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Staffordshire National Mapping Programme

Phase 1 Eastern River Confluences

Aerial Survey Mapping Summary Report

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1 SUMMARY

This aerial survey mapping report describes the methodology and results of the first phase of the Staffordshire National Mapping Programme project: the Eastern River Confluences. The project was funded by English Heritage (EH) through the National Heritage Protection Commissions Programme (NHPCP), and undertaken by Archaeological Research Services Ltd (ARS Ltd) in partnership with EH and with the Staffordshire County Council (SCC). The project was carried out by ARS Ltd Investigators based with EH's Aerial Investigation and Mapping team in York.

The Staffordshire NMP survey area comprises 265 complete 1km squares, equating to approximately 10% of the county. Transcriptions were produced as digital maps in AutoCAD, with supporting records produced to NMP standards and entered into the National Record of the Historic Environment (NRHE) database, AMIE. Mapping began on the 21st March 2013 and was completed on the 12th June 2014.

The project mapped and recorded a wide range of archaeological sites of varying nature dating from the Neolithic period to the twenty-first century. A total number of 733 new records were created in the NRHE database and a further 100 existing records were enhanced.

Elements of the survey extended beyond the Staffordshire county borders into Derbyshire in order to allow the completion of whole kilometre squares, and this required the assistance of the Derbyshire County Council, in addition to the Staffordshire County Council.

2 ACKNOWLEDGEMENTS

The Staffordshire NMP was undertaken by Archaeological Research Services Ltd in partnership with the Staffordshire County Council, who contributed through access to the Historic Environment Record (HER) data and air photograph collections.

Thanks are due to the EH Archive Services Team (formerly the NMR), primarily Luke Griffin, who supplied all EH Archive aerial photography for the project.

Quality Assurance and continual guidance was supplied by members of English Heritage's York-based Aerial Investigation and Mapping team, Dave MacLeod, Dave Knight, Matt Oakey and Sally Evans.

3 INTRODUCTION

The Staffordshire NMP project is an air photo interpretation and mapping project designed to sample areas of Staffordshire, a county subjected to very little previous large-scale systematic aerial survey mapping. The single previous NMP project extending into Staffordshire, the former National Forest NMP project, abuts the project area to the south-east.

The project was proposed to consist of two phases and designed to sample the different landscapes present within the county and target identified research priorities. The first survey phase, the eastern river confluences, is summarised here. The area was divided into two blocks, chosen in accordance with the strategy for the NMP (Fig. 1).

- The southern block targets an area of high archaeological potential identified from English Heritage reconnaissance recording, and extends the NMP coverage of the River Trent from the former National Forest NMP project area (Macleod 1995). The area covers 140km², following the path of the River Trent north-west to Stafford; it targets potential future areas of aggregate extraction, as well as assessing the archaeological nature and survival of earthworks in this region.

- Situated to the north of the first block, the second block centres on the uplands of the Weaver Hills, extending north marginally into the Peak District National Park. This area has been subjected to extensive limestone quarrying such as the Caldonlow Quarries and contains a high number of scheduled monuments. The area covers 125km² and was relatively poorly understood prior to this survey. It was targeted to improve the base knowledge of the area and to inform future development as exemplified by applications for quarry expansions.

The survey was carried out to the NMP standards for mapping and recording (Winton 2013), which are intended to produce a comprehensive record of the archaeology of England, from prehistory to modern times, through the interpretation, mapping and recording of all archaeological features visible as earthworks, cropmarks and structures on aerial photographs.

The second phase comprising a further two survey blocks in the county is to follow immediately from the first, and the results for this will be summarised in a separate report.

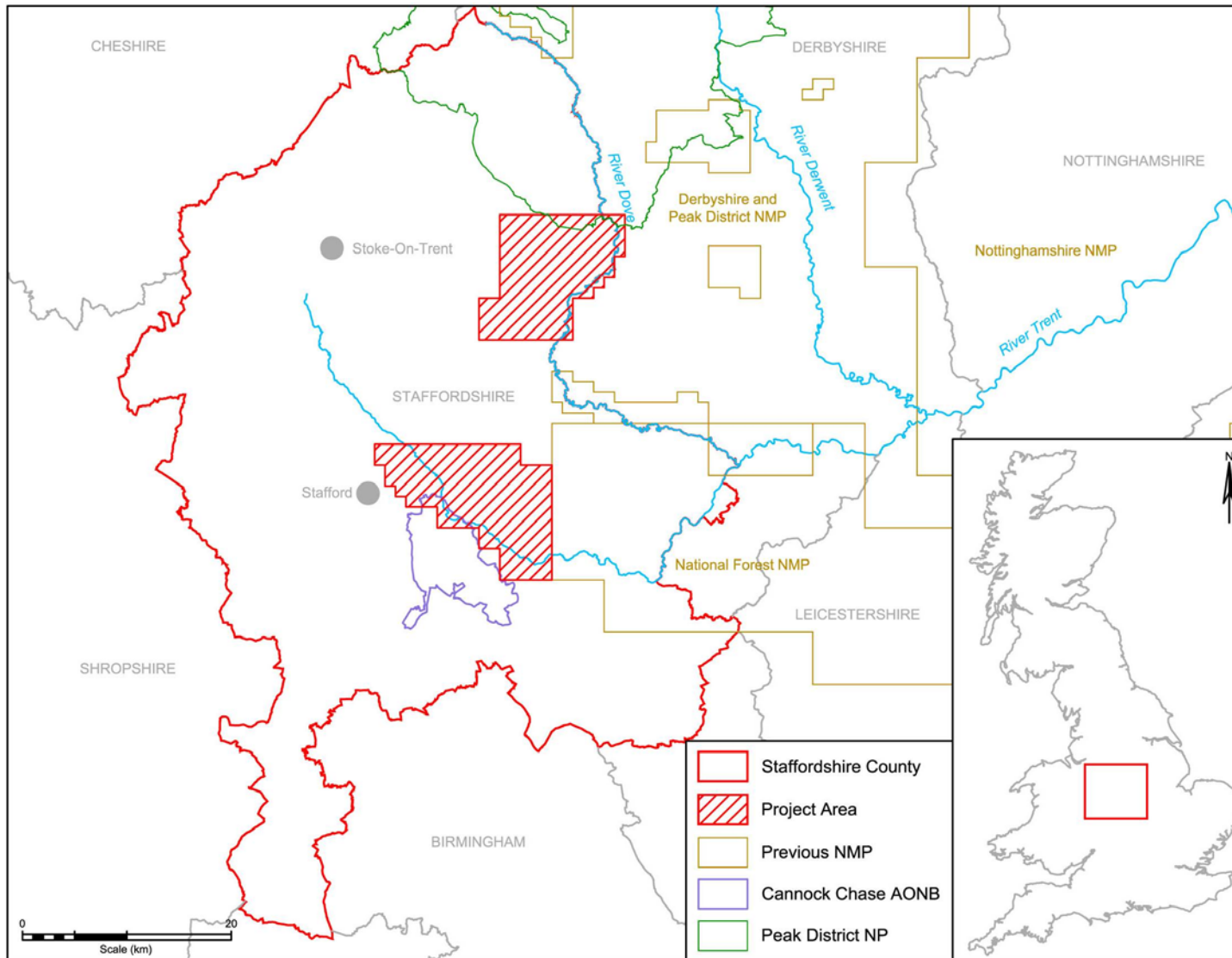


Figure 1. The Staffordshire National Mapping Programme project area and previous NMP.

4 PROJECT MANAGEMENT

The project was funded by English Heritage and undertaken by Archaeological Research Services Ltd.

The Project Assurance Officer was Jonathan Last (EH NHPCP), working with Dave MacLeod as the EH Quality Assurance Officer (EH), and a Project board comprising of Stephen Dean (SCC), Suzy Blake (SCC), Ian George (EH Regional Inspector) and Deborah Williams and David Hilton (EH Designation Team). The Project Executive was Robin Holgate (ARS Ltd).

Dave Knight (ARS Ltd) was the initial Project Officer, being replaced on his departure by Samantha Bax in June 2013. The aerial survey team consisted of Dave Knight (March 2013 – June 2013) and Samantha Bax (March 2013 – June 2014).

The EH NMP Quality Assurance Officer for the air photo mapping was David MacLeod, and quality assurance was carried out on approximately 5% of the total mapped area. The EH team also provided advice, training and support where necessary and ensured the interpretation, mapping and recording were conducted according to NMP standards.

The project ran for 15 months, beginning on the 21st March 2013, with mapping and recording completed on the 12th June 2014.

5 SCOPE OF THE SURVEY

5.1 Geographical Scope

The project area comprises two blocks (see Chapter 3), designed to sample two different landscape regions of Staffordshire. The southern area abuts the former National Forest NMP project area to the east, the only previous NMP aerial survey within the county. The first phase of the Staffordshire NMP project has doubled the area of the county mapped to NMP standards, bringing the total to approximately 19 per cent. The survey was conducted over 6 full and 14 part 1:10,000 Ordnance Survey quarter sheets (Appendix 1), covering a total area of 265km² (Fig. 2).

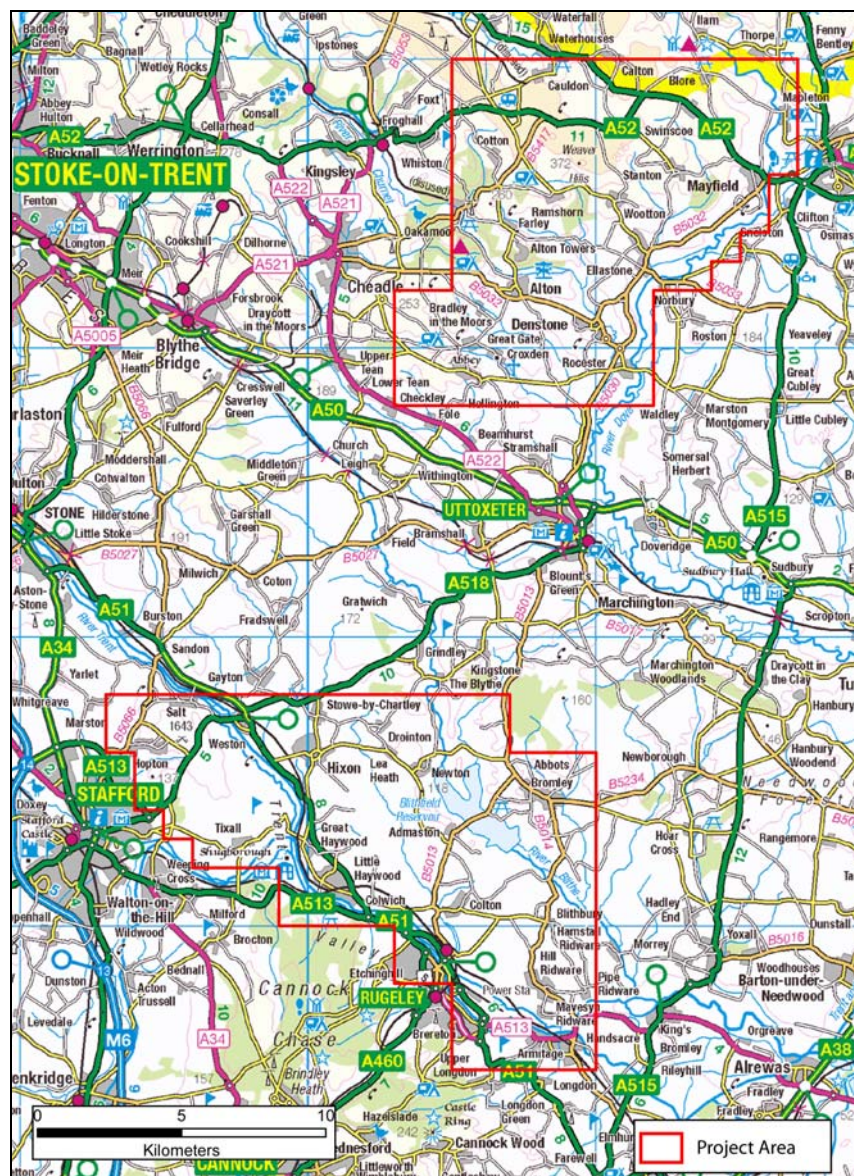


Figure 2. The Staffordshire NMP project areas: geographical scope.

5.2 Geology, Topography and Modern Land-Use

The following overview was composed using the National Character Area profiles, together with geology data obtained from the British Geology Survey (Fig. 3) at a scale of 1:625,000 and soil data from the Cranfield Soil and Agrifood Institute (NRSI) Soilsapes Viewer accessed online, at a scale of 1:250:000.

The southern project area falls within the Needwood and South Derbyshire Claylands National Character Area (NCA) 68 (Natural England 2012a): a low lying, largely rural area. Arable cultivation dominates the floodplains of the Rivers Trent and Blithe, whilst mixed farming is more apparent elsewhere. The Blithfield Reservoir covers an area of 320ha, and was constructed by the damming the River Blithe in the late 1940s. The topography is undulating, divided by the broad valleys of the rivers Trent and Blithe. The bedrock geology here is dominated by Triassic mudstones with a band of Permian and Triassic sandstones extending across the southern edge of the project area to the River Trent, coinciding with freely-draining loamy and sandy soils. River Terrace Deposits and alluvium line the River Trent, with further alluvium deposits lining the Rivers Blithe and their tributaries. Glacial Sand and Gravel deposits are located to the north and east of the River Blithe and areas of till are dispersed across the Triassic mudstones, where soils are loamy and clayey with slow permeability and impeded drainage.

The northern area is a more varied landscape divided between the White Peak NCA 53 (Natural England 2012b) and NCA 64: Potteries and Churnet Valley (Natural England 2012c). The landscape of the Churnet Valley is characterised by narrow valleys and small plateaux, dominated by areas of woodland and pastoral farming. The River Churnet merges with the Dove towards the south, forming a wide valley extending north, and marking the eastern extent of the project area. West of the River Dove, the topography rises to the Peak District limestone plateau and the adjacent Weaver Hills, formed of Carboniferous Limestone Series. A central band of Permian and Triassic sandstones, overlain by freely draining sandy soils, is bordered to the north-west by Namurian Millstone Grit Series sandstones and south by Triassic mudstones, associated with poorly draining loamy, clayey and peaty soils. Alluvium deposits line the River Dove and Churnet. Settlement is rural in nature, concentrated along the rivers and southern lowlands, where land-use is dominated by pastoral agriculture. The Weaver Hills are dominated by extensive limestone quarrying, with sand and gravel and sandstone extraction towards the west.

