

THE CARRANT VALLEY LANDSCAPE NMP

NATIONAL MAPPING PROGRAMME REPORT

Sharon Bishop



This report has been prepared for use on the internet and the images within it have been down-sampled to optimise downloading and printing speeds.

Please note that as a result of this down-sampling the images are not of the highest quality and some of the fine detail may be lost. Any person wishing to obtain a high resolution copy of this report should refer to the ordering information on the following page.

The Carrant Valley Landscape NMP

Sharon Bishop

© English Heritage

ISSN 1749-8775

The Research Department Report Series, incorporates reports from all the specialist teams within the English Heritage Research Department: Archaeological Science; Archaeological Archives; Historic Interiors Research and Conservation; Archaeological Projects; Aerial Survey and Investigation; Archaeological Survey and Investigation; Architectural Investigation; Imaging, Graphics and Survey; and the Survey of London. It replaces the former Centre for Archaeology Reports Series, the Archaeological Investigation Report Series, and the Architectural Investigation Report Series.

Many of these are interim reports which make available the results of specialist investigations in advance of full publication. They are not usually subject to external refereeing, and their conclusions may sometimes have to be modified in the light of information not available at the time of the investigation. Where no final project report is available, readers are advised to consult the author before citing these reports in any publication. Opinions expressed in Research Department Reports are those of the author(s) and are not necessarily those of English Heritage.

Requests for further hard copies, after the initial print run, can be made by emailing:

Resreports@english-heritage.org.uk

or by writing to English Heritage, Fort Cumberland, Fort Cumberland Road, Eastney, Portsmouth PO4 9LD
Please note that a charge will be made to cover printing and postage.

SUMMARY

The Carrant Valley Landscape project was initiated by Jan Wills (Gloucestershire County Archaeologist) to provide a context for the nationally important later prehistoric and Roman lowland settlement site at Beckford, Worcestershire. The Historic Environment Enabling Programme (HEEP; Project Number 3212) is funding the completion of the post excavation analysis of this site and landscape sequence. The aerial survey results provide a contextual landscape overview for the excavation results and will contribute to the Council for British Archaeology (CBA) Research Report publication (Wills, forthcoming).

The Carrant Valley Landscape aerial survey was carried out to NMP standards (Winton, 2007) and covers an area of 200km². Archaeological features recorded from the aerial photographs included a possible later prehistoric field system and associated settlement at Bushley, an extensive medieval agricultural landscape and a range of Second World War features. The hilltop site at Bushley offers a potential comparison for Beckford, whereas medieval ridge and furrow may mask other prehistoric sites in the valley.

CONTRIBUTORS

Sharon Bishop carried out the interpretation, transcription, recording and analysis.

ACKNOWLEDGEMENTS

The Carrant Valley Landscape NMP project was initiated by Jan Wills, Gloucestershire County Archaeologist. The author would like to thank Jan for her advice and insight into the Beckford site and Tim Grubb for the provision of data from the Gloucestershire Sites and Monuments Record. Thanks also to Victoria Bryant and Mike Glyde, Worcestershire HER, for information relating to various sites within the project area and to Mick Wilks, Defence of Worcestershire volunteer. Thanks to Luke Griffin, Enquiry & Research Services Support Team, National Monuments Record, for supplying the photographs; to Helen Winton (Aerial Survey and Investigation) for her advice and guidance in the preparation of this report, and to Damian Grady for his advice.

All base maps and contour data used in this report are reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office, © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. English Heritage 100019088. 2009

This project was carried out in collaboration with Cambridge University's Unit for Landscape Modelling (ULM): their contribution being the loan of material from their Air Photo Library.

English Heritage would like to thank the Environment Agency for providing the Lidar data.

The image on the front cover is an extract from the NMP mapping for SO 93 NE © English Heritage NMR, with an Ordnance Survey base map.

ARCHIVE LOCATION

The National Monuments Record Centre,
Kemble Drive,
Swindon
SN2 2GZ

DATE OF SURVEY

January 2006 to June 2007

CONTACT DETAILS

Aerial Survey
English Heritage
Kemble Drive
Swindon
SN2 2GZ

AerialSurvey@english-heritage.org.uk

CONTENTS

Introduction	1
Background.....	1
Project Area.....	1
Summary of methodology.....	2
The character of the Carrant Valley.....	3
Geology and soils	4
Factors affecting the survey results	5
Geology and soils	5
Land use.....	6
The aerial photographs.....	8
Summary	8
Project results	9
Overview	9
Previous aerial survey and interpretation.....	9
Beckford	10
The archaeology of the Carrant Valley.....	14
Introduction	14
The Neolithic (c4000 BC – c2200 BC) and Bronze Age (c2600 BC – c700 BC) landscape	16
The Iron Age (c800 BC – AD 43) and Roman (AD 43 – AD 410) landscape	21
The early medieval landscape (cAD 410 – cAD 1086).....	33
The medieval and later agricultural landscape (cAD 1086 onwards)	34
Miscellaneous	41
The Second World War.....	45
Conclusion	52
Bibliography.....	54
Maps.....	62

Appendix 1: The archaeological scope of the survey.....	63
Plough-levelled features.....	63
Earthworks.....	63
Ridge and furrow	63
Buildings.....	63
Industrial archaeology.....	63
Military archaeology	64
Field boundaries	64
Geological and geomorphological marks	64
Appendix 2: AutoCAD NMP conventions and layers.....	65
Appendix 3: Sources	67
Appendix 4: AMIE recording statistics.....	69
Appendix 5: Lidar	72

ILLUSTRATIONS

Figure 1: Location of the archaeological surveys to NMP standards.....	1
Figure 2: The topography of the Carrant Valley	3
Figure 3: Geological cropmarks at Kemerton	6
Figure 4: The Beckford excavations and cropmarks.....	11
Figure 5: A comparison of the Beckford aerial survey transcriptions.....	13
Figure 6: The Neolithic and Bronze Age Carrant Valley.....	17
Figure 7: The funerary complex at Kemerton.....	18
Figure 8: The Iron Age (IA) and Roman (RO) Carrant Valley from air photographs.....	21
Figure 9: Examples of Iron Age hillforts and hilltop earthworks.....	23
Figure 10: Examples of Iron Age and Roman settlement forms	24
Figure 11: Trackways at Kemerton.....	27
Figure 12: The Iron Age / Roman field system at Bushley Green	30
Figure 13: The hillfort and associated field system at the Warren	30
Figure 14: The medieval landscape of the Carrant Valley as seen on aerial photographs ..	34
Figure 15: The medieval landscape of Ashchurch.....	35
Figure 16: Medieval farmsteads	39
Figure 17: Possible medieval flood defences along the Severn.....	43
Figure 18: Part of Tewkesbury anti-tank island.....	46
Figure 19: Ashchurch Vulnerable Position.....	48
Figure 20: Aircraft obstructions and the fuel store at Saxon's Lode	50
Figure 21: AMIE records by theme.....	70
Figure 22: New AMIE records by period.....	71
Figure 23: Amended AMIE monument records, by period	71
Figure 24: Lidar examples at the Mythe.....	73

INTRODUCTION

Background

The Carrant Valley Landscape project was carried out to English Heritage's National Mapping Programme (NMP) standards, between January 2006 and June 2007. The project is an extension to the North Gloucestershire Cotswolds NMP project (Stoertz, forthcoming) and was designed to provide a landscape context for the unpublished but nationally important later prehistoric and Roman lowland settlement site at Beckford, which was excavated in the 1960s and 1970s in advance of sand and gravel extraction (Wills, 2004). The aerial survey will aid any future archaeological evaluation in advance of other extraction in the area.

Project Area

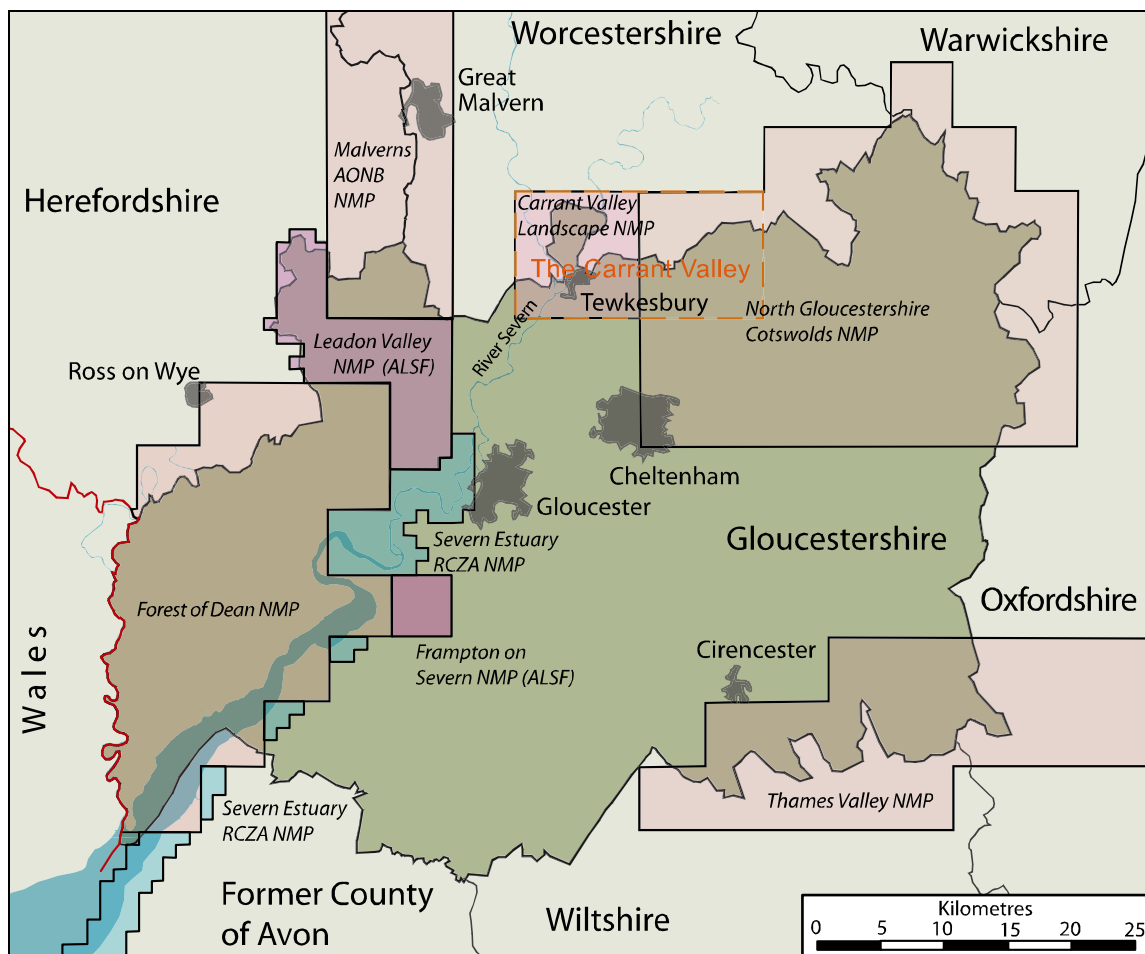


Figure 1: Location of the archaeological surveys to NMP standards
The Carrant Valley area is outlined in orange and is shown in relation to other completed and on-going projects in and around Gloucestershire, south-west England.

The area examined in this report comprises 200 square kilometers, or eight adjacent 1:10,000 scale Ordnance Survey quarter-sheets (Figure 1); four from the Gloucestershire North Cotswolds NMP project and four from an extension to this project, known as the Carrant Valley Landscape NMP. The whole of the Carrant Valley has therefore been surveyed to NMP standards, from the Carrant Brook's source in the east near Sedgeberrow, to where the Carrant Brook flows into the River Avon just north of Tewkesbury. Approximately 60% of the Carrant Valley is in Gloucestershire, with the remaining 40% in Worcestershire.

Summary of methodology

The aim of the project was to interpret and transcribe all archaeological features visible on aerial photographs that potentially date from prehistory to the 20th century, including industrial and military sites, to NMP standards (Winton, 2007). This entailed the systematic examination of all available oblique and vertical aerial photographs held by the National Monuments Record (NMR) and Cambridge University's air photograph library (known as CUCAP) as well as those held by the relevant County Councils (details of the sources consulted are given in Appendix 3). Other main sources included monument records from Worcestershire's Historic Environment Record (HER), Gloucestershire's Sites and Monuments Record (SMR) and English Heritage's National Monuments Record. Four tiles of Environment Agency Lidar data were also examined (see Appendix 5).

The relevant aerial photographs were scanned and rectified using the University of Bradford's "Aerial" programme (version 5.29). Contour data was used for each rectification to compensate for height differences across undulating terrain. The base map used for rectification was the 1:2,500 scale Ordnance Survey vector map; accuracy is therefore to within +/- 2metres. The archaeological features on each photograph were interpreted and traced using AutoDesk Map 2004 and 2007 software. This produced a digital map file for each Ordnance Survey quarter-sheet. The mapping conventions and layers used are defined in Appendix 2.

AMIE monument records were created or amended where appropriate (see Appendix 4). All data and documentation relating to the project has been archived at the National Monuments Record (NMR) and is available through NMR Enquiry and Research Services (see Appendix 3). Copies of the mapping and updated AMIE records have also been supplied to Worcestershire HER and Gloucestershire SMR.

THE CHARACTER OF THE CARRANT VALLEY

The Carrant Valley extends to the east of the broad flat Severn Vale and narrows where the Carrant Brook flows between the Cotswold outliers of Bredon, Dumbleton and Oxenton Hills (Figure 2). Bredon Hill is the only significantly higher ground in the area, rising to nearly 300m. Its summit provides sweeping views across the vales and its base is ringed by compact villages (Dreghorn, 1967; Countryside Agency, 1999; Pilbeam, 2006). The Carrant Brook flows westwards from its source between Sedgeberrow and Dumbleton to join the River Avon near its confluence with the River Severn.

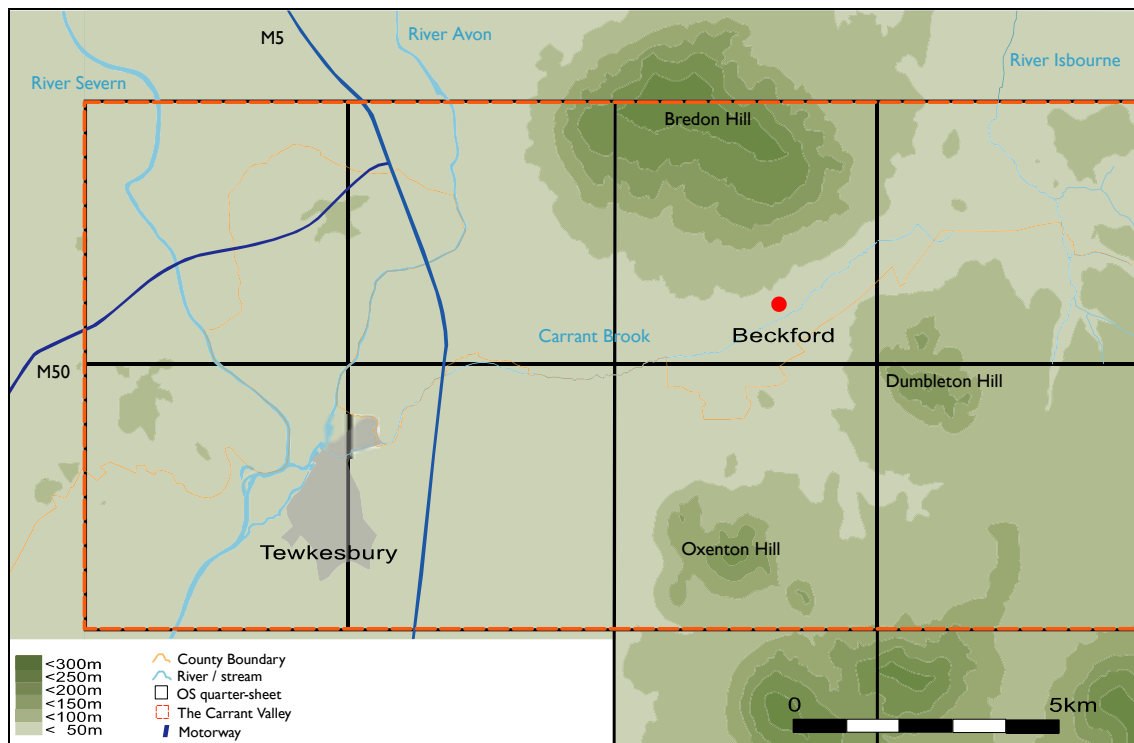


Figure 2: The topography of the Carrant Valley

The majority of the land in the valley lies less than 50m above mean sea level (AMSL) and in most winters the riverside meadows are flooded. The landscape is predominantly open with little woodland, although orchards are abundant in the Severn Vale, where the landscape also comprises mixed arable and pasture, including some market gardening. The settlement pattern is one of nucleated villages and dispersed farms but includes the ancient market town of Tewkesbury. The architecture of the area includes many timber-framed or deep red brick buildings with pan-tile roofs and the older buildings within the villages are usually found close to the large church (Countryside Agency, 1999).

The meaning of the British name “Carrant” is “friendly, pleasant stream”, which suggests a welcoming landscape. The combination of river valley and accessible upland would have provided a wide range of natural resources and extensive views that may have been considered as ideal for settlement (Hooke, 1990, 81).

Geology and soils

Tewkesbury is situated on a band of Blue Lias clay which extends roughly north / south. Triassic Mercia Mudstones (formerly known as Keuper Marl) cover most of the landscape west of this band, with Jurassic Lower Lias clays to its east. Both of these areas are overlain by alluvium along the river floodplains and river terrace deposits topped with sand and gravel, especially to the north-east of Tewkesbury and along the northern bank of the Carrant Brook. The mudstones are occasionally overlain with bands of Arden sandstone and limestone and are generally covered by poorer wet silty clay soils, whereas the Lias clay landscape is covered with heavy but more fertile soil. Bredon Hill is the largest of the Cotswold outliers and is formed of oolitic limestone, with deposits of fan-gravels towards the western end of its dip slope (BGS, 1953; 1988; Countryside Agency, 1999; Pilbeam, 2006).

FACTORS AFFECTING THE SURVEY RESULTS

A number of different factors have affected the results of the archaeological survey. These include the geology and land use within the Carrant Valley and the quality and quantity of the available aerial photographs. Archaeological survey using aerial photographs is particularly effective in rural agricultural areas like the Carrant Valley, where medieval and post medieval earthworks survive on the earlier aerial photographs. Later 20th century conversion to arable crops allows the formation of cropmarks over sub-surface archaeological features.

Geology and soils

River terrace gravels are often considered a “honey pot” geology for aerial survey; areas of lighter, well-drained soil which are particularly good for producing cropmarks (Grady, 2007). These drift deposits are also a particularly important aggregate resource and several areas have been extensively quarried in the later 20th century. This has enabled archaeological investigation of complex areas of multi-period cropmarks, notably at Kemerton and Beckford (Dinn & Evans, 1990; Wills, 2004). Drift deposits occur at shallow depths over extensive areas, which means the surface area associated with their extraction is significantly greater than with hard rock (Mullin, 2005). This is usually to the detriment of the archaeological remains: where large areas of aggregate are extracted whole archaeological sites and landscapes can be removed (see Beckford, below) and a completely new pattern of fields imposed over the back-filled gravel pits.

Very few cropmarks have been photographed to the south of the Carrant Brook and none at all on the wet silty clay soils to the west of the River Severn. This is due to a combination of the heavier clay soils, the extensive earthwork remains and the predominance of pasture. Sub-surface archaeological features in clay soils can produce cropmarks, given the right conditions, but they take longer to form and may appear a week or two later than on other soils (Wilson, 2000, 70; Grady, 2007, 33).

Alluviation along the river valleys and colluviation can hinder the formation of cropmarks. Excavations at Ashton Under Hill showed that where the alluvial clays covered the valley bottom to a depth of around 0.5m no cropmarks of the underlying archaeological features were visible (White, 1992). Environmental samples from Beckford show that some soil was brought down the slopes of Bredon Hill by medieval ploughing (Greig and Colledge, 1988). This soil subsequently filled the shallow hollows across the site, forming areas of deeper soil which probably inhibit the formation of cropmarks over the sub-surface archaeological features (Wills, forthcoming). One positive point is that alluvial deposits also have the potential to preserve good quality environmental data and organic material (Mullin, 2005).

The presence of non-archaeological cropmarks can be a complication for archaeological survey using aerial photographs. Within the Carrant Valley an area of geological cropmarks was recorded near Aston Mill Farm, Kemerton (Figure 3). A series of ditches form concentric arcs that extend across a large area which also contains cropmarks of Bronze Age funerary monuments and Iron Age and Roman settlements. The pattern of arcing ditches had initially been interpreted from aerial photographs as a possible field system, however, when the ditches were sectioned they were concluded to be natural

features (Dinn & Evans, 1990, 14). It is likely that they are the result of the complex layering of the fan gravels on the dip slope of Bredon Hill. These gravels fan out from the higher slopes towards the brook, so the pattern of arcing ditches observed as cropmarks may represent the lower edges of the gravel layers.

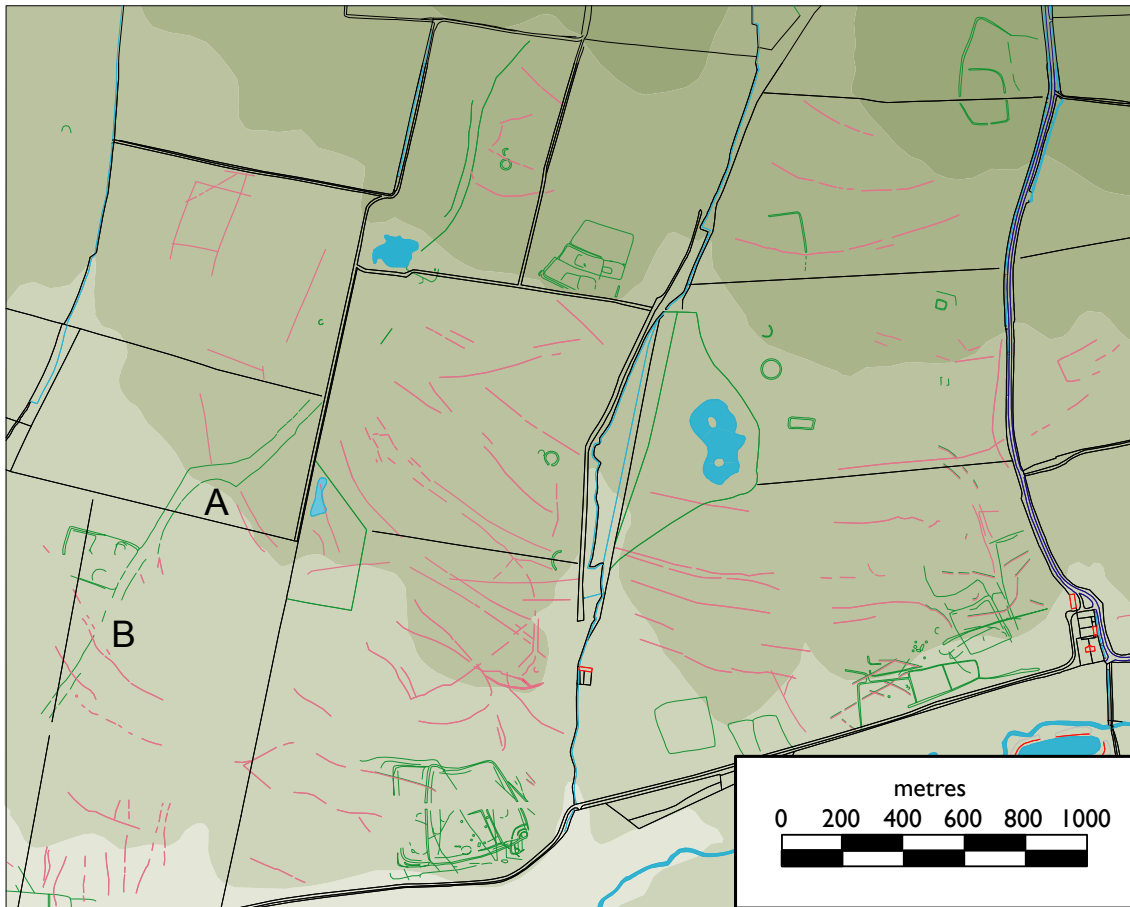


Figure 3: Geological cropmarks at Kemerton

The geological cropmarks (in pink) form a number of roughly concentric arcs. They appear to form a junction with a ditch-defined trackway at "A" which shows as a very similar looking cropmark, however, similar features on the same alignment appear to cut across the same trackway at "B".

