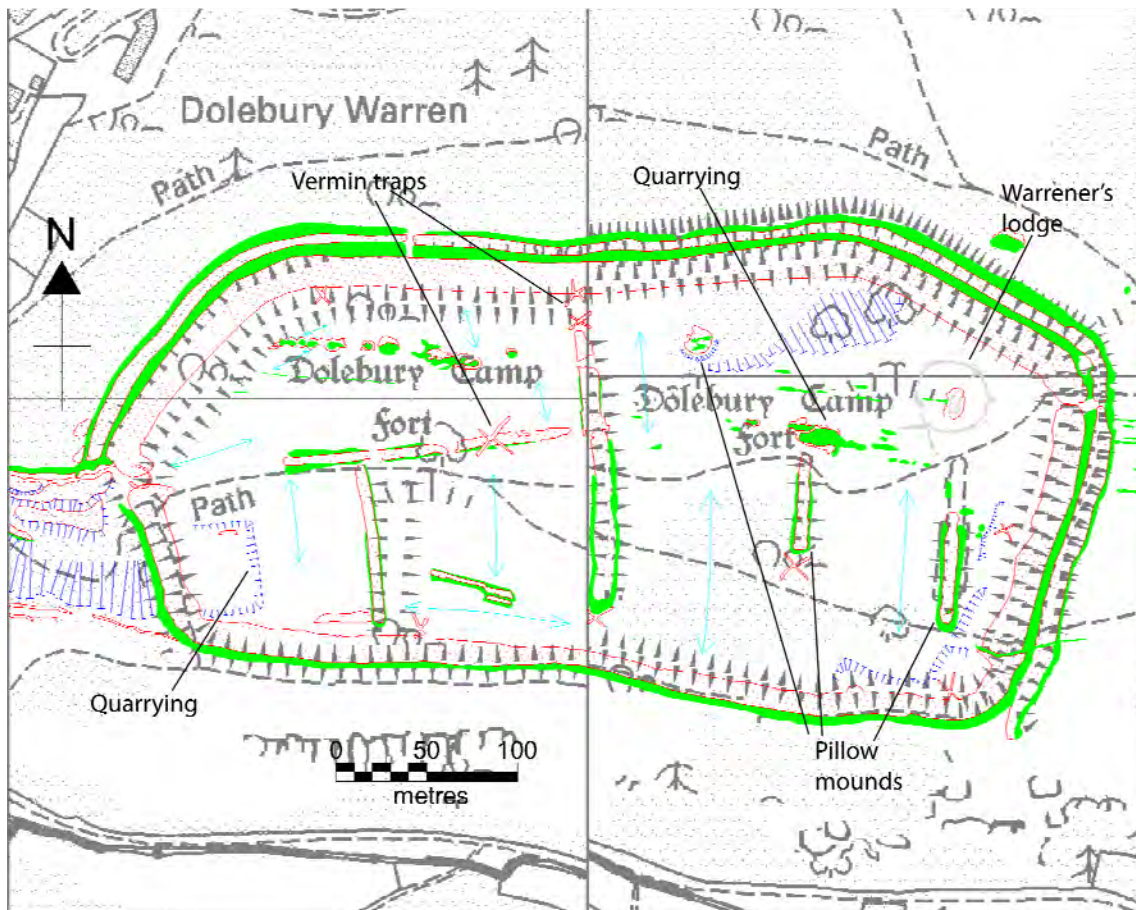


Figure 27: Dolebury Warren.

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Rabbits were probably introduced to Britain in the early medieval period, and were farmed for meat and fur for several hundred years before they became a wild species, now thought of as native. The numbers of warrens increased dramatically in the 14th and 15th centuries, and by the 16th century they were widespread nationally. Warrens remained important as a food source until the 18th century, until their price and therefore status declined in the later 18th century, and continued to fall through the 19th century. Keeping rabbits was generally the preserve of the wealthy, as large areas of land needed to be enclosed for the rabbits, and

fodder crops produced elsewhere and brought in. The law held that a lord of the manor could introduce rabbits onto his waste, or common land, without infringing or diminishing the common rights of his tenants, and an enclosure for rabbits was as common a feature of high status houses as a dovecote or fishpond (Williamson 2006: 1-10).

Keeping rabbits entailed constructing artificial warrens, known as pillow mounds. Often built in groups, these pillow mounds were sometimes accompanied by vermin traps and warreners lodges (Williamson 2006: 58-66). There were a number of rabbit warrens located around the edge of Mendip, some of which now survive only as place names (Neale 1976: 92).



Figure 28: The eastern end of Dolebury Camp as viewed from the north. Three pillow mounds and the remains of the circular enclosure and warreners lodge are clearly visible. NMR ST4559/1 NMR SF1462/103 07-MAR-1979 © Crown Copyright. NMR

Dolebury Warren (NMR: 1494857; Fig. 27), located within an Iron Age hill fort, is one of the most substantial medieval rabbit warrens on Mendip. The pillow mounds are defined by linear banks flanked in some areas by quarry ditches. The pillow mounds vary in length between 50 metres and 150 metres, and measure between six metres and 12 metres wide. The smaller pits and spoil heaps on east to west alignments are the result of 19th century ochre extraction. The 'X' shaped features are vermin traps, to prevent predation of the rabbits. The building within a circular wall in the north-eastern corner of the fort is the

warreners lodge and its enclosure. The whole area surrounding the hillfort is known as Dolebury Warren, although there is no evidence for pillow mounds outside the hillfort.

Generally vermin traps were constructed of wood and therefore have left little or no archaeological trace (Williamson 2006: 53-59), so their survival here is unusual. The use of the vermin traps appears to post date the construction of the pillow mounds, hinted at by the vermin trap seen overlying a pillow mound on Figure 27. The Edwardian topographer Knight (1915: 205) describes the distinctive form and purpose of the vermin traps, but the function of the pillow mounds was unknown to him, suggesting that the vermin traps were still used long after the rabbits had abandoned the pillow mounds. The hill was still known as Dolebury Warren, which may suggest that rabbits were still caught there.

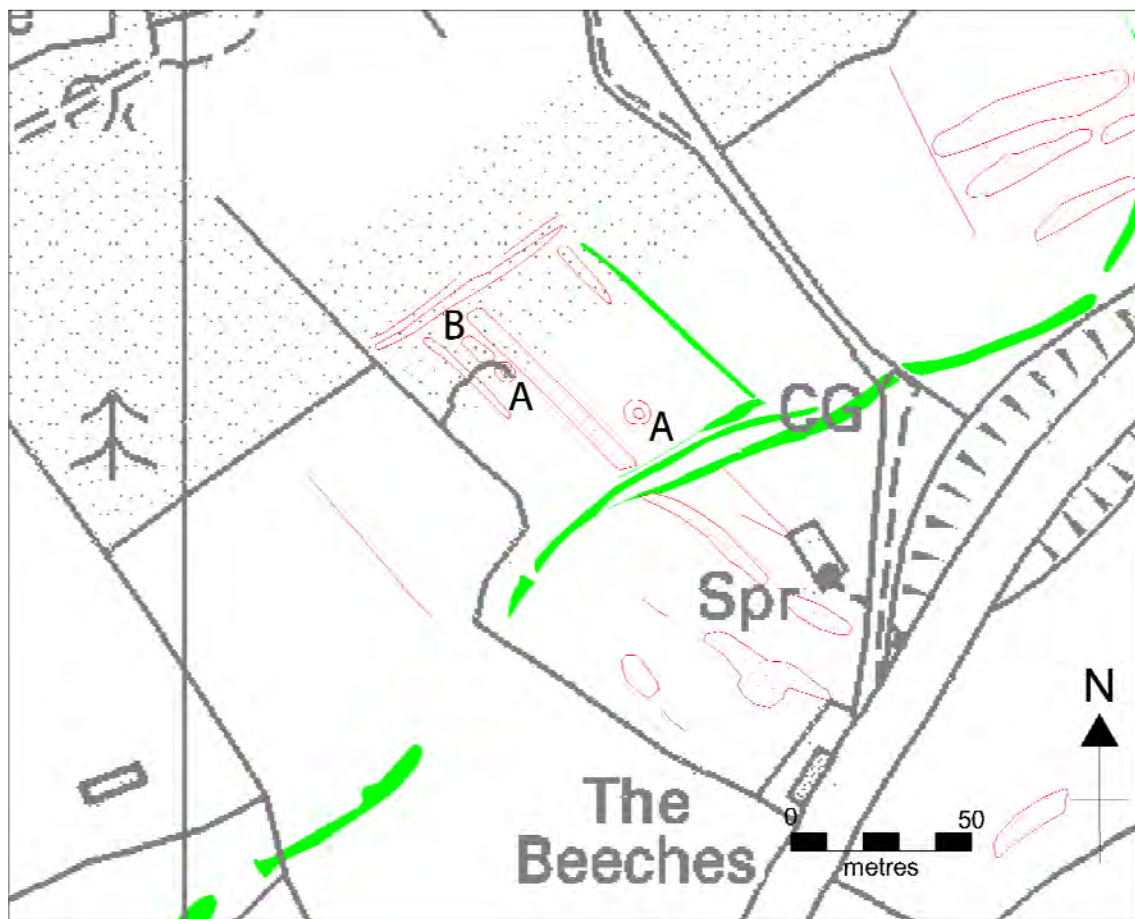


Figure 29: Possible pillow mounds among lynchets at Christon.
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The warreners lodge is visible as a rectangular stone building (Figure 28), very little of which survives, and which was known to be in ruins by the 1830s (Hollinrake & Hollinrake 1984).

The remains of the lodge were surrounded by a garden enclosed by a low circular stone wall which measures 40 metres in diameter. The lodge is located on the highest point within the hillfort and would have had good views over the warren and the surrounding landscape, enabling the warreners to keep a close eye on the rabbits. The warreners lodge is marked on the 1st edition Ordnance Survey Map (1885) as the 'watch tower (site of)' which may be referring to a possible defensive role for the warreners lodges as well as the need to protect the warren from poachers.

At Christon there are three possible pillow mounds (NMR: 1493738) visible as earthworks within the medieval field system (NMR: 192356). The two round mounds marked as 'A' and the rectilinear mound at 'B' on Figure 29 with squared ends are typical forms for pillow mounds in lowland locations (Williamson 2006: 34, 40-41). Their location amongst lynchets suggests they post date the arable land-use, as rabbits and crops do not usually mix well.

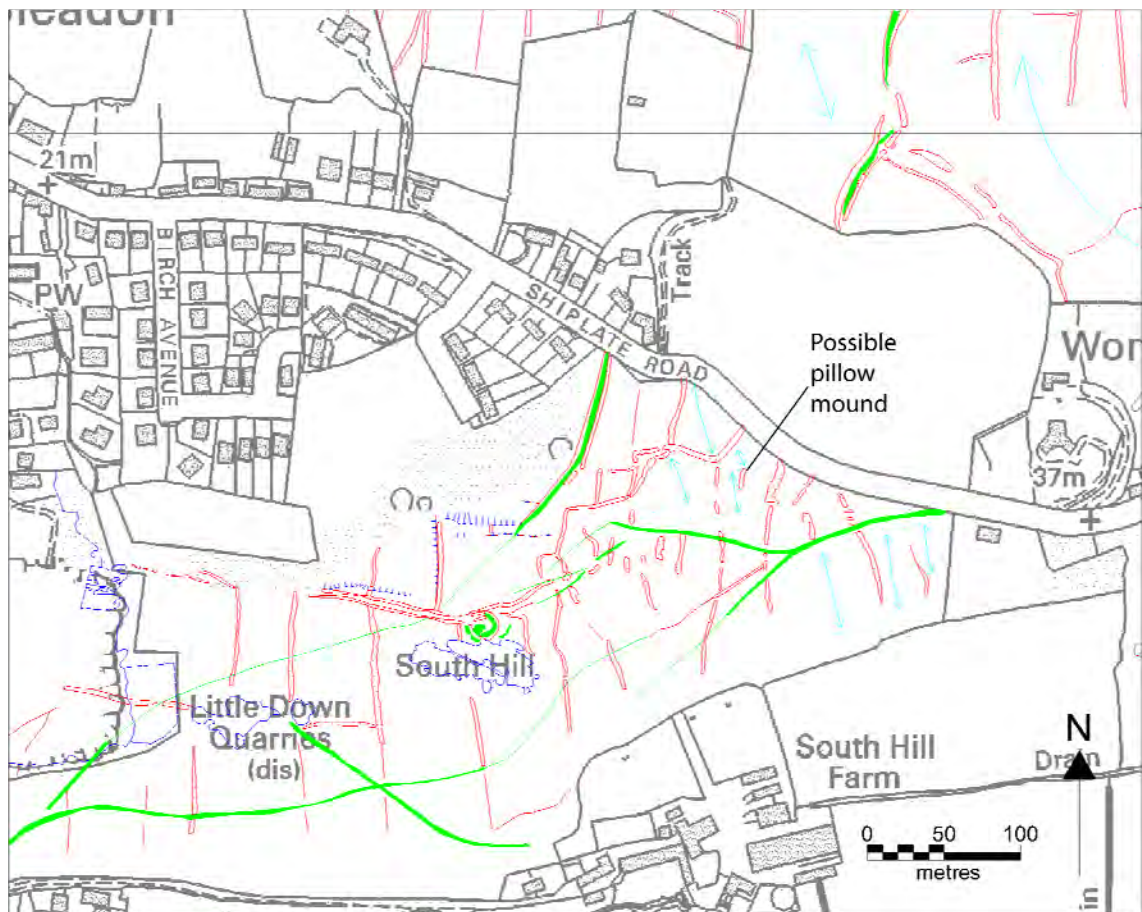


Figure 30: A possible pillow mound at South Hill, south of Bleadon.

