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HADRIAN'S WALL WORLD HERITAGE SITE
NATIONAL MAPPING PROGRAMME PROJECT

NATIONAL MAPPING PROGRAMME SUMMARY REPORT

Matthew Oakey

AERIAL SURVEY
AND INVESTIGATION

ENGLISH HERITAGE

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SUMMARY REPORT

Matthew Oakey

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SUMMARY

This report describes the specification and methodology for the mapping and recording followed by an overview of selected results from the Hadrian's Wall National Mapping Programme (NMP) project . The project ran from 1 June 2002–15 July 2008 and encompasses the entire area of the Hadrian's Wall World Heritage Site (WHS) and its immediate hinterland. It covers 69 Ordnance Survey 1:10,000 scale quarter sheets spanning the counties of Cumbria, Northumberland and Tyne and Wear.

Digital maps at a nominal scale of 1:10,000 and supporting records were created by English Heritage's Aerial Survey & Investigation teams based in York and Swindon. The project identified and mapped sites varying in date from a potential Neolithic henge through to 20th-century military remains. New records were made for 2748 sites and a further 806 existing records were enhanced.

CONTRIBUTORS

Mapping and recording was carried out by Sharon Bishop, Yvonne Boutwood, Edward Carpenter, Ann Carter, Dilwyn Jones, Antonia Kershaw, Matthew Oakey, Fiona Small, Cathy Stoertz and Jane Stone of English Heritage Research Department's Aerial Survey & Investigation team. Emma Pickford, Mel Partlett and Shona Williams participated as part of the English Heritage Professional Placements in Conservation (EPPIC) scheme.

ACKNOWLEDGEMENTS

English Heritage would like to thank Tim Gates for supplying his gazetteer of sites to accompany his air photo mapping for parts of the Hadrian's Wall corridor. Also for sharing his expertise in providing some training and allowing the use of his air photographs in PowerPoint presentations. Thanks are also due to all members of the Liaison Group for their advice throughout the project; the staff at the Northumberland National Park, Cumbria, Tyne and Wear and Northumberland HERs and the Museum of Antiquities, University of Newcastle; Chris Going of GeoInformation Group; Roger J C Thomas of English Heritage for advice on military remains and the Enquiry and Research and Air Photography library staff at the NMR.

This project was carried out in collaboration with Cambridge University's Unit for Landscape Modelling (ULM), Cumbria HER, Northumberland HER and the Museum of Antiquities, University of Newcastle: their contribution being the loan of air photographs and supplying HER data.

Cover photograph: detail from NMR NY 7968/178 20534/27 31-MAR-2006 © English Heritage. NMR

ARCHIVE LOCATION

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DATE OF SURVEY

1 June 2002–15 July 2008

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INTRODUCTION

The Hadrian's Wall World Heritage Site Management Plan 1996–2001 stressed the need to take a holistic view of the Wall and its setting and the need for a proper research strategy (English Heritage 1996, 5.2.1). The digital mapping of all aerial photography of the World Heritage Site (WHS) was listed as an action under Policy 13 of the Hadrian's Wall World Heritage Site Management Plan 2002–2007 (English Heritage 2002, 84).

The Hadrian's Wall NMP project (AMIE Event UID: 1360986) aimed to enhance the understanding of and assist the management of the WHS through comprehensive, consistent and accurate recording of both the WHS and its setting zone (Kershaw 2002, 6). It is intended that the results of the project will feed into the planned Geographic Information System (GIS) for Hadrian's Wall as well as English Heritage's corporate GIS.

The aim of the National Mapping Programme is to increase our understanding of the historic environment. It achieves this by identifying, interpreting, mapping and recording all probable and possible archaeological features visible on air photographs as cropmarks, soilmarks, parchmarks and earthworks. Digital maps, at a nominal scale of 1:10,000, and supporting records were produced by the mapping project (AMIE Parent Collection UID: EHC01/010). The project identified and mapped sites varying in date from a potential Neolithic henge through to 20th-century military remains. New records were made for 2748 sites and a further 806 existing records were enhanced.

This report describes the specification and methodology for the mapping and provides an overview of selected results from the project.

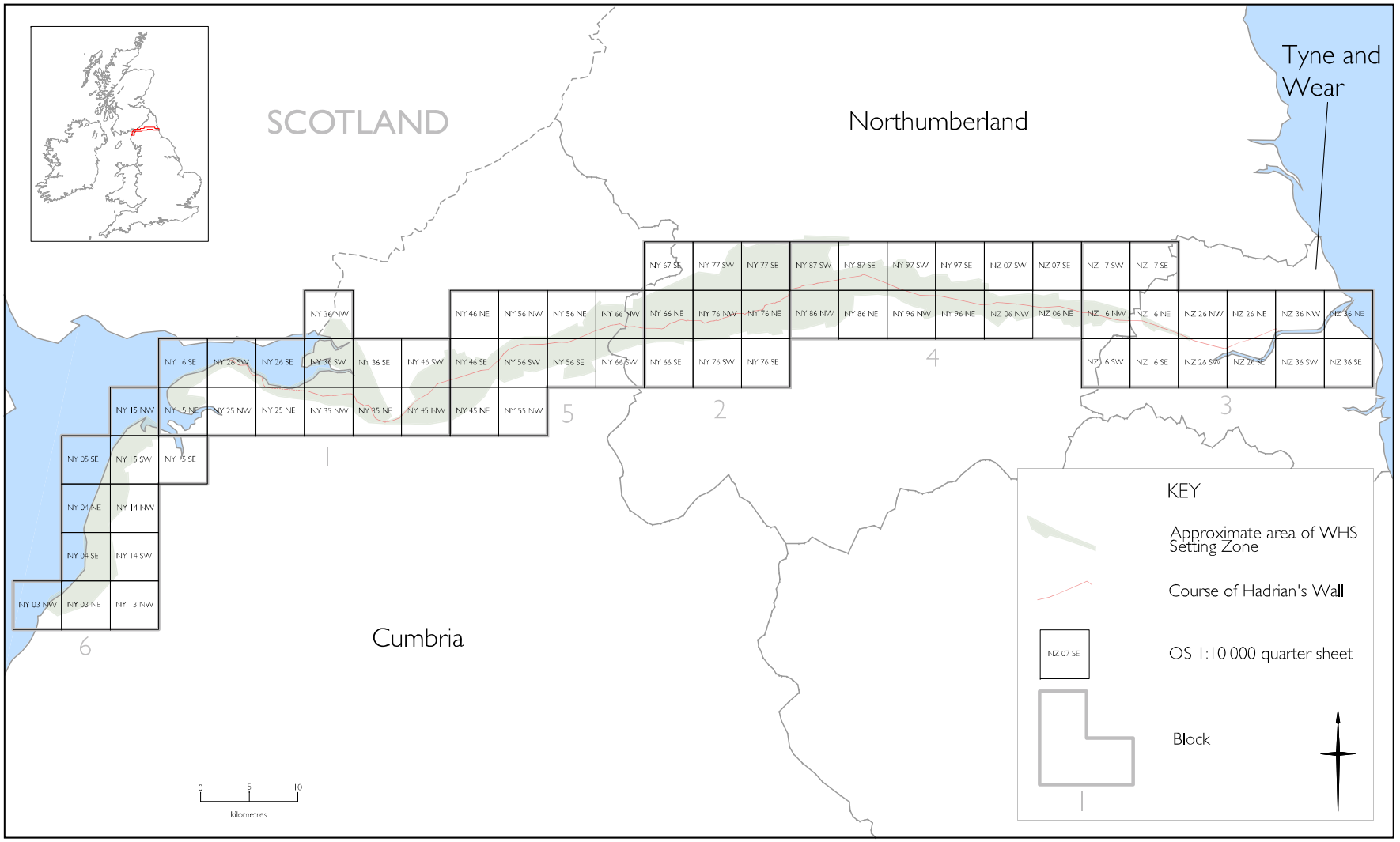

Fig 1: The Hadrian's Wall NMP Project area. ©Crown Copyright and database right 2009. All rights reserved. Ordnance Survey Licence number 100019088.

SCOPE OF THE SURVEY

Geographical scope

Hadrian's Wall runs from Newcastle-upon-Tyne in the east to Bowness-on-Solway in the west, a distance of approximately 117km. Although the Wall as a continuous stone curtain terminates at Bowness-on-Solway a system of coastal defences continued down the west coast as far as Maryport. The NMP project area encompasses the whole of the WHS and its setting zone (a buffer zone extending between 1km and 6km from the WHS itself), and comprises 69 Ordnance Survey 1:10,000 scale quarter sheets totalling approximately 1693sq km (Fig 1, Appendix 1). Approximately 32sq km of land, sea and inter-tidal zone fell within Scotland and therefore geographically outside the remit of English Heritage; no mapping or recording was undertaken of this area. For the purposes of photo loan administration the project was divided into six main blocks (Fig 1, Appendix 2). These were mapped sequentially apart from quarter sheet NY 04 NE which was mapped in 2004 to evaluate the rate of coastal erosion near the fort at Beckfoot.