Land use

Today much of the Carrant Valley landscape is agricultural land with a mix of pasture and arable, although orchards are common in the Severn Vale and there are several nurseries. The Carrant Brook and two major rivers provide a significant natural boundary, which forms part of the current county boundary between Worcestershire and Gloucestershire, and it is likely that they acted as social and political boundaries in the past. Differences in land use across the surveyed area are influenced by the properties of the underlying geology but also reflect the diverse historic development of the various land-holdings.

Widespread conversion to pasture in the post medieval period led to the excellent preservation of earthworks in the Carrant Valley, particularly of the medieval and post medieval settlements and their surrounding open fields. By the end of the 20th century,

the clay areas to the west of the Severn and south of the Carrant Brook were starting to be ploughed and converted to arable, increasing the potential for cropmarks to reveal sub-surface remains. Medieval and modern ploughing has an effect on the preservation of buried archaeological remains: excavations at Kemerton and elsewhere have shown that the medieval furrows cut through many of the earlier archaeological features and the medieval furrows had themselves been truncated by more recent ploughing (Dinn & Evans, 1990, 62; Coleman et al, 2006, 88).

Aerial photography is particularly useful for revealing otherwise hidden landscapes, since cropmarks are most easily recognized and recorded from the air (Wilson, 2000). The lighter soils to the north of the Carrant Brook appear to have been more extensively used for arable cultivation in the 20th century and this area contains the majority of the cropmarks recorded. The potential for new archaeological sites to be revealed as cropmarks in the clay areas is illustrated at Great Washbourne. Here fragmentary cropmarks indicate a possible multiphase Iron Age and / or Roman settlement site and perhaps an associated field system. They were first recorded in July 1996, once the overlying ridge and furrow had been ploughed level. The drought conditions that year also contributed to the formation of cropmarks.

Only a small proportion of archaeological features at any site may show as cropmarks and excavations nearly always reveal a much more complex range of dates and activity than is suggested from the cropmarks alone (Webster, 1974). For example, excavations in advance of road building around Tewkesbury have proved the existence of several later prehistoric settlements that were otherwise invisible, even to surface collection survey (Walker et al, 2004). These excavations clearly demonstrated that medieval ridge and furrow covers many earlier features.

Urban developments often mask, or have already destroyed, earlier archaeological features and historic aerial photographs provide useful data for such areas. For example, within Tewkesbury a set of medieval fishponds and several Second World War domestic and defensive temporary features are recorded on aerial photographs. Woodland can also be perceived as significantly less responsive to archaeological aerial survey (Small et al, 2006) but as only small areas of woodland are found within the Carrant Valley this is not a particular problem here.

Two gaps in the cropmarks on the terrace deposits require explanation. A relatively large terrace deposit at Ashchurch, to the south of the Carrant Brook, is overlain by a huge military vehicle depot, which was rapidly constructed in 1940. Although it is likely that settlement sites broadly contemporary with those at Beckford occupied this area, the urgent needs of the Second World War probably prevented any archaeological investigation in advance of the military development. The area may therefore still contain significant archaeological information hidden beneath the huge hangars. The second area lies between Beckford and Crashmore Lane, Kemerton, and suffers from an almost complete lack of specialist oblique photography. Only one pit alignment was recorded, despite the close proximity of significant cropmark sites to either side, and it therefore seems likely that conditions, including the overlying crop and level of ploughing, had not been conducive to cropmark formation in this particular area.

The aerial photographs

A large proportion of the oblique aerial photographs of the Carrant Valley concentrate on the group of cropmark sites near Beckford (see below), however, even within this area, some sites were only photographed once. This illustrates both the inconsistent coverage of the aerial photography and how changing conditions mean that even in “honey pots” cropmarks do not always show clearly. The lack of repeat photography suggests that the scheduled sites were not systematically monitored from the air prior to their destruction through large-scale gravel extraction. Over the last ten years the oblique aerial photographs have focused on the extensive flooding around Tewkesbury and Upton Upon Severn. This means that apart from good recent coverage of the two urban centres much of the surrounding landscape is under water on the available aerial photographs.

The majority of the earthworks were transcribed from Royal Air Force (RAF) vertical photographs taken in January 1947, in which the low winter sun highlights the archaeological features. Vertical photographs provide almost blanket coverage of the survey area and were taken at irregular intervals between 1946 and 1988. They give an essential historical perspective, in particular for many areas that have been ploughed level or built over in the last 50 years. A rapid assessment of recent on-line aerial photographs (eg Flash Earth, 2008) suggests they have been taken shortly after harvest and therefore do not show any cropmarks, although an open archaeological excavation is visible within a housing development to the south-east of Tewkesbury.

The lack of recent oblique photographs may in part be explained by the proximity of Gloucester airfield and its restricted air zone, which is situated just a few miles to the south of the survey area (Grady, pers comm). The potential of more aerial reconnaissance for the survey area is highlighted by the suggested Neolithic Henge site at Bredons Norton, which was only identified from aerial photographs taken by Mike Glyde in 2003. This site was not visible on any of the aerial photographs held by the NMR or CUCAP.

Summary

The apparent absence of cropmarks to the south of the Carrant Brook does not equate with an absence of archaeology but almost certainly relates to the area's geology, soils and historic land-use. As more fields are converted to arable the potential for cropmark formation increases and many new archaeological sites may be revealed, balancing out the picture of prehistoric and Roman activity in the Carrant Valley. This conversion poses a threat to the surviving medieval and post medieval earthworks and any sub-surface features beneath them, which could still be well preserved. Continued ploughing may also truncate any sub-surface archaeological features.

PROJECT RESULTS

Overview

The NMP surveys have added greatly to the number and variety of archaeological sites recorded in the NMR, HER and SMR (see Appendix 4). This section will examine the contribution that archaeological survey using aerial photographs has made to existing knowledge of the Carrant Valley. After a brief summary of previous archaeological survey using aerial photographs there is a discussion of the excavated sites at Beckford and their relationship to the cropmark evidence. A general discussion of the archaeology of the Carrant Valley follows.

Previous aerial survey and interpretation

Knowledge of archaeological sites in the Severn and Avon valleys has benefited from aerial surveys by Arnold Baker in the late 1950s and by Jim Pickering in the early 1960s. These were synthesised and published by Webster and Hobley in 1964. A large concentration of potential Iron Age and Roman settlements were identified on the permeable sand and gravel soils immediately to the north of the Carrant Brook. Hobley's mapping showed the number and complexity of these new sites, highlighting the density of settlement in an area that had previously been considered as an unattractive wooded wasteland in prehistory (Hunt, 1982).

Hobley's synthesis lacked any detailed identification of the cropmark features other than simple descriptions, however, it was followed up by the Avon-Severn Research Project between 1963 and 1974, which aimed to investigate such features on the ground (*ibid*). For the Vale of Evesham, Malkin's index of Roman settlement sites located through finds (1938) was used as the basis for similar work (Cox, 1967). Subsequent synthetic work in the area has been limited, although transcriptions from aerial photographs were used to inform the location of excavation trenches at Kemerton Farm ahead of large-scale gravel extraction in the 1980s (Dinn & Evans, 1990).

The lack of attempts to synthesize the rapidly expanding mass of detailed evidence has been noted (Haselgrove, 2001), and the Carrant Valley Landscape NMP Project is one of many such projects in the region which seek to redress this issue (Figure 1), albeit for a relatively small area of landscape. The project is not restricted to a single period of research, or those sites only visible as cropmarks. In applying the standard NMP methodology, this report aims to understand landscape change and development against a broad timeframe in the Carrant Valley.

Beckford

The cropmarks that extended for circa 1km along the Carrant Brook between Beckford and Ashton Under Hill were mapped by Brian Hobley in 1961 and 1963 and were recorded as Site number 14 in Webster and Hobley's study of settlement sites along the River Avon in Warwickshire (1964). The following discussion will focus on the south-westernmost of these features, which were subjected to three episodes of selected salvage and area excavation between 1964 and 1979, ahead of the extensive gravel extraction which subsequently destroyed these sites. The cropmarks at Beckford were transcribed twice by the Royal Commission on the Historical Monuments of England (RCHME): as sketch plotting of cropmarks across a wider area at a scale of 1:10,000, and in 1987 an area of 500m by 500m was transcribed at a scale of 1:1250, ready for publication in the excavation report.

The variability of visibility of the cropmarks at Beckford is due to a number of factors. Only a limited number of oblique and vertical aerial photographs were taken before the gravel extraction destroyed the sites. The vertical photographs were not consulted by the surveys detailed above, although these photographs do not add significant detail to the site. Many of the oblique photographs were taken at such an acute angle that their rectification is difficult when combined with the limited range of control information recorded on the Ordnance Survey base map. The pasture and course-leaved crop that covered part of the area are less conducive to cropmark formation than other cereal crops. The masking effects of alluvium and colluvium across the area have also affected the formation of cropmarks. Each of these points will be looked at in more detail below, as part of a comparison of the NMP and RCHME transcriptions with the interpretations of each of the three groups of features excavated (labelled on Figure 4 as A, B and C). Feature numbers from the excavations are used in the text, where known.

The northern side of a large rectangular enclosure at "A" was visible as a faint cropmark in 1961. By far the sharpest and most detailed cropmarks appear on oblique photographs taken in 1962. Aerial photographs taken in 1965 show that gravel extraction had already destroyed the western side of the rectangular enclosure and a small excavation trench can be seen across the central curvilinear feature identified on the earlier photographs ("Site 2" in Oswald, 1970-2). The next aerial photograph was taken in 1968 and shows the whole of the rectangular enclosure at "A" to have been destroyed; the gravel pit that occupies its location is already full of water. Within seven years of the site being recorded as cropmarks it had been completely destroyed by the gravel extraction.

Site "A"'s excavator, Oswald (1970-2), suggested that the large rectangular enclosure was used as a stock enclosure in the late Iron Age, however, a re-evaluation of his report has left this interpretation open to question (Wills, forthcoming). The cropmarks suggest that two concentric ditches define the rectilinear enclosure, the outer being much broader. Within this enclosure are two curvilinear enclosures, which could represent huts, plus several pits, which are probably domestic. A linear ditch, perhaps a trackway, extends parallel to and beyond the enclosure's northern side.

There is a gap in the cropmarks between the excavated areas "A" and "B", which coincides with a rectangular strip of more coarsely textured vegetation. The density of cropmark features in the more responsive crops to either side of this strip suggest that

the apparent lack of archaeological features is a result of the less conducive crop rather than a real lack of sub-surface features. A faint cropmark of a ditch extending across this area provides evidence of a potential link between the two areas (Figure 4).



Figure 4: The Beckford excavations and cropmarks

The ditches transcribed as part of the aerial survey are shown in green against the excavated areas (in orange) and the areas of deeper soil (purple). The base map is: © Crown Copyright. All rights reserved. English Heritage 100019088, 2009

The archaeological features at “B” were overlain by medieval ridge and furrow, which was still extant as earthworks in 1947 but had been converted to arable and ploughed level by 1970. The excavations found evidence of medieval and later ploughing, which had truncated some of the sub-surface features (Wills, forthcoming). Some of the features visible as cropmarks in area “B” were excavated in the mid-1970s. Most of this area was simply stripped of topsoil by machine as part of the salvage recording, although the northern end was excavated by hand (Britnell, 1975).

The most substantial archaeological feature in area “B” is a broad boundary ditch (Wills, forthcoming, excavation feature number S100,) that extends roughly NNW / SSE perpendicular to the Carrant Brook. This boundary was initially dated to the Bronze Age but new Radiocarbon dates suggest that it may be early Iron Age (Wills, pers comm). The boundary ditch may extend further in either direction but its course is not visible on the aerial photographs. Further aerial reconnaissance may be able to provide clarification, as the field to the north of the road is still in arable. Conversely, the area nearer the Carrant Brook to the south is covered by pasture on the available aerial photographs, which is usually less responsive to the formation of cropmarks. This area is part of the Carrant’s floodplain and it is assumed that any sub-surface features are probably covered

with a layer of alluvium, increasing their chances of preservation but also making it less likely that they will show as cropmarks. Targeted excavation could be used to establish whether the boundary ditch or other features continue towards the brook.

The area excavated by hand at the northern end of area "B" was focused on an Iron Age D-shaped ditched enclosure (Britnell, 1975; Wills, forthcoming, excavation feature number S113). The enclosure is contemporary with the groups of pit situated to either side and is sealed by a yard (Wills, forthcoming, excavation feature number S111) which is also Iron Age in date. Several phases of overlapping construction and activity are clearly evident in the excavated material but cannot be differentiated from the two-dimensional cropmark pattern. For example, the cropmarks suggest the western side of the D-shaped enclosure is to the west of the Bronze Age linear boundary ditch. The excavations, however, show that this ditch is actually part of a larger enclosure that extends to the north-east, but which is not visible as a cropmark due to the presence of an area of deeper soil (Figure 4).

The area of deeper soil is probably from alluviation and / or colluviation processes and is visible on the aerial photographs as a darker tone. The excavations showed that subsequent agricultural use has resulted in a flattening of the topography, with medieval and later ploughing spreading the deposited material, eroding the ridges and filling hollows (Greig and Colledge, 1988; Wills, forthcoming). This extra layer of soil hampers the formation of cropmarks, thereby camouflaging the presence and complexity of the underlying archaeological features. Within area "B" these include a complex sequence of large Iron Age enclosures and an overlying Roman period field system complete with trackways.

At the very south-western end of the area of deeper soil, in the gap between Oswald's ("A") and Britnell's ("B") excavations, a sub-square ditched enclosure with several internal divisions is indicated by faint cropmarks. The marks are partially the result of "lodging", where some of the crop has been blown over, and this increases the difficulty in trying to define the archaeological features in this area. All of these factors combine to make interpretation more difficult, but the sub-square enclosure's situation to the west of the Roman field system found through excavation, plus its relatively rectangular form, could indicate that it is a contemporary structure (Wills, forthcoming).

Area "C" contained the densest area of cropmarks at risk from the proposed quarrying and was therefore targeted for excavation between 1976-9 (Wills, 1978). This area had a sequence of large middle Iron Age ditched enclosures which contained roundhouses, small domestic curvilinear enclosures and pit groups. These enclosures were also overlain by areas of deeper soil and plough-levelled medieval ridge and furrow. Aerial photographs taken in 1970 show that these features continue eastwards, beyond the field boundary and beyond the area at risk from extraction in the 1960s.

In summary, it appears that the majority of cropmarks visible in the area excavated at Beckford relate to the various phases of Iron Age occupation. Roman period features were very hard to distinguish. The overlying medieval ridge and furrow was visible on aerial photographs across much of the site as cropmarks. The clearest cropmarks at Beckford were concentrated along the centre of the field, although these were partly obscured by some areas of deeper soil. Whilst the cropmarks clearly show a multi-phase

site, the excavations have shown that the reality is much more complex. The areas of well defined cropmarks usually corresponded with the most damaged parts of the site, where a shallow top-soil sealed the often truncated archaeological features. In contrast, the areas producing the poorest cropmarks contained the best-preserved archaeological deposits, with some surviving vertical stratigraphy revealing a very complex sequence (Wills, 1985, 68; forthcoming).

Transcriptions

Figure 5 provides a direct comparison of the RCHME transcription with the NMP mapping. It is perhaps unsurprising that the accuracy of the two mapping extracts is very similar, given that both were created from the same aerial photographs and base mapping and used computerised rectifications. The use of contour data in the NMP survey should enhance its accuracy. The wider scope of the NMP surveys place the Beckford sites into a broad multi-period archaeological landscape.



Figure 5: A comparison of the Beckford aerial survey transcriptions. The RCHME's detailed aerial survey from 1987 is shown in black, with the North Gloucestershire Cotswolds NMP mapping overlaid in green. "P" on the RCHME mapping indicates periglacial features, which were not mapped as part of the NMP survey. The base map is: © Crown Copyright. All rights reserved. English Heritage 100019088. 2009

The subtle differences between the two transcriptions, such as the number and arrangement of pits, can be explained by the interpretative decisions made in each case. The transcription extracts confirm that the interpretative skills utilised and accuracy of the feature mapping are at a consistently high standard. Researchers can therefore have a high level of confidence in other hand-drawn aerial surveys, although at other sites more recent aerial photographs may show additional detail.

THE ARCHAEOLOGY OF THE CARRANT VALLEY

Introduction

Flint and stone implements dating from the Palaeolithic, Mesolithic and Neolithic periods have been found around Bredon Hill and in the quarries along the Carrant Brook (Figure 6; Darvill, 1987; WCC, 2007), indicating a long period of episodic use of this area, however, the nature of this archaeological evidence is such that it is seldom visible from the air. It is usually the “monumental” structures, such as the long barrows and causewayed enclosures constructed in the Neolithic period, which are the earliest sites to be recognisable on aerial photographs (Wilson, 2000, 90).

The Neolithic sites in the Carrant Valley are associated with burials and probably formed a focus for the rituals of life and death in the community. They include a possible mortuary enclosure at Overbury and a now discounted long barrow on Bredon Hill. A penannular enclosure at Bredon has been suggested as a Neolithic henge (Mike Glyde, pers comm) and some of the potential round barrow sites could be late Neolithic in origin (Thomas, 1999).

Bronze Age settlements have been identified through excavations around Tewkesbury (eg Walker et al, 2004) and at Huntsman’s Quarry, Kemerton (Jackson & Napthan, 1998). Although no previous indications of Bronze Age activity in these areas had been recognized through aerial survey, their presence clearly implies that other contemporary sites are still to be found. The NMP surveys have quadrupled the number of ring ditches in the Carrant Valley. These have been interpreted as potential Bronze Age round barrows, although this is simply the most common explanation of a circular ditch. Such sites may have a long and complex history of use (Darvill, 1987; Wilson, 2000, 101).

Many of the cropmark sites that are morphologically similar to the Iron Age and Roman settlement sites at Beckford were previously known through aerial reconnaissance work but the Carrant Valley Landscape NMP has added three new examples. The aerial surveys were also able to add detail to the mapping of several known sites, as well as placing them within a multi-period landscape context. Again, more of these sites remain to be found through developer funded and other archaeological investigation.

The early medieval landscape is not evident on aerial photographs in the survey area, however, elements such as nucleated settlements and open fields that make up the medieval landscape may have had their origins in this period (Heighway, 1987). Much of the medieval agricultural landscape of settlements and surrounding ridge and furrow was evident as extensive earthworks on aerial photographs taken in the 1940s. This apparently simple pattern is in itself a composite; it is probably the result of the complex development of land-use and re-use of the area throughout the medieval period. The repeated ploughing of this area in the medieval and post medieval periods may have significantly damaged archaeological remains from earlier periods. The medieval earthworks themselves were largely preserved by large-scale conversion to pasture in the post medieval period (Elrington 1968), but in the later 20th century ploughing has levelled many of these sites. This deep ploughing may also have damaged sub-surface archaeological deposits.

Other features recorded, such as mill races and evidence of extractive industries (clay, gravel, sand, stone pits and quarries) are especially difficult to date from aerial photographs alone and so have been treated separately, as have the flood defences along the two major rivers and fragments of post medieval designed landscapes. The latter in particular were often inferred from botanical features like tree belts or the preservation of the medieval cultivation pattern within the park, rather than specific earthworks and cropmarks.

A number of Second World War features were recorded by the Defence of Britain project (Foot, 2006). The volunteers in Worcestershire were particularly thorough and two have continued to work on the HER's "Defence of Worcestershire" project. These resources provide invaluable information when interpreting the range of temporary structures that were constructed during the Second World War. Not all of the known features were visible on the available aerial photographs since many had already been removed. Several vertical sorties taken in the early and mid-1940's cover the development of the vehicle depot at Ashchurch, however, providing a detailed record ranging from its initial construction, adaptation during the war and subsequent re-development.

The Neolithic (c4000 BC – c2200 BC) and Bronze Age (c2600 BC – c700 BC) landscape

Few Neolithic monuments are recorded in the Carrant Valley (Figure 6). They are associated with burials and comprise a suggested henge at Bredon; a probable mortuary enclosure at Overbury, and a long barrow on Bredon Hill. Finds of Neolithic flint and stone implements cluster around Bredon Hill and later Neolithic domestic activity is suggested by the Grooved Ware pottery found in pits excavated at Kemerton, to its south (Dinn & Evans, 1990). The long barrow is discounted below, but the suggested henge and the mortuary enclosure are both associated with cropmarks of other features, apparently forming small clusters of Neolithic and Bronze Age funerary monuments near the confluence of the rivers Avon and Carrant. This pattern of small complexes at intervals along the rivers is similar to that of the Upper Thames Valley (Thomas, 1999, 184). It is clear that the Carrant Valley was used during the Neolithic, although the actual pattern of use may have contrasted with other river valleys and upland areas in the West Midlands (Ray, 2002). It is likely that there was at least some small-scale clearance of woodland in the Neolithic, probably associated with the sporadic use of the valley's monuments and natural resources (Thomas, 1999).

The cropmark of a penannular ditch near the village of Bredon was suggested as a Neolithic henge when discovered recently (Mike Glyde, pers comm). The site would be of great regional importance as the only henge identified in Worcestershire (Victoria Bryant, pers comm). Morphologically, however, this small site appears to lack the external concentric bank of a "classic" henge and could easily be confused with other ambiguous circular funerary monuments dating to the later Neolithic and early Bronze Age, which are sometimes referred to as "causewayed barrows" or "hengiforms" (Harding & Lee, 1987; Thomas, 1999; Bradley, 2007). Excavation in 2004 by University College, Worcester, showed that the site is indeed a ritual monument with a burial focus dating to the late Neolithic / early Bronze Age (BBC, 2004). A suggested henge at Nafford, north of Bredon Hill, has been discounted (Harding & Lee, 1987, 161).