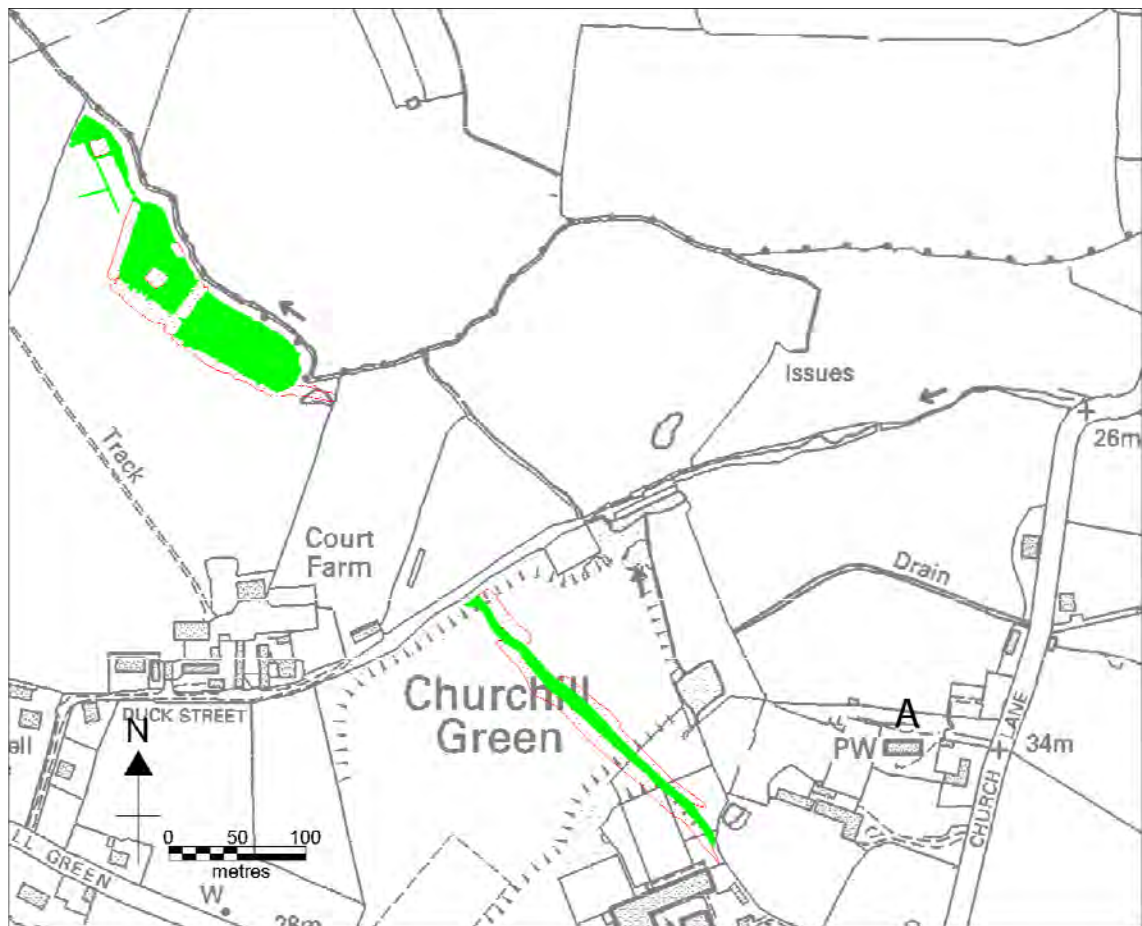
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Another possible example of a pillow mound is located on South Hill, just south of Bleadon (Figure 30). The north to south oriented linear mound overlies ridge and furrow. The other surrounding banks are elements of a probably Iron Age or Roman field system, which may have been reused in the medieval period, creating the ridge and furrow. The trackways and quarrying shown in Figure 30 post-date the field system. Pillow mounds are usually built in groups to ensure an economically viable population, so it is possible that other pillow mounds near this location have been levelled. The group of short linear banks at the centre of Figure 30 may be pillow mounds, or they could also be lynchets which have been disturbed by later quarrying activities.

6.4.4 Fish ponds

Fish ponds are a commonly seen feature of medieval settlement sites, and are often associated with higher status sites, such as manor houses and abbeys. Fishponds were important symbols of status in the medieval and early post-medieval periods, and were part of a suite of high status food production sites, along with dovecotes, deer parks, warrens, vineyards and gardens (Riley & Wilson-North 2001: 103). Fish ponds were constructed for breeding fish or as stock ponds or stews for holding fish caught in rivers or pools until they were needed (Aston 1985: 105). No fishponds were recorded as part of the aerial survey of the Mendip plateau and the southern Mendip slopes. The reason for this may be that higher status settlements such as manors and monasteries were often located in valleys where they could access a more secure water supply, a pattern also seen on Exmoor (Riley & Wilson-North 2001: 116: 120). There are a number of granges on upland Mendip, but no evidence of fishponds has come to light thus far.

Figure 31 shows three well preserved fish ponds just north of the village green in Churchill (NMR: 195172). These are likely to be medieval, and are close to Churchill Court (Figure 31, A), home to the Fitzpayne family in the late 13th century, before passing through a series of families in the later medieval period (Plaster 2005). The stream has clearly been diverted to construct the ponds. Two, perhaps three fish ponds are visible, suggesting a fish management regime or breeding programme.



*Figure 31: Three medieval fishponds to the north of Churchill.
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6.5 Extractive industries

The Mendip Hills are an important source of minerals and building stone (Bettey 1988: 64) which were first exploited on a large scale during the Roman period, though Gough (1967: 19) suggests that Iron Age peoples were working the mineral ores before the Romans arrived. Many minerals were exploited in the Mendip Hills but the most common were lead, zinc (exploited from the 16th century onwards), and iron (mainly in the form of ochre). Small amounts of manganese, silver (associated with lead ore), barium and strontium have also been worked.

Mineral resources differ across the Mendip Hills, and there are corresponding differences in the pattern of their exploitation. The central plateau has numerous large mine workings, particularly the lead mines at Charterhouse and the zinc mines at Shipham, whereas mining in the northern Mendips is more extensive but less intense. Although mineral ores are

present in the northern Mendip survey area they are less rich and less profitable, and so tend to have been exploited through smaller scale operations concentrated on unenclosed upland or the steep sides of valleys, which otherwise would have little productive use.

The evidence on aerial photographs may relate to earlier phases of extraction but most remains probably relate to the post-medieval periods. The expansion of the industry at this time meant that all possible mining areas were worked or reworked, obscuring evidence of earlier industry (Truscoe 2008). In northern Mendip a small proportion of the mine workings are visible on the aerial photographs and lidar data. However, the pattern of mining visible may be inaccurate as some of the shallow workings, pits and shafts may already have been filled in (BGS 2009) prior to the first available aerial photographs and others are likely to be obscured by dense vegetation. In the east of the project area there are relatively few extractive pits, which reflects the change in geology. The Pensford coal basin underlies the eastern end of the project area, where coal mining becomes more important.

6.5.1 Mining in the medieval period

Exploitation of the mineral wealth on Mendip continued throughout the medieval and post-medieval periods. It is known that the Bishop of Bath and his successors, who were the largest ecclesiastical land-lords on the Mendip hills, were granted a licence in 1235 by King Richard I to mine for lead (Gough 1967: 49). By 1283 many other religious houses, such as the canons of St Augustine's and the Knights Templar (Brown pers. comm.) were also granted rights to extract minerals.

At Burrington Ham, lead is known to have been mined in the medieval period on lands owned by the Abbey of Glastonbury (ibid.: 55) and although there is no evidence as to exactly where this mining took place, a likely candidate must be the workings recorded by the aerial survey at Burrington (Figure 32).

Although there is plenty of documentary evidence for lead mining in the medieval period, there is little evidence that can be positively identified as belonging to this period on the aerial photographs and lidar data. As Truscoe (2008: 43) points out, the expansion of the industry in the post-medieval period was such that all possible mining areas were reworked,

thus obscuring traces of earlier industrial activities. Therefore the true extent of mine workings before the post-medieval period is not fully understood.



Figure 32: An extensive area of probably medieval extractive pits at Burrington Ham. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009

6.5.2 Mining in the post-medieval period

By the end of the medieval period, the mining areas on the Mendip Hills had been reorganised into four liberties, each administered by a Lord Royal of Mendip who granted the right and licence to mine (Gough 1967: 68). In the middle of the 16th century the mining industry started to expand and between 1600 and 1670 the mines attained their maximum output (ibid.: 112).

There were eight discrete areas of mining identified within the north Mendip project area, comprising rakes, formed from rows of extractive pits, often joined together. A great deal of the mining followed veins running near the surface; which formed the rakes which have left the most conspicuous traces on the hillsides (Gough 1967: 3). Not all the mines produced ore; many were exploratory shafts or pits sunk along calcite veins in the hope of finding richer ore bodies (BGS 2009). It is of course not possible to distinguish from the evidence

visible on the aerial photographs or lidar data whether particular pits were exploratory or not, but it may be likely that small areas of pits (similar to those identified by Truscoe (2008: 51)), may have been associated with speculative prospection, for example those visible on Loxton Hill, west of Loxton (NMR: 1493880; Figure 35).

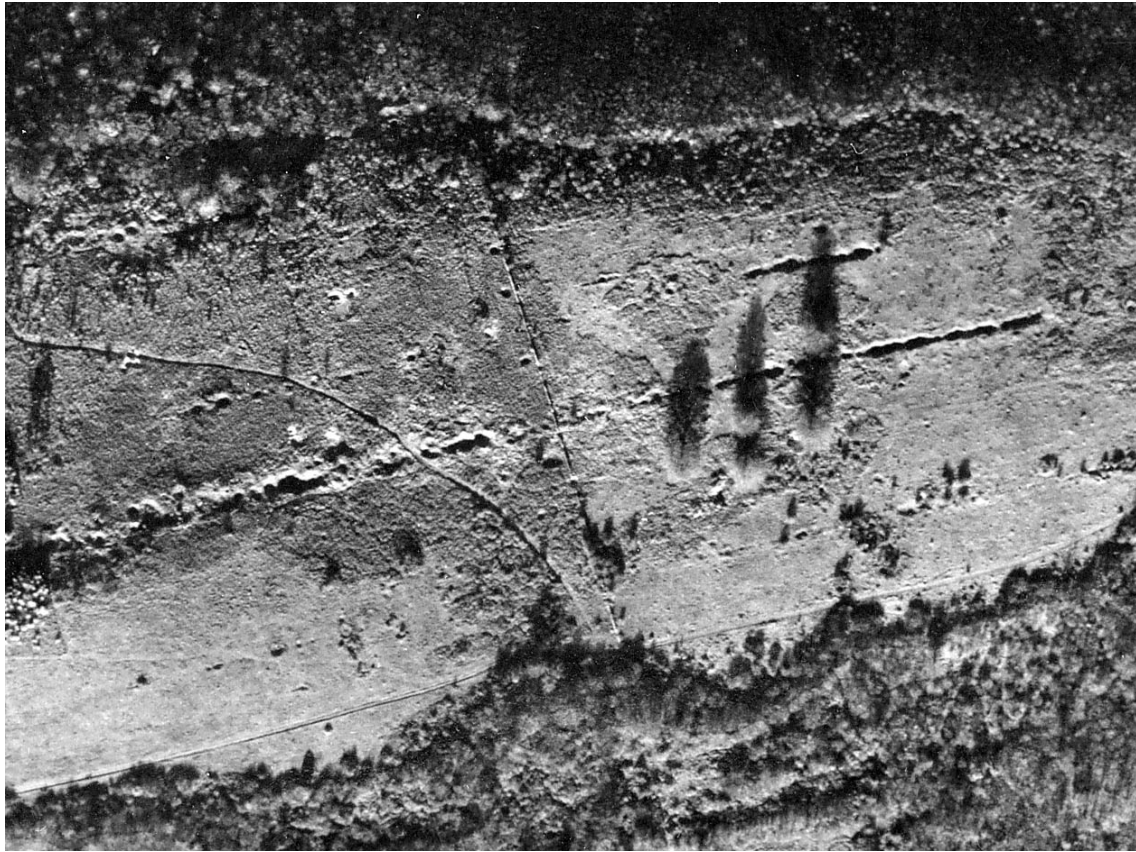


Figure 33: Mining rakes following mineral veins across Sandford Hill, Sandford. Note the dense vegetation to the north and south, potentially obscuring further mine workings. NMR RAF/CPE/UK/1869 3284 04-DEC-1948 English Heritage (NMR) RAF Photography.