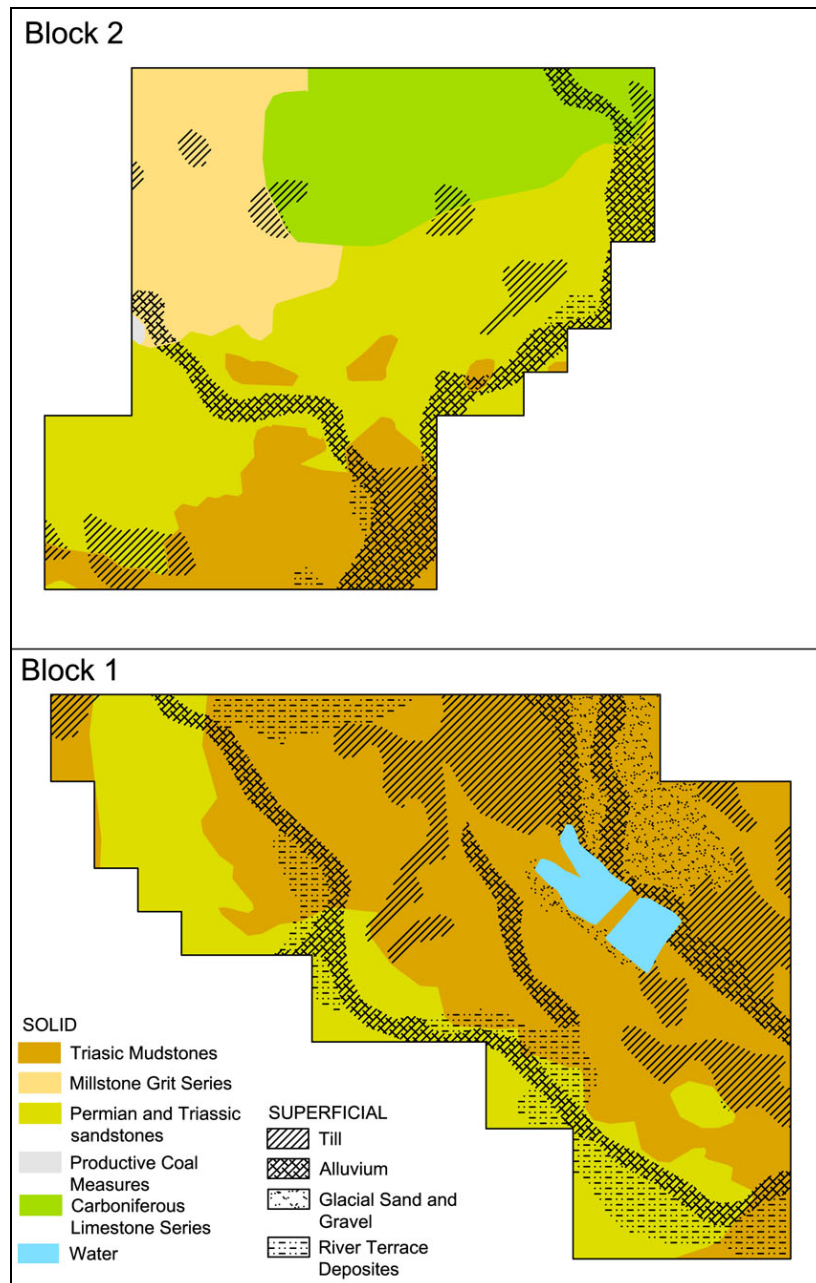


Figure 3. The Solid and Superficial Geology of the Mapping Area

Based upon the 1:625,000 scale Digital Geology Map of Great Britain, with the permission of the British Geological Survey.

The underlying soil and geology, together with the former and modern land-use, has impacted on the visibility of the archaeological features in a number of ways. The targeting of the free-draining soils and geologies lining the River Trent for arable cultivation has led to the erosion of most earthworks of archaeological origin in this area. Whilst this has destroyed much of the above ground remains, in the right circumstances the arable fields are conducive to cropmark production, particularly on the River Terrace Deposits lining the River Trent. The increase in poorly-draining soils in the northern project area, together with a greater coverage of woodland, areas of

moorland and a greater dominance of pastoral farming, inhibits the production of cropmarks. The reduction in arable farming has also had the effect of increasing medieval and post-medieval earthwork survival in the north, and this is likely to be masking earlier underlying features.

5.3 Archaeological Scope

The aim of NMP is to increase our understanding of the historic environment. This is achieved by the mapping and recording of all possible and probable archaeological features identified on air photographs and (where available) lidar as earthworks, cropmarks, soilmarks, parchmarks and structures.

The sphere of interest for the project follows NMP guidance (Winton 2013) and is summarised below.

5.3.1 Earthwork archaeology

All earthworks identified as archaeological in origin were mapped, including those since levelled. When available RCHME/EH ground survey plans were used to assist and enhance the air photograph interpretation and mapping. Where the quality of the photography was insufficient to trace individual earthwork features with certainty, these were mapped as an extent of area. Complex braided trackways, thought to be primarily of post-medieval date were not mapped unless they directly impacted upon other archaeological features.

5.3.2 Levelled archaeology

All cropmarks, soilmarks and parchmarks identified as archaeological in origin were mapped and recorded.

5.3.3 Post-medieval and modern field boundaries

Identified post-medieval and modern field boundaries (upstanding or levelled) that are depicted on first edition Ordnance Survey or later edition maps were generally not mapped, except to provide a wider context for field systems not mapped, or where found to truncate archaeological features.

5.3.4 Medieval and post-medieval ridge and furrow

All ridge and furrow was mapped: this was depicted as an outline the extent of area and the direction of ploughing. Ridge and furrow of probable medieval date was indicated

by wide, curving, usually s-shaped ridge and furrow earthworks, whilst post-medieval ridge and furrow is indicated by usually narrow, straight ridge and furrow earthworks. Where medieval ridge and furrow appeared to have been reused, as indicated by split ridges visible as narrower, curving ridge and furrow earthworks, or where the date of the earthworks was uncertain, these were dual indexed as medieval/post-medieval date.

5.3.5 *Industrial features and extraction*

Small-scale extractive pits of less than 0.5ha were not mapped unless the extraction impinged on existing archaeological features, or visibly associated with other elements, such as limekilns. Quarries greater than 0.5ha were mapped and recorded usually as an extent of area, irrespective of if they were depicted on any Ordnance Survey map. Earthwork features within these complexes, such as spoil heaps were generally mapped, though other elements such as tramways, trackways and extant buildings etc were only mapped if considered to be of archaeological significance. Industrial sites such as brick and tile works were usually mapped as an extent of area. Urban industrial sites were not mapped.

5.3.6 *Twentieth Century military features*

Former military sites were mapped in detail where possible, larger sites were mapped as an extent of area due to time constraints.

5.3.7 *Buildings*

The foundations of buildings visible as cropmarks, soilmarks, parchmarks, earthworks, or ruined stonework were mapped and recorded, except when they were depicted on first edition Ordnance Survey or later edition maps. Medieval ruined castles and monastic sites were also mapped if ruinous in form. Roofed or unroofed standing buildings or structures were generally not recorded unless they fell within the sphere of NMP interest, usually associated with industrial or military remains.

5.3.8 *Parkland, landscaped parks, gardens and country houses*

Post-medieval landscape and garden features visible as earthworks, cropmarks, parchmarks and structures were only mapped if previously unrecorded by first edition Ordnance Survey or later edition maps.

5.3.9 *Geological features*

In line with NMP practice, geological features were not mapped. These may be described within monument records, for example where close proximity potentially affects the accuracy of the interpretation.

5.4 Sources

All readily-available air photographs were consulted, together with lidar JPEGs (where coverage was available) from the following collections.

- The EH Archive was the primary source of photography, with three loans consisting of a total of 3,667 vertical and 794 oblique photographs. The vertical photography was made up from a number of sources, predominantly comprising RAF and Ordnance Survey (OS) photography dating between 1941 and 2000. The oblique photography also came from a wide variety of sources and ranged in date from 1926 to 2010.
- A search of the Cambridge University Collection of Aerial Photography (CUCAP) online catalogue identified an additional 238 oblique photographs. This number excludes duplicate CUCAP photography held within the EH Archive. This specialist oblique photography, ranging in date from 1950 to 1984, was particularly useful, in some cases comprising the only evidence for a site.
- The Staffordshire County Council aerial photography collection was accessed and all the available oblique photographs were analysed, most of which were duplicates from the EH Archive and CUCAP collection. Vertical coverage held by the Council was not consulted in detail due to the repetition of flight sorties and the time implication. The photography used in mapping was dated to between 1963 and 1994.
- Orthophotography was supplied to EH by Next Perspectives™ through the Pan Government Agreement (PGA), ranging in date from 2007 to 2010, and was used not only for mapping, but also for the latest evidence statement for earthwork and structural sites.
- Google Earth™ imagery was also consulted to provide additional data.
- 2 metre resolution lidar data was accessed from the Environment Agency through EH; this was supplied in the form of 25km² and 2km² JPEGs. The lidar data did not cover the project area in full, 84km² of Block 1 and 63km² of Block 2 was available, equating to approximately 55% of the project area.

5.5 Monument Data and Other Sources

The National Record for the Historic Environment (NRHE, formerly the National Monuments Record or NMR) database, AMIE, together with HER monument records, and Scheduled Monument data, were consulted regularly during the interpretation, mapping and recording programme. The data, supplied as shape files (.shp), was input in AutoCAD to assist with mapping and interpretation.

Historic and modern Ordnance Survey mapping was also consulted to aid the interpretation and dating of features.

Readily-available reports of previous archaeological investigations within the project area were consulted, including existing detailed earthwork surveys. These were used to enhance the interpretation and mapping of the sites, and included detailed surveys of Croxden Abbey (Brown and Jones 2009) and Bunbury Hillfort (Cocroft *et al.* 1988).

6 METHODOLOGY AND RECORDING

6.1 Mapping Methods

The mapping and recording methodology was carried out to NMP guidelines. All hard-copy photography was analysed under magnification, and stereoscopically where possible. The photograph was scanned, usually at a resolution of between 300-500dpi for rectification using AERIAL 5.29 software. Ordnance Survey MasterMap® 1:2,500 scale digital maps or 25cm resolution PGA orthophotography provided control for rectification. 5m interval contour data to improve the accuracy of the photo rectification; this was provided by EH (Licensed to EH for PGA through Next Perspectives™). Accuracy for the OS MasterMap® map is approximately ±2.5m or higher and rectification of photographs is normally within ±2m. Rectification accuracy will be lowered in areas of large topographical change.

The identified archaeological features were mapped from the rectified air photographs and lidar (imported as georeferenced JPEGs) using AutoCAD Map 3D. The mapping conventions and layer structure used in the drawing files is summarised in Appendix 2. An attached data table for each feature recorded the corresponding NRHE record number and interpretation among other data within the drawing file (see Appendix 3 for an example attached data table).

In addition, the corresponding HER number (where existing) was included in the attached mapping data to aid concordance (see Appendix 3 for mapping data).

6.2 Recording Practice

The mapped archaeological features were recorded in the EH NRHE database. New records were created for previously unrecorded sites and those with existing records were updated. A list of the monument types used for this project is compiled in Appendix 4.

The PGA orthophotography was generally used to record the latest monument condition for earthworks and structural elements, unless more recent photography was available, for example from the EH Archive. No latest evidence source was recorded for cropmark sites.

Where possible, concordance between HER datasets and NRHE records was made through the mapping attached data table (see Appendix 3). An impact assessment was

compiled for scheduled monuments to note changes to monument condition and discrepancies in data where present.

6.3 Data Archive and Dissemination

Copyright of the aerial survey mapping and associated NRHE records produced by the project resides with EH. Licence to use the data has been extended to ARS Ltd, Staffordshire County Council and Derbyshire County Council through the ALGAO agreement.

6.4 Project Archive

The mapping has been deposited with the EH Archive in Swindon under a single parent collection number: EHC01/221, drawing number: MD003246.

The newly-created and enhanced monument records form part of the NRHE database, which are downloaded into the EH webGIS. The records are also available to view online through the PastScape website (www.pastscape.org.uk).

6.5 Project Dissemination

A copy of the AutoCAD Map drawing file has been supplied to ARS Ltd and shared with EH. Staffordshire County Council and Derbyshire County Council received the mapping data in shape-file format for incorporation into their individual Geographical Information Systems.

All NRHE records have been supplied to ARS Ltd, and the relevant records to the Staffordshire County Council and Derbyshire County Council in Portable Document Format (.pdf). The project used Oracle Discoverer Plus Version 9.0.4.45.04 to output the NRHE record data in EXCEL spreadsheet format.

A copy of this aerial survey mapping report will be deposited with the EH Archive in Swindon, and will be available for download on the EH website.

7 SUMMARY OF PROJECT RESULTS

The following is a brief overview of the Phase 1 aerial survey mapping results, comprising approximately 10% of the county of Staffordshire. The results are discussed broadly by period, and specific sites are referenced in brackets to the relevant NRHE database Unique Identifier Number (UID).

The vertical and oblique photography offered good coverage of the whole project area. The quality of the photography varied somewhat, particularly the RAF photography. 178 of the verticals were supplied in the form of laser copies due to the delicate condition of the archive photographs, which reduced the level of detail obtainable from these sources.

The greatest concentration of oblique and vertical photography occurs on the course of the River Trent and, to a lesser extent, the River Dove. The vertical photography coverage is likely to have been affected by the location of urban areas, such as Rugeley documenting urban expansion, and to a lesser extent the increase in military activity in the area of the River Trent and Stafford. The oblique photography repeatedly targeted the concentrations of cropmarks on the Trent in the southern block, whilst the oblique coverage was more dispersed in the north, targeting the scheduled monuments and parklands.

The aerial survey mapping for the Staffordshire NMP amended 100 existing monument records and produced 733 new records. As a result 88% of the records produced comprised new monuments in the NRHE database. This summary provides an overview of the archaeology of the area as evidenced by the aerial survey record.