Further east, a resistivity survey and trial trenching near the probable mortuary enclosure at Overbury suggested that preservation was likely to be too poor for further investigative work to be a priority (Dinn and Evans, 1990, 14). The site was subsequently destroyed through gravel extraction, without archaeological investigation. The shape of the enclosure is therefore the only evidence on which to base our interpretation. It comprised a single ditch-defined rectangular enclosure with curved corners that measured 30m long by 11m wide and was orientated east – west, roughly parallel with the Carrant Brook. Such elongated enclosures found in the river valleys of the Midlands and southern England are often interpreted as Neolithic "mortuary enclosures", although excavated examples are usually part of complex multi-phase monuments at which funereal activity is not necessarily the initial function (Darvill, 1988; Jones, 1998; Deegan & Foard, 2007). Two ring ditches indicating possible round barrows are situated just over 50m away to the north; these were often placed with reference to earlier funerary monuments and in the West Midlands their presence often points to centres of Neolithic activity (Ashbee, 1960; Ray, 2002).

The suggested Neolithic long barrow comprises an earthwork linear bank situated along the top of the scarp on the north-eastern side of Bredon Hill. Its limestone upland location with a steep slope to one side fits comfortably with the wider distribution of Neolithic long barrows in the Cotswolds, but the site appears to lack the megaliths commonly associated with the Cotswold Severn group, which have a distinct construction and form (Saville, 1984). It also lacks the broad flanking ditches commonly associated with long barrows (Wilson, 2000). The mound is not shown on the early edition Ordnance Survey maps and was only proposed as a possible long barrow in 1979 (Oral information, D Cranstone). It therefore seems probable that the mound is a more recent feature of the landscape such as a spoil heap from the nearby quarrying, or perhaps a medieval pillow mound.

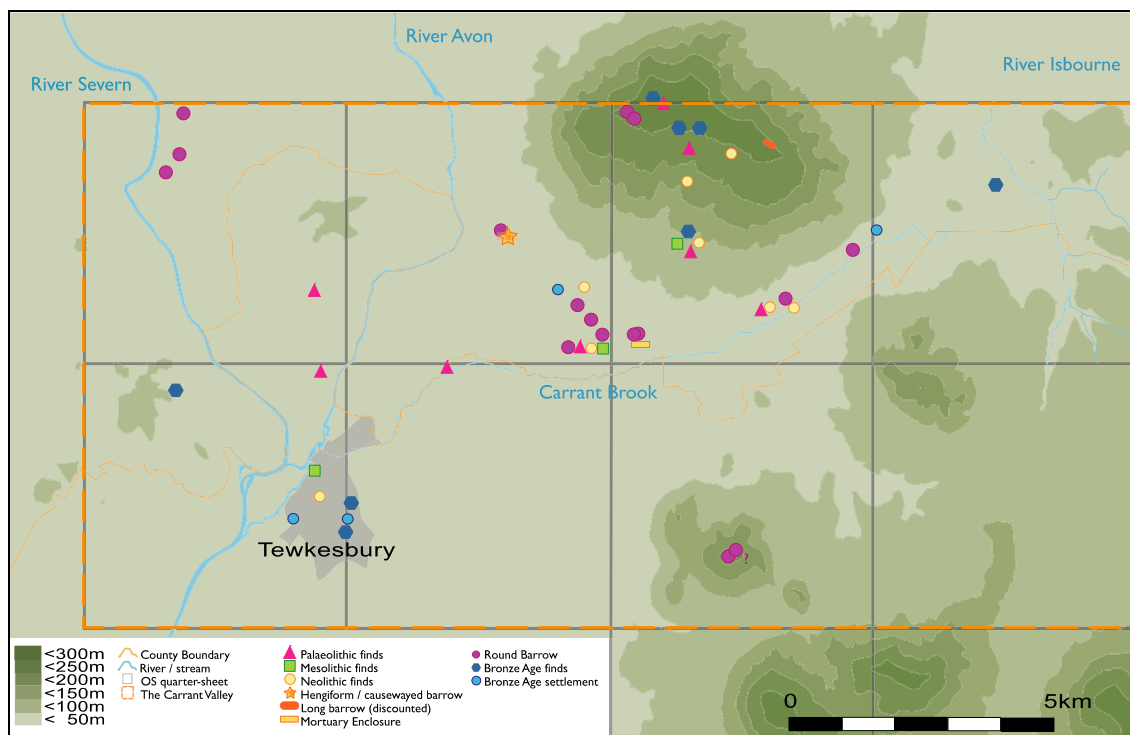


Figure 6: The Neolithic and Bronze Age Carrant Valley

Bronze Age sites in the Carrant Valley comprise several ploughed out round barrows visible as cropmarks, scattered bronze finds and a few settlement sites identified through developer-funded excavation (Figure 6). The number of burial monuments and complexity of the excavated settlements suggest intensified farming activity in the middle Bronze Age (Darvill, 2006; Yates, 2007). By the later Bronze Age it appears that settlement in the Carrant Valley was based on a mainly pastoral economy of farms and hamlets. Environmental evidence from Kemerton suggests an open landscape with plenty of grazed pasture (Griffin et al, 2002). Similar evidence from Beckford suggests an open landscape of mainly open grassland with some pasture and cereal cultivation and a few trees (Greig and Colledge, 1988). Re-assessment of other scientific data from Beckford, however, suggests that this picture of an open landscape is slightly later than at Kemerton, and is perhaps early Iron Age (Wills, pers comm).

Long ditches divided up parts of the Severn Vale by the later Bronze Age (Moore, 2006, 67) and examples in the Carrant Valley have been discovered through excavation, hinting that other instances are just not visible on the available aerial photographs. A Bronze Age boundary ditch was recently discovered through excavation at Childswickham, Worcestershire (Hurst, 2002) and appears to have been respected into the Roman period. The arrangement of excavated ditches at Tewkesbury suggests that they are parts of a middle Bronze Age field system and excavation at Huntsman's Quarry, Kemerton, revealed a late Bronze Age co-axial field system with integrated trackways (Walker et al, 2004; Jackson & Napthan, 1998).

Interpreting and dating linear cropmarks can be difficult. New radiocarbon dates suggest that the boundary ditch visible as a cropmark at Beckford may be early Iron Age (Wills, pers comm). The pattern of geological cropmarks at Kemerton had previously been interpreted as a possible "Celtic" field system (Glyde, 2000; see Factors affecting the survey results, above). Although pit alignments and "Celtic" field systems are often established in the Bronze Age (Thomas, 2003; Yates, 2007) they are discussed below because of their apparent associations with the Iron Age and Roman settlements in the Carrant Valley.



Figure 7: The funerary complex at Kemerton
 The base map is: © Crown Copyright. All rights reserved. English Heritage 100019088. 2009

Potential Bronze Age funerary monuments have been recorded as cropmarks of single circular ditches ("ring-ditches"). Most are assumed from their size and siting to have once surrounded circular burial mounds or barrows, although other interpretations are possible (Wilson, 2000, 113). The probable round barrows appear to form three clusters: one around Saxon's Lode at Upton on Severn; a small group at Bredon that includes the penannular site discussed above, and others dispersed amongst the cropmarks of Iron Age and Roman features beside the Carrant Brook between Kemerton and Ashton Under Hill. At Kemerton (Figure 7) a group comprises several ring ditches concentrated near the possible Neolithic mortuary enclosure discussed above, plus two possible Iron Age square barrows, perhaps indicating a small ritual or funerary complex that continued in use and re-use (Dinn and Evans, 1990, 60).

Many of the probable barrows in the Carrant Valley have already been lost to gravel extraction without any archaeological investigation. One exception was a ring-ditch at Aston Mill Farm, which was subjected to seven hand-dug trenches within a machine stripped area (Dinn and Evans, 1990, 17). These excavations suggested activity in the area from the late Neolithic period onwards. Middle and late Bronze Age cremation burials had been inserted into the ditch but there were no contemporary internal features such as a central grave cut. Had any internal features existed it is likely that they were already ploughed away with the overlying barrow mound.

The round barrow situated near the north-western end of Bredon Hill was discovered by ploughing in 1963. A similar very low mound was observed by its excavators at the same time immediately to its west, at the end of the ridge. Neither of these barrows is visible on the available aerial photographs. This is probably partly because their remains were almost ploughed-out by the early 1960s and comprised the same limestone rubble material as the surrounding hilltop, and partly due to a lack of oblique photography of this location. Excavation showed that the rock-cut graves beneath the easternmost barrow were sealed beneath the modern plough soil (Thomas, 1965).

Across southern England it was common for Bronze Age burial grounds and settlements to be located within a few hundred metres of each other in a repetitive pattern (Darvill, 2006, 39). The presence of Bronze Age round barrows along the Carrant Valley clearly points to nearby contemporary settlement but confidently dating these sites purely on the morphology of the cropmarks is problematic because their component forms are also common within later settlement sites (Wilson, 2000; see Iron Age and Roman Settlement, below). Excavations in the Carrant Valley have shown that settlement sites occupied in the Bronze Age were often re-used in later periods (White, 1992; Walker et al, 2004). Where settlement sites have continued in use it is not possible to establish chronology from the palimpsest of cropmarks.

Bronze Age settlements in southern Britain usually comprise clusters of two to five round houses accompanied by ponds, granaries and storage pits, but only just over half of the known sites were enclosed (Brück, 2007). The large outer ditches of enclosed settlements are more clearly visible as cropmarks than the less substantial drip-gullies and post-holes of their internal structures. Similarly, only the principal features of the most substantial houses are likely to yield visible cropmarks, which can make unenclosed settlements less conducive to cropmark formation (Wilson, 2000). Truncation of sub-surface features by medieval and later ploughing will also affect their visibility.

In 1991 the evaluation of a multi-phase cropmark site at Ashton Under Hill, ahead of gravel extraction, revealed deposits from a probable late Bronze Age settlement situated beneath late Iron Age industrial activity and extensive Roman occupation. Of particular significance to the wider understanding of cropmark sites along the Carrant Valley is the fact that deposits covered with alluvium had not formed cropmarks: the Iron Age features encountered to the south of the brook had not previously even been suspected (White, 1992, 227).

Other Bronze Age settlements within the Carrant Valley have been discovered through developer-funded excavation in places where no cropmarks or other surface indications had been recognised. Limited excavation in advance of quarrying at Huntsman's Quarry, Kemerton, revealed the most comprehensive evidence for late Neolithic / Bronze Age unenclosed settlement identified in the region to date (Jackson & Napthan, 1998). Other examples along the Tewkesbury relief road revealed an area rich in Bronze Age settlement close to the River Severn. They included a Bronze Age D-shaped enclosure and domestic pits overlain by a Roman period farmstead and trackway, plus evidence of Bronze metalworking (Walker et al, 2004).

These excavated examples show that it is quite possible that other subsequent settlements in the Carrant Valley periodically re-use locations that were first recognised as suitable for settlement in the Bronze Age. Their discovery also suggests that more Bronze Age settlement sites probably remain to be found in the Carrant Valley and perhaps to the west of the Severn, where prehistoric settlement remains illusive.

The Iron Age (c800 BC – AD 43) and Roman (AD 43 – AD 410) landscape

The aerial survey has added three possible Iron Age / Roman settlement enclosure sites to the pattern of known cropmark sites within the Carrant Valley and has accurately mapped and added detail to known cropmark sites. It has shown how some of the settlements were connected by trackways. Other divisions of the landscape, in the form of field systems and pit alignments, probably indicate agricultural land-use and political or social boundaries.

Many of the settlement sites comprise a palimpsest of overlapping cropmarks of rectilinear enclosures, hut circles and pits, which suggest more than one phase of use and re-use. Ascribing dates to morphologically similar cropmark sites can be problematic in regions where there is a lack of excavation but there is some comparative excavation data available in the Carrant Valley; for example from Beckford (see Beckford, above) and Kemerton (Dinn & Evans, 1990). It is overly simplistic, however, to transfer interpretations of date and function from one excavated site directly onto other unexcavated but morphologically similar sites. Such information can be used to highlight the potential of each site, which will have its own unique history of (re)construction and use that can only be understood through the application of complimentary investigative techniques.

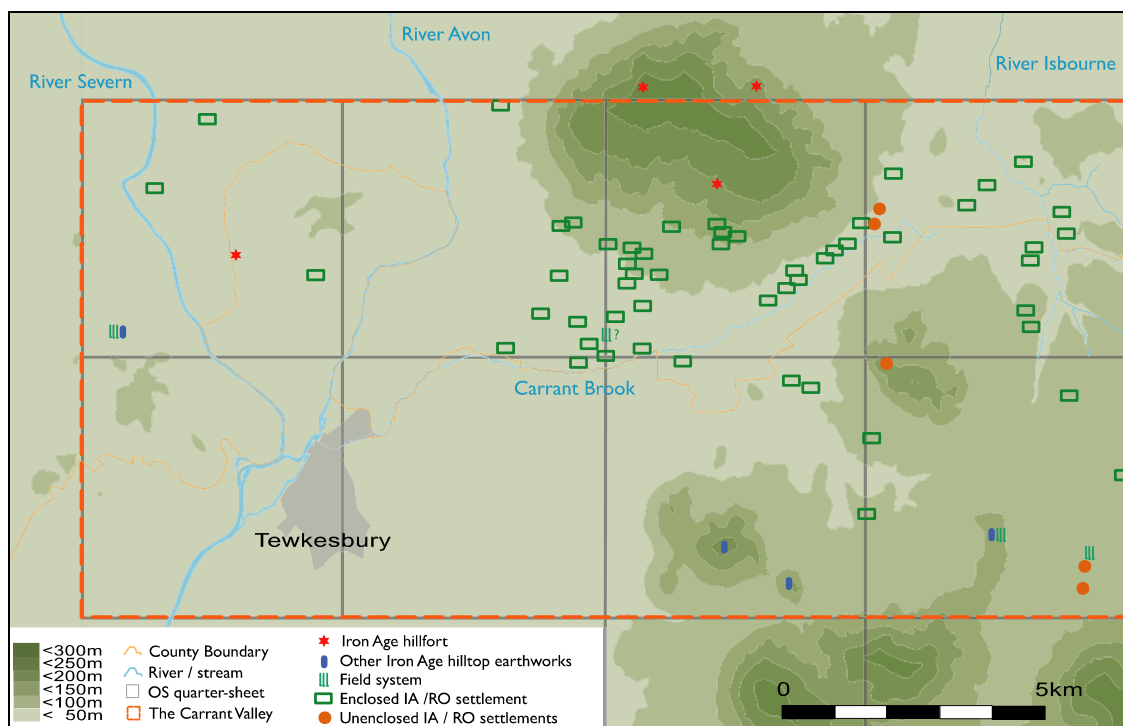


Figure 8: The Iron Age (IA) and Roman (RO) Carrant Valley from air photographs

Excavated sites in the Carrant Valley show that some settlement sites were first used in the Bronze Age and continued in use into the Iron Age and Roman periods (eg White 1992). The distribution of cropmark settlement sites is clearly skewed towards the lighter soils immediately north of the Carrant Brook (Figure 8) and is probably more a result of bias in the aerial photograph cover than the actual distribution of these sites. Excavations around Tewkesbury (Walker et al, 2004) highlight the potential for other prehistoric and

Roman settlements to be found in the Carrant Valley. The presence of other contemporary settlements on the higher flanks of Bredon Hill also hints that the settlement pattern is more widespread than suggested by current evidence.

The mapped settlement pattern does not necessarily indicate a continuous contemporary landscape; the sites may not have been occupied at exactly the same time, nor for the whole of the Iron Age and Roman periods. The few suggested Roman villas within the Carrant Valley can be compared and contrasted with the broadly contemporary sites mapped by the aerial survey, enhancing their interpretation. The majority of the cropmark sites are morphologically comparable to the excavated sites at Beckford so they, too, probably represent phases of use and re-use that spanned the Iron Age and Roman periods. These periods are therefore considered together in this report.

Settlement

A few Iron Age settlement sites survive as earthworks within the Carrant Valley and need consideration as part of the overall pattern (Figure 8). They comprise four hillforts and several modified knolls. Three of the hillforts are situated on Bredon Hill, with a single univallate hillfort located on a slight rise between the two major rivers at Towbury Hill. The Knolls at Oxenton, Bushley Green, the Warren and Dixton Hill are all natural outcrops of hard rock strata that have been artificially scarped. Each has distinct arrangements of bank and ditch ramparts to one or more sides that must have been intentionally constructed (Figure 9). They have also been disturbed by quarrying and or ploughing.

The earthworks on Dixton Hill are further complicated by the later imposition of a medieval motte and bailey, making the interpretation of earlier periods at these sites difficult. Oxenton Hill has produced Iron Age pottery (Watson, 2002) and the lack of comparative cropmark data from south of the Carrant Brook could imply nucleation of settlement to the hilltop sites, however, it is more likely that settlement evidence is presently undetected on the Lower Lias clay in this area, which is largely covered by extant medieval ridge and furrow (see Figure 14; Moore, 2006).

Finds indicate that habitation at Beckford was at least partially contemporary with occupation of the hillforts of Kemerton and Conderton Camps (Britnell, 1974) but there are insufficient differences in the material or internal structural remains to suggest a differentiation of function or social class (Thomas, 2005). The only obvious differences are the ramparts. The middle Iron Age inhabitants of Conderton Camp were prosperous farmers who grew barley and wheat, and were skilled in herding and woodland management. They produced most of their own food but were well integrated in exchange systems that extended throughout the Severn Valley (Thomas, 2005).

The densest concentration of complex settlement sites in the Carrant Valley extends along the strip of land flanking the northern side of the Carrant Brook between Beckford and Ashton Under Hill, including the Beckford site itself (see above). This apparent intensity of settlement is probably due to a combination of factors, one of which is the coincidence of gravel soils and arable cultivation which are particularly conducive to cropmark formation. The topography may also be a factor, since the Carrant Valley narrows significantly here as it passes between Bredon and Dumbleton Hills (Figure 8).

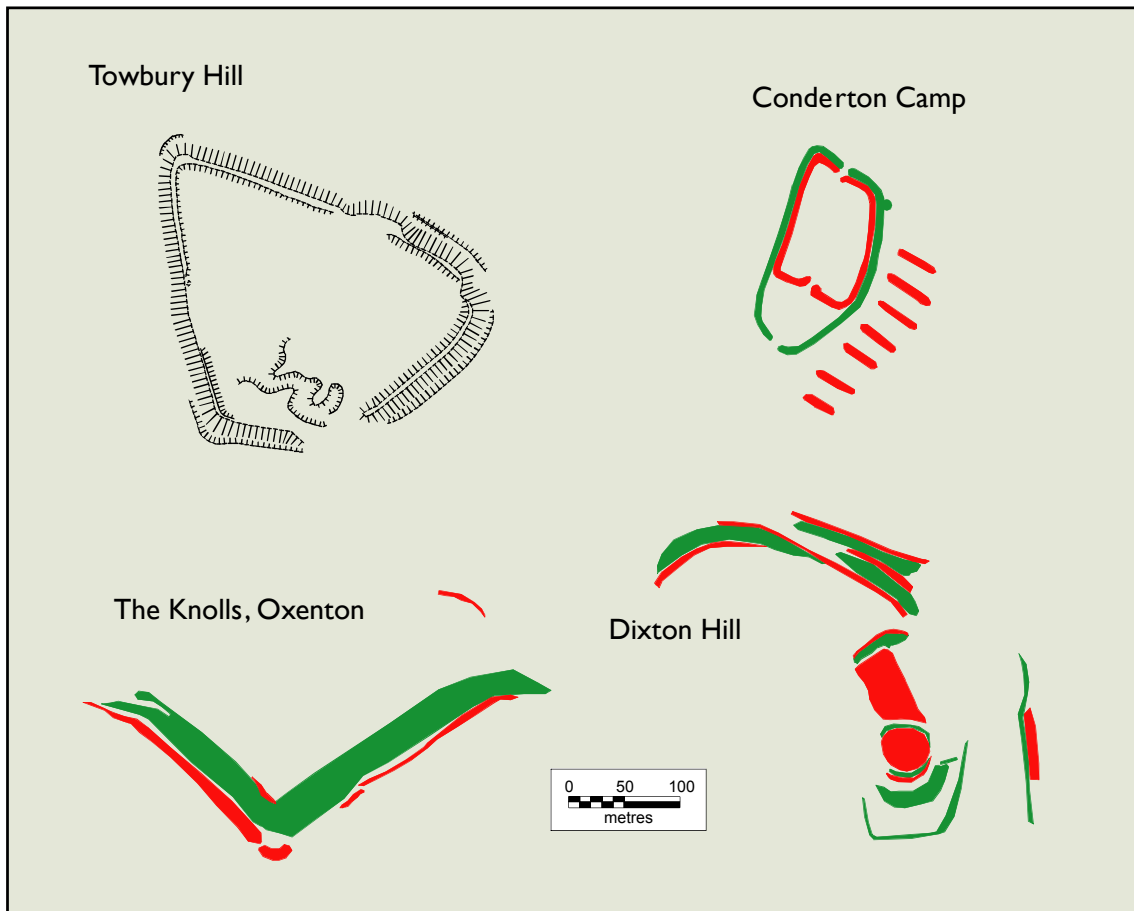


Figure 9: Examples of Iron Age hillforts and hilltop earthworks
 Towbury Hill is based on the OS base map: © Crown Copyright. All rights reserved.
 English Heritage 100019088. 2009. The illustration of Dixton Hill includes the earthworks
 interpreted as a medieval motte and bailey. For Bushley Green see Figure 12 and for the
 Warren see Figure 13.

The Beckford site is on a slight slope and the main excavated site is quite dry, indicating that year round occupation was possible. This contrasts with the larger and wetter river valley of the Severn to the west where the extensive floodplains may have encouraged seasonal settlements to exploit the lush summer grazing (Creig and Colledge, 1988). The cropmarks of Iron Age and Roman settlements are not confined solely to the river terrace deposits. Morphologically similar rectilinear enclosures are also visible as cropmarks on the Lower Lias clay of the lower slopes of Bredon Hill and the wider Carrant Valley, including a few sites situated to the south-east of the Carrant Brook.

Single simple rectilinear enclosures like that at Twynning have been recorded in the Carrant Valley, however, it is possible that only the largest enclosure ditches are revealed as cropmarks and the slighter components of the site, like drip-gullies around huts, are not. Most of the cropmark sites in the Carrant Valley appear to be complex. They usually comprise rectangular or polygonal enclosures with curved corners defined by one or more concentric ditches of various widths (Figure 10).