The two largest mining areas within the project area are near Burrington Ham (NMR: 1494947; Figure 32) and southeast of Hutton (NMR: 1493806; Figure 34). Both were previously unrecorded in the NMR and North Somerset HER. Gough (1967: 96; 241-243) describes evidence of ochre and calamine pits worked on the hills above Hutton probably from the mid-18th century but apparently abandoned by 1823.

Other important areas with a wealth of mineral deposits are Sandford Hill, Sandford (Figure 33) and Dolebury Warren, where linear rakes can be seen cutting across the hillside from east to west. It is likely that there are more shafts and extraction pits than those mapped from aerial photographs as part of this project, owing to dense woodland and vegetation

which obscures much of the hilltops. Iron ore was being sought in both locations by a small-scale operator in 1830, with Sandford Hill producing good quantities of haematite (Gough 1967: 173). Knight (1915: 209), wrote that shafts had been sunk on Dolebury at various periods for iron, lead, manganese and probably calamine. Mining for ochre is recorded on Dolebury Warren by a Mr B. E. Somers in the late 1800s but no great quantities were found. In 1902 he made more systematic investigations inside and outside the Iron Age hillfort without sufficient success to warrant further operations and the mining ceased in 1904 (Gough 1967: 244). It is likely that the extraction pits recorded by the aerial survey within Dolebury Camp can be attributed to Mr Somers (see Figure 27 above).

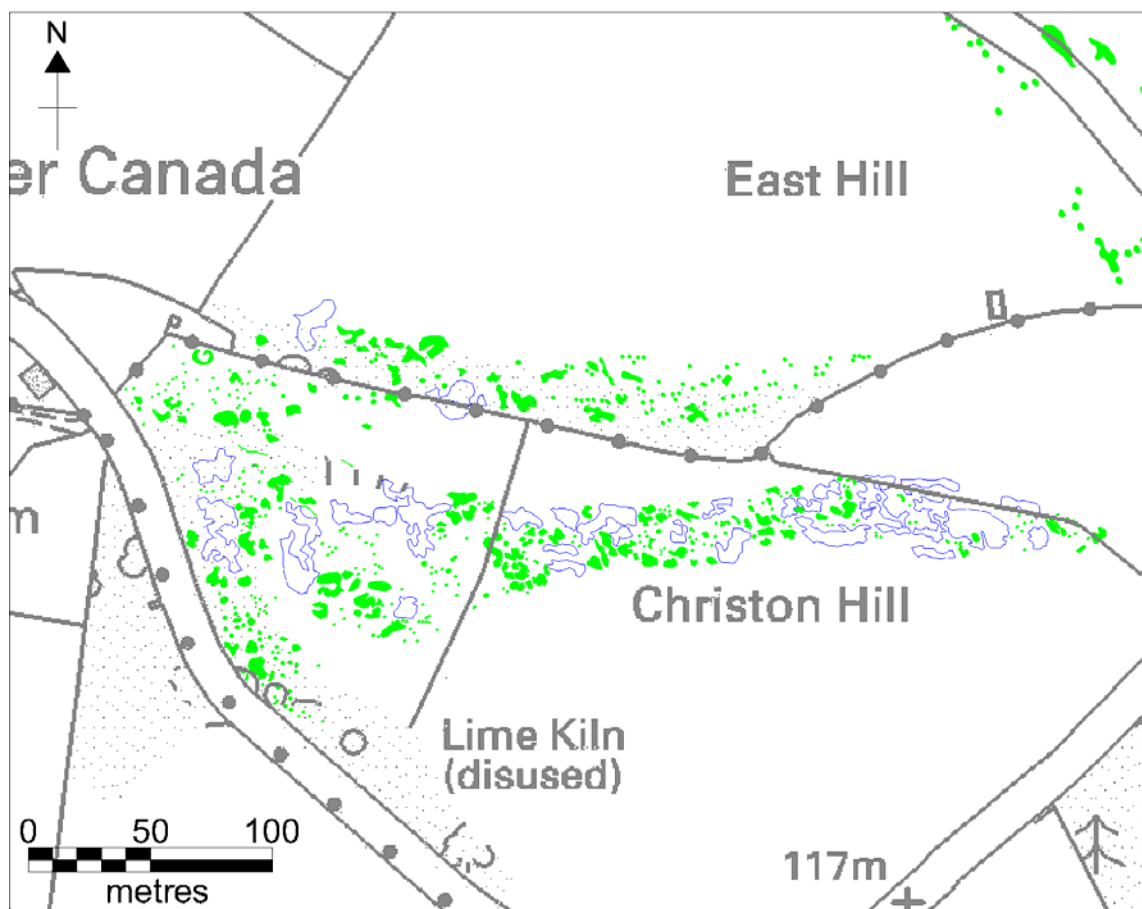


Figure 34: An area of probably medieval extractive pits on Christon Hill, south-east of Hutton.

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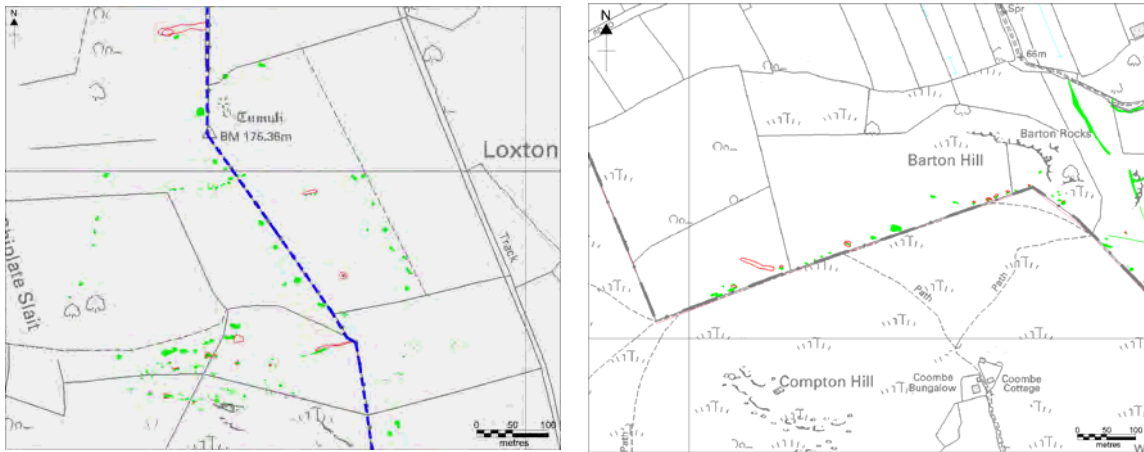
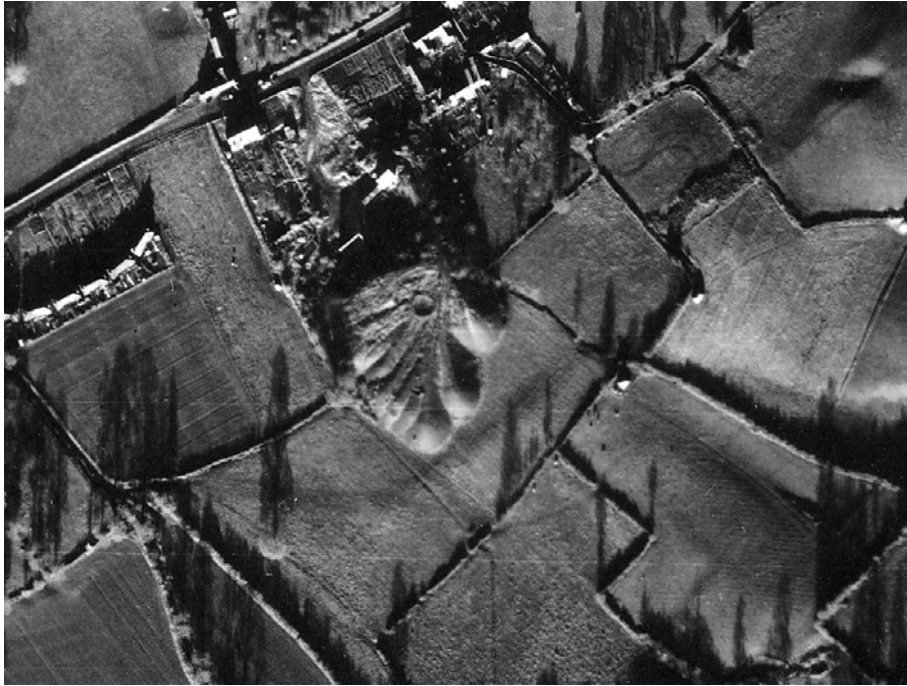


Figure 35: The mining areas on Loxton Hill and between Compton and Barton Hill. Loxton Hill is on the left, and Barton Hill is on the right. The extractive pits follow the civic boundaries, shown by the dashed blue line. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009

Mine workings on Loxton Hill (NMR: 1494049 & 1493880) and between Compton Hill and Barton Hill (NMR: 1494056) seem to follow the parish boundaries (Figure 35). The reasons for this are unclear but it may relate to speculative mining where manorial control was uncertain. Documentary evidence suggests that the extractive pits on Loxton Hill are likely to date from the late 18th century when a Mr Catcott was searching for ochre on the hill (Gough 1967: 241). Copper was also found here in small quantities at about this time and was mined by Cornish miners (ibid.: 251).

The only known coal mining within the project area is at Bishop Sutton. The town is located over the Pensford Coal basin, which lies in the northern part of the Somerset Coalfield. The date of the first pits around Bishop Sutton is uncertain but there was at least one before 1719. By 1824 a collection of four bell pits were identified in field tithe No. 1409, and four shaft pits in field tithe No. 1428, but it was noted they were no longer working (Williams 1967: 2). The three main coal mines which existed in Bishop Sutton have since been obliterated by housing (ibid.: 1) and the only evidence visible on the aerial photographs of the coal mining industry is a large spoil heap which was waste from the 'New Pit', first sunk in the early 1800s. It is not clear what the circular feature in the centre of the spoil heap is, but is cut into the spoil heap and post-dates it. The spoil heap shows classic finger dump morphology (Figure 36). The linear dumps were kept level to allow material to be wheelbarrowed or trammed along to extend them (Herring 2008: 35, 199). The New Pit continued to be worked throughout the 1800s but was finally closed in 1929.



*Figure 36: A coal tip with 'finger' dumps from the New Pit at Bishop Sutton.
NMR RAF/CPE/UK/1869 4248 04-DEC-1946 English Heritage (NMR) RAF Photography.*

6.5.3 Quarrying in the medieval and post-medieval periods

During the medieval and post-medieval periods most quarries were small local concerns extracting stone for buildings, stone walls and for the production of agricultural lime (Farrant 2008: 13); evidenced by the many post-medieval lime kilns scattered across the Mendip Hills. The Carboniferous Limestone, Quartzitic Sandstone, Dolomitic Conglomerate and various Jurassic Limestones have all been quarried for building stone (Ibid.: 13). The main quarries recorded within the project area are located at Sandford Hill, South Hill and Churchill Batch. Quarry workings began at Sandford in the mid-19th century, exploiting the pure Burrington Oolite, a very good building stone, and continued in operation until the late 20th century. The other quarries within the project area had ceased operations by the mid-20th century. The aerial photographs provided an illustrative means from which to chart the development of the quarries, particularly Sandford quarry which expanded from a small extraction area in 1946 to almost half the hill by 1993 (Figure 37).

6.5.4 Quarrying in the twentieth century

Expansion of the stone quarrying industry in the Mendip Hills took place between the First and Second World Wars, when large scale quarries were either opened up or expanded. The rocks of the Carboniferous Limestone series were exploited as a raw material for

cement and concrete manufacture, as a good source of building stone and crushed for road aggregate (BGS 2009).