The monument evidence mapped was in the form of earthworks, structures and cropmarks. These were dated according to morphological characteristics, together with any available existing archaeological or documentary data. Broader periods such as 'Later Prehistoric' were used when dating was less certain and double-indexing of periods was used to indicate where a feature is likely to have been in use across two periods such as 'medieval/post-medieval'.

7.1 Later Prehistoric and Roman periods

7.1.1 Neolithic period

A small concentration of potentially Neolithic monuments was recorded in the area of Mavesyn Ridware. The most notable of these monuments is the Mavesyn Ridware causewayed enclosure, located on the north bank of a bend in the River Trent (1073323) (Fig. 4). The curvilinear enclosure is visible as cropmarks formed of deliberately interrupted, sinuous ditches, many with bulbous terminal ends. The enclosure is defined by at least three ditch circuits, enclosing an area of approximately 3.6ha. See also Fig. 30 and Discussion for further detail.



Figure 4. Mavesyn Ridware Neolithic causewayed enclosure (1073323) visible as cropmarks

JAP 19437/ J137 16-JUL-1995 © English Heritage (Jim Pickering Collection).

North-west of the causewayed enclosure, east of Hill Ridware, a possible bank barrow defined by two closely-spaced parallel ditches was recorded (1433578) (Fig. 5). The bank barrow ditches are interrupted, parallel at approximately 10m apart and have a maximum visible length of 124m. A slight curving inwards of the north-eastern extent of the bank barrow ditches indicates this to be the terminus. The south-west extent is unknown, extending beneath the modern road and an area of housing. Previous descriptions of the monument have also described it as a possible cursus (Barber 2007, Fig. 6.3). Accurate transcription of the monument highlighted the especially narrow spacing of the defining ditches, which may be more suggestive of the remains of a bank barrow (also pointed to by Loveday 2004, 1), and comparable in size to Long

Low bank barrow located in the Staffordshire Peak District, measuring at least 166m in length and between 13m and 18.5m wide (McOmish and Tuck 2002, 14). An incomplete curvilinear enclosure to the immediate north of the bank barrow (1576120) could tentatively be associated with it, but was labelled with a broader date range of Later Prehistoric/Roman (Fig. 5).



Figure 5. Hill Ridware bank barrow (1433578) and curvilinear enclosure (1576120) visible as cropmarks
NMR 17825/3 23-JUN-2003 © English Heritage.

A less certain site of potential Neolithic origin is a potential mortuary enclosure (1433597). The enclosure is located 660m to the north-east of the Mavesyn Ridware enclosure, and 550m south-east of the bank barrow (Fig. 6). The enclosure measures approximately 27m by 25m internally, with the ring ditch of a probable round barrow overlying (or underlying) the square enclosure ditch. A probable Iron Age/Roman pit alignment (1576271) appears to curve south-east to avoid the features which may suggest the existence of an upstanding earthwork when the pit alignment was constructed. Subsequently a medieval field boundary was constructed across both features on a different alignment. The proximity of the square enclosure and round barrow is unlikely to be a coincidence, although the date and function are open to debate. The enclosure was termed a mortuary enclosure based on morphological similarities to monuments recorded as such elsewhere, for example those discussed by Deegan (2007, 48-52 and Fig. 4.3). These included examples associated with round barrow ring ditches, and sites with a proven mortuary function known from excavation. However, the poor definition of the site class is recognised (Deegan, 2007 51), with the use of the term mortuary enclosure viewed as an arbitrary classification as highlighted by Barber (2007, 87).



Figure 6. A possible Neolithic mortuary enclosure and round barrow

JAP 1150/33 28-JUN-1975 © English Heritage (Jim Pickering Collection).

7.1.2 *Bronze Age*

The Bronze Age evidence identified from air photography was dominated almost entirely by round barrows. The round barrows have all been recorded as Bronze Age in date, since most British examples belong to the Early Bronze Age (Woodward 2002, 43) and due to a lack of known distinguishing features to identify examples of other periods. This said, modern excavation and dating techniques continue to identify greater numbers of round barrows with Neolithic origins, such as the multiple ring ditch defined barrow at Thornborough (Deegan 2005, 10; Harding 2013, 74-7), which has similarities with an example at Little Ingestre (1572158). This double ditch defined barrow appears to have a polygonal outer ring ditch, with a smaller more oval inner ring ditch. Analysis of the Peak District barrows (Barnatt and Collis 1996) also highlights the difficulties in identifying round barrows with Neolithic origins, a phenomenon which could be far more frequent than current evidence suggests (Barnatt 1996, 129).

The barrows were found in equal numbers in both the northern and southern project areas, with up to 85 round barrows mapped in total (Fig. 7), though the distribution and earthwork survival of the monuments varied considerably across the project areas. All but two of the sites in the south were recorded from ring ditches visible as cropmarks, and these were generally located in the river valley of the Trent and, to a lesser extent, the Blithe.

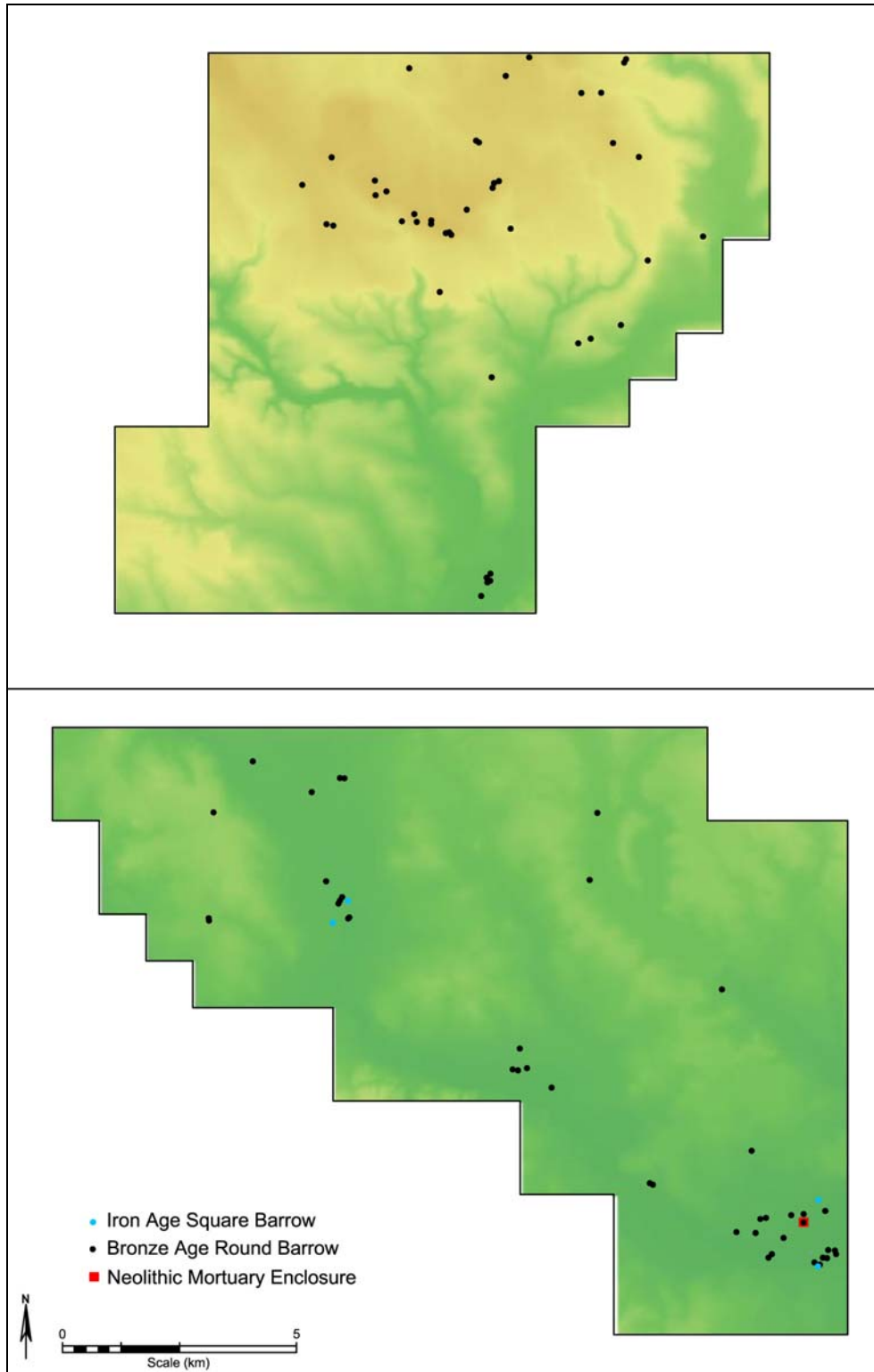


Figure 7. Funerary monument distribution.

In contrast, the northern examples were mostly recorded as upstanding earthworks and were concentrated on the uplands. In the north, all but one small group of barrows (near Rocester) avoid the lowland river valleys, instead favouring the prominent upland ridges, notably the Weaver Hills, where the greatest concentration of monuments were found; the distribution of barrows is more dispersed beyond these areas.

Towards the south the barrows are also generally quite dispersed, but more pronounced barrow groupings were observed in the Trent Valley. The largest of these groupings is located in the vicinity of the Mavesyn Ridware Neolithic causewayed enclosure, bank barrow and potential mortuary enclosure, where the ring ditches of 11 probable barrows were recorded (1433610, 1433671, 304643, 304643, 1433571, 1433608, 1576142, 1433594, 1433590, 1433597 and 1576283). The location of the monuments here are constricted within a bend of the river and some of the barrows are closely associated with, or aligned on, the Neolithic monuments, including the inner ring ditch of a double ditch defined barrow (1433608) aligned with the bank barrow ditches approximately 270m south-west of the visible extent of the monument. On the opposite southern bank of the river is a second group, or barrow cemetery, consisting of a more densely clustered group of seven barrows (1458811, 1458812, 1458814, 1458807, 1458797, 1431621 and 1576013). Following the River Trent to the north, two further dispersed barrow groups are located between Colwich and Colton, one consisting of five probable barrows with another group of seven barrows located at Little Ingestre. A final group of five barrows was observed west of the River Dove south of Rocester.



Figure 8. An unusual formed round barrow overlooking the Dove Valley (307634)

RAF/540/568 3174 28-JUL-1951 © English Heritage RAF Photography.

Differences in barrow form and variations in size were observed within the project area, with variations between approximately 4.5m and 45m in diameter, although few examples were of these extreme high and low values. This is largely consistent with a previous review of the Peak District barrows, which the northern area partially falls within (Barnatt and Collis 1996, 26). A visual assessment of the barrows indicates the smallest examples are more dispersed throughout, whilst the largest examples, those over 30m in diameter, are fewer. The largest, with a diameter of 45m, is an isolated site in the Blithe Valley (1578151); three breaks were recorded in the ring ditch but it is unclear if this is due to cropmark visibility or deliberately constructed interrupted ditches. Two other large examples are Row Low barrow (307723), measuring 41m x 43.5m and a third over a kilometre to the north (307634), measuring 32.5m x 28.5m, both overlooking the Dove Valley. These are also isolated sites. The northernmost of these barrows has an unusual form, defined by an oval-shaped ditch and partially lined by an inner and outer bank on the south-east side (Fig. 8). The ring ditch widens towards the north-west and south-east sides, which may have been caused by relatively recent farming activity. The unusual form may of course also indicate the site is not a barrow.

Other variations in form were most apparent in the round barrow ring ditches visible as cropmarks. At least four of the barrows appear, at least in part, to have been defined by polygonal ring ditches. A single ditch defined example near Little Ingestre (1580130) measures approximately 11m in diameter and is closely associated with a double ditched defined example (1572158), of which only the outer ring ditch appears polygonal and measures approximately 27m in diameter.

The remaining two examples are also defined by double ditches both of polygonal form (1585285 and 1431621). In addition to the three above mentioned double ditch defined barrows a further five examples were recorded with curvilinear ditches only (including 1575485 and 1585300). Two more examples occur within the Mavesyn Ridware barrow cemetery (1433610 and 1433608), the latter of which could be of a more elaborate form as indicated by protruding ditch-defined features extending from the ring ditches and potentially associated internal pits. South of the River Trent a second double ring ditch may have a similarly more elaborate construction (1458797) as indicated by the occurrence of several linear ditch elements extending horizontally through the outer ring ditch (Fig. 9).

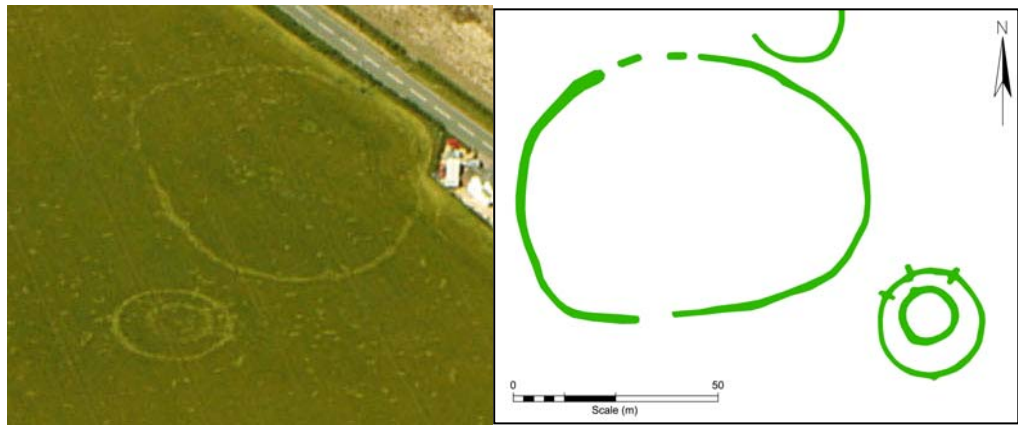


Figure 9. A double ditch defined round barrow with evidence of a more elaborate construction (1458797) and Later Prehistoric curvilinear enclosure (1458796) as visible on air photography and mapping

Photography: NMR 20339/14 8-JUL-2005 © English Heritage.