Archaeological scope

The aim of the NMP is to increase our understanding of the historic environment. It achieves this by identifying, interpreting, mapping and recording all probable and possible archaeological features visible on air photographs as cropmarks, soilmarks, parchmarks and earthworks. The NMP Sphere of Interest draft report (Boutwood & Winton 2004) documents the scope of NMP; the main aspects relevant to the type of landscape of Hadrian's Wall are summarised below.

Earthwork archaeology

All extant earthworks identified as archaeological in origin were mapped and recorded.

Levelled archaeology

All cropmark, parchmark and soilmark features identified as archaeological in origin were mapped and recorded.

Post medieval and modern field boundaries

Field boundaries (upstanding or levelled) that are visible on air photographs but are also depicted on Ordnance Survey first edition or later edition maps were not mapped. The exception to this was where elements of the extensive sod cast boundary systems were depicted on maps.

Ridge and furrow

All extant, vestigial, soilmark, parchmark and cropmark evidence of ridge and furrow visible on air photographs was mapped and recorded. Using a simplified depiction the extent of the blocks of ridge and furrow and the direction of ploughing were delineated. Remains were characterised as medieval or post medieval in date. When the form was not diagnostic as to its date or the ridges of medieval ridge and furrow had been sub-divided in the post medieval period ('split rig') it was identified as medieval/post medieval. The state of preservation was evaluated from the latest available photography and the

remains were distinguished in the Autodesk Map® layer structure between those that were extant and those that had probably been levelled or were showing as cropmarks (see Appendix 3). It should be noted that as the date and quality of the latest photography varies across the project area, this information can only be used as a general guide, it is not a definitive statement on the current condition.

Prehistoric cultivation in the form of cord rig was mapped with a similar depiction. These slight earthwork features were mapped primarily from oblique photography taken between 1992 and 2001 and presumed to be still extant. There were no more recent photographs available to verify its condition.

Industrial features and extraction

Widespread and common small-scale extraction of stone was not mapped, unless it directly impinged on other archaeological features. The exception to this was within a band 2km north and 2km south of Hadrian's Wall where all extraction was recorded. Unless there was positive Roman dating evidence a post medieval date was attributed. At sites where extraction and processing were closely associated (for example limestone quarries and lime kilns or clay pits and brick works) extraction was mapped. Coal, ironstone and lead mining and associated features were mapped and recorded. Features were either mapped as seen or, where features were extensive or amorphous, defined by an extent of area. Major transport features (ie disused canals and main railways) were not mapped as they are already adequately depicted on the Ordnance Survey base maps, however, smaller features such as tramways, with associations to industrial complexes, were mapped and recorded. 20th-century industrial remains were only mapped when of particular interest or when associated with earlier features.

20th-century military remains

Military features up to and within the Cold War period were mapped. They were generally mapped as seen but camps were depicted as an extent of area. Military airfields were outlined as an extent of area and the plan of the runways was depicted. The exception to this is at Carlisle airfield where the features were mapped as seen.

Buildings and structures

The foundations of buildings visible as earthworks, ruined stonework, cropmarks and parchmarks were mapped and recorded. Standing roofed or unroofed buildings or structures and those that were depicted on the Ordnance Survey first edition or later edition maps were generally not recorded unless they fell within the NMP Sphere of Interest such as military or industrial sites.

Coastal archaeology

Archaeological features within the intertidal zone were mapped and recorded.

Parkland, landscaped parks, gardens and country houses

Earthwork and levelled landscape park and garden features were mapped and recorded. Urban and 20th-century parks and gardens and were not recorded.

Urban areas

Archaeological features of the pre-urban landscape meeting the previous criteria, when identified either as islands of survival or from historic photography, were mapped.

Geological features

Geological features were not mapped or recorded but may be mentioned in the monument record when they occurred in close proximity to archaeological features and there was a risk of confusion with those features.

SOURCES

Air photographs

All readily available air photographs were consulted, which are effectively those held in five main collections. The National Monuments Record (NMR) was the primary source of photography. A total of approximately 10,000 specialist oblique and 17,500 vertical prints from this collection were examined. The vertical loans ranged in date from 1930 to 1995 and the specialist oblique photography ranged in date from 1930 to 2006.

Additional prints were loaned to the project by the Cambridge University Collection of Air Photos (CUCAP) administered by the Cambridge University Unit for Landscape Modelling, the Northumberland Historic Environment Record (HER), the Cumbria HER and the Museum of Antiquities, University of Newcastle. The air photograph collection of the Cumbria HER was also accessed at the Cumbria County Council offices in Kendal in June 2008 to examine the photography for blocks 5 and 6. The majority of the quarter sheets for these blocks had been mapped by this point so where additional features to those already mapped were visible, photographs were scanned for rectification and mapping at the English Heritage offices in York.

In addition to these sources a rectified, georeferenced photo mosaic of vertical photographs dating to the 1930s was provided by the GeoInformation Group. This was used as a digital layer in Autodesk Map®.

Monument data

The English Heritage National Monuments database, AMIE, was consulted as were the HERs for Cumbria, Northumberland and Tyne and Wear. Where possible concordance between the HER and AMIE datasets was made in the AMIE database.

Additional sources

From 1998 to 2001 sketch mapping was carried out by Tim Gates of 160sq km of land within the Northumberland National Park (Gates 2004) which fell within the area of the Hadrian's Wall NMP project. The 1:10,000 scale overlays and accompanying gazetteer created by Gates were routinely consulted to aid mapping and interpretation.

A 1:2,500 scale measured field survey was undertaken by RCHME between January 1988 and August 1993 (RCHME: Hadrian's Wall Project, AMIE Event UID 617198). The purpose of the survey was to revise the Ordnance Survey Linear File for the Wall dating from the 1960s and 1970s. The project surveyed the Wall, Ditch, Vallum and Military Way and any other Roman remains that fell within the same kilometre as an element of the Hadrian's Wall Linear. Pre- and post-Roman remains were only surveyed when they directly impinged on Roman features. Raster files of the survey were routinely used in Autodesk Map® to aid mapping and interpretation of the Wall and its associated structures.

In 1991 a survey of the fort and *vicus* at Chesters was undertaken by RCHME (RCHME: Chesters Roman Fort Survey, AMIE Event UID 891288). One element of this was a photogrammetric survey of the cropmarks of the *vicus* area. The raster plan produced was

scanned and digitised as part of the Hadrian's Wall NMP project. This was recorded in the attached data tables as 'RCHME Photogrammetric Survey Nov-1991'.

In 1992–1993 a survey of the fort and *vicus* at Maryport was undertaken by RCHME (RCHME: Maryport Roman Fort Survey, AMIE Event UID 930691). One element of this was the air photograph mapping of the cropmarks of the *vicus* and roads at a 1:2,500 scale. The transcription was digitised in the Hadrian's Wall NMP project. This was recorded in the attached data tables as 'RCHME MARYPORT SURVEY 1992'.

In June 2003 an area of approximately 8sq km centred on Carrawburgh was surveyed by lidar. The survey was commissioned by English Heritage from the Cambridge University Unit for Landscape Modelling. The data was used to complement the traditional aerial photography and features identified from this source were mapped and recorded in the attached data tables as 'lidar June 2003'.

The Defence of Britain Project was undertaken between 1995 and 2002 and recorded nearly 20,000 20th-century military sites in Britain. For the Hadrian's Wall NMP project the online database was accessed via the Archaeology Data Service, hosted by the University of York. In June 2005 the entire project database was migrated into English Heritage's AMIE database. The records were then accessed via AMIE from this date onwards. Migrated Defence of Britain records were only amended in AMIE in the later stages of the project.

A reconnaissance flight (English Heritage Flight Number N642) was undertaken over the Solway area on 28 July 2006. This flight produced a number of new cropmark features and also enhanced some already mapped by the Hadrian's Wall NMP project. The interpretation and mapping of these photographs was undertaken as part of Aerial Survey & Investigation's Reconnaissance Recording Programme (AMIE Event UID 1449600) and the mapping was incorporated into the project in July 2008.

METHODOLOGY AND RECORDING

Mapping methods

Mapping methods were in accordance with practices developed for the NMP. Oblique and vertical photographs were scanned and rectified using the specialist AERIAL software (up to version 5.29). For Blocks 1 and 2 control was derived from the Ordnance Survey 1:10,000 scale raster maps. For all subsequent blocks control was derived from the Ordnance Survey 1:2,500 scale Land-Line® vector mapping. Where necessary topographic information derived from the Ordnance Survey Land-Form PROFILE® contour data was used in AERIAL to improve the accuracy of rectification. Accuracy for the Ordnance Survey mapping is in the range of ±2.8m for Land-Line® mapping and ±8m for raster maps. Rectification of photographs is normally within ±2m of the base map, however where control was a problem or control derived from rectified vertical photography was used accuracy may be less.

Rectified images were placed into Autodesk Map® where the archaeological features were mapped. The mapping conventions and the layer structure used are summarised in Appendix 3.

Recording strategy

All mapped features were recorded in the English Heritage National Monuments Record database, AMIE. New records were created or existing monument records were amended, following NMR Heritage Datasets: Monument Recording Guidelines. Within the Autodesk Map® drawing files monument data was also recorded within two attached data tables (*see* Appendix 4). Morphological information for selected sites was input into the Aerial Survey Recording Module.

Mapping and recording were usually carried out within quick succession but records were occasionally created at a later date when photography from the HER collections was examined. Some records may therefore have a later date than the listed completion date of the quarter sheet (Appendix 1).