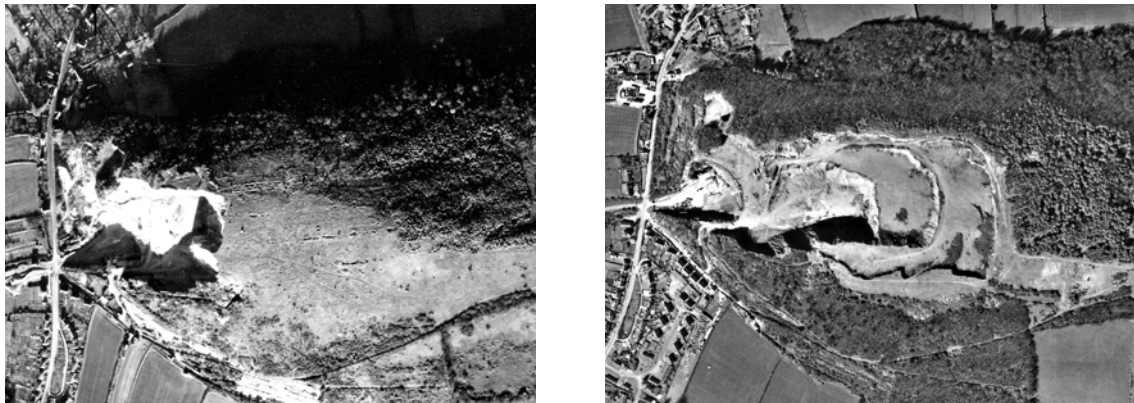


Figure 37: Sandford Hill quarry, the largest quarry in the northern Mendip Hills. The quarry as it was in 1948 (left) and in 1989 (right) shows its expansion. The quarry face is now used for climbing and abseiling. NMR RAF/CPE/UK/1869 3284 04-DEC-1948 English Heritage (NMR) RAF Photography; OS/89071 342 08-APR-1989 © Crown copyright. Ordnance Survey

The continuing expansion of Sandford Hill Quarry after the Second World War can be followed on the historic aerial photographs (Figure 37). In 1993 the workings finally ceased but not until a large bite had been created in the western end of Sandford Hill, covering an area of about 276 metres by 170 metres. Due to the eastward extension of the quarry face many post-medieval surface mine workings on the summit of Sandford Hill have been destroyed.

All quarries identified in the project area have now ceased operations but commercial stone extraction continues in other parts of the Mendip Hills. Somerset as whole is the second largest supplier of roadstone in England (Williams & Williams 1996: 126)

7 RESULTS OF THE AERIAL SURVEY: 20TH CENTURY

7.1 The Twentieth Century

The 20th century sites recorded by the aerial survey of north Mendip mainly fall into two categories; Second World War military activities and the expansion of limestone quarrying. The expansion of quarrying is discussed above in the section on extractive industries (see 6.5.4), as it forms part of the continuous pattern of extraction on Mendip.

7.1.1 The Second World War

Many of the Second World War military structures recorded in north Mendip as part of this project were mapped and recorded from 1940s RAF vertical aerial photographs. As many wartime defences and military sites were removed or demolished not long after the war the early photographs are sometimes the only evidence of their extent, form and location.

The largest group of military establishments recorded within the project area is in the west, around Weston-super-Mare, Hutton, Locking and Banwell; where an RAF base, an RAF airfield, a shadow factory and five military camps were recorded. Barrage balloons, anti-aircraft batteries and pillboxes associated with the defence of these military sites were also recorded.

The pattern of military sites and defences identified in the north Mendip need to be viewed alongside those identified in the rest of the Mendip Hills to produce a fuller picture of the military landscape during the war. Many of the defensive sites recorded in the Central Mendip Hills project area were related to the preventing enemy aircraft landings, munitions storage and anti tank features. Most of the defensive sites in the north Mendip were associated directly with the RAF airfield and shadow factories.

7.1.2 The RAF, airfields and ‘shadow’ factories.

A civilian airport was constructed at Weston-Super-Mare in 1936, which later became a focus for RAF activities before and during the war. RAF Locking which was constructed two years later in 1938 was located 1.4 kilometres to the west of the airport. Although it was unusual for an RAF base to be located away from an airfield it was not considered a

handicap as it was still conveniently placed for Weston (Berryman 2006: 132). RAF Locking was a School of Technical Training and operated a Station Flight at Weston-super-Mare airport for communication and staff training (Delve 2006: 278). By 1940 the RAF had taken over the airport, to provide navigation training to Observers and Navigators (Berryman 2006: 136). The airport is now disused and RAF Locking has been demolished and levelled for new developments.

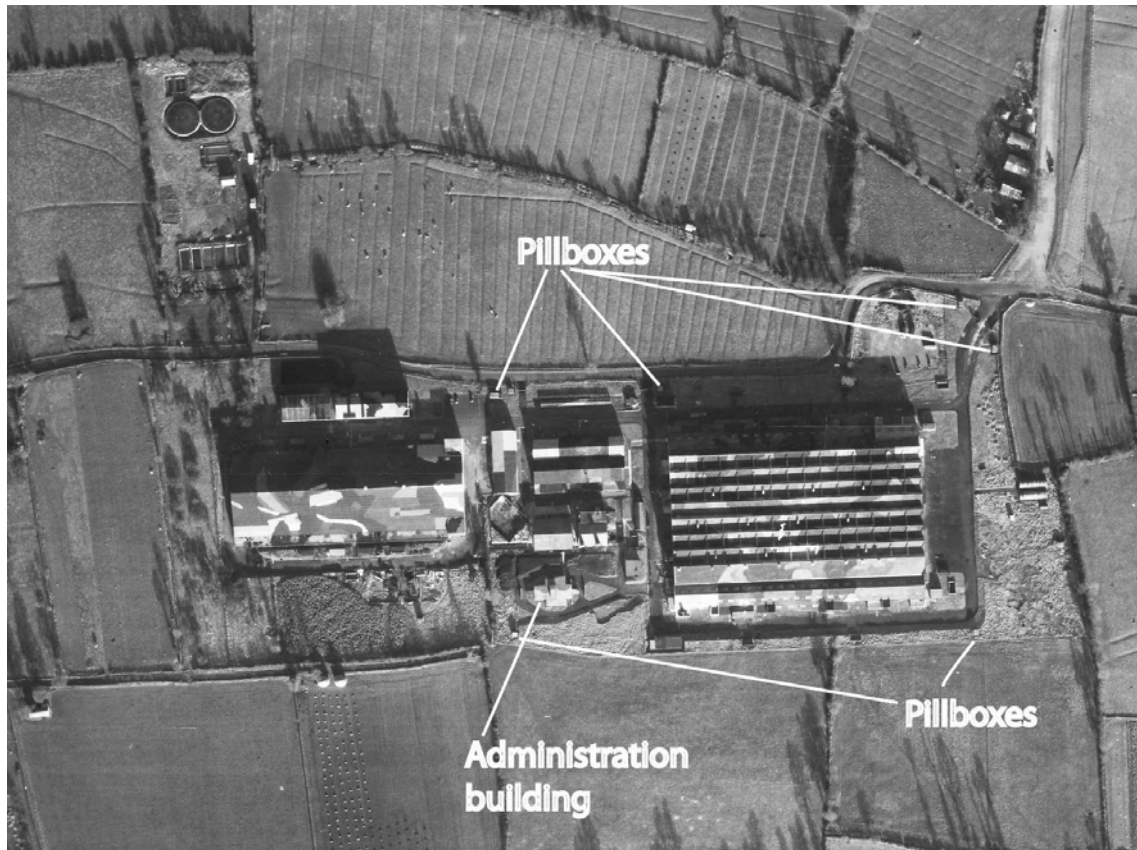


Figure 38: The Banwell 'shadow' factory. Note the camouflage paint on the roof and the pillboxes which were placed around the perimeter of the site. There was also a Home guard HQ. The administration building has angled sides and blast walls to the east and west, offering protection should the factory be targeted during a bombing raid. NMR RAF/3G/TUD/UK/15/21 5263 13-JAN-1946 English Heritage (NMR) RAF Photography

From 1940 the Ministry of Aircraft Production built the Oldmixon Shadow Factory, just to the west of the project area, adjacent to the western boundary of the airfield, where test flights of new aircraft were carried out (Ashworth 1990: 205-206). It also provided a useful backup facility should the main factory at Bristol be attacked (Berryman 2006: 136). In 1941 another aircraft shadow factory was built at Banwell, 540 metres south of RAF Locking, by Bristol Aeroplane Ltd (Figure 38). This factory was still visible on later aerial photographs, as

it continued in use after the war, producing first flat pack housing and then rocket components (Bristol Aerojet Limited 1993). Nothing survives of the buildings or structures today as the site was completely redeveloped in 2002 and is now a housing estate. Therefore the aerial photographs give us a unique view of this site as it was immediately after the war.

7.1.3 Defensive sites and structures

Military and other important sites were strategic targets for enemy bombers and as such were defended by light and heavy anti-aircraft batteries, searchlight batteries, pillboxes and barrage balloons.



Figure 39: Two barrage balloon sites at Locking and on Bleadon Hill. On the photograph on the left (Locking, taken in 1948) the circular arrangement of concrete mooring posts are visible, with adjacent access track and Nissen huts. In the image on the right (Bleadon Hill) taken during the war in 1942 an inflated barrage balloon is visible. NMR RAF/541/41 4249 22-MAY-1948, NMR RAF/FNO/37 5045 11-JUL-1942 English Heritage (NMR) RAF Photography.

Within the project area ten barrage balloon sites were mapped and recorded from 1940s aerial photographs. Barrage balloons were set up to prevent enemy aircraft from flying low and therefore to make it harder for them to hit their targets (Simkin n.d.). The barrage balloons provided protection to RAF Weston-super-Mare airfield and the Oldmixon Shadow factory. The barrage balloon sites comprised a circular balloon mooring area approximately 23 metres in diameter, from which the balloon was winched into the air prior to an air raid and tethered to regularly spaced concrete blocks. At all sites a circular access road was visible adjacent to the tethering blocks and most sites had two Nissen huts, which provided the balloon crews' accommodation (Figure 39). Most of the concrete blocks were removed

after the war and the balloon sites appear to be gone on aerial photographs taken in 1951. The two barrage balloon sites between Oldmixon and Hutton were only identified by circular cropmarks, but the presence of an access road and/or Nissen huts identified that barrage balloons were once located there.



Figure 40: A light AA Gun Emplacement.

The two small square structures to the southeast of the emplacement were probably magazine stores. NMR RAF/3G/TUD/UK/15/21 (PART III) 5255 13-JAN-1946 English Heritage (NMR) RAF Photography

The airfield and shadow-factories were also defended by anti-aircraft gun emplacements and heavy anti-aircraft batteries. The anti-aircraft gun emplacements were designed for a single Bofors AA gun and were part of the airfield defences for RAF Weston-super-Mare (North Somerset HER MNS3529). The three examples recorded within the survey area are either within or just outside the airfield boundary. They comprised an open square area in which to mount the gun, surrounded by a bank. A concrete internal wall can also be seen in the gun emplacement to the west of Moor Lane, on the southern edge of RAF Weston-super-Mare (NMR: 1491244, Figure 40). All three sites were completely levelled by 1989.