A number of other enclosures was identified within the project area which lay outside the distinctive forms of enclosure, such as the round barrow ring ditches, and for which it is difficult to assign a more definitive date than Later Prehistoric or Later Prehistoric/Roman. Two such enclosures of similar size, are located approximately a kilometre east of the Mavesyn Ridware causewayed enclosure (Fig. 10). The first of these (1458796) is curvilinear in shape, measuring approximately 83m x 62m (Fig. 9). The enclosure is located in close proximity to two round barrows, the nearest (1576013) only 3m apart. The westernmost of the enclosures (1458802) is sub-rectangular in form, with a particularly rounded north-east corner. The enclosure is defined by a single, deliberately interrupted ditch circuit, measuring up to 92m in length and between 33m and 60m wide; a probable Iron Age/Roman pit alignment (1458803) runs through it.

A rectilinear enclosure (1576539) approximately 58m x 62m in size with rounded corners has an adjoining annex to the south and a potentially associated hut circle to the north-east (Fig. 12. D). The presence of the potential hut circle suggests domestic activity, although the ring ditch could be the remains of a round barrow and the close proximity to the enclosure could be a coincidence.



Figure 10. The small causewayed enclosure (1458802) and second curvilinear enclosure (1458796) together with the ring ditches of round barrows and a probable Iron Age/Roman pit alignment (1458803), visible as cropmarks on an oblique air photograph

NMR 20339/15 08-JUL-2005 © English Heritage.

An example of an unusual curvilinear enclosure example of horseshoe shape (1572114) is located east of the River Trent, south of Weston. The enclosure appears to have a south-east facing entrance and measures 31m by 36m internally. A second ditch circuit lines the south-east side 18m from the enclosure, and a corresponding break at the suggested enclosure entrance supports the suggestion these are deliberate breaks in the ditch.

A final example of a curvilinear enclosure (1585303), defined by a fine, single ditch has maximum dimensions of 39m x 41m. The enclosure ditch is incomplete; it is not clear from the photography whether these are deliberate breaks in the circuit which could indicate an earlier, potentially Neolithic, palisaded enclosure or the product of poor cropmark visibility. Interestingly the enclosure is closely associated with the barrow cemetery south of Rocester between the River Dove and River Churnet (Fig. 11).

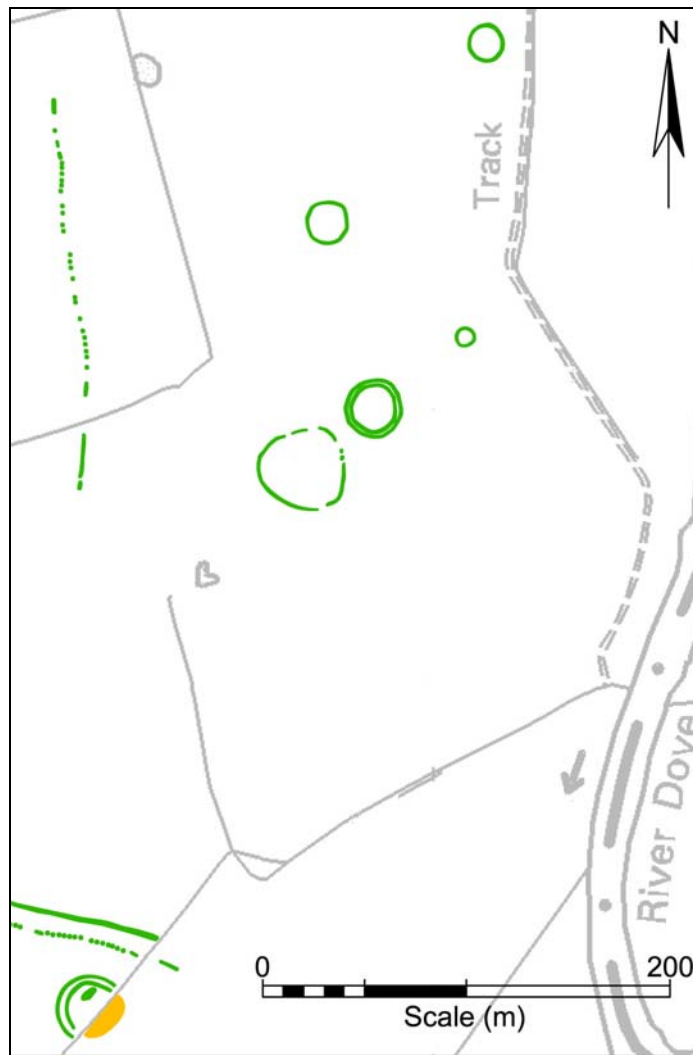


Figure 11. Transcription of an irregular shaped curvilinear enclosure (1585303) surrounded by the ring ditches of round barrows, and probable Iron Age/Roman pit alignments between the Rivers Dove and Churnet.

7.1.3 Iron Age

Bunbury hillfort (305379) is a univallate enclosure located on a natural spur overlooking the Churnet Valley. The hillfort, located in the grounds of Alton Towers, has been badly damaged. Two sections of rampart were recorded during the 1988 RCHME earthwork survey (Cocroft *et al.* 1988) along the northwest and southwest escarpments. Due to consistent tree cover of the site a length of the rampart was mapped from lidar data; detail was limited due to the low resolution of the data.

Numerous probable rectilinear enclosures of potential Iron Age origin were recorded but largely confined to the southern cropmark producing area of the Trent Valley. Settlement was indicated at two of the sites by the presence of probable round houses. The first of these was located west of Hill Ridware and consisted of a double ditch

rectilinear enclosure (1433626) with rounded corners enclosing an area of 61m by 74m (Fig. 12. A). The round house, defined by an incomplete ring ditch, measures approximately 9.5m and probable boundary ditches and a pit alignment on the same alignment to the enclosure are considered to be associated with it. A potential hut circle was also recorded within a rectilinear enclosure near Abbots Bromley (1458775), both visible as earthworks on 1940s RAF photography (Fig. 12. C). The enclosure sits on a gently sloping higher area of land and is defined by a broad bank of approximately 7m, lined by an outer ditch on the north-eastern half. The broad bank alone was visible, defining the south-west side of enclosure, and a potentially associated hollow way extends north-east from the enclosure. This is one of only a couple of earthwork sites of potential prehistoric origins recorded within the project area. A complex of field boundaries, elements of pit alignments, a trackway and an Iron Age square barrow are associated with another rectilinear enclosure (1580220) north-west of Great Haywood (Fig. 12. B).

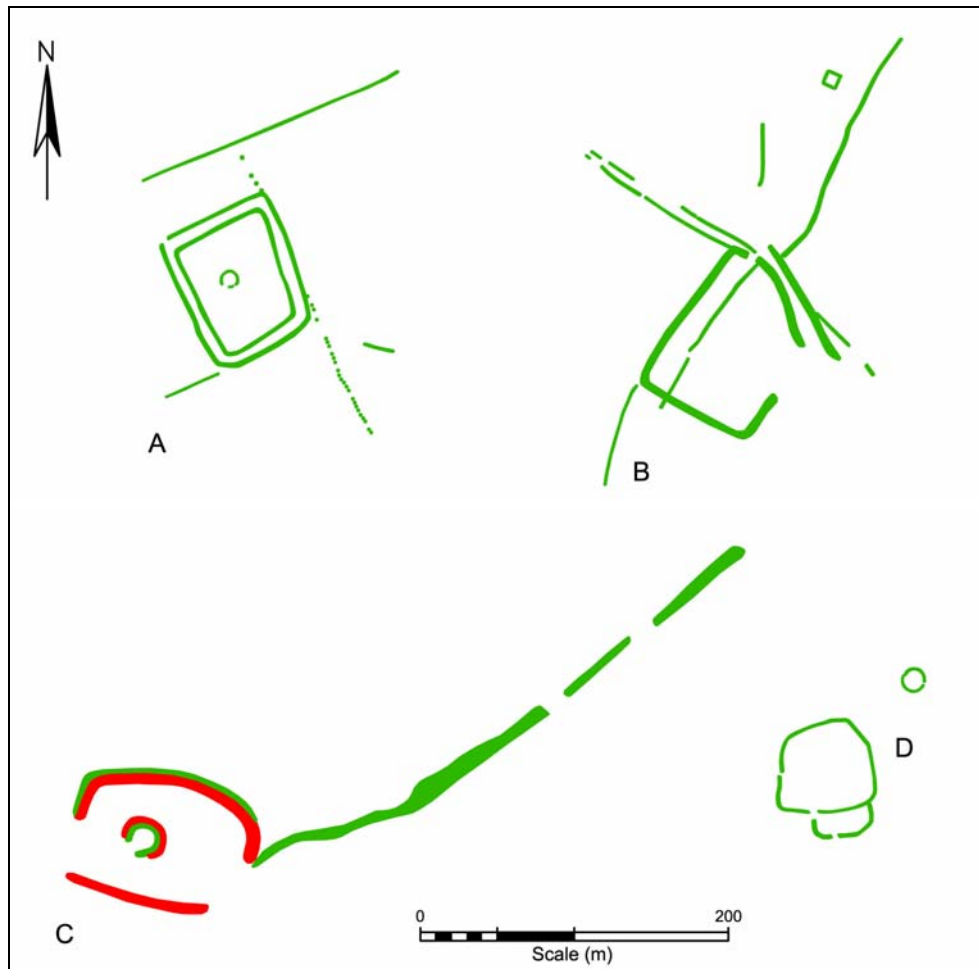


Figure 12. Transcriptions of probable Iron Age/Roman enclosures A. 1433626, B. 1580220, C. 1458775, and Later Prehistoric/Roman enclosure D. 1576539.

Field systems are the most abundantly recorded site type of probable Iron Age date. The field systems are formed mostly of ditch-defined fragments consisting of linear and/or sinuous ditches and pit alignments, such as the example described above. This is also one example from a dispersed concentration of field system cropmarks located in the south-west area of the project area (1572171, 1580107, 1572169, 1571896 and 1571897). A curvilinear enclosure (1571914) located adjacent to a field boundary ditch of a larger field system (1571906) appears to be respected by the boundary ditch and could be associated with it. A second concentration of field systems occurs in the south-east: some of these are distinctively sinuous in nature (1459418, 1576182 and 1576585), whilst other elements are extensive and appear to form linear field allotments (1458803, 1576271, 1576124). These could be related to a different, potentially earlier, phase of land division, comparable to linear boundaries of possible late Bronze Age date found at Nosterfield Quarry, North Yorkshire (Dickson and Hopkinson 2011, 143-4). The only identified field system of potential Iron Age/Roman date in the north of the project area was recorded in Okeover Park (1585554) and survives as earthworks (Fig. 21).

A number of trackways was recorded, formed by parallel double ditches, pit alignments or both, and were often found in association with other probable Iron Age or Roman features such as elements of field systems or enclosures (including 1576016 and 1580220). An example of a double pit alignment, recorded west of the River Trent near Little Ingestre (1572160), could be associated with the earthworks of a hollow way in the adjacent field. The pit alignment itself is sinuous and can be seen to partially overlie a double ditch defined round barrow (1572158) (Fig. 13). The hollow way to the west could have been caused by later reuse of the pit alignment route, or the alignment could be coincidental, with the hollow way extending through the field to the modern road, similar to a hollow way situated to the north (1580213).

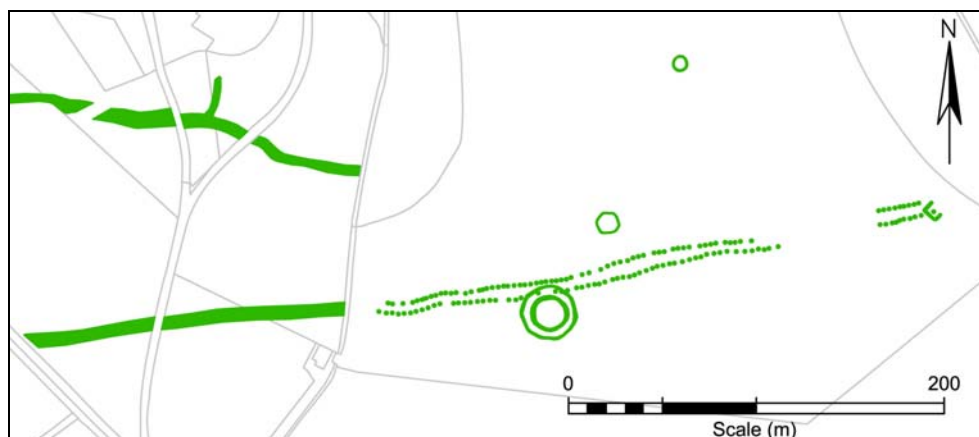


Figure 13. Transcription of a probable Iron Age/Roman pit alignment (1572160), overlying the ring ditch of a round barrow (1572158) and potential Iron Age square barrow (1580223). A hollow way on the same alignment of the pit alignment may be associated.

North of the confluence of the rivers Blithe and Little Blithe is a collection of three roughly parallel trackways (1574267 and 1574276), the longest of which is defined by parallel ditches and visible for approximately 570m, whilst the easternmost (1574276) is defined by a double pit alignment extending between the Little Blithe and Ash Brook. It is possible these trackways were also utilised as field boundaries. Nearby rectilinear enclosures (1574265 and 930252) are probably also associated with them.

Potential Iron Age funerary monuments were recorded in the form of square barrows. Four small rectilinear enclosures were identified as potential square barrows, all located in close association with other probable Iron Age features. The only complete square enclosure (77468) was located adjacent to a field boundary associated with a rectilinear enclosure (1580220), measuring 7.6m in width (Fig. 12. B). A second enclosure (1580223) is located at the east end of the visible extent of the probable Iron Age/Roman pit alignment described above (Fig. 13). The remaining two examples (1576182 and 1586901) are also associated with field systems of a similar date.

7.1.4 *Roman*

Definitively Roman evidence in the project area was sparse, consisting only of the road linking Rocester Roman town with Little Chester and Chesterton (1582086). The earthworks of the road are visible intermittently where the overlying medieval and/or post-medieval field boundary has been removed. Further probable Roman evidence exists in the field systems and enclosures described previously, use of which is likely to span into the Roman period or could potentially be of Roman origin.