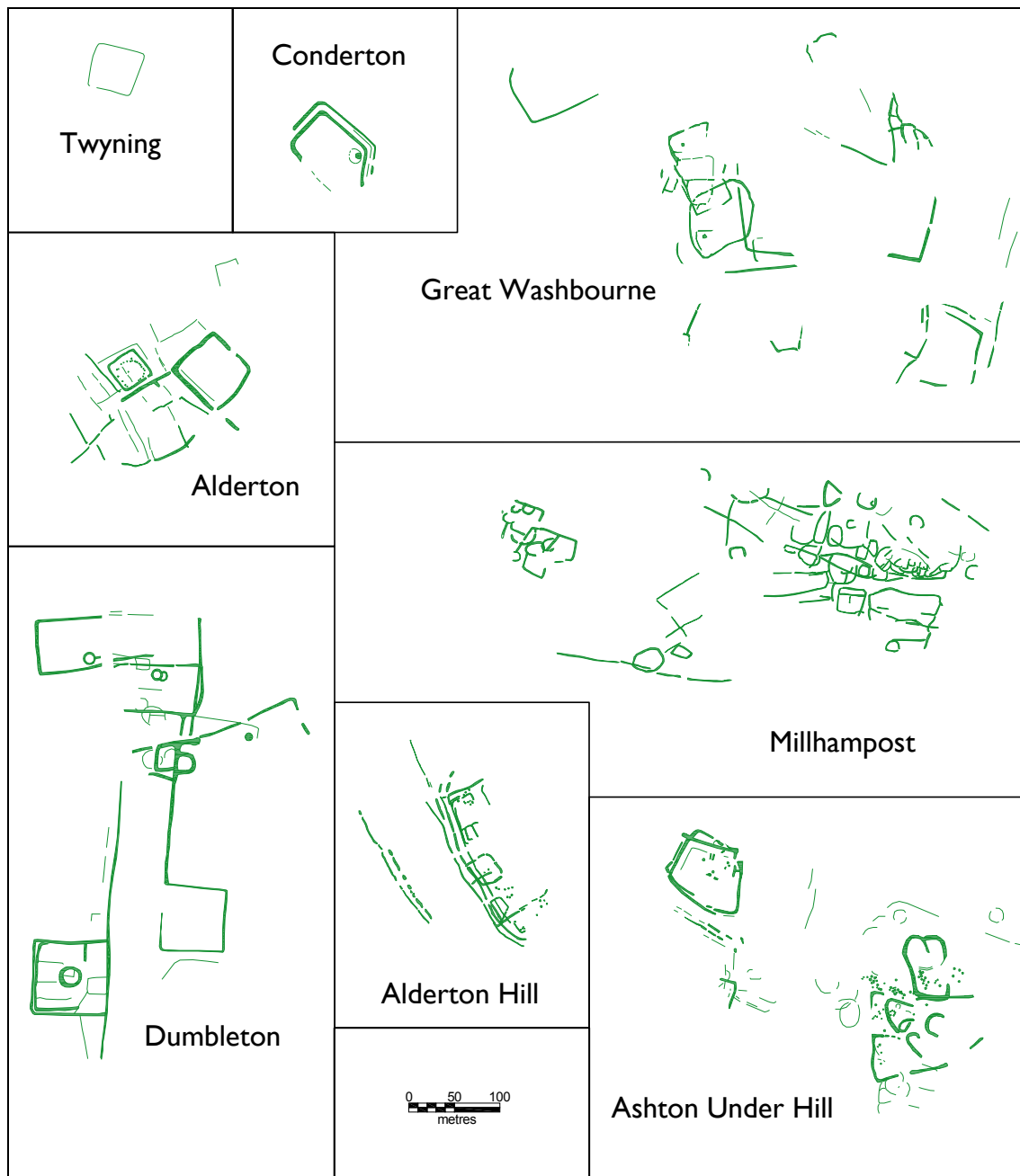


Figure 10: Examples of Iron Age and Roman settlement forms

The enclosures often contain at least one possible hut circle, plus a number of circular and amorphous pits, possibly for storage or rubbish. Some sites have other internal ditches that may have divided the enclosure into zones of activity or function (Moore, 2007) and a number are clearly linked to trackways (see below). Beckford and the other morphologically similar settlement sites recorded by the aerial survey conform to the enclosed type of settlement, which dates to the middle Iron Age through to Roman periods and is recognised across the West Midlands (Hingley, 1989; Dark & Dark, 1997; Moore, 2006). These sites are usually interpreted as farmsteads comprising one or more households and the structures within the enclosure(s) would have comprised a range of domestic, storage and ancillary buildings (Hingley, 1989, 74).

Many of these settlement sites are visible as complex overlapping cropmarks that clearly indicate several phases of use and re-use of the same locations. The complexity of the cropmarks indicates fluid episodes of expansion and contraction in the settlement pattern that may have extended over several hundred years. Indeed, excavations of morphologically similar sites across the West Midlands have shown that in many cases they were occupied as a group, rather than as a single enclosure, from the middle Iron Age through to the Roman period (Dark & Dark, 1997, 57). Each component of the settlement group may have been altered several times, and a major change in the settlement pattern in the form of the alignment of the enclosures is evident in the excavated Beckford examples at the transition between the middle and late Iron Age (Wills, 1978; Hurst, 2002).

Cropmark sites are only occasionally visible to the south and east of the Carrant Brook but this is probably mainly because they are masked by earthworks of overlying medieval ridge and furrow (see below). Fragmentary cropmarks reveal parts of an Iron Age and Roman settlement site and field system on a gravel island at Great Washbourne and cropmarks of other similar settlements are occasionally visible on the Lower Lias clays around Alderton and to the east of Dumbleton, near the River Isbourne (Figure 8). This distribution is more likely to be the result of mid-20th century arable at these particular locations, rather than the real pattern of Iron Age and Roman settlements south and east of the Carrant Brook.

Although the Iron Age and Roman settlement pattern of the Carrant Valley comprises mostly enclosed settlements there are one or two exceptions which appear to lack associated large enclosures or fields. In such a relatively small survey area it is difficult to say if this pattern is significant. The cropmarks at these sites, for example at Alderton Hill and further south-east at Millhampost, suggest a settlement form that comprises a number of overlapping phases of small enclosures, probable hut circles and pits (Figure 10). It is difficult to distinguish areas of settlement from small fields in such complex palimpsests and the functions of specific areas may have changed in different phases.

These sites do, however, appear to be quite different morphologically to the sites at Beckford. Whilst it is possible that no enclosure ditch has yet been identified on the available aerial photographs, it may be that further eastwards there is a gradual change to more open settlements similar to those found in the upper Thames Valley (Wigley, 2002). The Beckford style settlements may not always have been enclosed and the absence of a large surrounding enclosure at other sites could perhaps indicate a differentiation of wealth, status or function (Hingley, 1989, 80).

Roman Villas

The possible Roman villas within the Carrant Valley are suggested mostly from surface finds of Roman material. Nearly all of these finds are associated with the possible Iron Age / Roman farmstead settlements discussed above, suggesting continued occupation into the Roman period. As the construction of the farmsteads does not appear to alter significantly it is impossible to distinguish specifically Roman period enclosures from the cropmarks alone. Changes to these settlements sites in the Roman period probably included a gradual adoption of more Romanised features, unique to each site, such as the stone built rectilinear buildings of conjoined rooms that we might traditionally refer to as "villas" (Saville, 1984; Dark and Dark, 1997). These might be expected to show on the aerial photographs as parching or stunting of the vegetation overlying the buried walls or as positive cropmarks where the stone or wooden foundations have been robbed away (Wilson, 2000).

Unfortunately no such "villas" are recognisable on the available aerial photographs. In 1975 a courtyard villa was claimed after a flight over cropmarks near Aston Somerville (Price, 1976), but no aerial photographs from the flight survive. The supposed Roman villa at Elmont on Bredon Hill was proved by re-excavation to be a medieval farmstead (Thriepland, 1946-8). Roman brick, tile and possible hypocaust pilae found circa 300m to the west in Nettlebed field, however, do appear to indicate the presence of a Roman building of some architectural sophistication, such as a small villa with a tiled roof and heating system (Watson, 1987). Resistivity surveys of the hilltop at Bushley Green also show signs of a very faint rectangular building that is assumed to be Roman from the dominance of Roman period surface finds (Moore-Scott & Bagshaw, 2001).

Connections across the landscape

The aerial survey shows a fragmentary pattern of trackways that hint at a complex system of routes up the slopes of Bredon Hill, along the Carrant Valley and across the wider landscape. Such features may also form physical, social and political boundaries, controlling movement through the landscape as part of a wider system of landscape division within the Carrant Valley (see below). Three long distance routes extend through the Carrant Valley: a prehistoric salt-way from Lechlade to Droitwich; the Roman Road between Gloucester and Birmingham, and Port Street, which extends east / west. Other route-ways in the Carrant Valley are suggested by the cropmark pairs of parallel linear ditch fragments often associated with the settlements and field systems.

Only a fragment of the Roman road between Gloucester and Birmingham was recorded as earthworks by the aerial survey where it crossed Shuthonger Common, although on the most recent aerial photographs it appears to have been ploughed level. A rectangular enclosure abutting the Roman road was also recorded as earthworks on the common. Although it clearly respected the Roman road, it is not clear from the aerial photographs whether this was part of a contemporary or later, perhaps medieval, field system.

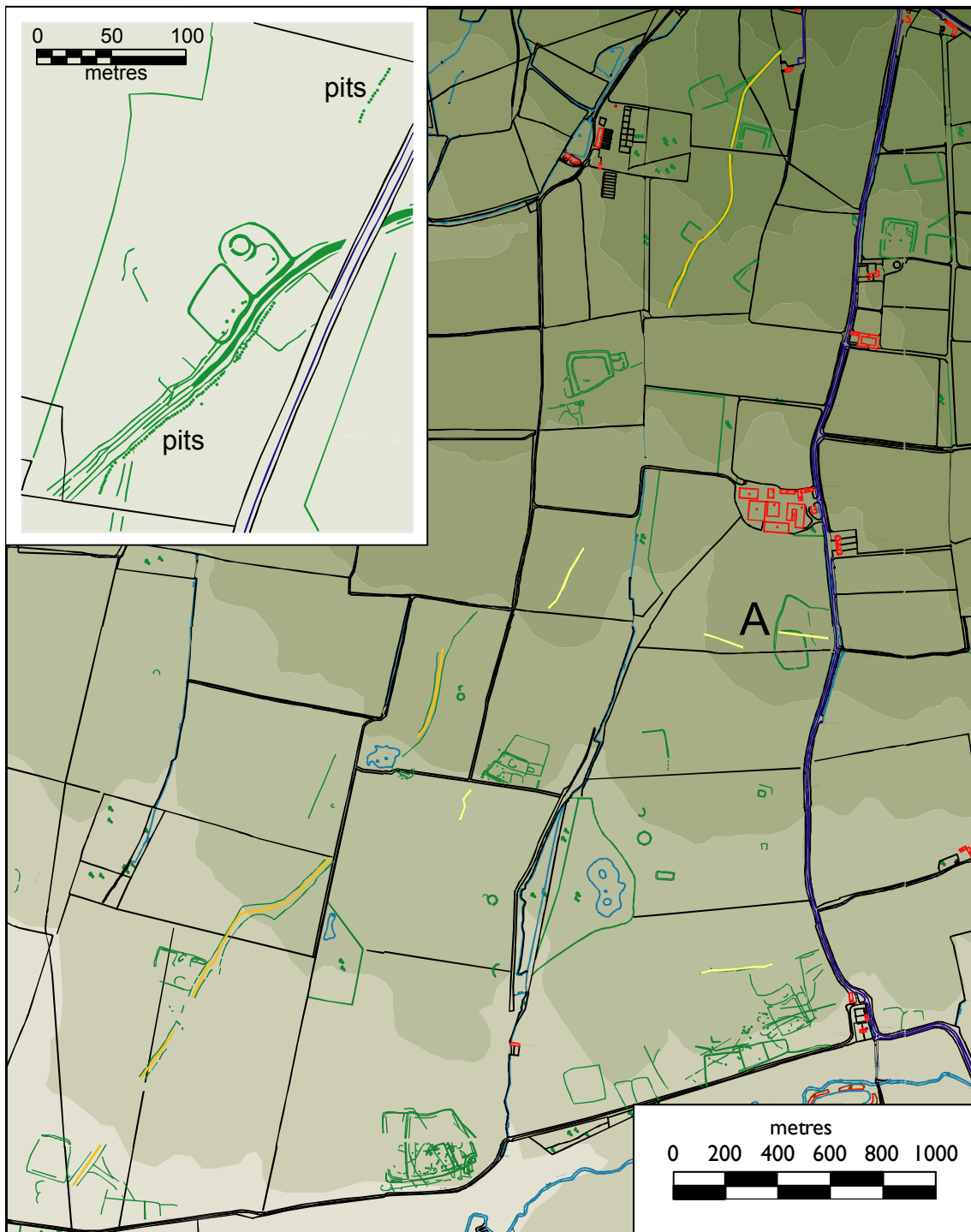


Figure 11: Trackways at Kemerton

The sections of trackway in the main image are highlighted in light orange and the pit alignments in yellow: the overlapping pit alignment and enclosures at Crashmore Lane are marked "A". The inset is 1km to the west. The base map is: © Crown Copyright. All rights reserved. English Heritage 100019088, 2009

The clearest evidence of the physical connection between Iron Age and Roman settlements is provided between Overbury and Kemerton. Here, several sections of a sinuous trackway are visible as cropmarks that appear to be aligned up the slope of Bredon Hill (Figure 11). The trackway is defined by two roughly parallel linear ditches and extends for a total distance of just over 2.5 kilometres. Several sections of trackway had previously been known in this area but the aerial survey has revealed two important new pieces of information. Different sections appear to form parts of the same route up the hillside, connecting several of the settlement enclosures, and the same trackway may have continued further southwards than previously known, towards the Carrant Brook. By extension this could suggest the location of a river crossing.

A second trackway is situated almost 1 km to the west and extends SSW / NNE on a roughly parallel course (Inset, Figure 11). It is defined by several parallel linear ditches, which suggest the trackway has been repeatedly re-cut, signifying some longevity. Its eastern side is partially defined by an alignment of circular pits. This intentional variation and complexity could indicate a difference in the status attached to this section of trackway. Alternatively, it could simply imply some sort of palisade or fence and that the route was used to herd livestock up and down the hill, perhaps to utilise summer pasture on the hilltop in much the same way as it was used in the medieval period (Dyer, 1995).

A number of the cropmark Iron Age and Roman settlements in the Carrant Valley have elements that suggest connecting trackways. These are implied by pairs of parallel ditches extending towards the enclosures; by ditches extending parallel to one side of an enclosure; by a ditch extending beyond one side of an enclosure, or by the close proximity of enclosures where the gaps between them may also define a trackway passing through the settlements and field systems. Caution is necessary, however, as some of these features could indicate partially visible conjoined enclosures. On occasion the hut circles, pits and sub-rectangular enclosures overlap the linear ditches of a possible trackway, for example at Alderton Hill (Figure 10).

Landscape division: field systems and linear boundaries

Trackways connecting the Iron Age and Roman settlements also serve to break up the landscape, controlling movement through it in the same way as field boundaries limit the movement of livestock. In this way the trackways discussed above form part of a wider system of landscape division within the Carrant Valley, only small discrete fragments of which are visible on aerial photographs. These comprise two field systems, several pit alignments and the linear boundary ditch at Beckford.

These features may not all have been contemporary; the NMP transcription shows a composite but probably incomplete plan of boundaries that were added to the existing pattern over centuries, physically dividing and sub-dividing the Carrant Valley. Although the Carrant Valley contains examples of Bronze Age linear ditches (eg Walker et al, 2004; see above), pit alignments are not securely dated in the West Midlands (Dinn & Evans, 1990). In the Severn Valley they appear to be integrated into complex field systems commonly associated with middle and late Iron Age settlements (Hingley, 1989; Moore, 2006).

Some of the settlement enclosures discussed above almost certainly functioned as fields or livestock enclosures at some point. For example, the first phase of construction at Conderton Camp appears to have been used mainly as a livestock enclosure, although the spacing of magnetic anomalies across the spur suggested earlier cultivation (Thomas, 2005). It therefore appears that the middle Iron Age hillfort was constructed over a pre-existing field system, possibly still visible as the series of cultivation terraces situated immediately to the hillfort's south-east although these could be later (Figure 9; *ibid*). All of these elements may have combined within an agricultural pattern perhaps as fluid as that of the settlements.

Two probable Iron Age and / or Roman field systems were recorded by the aerial surveys in the Carrant Valley region; at Bushley Green and the Warren. They each comprise arrangements of linear banks and or ditches which define conjoined square and rectangular fields of a similar scale, although the field system at the Warren is far more extensive. These fields are significantly smaller than the later pattern of medieval ridge and furrow cultivation and both field systems appear to be linked with Iron Age and / or Roman period hill-top settlements.

An incomplete oval hill-top enclosure at Bushley Green, Worcestershire, is nearly surrounded by a system of conjoined linear banks that outline rectangular fields on the hill-slope (Figure 12). Field walking surveys show the hilltop to have been occupied in the late Iron Age and Roman periods and a resistivity survey suggested a very faint rectangular building which has been interpreted from the surface finds as a possible Roman villa (Moore-Scott, 1997; Moore-Scott & Bagshaw, 2001).

The North Gloucestershire Cotswolds NMP aerial survey was able to add significant further detail of the likely contemporary landscape for the hillfort at the Warren, Toddington (Figure 13). Mid-20th century clearance of the adjacent Great Grove wood to the east revealed a number of banks and ditches whose pattern suggests a co-axial arrangement of fields covering about 13 hectares. The soilmarks of other severely ploughed-out linear banks were recorded adjacent to the hillfort, indicating additional possible outworks or annexes that could perhaps have been used as paddocks. That the field system may be contemporary with the hillfort is suggested by their close proximity and by a linear bank with a similar alignment that appears to connect the south-eastern annex to some of the field system ditches.

Both field systems survived as earthworks into the later 20th century due to their being covered by trees. Removal of the trees allowed the earthworks to be recorded but both sites have subsequently been ploughed level. A third possible example of a field system was thought to be visible in the pattern of cropmarks at Kemerton, but these are most likely to be the result of the underlying fan gravels rather than man-made features (see Factors affecting the survey, above).



Figure 12: The Iron Age / Roman field system at Bushley Green
 The contours are at 5m intervals and the base map is: © Crown Copyright. All rights reserved. English Heritage 100019088, 2009.

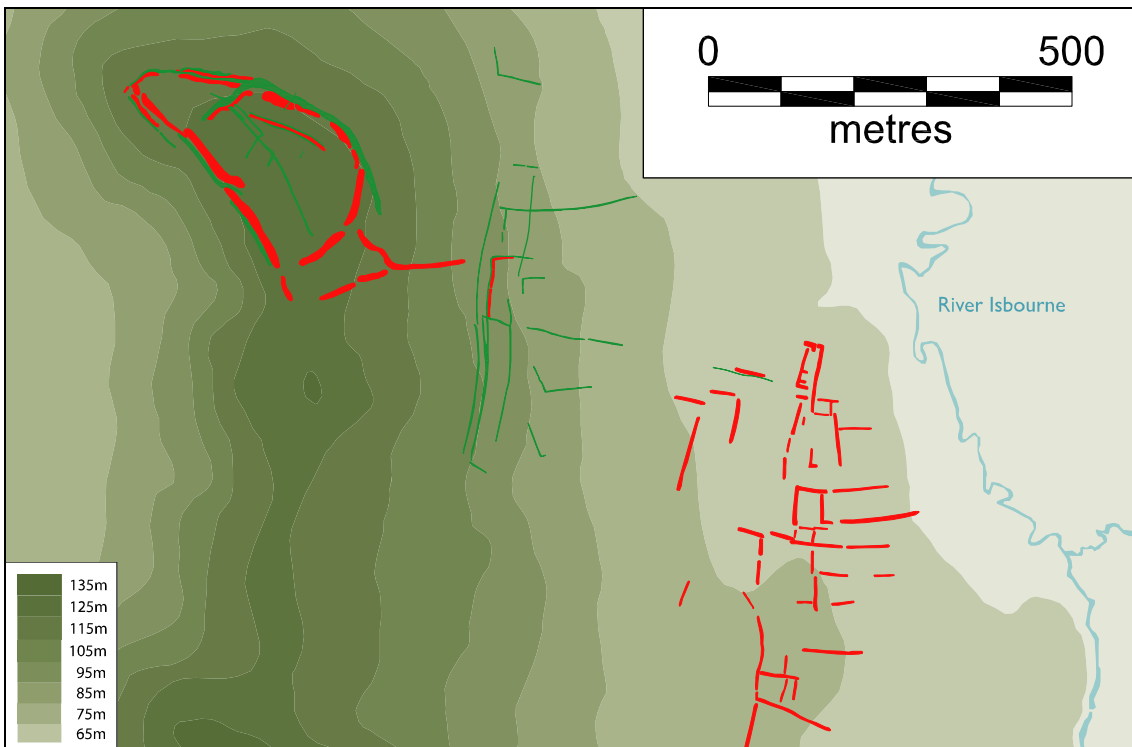


Figure 13: The hillfort and associated field system at the Warren

Twelve pit alignments were recorded as cropmarks in the Carrant Valley. They range from a short alignment of just five pits on Bredon Hill to sinuous alignments of numerous circular pits that extend for up to 220m. Pit alignments are usually dated to the later Bronze Age through to the early Iron Age although on excavation they often lack dateable cultural material, or any evidence for having contained posts, and they rarely show stratigraphic relationships with other archaeological features (RCHME 1998; Muir, 2004). They were carefully placed in the landscape with respect to earlier man-made features and the natural topography. The time and care given to the construction of this intentionally different form of boundary suggests that they may also have functioned in a more symbolic way, formalising social and political boundaries and reinforcing feelings of group identity (Thomas, 2003).

Many of the pit alignments in the Carrant Valley extend parallel or perpendicular to the trackways that link the settlement enclosures (see Figure 11). This could suggest they acted as field boundaries. This is best illustrated by two pits alignments at Ripple, Worcestershire, which appear to form parts of field systems associated with two separate settlements. At Bow Farm a pit alignment extends parallel to but just over 60m away from a trackway. The overall pattern of cropmarks at Bow Farm suggests that the trackway and the pit alignment combine to define conjoined fields which abut another trackway extending perpendicularly to their west. At Naunton a sinuous pit alignment extends southwards perpendicular to a settlement enclosure, apparently dividing the area immediately to its south into two.

As a whole the pattern of pit alignments visible at Kemerton, Overbury, Conderton and Beckford appears to form parts of a large co-axial system of land division on the lower slopes of Bredon Hill, although these dispersed features may not actually be contemporary. A rare opportunity to examine the chronological relationship between the pit alignments and the settlements through targeted excavation could be provided at Crashmore Lane (marked as "A" on Figure 11), where a pit alignment cuts through (or is cut by) one of the settlement enclosures.

The fragmentary appearance of the pit alignments reflects the discontinuity of the cropmarks, not necessarily the original features. The pit alignments at Kemerton do not appear to be aligned on any of the earlier burial monuments (see Figure 7), so in this context they do not seem to have a ritual function. Their pattern suggests the pit alignments relate to agricultural divisions within the landscape. They may still have formed a symbolic boundary, however, as the physical demarcation of different areas of agricultural land use (Boutwood, 1998; Thomas, 2003). There is some question over how effective they would be for containing livestock, especially if the pits were empty. Empty pits would still form an obvious barrier to movement but they may have been accompanied by hedges and fences which would leave little archaeological trace, as shown by examples of alignments of pits and post holes in close proximity at Ling Hall Quarry, Warwickshire and further a field at St Ives, Cambridgeshire (Dinn & Evans, 1990, 61 Palmer, 2002; Pollard, 1996).