The RCHME Hadrian's Wall project survey (*see* Additional sources) had already recorded the Wall, Ditch, Military Way and Vallum in AMIE in relatively small sections reflecting current land ownership rather than archaeological units. For block 1 and quarter sheet NY 66 NE of Block 2, these records were amended as per normal NMP methodology, which proved to be a very time consuming process. In subsequent blocks recording methodology was revised and a single record for the Wall with Wall Ditch, Military Way and Vallum were created for each quarter sheet. These were then linked to the appropriate parent linear records.

Where possible concordance between the HER data and AMIE records was made. However, no facility exists to comment on records that exist within the HER (and not in AMIE) but that were dismissed by the NMP project.

PROJECT MANAGEMENT

Mapping and recording was carried out by Yvonne Boutwood, Ann Carter, Dilwyn Jones, Antonia Kershaw, Matthew Oakey, Melanie Partlett, Emma Pickford, Jane Stone and Shona Williams (Aerial Survey & Investigation, York).

Initially project co-ordination was carried out by Antonia Kershaw with Pete Horne (then Team Leader York) responsible for the management of the project. Subsequently Ann Carter has acted as liaison contact with Dave MacLeod (Team Leader York) responsible for management of the project. Other tasks have been shared between team members.

Mapping and recording of block 5 was undertaken by Sharon Bishop, Edward Carpenter, Fiona Small and Cathy Stoertz (Aerial Survey & Investigation, Swindon). Project co-ordination was carried out by Fiona Small with Helen Winton (Team Leader Swindon) responsible for management of the project.

The project started on 1 June 2002 and mapping and recording were completed by 15 July 2008.

DATA ARCHIVE AND DISSEMINATION

Copyright

The copyright of the air photograph mapping and associated records produced by this project lies with English Heritage. Permission to reproduce and publish any of this material must be sought form NMR Enquiry and Research Services, NMRC, Kemble Drive, Swindon, SN2 2GZ.

Project archive

This project produced 69 Autodesk Map® 2007 drawing files, one for each Ordnance Survey 1:10,000 quarter sheet. Copies of the digital drawing files are deposited in the archive of the NMR. The digital files are the primary product of the project; no film copies were archived. Aerial Survey & Investigation York and Swindon also retain copies of the digital files, for day-to-day access.

Project dissemination

ESRI Shapefile versions of the Autodesk Map® drawing files and digital PDF copies of the AMIE records have been supplied to Tyne and Wear, Cumbria and Northumberland HERs and the Northumberland National Park Authority.

During the project information was disseminated to the liaison group at biannual meetings and to the general public and local societies through talks and displays. A summary of the work has also been made available through the English Heritage website.

SUMMARY OF RESULTS

NMP mapping

The following is intended to give a brief overview of the archaeological features mapped by the project on a broad period-by-period basis. It is not intended as a comprehensive analysis. A list of monument types recorded by the project can be found in Appendix 5. Where references are made to specific sites these are followed by their AMIE UID numbers.

The archaeological features recorded range in date from the Neolithic to the 20th century. New records were made for 2748 sites and a further 806 existing records were enhanced. The morphology of features was primarily used to date sites, as excavations within the project area have predominantly taken place on Roman monuments. Where a narrow date term could not be attributed to a feature, broader date terms like 'prehistoric' were sometimes used.

Some of the results of the project have already been published elsewhere and aspects of the archaeology have been the subject of more detailed research reports (Boutwood 2005; Small 2008). In 2002 a desk-based study used aerial photographs to examine three small areas along the Wall, assessing rates of natural erosion and identifying changes in vegetation, land use and monument condition (Radford 2002).

Boutwood's (2005) research examined prehistoric and Romano-British settlement and the Roman frontier defences on the Solway Plain. It was demonstrated that the NMP mapping revealed the complexity of phasing at some of the prehistoric and Romano-British cropmark sites on the Solway Plain. It was also noted that these sites sit in a wider landscape context of linear boundaries and potential field systems, not identified prior to the mapping. The NMP mapping did not confirm the defensive system of parallel double ditches along the Solway frontier as proposed by Dr Barri Jones. One section of parallel ditches north-east of Biglands was recorded, however, as 2nd century AD pottery was recovered during excavation of one of the ditches. The context of the ditches, almost aligned with the front and back of the milefortlet, may also be interpreted as defining a military strip (Boutwood 2005, 17).

Small (2008) gave an overview of the NMP mapping for the area between Brampton and Birdoswald. It was noted that the majority of monuments recorded during the mapping related to post medieval quarrying, peat cutting and narrow ridge and furrow. In the lower-lying areas, bordering the Solway Plain, sites broadly classified as prehistoric in date were seen as cropmarks. Elements of the Wall, Ditch, Vallum, Stanegate and Military Way that have subsequently been plough levelled were identified from historic vertical photography.

Prehistory

Three Neolithic monuments were recorded by the project and represent the earliest features identified on the air photographs. At Fourstones a large multiple ditched enclosure (1447586) has been tentatively recorded as Neolithic and approximately 280m to the east is a partially visible double ditched enclosure that may represent a henge

(1447579) (Fig 2). A pit defined enclosure at Plasketlands (9108) has been partially excavated and radiocarbon dated to the early Neolithic.

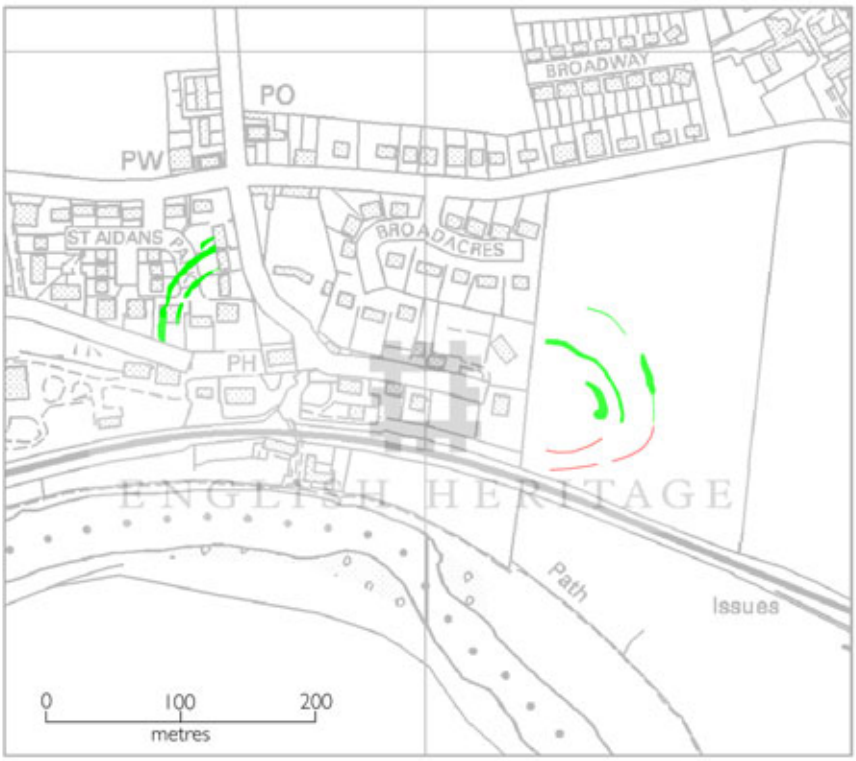

Fig 2: Possible Neolithic enclosures at Fourstones, Northumberland. ©Crown Copyright and database right 2009. All rights reserved. Ordnance Survey Licence number 100019088.

The Bronze Age is almost exclusively represented by funerary monuments such as barrows and cairns. While some of these, such as the round cairn near Barrasford (19167), are dated by excavation others have been dated morphologically. No morphologically distinct settlement types that could be dated to the Bronze Age with any degree of certainty were identified and this area would benefit from further research. However, several isolated curvilinear enclosures are visible as cropmarks on the Solway Plain and Cumbrian coast and have been attributed a broad prehistoric date and therefore may have Bronze Age origins.

In the upland regions there is evidence for both enclosed and unenclosed prehistoric settlement. Some of the most coherent remains are at Green Brae (1214729) and Little Shield (1407101) where enclosed settlements, including hut circles, are embedded within a fragmentary system of field boundaries. Cord rig cultivation is found both in the vicinity of settlements and elsewhere. Ground investigation has suggested that this may have begun as a practice as early as the Bronze Age/ Iron Age transition and does not continue beyond the Roman period (Topping 1989, 171). At Greenlee Lough both the air photographs and subsequent excavations demonstrated that cord rig was overlain by the defences of a Roman camp (Welfare 1985). The relationship to the field systems and settlements is often unclear but there are instances where this can be established such as Pont Gallon Burn (1385294) where a hut circle is partially overlain by cord rig.

The Iron Age/ Roman transition

There are eight hillforts and a defended enclosure, characteristic of the Iron Age, five of which are concentrated in the central zone of the survey area. These occupy commanding locations in the landscape, commonly in close proximity to and overlooking river courses, and the hillfort at Warden Hill (18338) perhaps exemplifies this. Of particular note is a previously unknown hillfort or promontory fort at West Wylam (1443439) that was identified from historic RAF vertical photography (Fig 3); this feature now appears to be entirely levelled. Other single ditched enclosures of similar size to the defended sites, some of which survive as earthworks, may relate to settlement or stock management but were not thought to have a defensive function.