7.2 **Medieval**

7.2.1 *Land-use and Settlement*

Evidence for medieval land-use is dominated by ridge and furrow, which is particularly extensive towards the north, but also dispersed across much of the project area. A rapid assessment of their current condition indicates approximately 35% of the probable medieval and reused medieval ridge and furrow survives as extant earthworks. The concentrations of ridge and furrow in the north appear to avoid the very highest areas of the Weaver Hills, favouring the adjacent marginally lower areas around Wootton and Stanton, and lower-lying areas of the River Dove around Mapleton and the River Churnet in the area south of the Churnet Valley (Fig. 14). The extent and concentration of medieval ridge and furrow was significantly less in the south, where it was largely dispersed in small concentrations, such as in the area of Drinton (1559519), or individual fields of earthworks.

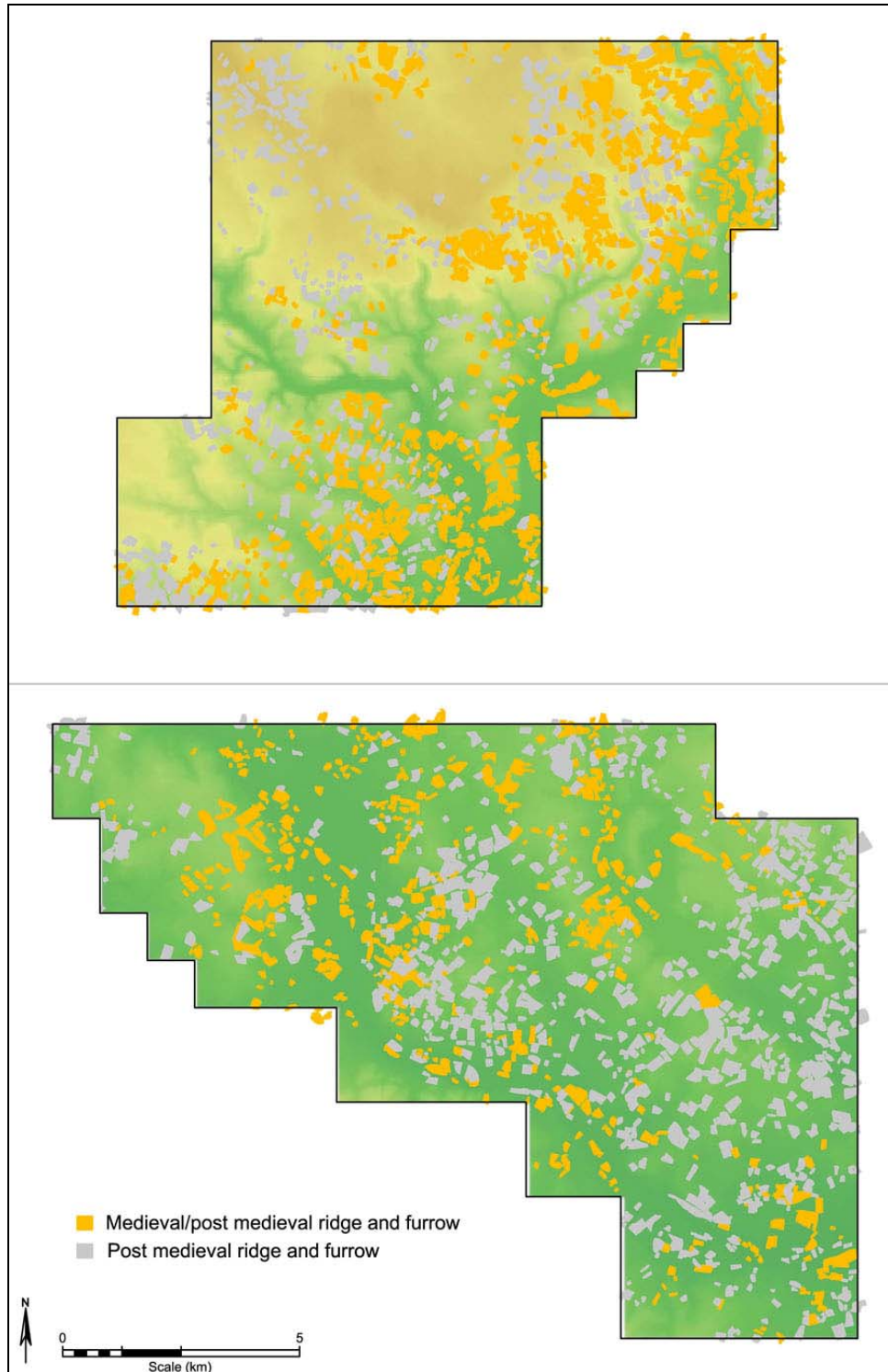


Figure 14. Distribution of medieval and/or reused medieval ridge and furrow and the Post-medieval Ridge and Furrow.



Figure 15. Wootton field system (307658).

DNR 2403/20 04-SEP-1986 © English Heritage (Derrick Riley Collection).

Evidence for field systems and more dispersed field boundaries is extensive, again generally avoiding the highest areas of land. Consisting of numerous field boundaries and/or lynchets, the field systems are most frequently associated with the existing pattern of field boundaries, where field boundaries have been removed to form larger fields such as an area of field system west of Norbury (1586043), field boundaries surrounding settlement evidence at Bradley in the Moor (1582699) and the area of Barrow Hill, north of Rocester (1585990). Less frequent are examples situated on a different alignment to the modern field system, such as an example north of Calwich Park (1585842) and the extensive area of field boundaries visible as cropmarks to the north of Shugborough Hall (1575492). The field system at Wootton (307658) is particularly extensive (Fig. 15), consisting of numerous fields of ridge and furrow defined by field boundaries and lynchets covering an area of approximately 3.5ha and probably associated with a hollow way and potential moat to the south (1585780). Lynchets are numerous in the northern area around Upper Mayfield (307483, 307478, 307461 and 1585368) and further north still is a dense cluster south of Thorpe (1585407). Lynchets are also found on the southern and northern slopes of the Weaver Hills around Ramshorn (1583270 and 1583252) and Cauldon (1583461). Several examples of field boundaries visible as cropmarks and formed at least in part by pit alignments appeared to be medieval date, such as an example east of Hill Ridware (1576263). A further two examples were more complex, with multiple phases of ditch and pit construction. Field boundaries, in part, associated with medieval ridge and furrow were recorded east of Hixon Airfield (1572202) (Fig. 16), and another example west of Hill Ridware (1576676) is located on a different alignment to a nearby

Iron Age/Roman enclosure and associated boundaries. It is possible these multi-phased field boundaries originated in the Iron Age/Roman period and were later re-cut.



Figure 16. Medieval/post-medieval field boundaries defined by ditches and pit alignments, and associated with medieval ridge and furrow, visible as cropmarks on oblique air photography

NMR 28051_58 30-JUN-2010 © English Heritage.

Settlement evidence within the project area is varied, and includes earthworks associated with existing or shifted settlements, moats and other enclosures. A clear example of settlement evidence was recorded at Norbury, in Derbyshire (1585979) (Fig. 17). Here crofts line the road Norbury Hollow to the south and platforms, field boundaries, ridge and furrow and a pond appear to be associated. Boundary banks and, in places, modified plough headlands form a hollow way between fields of ridge and furrow. Further evidence of multiple phases of use is notable in the presence of a possible stack stand overlying ridge and furrow. Similar earthworks are associated with the village of Mapleton (307531): a scheduled site. Here a number of crofts and the adjacent settlement boundary can be seen to extend west of the road that runs through the village, together with an extensive field system of ridge and furrow, field boundaries and lynchets surrounding the village. At Bradley in the Moors (1582699) earthworks of probable crofts and tofts extend from the existing boundary pattern of the modern settlement to the north. Elsewhere, field boundaries are the only potential evidence of the medieval origins of a settlement, such as those forming a field system surrounding the village of Hopton (1573672).



Figure 17. Norbury medieval settlement (1585979)

RAF/106G/UK/398 4004 17-JUN-1945 © English Heritage RAF Photography.

7.2.2 Enclosures

Fourteen rectilinear moats were recorded in the project area, most of which were located in the south. The moated enclosures vary in size quite considerably from the largest at Bagot's Bromley near Abbots Bromley (304818), measuring approximately 155m x 78m, to the smallest enclosing an area of approximately 20m square, located in farmland in Drointon (304904). The Drointon moat is one of two only 200m apart: the second, larger moat (304899) is located to the north-east and both are surrounded by numerous fields of ridge and furrow of medieval origin, a number of whose field boundaries have been retained to the present day. The moats are defined by a single enclosing ditch, and a number have elements of an adjacent outer bank, including Lower Booth (304928) and a previously unrecorded moat south-east of Tixall (1580123).

Several of the moats appear to have been associated with fishponds, including the poorly-preserved moat at Pipehall (304568) which is partially visible as a cropmark and the scheduled site of Handsacre Hall moat (304581), which contains the remains of the fourteenth century Hall (EH scheduling data) and is thought to be associated with a large fishpond approximately 300m to the south-west. The well-preserved moat at Ribden (305245) is located west of a probable former natural watercourse and appears to be associated with a water channel extending north to south (Fig. 18). The moat in Smyth's Plantation south of Okeover Park (307439) is located to take advantage of the natural watercourse, which in part defines the moated enclosure mapped from lidar.

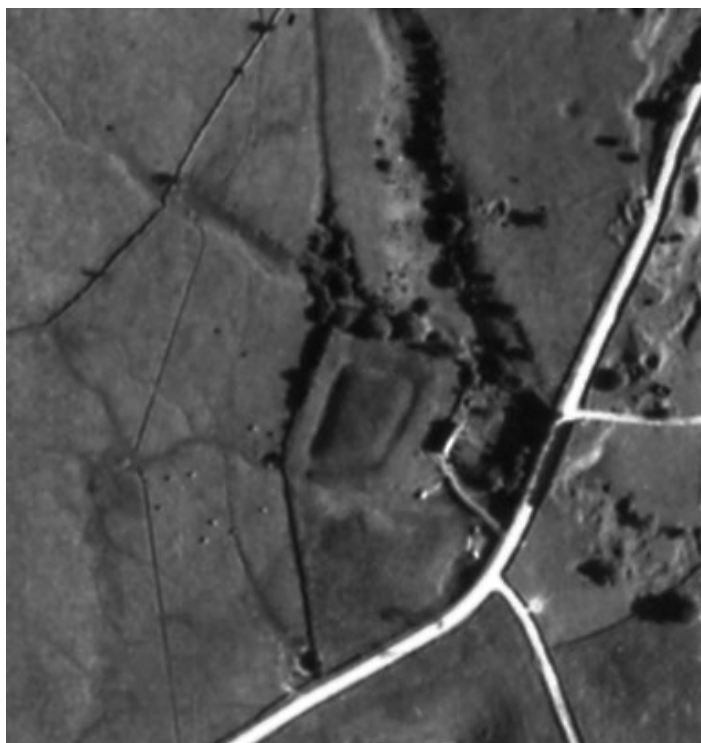


Figure 18. Ribden moat (305245)

RAF/106G/UK/398 4055 17-JUN-1945 © English Heritage RAF Photography.

A number of other enclosures of potential medieval origin was recorded within the project area, including a further two potential moated sites. The first is located south of Wootton (1585780) and is defined by hollow ways which appear to be associated with the previously described field system to the north (307658). The second site (1576541) is of similar size to the smaller moat examples in the project area and is visible as a cropmark in Rugeley. The remaining enclosures differed from the moated sites by their narrow defining ditches, such as the enclosure west of Rocester (1431625) and a double-ditch rectilinear enclosure near Mavesyn Ridware (1459416) (Fig. 19). The medieval origin of the latter is suggested because of the alignment with and close proximity to a potentially medieval former road (1459415). The internal enclosure ditch measures approximately 64m x 37m; post holes within this form a double pit alignment extending from the western arm of the enclosure, which could indicate the site of a former building. Elements of a probable Iron Age/Roman field system (1459418) are also visible across the site.

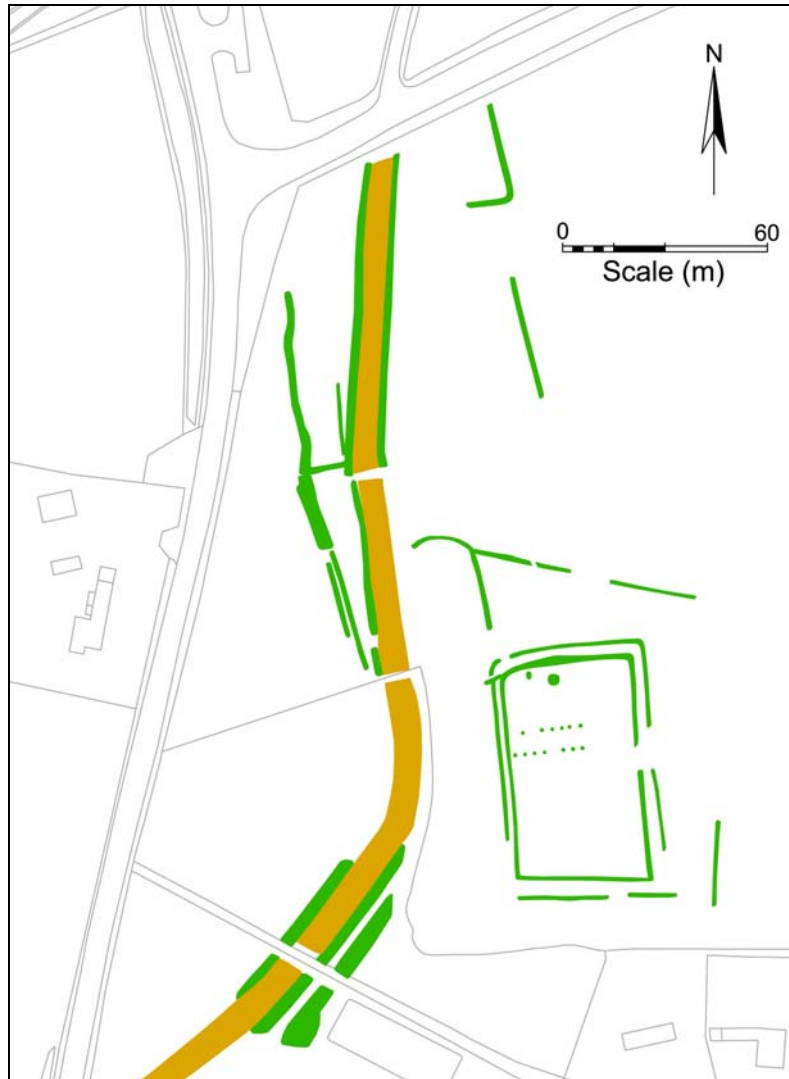


Figure 19. Possible medieval road (1459415) visible as earthworks and cropmarks and adjacent enclosure (1459416) visible as cropmarks.