Summary

The Carrant Valley contained interconnected settlements that developed from the middle Iron Age through to the Roman period. Some of these sites could have earlier origins. The Iron Age and / or Roman settlement sites are predominantly situated on the lighter gravel soils at the edge of the floodplain. Contemporary settlements and field systems are less visible to aerial survey on the Lias clays to the south of the Carrant Brook (see “Factors affecting the survey”, above) perhaps giving a false impression of a preference for lighter soils. Some sites have been recorded as cropmarks as more land is converted to arable but several excavations, notably around Tewkesbury, have shown that many prehistoric sites in this area have no apparent surface indications.

The excavated material from Conderton Camp and Beckford suggests that the two different settlements performed a remarkably similar range of agricultural and subsistence functions. There is nothing in either assemblage to suggest a hierarchical relationship between the sites. The absence or complexity of boundaries at some of the cropmark sites could perhaps indicate differences in wealth, status and / or function, but these probably changed over time as part of a fluid pattern of land use.

The environmental evidence from Beckford (Creig & Colledge, 1988) suggests a picture of increased human activity in the Iron Age and Roman periods. The combination of small enclosures, fields and trackways suggests a mixed farming economy, with the seasonally inundated floodplains probably utilised for summer grazing (Walker et al, 2004, 88). Early Roman period alluviation was uncovered in trenches dug along the edge of the gravel terrace at Kemerton and the excavators suggest it may be linked to increased cultivation, and therefore erosion, further up the Carrant Valley (Dinn & Evans, 1990, 62).

The combined excavated and air survey evidence suggests the Iron Age and Roman inhabitants of the Carrant Valley were prosperous farmers who were well integrated in exchange systems that extended throughout the Severn Valley, perhaps utilising the rivers as a network of cross-country routes (Darvill, 2003; Thomas, 2003; Moore, 2006).

The early medieval landscape (cAD 410 – cAD 1086)

Indirect evidence for early medieval activity in the Carrant Valley is provided by documentary sources such as charters (Heighway, 1987; Hooke, 2003) but there are very few physical traces that can be recorded from aerial photographs. This is a common predicament across the region (see Small & Stoertz 2006; Winton, 2005). Although two Grubenhaeuser are known through excavation evidence at Kemerton (Dinn & Evans, 1990), none has been positively identified on the aerial photographs of the Carrant Valley. Systematic analysis of all of the available aerial photographs has also shown that the nearby suggested Grubenhaeuser identified from aerial photographs of Aston Mill farm by Time Team (Taylor, 1999) actually relate to 20th century water treatment activity.

One possible early medieval churchyard enclosure was recorded as cropmarks and earthworks associated with the redundant church and deserted medieval village at Little Washbourne. It comprises a boundary bank and flanking ditch which form a curving triangular shape measuring 160m along its ENE / WSW axis. Circular or oval churchyards were often associated with the cemeteries and churches of the early medieval church (Muir, 2004, 33). The morphology of the site at Little Washbourne could therefore suggest an early medieval Christian site which developed into the now deserted medieval settlement. Several large building platforms forming parts of the medieval village survive as earthworks, together with a probable hollow way.

The medieval and later agricultural landscape (cAD 1086 onwards)

The remains of the medieval and later agricultural landscape, which may obscure earlier sites underneath, dominate the air photograph evidence for the Carrant Valley (Figure 14). Medieval open fields stretched across the Carrant Valley and up the lower slopes of the hills. They were interspersed with features relating to livestock, in the form of dewponds and small paddocks, and settlement: several moated sites, a few farmsteads and deserted medieval settlements. The conversion of large tracts of this landscape to pasture in the 16th and 17th centuries helped preserve many medieval features as earthworks into the mid-20th century.

In places, the aerial survey has transcribed what appear to be virtually complete patterns of ridge and furrow with the associated settlements for whole parishes (see Ashchurch, below). This picture is a composite, however, that indicates the fullest extent of the agricultural activity. Charters suggest ridge and furrow was beginning to be established around new estate foci in the early medieval period (Heighway, 1987; Hooke, 2003), but not every open field would have been established at the same time, nor would all of the fields necessarily have been used concurrently or throughout the entire medieval period. To the west of the Carrant Valley the character of the medieval landscape changes slightly where it opens out into the Severn Vale and this is reflected in both the more fragmentary pattern and the form of ridge and furrow cultivation.

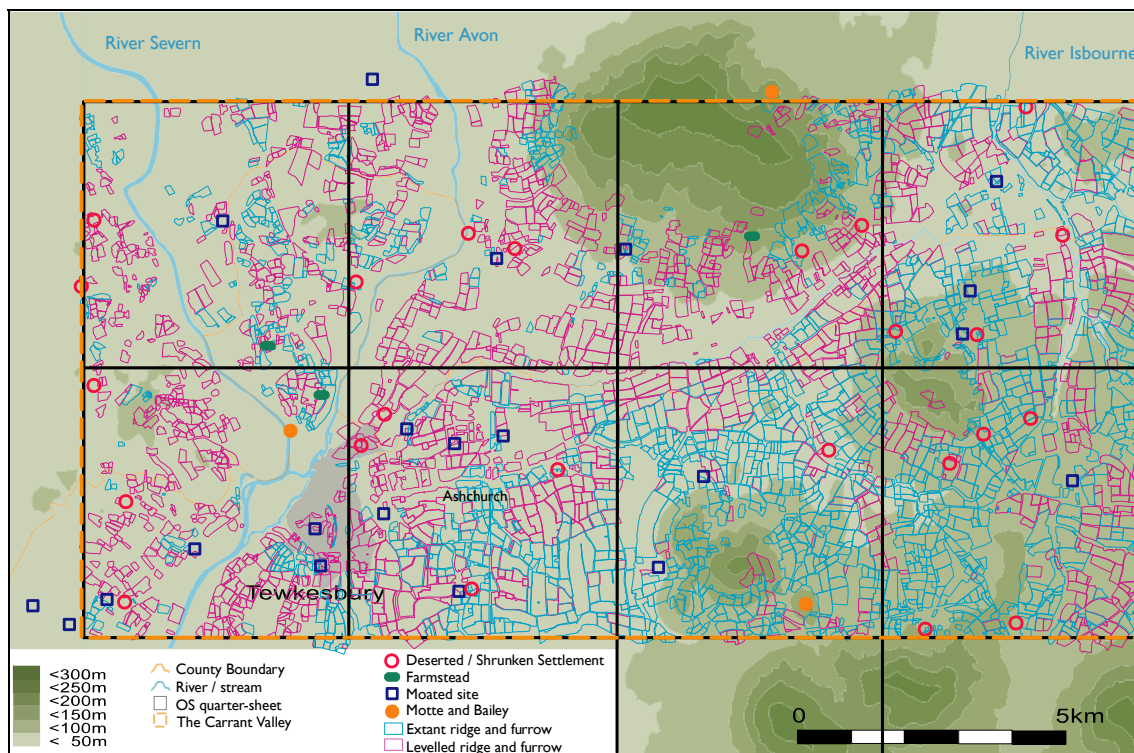


Figure 14: The medieval landscape of the Carrant Valley as seen on aerial photographs

The aerial survey results imply that medieval settlement in the Carrant Valley comprised a variety of settlement forms. These include the market town of Tewkesbury, small, nucleated villages and hamlets clearly linked with the open fields, and small individual farmsteads more closely associated with pastoral farming and perhaps only seasonally

occupied. Each of these settlements will have its own unique history and even where completely deserted, this abandonment or desertion may not have occurred until the early post medieval period.

Ashchurch

Ashchurch formed part of the early medieval and subsequent manor and parish of Tewkesbury but established its independence after the dissolution, by which time its various tithings had been resolved into just four: Northway and Newton, Aston on Carrant, Fiddington, and Pamington (Elrington, 1968, 170). Earthworks apparently relating to settlement within the tithings of Fiddington and Pamington are situated within the current settlements. The northern part of the modern parish, above the A46, has been developed for housing and industrial use since the mid-20th century, whereas the southern part of the parish remains mainly in agricultural use.

Medieval ridge and furrow cultivation covers nearly the whole of the modern parish, which is relatively flat and mostly of clay geology (Figure 15). The only significant gap is due to the Second World War military vehicle depot and the earliest available aerial photographs actually show the ridge and furrow being destroyed as the depot is constructed. Nearly half of Ashchurch's ridge and furrow was visible as earthworks on aerial photographs taken in 1970, but much of this may since have been ploughed level.

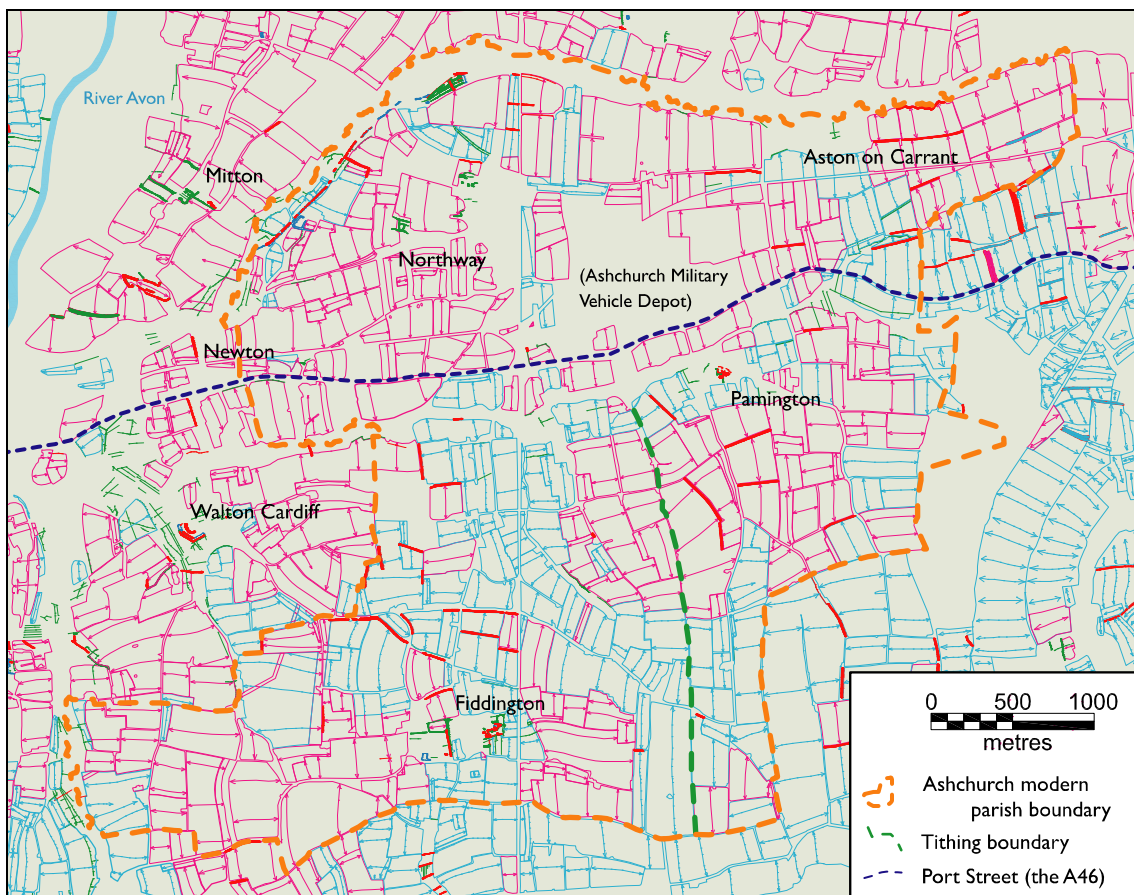


Figure 15: The medieval landscape of Ashchurch
For the mapping conventions see Appendix 2.

The earthworks at Fiddington and Pamington each comprise several building platforms that are situated within an area defined by drainage ditches, separating each settlement from its surrounding open fields. Additional ditches at Fiddington could define tofts or perhaps closes within the settlement and / or could feed the moat. A small circular mound at Pamington could possibly indicate the site of a dovecot or a windmill. Today the settlement of Fiddington comprises little more than a few farms grouped near the 16th or 17th century manor house, itself located on a probable medieval moated site (see below). The names of some of these farms ("Glebe", "Grange" and "Rectory") may still reflect their appointment to the provision of the Tewkesbury monks' table in AD 1105 (Elrington, 1968, 176).

Any medieval settlement within Ashchurch's north-eastern tithing is probably overlaid by the small modern settlement of Aston-on-Carrant, although the ridge and furrow that covers the rest of this tithing may also have obliterated any earlier settlement. The narrow plots that extend along the northern side of the road in the village could preserve the format of a medieval row (Roberts, 1982), although none of the houses that today make up the small village is of any great age. 20th century housing, military and industrial development may obscure signs of medieval settlement within Ashchurch's north-western tithing of Northway and Newton, however, it does contain a concentration of moated sites.

The ridge and furrow cultivation blocks appear to respect the routes of many of the roads through the parish, suggesting that these roads are medieval or perhaps even earlier features of the landscape. The main east / west route through the area is now followed by the A46 but was referred to as "Port Street" in the late 10th century and may already have existed for some time (Elrington, 1968, 172). Parts of the boundary between the two tithings of Fiddington and Pamington are respected by the cultivation blocks to either side and so can easily be traced as it extends northwards from the southern parish boundary (Figure 15). A number of drainage ditches and plough headlands separate the cultivation blocks, some of which reinforce roads, for example at Rectory Farm, Fiddington, or streams, including parts of the Carrant Brook.

Cultivation beyond Ashchurch

Ridge and furrow covers most of the low-lying landscape to the east of Tewkesbury although gaps can be explained by the presence of contemporary settlements, including the town of Tewkesbury itself, plus occasional meadows, paddocks and hilltop pastures, especially the relatively large plateau of Bredon Hill in the north. Corridors that are devoid of ridge and furrow extend along both the Severn and Avon rivers and their tributaries, including the Carrant. These correlate closely with the edge of their respective floodplains and the limit of alluvial spread. The "hams", large flat meadows beside each of these rivers, are still flooded most winters (and even some summers!) when their nutrients are replenished by the water-borne silt (Pilbeam, 2006). Possible paddocks or stock enclosures defined by small earthwork enclosures are situated beside a stream at Gothic Farm and adjacent to small settlements, such as the probable medieval farmsteads at Twyning or that at Elmont.

To the west of the River Severn the pattern observed by the aerial survey is slightly different. A large proportion of the ridge and furrow here is relatively straight and narrow and is probably the result of 19th century steam ploughing or more recent land improvement. Several of the cultivation blocks, for example around Forthampton, are occupied by rows of trees on the 1940s aerial photographs. The pattern of furrows visible is therefore likely to relate to drainage of post medieval orchards rather than any previous use for arable. A number of the narrow ridges have retained a slight curve, however, which suggests that they may overlie medieval ridge and furrow cultivation strips. The crop rotation in the open fields may also have been slightly different west of the Severn, where the naturally more fertile soils allowed crops to be grown in two successive years before a period of fallow restored their fertility. Open field systems comprising three fields, each defined by hedges, were therefore common across the Severn Vale in the medieval period, together with small closes and other plots located near each settlement (Pilbeam, 2006).

The more fragmentary pattern of ridge and furrow to the west of the Severn may also be explained by different land-uses documented for the early medieval and medieval periods. Charter documents contain more references to features such as "haga" (a hawthorn hedge) to the west of the Severn, implying early medieval deer hunting areas (Hooke, 2003). Several medieval deer parks are also recorded in the area, including one at Bushley, in what was to become part of the Forest of Malvern and Corse Chase (Pilbeam, 2006). As such, there would have been restrictions on exploitation and settlement within the forest under periods of Forest Law (James, 1981) which have probably affected the pattern of medieval agriculture and settlement.

Settlement

The medieval settlement pattern in the Carrant Valley comprises the Abbey town of Tewkesbury, which is the main high status settlement (Elrington, 1968; Pilbeam 2006), and hamlet settlements with occasional villages and dispersed manors and farmsteads, some of which were moated (Figure 14). This pattern is common across the region, which is peripheral to the "central province" of classic medieval nucleated settlement (Roberts, 1977; Roberts & Wrathmell, 2002). The process of co-locating peasants into hamlets and small villages to work the developing systems of open fields probably began piecemeal in the 10th and 11th centuries and a number of economic and cultural factors would have driven their subsequent development (Dyer, 2002; Hooke, 2003).

Medieval moated sites were widely dispersed across the Lower Lias clay within the Severn and Carrant Valleys (Figure 14). They may have fulfilled a variety of defensive, ornamental and fish rearing functions. There is no clear correlation between the location, shape, size and complexity of moated sites and their status in Worcestershire; some sites were manorial, whilst others were linked with assarting (Bond, 1978). Any status implied by the creation of a moat may have had a closer relationship with the aspirations of the inhabitants, who could have been relatively far down the social scale (Rackham, 1986; Bowden, 2005).

The densest concentration of moated sites is found at Northway, where the aerial survey identified a new possible site. Unfortunately, this site was destroyed when the housing

estate was constructed in the 1960s, apparently without archaeological investigation. Other moated sites in the Carrant Valley have suffered similar fates: the moat around St James' church at Walton Cardiff has been levelled, and the suggested moated site at Fiddington has been partially backfilled to form a pond.

Earthworks situated within and around extant villages in the Carrant Valley provide evidence for contraction, a shift in focus or, very occasionally, a site that has been completely depopulated. It does not necessarily follow that medieval hamlets and small villages are more likely to have disappeared completely: if anything, these smaller settlements are more easily adapted to change (Jones, 2008).

Some of the earthworks recorded at Dumbleton may relate directly to changes at Dumbleton manor, which was controlled by Abingdon Abbey in the medieval period (Bond, 1979). An irregularly shaped earthwork bank situated immediately to the west of the Manor's location, as marked on Ordnance Survey maps, could represent the overgrown foundations of part of an earlier manor house, or perhaps some of its gardens. Other earthworks suggesting deserted medieval house platforms and crofts are located around the southern side of the village. This gives an overall picture of a gradual organic movement of settlement northwards in the medieval and post medieval village.

A similar northward shift in the focus of medieval and post medieval settlement is evident at Ashton Under Hill, Worcestershire. Here a group of deserted tofts is located immediately south-west of the 12th century church of St Barbara, but the current village extends along the road to the north of the church. At nearby Grafton the stone foundations of medieval or post medieval buildings were brought to the surface in the mid-20th century by the ploughing of a 19th century cider apple orchard. Earthworks in and around the villages of Naunton and Greet, Gloucestershire, and between the modern housing plots at Chaceley, to the west of the River Severn, suggest equally fluid patterns at each of these individual settlements.

Some of the medieval settlements suggested in documentary sources, such as Bredon's Hardwick, Worcestershire, appear to be completely overlain by a group of later farms and were not visible to the aerial survey. Other medieval settlements appear to have contracted significantly. A settlement called 'Didcot' was first documented in the 11th century and a hollow way flanked by at least five tofts was recorded by the aerial survey. Although documents state that 30 villagers were evicted in AD 1491 a chapel survived on the site into the 16th century, suggesting that the settlement was still occupied. The adjacent Didcot Farm continues the settlement's name, which could indicate that the settlement was never wholly deserted. The final contraction into this single farm may have been part of the wider trend to convert land to pasture in the 16th and 17th centuries (Elrington, 1968). This conversion coincidentally preserved the settlement earthworks until the area was converted back to arable in the later 20th century.

Only one apparently completely deserted settlement was recorded, at Littleton, although totally deserted medieval settlements are thought to be more common in the lower-lying areas like the Carrant Valley than on the Cotswold hills to the south (Dyer, 2002). Littleton was located immediately west of the River Isbourne and was abutted to the north and south by contemporary ridge and furrow. A mill was probably situated downstream but the main settlement comprised a compact cluster of tofts, each

containing a building platform, situated around a central hollow way. Stone foundations and 13th and 14th century pottery sherds have been recovered from the site, which was last documented in the mid-16th century. Again, the final depopulation of this medieval settlement could be associated with the widespread conversion to arable in the early post medieval period.

Three medieval farmsteads were recorded as earthworks in the Carrant Valley (Figure 16). They comprise Elmont farmstead, which is situated mid-way up the dip-slope of Bredon Hill, plus two small agricultural settlements located on the peninsula between the two major rivers in Twyning parish; one at the Mythe and the other at Shuthonger Common. Documentary sources suggest that other, probably similar, sheepcote structures were situated within the manors of Twyning (Dyer, 1995) and Ashchurch (Elrington, 1968, 181).

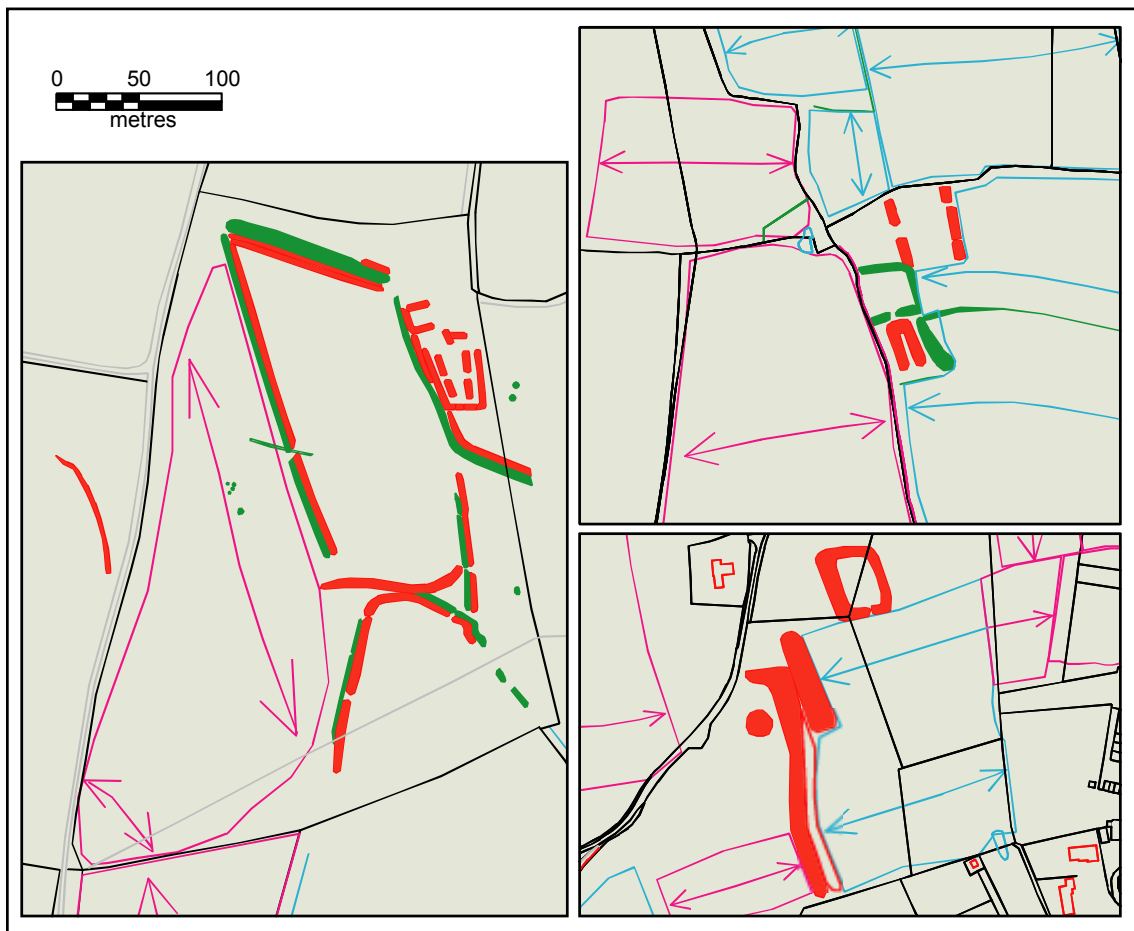


Figure 16: Medieval farmsteads

Elmont is shown on the left, the Mythe top right and the Twyning site bottom right. The base map is: © Crown Copyright. All rights reserved. English Heritage 100019088. 2009

Elmont comprises a large irregularly shaped paddock situated adjacent to a group of agricultural buildings arranged around a trapezoidal yard. The buildings were initially interpreted as a Roman villa after partial excavation in 1924-5, but re-examination showed that they were actually medieval in date (Thrieland, 1946-8). One of the smaller buildings contained a hearth, which suggests some form of domestic use. This supports

Dyer's interpretation of the long narrow building that extends along the eastern side of the yard as a sheepcote (1995; 1996). It would have been necessary for the shepherd to live on site at various seasons of the year. In addition to sheltering the flock over the winter months (between Martinmas (November 11th) and Easter) and at lambing, sheepcotes provided stores for fodder, were sources of manure and acted as minor foci for administration of the manor or estate (ibid). Given its location at the edge of the ridge and furrow (see Figure 14), it seems likely that the Elmont site was used to control the movement of sheep to and from the extensive hilltop pastures nearby and manage their grazing of the open fields.