Fig 3: Previously unknown hillfort of promontory fort at West Wylam. North is to the bottom of the image. RAF 58/2685 F21 0302 23-JAN-1959 English Heritage (NMR) RAF Photography.

In the lowland regions of the Solway Plain numerous enclosures and associated field or linear boundary systems are dated morphologically to the Iron Age/ Roman transition, especially if they include elements reflecting an Iron Age tradition, such as round houses. Excavation on a few of these enclosures in this region has, however, tended to produce Roman dates between the 2nd and 4th centuries AD and indicated that they were settlements. A more comprehensive account of the cropmark archaeology on the Solway Plain can be found in Boutwood (2005).

To the north-west of the Newcastle-upon-Tyne conurbation are a large number of isolated sub-square enclosures, visible as cropmarks. Many of these are similar in size,

enclosing an area of approximately 0.2ha, and some examples (eg 1440708) have double ditched elements but no evidence for internal structures such as round houses can be seen. This pattern of enclosures provides an interesting contrast to the more articulated landscapes seen on the Solway Plain and it is unclear whether they represent settlements or stock enclosures.

A few rectilinear enclosures, some of which contain hut circles, survive as earthworks in the central upland zone. Although elements of these sites, such as the hut circles, might be considered to be following an Iron Age tradition it is not possible to confidently give these an Iron Age date. Excavation at Milking Gap (15246), for example, dated the site to the mid-2nd century AD. These have therefore been attributed an Iron Age/ Roman date and may well represent Romano-British 'native' settlement.

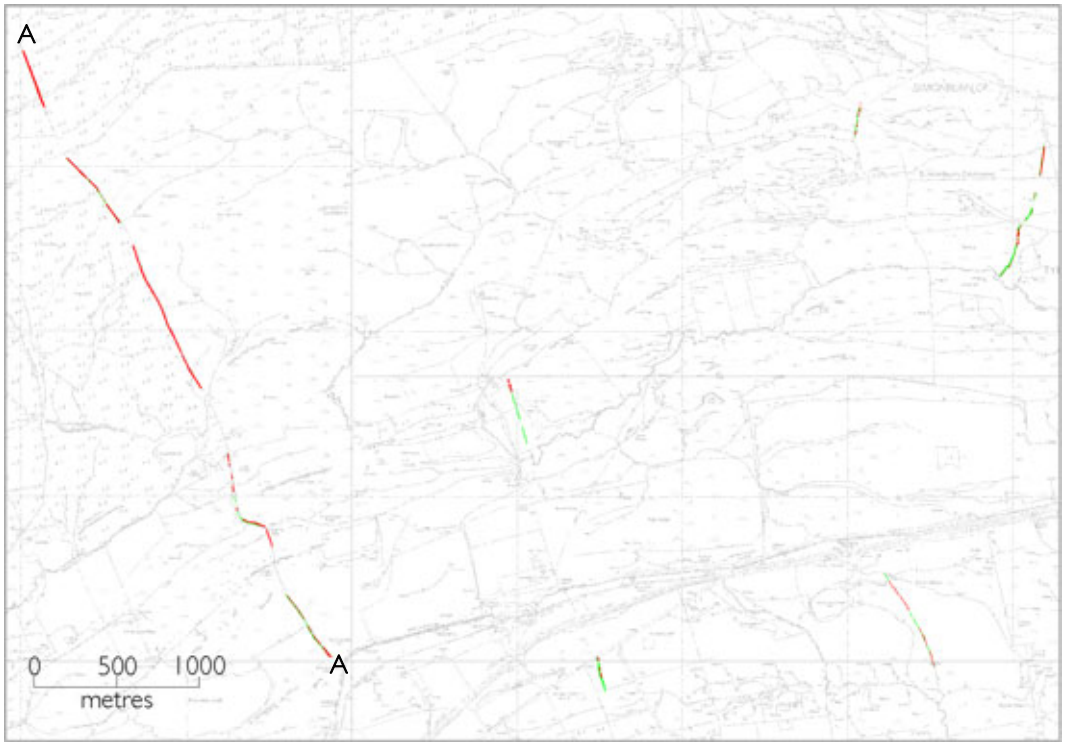

Fig 4: Black Dyke (A) with fragmentary linear boundaries.

A small number of fragmentary linear boundaries were identified from the air photographs and, while attributed an uncertain date, may have origins in the Iron Age (Gates 2004, 52 and Appendix B) (Fig 4). They are defined by a single ditch and are commonly flanked by a bank on the eastern side. Predominantly situated in the western fringes of the central upland zone, most boundaries share a common north south alignment with one another and with Black Dyke, which suggests that they may broadly be contemporary. Although the boundaries are too fragmentary to confirm that they formed part of a coherent system of land division, there are traces of two boundaries to the east of Black Dyke which define areas of land between 1700m and 1800m wide. Little research has been carried out on the date and function of Black Dyke, a more substantial linear boundary of uncertain date, although it is suggested that it has pre-Roman origins.

Roman

The Roman military landscape of the frontier zone has been exhaustively covered for many decades and is the subject of numerous publications so will not be considered in detail within the present report. The greatest contribution the NMP mapping has made is in placing the Roman military features in their wider landscape context. Historic photography from the 1930s and mid-1940s proved valuable, often showing sections of the Vallum prior to being levelled or severely denuded (eg 1378286). In addition to the known military remains, the project has also identified many previously unrecorded structures.

A total of 65 temporary camps were identified both as earthworks and cropmarks, 16 of which were previously unrecorded. A number of these are recorded as 'potential' new camps and further archaeological investigation may be required to confirm their interpretation (Fig 5). There is considerable variation in both the size and form of the camps which is not fully understood but may relate to specific phases in the construction of the forts, Wall and Vallum.

Fig 5: Cropmarks of a potential new camp at Halton Shields, Northumberland. NMR NZ 0168/19 17808/28 06-MAY-2003 © English Heritage. NMR.

While most of the forts along Hadrian's Wall survive as earthworks, several, such as Washingwells (25118) and Beckfoot (9087), were revealed as cropmarks. At Beckfoot historic photography was used to assess coastal erosion which was threatening archaeological features such as the Roman cemetery. Civilian settlements or vici are situated outside a number of forts and 2006 aerial reconnaissance showed traces of the

vicus at Burgh by Sands (10758).

Some preliminary research into the wider landscape context of the fort at Carvoran (13857) was undertaken to investigate fragmentary linear features relating to a possible Roman aqueduct (1398485). Further investigative work by English Heritage's Archaeological Survey & Investigation team has been proposed. To the east of the fort lie four possible burial mounds which have been interpreted as a cemetery associated with the fort.

Within the context of the Roman road network along Hadrian's Wall, both Stanegate and the Military Way are best preserved in the upland regions where continuous sections of up to 3.7km in length survive as extant earthworks. In the section of the Wall running between milecastles 36 and 44 there are at least seven branch roads linking various turrets and milecastles to the Military Way. While some were known from ground survey, three of these branch roads were not previously recorded.

As well as the Roman military sites, Romano-British settlement is also recorded in the mapping. As discussed previously, a significant proportion of the enclosures visible as both earthworks and cropmarks and dated to the Iron Age/ Roman period are likely to have been in use or even established during the period of Roman occupation. Excavation of enclosures on the Solway Plain such as Oughterby (10776) have dated some sites to the Roman period so a Roman date for other morphologically similar sites might be inferred.

Fig 6: Probable Jobey 'type A' enclosure at Errington Hill Head, Northumberland, highlighted by light snow cover. NMR NY 9570/9 17768/17 05-FEB-2003 © English Heritage. NMR.
In his survey of Roman rectilinear earthworks (Jobey 1960), Jobey identified a form of enclosure he termed 'type A'. These are sub-rectangular in form and often have one side

slightly bowed outwards. Two large hollows separated by a causeway generally occupy between one third and one half of the enclosure. Excavation at some of these sites, including West Gunner Peak (19140) which lies within the Hadrian's Wall survey area, has suggested a Roman date. A number of probable Roman rectilinear enclosures were mapped during the project. These include two sites at Settlingstones Burn (16342) and Errington Hill Head (1433427) (Fig 6) which were not included in Jobey's original gazetteer but appear to fit within the 'type A' category.

Medieval

No sites diagnostic of the early medieval period, such as grubenhaüser, were recorded by the project. Just one feature, an excavated round barrow at Aspatria (9579) which produced Viking grave goods, is attributed an early medieval date. This, however, might suggest that other round barrows which were dated to the Bronze Age on the basis of their morphology may actually have an early medieval date.

At least some Roman and Romano-British sites continued to be occupied after the Roman military withdrawal. For example, early medieval timber framed buildings were identified through excavation at both Birdoswald (13993) and South Shields (26402) Roman forts. It is unlikely that this continuity of settlement will be distinguishable from the pre-medieval features on air photographs.

To the west of the River North Tyne medieval settlement is represented by a small number of dispersed monuments including defensive structures such as mottes and castles. In the upland landscapes of the central zone there are a small number of isolated fragments of field boundaries as well as at least one more coherent field system (1476096). Features dated to the medieval period are predominantly associated with the management of stock including enclosures and the remains of small buildings and structures sometimes termed sheilings.