7.2.3 Fortified Sites

Alton Castle (305392) is the only castle recorded within the project area. The site is located in the village of Alton, overlooking the Churnet Valley to the south. The castle was first built around 1175, by the lord of the manor of Alton, Bertrum de Verdun (Pevsner 1974, 59). Evidence of thirteenth and fourteenth century alterations are visible in the standing remains, and records show that it was dismantled during the Civil War (Cantor 1966, 42). The surviving elements consist of the curtain wall surrounding an oval bailey which is defined by the natural scarp on the north side and a rock-cut ditch to the south.

7.2.4 Monastic Sites

Two monasteries were mapped within the northern project area; Croxden Abbey (305014) and Rocester Abbey (307305). Croxden Abbey was a Cistercian monastery, land for which was granted by Bertrum de Verdun in 1179 (Brown and Jones 2009, 11). Elements of the monastery stand as a ruined building and more of the site is visible as excavated foundations (Fig. 20 and 22). Earthworks at the site include evidence of water management, comprising numerous leats, a large dam forming a pond, as well as a rectilinear enclosure, pillow mounds and a number of probable field boundaries, although some of these are likely to have post-medieval origins. In contrast, the Augustinian monastery Rocester Abbey is not known to have been subjected to archaeological investigation and the evidence consists of a small concentration of earthworks, including building platforms adjacent to earthworks of a probable post-medieval formal garden (1585198) and a post-medieval extractive pit that is likely to have been caused by the robbing out of the monastery building material (Fig. 24).



Figure 20. Croxden Abbey (305014)

NMR 20495/22 09-NOV-2005 © English Heritage.

7.2.5 Deer Parks

Two potential medieval deer parks were identified from the air photography, both within the parish of Okeover. The more substantial of the two is located within the landscape park of Okeover Park (1585560). Here multiple bank earthworks appear to partially enclose the central area of the Park (Fig. 21). Surrounded by ridge and furrow of mostly medieval origin, a plough headland to the north appears to have formed part of the enclosure. The proposed park pale terminates at a curvilinear enclosure of possible medieval origin (1585559) and hollow ways within the Park may also be associated with it. The second park pale (1584368) had not previously been recorded. The earthworks consist of a broad bank located to the east of and on the same alignment as the modern road north of Upper Mayfield situated in fields named Cornpark on historic Ordnance Survey mapping. The south-eastern end of the earthwork curves away from the road towards a natural gully, east of which additional bank earthworks extend towards the River Dove and may be associated (1585371).



Figure 21. Okeover medieval deer park (1585560), post-medieval landscape park (1585562) and potential Iron Age Roman field system (1585554), visible as earthworks

NMR 17263/30 19-MAR-1999 © English Heritage.

7.3 Post-Medieval and Twentieth Century

7.3.1 *Post-Medieval Land-Use and Settlement*

Post-medieval evidence of land-use is extensive and wide ranging, although distinguishing settlement evidence from earlier medieval earthworks and cropmarks is difficult, as many of these sites are likely to have been reused or continued in use during the post-medieval period. Evidence of arable cultivation of post-medieval date is dispersed, with more notable concentrations of ridge and furrow and narrow ridge and furrow occurring in the south. Post-medieval ridge and furrow expands onto the uplands west and east of the Weaver Hills. Earthwork survival of post-medieval ridge and furrow is poor at 21% (Fig. 14), resulting in a higher proportion surviving in the southern area where the effect of agricultural intensification has been greatest.

Although post-medieval field systems were identified on the air photography, much was recorded on historic Ordnance Survey mapping and was therefore outside the remit of the project. Post-medieval ridge and furrow and reused medieval ridge and furrow provides evidence for reuse, such as the field systems at Wootton (307658) and west of Norbury (1586043). An enclosure complex north-west of Swinscoe (1584574) is likely to be of post-medieval date. The site consists of a large subdivided rectilinear enclosure and associated trackways, with the enclosure measuring approximately 293m in length and varying in width between 66m and 171m, and the south-east extent of the enclosure being in part defined by a former watercourse. The complex does not appear to be associated with arable agriculture, although narrow ridge and furrow appears to partially overlie it, which may indicate a likely association with animal husbandry.

Other evidence of small-scale post-medieval land-use consisted of several pillow mounds, stack stands and probable sheep folds. Pillow mounds consisting of a pair of rectangular mounds with surrounding ditches were recorded in former woodland near Hollington (1580575), and a second pair was identified near Ramshorn (1583238). All four mounds were of similar dimensions and appeared to have been constructed on marginal land within or near woodland. A third more complex example at Croxden Abbey (305014) consisted of rectilinear banks surrounded by a larger bank-and-ditch defined enclosure which may also have formed warrens (Brown and Jones 2009, 23-24) (Fig. 22). Evidence for stack stands and sheep folds is equally infrequent and dispersed. Several stack stands were recorded within Ingestre Park (1580097) overlying medieval ridge and furrow, indicating a change of land-use from arable to pastoral farming here.



Figure 22. Croxden Abbey (305014)

NMR 20494/3 09-NOV-2005 © English Heritage.

After ridge and furrow the most abundant evidence for post-medieval land-use consisted of bedwork water meadows. These were concentrated in the south, and were extensive in places, particularly lining the River Trent. The extent and form of the earthworks varied considerably, from narrow corridors of earthworks adjacent to a watercourse, for example near Weston (1575521 and 1575644) or east of Little Ingestre (1580106), to large expanses of more than 20ha, such as the site south-west of Colwich (1578184) situated within a bend of the River Trent and extending across more than 30ha. The limit of the water meadow here is difficult to establish due to the presence of medieval ridge and furrow, which appears to have been incorporated into the water meadow system together with areas of a more typical regular layout of water channels.

Variations in water meadow form are evident in another extensive site at the confluence of the rivers Trent and Sow (1580102). The area is divided by the Staffordshire and Worcestershire Canal, to the north of which the water channels are arranged in an irregular herringbone layout, defined by faint earthworks; within this, small areas have been re-cut with water channels of a rectilinear layout (Fig. 23). South of the canal, a well-defined rectilinear system of water channels respects the path of the canal and obviously post dates its construction of 1772. It was clearly planned to fill the area between the River Sow and the canal, similar in nature to another example north of Great Haywood (Fig. 23).

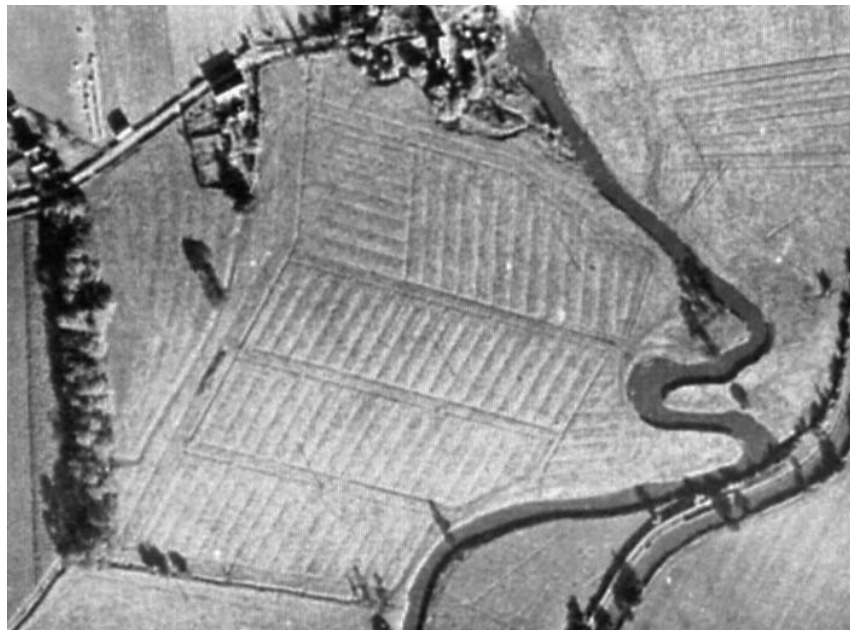


Figure 23. Post-medieval water meadows. Top: herringbone layout of drains (1580102) surrounding a moat (1580123) near Tixall. RAF/542/9815/142 15-DEC-1954 © English Heritage RAF Photography. Below: rectilinear plan (1580106) north of Great Haywood. RAF/S621/6 20-OCT-1941 © English Heritage RAF Photography.

Landscape parks and gardens are a common feature in Staffordshire and a large number fell within the project area. Probable post-medieval earthworks and cropmarks were mapped in a number of the parks, including garden features in Shugborough Park (1145400) and possible carriageways in Ingestre Park (1575946 and 1575641). Within Okeover Park (1585562) garden features included a rectilinear platform located on a potentially medieval enclosure (Fig. 21) and a terraced garden to the south of the walled garden associated with the Hall.

Features of a formal garden within a field under pasture in Rocester (1585198) form a near square-shaped raised earthwork divided into four quadrants surrounding a central platform, and separated by a ditch (Fig. 24). It is suggested the garden features relate to a property known as Rocester Hall, recorded by the Hearth Tax in 1666, the precise location of which is not known (Taylor 2014, 35). The garden features are adjacent to earthworks thought to be associated with Rocester Abbey. The crisp nature of the garden feature earthworks, in comparison to those of the Abbey, indicates a later date. Potentially the garden features may have been a reused part of the Abbey foundations.



Figure 24. Earthworks associated with the medieval monastery of Rocester Abbey (307305) and post-medieval garden features (1585198)

NMR 20451/1 09-NOV-2005 © English Heritage.

7.3.2 Industrial Activity

The Weaver Hills and surrounding uplands saw extensive limestone quarrying from the post-medieval period (Fig. 25). The large-scale extraction and transportation of limestone began in the second half of the eighteenth century, when the Caldon Branch of the Trent and Mersey Canal was built. A series of tramlines were constructed between 1777 and 1849 linking the Caldonlow Quarries (1583292) and the canal at Froghall, where the limestone was processed before transportation (Sherlock 1976, 100). Many elements of the tramlines were visible as earthworks (305338), the paths of which were mapped to the extent of the project area.



Figure 25. Caldonlow Quarries (1583292) within which multiple phases of extraction are visible together with surrounding small-scale extraction and processing (1583308)

RAF/106G/UK/398 4057 17-JUN-1945 © English Heritage RAF Photography.

In addition to the large-scale evidence of limestone extraction and processing, 36 small lime kilns and associated quarries were recorded within the north of the project area. Of these 16 were nucleated in the immediate area south of or within the modern extent of Caldonlow Quarries (1583308) (Fig. 26), now a cement works. The lime kilns were mostly visible as earthwork mounds and many had inclined trackways extending from the quarry to the kiln top. Kilns were visible as structures at two of the sites, one west of Blore (1583815) and another near Weaver Farm (1583761). Modern quarrying has extended south across the Weaver Hills, where Wardlow and Kevin quarries have merged into a single 10ha site (1583183).



Figure 26. Lime kiln and quarrying south of Caldonlow Quarries (1583308)

RAF/106G/UK/398 4057 17-JUN-1945 © English Heritage RAF Photography.

Other forms of extraction consisted of dispersed sandstone and sand and gravel quarries, small in scale until the twentieth century when areas were targeted for more extensive extraction towards the west of the project area, north and south of the Churnet Valley (1580500 and 1583062). Clay pits usually associated with Brickworks or similar production sites were frequent in the south, such as those in Armitage and Handscare (1576551, 1576549 and 1576028). Marl pits were numerous, but few were over 0.5ha in size and mapped; these were dispersed across much of the south of the project area (such as 1576385 and 1579447).

Sporadic evidence for mining within the project area took the form of copper, coal, lead and zinc extraction, targeting local mineral seams. The earliest documentary evidence for the scheduled site of Thorswood Mines (1573457) dates to the late seventeenth century and is known to have been mined for copper, lead and zinc (EH scheduling). The earthworks of the mine shafts, associated shaft mounds and one of the four or five recorded winding circles, also known as gin circles, were mapped (Barnatt *et al.* 2013, 78) (Fig. 27).

In the Weaver Hills, west of Thorswood, numerous further mines were mapped and recorded by the type of mining depicted on Ordnance Survey historic mapping or other sources. These included linear clusters of lead mines (1583151, 1583186 and 1583233), a rake (1583175) and nearby copper mines of a more dispersed nature (1583273 and 1583275). Copper, lead and some zinc ores were mined from the Ribden Mine (Ford 2000, 18) south of the Caldonlow Quarries, and were already active by the

1680s to 1862 (Sherlock 1976, 101). Here a large shaft, associated with a trackway, large spoil heap and probable reservoir were mapped together with numerous linear mine shafts and a rake in the surrounding area (1462764).

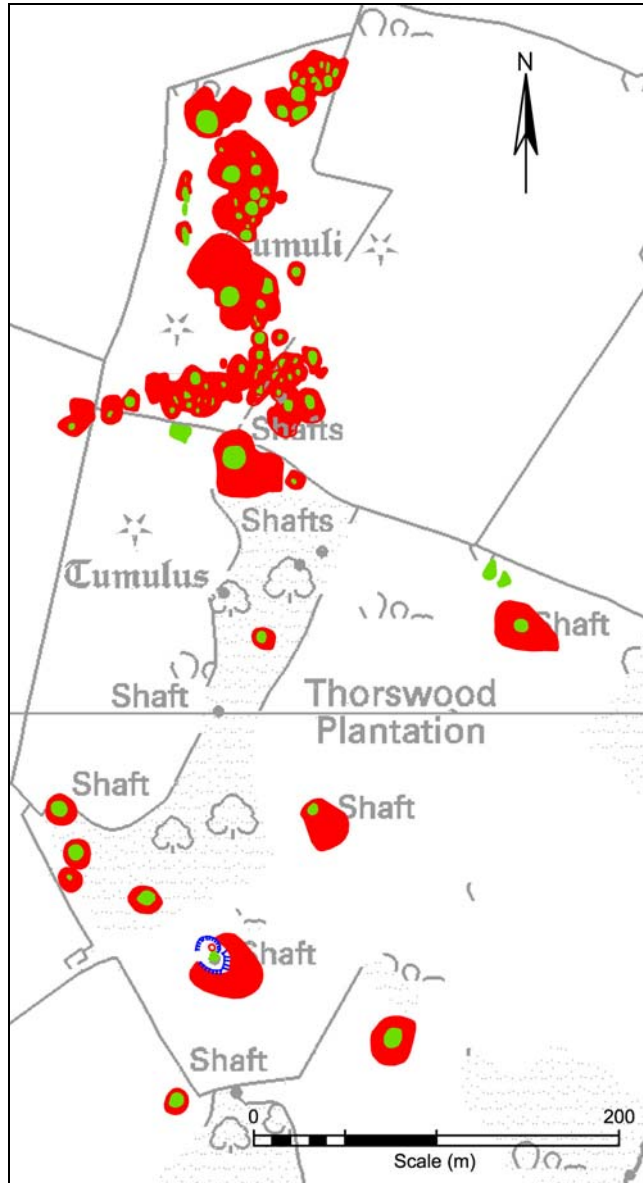


Figure 27. Thorswood Mines (1573457) mapping. The locations of additional shafts, masked by tree cover on the air photography, are indicated on the OS mapping background.