The example at the Mythe takes the form of a rectangular building platform on top of which is what appears to be the foundation of a long narrow building. The building platform is outlined by drainage ditches which are abutted by the surrounding ridge and furrow. A series of small ditch and / or bank defined paddocks are situated immediately to its north, between the cultivation blocks. The second example at Twyning is located near Shuthonger common. It comprises a rectangular building platform that may be associated with a pronounced double plough headland and a circular platform situated nearby. Both sites appear to be respected by the surrounding ridge and furrow, which suggests that they are features of the contemporary landscape. From their small size and association with the cultivation blocks they can probably be considered as small medieval agricultural settlements or farmsteads. They may even relate to the documented sheepcotes within the parish ((Dyer, 1995).

Dewponds

The continued importance of Bredon Hill for pasture within the post medieval agricultural landscape is shown by the construction of several dewponds. These take the form of shallow circular ponds and are dispersed over the plateau. They are often situated at the convergence of several field or yard boundaries, to provide water for livestock in all of the adjoining fields. Despite their name, dewponds were fed by rainwater and run-off from the surrounding slopes. They therefore had to be placed carefully to maximise the rainfall collection but reduce evaporation (Rackham, 1986, 368). The dewponds on Bredon Hill were probably constructed at the same time as the stone field walls when the land was enclosed in the early 19th century, although it is also possible that the walls are later features that were purposely aligned to utilise the earlier dewponds.

Summary

The aerial survey provides an excellent but incomplete view of the medieval landscape within the Carrant Valley, largely due to the fortuitous conversion of large areas to pasture in the early post medieval period. It presents a pattern of small, perhaps seasonally occupied, farmsteads, groups of farms and small hamlets and villages together with small meadows that are dotted amongst the extensive open fields.

Miscellaneous

Industrial

The aerial surveys have recorded evidence of some small-scale industrial activities such as milling and quarrying dotted across the Carrant Valley, however, complementary field and excavation data needs to be combined with documentary sources to gain a fuller understanding of these sites.

The presence of mills is often indicated by the damming and / or straightening of a stream, where the energy of the water was harnessed to power the mill, and the Carrant Brook itself has been straightened or diverted in several places. Sometimes the county boundary follows a more sinuous course nearby instead of the brook itself, indicating that changes to the watercourse probably took place after the county boundaries were established, probably in the medieval period. Documentary sources from AD 1482 and AD 1520 referring to diversions to the brook confirm this interpretation (Elrington 1968, 172).

One of the longest sections of constructed mill race extends north–east / south-west for circa 1250m, between Northway mill and Cowfield mill, which it serviced. From their spatial relationship and the direction of flow of the water, it seems probable that the Carrant Brook was straightened first for one mill (perhaps that recorded as Carrantes mill in AD 1487). Then the long mill race was constructed to provide a head of water to power Cowfield mill, which was first recorded in AD 1506 (Elrington 1968, 183). Other water-powered mills are situated on tributaries of the Carrant, just before they join the brook: for example at Aston Mill, Kemerton, or are associated with small deserted medieval settlements such as at Littleton in Dumbleton parish, or the monastic precincts of Tewkesbury (Pilbeam, 2006).

Extraction of clay, gravel, sand or stone, as seen on aerial photographs, is usually credited to the Post Medieval or modern periods on the basis of an increased need for aggregate materials due to the Industrial Revolution, although local extraction of materials like clay, sand, gravel and stone would probably have a much longer history (Pilbeam, 2006). Many of the extractive pits and quarries recorded by the aerial survey have been cut into medieval ridge and furrow and so probably date from the post medieval period; the small quarries probably supplied material to build roads.

Geology maps and the early edition Ordnance Survey maps are often labelled with the material extracted and any associated features such as brick- or lime-kilns. The surface buildings associated with extractive industries were usually ephemeral, constructed of wood and iron, and were often removed shortly after going out of use (Palmer & Neaverson, 1994) so this documentary evidence is invaluable when trying to determine a site's function and period of use.

A number of limestone quarries were recorded as earthwork hollows and pits dispersed around the summit of Bredon Hill. The Lower Inferior Oolite that makes up the hill is a limestone with few fossils that does not split in any preferred direction. It can easily be cut into cubes or carved and so has long been in demand for local buildings. The stone is readily extracted in massive cream-coloured blocks cut along the joints and bedding planes and weathers relatively well, gradually changing colour (Pilbeam, 2006). By the

10th century building stone was used extensively, especially for churches, and quarries are occasionally mentioned in early medieval charters (Heighway, 1987, 70). Further away from the source of good building stone that Bredon Hill provided other building materials were used; occasionally Lias limestone was used in barns and churches (Hadfield, 1973; Pilbeam, 2006) and a sandstone quarry was dug into Towbury hillfort.

Clay, gravel and sand pits are dispersed across the drift deposits of the surrounding lower-lying landscape. The larger gravel pits date mostly from the later 20th century and were therefore not mapped by the aerial surveys. Only one brickwork site has been identified within the project area, located next to the River Severn at the Mythe. The earliest hand-made bricks are found in late 17th century properties across the Severn Vale and some of these could have been made at the Mythe, where brickworks were documented as early as AD 1634 (Pilbeam, 2006). The linear clay pits extend for circa 700m along the eastern bank of the River Severn but were worked out during the first half of the 19th century and have subsequently filled with water. To their south-east the rest of the site is only recognisable on aerial photographs as an area of disturbed ground and ponds, the detail of which is partially obscured by trees. A lime-kiln was marked on the 1889 Ordnance Survey map and some derelict buildings were noted in 1992 (GSIA / AIA, 1992). Elsewhere in the Carrant Valley, a 19th century brickworks was recorded by the aerial survey as amorphous earthworks near Dumbleton, although these probably represent a relatively short-lived brick production site.

Several of the holes left behind by the extractive industries, especially the later 20th century gravel pits, have subsequently been re-filled; either with water to provide leisure facilities (eg Croft Farm) or with more top-soil so that an agricultural landscape can be re-instated. The imposition of a new agricultural landscape is most evident between Kemerton and Beckford, where the extent of the huge later 20th century gravel extraction was subsequently visible as an amorphous large dark cropmark that stretched across several fields whose pattern varied considerably from their predecessors. Due to the nature of the drift deposits, which occur at shallow depths over extensive areas, the land-grab associated with their extraction is significantly greater than with hard rock (Mullin, 2005). This has been largely to the detriment of the earlier archaeological remains in the Carrant Valley (see Beckford, above).

Flood defences

Flood defences flank parts of each of the Severn and Avon rivers as they pass through the surveyed area. They usually comprise broad, flat-topped linear earthwork banks with ramps for vehicular access. Not all of these flood defences are shown on the early Ordnance Survey maps, however, many are probably improvements under mid-19th century Acts of Parliament (Elrington, 1968). The banks were constructed to prevent water flooding the surrounding area, which is marked as "liable to flood" on the same maps. Before the construction of numerous weirs and locks, the effects of the tide could be seen up to Worcester. Today only the high spring tides reach Tewkesbury (Severn Boating, 2009).

One flood defence bank, however, stands out as morphologically different. It is flanked on both sides by narrow drainage ditches and the bank itself is much narrower, more sinuous and has a rounded top. It extends for over 1 kilometre in a large arc that is roughly parallel to the western bank of the River Severn (Figure 17). Its greater antiquity is indicated by the fact that its westernmost end continues beside part of the Old Severn. Clearly the flood defence was constructed some time before the construction of the Upper Lode lock and the diversion of the River Severn in 1858 (Elrington, 1968; Witts, 2000). The substantial differences in form to the other flood defences could also suggest that the bank has a much earlier, perhaps medieval, origin.



*Figure 17: Possible medieval flood defences along the Severn
RAF/CPE/UK/1929 Extract from frame 2060 16-JAN-1947
English Heritage (NMR) RAF Photography*

Designed landscapes

The Carrant Valley and Severn Vale contained a number of wealthy medieval estates which developed and were sub-divided over subsequent centuries (Page & Willis-Bund, 1924; Elrington, 1968). After the dissolution they were increasingly used as a vehicle for the display of power and prestige of the gentry (Kingsley, 1989). Aspects of several of the post medieval landscape parks within the surveyed area are recognisable on aerial photographs in the pattern of tree belts and tree enclosure rings, parkland trees, drive-ways, water features, formal avenues, parterres and walled kitchen gardens.

At Norton Park, which extends across the western flanks of Bredon Hill, the extent of the parkland is suggested by the excellent survival of the medieval ridge and furrow, in contrast to outside the park where it has been subject to mid-20th century ploughing. This is not always the case though: at Pull Court the ridge and furrow within the park was already ploughed level by the mid-20th century.

Several of the post medieval country houses probably occupy the sites of earlier buildings located within the medieval estates; for example Pull Court (now known as Bredon School) and Bushley Park. Documentary sources show that these two sites were closely connected: in AD 1545 Pull Court kept the deer park at Bushley, which extended over 210 acres and formed part of Malvern Chase (Page & Willis-Bund, 1924). Linear belts of trees appear to define the extent of the post medieval park of Pull Court and could perhaps reflect its medieval boundaries. Two tree enclosure rings were recorded as earthworks within the probable extent of Bushley Park, near the house; one circular and one square embanked enclosure were situated on top of medieval ridge and furrow, clearly indicating their later date.

Two water features are visible on the aerial photographs, which show a serpentine lake at Overbury and the buried water supply to a fountain at Pull Court. The latter comprised a combination of an earthwork reservoir and cropmarks of the buried water channels that extend across the park and are aligned on a fountain situated immediately beside the house. An avenue of trees defines the driveway at Norton but to the west of Pull Court a probable driveway showed as cropmarks and at Forthampton the earthwork bank followed by the driveway has been adopted for use as a minor road. The walled kitchen gardens, for example at Tewkesbury Park and Forthampton, are probably slightly later features dating to the 19th century.

A number of the country houses and their grounds were adapted for use as camps and depots during the Second World War (see below). Aerial photographs taken in the later 20th century record the increase of ploughing within the parks, the demolition of some of the garden features and the subsequent redevelopment of these sites; for example as a golf course and country club at Tewkesbury Park and a housing estate at Strensham Court.

The Second World War

Aerial photographs taken during and shortly after the Second World War by the British and American air forces can provide a large amount of detail on the civil defences and military installations. After Dunkerque the possibility of invasion became very real and a huge amount of labour and materials were expended over the summer of 1940 to establish a system of anti-invasion defences across the whole country (Linnell, 1998; Foot, 2006). These focused largely on towns, villages and other settlements, forming a layered system of all-round defence but with differing strengths. The component sites within this system were variously known, in accordance with their particular defence requirements, as anti-tank islands, fortresses, and defended places, amongst other things. Key communication points (bridges, viaducts, key services and defensive sites) were known as "Vulnerable Positions" and numbered as part of the national scheme (ibid).

A number of these components of the wartime English landscape were recorded by the aerial surveys. Tewkesbury has acted for centuries as both the crossing point of the Rivers Severn and Avon and as the main route north into Worcestershire (Pilbeam, 2006; Mick Wilks, pers comm). These factors contributed to the town's importance as a key communication point and an anti-tank island was established in and around the town during the Second World War. The large flat Hams near both of the major rivers were covered by aircraft obstructions. A military vehicle depot located a few miles east of Tewkesbury formed the focus for Ashchurch Vulnerable Position and the fuel store at Saxon's Lode was a Defended Locality. The landscape parks associated with the houses of Strensham and Mythe were adopted for use as storage and emergency supply depots. Each of these sites are made up of an assortment of defensive and domestic features, including pillboxes, nissen and other huts, air-raid shelters, tents, storage tanks, slit trenches, obstacles for aircraft, tanks and other vehicles, huge hangars and even sewage works.

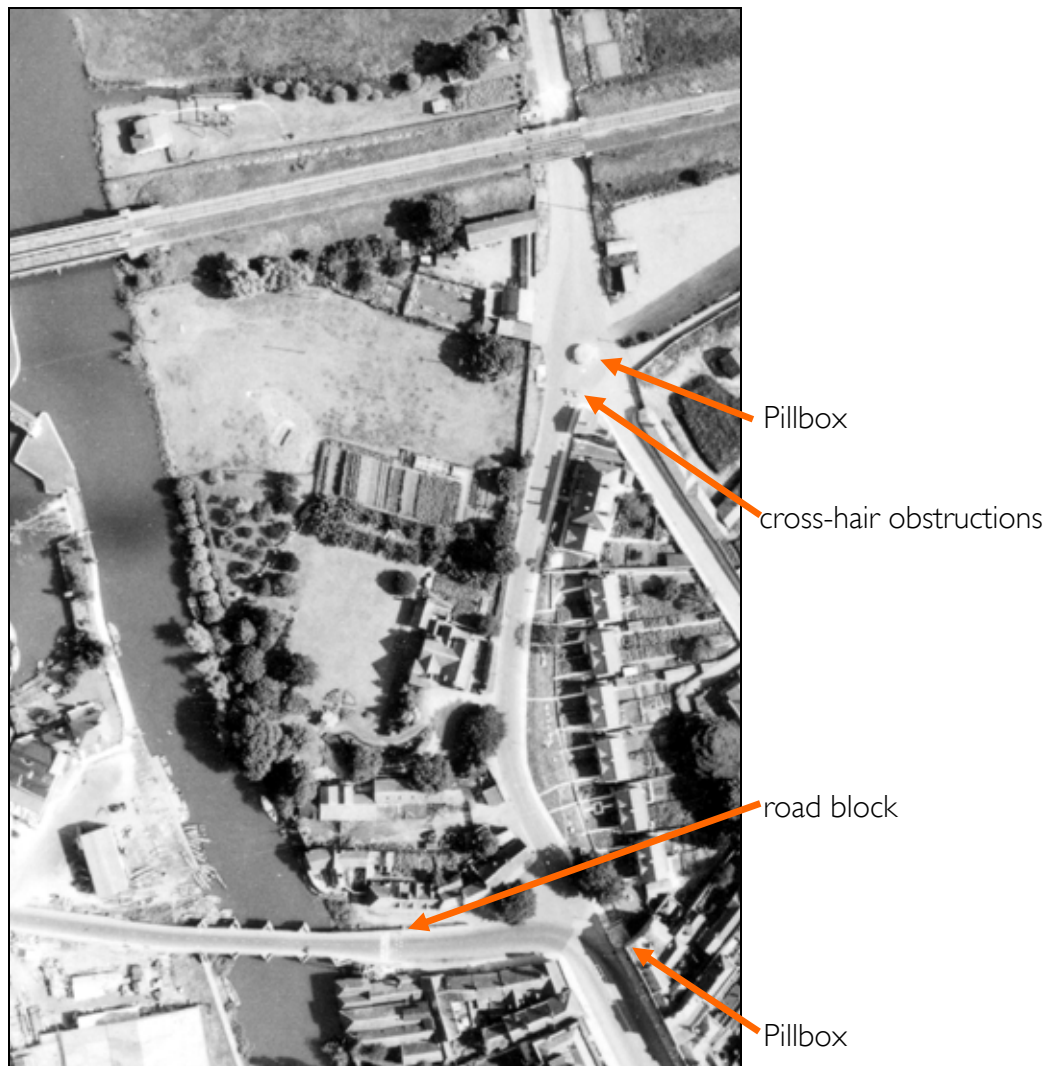
Tewkesbury anti-tank island

The Tewkesbury anti-tank island comprised several lines of defence around a centrally located "keep" area where the War Memorial now stands (Mick Wilks, pers comm). Much of the anti-tank defensive capability at Tewkesbury could have been provided by the two major rivers and their tributaries, the Tirlle, Swilgate and Carrant, which provided natural obstacles around the town. The spoil flanking the Carrant Brook after it was dredged, perhaps to improve its effectiveness as a defensive obstacle, is still clearly visible on aerial photographs taken in 1947. These natural defences were largely ignored, however, and Tewkesbury's defences were placed wherever there was room for them, rather than with any tactical foresight (Linnell, 1998).

There are very few large-scale vertical photographs of Tewkesbury taken in the early 1940s, although one image clearly shows several components of the anti-tank island's defences at the town's northern edge (Figure 18). It shows a road block visible as the white stripe across the road and a pattern of dots immediately to its right (east) located at the eastern end of the medieval King John's bridge. The light colouring suggests that the obstructions may be concrete anti-tank cylinders although they could also comprise the slots for "asparagus" (rail lines set hedgehog style across the road) (Linnell, 1998). Moving eastwards, a pillbox is situated opposite the road junction and further north a

triangle of three cross-hair road obstacles is visible just before the fork in the road, at the centre of which is situated another circular pillbox, forming a traffic island. A further gun emplacement is suggested by the U-shaped feature situated immediately north of the railway, near the River Avon.

Two other photographs from this sortie show some of the defences constructed by the Home Guard at other points around the town. One circular pillbox almost blocked the junction between Barton Road and Chance Street but was demolished by the United States Army in 1944. Another pillbox, situated just over 200m to the east, was camouflaged to resemble a haystack and accompanied by two slit trenches and two gun emplacements. The hay camouflage had been removed on aerial photographs taken in 1943 and a hexagonal pillbox with a western entrance is visible.



*Figure 18: Part of Tewkesbury anti-tank island
RAF/13A/UK763 Extract from frame 47 31-AUG-1941
English Heritage (NMR) RAF Photography*

Aircraft obstructions

The large flat water meadows immediately beside each of the rivers were seen as particularly vulnerable to airborne invasion. Their wide open expanses provided a length of 500 yards which is long enough for a powered aircraft to land or take off (Foot, 2006, 10). Ditches were therefore dug in a grid pattern across the Severn Ham, Tewkesbury, and several grids of similar earthwork obstacles were constructed on the Hams and meadows around Upton on Severn (Figure 20). The spoil dug from the narrow trenches was piled into linear banks on one side of the ditch to enhance the obstacle further. The obstacles on the Severn Ham were subsequently used as the boundaries of dole meadows and can still be seen as earthworks today (Wilks, pers comm).

Aircraft obstructions were also placed along the River Avon, for example at Twyning Fleet. These took the form of an irregular grid pattern that was probably made up of upright wooden or concrete posts which were erected in the summer of 1941 but removed shortly after the war ended. Although the posts themselves could not be seen, small irregular trapezoidal areas of spoil forming a grid pattern could be seen to extend across the low-lying area.

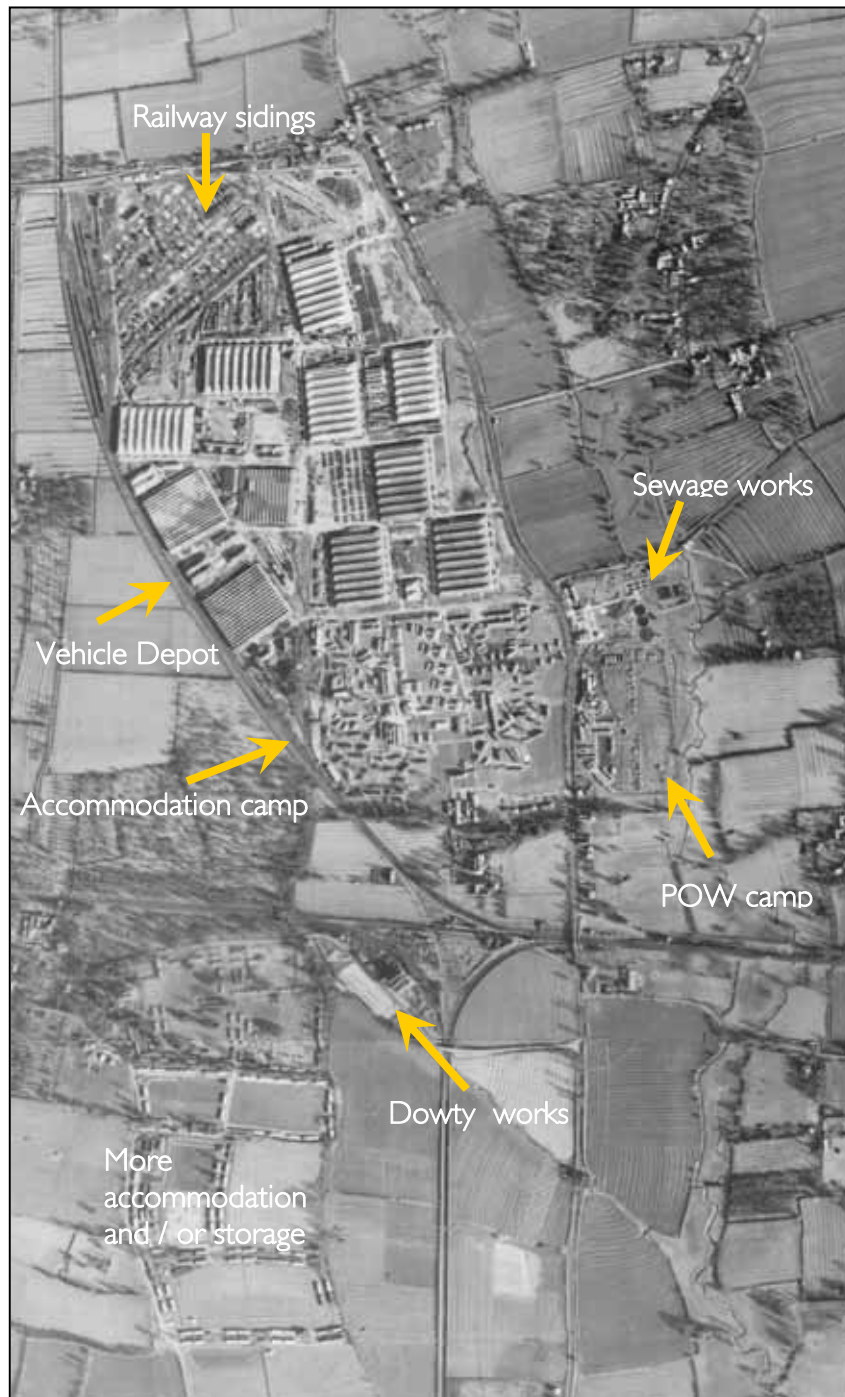
Ashchurch Vulnerable Position (Number VP804)

The focus of Ashchurch Vulnerable Position was the Military Vehicle Depot, around which there were accommodation camps and various defences (Figure 19). The Dowty aircraft component repair works situated beside the railway should also be considered as part of this group. The site had been an Army depot since 1939 and the earliest aerial photographs, taken in 1940, show the large depot still under construction. Work appears to have started at the western (bottom) edge of the site and moved eastwards (up), levelling medieval ridge and furrow in the process. The vehicle depot comprises several huge storage sheds between which are situated on areas of hard-standing and circular water or fuel tanks. Ashchurch is the Ministry of Defence's primary vehicle storage and distribution site and the depot's role is still to distribute offensive and support vehicles to the front line and to provide for the repair and modification of returning vehicles (Moore, 2007).