Little evidence for farmsteads was identified on the air photographs, although some areas of ridge and furrow were, and of these sites a number may have had post medieval origins. This may suggest that present day farms occupy the same locations but alternatively may reflect a pattern of seasonal upland settlement rather than permanent occupation. The latter scenario would reflect patterns of settlement identified through fieldwork in the vicinity of Busy Gap (Crow 2007, 329-330). At Settlingstones Burn are a series of three rectangular structures defined by narrow stone walls (1445333) (Fig 7). Two appear to be incomplete but the third appears to be comparable in size and form to sheep houses or sheepcotes recorded elsewhere in England, having two opposed entrances at the mid-point of the long sides.

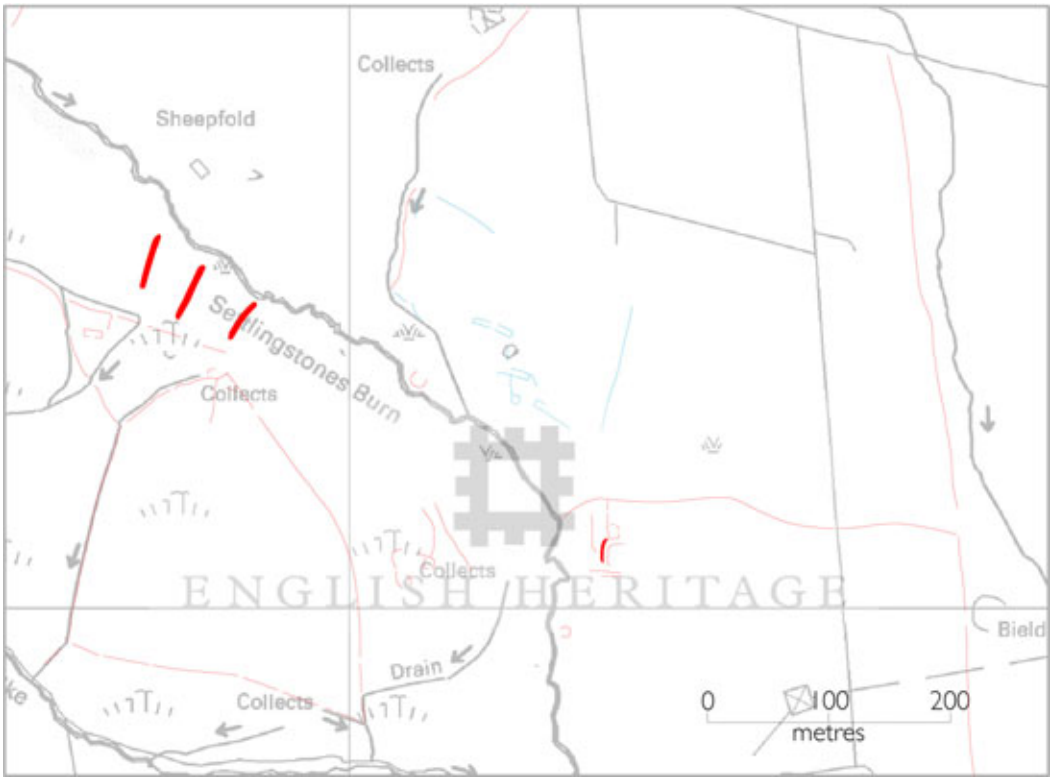

Fig 7: Possible medieval sheep houses (in blue) and sod cast boundary banks at Settlingstones Burn, Northumberland. ©Crown Copyright and database right 2009. All rights reserved. Ordnance Survey Licence number 100019088.

East of the River North Tyne there is a change in the character of the medieval settlement from dispersed to nucleated. Here the landscape is characterised by a number of planned nucleated settlements such as Keepwick (19050) and East Matfen (20895), with evidence of crofts, streets and rows of houses (Fig 8). Most, if not all of these are likely to have been occupied into the post medieval period and features suggesting continued occupation can be identified on nearly all of the sites. Numerous fragments of the settlements' associated open fields are visible as broad ridge and furrow; these again often have evidence of re-use and sub-division in the post medieval period. Other than a few broad boundary banks which are possibly medieval in date, few features lie beyond the immediate hinterland of the nucleated settlements. This suggests that they were set in a landscape of open strip fields and common land.

In the context of the nucleated settlements, Ingoe (20879) is distinctive in its form. The dominant element of the site is a large embanked rectilinear enclosure with sub-divisions and the remains of a range of buildings. This kind of feature is not found at any of the other settlement sites within the survey area and is morphologically comparable to granges or demesne farms found elsewhere in England.

Fig 8: East Matfen medieval settlement, Northumberland. NMR NZ 0471/27 17417/31 13-JAN-2000 © English Heritage. NMR.

Post medieval agricultural

By far the most common monument type relating to the post medieval agricultural landscape is ridge and furrow. This takes the form of either very narrow (1-2m in width) steam ploughed rig or broader yet still straight rig. Evidence for the practice of sub-dividing the ridges of earlier medieval ridge and furrow in the post medieval period to form 'split rig' is also prevalent.

In the upland regions extensive systems of sod cast boundary banks divide up the landscape (Fig 9). The dating and phasing of these banks is unclear but it is likely that the systems represent more than one phase of construction. In places the chronological relationship to other archaeological features is clear, for example overlying ridge and furrow, but elsewhere it remains ambiguous and it is possible that some of the more sinuous boundaries may have medieval origins. Similar systems of boundary banks have been documented in central Scotland (RCAHMS 2001) and appear to be associated with a cycle of pastoral and arable land use. The sod cast boundaries in the Hadrian's Wall landscape are, at least superficially, comparable so may be the product of an analogous agricultural regime. A further consideration must be that the sod cast banks were a convenient and established form of boundary and may have had a variety of uses.

Numerous bank defined enclosures are also situated in the upland regions. Many of these are likely to relate to stock management, possibly as part of a pastoral and arable land use cycle. While some are demonstrably associated with the sod cast boundary systems, and therefore broadly contemporary, many other isolated examples are also recorded.

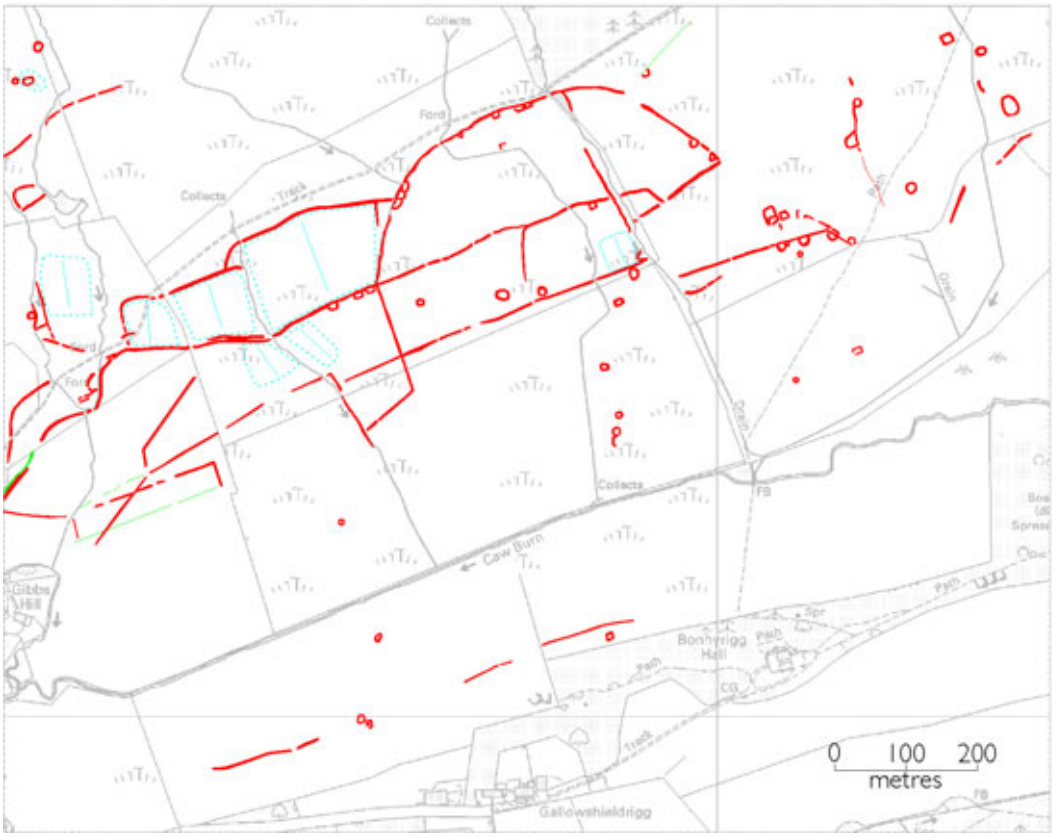

Fig 9: Sod cast boundary banks, stock enclosures and stack stands near Greenlee Lough, Northumberland. ©Crown Copyright and database right 2009. All rights reserved. Ordnance Survey Licence number 100019088.