Further evidence of mining included two areas of coal mining, previously unrecorded, in Upper Cotton (1583104); the largest concentration was located on the northern slope of Beelow Hill (1583106 and 1583109). Many more mapped mine shafts and prospecting pits were not recorded on historic Ordnance Survey mapping and the extracted mineral could not be identified from geology mapping. These were dispersed

across the north, and included earthworks on The Dale (1583677) and a small concentration of since levelled mines near Dale House Farm (1583834).

7.4 Military Features

The military sites were identified from the 1940s and 1950s RAF photography. The sites frequently consisted of ephemeral features quickly removed after the war, for which the RAF photography provides a unique record of local military activity.

7.4.1 First World War

Practice trenches at two sites formed the only visible military activity of probable First World War origin; the majority of military evidence was associated with the Second World War. Both sites are in the southern project area and are small-scale, isolated features. The first is on the northern edge of the Cannock Chase AONB (1578406). The practice trench appears to have been constructed by modifying and extending a weir visible on historic Ordnance Survey mapping (Fig. 28). Further practice trenches of a similar form were recorded in the grounds of Ingestre Park, to the south of the Hall (1580098), located outside the main area of Second World War activity described below.

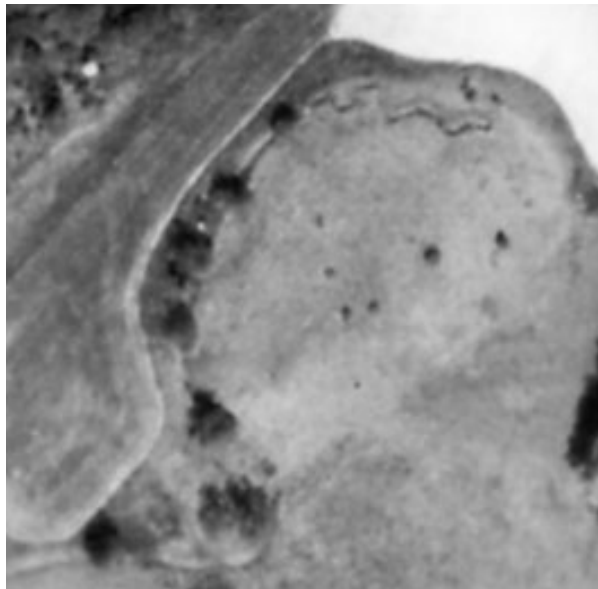


Figure 28. First World War practice trench constructed by modifying a weir (1578406)

RAF/541/28 4299 17-MAY-1948. © English Heritage RAF Photography.

7.4.2 Second World War

The Second World War military activity was concentrated in the south, where the largest area of activity is associated with RAF Stafford, now MoD Stafford (1573651). Here an extensive military camp and associated satellite camps consisted of military buildings and roads, pillboxes, air raid shelters, emergency water supplies and a nearby firing range (1574366).



Figure 29. Abbots Bromley grass airfield (1383061)

RAF 541/28 3183 17-MAY-1948 © English Heritage RAF Photography.

Hixon Airfield (1397674) is one of two military airfields in the project area. Many associated camps and a nearby probable vehicle depot (1575610) were recorded to the south of the airfield and in the northern estate grounds of Ingestre Hall. The second airfield, at Abbots Bromley (1383061), was a grass airfield in use between 1940 and 1945 as a relief landing ground for training units, including the Elementary Flying Training School (Delve 2007, 21). The airfield hangers and other buildings, access road and an earthwork marker in the form of a raised cross (Fig. 29) were recorded from 1948 photography when the site had already reverted back to farmland. The airfield continued in use until 1949.



Figure 30. Alton Park (1582620) military training ground, above showing full extent, below the training ground in greater detail

RAF/106G/UK/398 4048 17-JUN-1945 © English Heritage RAF Photography.

A number of military camps was located in the grounds of parklands within Shugborough Park (1580149), Blithfield Park (1578088) and Alton Park (1582620). The latter was the site of a cadet officer training school. (Fig. 30) The main area of the camp was recorded in an area of former garden and woodland south of the manor house within Bunbury hillfort and consisted of numerous military buildings, roads and an emergency water supply tank. Additional military buildings and an area of hard

standing were mapped to the north of the manor house and ponds. A third area of activity was mapped in parkland to the east, comprising practice trenches, weapons pits, and barbed wire obstructions.

Small-scale evidence of defensive sites was identified in the form of gun emplacements (1585242 and 1416345). Two searchlight batteries were also recorded, one in farmland to the south-east of Thorpe (1559475) and a second better defined site was recorded on Wolseley Road to the north-west of Rugeley (1578108), comprising four searchlights defined by circular embanked earthworks, a gunpost, trackway and associated buildings. One of the searchlight earthworks appears to be still extant on 2010 vertical photography. Also located on Wolseley Road, was a Standard Type Prisoner of War Camp (1473998). The Prisoner of War camp was in use until 1947 and the site has since become a sewerage works, still in use today. Other small-scale wartime features consisted of a number of air raid shelters recorded in Rugeley (1579672 and 1579670) and bomb craters (1578122 and 1580144).

7.4 Features of unknown date

Features of unknown date consist of usually isolated features, lacking definitive features for dating purposes and frequently of potential natural origin; these included a number of small mounds (1573663, 1573722, 1575643 and 1575647) and elements of linear and curvilinear ditches not obviously assignable to a period (such as 1573684, 1576161 and 1576164).

7.5 Discussion

7.5.1 Later Prehistoric and Roman periods

This mapping project has recorded a wide variety of archaeological sites across the project area, indicating some distinct patterns of land-use. Whilst the Neolithic activity appears sparse, it forms a concentration of potential monuments focused in the area of the Mavesyn Ridware causewayed enclosure, which is likely to have subsequently become a focus for Bronze Age round barrow construction and, potentially, later land division (Fig. 31).

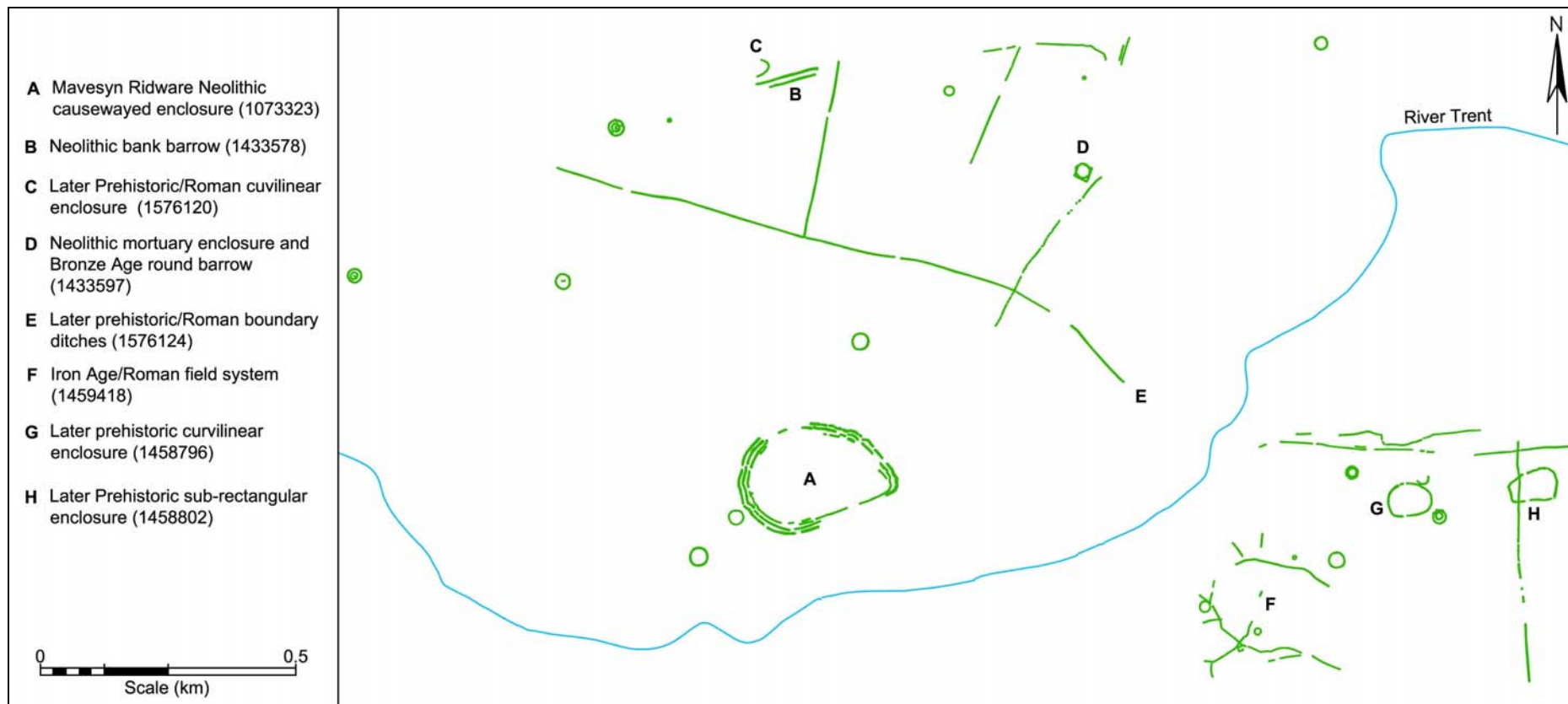


Figure 31. The Trent Valley Prehistoric landscape.

The Mavesyn Ridware enclosure is one of only two causewayed enclosures recognised in the West Midlands (Barber 2007, 89); the second, 7km south-east at Alrewas, is a Scheduled Monument and of similar form. Both enclosures are defined by at least three closely spaced ditch circuits, forming an egg-shape enclosure of similar size, located near the River Trent (Oswold, *et al* 207, 68). Continued research into potential Neolithic enclosures in the north of Britain suggests a greater diversity of form than previously identified (Waddington 2001, 10), increasing the potential for further Neolithic enclosures to be identified in the region in the future. Despite this, the Mavesyn Ridware and Alrewas enclosures remain relatively isolated examples of a similar construction (Oswold, *et al* 207, 109) and warrant further investigation.

As with the causewayed enclosures, the dating of the remaining Neolithic monuments is based entirely on morphology. This needs further analysis: for example, the proposed nearby bank barrow at Hill Ridware is a rare form of monument (Field 2011, 3) which is difficult to distinguish from cursuses (Barber, 2007, 84). The causewayed nature of the enclosure ditch, similar to the causewayed enclosure, is not an uncommon feature observed in some long barrows and mortuary enclosures (Oswold, *et al* 207, 78 Fig. 4.27).

The Bronze Age evidence shows a considerable bias towards funerary monuments. The distribution of round barrows is either focused in the low-lying river valleys or displays a preference for prominent upland locations such as the Weaver Hills. The contrast in earthwork survival is also equally apparent, with earthwork remains almost entirely surviving on the uplands and very few earthwork examples in the south, defined instead by the presence of ring ditches visible as cropmarks.

The barrows located in the Trent Valley more frequently form dispersed groups, or cemeteries of round barrows, and are otherwise dispersed in both project areas, following a similar pattern observed in both the adjacent National Forest NMP (Macleod 1995, 24) and investigations of the Catholme Ceremonial Complex (Chapman *et al* 2010, 138). The highest concentrations of barrows in the Trent Valley are in the area of the Mavesyn Ridware enclosure. The recording of the levelled round barrows in the area from cropmarks has demonstrated further the variability of these monuments, with at least eight of the barrows defined by polygonal ring ditches and eight examples of double ditch defined barrows (four of which are both). The two sites with potential evidence of a more elaborate form of construction demonstrate further the complexity of the monuments.

The funerary evidence is substantially greater across the project area in comparison to that of settlement and land-use of Later Prehistoric and Roman date. Whilst dispersed

evidence was recorded across the southern cropmark producing area, very little was identified towards the north. The exception, a field system in Okeover Park, has been protected within the Park grounds and is visible within an area void of ridge and furrow earthworks. Given the greater preservation of earthworks on the northern uplands it is surprising more evidence for settlement or field systems was not identified. This may in part be explained by the greater survival of medieval earthworks masking the earlier features. This is supported by the recording of findspots, particularly of Roman date, which are concentrated in the parishes of Wootton and Alton, in addition to the expected concentration at Rocester, suggesting that Roman activity was more extensive than the aerial survey results alone suggest.

7.5.2 Medieval period

The medieval archaeological remains in the project area consist of a combination of settlement remains and field systems, including lynchets and, most commonly ridge and furrow earthworks. Aerial survey has provided evidence of the intensive nature of medieval settlement and land-use in the north, which was likely to have been equally as intensive in the south but has been destroyed or masked by intensive modern farming and continued settlement use. The expansion of medieval farming onto the less favourable soils and the construction or formation of lynchets on the valley sides in the northern area may suggest an increase in land pressure. Fewer moats and other suggested medieval enclosures were recorded towards the north where settlement evidence consisted of small villages or hamlets.