The depot utilised a greenfield site at the junction of the two railways: the Birmingham and Gloucester and the Ashchurch and Evesham lines. A large number of railway sidings were constructed at the eastern end of the depot, with a single railway line extending through the centre of the site, between the huge storage sheds. The railways clearly played an important part in delivering both vehicles and personnel to and from the depot during the Second World War. These sidings had been removed on aerial photographs taken in 1954 and more of the huge storage sheds built in their stead. This could indicate an increased reliance on road-based transport although many military vehicles still arrive and leave Ashchurch by train (Moore, 2007).

At the height of wartime activity at the vehicle depot, in 1944, a large number of square tents were used to provide additional accommodation, utilising any spare space. They were arranged in rows beside some of the westernmost storage sheds and between existing buildings in the accommodation camp located immediately to the depot's west. The accommodation camp comprised a large number of buildings and nissen huts, some

forming repetitive patterns and others distributed more randomly. Earthwork mounds covering the air-raid shelters were situated randomly between these huts. What appear to be the offices or officers' quarters can be distinguished by the white-washed formal patterns laid out in front of the long rectangular buildings near the camp's entrance.



*Figure 19: Ashchurch Vulnerable Position
North is to the left of the image.
RAF CPE/UK/1929 mosaic from frames 1008 and 1009 16-JAN-1947
English Heritage (NMR) RAF Collection*

Some additional accommodation was constructed south of the main A46 road. Situated immediately adjacent to Ashchurch's sewage treatment works this would probably have provided the least desirable lodgings. The accommodation initially comprised a number of huts but by 1945 had been converted to house German Prisoners of War as a work camp. Again, square tents provided additional accommodation but the most obvious difference between the accommodation areas is the construction of a barbed-wire fence and several watch-towers around the perimeter. The lack of air-raid shelters for this camp is also noticeable, although these may not have been considered necessary if the main threat of attack was thought to have passed.

A number of rectangular buildings at Northway are arranged along field boundaries, possibly in an attempt to disguise their presence. These also appear to lack air-raid shelters but their lay out may suggest a storage function, rather than accommodation for personnel. In this instance, however, a local individual approached the Gloucestershire HER to describe the buildings at the Northway camp and their use for Prisoners of War who were employed breaking up Bren Carriers (Tim Grubb, pers comm). At least one of the Northway camp's nissen huts survives. It has been adapted for community use as part of the housing estate that now occupies this location.

The military vehicle depot, associated accommodation camps and aircraft repair works at Ashchurch are all defended by a ring of at least five Light Anti-Aircraft (LAA) batteries, plus a searchlight battery situated circa 2km to the depot's north-west that also formed part of the Gloucester Defended Area (GDA). The two entrances to the depot on the A46 were protected by pillboxes and the storage shed roofs were painted with a random camouflage pattern during the war.

Defended Localities

Saxon's Lode Defended Locality was centred on the fuel depot, which was recorded by the Defence of Britain project. The fuel depot has three distinct and separate areas, probably as a safety measure to ensure that the whole fuel store would not ignite at once. Each area comprises a large fuel tank and associated pipes and air-vents, plus an assortment of other structures, including air-raid shelters and pillboxes (Figure 20). The fuel tanks are either rectangular or an alignment of circular tanks and appear to be sunken into the ground, covered with earth and grassed over. The fuel depot is clearly located to take advantage of the good supply links: the westernmost area is served by a quay on the River Severn and the southernmost area has sidings on the Malvern to Ashchurch railway.

Other Defended Localities were recorded by the Defence of Britain project (Foot, 2006) but were not visible on the available aerial photographs. At Bredon and Beckford these comprised an assortment of road blocks, fire trenches, spigot mortars and machine-gun posts (Mick Wilks, pers comm). Their apparent invisibility was partly due to the post-war date of the photographs as many of the temporary elements of wartime defence were removed very quickly. The small scale of the available photographs has also meant that small features like pill boxes are very difficult to distinguish. A significant point is that many of the defence features were intentionally camouflaged from the out-set. For example, at Beckford the machine gun posts used existing houses and bungalows which effectively disguised their presence to both military and later archaeological aerial survey.



Figure 20: Aircraft obstructions and the fuel store at Saxon's Lode
 The pattern of red grids across the Hams and Uckinghall meadow are formed by the spoil banks of the aircraft obstruction ditches. The base map is: © Crown Copyright. All rights reserved. English Heritage 100019088, 2009

Other military installations

Other Second World War military camps were situated at the Mythe and at Strensham, both of which were considerably smaller than Ashchurch and have subsequently been removed. These camps comprised rows of assorted nissen huts and other long rectangular buildings and were each situated within the grounds of a large post medieval house, which was probably used as offices and / or accommodation for the officers. In 1942 the Mythe Camp was used as the Headquarters of the 37th Searchlight Battery but their occupation of the site was probably short-lived (Mick Wilks, pers comm). The Strensham camp functioned as an Emergency food store, probably for sugar (ibid). Immediately after the War it appears to have been used for more general storage. Aerial photographs taken in 1946 show a large number of vehicles and pieces of equipment arranged in rows extending across the southern half of the park.

A possible telecommunications site was located immediately south of the anti-aircraft obstacles at Twyning Fleet but has been removed. The site comprised four aerial masts located within a small square fenced enclosure, plus other groups of huts and a variety of small associated structures distributed along the lane. Given the relative proximity of the Royal Signals and Radar Establishment at Malvern and the Telecommunications Research Establishment at RAF Defford it is plausible that the site could have been involved in early Radar experiments.

Groups of nissen huts placed along field boundaries are common throughout the Carrant Valley during the 1940s. Some can easily be explained by the presence of recorded searchlight batteries, as at Mitton, or have perhaps been confused with agricultural haystacks, but the purpose of others remains a mystery. At Kinsham, Worcestershire, a row of nearly thirty possible huts extends beside a field boundary. This seems too many to be interpreted simply as a row of haystacks and the presence of other military installations such as Ashchurch within just a few miles could perhaps suggest some form of military storage.

Summary

The 1940s aerial photographs provide valuable insight into the range, development, extent and spatial relationship of Second World War camps, depots and defences around Tewkesbury. Occasional large scale photographs taken earlier in the war provide pockets of particularly detailed evidence but the lack of stereoscopic overlap means that at sites like the Twyning Fleet aircraft obstructions the details remain unclear.

CONCLUSION

The aerial survey has revealed a wide range of archaeological features. The archaeology of the Carrant Valley as a whole is clearly dominated by past agricultural practices, by far the most common of which is the medieval ridge and furrow cultivation. This extends in a virtual blanket across the lower-lying landscape although within this pattern other elements of the landscape's development have been recorded, ranging from a possible Neolithic henge, Iron Age and Roman settlement, to post medieval industry and landscaping, and 20th century wartime logistical depots and defences. The valley of this "pleasant stream" (Hooke, 1990, 81) has provided homes and farms for people over several millennia but at present we have only a partial view of the more distant parts of this long history.

Although most of the later prehistoric and Roman sites were already known the aerial surveys allow their spatial relationships to be examined more easily. The digital mapping highlights the details of individual settlement sites, many of which comprise a palimpsest of overlapping features clearly indicating more than one phase of use. They also show how each settlement site is connected to a wider network by trackways extending up the slopes of Bredon Hill and how they relate to other broadly contemporary features like the pit alignments and linear boundary ditches that appear to divide the landscape. This therefore provides a useful context for the setting of the excavated site at Beckford within the Carrant Valley.

The medieval landscape of ridge and furrow, with a mixture of seasonal and permanent settlements dotted amongst the open fields, could mask a number of earlier sites. These include those visible as cropmarks, as at Beckford, or those sites around Tewkesbury that have been discovered through excavations prior to development. Conversion to arable has already started to reveal new cropmark sites south of the Carrant Brook. Further conversion of this area increases the chances of cropmark formation, although these cropmarks may appear later in the season due to the clay soils (Grady, 2007). Similarly, more sites may come to light through developer funded archaeology as Tewkesbury and other settlements in the Carrant Valley continue to change and the aggregate areas are further exploited. This area is still full of archaeological potential.

Recommendations for further work:

- ➔ Continued aerial reconnaissance is required to identify and record sites forming as cropmarks as the overlying medieval earthworks are ploughed away.
- ➔ Incorporation, review and syntheses of these aerial survey results together with information derived through other archaeological techniques, like dating evidence from the excavated site at Beckford, to assess the local, regional and national significance of new discoveries.
- ➔ Comparison of the NMP survey results with the Historic Landscape Characterisation for both Gloucestershire and Worcestershire to identify trends of distribution and / or survival.
- ➔ Assessment of survival for revised Heritage Protection system
- ➔ Targeted non-invasive techniques: field work, documentary research, geophysics.
- ➔ Targeted invasive investigation: eg excavation to examine the relationship of the pit alignments and settlement at Crashmore Lane.

BIBLIOGRAPHY

- Ashbee, P 1960 *The Bronze Age round barrow in Britain*. London: Phoenix House
- BBC 2004 'Students unearth Neolithic Henge' *Where I live: Hereford and Worcester*. 24th September 2004.
<http://www.bbc.co.uk/herefordandworcester/culture/2004/09/neolithic_bredon.shtml> [Accessed 25th September 2008]
- Bewley, R H 2001 'Understanding England's Historic Landscapes: An Aerial Perspective'. *Landscapes* Volume 2 (Number 1), 74-78. Windgather Press
- Bond, C J 1978 'Moated Sites in Worcestershire', in Aberg, F A (ed) *Medieval Moated Sites*. CBA Research Report 17. 71-77
- Bond, C J 1979 'The reconstruction of the medieval landscape: the estates of Abingdon Abbey', *Landscape History*, Volume 1, 59-75
- Bowden, M 2005 *The Malvern Hills: an ancient landscape*. Swindon: English Heritage
- Bradley, R 2007 *The Prehistory of Britain and Ireland*. Cambridge World Archaeology. Cambridge.
- Bradley R & Yates D 2007 'After Celtic fields: the social organization of Iron Age agriculture', in Haselgrove, C & Pope, R (eds) *The Earlier Iron Age in Britain and the near Continent*. Oxford: Oxbow.
- Britnell, W J 1975 'An Interim Report Upon Excavations at Beckford, 1972-4'. *Vale of Evesham Historical Society Research Papers*, Volume 5, 1-11
- Brück, J 2007 'The Character of Late Bronze Age settlement in Southern Britain', in Haselgrove, C & Pope, R (eds) *The Earlier Iron Age in Britain and the near Continent*. Oxford: Oxbow.
- Cameron, K 1996 *English Place Names*. London: Batsford
- Coleman L, Hancocks A & Watts M *Excavations on the Wormington to Tirley pipeline, 2000: four sites by the Carrant Brook and River Isbourne, Gloucestershire and Worcestershire*. Cotswold Archaeology Monograph series; 3. Cirencester: Cotswold Archaeology
- Cox, B J 1967 'Romano-British Occupation sites in the Vale of Evesham'. *Vale of Evesham Historical Society Research papers*, Volume 1-3, 11-16
- Countryside Agency 1999 'Severn and Avon Vales: Character Area 106' *Countryside Character: South West*, Volume 8. Countryside Agency
- Dark, K & Dark, P 1997 *The Landscape of Roman Britain*. Sutton.

- Darvill, T 1987 *Prehistoric Gloucestershire*. County Library Series. Alan Sutton & Gloucestershire County Library.
- Darvill, T 1988 'Long Mortuary Enclosures'. *Monuments Protection Programme, Monument Class Description*. London: English Heritage. <http://www.english.gov.uk/mpp/mcd/lme.htm> [Accessed 25th June 2008]
- Darvill, T 1989 'Henges'. *Monuments Protection Programme, Monument Class Description*. London: English Heritage. <http://www.english.gov.uk/mpp/mcd/henges.htm> [Accessed 25th June 2008]
- Darvill, T 2003 'The Land of the Dobunni', in Ecclestone, M, Gardner, K S, Holbrook, N & Smith, A *The Land of the Dobunni*. Committee for Archaeology in Gloucestershire / CBA South West
- Darvill, T 2006 'Early Prehistory', in Holbrook N & Jurica J (eds) *Twenty-five years of archaeology in Gloucestershire: A review of new discoveries and new thinking in Gloucestershire, South Gloucestershire and Bristol, 1979-2004*. Bristol and Gloucestershire archaeological reports 3. Cirencester: Cotswold Archaeology
- Deegan, A & Foard, G 2007 *Mapping Ancient Landscapes in Northamptonshire*. Swindon: English Heritage
- Devereaux B J, Amamble, G S, Crow, P & Cliff, A D 2005 'The potential of Airborne Lidar for Detection of Archaeological Features Under Woodland Canopies' *Antiquity, Number 79*, 648-660
- Dinn, J & Evans, J 1990 'Aston Mill Farm, Kemerton: Excavation of a Ring-ditch, Middle Iron Age Enclosures, and a Grubenhaus', *Transactions of the Worcestershire Archaeological Society, Third Series, Volume 12*, 5-66
- Dreghorn, W 1967 *Geology explained in the Severn Vale and Cotswolds*. Newton Abbott: David & Charles.
- Dyer, C 1995 'Sheepcotes: Evidence for Medieval sheep farming'. *Medieval Archaeology: Journal of the Society for Medieval Archaeology*, Volume 39, 136-164
- Dyer, C 1996 'Seasonal settlements in Medieval Gloucestershire: Sheepcotes', in Fox H S A (ed) *Seasonal Settlement: Papers presented to a meeting of the Medieval Research Group*. Vaughan Paper No. 39. Leicester: University of Leicester / Medieval Settlement Research Group, 25-33
- Dyer, C 2002 'Villages and non-villages in the Medieval Cotswolds'. *Transactions of the Bristol and Gloucestershire Archaeological Society* Volume 120, 11-35
- Dyer, J 1992 *Hillforts of England and Wales*. Shire Archaeology 16. Princes Risborough: Shire.

- Elrington, C R (ed) 1968 *A History of the County of Gloucester*; Volume 8
The Victoria history of the counties of England. London: Oxford University Press
- Finberg, H P R 1975 *The Gloucestershire Landscape*. The making of the English Landscape Series. London: Hodder & Stoughton.
- Flash Earth 2008 <http://www.flashearth.com/?lat=51.979227&lon=-2.136816&z=16.1&r=0&src=msl>
[Accessed 24th June 2008]
- Foot, W 2006 *Beaches, fields, streets, and hills; the anti-invasion landscapes of England, 1940*. CBA Research Report 144. York: CBA.
- GSIA / AIA 1992 *A guide to the Industrial Archaeology of Gloucestershire*. Gloucestershire Society for Industrial Archaeology / Association for Industrial Archaeology. Ironbridge: Association for Industrial Archaeology
- Glyde, M 2000 *Desk Based Assessment of the cropmarks at Kemerton*. Unpublished Worcestershire County Council Report.
- Grady, D 2007 'Cropmarks on Clay – getting the timing right' in Mills, J & Palmer, R *Populating Clay Landscapes*. Stroud: Tempus
- Greig, J & Colledge, S 1988 *The Prehistoric and Early Medieval waterlogged plant remains from multi-period Beckford sites 5006 and 5007 (Worcestershire) and what they show of the surroundings then*. Ancient Monuments Laboratory Report 54/88, English Heritage
- Griffin S, Dalwood H, Hurst D & Pearson E 2002 'Excavation at Perdiswell Park and Ride, Droitwich Road, Worcester', in *Transactions of the Worcestershire Archaeological Society, 3rd Series Volume 18*, 1-24
- Hadfield, C & A M 1973 *The Cotswolds: A New Study*. Newton Abbott: David & Charles
- Harding, A F & Lee, G E 1987 *Henge Monuments and related sites of Great Britain: Air Photographic Evidence and Catalogue*. BAR British Series 175.
- Haselgrove C, Armit I, Champion T, Creighton J, Gwilt A, Hill J D, Hunter F & Woodward A 2001 *Understanding the British Iron Age: an Agenda for Action*. A report for the Iron Age Research Seminar and the Council of the Prehistoric Society. Salisbury: Trust for Wessex Archaeology.
- Heighway, C 1987 *Anglo-Saxon Gloucestershire*. Gloucester: Alan Sutton / Gloucestershire County Library
- Heighway, C 2003 'Not Angels but Anglicans: the origins of the Christian Church in Gloucestershire', in Ecclestone, M, Gardner, K S, Holbrook, N & Smith, A *The land of the Dobunni*. Committee for Archaeology in Gloucestershire / CBA South West
- Hingley, R 1989 *Rural Settlement in Roman Britain*. London: Seaby

- Hobley, B 1961 *Early Settlement Sites in the Warwickshire Avon Valley*. Typescript
- Hooke, D 1981 *Anglo-Saxon Landscapes of the West Midlands*, BAR 95
- Hooke, D 1990 *Worcestershire Anglo-Saxon Charter-bounds*. Studies in Anglo-Saxon history series 2. Woodbridge: Boydell Press
- Hooke, D 2003 'Landscape Studies', in Ecclestone, M, Gardner, K S, Holbrook, N & Smith, A *The Land of the Dobunni*. Committee for Archaeology in Gloucestershire / CBA South West
- Hunt, A M 1982 'Archaeology in the Severn and Avon Valleys - a review'. *West Midlands Archaeology* CBA Group 8 No. 25, 1-24
- Hurst, D 2002 *Middle Bronze Age to late Iron Age Worcestershire*. West Midlands Regional Research Framework for Archaeology, Seminar 2
- Jackson, R & Napthan, M 1998 'Interim report on salvage recording of a Neolithic or Beaker and Bronze Age settlement and landscape at Huntsman's Quarry, Kemerton' *Transactions of the Worcestershire Archaeological Society, 3rd Series, Volume 16*, 57-68
- James, N D G 1981 *A history of English forestry*. Oxford: Blackwell
- Jones, D 1998 'Long Barrows and Neolithic Elongated Enclosures in Lincolnshire: An Analysis of the Air Photographic Evidence', *Proceedings of the Prehistoric Society* 64, 83-114
- Jones, R 2008 'Contrasting patterns of village and hamlet desertion in England', paper given at: *Deserted Villages Revisited Conference*, University of Leicester
- Kingsley, N 1989 *The country houses of Gloucestershire, volume one: 1500-1660*. Cheltenham
- Linnell, B 1998 'Fortress Tewkesbury'. *Tewkesbury Historical Society Bulletin* 1998, 34-35
- Malkin, G R 1938 *Romano-British Habitation in the Vale of Evesham*. Typescript.
- Moore, S 2007 'From the car park to the front line'. *Preview – the magazine for Defence Equipment and Support*, 8th August 2007.
<http://www.mod.uk/DefenceInternet/DefenceNews/EquipmentAndLogistics/FromTheCarParkToTheFrontLine.htm> [Accessed 7th December 2007]
- Moore, T 2006 'The Iron Age', in Holbrook N & Jurica J (eds) *Twenty-five years of archaeology in Gloucestershire: A review of new discoveries and new thinking in Gloucestershire, South Gloucestershire and Bristol, 1979-2004*. Bristol and Gloucestershire archaeological reports 3. Cirencester: Cotswold Archaeology

Moore, T 2007 'The Early to Later Iron Age transition in the Severn-Cotswolds: enclosing the household?', in Haselgrove, C & Pope, R (eds) *The Earlier Iron Age in Britain and the near Continent*. Oxford: Oxbow.

Moore-Scott, T 1997 'Late Iron Age / Romano-British Settlement at Bushley Green, South Worcestershire'. *Glevensis: Gloucestershire and District Archaeological Research Group Review*, Volume 30, 53-56

Moore-Scott, T & Bagshaw, S 2001 'Bushley Green Revisited: A Resistivity Survey'. *Glevensis: Gloucestershire and District Archaeological Research Group Review*, Volume 34, 27-29

Muir, R 2004 *Landscape Encyclopedia: A Reference Guide to the Historic Landscape*. Macclesfield: Windgather Press

Mullin, D 2005 *The aggregate landscape of Gloucestershire: predicting the archaeological resource*. Aggregates Levy Sustainability Fund Project: ALSF / EH 3346. Gloucester: Gloucestershire County Council Archaeological Service

Oswald, A 1970-2 'Excavations at Beckford'. *Transactions of the Worcestershire Archaeological Society, Third Series*, Volume 3, 7-54

Page, W & Willis-Bund J W (Eds) 1924 'Parishes: Bushley', A History of the County of Worcester: volume 4. Victoria County History, 45-49. <http://www.british-history.ac.uk/report.aspx?compid=42853> [Accessed 06 Dec 2007]

Palmer, M & Neaverson, P 1994 *Industry in the Landscape, 1700-1900*. London: Routledge

Palmer, S C 2002 *Ling Hall Quarry, Church Lawford, Warwickshire, Archaeological Excavations 1989-1999*. Warwickshire Museum Report 0210. <http://www.warwickshire.gov.uk/Web/corporate/pages.nsf/Links/42F31DEC8C968A4B80256DD400515547> [Accessed 31st July 2007]

Pilbeam, A 2006 *The Landscape of Gloucestershire*. Stroud: Tempus

Pollard, J 1996 'Iron Age riverside pit alignments at St Ives, Cambridgeshire'. *Proceedings of the Prehistoric Society* Volume 62, 93-115

Price, E A 1976 'The Gloucestershire / Worcestershire Border'. *Glevensis: Gloucestershire and District Archaeological Research Group Review*, Volume 10, 19

RCHME 1998 *Thesaurus of monument types: a standard for use in archaeological and architectural recording*. 2nd Edition. Swindon: Royal Commission on the Historical Monuments of England (RCHME)

Rackham, O 1986 *The History of the Countryside*. London: Dent

- Ray, K 2002 *The Neolithic in the West Midlands: an overview*. West Midlands Regional Research Framework for Archaeology, Seminar 1.
- Roberts, B K 1977 *Rural Settlement in Britain*. London: Hutchinson
- Roberts, B K 1982 *Village plans*. Princes Risborough: Shire
- Roberts, B K & Wrathmell S 2002 *Region and place: a study of English rural settlement*. London: English Heritage
- Saville, A (ed) 1984 *Archaeology in Gloucestershire from the earliest hunters to the industrial age*. Cheltenham
- Severn Boating 2009 <http://www.btinternet.com/~motorboat/tides.htm> [Accessed 20/JAN/2009]
- Small, F & Stoertz, C (eds) 2006 *Gloucestershire: Forest of Dean NMP* National Mapping Programme Report. Research Department Report Series No. 28/2006. Swindon: English Heritage
- Steedman, K 1994 'Excavation of a Saxon site at Riby Cross Roads, Lincolnshire'. *Archaeological Journal* 151, 212 – 306
- Stoertz, C forthcoming *The North Gloucestershire Cotswolds NMP*. NMP National Mapping Programme Report. Research Department Report Series. Swindon: English Heritage
- Taylor, T 1999 *Time Team 99: the site reports*. London: Channel 4 Television, 74-81
- Thomas, J 1999 *Understanding the Neolithic*. London: Routledge.
- Thomas, J 2003 'Prehistoric pit alignments and their significance in the archaeological landscape', in Humphrey, J (Ed.) *Re-searching the Iron Age*. Leicester Archaeological Monograph Number 11, 79-86
- Thomas, N 1965 'A double Beaker burial on Bredon Hill, Worcestershire'. *Transactions of the Birmingham Archaeological Society*, Volume 82, 58-76
- Thomas, N 2005 *Conderton Camp, Worcestershire: a small middle Iron Age hillfort on Bredon Hill*. CBA Research Report 143. York: CBA.
- Thriepand, L M 1946-1948 'Medieval farmstead on Bredon Hill', in *Transactions of the Bristol & Gloucestershire Archaeological Society*, Volume 67, 415-418
- WCC 2007 *Unlocking the Past: The Story of Worcestershire's Archaeology Revealed Through Quarrying*. Worcestershire County Council.