Stack stands are very numerous and are again concentrated in the upland regions. A more in depth discussion on stack stands can be found in Gates (2004, 35-39). The stands vary in size and form and can occur in various contexts; as isolated examples, in large clusters or attached to sod cast boundary banks. It is likely that the distribution of stack stands represents successive phases of construction and it is possible that they may have different functions. For example one variant form of stand, playing card shape in form with an external ditch, is near identical to known peat drying platforms on Bodmin Moor. The morphological similarity and location of some stands near to peat deposits in the Hadrian's Wall landscape may, therefore, offer a parallel (Gates 2004, 38).

Post medieval industrial

The extensive occurrence of post medieval industrial features demonstrates that the Hadrian's Wall landscape has been a focus for the extractive industries for many centuries. Industrial remains are widespread and broadly relate to the extraction of stone, coal and lead with the distribution of features reflecting the varying geology. Extraction of ironstone was identified at just three locations. Many of these sites have associated processing facilities such as coke ovens and lime kilns as well as systems of tramways linking them to the sources of extraction.

Lead mining is restricted to linear bands following the Settlingstones, Stonecroft and Fallowfield veins and is often defined by small-scale remains such as shafts, adits and spoil heaps. Early edition Ordnance Survey maps were often used to identify features as relating to lead mining. Some larger processing facilities exist such as Langley Barony (1445000) where lead, barytes, witherite and zinc were mined and processed. A system of reservoirs and leats is associated with the main processing area (Fig 10).

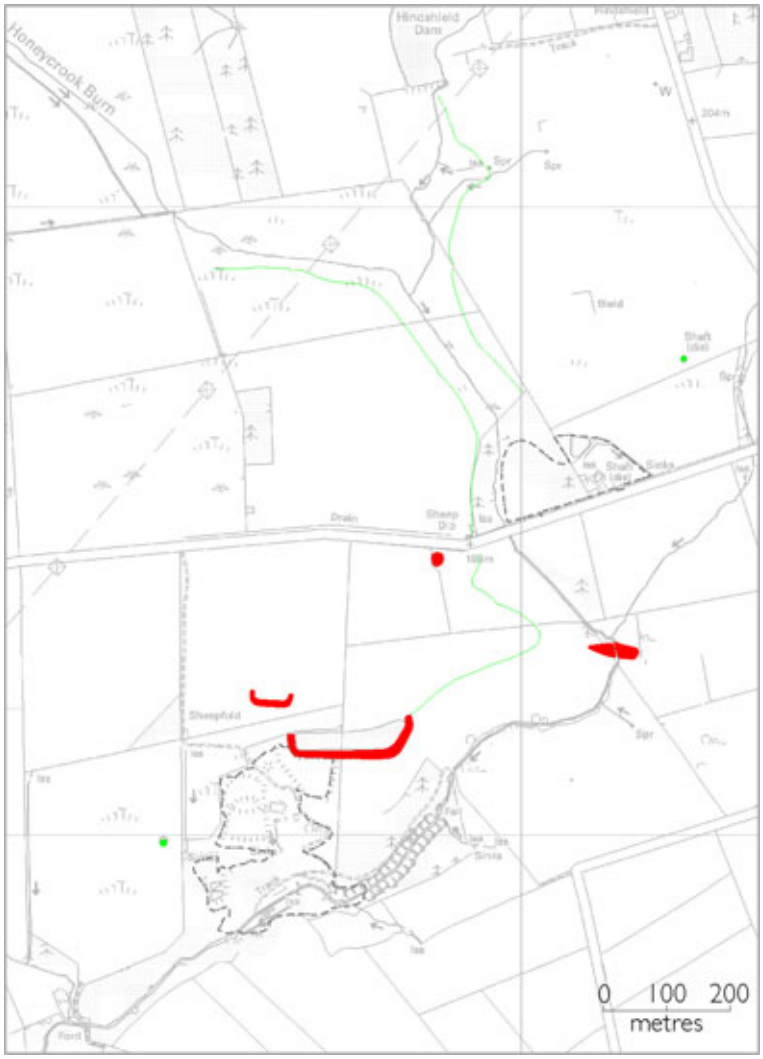

Fig 10: Langley Barony lead mine, Northumberland. ©Crown Copyright and database right 2009. All rights reserved. Ordnance Survey Licence number 100019088.

A swathe of coal mining remains stretches from the Newcastle-upon-Tyne conurbation westwards to the Cumbrian border. No further evidence for coal mining is evident until the valley of the River Ellen where several mines are visible with large banks of coke ovens. A particularly high density of coal workings are centred on the Westphalian coal measures around Heddon-on-the-Wall where extensive networks of tramways can be seen (Fig 11).

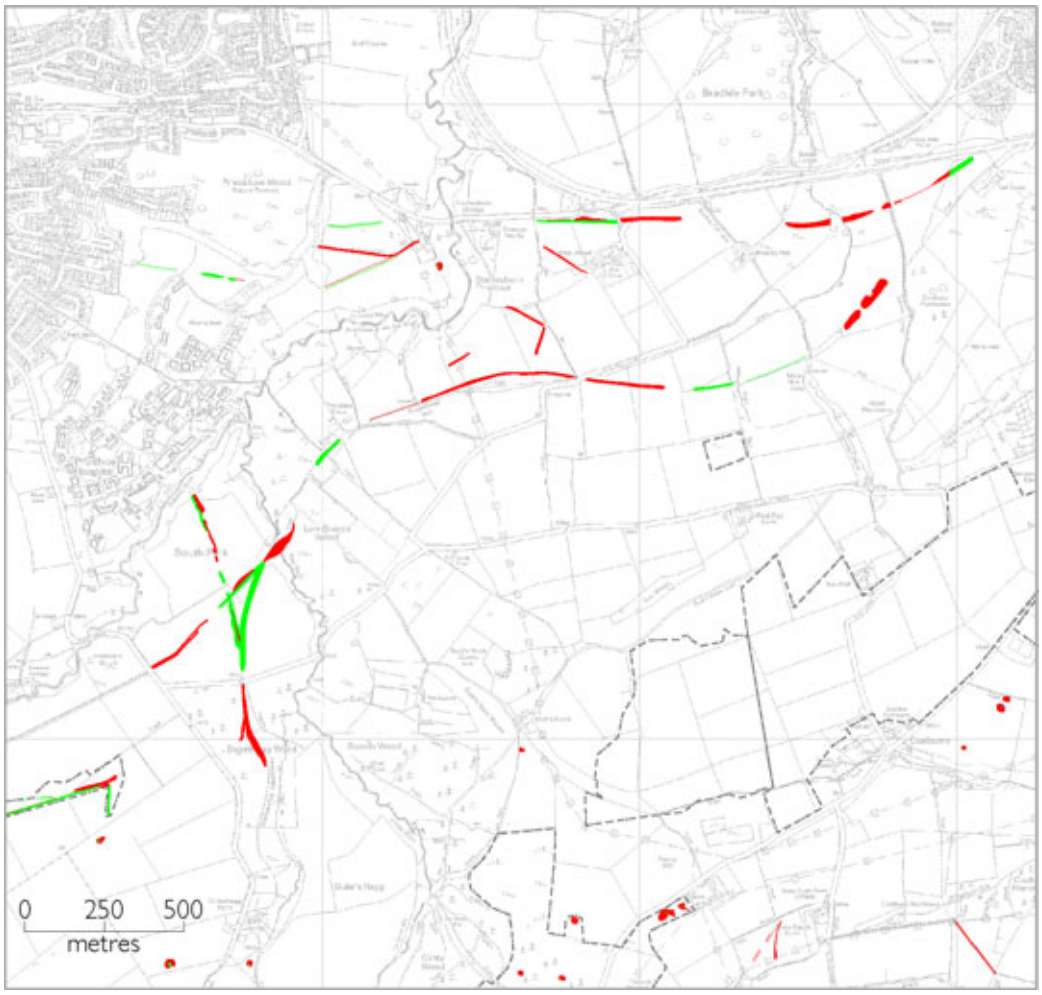

Fig 11: Tramways and coal extraction around Heddon-on-the-Wall, Northumberland. ©Crown Copyright and database right 2009. All rights reserved. Ordnance Survey Licence number 100019088.

Small-scale quarrying within the 4km band following the course of the Wall (see Industrial features and extraction) is very common and particularly so in the upland central zone. Analysis of the patterns of exploitation may prove useful in identifying potential Roman quarrying associated with the construction of Hadrian's Wall. A total of 65 post medieval lime kilns of varying scale are associated with limestone quarries. In addition to these are approximately 180 'sow kilns' which were used for small-scale lime burning. A termination of the quarrying activity can be observed east of Brampton. This coincides with the geological transition onto the sandstones and thick glacial drifts of the Carlisle basin. Here accessible outcrops of red sandstone are limited and situated well away from the Wall (Johnson 1997, 68-71), although sandstone was still used for its construction.

Other forms of extraction include several isolated but large areas of peat cutting as far east as Sewing Shields. There is also evidence for possible turf cutting on the salt marsh of the Solway. The only recorded salt working site is at Allonby (9147) where there are the remains of two well preserved salt pans and a row of associated workers cottages.