The number of recorded medieval sites has increased considerably, for example the newly recorded settlement evidence at Bradley in the Moors, a previously unrecorded moat near Tixall, and the enhanced extensive nature of the field system at Wootton. Earthworks identified as needing additional archaeological investigation include the probable Rocester Abbey earthworks. The evidence here of platforms, including building platforms, boundary banks and other amorphous earthworks, would benefit from a detailed earthwork and geophysical survey. This could incorporate the adjacent post-medieval garden features, to understand better the relationship between these features and investigate the reuse of the Abbey site. Another multi-phased site that would benefit from further study is Okeover Park, where there is evidence of one of the two suggested park pales within the project area, together with a potential medieval enclosure.

7.5.3 Post-Medieval period

This period was predominantly defined by the intensification of existing medieval sites of settlement and land-use, with large-scale introduction of complex systems of water meadows and industrial activity. The extensive nature of the water meadows along the

river valleys suggests these formed an important element of post-medieval farming practices in these lowland alluvial plains.



Figure 32. Flooded water meadow near Tixall (1580102) showing an unusual amount of earthwork definition

RAF/542/9815/142 15-DEC-1954 © English Heritage RAF Photography.

The varied nature of water meadow morphology, together with the variable degree of earthwork survival, similarities to and the reuse of ridge and furrow earthworks, caused difficulties identifying sites and their extent. It is possible some elements of water meadows were recorded as ridge and furrow due to a lack of visible evidence of associated water channels. Elsewhere, substantial drains potentially linked with water meadows had no surviving associated system of water channels to identify them as such and were not mapped. The recording of the water meadows relied heavily on their identification from early RAF photography which was of variable quality. In some areas the photography depicted excellent earthwork definition, for example when flooded (Fig. 32). It is likely the extent of water meadows is greater than that identified through this survey, as suggested by a desktop survey of the county based primarily on mapping data (Breeze *et al.* 2008). As previously discussed, the variation of water meadow sites in terms of extent and layout differed considerably. Further ground investigation of the form and surviving structural remains could provide a better indication of their development and use, especially in an area of England where water meadow construction had until recently been overlooked (see Breeze *et al.* 2008). Water meadows are known to have been used from at least the medieval period, but the main period of development was of post-medieval date (Taylor 2007, 31). The

apparent reuse of medieval ridge and furrow in some cases, in itself indicates the suitability of the earthworks to form water meadows, and emphasises the possibility of earlier simpler forms of irrigation, such as 'floating upwards' systems using dams as a method of flooding meadowland (*ibid* 29).



Figure 33. Ribden Mines (1462764) surrounding Ribden Low round barrow (305193), Weaver Hills

NMR 17487/34 17-JUL-2000 © English Heritage.

The post-medieval period saw increasingly intensive limestone extraction on the Weaver Hills, progressing from local workings of small quarries and associated kilns into a large-scale industrial process from the mid-eighteenth century onwards at the Caldonlow Quarries (Fig. 34) with associated tramways for transportation to Froghall Wharf. Mineral extraction is also recorded in small quantities at Caldonlow during the eighteenth century in the form of iron (Ford 2000, 18); however, evidence of this is likely to have been quarried away since it was not observed on the air photographs. Post-medieval mining was mapped in the north of the project area, consisting of mostly small-scale activity (Fig. 33). Evidence from excavation elsewhere in Staffordshire records copper extraction during the Bronze Age and medieval periods at the Ecton Hill mines (Timberlake 2013, 1) and lead mining in the Peak District from the medieval period (Barnatt and Rieuwert 1998, 63). The earliest known evidence for mining in this area is associated with the Thorswood mines dated to the late seventeenth century from documentary sources. Whilst it is possible mining activity within the project area predated the post-medieval period, evidence for this was not observed from the aerial survey.



Figure 34. Caldonlow Quarries (1583292) and medieval/post-medieval lynchets (1583461) viewed from the north

NMR 17486/28 17-JUL-2000 © English Heritage.

7.5.4 Twentieth Century

Industrial activities continue to have a huge impact on the area, in the form of large-scale extraction of limestone, sandstone, shale and sand and gravels. The photography forms evidence of the destruction of three probable round barrows (including Wardlow 3051988, Fig. 35), whilst the HER database records many more that have been removed by quarrying predating the aerial photography. The aerial survey also forms an important record of the Second World War military activity in the area, most of which has since been destroyed, such as the military camps located in the grounds of landscape parks including Alton Towers. The concrete hard standings, usually for former military buildings, are all that survive at a number of sites, as at the

Prisoner-of-War camp near Rugeley, now a sewage works. More extensive remains survive of the Hixon Airfield, including the concrete runway and control tower used today as an office.



Figure 35. Ward Low round barrow under excavation prior to its destruction (3051988).

DNR 2403/15 04-SEP-1986 © English Heritage (Derrick Riley Collection).

7.5.5 *Project Outcomes*

The project has produced high-quality mapping and recording of the identified archaeological monuments, highlighting the variability of the archaeological record in this area. In particular, the aerial survey highlights the complexity of the concentration of Later Prehistoric monuments in the area of the Mavesyn Ridware causewayed enclosure and has identified a number of other sites in need of additional investigation to better understand the dating and nature of the remains, which have been recorded based solely on comparative morphology to excavated sites elsewhere.

The mapping highlights the considerable impact land-use has had on earthwork survival and visibility. The largely cropmark-defined features recorded in the south provide the majority of the Iron Age/Roman period evidence, in contrast to the largely medieval and post-medieval dominated northern area recorded from extant earthworks. This distribution pattern is likely to be somewhat skewed: it is probable that the good earthwork survival in the north is masking earlier features, not visible from the aerial survey. The earthwork survival in the south is poor, largely the result of intensive

arable farming. A good example of the effect of ploughing was identified at the Iron Age/Roman enclosure and probable hut circle at Abbots Bromley (Fig. 36); here, unusually good lighting conditions for earthwork definition were observed on 1948 RAF photography and subsequent oblique photography of the site taken in 2005 shows the features to have been largely ploughed out.

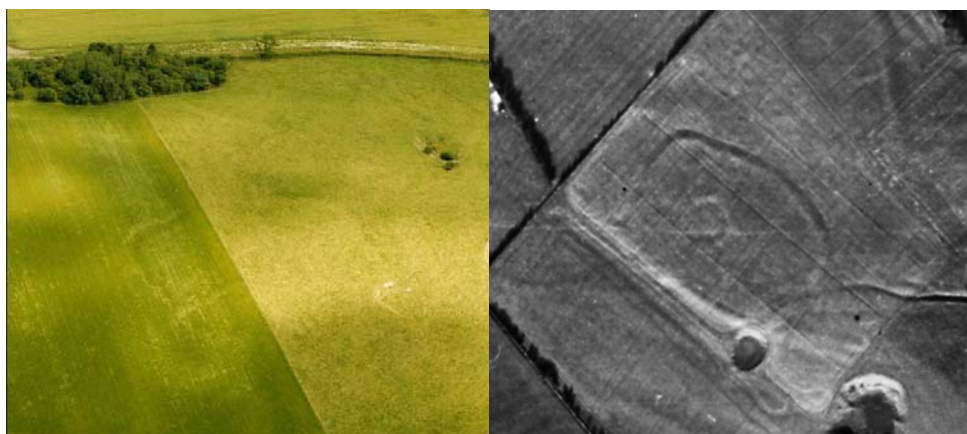


Figure 36. Abbots Bromley Iron Age/Roman enclosure and hut circle

Left: NMR 20342/11 08-JUL-2005 © English Heritage Archive. Right: RAF 541/215 3142 15-DEC-1948 © English Heritage RAF Photography.

The first phase of the project has produced a high-quality digital map of the archaeological landscape, an asset to inform future planning decisions and management which will be built upon with the second phase.

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APPENDIX 1 1:10,000 MAP SHEETS

MAP	BLOCK	AUTHOR	Km Squares	Collection Numbers
SJ 92 NE	1	DK	15	EHC01/221; AF00376
SJ 92 NW	1	DK	5	
SJ 92 SE	1	DK/SB	16	
SJ 92 SW	1	SB	1	
SK 01 NE	1	SB	25	
SK 01 NW	1	SB	4	
SK 02 NE	1	SB	9	
SK 02 NW	1	SB	15	
SK 02 SE	1	SB	25	
SK 02 SW	1	SB	25	MD003246
SK 03 NE	2	SB	10	
SK 03 NW	2	SB	4	
SK 04 NE	2	SB	25	
SK 04 SE	2	SB	25	
SK 04 SW	2	SB	4	
SK 13 NW	2	SB	4	
SK 14 NE	2	SB	9	
SK 14 NW	2	SB	25	
SK 14 SE	2	SB	1	
SK 14 SW	2	SB	18	

APPENDIX 2 AUTODESK MAP LAYERS AND DRAWING CONVENTIONS

Layer Name	Layer content	Attached data tables	Layer colour	Line type
0	None (AutoCAD Map 3D 2008 requirement)	none	7 (white)	CONTINUOUS
BANK	Closed polygons for features such as banks, platforms, mounds and spoil heaps	MONUMENT	1 (red)	CONTINUOUS
DITCH	Closed polygons for cut features such as ditches, ponds, pits or hollow-ways	MONUMENT	3 (green)	CONTINUOUS
EXTENT_OF_FEATURE	Closed polygons outlining complex or extensive remains such as mining or military installations	MONUMENT	30 (orange)	CONTINUOUS
MONUMENT_POLYGON	Closed polygons encircling all the features recorded within a single NRHE record	MONUMENT	7 (white)	CONTINUOUS
RIDGE_AND_FURROW_ALIGNMENT	Polyline showing the direction of ploughing of ridge and furrow	MONUMENT	4 (cyan)	CONTINUOUS
RIDGE_AND_FURROW_AREA	Closed polygon defining the furlongs or extent of area of ridge and furrow	MONUMENT	4 (cyan)	CONTINUOUS
STRUCTURE	Closed polygons for built features including concrete, metal and timber constructions such as military installations	MONUMENT	190 (purple)	CONTINUOUS
THACHURE	Polyline T-hachure convention to schematize sloped features indicating the top of slope and direction of slope	MONUMENT	5 (blue)	CONTINUOUS

APPENDIX 3 AUTODESK MAP DATA TABLES

MONUMENT DATA TABLE

The Monument Data table consists of nine fields that were input directly through AutoCAD Map 3D 2008. The content of these fields follows those that are entered in the NRHE database.

FIELD NAME	FIELD CONTENT	Sample data
MONARCH	NRHE Unique Identifier (UID)	307658
PERIOD	Date of features (EH Thesaurus)	MEDIEVAL/POST-MEDIEVAL
NARROW_TYPE	Monument type (EH Thesaurus)	FIELD BOUNDARY
BROAD_TYPE	Monument type (EH Thesaurus)	FIELD SYSTEM
EVIDENCE_1	Form of remains (EH Thesaurus) as mapped	EARTHWORK
PHOTO_1	Reference for the photograph from which the feature was mapped and the date of photography	DNR 2403/26 04-SEP-1986
EVIDENCE_2	Form of latest evidence (EH Thesaurus) as mapped	LEVELLED EARTHWORK
PHOTO_2	Reference for the photograph from which the latest evidence was taken	Next Perspectives PGA Imagery SK1045 16-AUG-2010
HER_NO	Staffordshire HER record number where applicable.	MST1965

APPENDIX 4 MONUMENT TYPES USED IN THE PROJECT

AIR RAID SHELTER	LEAT
AIRFIELD	LIME KILN
AIRFIELD BUILDING	LIMESTONE QUARRY
AUGUSTINIAN MONASTERY	LYNCHET
BANK (EARTHWORK)	MARL PIT
BANK BARROW	MILITARY AIRFIELD
BARBED WIRE OBSTRUCTION	MILITARY AIRFIELD
BEACON	MILITARY BUILDING
BOMB CRATER	MILITARY CAMP
BOUNDARY BANK	MILITARY DEPOT
BOUNDARY DITCH	MILITARY ROAD
BOWL BARROW	MILITARY TRAINING SITE
BRICK AND TILE MAKING SITE	MINE
BRICKWORKS	MOAT
BUILDING PLATFORM	MORTUARY ENCLOSURE
CARRIAGEWAY	MOUND
CASTLE	NARROW RIDGE AND FURROW
CAUSEWAYED ENCLOSURE	PARK PALE
CISTERCIAN MONASTERY	PARK PALE/PLOUGH HEADLAND
CLAY PIT	PILLOW MOUND
CLAY WORKINGS	PIT
COAL MINING SITE	PIT ALIGNMENT
COPPER MINE	PLATFORM
CROFT	PLOUGH HEADLAND
CURTAIN WALL	POND
CURVILINEAR ENCLOSURE	POST HOLE
DAM	POTTERY WORKS
DEER PARK	PRACTICE TRENCH
DITCH	PRISONER OF WAR CAMP
DRAIN	PROSPECTING PIT
EMERGENCY WATER SUPPLY	QUARRY
ENCLOSURE	RAKE
ENGINE HOUSE	RECTILINEAR ENCLOSURE
EXTRACTIVE PIT	RESERVOIR
FIELD BOUNDARY	RIDGE AND FURROW
FIELD BOUNDARY/DRAIN	ROAD
FIELD BOUNDARY/HOLLOW WAY	ROUND BARROW
FIELD SYSTEM	ROUND HOUSE (DOMESTIC)
FIRING RANGE	ROYAL OBSERVER CORPS SITE
FISHPOND	SALT WORKS
GARDEN FEATURE	SAND AND GRAVEL EXTRACTION SITE
GARDEN PATH	SANDSTONE QUARRY
GARDEN TERRACE	SEARCHLIGHT BATTERY
GRAVEL PIT	SEARCHLIGHT EMPLACEMENT
GUN EMPLACEMENT	SETTLEMENT
GUNPOST	SHAFT
HA HA	SHAFT MOUND
HARD STANDING	SHALE QUARRY
HOLLOW WAY	SHEEP FOLD
HUT CIRCLE	SIGNAL SQUARE
LANDSCAPE PARK	SPOIL HEAP
LEAD MINE	

SQUARE BARROW
SQUARE ENCLOSURE
STACK STAND
SUBRECTANGULAR ENCLOSURE
TERRACED GARDEN
TOFT
TRACKWAY
TRAMWAY
TREE RING
UNIVALLATE HILLFORT
VENTILATION SHAFT
WATER CHANNEL
WATER MEADOW
WEAPONS PIT
WINDING CIRCLE