- Walker, G, Thomas, A & Bateman, C 2004 'Bronze-Age and Romano-British Sites Excavated on the Route of the Tewkesbury Eastern Relief Road, 1996-7', in *Transactions of the Bristol & Gloucestershire Archaeological Society*, Volume 122, 29-94
- Watson, B 1987 'Beckford, Nettlebed Field Romano-British Site'. *West Midlands Archaeology*, CBA Group 8 Newsletter 30, 1
- Watson, B 2002 'Recent Iron Age finds from Oxenton Hill, in *Glevensis* 35, 37-39
- Webster, G & Hobley, B 1964 'Aerial Reconnaissance over the Warwickshire Avon'. *Archaeological Journal*, Volume 121, 1-22
- Webster, G 1974 'The West Midlands in the Roman period; a brief survey'. *Birmingham and Warwickshire Archaeological Society Transactions* Volume 86, 49-58
- Welch, M 2003 'Migrating Hordes', in Ecclestone, M, Gardner, K S, Holbrook, N & Smith, A *The Land of the Dobunni*. Committee for Archaeology in Gloucestershire / CBA South West
- White, H A 1992 'The Work of Hereford and Worcester County Council Archaeological Section 1990-1991: Gravel Quarrying'. *Transactions of the Worcestershire Archaeological Society*, Third Series, Volume 13, 226-227
- Wigley, A 2002 'Touching the Void: Iron Age Landscapes and settlement in the West Midlands'. *West Midlands Regional Research Framework for Archaeology*, Seminar 2
- Williams, R B G 1973 'Frost and the works of man'. *Antiquity*, XLVII pp.19-31
- Wills, J 1978 'Beckford 1978'. *West Midlands Archaeology* CBA Group 8 Newsletter No. 21, 43-45
- Wills, J 1985 'Research Strategies for the archaeology of the rural landscape: a review following excavations at Beckford 1975-1979'. *West Midlands Archaeology*, CBA Group 8 Newsletter No. 28, 67-71
- Wills, J 2004 *Beckford, Worcestershire, Post-excavation updated project design*. Gloucester: Gloucestershire County Council
- Wills, J forthcoming *Beckford*. CBA Research Report.
- Wilson, D R 2000 *Air Photo Interpretation for Archaeologists*. Stroud: Tempus
- Winton, H 2005 *Malvern Hills AONB: a report for the National Mapping Programme*. Aerial Survey report series; AER/4/2005 Swindon: English Heritage.
- Winton, H 2007 *NMP Manual*. Swindon: English Heritage.
- Witts, C 2000 *Severn Tales: Notable Dates in the History of the River Severn* River Severn Publications. <http://www.sevemborendirect.co.uk/history.htm> [Accessed 1st August 2007]

Yates, D 2007 *Land, Power and Prestige: Bronze Age field systems in southern England*.
Oxford: Oxbow.

Maps

Malvern hills & Bredon hill (Explorer 190) 2001 1:25,000 Ordnance Survey

British Geological Survey (BGS) 1953 1" Solid and Drift, Sheet 217 Moreton in Marsh

British Geological Survey (BGS) 1988 1:50,000 Solid and Drift, Sheet 216 Tewkesbury

APPENDIX I: THE ARCHAEOLOGICAL SCOPE OF THE SURVEY

The objective of the National Mapping Programme (NMP) is to identify and transcribe all probable and possible archaeological features that are visible as cropmarks, soilmarks or earthworks on aerial photographs. As part of the NMP, the Carrant Valley Landscape and North Gloucestershire Cotswolds projects aimed to record all archaeological monuments seen on aerial photographs, whether ploughed-level or upstanding remains, and dating from all periods from the Neolithic to the 20th century, including military and industrial features. For the purpose of this survey the following definitions were used:

Plough-levelled features

All cropmarks and soilmarks representing sub-surface features of archaeological origin were recorded. For the purposes of NMP the term 'cropmark' is taken to be inclusive of soilmarks.

Earthworks

All earthwork sites visible on aerial photographs were recorded, whether or not they had been previously surveyed, and whether or not they were still extant on the most recent photographs. The full extent of earthwork sites were transcribed where visible, but it was made explicit in the accompanying AMIE database record (see below) which elements of any particular group of earthworks survived and which had been destroyed.

Extant earthworks such as hillforts and barrows, defined by hachures on the current Ordnance Survey (OS) 1:10,000 base maps, were depicted with the appropriate NMP conventions. Sites appearing on the OS base map which had not been photographed, or that were completely obscured by vegetation, were not shown, but were identified on the Map Note Sheet.

Ridge and furrow

Areas of ridge and furrow were recorded using a standard convention to indicate the extent and direction of the furrows. A distinction between destroyed and surviving fields of ridge and furrow has been made by recording on two separate layers in AutoCAD. Longer furlong boundaries and linear earthworks such as headland banks have been shown in stipple as earthworks, but individual strip fields have not been depicted.

Buildings

Buildings that appeared as earthworks, cropmarks or soil marks representing buried foundations were recorded, using the convention appropriate for the form of remains.

Industrial archaeology

Areas of industrial archaeology were recorded using the appropriate conventions where they could be recognised as pre-dating 1945. The large later 20th century gravel pits were not depicted but are usually noted on the Map Note Sheet.

Military archaeology

Individual buildings relating to the Second World War were depicted, whether or not they have since been destroyed. Isolated military structures such as pill boxes, air raid shelters and buildings associated with searchlight batteries were also mapped.

Field boundaries

Recently removed field boundaries seen as cropmarks were not recorded if they could be seen on the 1:10,000, 1:10,560 or OS First Edition maps. Where they were extensive, and in danger of being confused with the remains of earlier field systems, their presence and extent were noted on the Map Note Sheet.

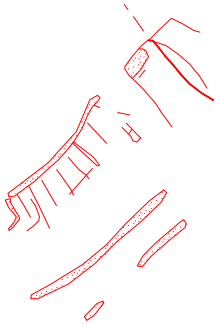
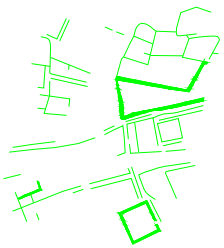
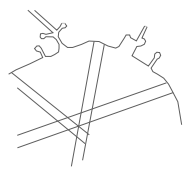
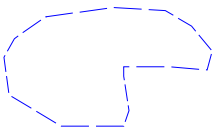
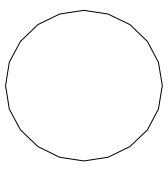
Geological and geomorphological marks

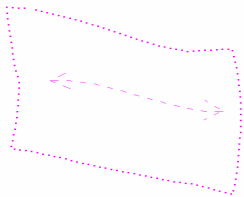

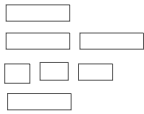
Geological features visible on aerial photographs were not plotted, although their presence may sometimes have been noted on the Map Note Sheet, eg if the presence of former river channels defined the limits of an archaeological site, or if the nature of the marks was such that they could be confused with those of archaeological origin.

The standard conventions used in the depiction of all features transcribed in AutoCAD are outlined in Appendix 2.

APPENDIX 2: AUTOCAD NMP CONVENTIONS AND LAYERS

To avoid subjective classifications, which may alter as interpretations of sites develop, the NMP mapping conventions used are based on the form of the remains: e.g. banks, ditches, or structures. The date, function and preservation of the features (ie if it is a cropmark or an earthwork) and other details are recorded in full in the accompanying AMIE database record.

Layer	Example
<p>BANK The outline of all features seen as banks or positive features, eg 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 A stipple that fills the outline 'bank'.</p>	
<p>DITCH All features seen as ditches; also excavated features, eg ponds and pits. Thin ditches appear on this layer as a single line.</p> <p>DITCHFILL A solid fill for the outline 'ditch'.</p>	
<p>EXTENT OF AREA The extent of large area features such as the perimeters of airfields, military camps, and mining / extraction areas.</p>	
<p>LARGE CUT FEATURE Represented by a dashed line. Used for large cut features such as quarries, ponds, and perhaps scarps that can not easily be depicted with the use of either bank or ditch.</p>	
<p>MONUMENT POLYGON Used to define the extent of a group of AutoCAD objects corresponding to a single monument in the NMR's AMIE database.</p>	

Layer	Example
<p>RIGARRLEVEL 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 Outline of a block of ridge and furrow, seen as earthworks or cropmarks, but known to have been ploughed level.</p>	
<p>RIGARREWK 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 Outline of a block of ridge and furrow still surviving as earthworks on the latest available aerial photographs.</p>	
<p>STRUCTURE Used for features which do not easily fit into other categories because of their form, e.g. tents, radio masts, painted features (eg camouflaged airfields).</p>	
<p><u>Other Layers:</u></p>	
<p>(VIEWPORT) Used for printing</p>	
<p>(SHEET) Used for printing</p>	
<p>GRID 1:10,000 grid</p>	
<p>RASTER Used to load rectified aerial photographs</p>	

APPENDIX 3: SOURCES

National Monuments Record (NMR) vertical and oblique aerial photograph collections:

NMR Enquiry and Research Services
English Heritage
National Monuments Record
Kemble Drive
Swindon
SN2 2GZ
Tel: +44(0)1793 414600

The project was carried out in collaboration with Cambridge University's Unit for Landscape Modelling (ULM - formerly Cambridge University Committee for Air Photography (CUCAP)), their contribution being the loan of vertical and oblique aerial photographs.

Unit for Landscape Modelling (ULM)
University of Cambridge
Sir William Hardy Building
Tennis Court Road
Cambridge
CB2 1QB
Tel: +44(0)1223 764377

Additional aerial photographs and Monument records were supplied courtesy of Gloucestershire Sites and Monuments Record:

Gloucestershire SMR
Gloucestershire County Council Archaeology Service
Environment Department
Shire Hall
Gloucester
GL1 2TH
Tel: +44(0)1452 425705
Email: archaeology.smr@gloucestershire.gov.uk

And Worcestershire Historic Environment Record (HER):

Historic Environment and Archaeology Service
Woodbury Hall
University College Worcester
Henwick Grove
Worcester
WR2 6AJ
Tel: +44(0)1905 855494
Email: archaeology@worcestershire.gov.uk

Lidar data was supplied under licence by:

The Environment Agency
Science Group – Technology
LIDAR Team
Rivers House
Lower Bristol Road
BATH
BA2 9ES

Ordnance Survey maps

All base maps are reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or criminal proceedings. English Heritage 100019088, 2009.

APPENDIX 4: AMIE RECORDING STATISTICS

Monument records for each site mapped or reviewed during the Carrant Valley Landscape NMP project have been added to English Heritage's NMR AMIE archaeological database, as well as an Event record for the Carrant Valley Landscape NMP project. The archive comprises four digital files, one for each map ¼-sheet AutoCAD drawing (see Table 1). Each AMIE monument record is linked by a unique identifier (UID) reference number to a monument polygon, defining the geographical extent of the monument record. The main elements of the monument record comprise location, indexed interpretation, textual description and main sources, including the aerial photograph(s) which best illustrate the site.

The statistics provided here are a guide to the AMIE Monument records and only provide a broad overview of the nature of the archaeology of the area. Features which in reality cover a larger physical area, such as the extensive ridge and furrow cultivation or Second World War anti-landing obstacles, are often recorded on a parish or large area basis and therefore may be statistically under represented in terms of monument records, especially when compared to other more discrete archaeological remains such as moats or isolated enclosures. Tewkesbury (SO 83 SE) has a large number of existing monument records due to the presence of the Abbey and numerous other historical buildings.

Statistics for the North Gloucestershire Cotswolds NMP will be given in that project's report (Stoertz, forthcoming).

Event:	UID: 1437295	The Carrant Valley Landscape NMP			
Archive Collection:	EHC01/060, AF000195				
Map ¼-sheet	Archive Item UID	AMIE Monument Records			
		Existing	Amended	New	Revised total
SO 83 NE	MD000072	63	19	55	118
SO 83 SE	MD000073	111	13	60	171
SO 93 NW	MD000074	59	15	42	101
SO 93 SW	MD000075	38	8	26	64
	Totals:	271	55	183	454

Table 1: AMIE records

The nature of archaeological aerial survey means that relatively large earthworks, cropmarks and structures are recorded but, usually, no new information is added to monument records which describe buildings, finds or other archaeological features that are not visible from the air. The Carrant Valley Landscape NMP aerial survey created 183 new AMIE monument records and amended 55 existing monument records. This amounts to the revision of 20% of the existing AMIE monument records plus a 67% increase in their number for these four quarter-sheets.

New and amended AMIE monument records

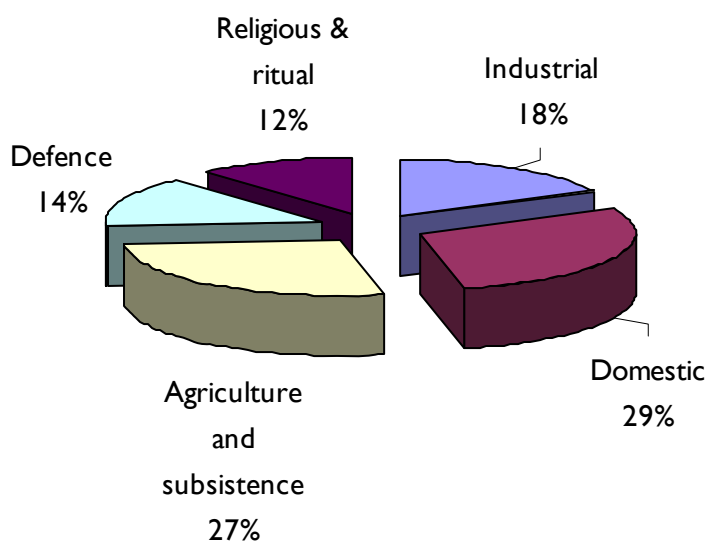


Figure 21: AMIE records by theme

Over half of the created and amended monument records relate to agricultural and domestic activities (ie field systems and settlements) (Figure 21). These records are dominated by the medieval ridge and furrow and associated settlements. The remaining half of the records is split between industrial, defence and ritual records. The industrial records comprise extractive pits and quarries and are mostly post medieval in date, whereas the religious and ritual sites mainly comprise Bronze Age ring ditches. Although the Iron Age hillforts may be indexed as defensive, most of these records relate to Second World War sites.

New monuments recorded by the Carrant Valley Landscape NMP were predominantly medieval and post medieval features (Figure 22). Within this there is a considerable overlap; for example most of the medieval ridge and furrow continued in use until the 16th or 17th century and is therefore also indexed as post medieval. A significant number of new 20th century features, mainly relating to the Second World War, have been recorded, or their Defence of Britain record amended.

Nearly half of the amended records also relate to the Medieval and Post Medieval periods (Figure 23). It should be noted that some amendments are to records for which there is no mapped information, where a comment is appropriate to explain relationships with other monuments, or where a review of the sources suggests that an existing record may relate to a non-archaeological feature.

New AMIE Records

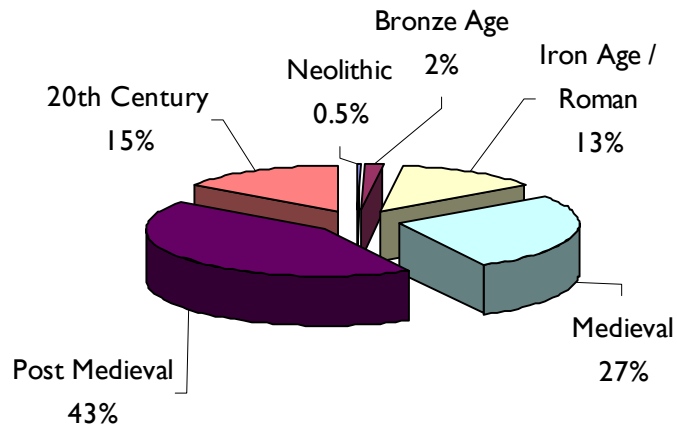


Figure 22: New AMIE records by period

Amended AMIE Records

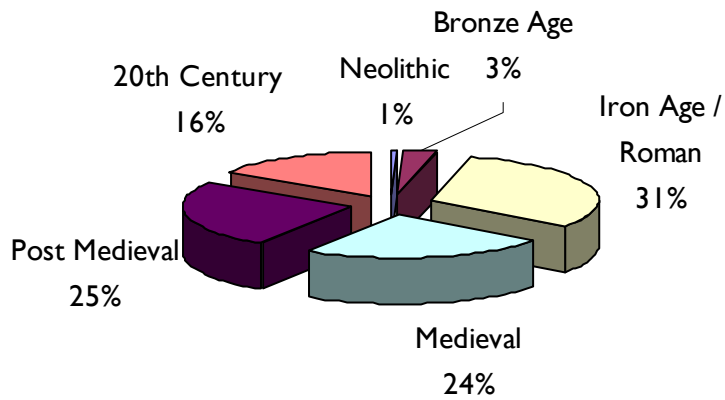


Figure 23: Amended AMIE monument records, by period

APPENDIX 5: LIDAR

Unfiltered & filtered Lidar data in ArcView ASCII grid format was kindly supplied by the Environment Agency under licence. Scenes were generated from the last pulse data using ESRI ArcScene software with a times two (x2) height exaggeration to emphasise even the slightest of earthwork features. Times five (x5) exaggerations were found to contain too much “noise” when exported to be useful. The scenes were lit at an altitude of 30° and an azimuth of 315° (north-west) and 45° (north-east) for comparison. Southern directional lighting was not used as the aerial photographs are naturally lit from this direction. The scenes were then exported as .JPG files and imported into AutoCAD to facilitate direct comparison with the NMP transcription.

Tile Name	Date Flown	% coverage	Resolution	Filename
SO 86 34	24 th March	97.28	1m	D0021710
SO 88 34	24 th March	96.29	1m	D0021718
SO 90 34	March 1999	97.51	2m	D0005806
SO 92 34	March 1999	99.97	2m	D0005816

Table 2: Lidar tiles

Lidar data was available for a strip measuring 2km wide that extends across the floodplain immediately to the north of Tewkesbury, and was compared against the NMP transcription, with individual anomalies investigated further. Unfortunately the Lidar data did not reveal any significant new archaeological sites, but did show that some of the ridge and furrow features thought to have been completely ploughed-out do, in fact, still have some height. Slight dips, the edge of the floodplain, drainage channels and streams were particularly evident. Lidar survey of aggregate areas of Gloucestershire has been identified as a priority (Mullin, 2005). As this comparison shows, Lidar data is particularly useful in bringing out the micro-topography of the relatively flat landscape which is not always easily visualised from contour lines. The Lidar technique has also been used to identify archaeological features in woodland landscapes in the Forest of Dean (Devereaux et al, 2005).

The Lidar data should not be used in isolation as artefacts within the data and the data itself require specialist interpretation. Taking the transcribed ridge and furrow as an example, much of it could be recognised as earthworks in the Lidar data, even where it had been recorded from aerial photographs as probably plough-levelled (transcribed in magenta). Data artefacts within the data often reveal themselves as amorphous areas of striping which on initial inspection look very similar to ridge and furrow cultivation (Figure 24; B), however, on closer inspection they can be seen to contradict this pattern as transcribed from the aerial photographs. Their irregular edges also hint at the pattern being a data artefact rather than an archaeological feature or real part of the landscape. The Lidar data reveals the surface of the landscape at the usually very recent date it was surveyed. The Lidar survey was able to add small pockets of cultivation into the extensive pattern already visible on the aerial photographs, but some sites like the medieval farmstead at the Mythe were considerably clearer on the historical aerial photographs, despite long winter shadows. This is because they had not yet been significantly damaged by ploughing (Figure 24; B).

Linear features are particularly visible in the Lidar data. If the group of linear banks with different orientations visible in the Lidar data at Mythe hook were examined solely from the Lidar data they could easily be interpreted as a potential late prehistoric or Roman field system (Figure 24; A). On comparison with the aerial photographs and the NMP transcription it becomes evident that these banks are indeed associated with fields, but actually form plough headlands as part of the medieval pattern of cultivation; the surrounding ridge and furrow is not really apparent in the Lidar image.



Figure 24: Lidar examples at the Mythe



ENGLISH HERITAGE RESEARCH DEPARTMENT

English Heritage undertakes and commissions research into the historic environment, and the issues that affect its condition and survival, in order to provide the understanding necessary for informed policy and decision making, for sustainable management, and to promote the widest access, appreciation and enjoyment of our heritage.

The Research Department provides English Heritage with this capacity in the fields of buildings history, archaeology, and landscape history. It brings together seven teams with complementary investigative and analytical skills to provide integrated research expertise across the range of the historic environment. These are:

- * Aerial Survey and Investigation*
- * Archaeological Projects (excavation)*
- * Archaeological Science*
- * Archaeological Survey and Investigation (landscape analysis)*
- * Architectural Investigation*
- * Imaging, Graphics and Survey (including measured and metric survey, and photography)*
- * Survey of London*

The Research Department undertakes a wide range of investigative and analytical projects, and provides quality assurance and management support for externally-commissioned research. We aim for innovative work of the highest quality which will set agendas and standards for the historic environment sector. In support of this, and to build capacity and promote best practice in the sector, we also publish guidance and provide advice and training. We support outreach and education activities and build these in to our projects and programmes wherever possible.

We make the results of our work available through the Research Department Report Series, and through journal publications and monographs. Our publication Research News, which appears three times a year, aims to keep our partners within and outside English Heritage up-to-date with our projects and activities. A full list of Research Department Reports, with abstracts and information on how to obtain copies, may be found on www.english-heritage.org.uk/researchreports

For further information visit www.english-heritage.org.uk