20th-century military

Historic vertical photographs show that World War II military installations were both diverse in form and widespread. Remains were identified throughout the project area but many of these sites were dismantled or demolished soon after they became redundant, leaving no extant remains. A coastal defence battery at Marsden (1403278) is the only World War I feature recorded by the project.

There are a total of six military airfields along with ancillary structures such as camps and dispersals. Also noted were a number of High Frequency Direction Finding (HF/DF) stations such as those at RAF Silloth (1473058 and 1470595). These would have acted as navigational aids for allied aircraft. Bombing range direction arrows, markers and an air gunnery range (1467459) associated with training aircrew were also recorded (Fig 12).

Fig 12: Air gunnery range (A), bombing range direction arrow (B) and firing range (C) on Grune Point, Cumbria. RAF 106G/UK/1486 4259 09-MAY-1946 English Heritage (NMR) RAF Photography.

The densest concentration of military remains lies in and around the conurbation of Newcastle-upon-Tyne and includes over 40 barrage balloon sites, extensive systems of aircraft obstructions and anti aircraft batteries. Most of the heavy anti aircraft (HAA) batteries were seen to have evidence of gun-laying (GL) mats. These comprised an octagonal arrangement of wooden posts on which a chicken wire mat was laid to create a false datum for the battery's RADAR (Fig 13).

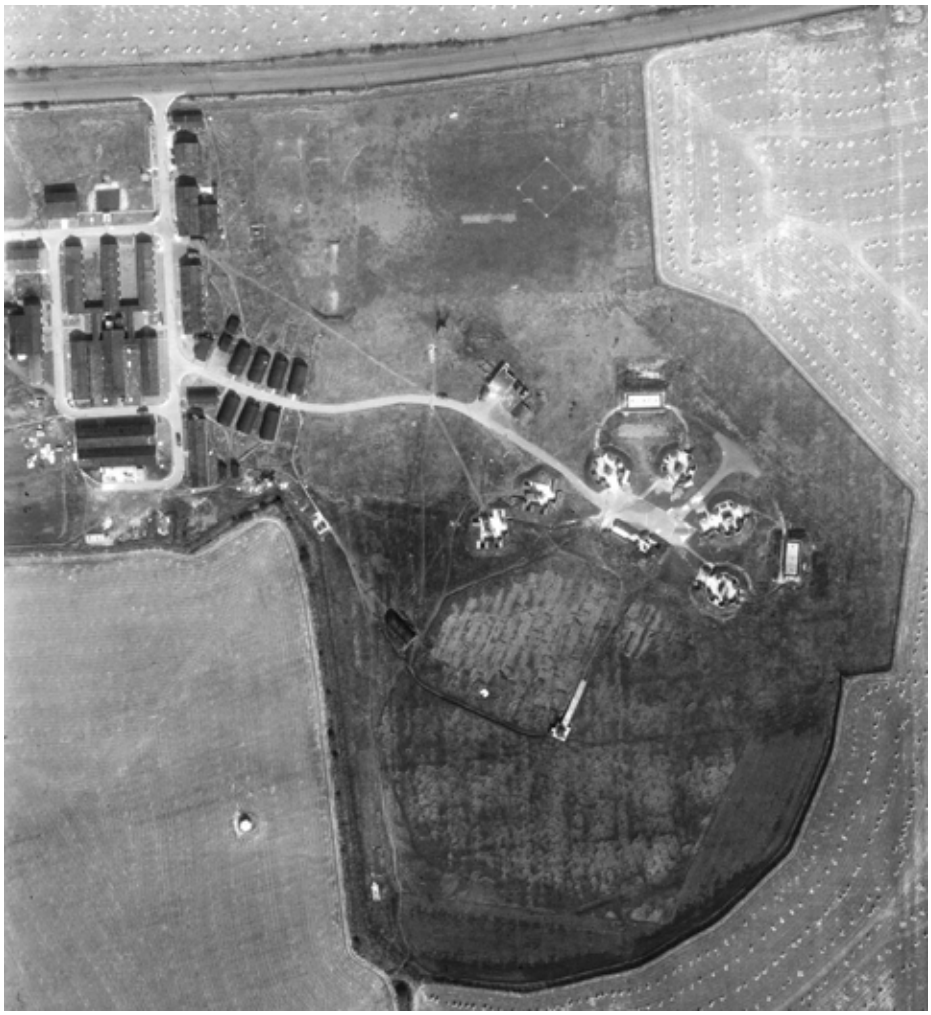

Fig 13: Heavy Anti Aircraft Artillery site near Cleadon, South Tyneside. The octagonal GL mat can be seen to the south of the gun emplacements. RAF 106G/UK/745 6255 28-AUG-1945 English Heritage (NMR) RAF Photography.

Various military camps are situated throughout the project area, three of which were identified as prisoner of war camps. While those at Darras Hall (1437040) and Nunsmoor Park (1029869) were purpose built, Featherstone camp (1393661) re-used an existing American training facility. Amongst the other military features is Scaleby bombing decoy or 'Q' site (1378213) which would have acted as a night decoy for Crosby-on-Eden aerodrome.

Anti invasion defences were situated on both the east and west coasts and included pillboxes, tank traps, trenches and minefields. A small number of Royal Observer Corps nuclear monitoring installations dating from the Cold War are situated throughout the project area. These include the site at Haydon Bridge (1413825) where an orlit post and later underground monitoring post are on the site of a World War II Observer Corps post.

Further research

The following themes have been identified as areas that would benefit from further research:

- Bronze Age upland settlement
- The Iron Age/ Roman transition
- The size and distribution of Roman camps in relation to other military remains and in a wider landscape context
- The medieval landscape, particularly the change in the character of the settlement pattern to the east of the River North Tyne
- The post medieval landscape, particularly pastoral and arable land use
- The World War I and II military landscape

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APPENDIX 1. QUARTER SHEETS

Quarter sheet	Block	Author	Date of completion
NY 03 NE	6B	Matthew Oakey	10/03/2008
NY 03 NW	6B	Jane Stone	20/02/2008
NY 04 NE	6A	Ann Carter	14/07/2008
NY 04 SE	6B	Matthew Oakey	08/02/2008
NY 05 SE	6A	Ann Carter	15/07/2008
NY 13 NW	6B	Ann Carter	18/02/2008
NY 14 NW	6A	Jane Stone	05/06/2008
NY 14 SW	6B	Ann Carter	17/12/2007
NY 15 NE	1A	Yvonne Boutwood	09/02/2008
NY 15 NW	6A	Matthew Oakey	18/04/2008
NY 15 SE	6A	Matthew Oakey	19/05/2008
NY 15 SW	6A	Ann Carter	21/05/2008
NY 16 SE	1A	Antonia Kershaw	07/01/2003
NY 25 NE	1A	Yvonne Boutwood	19/12/2006
NY 25 NW	1A	Antonia Kershaw	12/09/2002
NY 26 SE	1A	Antonia Kershaw	13/12/2002
NY 26 SW	1A	Ann Carter	11/03/2003
NY 35 NE	1B	Jane Stone	28/08/2003
NY 35 NW	1B	Yvonne Boutwood	14/07/2008
NY 36 NW	1B	Antonia Kershaw	26/03/2003
NY 36 SE	1B	Yvonne Boutwood	23/05/2003
NY 36 SW	1B	Antonia Kershaw	30/04/2003
NY 45 NE	5	Edward Carpenter	25/04/2007
NY 45 NW	1B	Antonia Kershaw	18/09/2003
NY 46 NE	5	Fiona Small	24/04/2007
NY 46 SE	5	Cathy Stoertz	22/06/2007
NY 46 SW	1B	Ann Carter	25/04/2003
NY 55 NW	5	Cathy Stoertz	20/06/2007
NY 56 NE	5	Edward Carpenter	25/06/2007
NY 56 NW	5	Sharon Bishop	18/06/2007
NY 56 SE	5	Edward Carpenter	25/04/2007
NY 56 SW	5	Sharon Bishop	18/06/2007
NY 66 NE	2	Yvonne Boutwood	04/06/2004
NY 66 NW	5	Fiona Small	24/04/2007
NY 66 SE	2	Antonia Kershaw	25/05/2004
NY 66 SW	5	Fiona Small	24/04/2007
NY 67 SE	2	Ann Carter	06/11/2003
NY 76 NE	2	Jane Stone/ Yvonne Boutwood	08/09/2005
NY 76 NW	2	Dilwyn Jones	30/09/2004
NY 76 SE	2	Antonia Kershaw	02/12/2003
NY 76 SW	2	Antonia Kershaw	16/01/2004
NY 77 SE	2	Ann Carter	16/03/2004
NY 77 SW	2	Dilwyn Jones	19/06/2003
NY 86 NE	4A	Emma Pickford	29/09/2006