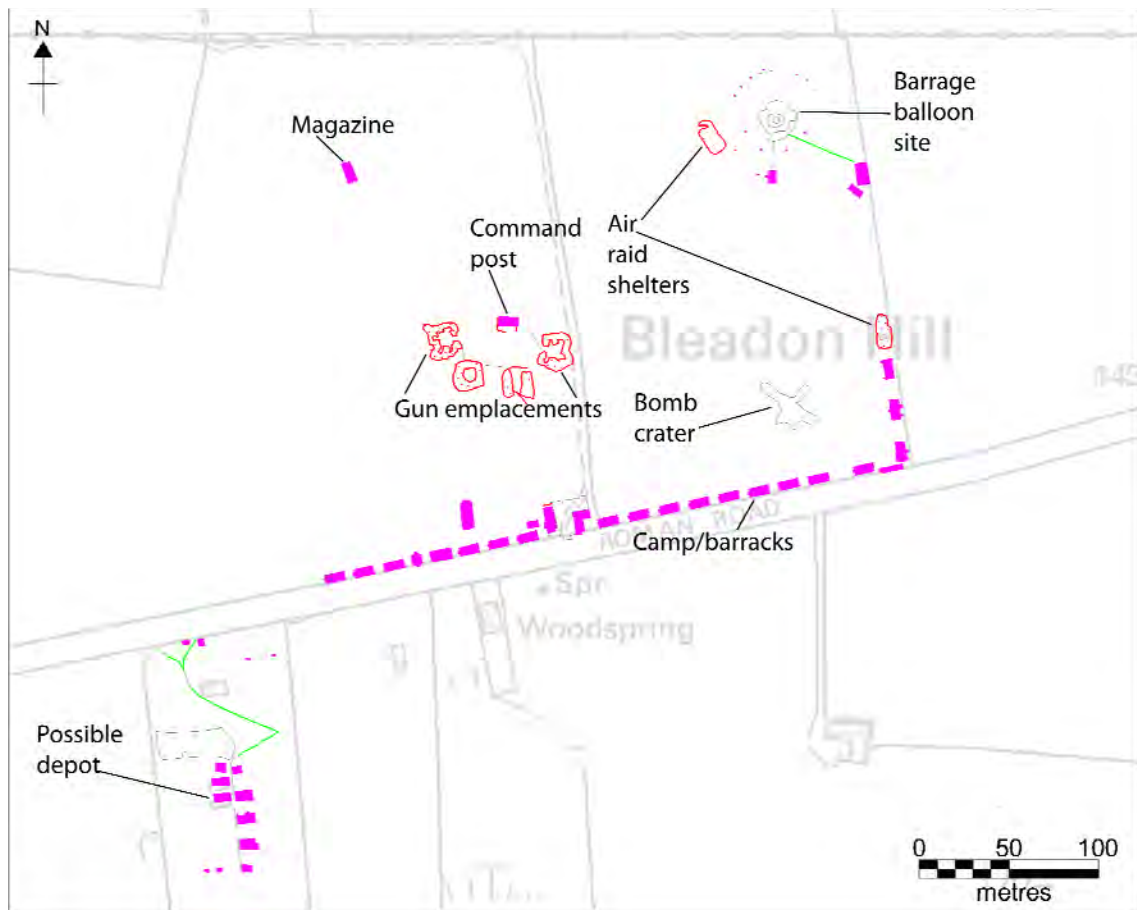
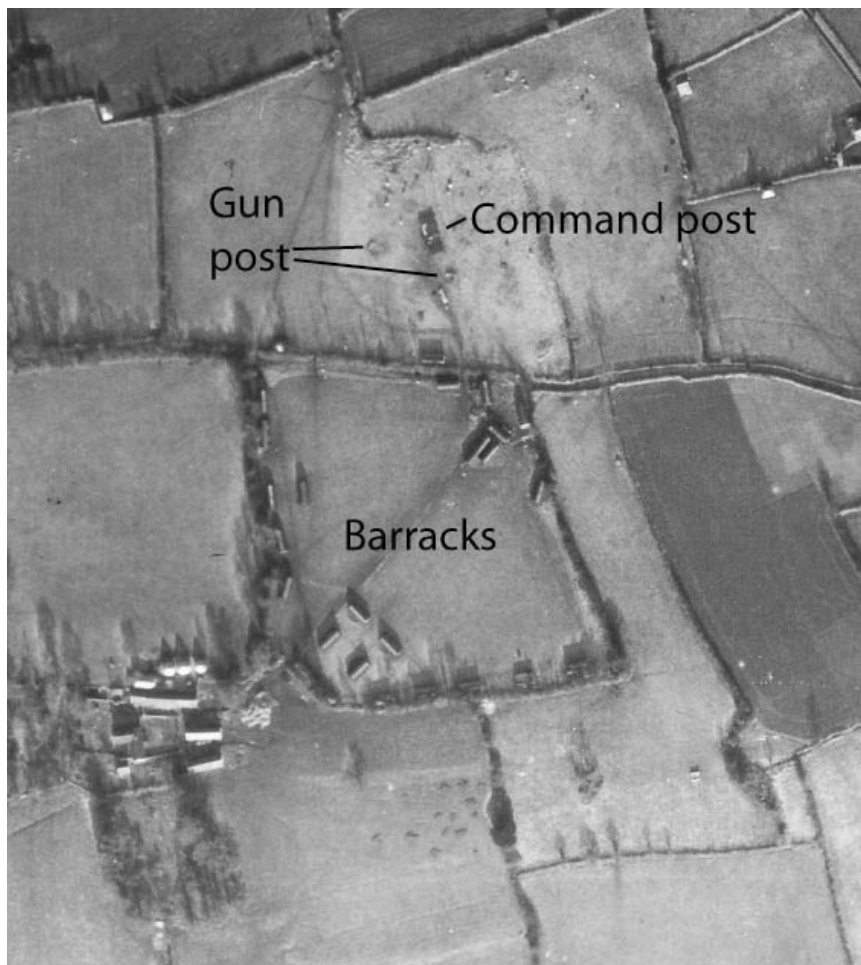


Figure 41: The heavy anti-aircraft battery on Bleadon Hill. A small camp and barracks lay adjacent to the gun emplacements. A barrage balloon site is also visible in the north-east corner. The structures are shown in magenta for clarity. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009.

Two heavy anti-aircraft batteries were identified within the project area. The battery recorded on Bleadon Hill (NMR: 1473661; Figure 41) adheres to a standard design, comprising four sub-square gun pits or emplacements positioned in a semi-circular arc around a centrally placed reinforced concrete command post, with an adjacent magazine building. In 1941, however the battery was only armed with two 3-inch mobile guns which can be seen in situ on the aerial photographs taken in 1942, but was finally equipped with four 3.7-inch mobile guns in 1943 (Dobinson 1996: 486). There are suggestions of possible machine gun emplacements on the 1942 photographs, but nothing definite enough to be mapped. The battery was targeted by enemy aircraft, as indicated by the irregular bomb crater to the south-east of the site.

The other anti-aircraft battery (NMR: 1471777) was recorded at North Hill Farm, Chew Stoke, in the east of the survey area (Figure 42). The battery was armed with four mobile

3.7-inch guns in 1941, and was manned by 349 Battery of the 76th Royal Artillery Regiment, but was unarmed and vacant in 1942 (Dobinson 1996). This abandonment accounts for the lack of preservation identified on the aerial photographs taken in January 1946, where only two of a probable four gun posts were visible surrounding the command post. The possible gun posts are defined by short sections of linear banks, defining sub circular, 'L' shaped and linear features. These may be the remains of sandbag walls, which were removed by July 1946. The site also comprises 25 barracks, ablutions blocks and other military buildings.



*Figure 42: The heavy anti-aircraft battery at North Hill Farm, Chew
NMR RAF/TUD/UK/1525 5080 14-JAN-1946. English Heritage (NMR) RAF Photography.*

Numerous pillboxes were constructed as defences against a land invasion (Osborne 2004: 44-45). Type 22 and Type 24 pillboxes as well as Vickers Gun Emplacements were strategically placed around the perimeter boundary of RAF Weston-super-Mare and some of these, located on the southern boundary of the airfield are recorded on aerial photographs. V-shaped slit trenches are also associated with the pillboxes and many have been mapped within the project area. At West End Farm, Locking, a number of related defensive

structures were mapped (Figure 43). Many of the pillboxes are still extant but other features and structures such as the slit trenches were levelled after the war.

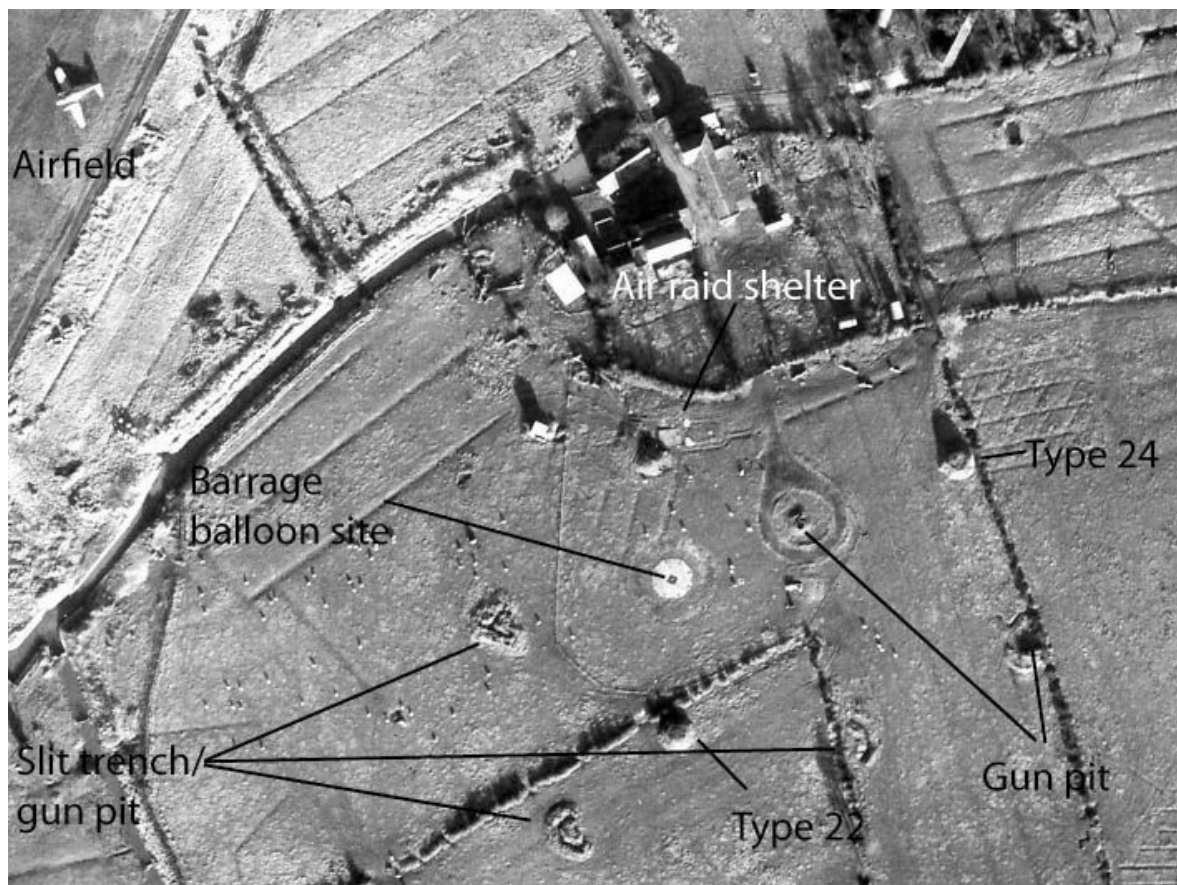


Figure 43: A defensive site on the south-eastern edge of RAF Weston-super-Mare airfield. The pillboxes were surrounded by an earthen bank to aid their camouflage within the landscape. NMR RAF/3G/TUD/UK/15/21 5263 13-JAN-1946 English Heritage (NMR) RAF Photography

7.1.4 Military camps and depots

Five military camps were identified in the project area, all of which were located east of RAF Locking and the Banwell Shadow Factory (Figure 44). The military camp at Knightcott (NMR: 1493262) was used as an overspill training camp for RAF Locking's School of Technical Training. Knightcott included a dome trainer; a concrete domed structure which housed training apparatus, including a projector, for training ground gunners in the art of airfield defence. This training site also had a secondary use as a prisoner of war camp in the later part of the war, and perhaps as late as 1947 (Brown 1999). Guards were probably housed in the nearby Summer Lane Camp (NMR: 1493244) to the north. These late war and immediate post-war prisoner of war camps could be low security (Donald Brown 1999: 205

and pers. comm.), which explains the absence of more conventional prisoner of war camp architecture. The other two camps located to the south probably provided barrack accommodation for military personnel training at the Knightcott Camp or staff working at the shadow factory.



Figure 44: RAF Locking, the Banwell 'shadow' factory and the associated military camps. These were also used for technical training and one was used as a low security POW camp towards the end of the war. NMR RAF/540/479 4029 22-APR-1951 English Heritage (NMR) RAF Photography

7.1.5 Other military features

Other previously unrecorded military features identified and mapped during the aerial survey include practice trenches (NMR: 1494085) and a searchlight battery (NMR: 1495919).

The Second World War practice trenches are visible as earthworks on aerial photographs taken in 1942, although they are indistinguishable from the surrounding extractive pits on aerial photographs taken in 1946 (Figure 45). They cannot be definitively dated to the Second World War, but the upcast on the spoil heaps does appear to be fresh in 1942. The

practice trenches are located in Hutton, on Elborough Hill just north of Christon plantation. The site comprises a pair of crenallated practice trenches linked by a communication trench, with indications of a second partial communication trench. The trenches are oriented NW to SE, extending parallel to the contours of the slope. Other practice trenches of this type are visible within the grounds of RAF Locking. Home Guard practice trenches have been recorded at Purn Hill, Bleadon (NMR: 1429664), although these could not be distinguished from extractive pits on the available aerial photographs. A group of five slit trenches or fox holes were also visible on the eastern slopes of the hill below Burrington hillfort (NMR: 1494953), although these may also predate the Second World War.

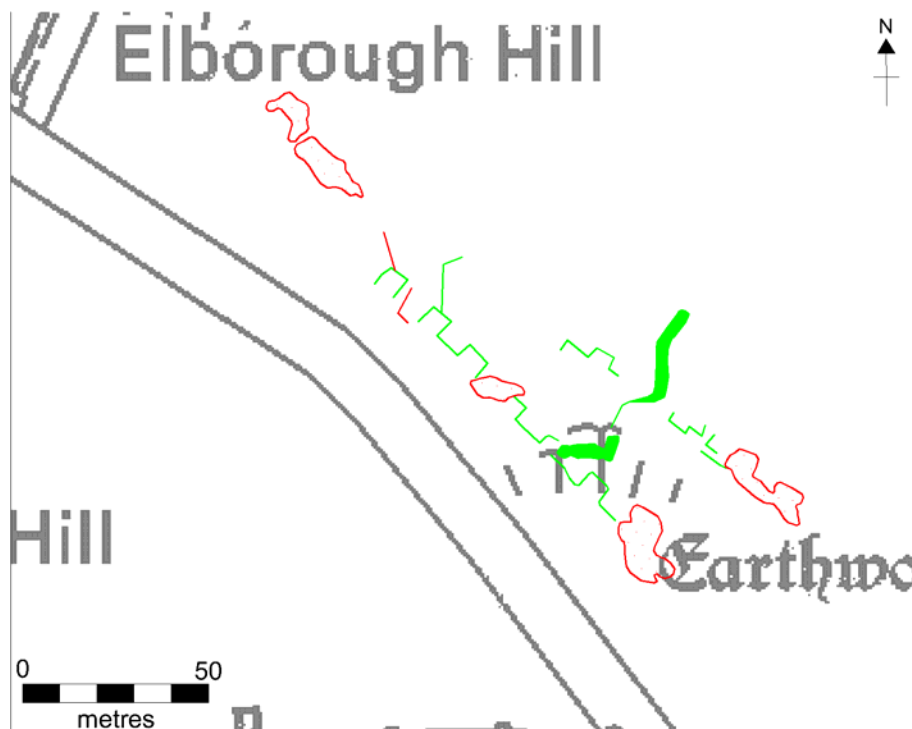


Figure 45: The practice trenches mapped on Elborough Hill. The banks are spoil heaps from the excavated trenches. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009.

A searchlight emplacement to the north of the village of Ubley is visible on aerial photographs taken in 1946 (Figure 46). The site comprises a ring-shaped bank, a penannular cropmark and the concrete hard standings of five buildings. The ring-shaped bank has an external diameter of 9.5 metres and an internal diameter of four metres, and surrounds the mounting for the searchlight. The penannular cropmark measures eight metres in diameter, and marks the location of a sound detector emplacement. The sound detector was removed at some point after 1943, as the obsolete technology was replaced with Elsie

searchlight control radar (Roger JC Thomas pers. comm.; Dobinson 2001: 345). The buildings associated with this site, probably storehouses, were removed between the end of the war and 1946, leaving their concrete hard standings visible. The searchlights were positioned to locate enemy aircraft for the benefit of anti-aircraft batteries and night fighter aircraft (Dobinson 2001: 283-5).



Figure 46: The searchlight battery north of Ubley. The searchlight can be seen as a ring shaped bank and the site of the sound detector as a penannular ditch. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2009

The searchlight batteries and anti-aircraft guns were augmented by observation posts. Members of the Royal Observer Corps are likely to have used the posts to track the movements and numbers of enemy aircraft, and transmit these to fighter command. The information would then be filtered and retransmitted to the RAF fighter groups, air defence sectors and to gun operations (Dobinson 2001: 200). The observation posts were located to allow observations to be made along the line of Mendip to Brean Down, north to the southern edge of Bristol and Avonmouth docks and eastwards towards Bath.

8 LIDAR

8.1 General principles

Light Detection and Ranging (lidar) survey measures distances by timing how long it takes for a beam of light to reflect off a target and return to a detector. Airborne lidar surveys are carried out by aircraft mounted with laser scanners. The scanners oscillate from side to side below the aircraft, and measure between 10 and 100,000 ground elevation points per second. The aircraft flies in a pattern of gridded transects which build up a detailed picture of the terrain (and anything else the laser pulses reflect off). This enables a highly detailed and accurate model of the ground surface (Bewley et al. 2005: 637). A differential GPS device in the aircraft records the co-ordinate of every data point, so that the resulting images are fully georeferenced. The results of the survey are a 3D cloud of points which can be used to create a digital elevation model. For a more in depth discussion of the technical aspects of lidar for the end user, see Crutchley (2008).

8.2 The study area

A lidar survey was commissioned by the AONB which was carried out by the University of Cambridge's Unit of Landscape Modelling (see Appendix 2), and was flown in two separate blocks. The western half of the AONB, between Bleadon in the west and Blagdon in the east, was flown between September and December 2005. The survey of the eastern half of the AONB and the east Mendip Hills, between Blagdon in the west and Frome in the east, was flown in April 2006. The dividing line between these two sorties extends roughly across the centre point of the project area discussed in this report. The lidar survey only covers the area of the AONB, and does not quite extend to the edge of the study area.

8.3 An analysis of the data and an interpretation of the results

The results of the lidar survey over the northern part of the Mendip study area were mixed, although they were certainly of enough use for the lidar to be counted as a significant contributor to the final results. The main drawback of the lidar is that much of it was flown at the wrong time of year, and post processing was not able to produce a digital elevation model showing the ground surface in woodland, although the lidar was able to see through scrub in some cases.

The lidar proved to be excellent for defining the form and extent of known sites, and often showed earthworks such as field systems with more clarity than any of the available vertical photographs. Although a stereo pair of vertical photographs should be able to show same amount of detail as the lidar if they are viewed with a stereoscope, in some cases there were no suitable aerial photographs available for a particular site. Poorly lit photographs taken at unsuitable times of day or photographs with very low contrast can prevent earthworks from being visible. The human eye is particularly good at filtering out the 'noise' of lidar, and discerning patterns, making the technique ideal for identifying and tracing field systems and other linear features (Devereux et al. 2005: 658). A key advantage of lidar is that no stereoscope is needed, and it provides a very accurate 3D image on the screen to map from.

Lidar is also useful for recording the current state of preservation of the earthworks (see Figure 47 below), but the strength of the collection of vertical photographs is that they can provide a long baseline to measure any change from. The vertical photograph collection goes back over fifty years plus, and provides evidence of sites before they were ploughed level or structures were removed. Lidar will eventually be able to provide this long baseline for comparison if it is flown regularly. The Environment Agency has an ongoing programme of remote observation, including lidar (Pritchard n.d.). This programme is intended to monitor environmental change, particularly coastal erosion, but it will be used in the future for archaeological purposes.

Lidar is also far more accurately georeferenced than a rectified photograph, and the locational data is likely to be more accurate than all but the most modern ground based surveys. The lidar also records things which are not on the map, which can be used for control information to rectify and georeference the photograph. This can include particular trees, stones or other structures which are visible on photograph showing the archaeology. GeoTIFFs are a high resolution image file format with georeferencing information built into the file and can be used to improve the rectification of aerial photographs by bringing them into the rectification programme as a background layer. This is particularly useful in upland areas where there are few boundaries and little other control information recorded on the map, although in most cases the level of detail on the OS 1:2,500 mapping is sufficient, given the size of the features that are mapped at 1:10,000.

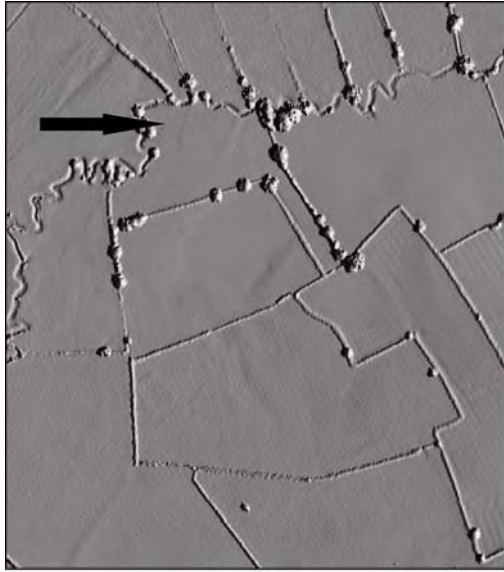


Figure 47: A probable Iron Age or Roman enclosure on the bank of the Lox Yeo. This appears to have been ploughed level on aerial photographs taken in the 1970s, but the lidar reveals that it still exists as faint earthworks. NMR RAF/3G/TUD/UK/21 5330 13-JAN-1946. English Heritage (NMR) RAF Photography. LIDAR ST3856 LAST RETURN 01-APR-2006 © English Heritage; source Cambridge Unit for Landscape Modelling

Although lidar is a very useful tool, it is important to bear its advantages and disadvantages in mind when using it. The final image is only an image, and the site or features which is shows have to be interpreted in the context of all the other available evidence, including the aerial photographs and any documentary evidence.

9 CONCLUSION

The northern Mendip Hills AONB NMP completion project has added significantly to the present state of knowledge of the archaeology of the area (see Appendix 3), with records relating to most archaeological periods added and updated. This report discusses the highlights of sites that were mapped during the course of the project, but it is by no means an exhaustive account of what was found. Aerial photographs and lidar are excellent techniques for prospection, and for understanding the form and extent of sites but they are less useful at dating sites and unless very recent photographs are available they may not give information about their present condition. Conversely the use of aerial photography from the 1940s onwards provides much information about the condition of sites throughout the second half of the 20th century.

Significant results of the survey from the prehistoric periods include the discovery of several round barrows. Several prehistoric or Roman field systems were identified, and the known extent of several other previously recorded field systems was extended, as well as being mapped in detail for the first time.

Military archaeology in Mendip is dominated by sites of the Second World War, with a number of RAF training camps and anti-aircraft sites having been recorded. These military features were associated with the RAF Weston-super-Mare airfield along with other defensive sites and structures. The level of detail available from the aerial photographs taken during and after the war is important in defining the extent, form and location of these sites which are often only partially described in written records. Further work leading from this aerial survey could focus on establishing the state of preservation and extent of sites, as well as seeking to cover areas not accessible to aerial survey. Most of the military sites have been removed over the past 40 years, so establishing the extent of preservation of their remains may be a priority, combined with researching any connected documentary evidence. The later prehistoric and medieval field systems which have been recorded on the northern slope of Mendip appear to be partly obscured by woodland; these earthworks may be better preserved than in surrounding areas of arable farmland. The possible castle or ringwork in Stowey Sutton is an example of a site for which only a basic level of interpretation is possible. A survey which establishes the form and extent of this site may contribute towards dating it, and giving it a full interpretation.

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APPENDIX I: NMP MAPPING STANDARDS

Introduction

The aim of National Mapping Programme (NMP) is to enhance the understanding of past human settlement, by providing primary information and synthesis for all archaeological sites and landscapes from the Neolithic period to the twentieth century. The NMP aims to do this to a consistent standard by interpretation, mapping, classification and description of all archaeological sites and landscapes in England which are visible on aerial photographs. This comprehensive synthesis of the information available on aerial photographs is intended to assist planning, protection and research of the historic environment.

The specific aims of the NMP are:

- * To produce a georeferenced digital transcription of the form and extent of all archaeological features visible on aerial photographs for the whole of England.
- * To record the location, indexed classification, archaeological description and analysis, and main sources of all archaeological sites visible on aerial photographs. Additional morphological recording is to be included for sites for which meaningful morphological comparisons can be made.
- * To provide a synthesis of the archaeology in each project area in the form of a report on the character, diversity, association and distribution of archaeological sites and landscapes.

Archaeological scope of the survey

The NMP applies a systematic methodology to the interpretation and mapping of all archaeological features visible on aerial photographs. This includes recording sites visible as cropmarks and earthworks but also structures, in particular those relating to early twentieth century military activities. The NMP typically records all archaeological features dating from the Neolithic up to the twentieth century. The following list summarises which classes of monument are depicted and how to record them.

Earthworks, plough-levelled features and buried remains

All cropmarks and soil marks which represent sub-surface features of archaeological origin have been recorded. Some earthworks for example, field boundaries, have not been mapped where they are clearly marked on the 1st edition Ordnance Survey Maps unless they are associated with other mapped features. Features which have an uncertain date or

thought to be possible geological marks have been recorded where they are associated with or may be confused with other archaeological features.

Post-medieval field boundaries

These have not been depicted, except where they are part of larger field systems and are not depicted by the Ordnance Survey or where they have been considered to be regionally or nationally archaeologically significant.

Military remains

Military buildings and structures from the Second World War (Pre-1945) were recorded and mapped according to the form and extent of the remains. Cold War military structures were also recorded.

Ridge and furrow

Medieval and/or post-medieval ridge and furrow were also recorded. Levelled and extant fields of ridge and furrow were depicted using different conventions and furrow directions were indicated by arrows.

Industrial archaeology

Areas of industrial archaeology have been recorded where the features can be recognised to predate 1945 and where their industrial buildings are no longer extant or not clearly marked on the 1st edition Ordnance Survey Maps. Areas of extraction i.e. lead mining rakes, have been mapped in detail where possible.

Buildings and structures

Buildings and structures were not generally mapped if first edition or later Ordnance Survey maps depict them. However, in specific contexts (e.g. industrial and military complexes, or country houses) and when in association with other features, they were mapped.

Transport

Major transport features (e.g. canals and railways) have not been mapped except where they are considered to be archaeologically significant.

Parks and gardens

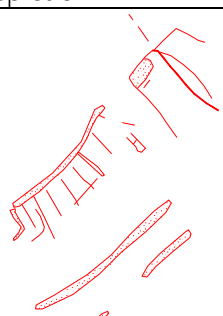

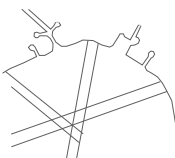
Only vestigial features, not botanical features, were mapped. In urban areas only significant parks and gardens are recorded. 20th century features were not mapped.

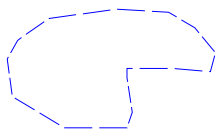
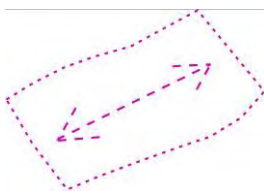
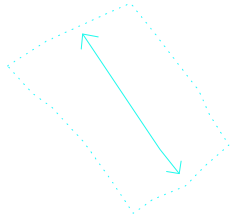

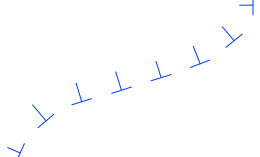
Digital transcription

The aerial photographs are rectified using specialist rectification software package (Aerial 5.29) with Ordnance Survey Mastermap 1:2,500 scale mapping. A digital terrain model function is also used to compensate for steep or undulating terrain. Due to the nature of some of the photographs, control points are sometimes hard to obtain and some control points are taken from soft boundaries i.e. hedges, and diffuse field boundaries. However, all control points typically have an average error of less than two metres to the 1:2,500 base map.

Archaeological features are then traced from rectified photographs and lidar tiles using AutoDesk Map 3D 2007 using standard NMP drawing conventions (see below). An average level of accuracy of less than two metres to the map is achieved and this gives an overall accuracy of plotted features, to true ground position, within 5-15 metres.

AutoCAD NMP conventions and layers

Layer name	Depiction
<p>BANK (red) The outline of all features seen as banks or positive features, e.g. platforms, mounds and banks; also to be used for the agger of Roman Roads. Thin banks will appear on this layer as a single line.</p> <p>BANKFILL (red) A stipple that fills the bank outline.</p>	
<p>DITCH (green) All features seen as ditches; also excavated features, e.g. ponds and pits.</p> <p>DITCHFILL (green) A solid line that fills the ditch outline</p>	
<p>EXTENT OF AREA (grey) The extent of large area features such as the perimeters of airfields and military camps</p>	

<p>LARGE CUT FEATURE (blue)</p> <p>Formerly the 'T-hachure', now represented by a dashed line. To be used for large cut features such as quarries, ponds, and perhaps scarps that cannot easily be depicted with the use of either bank or ditch.</p>	
<p>RIGARRLEVEL (magenta)</p> <p>Arrow depicting direction of rig in a single block ridge and furrow, seen as earthworks or cropmarks, but known to have been ploughed level.</p> <p>RIGDOTSLEVEL (magenta)</p> <p>Outline of a block of ridge and furrow, seen as earthworks or cropmarks, but known to have been ploughed level.</p>	
<p>RIGARREWK (cyan)</p> <p>Arrow depicting direction of rig in a single block of ridge and furrow seen as earthworks on the latest available aerial photographs.</p> <p>RIGDOTSEWK (cyan)</p> <p>Outline of a block of ridge and furrow still surviving as earthworks on the latest available aerial photographs.</p>	
<p>STRUCTURE (grey)</p> <p>Used for buildings, walls and features that do not easily fit into other categories because of their form, e.g. tents, radio masts, painted areas (camouflaged airfields).</p> <p>STRUCTUREFILL (grey)</p> <p>A solid fill within the structure outline. In this report, structure and structurefill are depicted as magenta to improve the clarity of the figures.</p>	
<p>SLOPE (Blue).</p> <p>T Hachures used to indicate the direction of a scarp or slope.</p>	

Lidar methodology for the Mendip Hills AONB NMP

The following detailed methodology was kindly provided by Simon Crutchley at the NMR who advised on methodology for the previous work in the Somerset part of the AONB. The same methodology as used in the earlier project will be followed for consistency:

“As well as the use of standard aerial photographs the Mendip project will also utilise lidar data. Whilst the optimal use of lidar data is to utilise the actual 3D data in an application in which mapping can be carried out on data where the illumination and height exaggeration can be controlled, this is not possible within the methodology available for Mendip. Instead the lidar data will be utilised in two separate but complementary forms. For each two kilometre by two kilometre tile (or variation thereof based on the cover flown) a pair of georeferenced image tiles (TIFFS) will be provided; one will be greyscale, highlighting features via controlled illumination; the other colour shaded according to height. These will be inserted into the CAD drawing and features mapped from them in the same manner as features are mapped from aerial photographs.

As well as these static image files, the lidar data will also be supplied in a format that allows 3D viewing, providing the means to view the models completely interactively in an environment where moving the cursor changes the light source almost instantaneously. This facility is provided by the Quick Terrain programs (Modeler to create the models and Reader to view them - www.appliedimagery.com). This enables an interpreter to examine the data themselves, changing the elevation and azimuth so as to emphasise features of interest. Whilst it is not possible to plot features against the 3D image, it is possible to view the 3D and flat images simultaneously and map features onto the flat image based on what is visible in 3D. If it is not possible to see the features on the flat image even with the assistance of the 3D image, a revised flat image can be created using the parameters determined by the interpreter in 3D”

The NMR database (AMIE)

As a result of the aerial survey to date, a total of 152 new monument records have been identified and created in the NMR's database (AMIE), as well as the revision of 162 existing records. The existing records were updated and/or revised where the form or extent of the site could be clarified or where more detailed information was necessary to provide a better understanding of the site. In a few cases, a record was updated to state that a particular site could not be seen on the available aerial photographs. Newly recorded monuments are indexed and given a textual description and are translated onto the English Heritage in-house Geographic Information System (WebGIS). Copies of the written records and digital mapping are supplied electronically to the relevant HERs, together with bound copies of this report. All monument records are given a unique identifying number, known as a HOB UID (Heritage Object Unique Identifier) as well as the older NMR reference numbering system relating to the Ordnance Survey map sheet e.g. ST 55 NE X4/HOB UID 197270. For

clarity, NMR records have been referred to as NMR: 1234567 throughout this report. Each Monument Record provides a textual description of the site, information on sources including the best aerial photographs of the site and other indexed information. A measured drawing record on the NMR catalogue of archive items was created for the digital NMP drawing for each area covering an Ordnance Survey 1:10,000 quarter sheet, e.g. MD002598. This record is linked to all relevant monument records. An Event record provides information on the context for the project, for example why, when and who carried it out, and this is linked to all monument records created or amended during the project.

- * The Mendip Hills AONB NMP (Truscoe 2008)– Archive File Number: AF00024
- * Gloucestershire County Council: The Mendip Hills AONB NMP Completion Project (Priest & Dickson 2009) – Event record: 1433671

APPENDIX 2: SOURCES

Aerial Photographic Sources

The main photograph sources consulted were:

National Monuments Record
Enquiry & Research Services
English Heritage
Kemble Drive
Swindon, SN2 2GZ
Tel: 01793 414 600
nmrinfo@english-heritage.org.uk

The collection of aerial photographs viewed comprised vertical sorties from the RAF, Ordnance Survey and Meridian Airmap Ltd, taken from 1941-2006; as well as specialist oblique photography taken between the 1930s and 2007. The most recent oblique photography was taken by English Heritage's in house aerial photographer, Damian Grady.

Unit for landscape Modelling (formerly Cambridge University Committee for Air Photography, CUCAP)
Sir William Hardy Building
Tennis Court Road
Cambridge, CB2 1QB
Tel: 01223 764377

The project consulted all available vertical and oblique aerial photographic prints listed in the online catalogue. (<http://venus.uflm.cam.ac.uk>)

Other photographic sources viewed were the Ordnance Survey's limited but recent colour vertical photographs and infrared aerial photographs supplied digitally through the Pan-Government Agreement, as well as recent online aerial imagery from Google Earth (<http://earth.google.com/>) and Live Local (<http://maps.live.com/>).

Lidar data was sourced from a lidar survey that was flown by the Cambridge University Unit for Landscape Modelling in late 2005 and spring 2006. The western half of the AONB, between Bleadon in the west and Blagdon in the east, was flown between September and December 2005. The survey of the eastern half of the AONB and the east Mendip Hills, between Blagdon in the west and Frome in the east, was flown in April 2006. The Lidar data

tiles were provided as rectified, hill shaded, greyscale georeferenced TIFs.

Monument Sources

Monument Information was consulted from the following:

- * National Monuments Record database (AMIE)
Monument record details can be viewed online at <http://www.pastscape.org.uk/>
- * North Somerset County Council Historic Environment Record
Further details can be found at online at
<http://www.n-somerset.gov.uk/Environment/Conservation/archaeology/HER.htm>
- * Bath and North East Somerset Council Sites and Monument Record
Further details can be found at online at
<http://www.bathnes.gov.uk/BathNES/environmentandplanning/Archaeology/SitesAndMonumentsRecord.htm>

Other Sources

Historic Ordnance Survey maps were also consulted as an additional source to aid interpretation including the first edition and current Ordnance Survey maps. Geological information was also consulted from maps produced by the British Geological Survey (BGS). Books and journal articles were also consulted as well as some internet resources (See Bibliography).

APPENDIX 3: ENHANCEMENT OF THE NMR

Enhancement of the National Monuments Record (NMR) database.

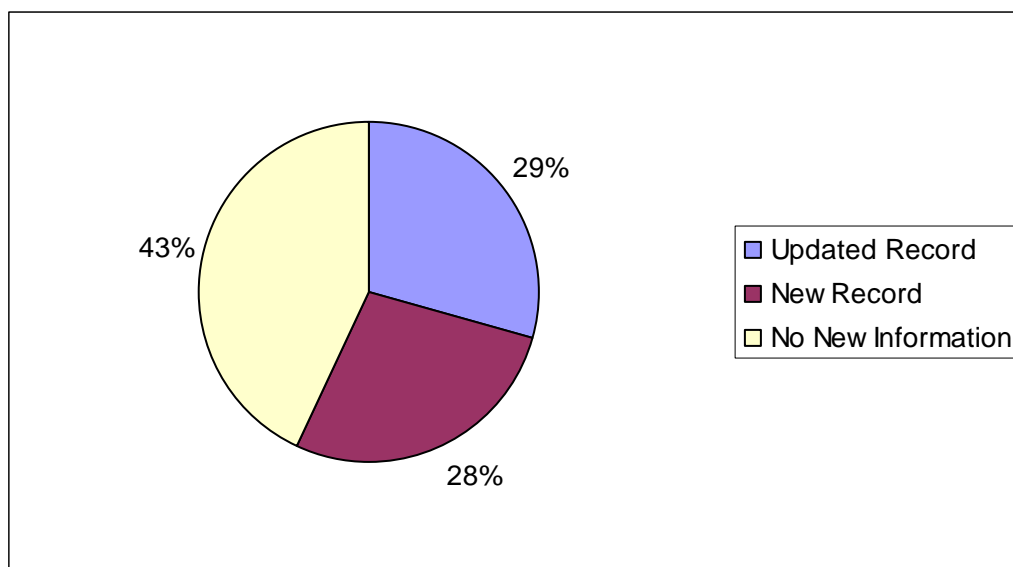


Figure 48: All the NMR monument records for the AONB NMP completion project. The raw data is drawn from column one of Fig. 54 below.

Figure 48 shows that the NMR database has been greatly enhanced as a result of this aerial survey, as the number of monument records almost doubled within the project area. The archaeological aerial survey in the northern Mendip Hills AONB has resulted in an increase in new sites recorded of 28% and a further 29% of existing sites which have been updated or amended as part of the aerial survey.

	Priest & Dickson 2009	Truscoe 2008:8	Totals
New records	152	303	405
Updated records	162	253	465
No new information	237	130	367
New and amended records per square kilometre	2.59	3.1	2.9

Figure 49: A table of NMR monument records relating to the AONB NMP Completion Project and the central Mendip Hills NMP.

When the statistics of both Mendip projects are combined (see Figure 49), the figures are broadly comparable. Approximately a third of the records are newly added to the database, a third of existing records were amended and a third were unchanged. In terms of records per square kilometre, the figures are also broadly comparable, and fit with the results of the 1991 AONB survey (Ellis 1991: 4). Ellis predicted that between 550 and 600 new sites might be recorded in a future project such as this one, although the 1991 project integrated ground based survey and was focused more intensely on a smaller area. The total figure of 405 new sites broadly fits with these predictions.

Large earthworks, cropmarks and structures tend to be most visible on aerial photographs and this is reflected in the kind of archaeological remains typically recorded. Therefore monument records which have not usually been updated include those that describe extant buildings, such as farms, churches, small finds, sites discovered by excavation and other archaeological structures not visible from the air (see Archaeological Scope of the survey, Appendix I for further details).

Archaeological records by period

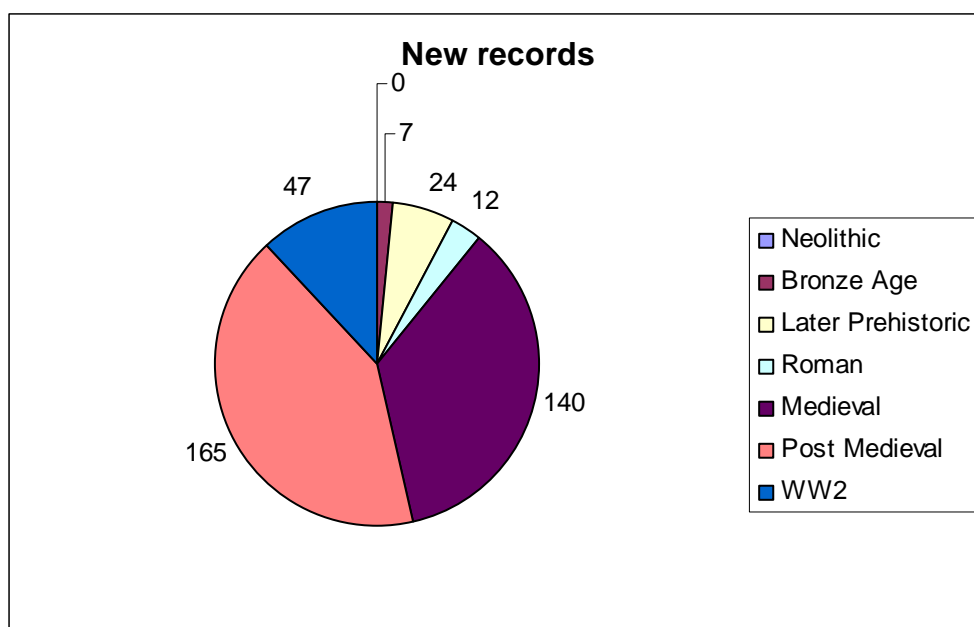


Figure 50: New NMR records from the AONB NMP Completion Project by period.

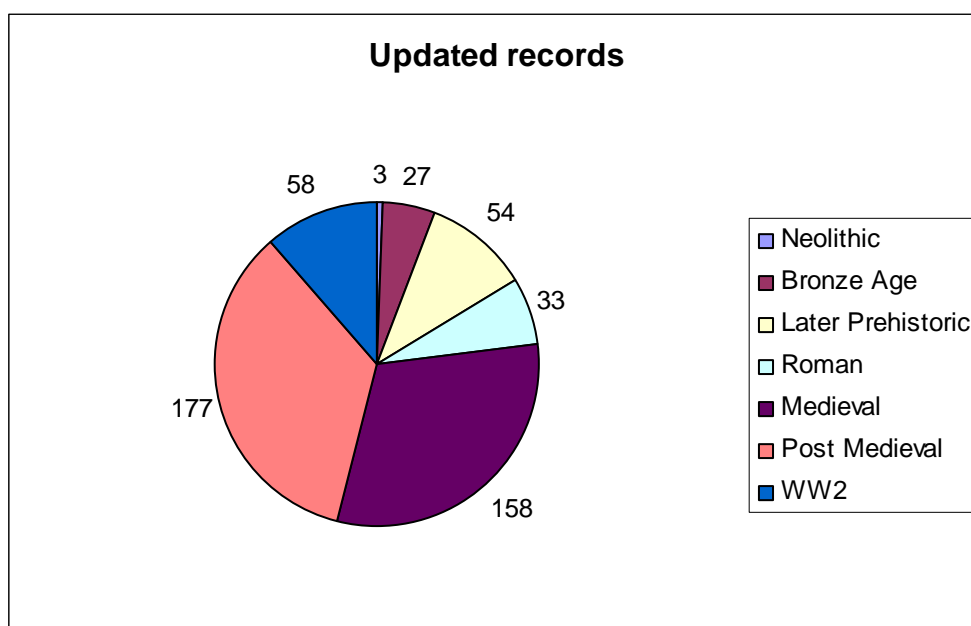
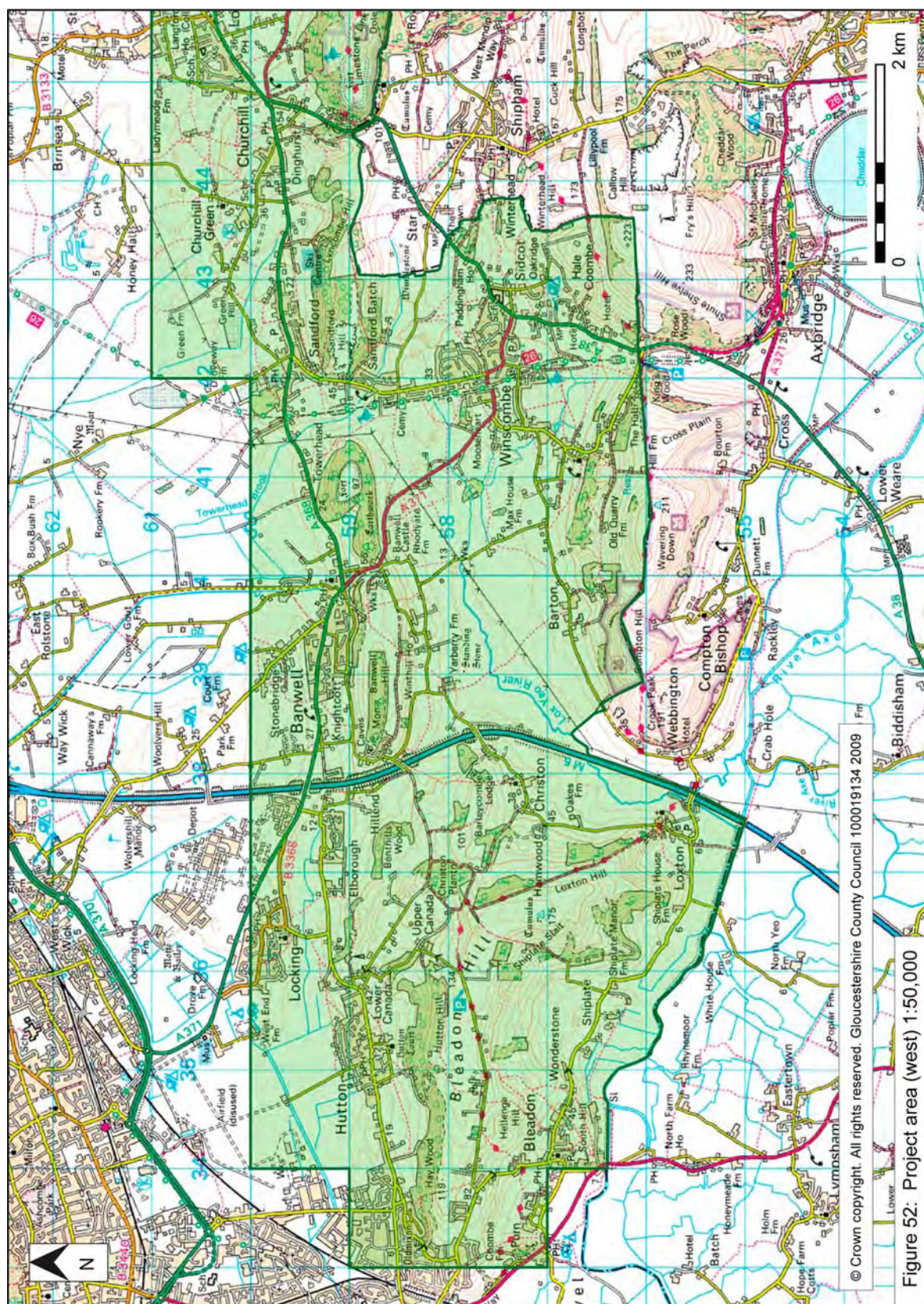


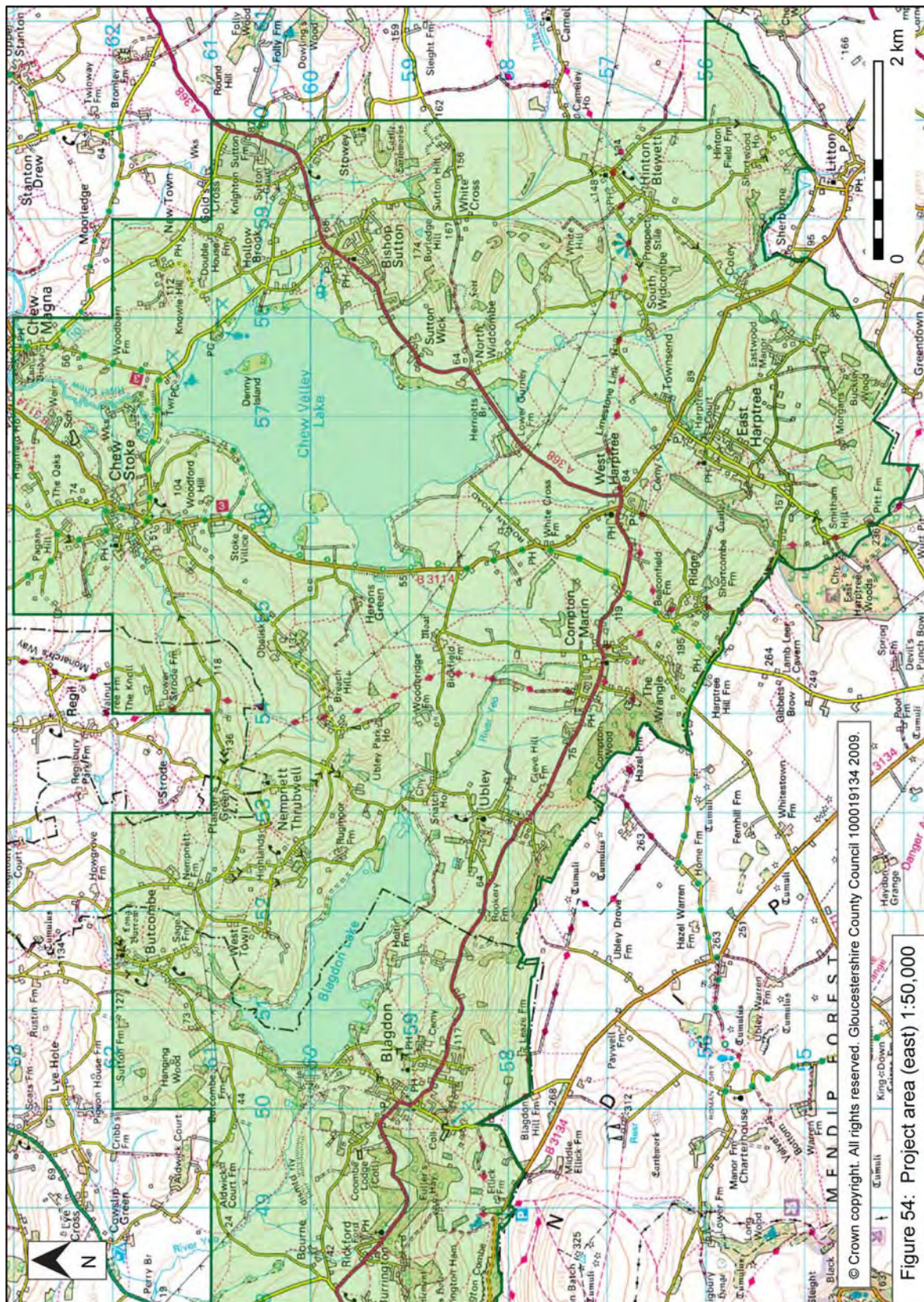
Figure 51: Updated NMR records from the AONB NMP Completion Project by period.

The two figures above (Figures 50 and 51) give a breakdown of the numbers of new and updated records by period. The figures were obtained by running queries on the NMR database (AMIE). However, these figures can only be seen as guidelines to the proportions of records of different periods which were recorded during the course of the project. It has not been possible to separate records which have been recorded with more than one period term attached to them; which comprise the vast majority of records. Sites which have been indexed as Later Prehistoric/Roman/Medieval will therefore appear three times in the statistics.

APPENDIX 4: MAPS OF THE SURVEY AREA







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