NY 86 NW	4A	Matthew Oakey	07/08/2006
NY 87 SE	4A	Ann Carter	01/09/2006
NY 87 SW	4A	Yvonne Boutwood	17/07/2008
NY 96 NE	4B	Matthew Oakey	08/02/2007
NY 96 NW	4A	Ann Carter	25/04/2007
NY 97 SE	4B	Matthew Oakey	09/11/2006
NY 97 SW	4A	Matthew Oakey	28/09/2006
NZ 06 NE	4B	Ann Carter	30/08/2007
NZ 06 NW	4B	Matthew Oakey	17/05/2007
NZ 07 SE	4B	Matthew Oakey	14/03/2007
NZ 07 SW	4B	Matthew Oakey	04/09/2007
NZ 16 NE	3C	Ann Carter	30/01/2006
NZ 16 NW	3C	Yvonne Boutwood	31/03/2006
NZ 16 SE	3C	Ann Carter	29/11/2005
NZ 16 SW	3C	Emma Pickford	19/06/2006
NZ 17 SE	3C	Ann Carter	05/04/2006
NZ 17 SW	3C	Yvonne Boutwood	19/12/2005
NZ 26 NE	3B	Ann Carter	21/06/2005
NZ 26 NW	3B	Ann Carter	22/09/2005
NZ 26 SE	3B	Ann Carter	23/03/2005
NZ 26 SW	3B	Ann Carter	12/08/2005
NZ 36 NE	3A	Antonia Kershaw	06/08/2004
NZ 36 NW	3A	Ann Carter	21/12/2004
NZ 36 SE	3A	Ann Carter	13/10/2004
NZ 36 SW	3A	Antonia Kershaw	15/10/2004

APPENDIX 2. NMR PHOTOGRAPH LOANS

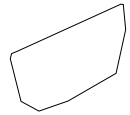
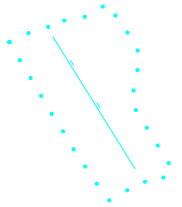
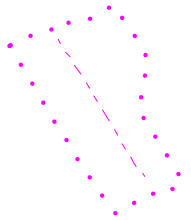
Block Number	Date of coversearch	NMR Loan Reference Number
1A	19 Feb 2002	40163
1B	20 Nov 2002	50529
2	24 Feb 2003	53501
3A	30 Oct 2003	63218D
3B	14 Jul 2004	63218C
3C	24 May 2005	75799
4A	10 Jan 2006	84878
4A	03 Jan 2007	84878A*
4B	01 Aug 2006	3827
4B	03 Jan 2007	3827A*
5	02 May 2006	881
6A	17 Mar 2004	66884†
6A	20 Sep 2007	18344A
6B	20 Sep 2007	18344B

* Additional loans of recent reconnaissance not accessioned when original block loan was sent

† Loan for NY 04 NE. Not included in block 6A loan

APPENDIX 3. AUTODESK MAP® LAYER CONTENT AND DRAWING CONVENTIONS

Layer Name	Layer content	Attached data tables	Layer colour	Linetype	
0	None (Autodesk Map 2007 requirement)	NONE	7 (white)	CONTINUOUS	
BANK	Closed polygons and polylines for features such as banks, platforms, mounds and spoil heaps	MONUMENT & MONARCH	1 (red)	CONTINUOUS	
BANKFILL	Solid fill for BANK layer polygons	MONUMENT & MONARCH	1 (red)		
CORDRIGARROW	Polyline showing the direction of ploughing in outlines of cord rig	MONUMENT & MONARCH	30 (orange)	CONTINUOUS	
CORDRIGDOTS	Closed polygon defining the extent of area of cord rig	MONUMENT & MONARCH	30 (orange)	CONTINUOUS	
DITCH	Closed polygons and polylines for cut features such as ditches, ponds, pits or hollow ways	MONUMENT & MONARCH	3 (green)	CONTINUOUS	
DITCHFILL	Solid fill for DITCH layer polygons	MONUMENT & MONARCH	3 (green)		
EXTENT_OF_AREA	Closed polygons outlining complex or extensive remains such as military airfields and camps	MONUMENT & MONARCH	8 (grey)	DASHEDX2	
GRID	Grid lines at 1km intervals	NONE	7 (white)	CONTINUOUS	
LARGE_CUT_ FEATURE	For large cut features such as quarries or pits	MONUMENT & MONARCH	5 (blue)	ACAD_ISO02W100	

MONUMENT _POLYGON	Closed polygons encompassing all the features within a single AMIE record.	MONARCH ONLY	7 (white)	CONTINUOUS	
RIGARREWK	Polyline showing the direction of ploughing in outlines of extant ridge and furrow	MONUMENT & MONARCH	4 (cyan)	CONTINUOUS	
RIGDOTSEWK	Closed polygon defining the furlongs or extent of area of extant ridge and furrow	MONUMENT & MONARCH	4 (cyan)	DOTX2	
RIGARRLEVEL	Polyline showing the direction of ploughing in outlines of levelled or cropmark ridge and furrow	MONUMENT & MONARCH	6 (magenta)	ACAD_ISO03W100	
RIGDOTSLEVEL	Closed polygon defining the furlongs or extent of area of levelled or cropmark ridge and furrow	MONUMENT & MONARCH	6 (magenta)	DOTX2	
STRUCTURE	For built features including stone, concrete, metal and timber constructions such as military installations	MONUMENT & MONARCH	9 (grey)	CONTINUOUS	
STRUCTUREFILL	Solid fill for STRUCTURE layer polygons	MONUMENT & MONARCH	9 (grey)	CONTINUOUS	
VIEWPORT	Administrative layer to allow printing	NONE	7 (white)	CONTINUOUS	

APPENDIX 4. AUTODESK MAP® ATTACHED DATA TABLES

Monument data table

The Monument Data table consists of five fields that were input directly through Autodesk Map®. The contents of these fields broadly duplicates those that are entered in the National Monuments Database AMIE, however there are the following exceptions:

The term SOW KILN was used in the attached data table for the small circular embanked enclosures that are the remnants of small-scale post medieval lime production. As this is not a recognized English Heritage Thesaurus term, LIME KILN was used in AMIE.

Monument types were preferably kept to a single term, but there were a few exceptions that were duel indexed: where the remains of lead mining were defined by shafts or adits these were indexed SHAFT/LEAD MINE or ADIT/LEAD MINE to distinguish them from coal mining remains which used a single term, for example SHAFT.

FIELD NAME	FIELD CONTENT	Sample data for Carrawburgh Fort
MONARCH*	AMIE Unique Identifier (UID)	16704
PERIOD	Date of features (EH Thesaurus) Single or duel indexed terms	ROMAN
TYPE†	Monument type (EH Thesaurus) Primarily single index term	FORT
EVIDENCE	Form of remains (EH Thesaurus) Single index term	EARTHWORK
PHOTO	NMR or other reference for the photograph from which the feature was mapped and the date of photography	NY8571/48 TMG 13889/81 16-May-1992

MONARCH data table

The Monarch Data table comprises just one field that records the AMIE Monument UID.

FIELD NAME	FIELD CONTENT	Sample data for Carrawburgh Fort
MONARCH*	AMIE Unique Identifier (UID)	16704

* MONARCH is a former name of the National Monuments database re-named AMIE. The table retains the former name to facilitate download into the English Heritage GIS.

† The type term reflects the individual components of a site, such as CROFT, rather than the higher level term, such as SETTLEMENT.

APPENDIX 5. MONUMENT TYPES

ADIT
ADIT/LEAD MINE
AERIAL ROPEWAY
AIR RAID SHELTER
AIRCRAFT HANGAR (TYPE T2)
AIRCRAFT OBSTRUCTION
ANNEXE ENCLOSURE
ANTI AIRCRAFT BATTERY
AQUEDUCT
AVENUE
BAILEY
BANDSTAND
BANK (EARTHWORK)
BARN
BARRACKS
BARRAGE BALLOON CENTRE
BARRAGE BALLOON SITE
BARROW
BARROW CEMETERY
BASTLE
BATH HOUSE
BATTLE HEADQUARTERS
BELL PIT
BELL PIT/LEAD MINE
BELLMAN HANGAR
BIELD
BLISTER HANGAR
BOMB CRATER
BOMBING DECOY
BOMBING RANGE MARKER
BOUNDARY
BOUNDARY BANK
BOUNDARY DITCH
BOUNDARY WALL
BOUSE TEAM
BRICKWORKS
BRIDGE
BUILDING
BUILDING PLATFORM
BURIAL CAIRN
CAIRN
CAIRNFIELD
CAMP
CARRIAGEWAY
CASTLE
CAUSEWAY
CHAPEL
CHIMNEY
CIRCULAR ENCLOSURE
CLAY PIT
CLEARANCE CAIRN
COAL MINING SITE
COAL WORKINGS
COASTAL BATTERY
COKE OVEN
COLLIERY
COMMAND POST
CONTROL TOWER
CORD RIG
CORN DRYING KILN
CREW YARD
CROFT
CULTIVATION TERRACE
CURTAIN WALL
CURVILINEAR ENCLOSURE
D SHAPED ENCLOSURE
DAM
DEFENDED ENCLOSURE
DITCH
DITCHED ENCLOSURE
DOUBLE DITCHED ENCLOSURE
DRAINAGE DITCH
EMBANKED AVENUE
ENCLOSED SETTLEMENT
ENCLOSURE
EXPLOSIVES FACTORY
EXTRACTIVE PIT
FARMSTEAD
FIELD BOUNDARY
FIELD SYSTEM
FILTER BED
FIRING RANGE
FISH TRAP
FISHPOND
FLOOD DEFENCES
FORT
FORT ANNEXE
FORTLET
FOUR POSTER STONE CIRCLE
FRONTIER DEFENCE
GATE
GATE TOWER
GOLF COURSE
GRANARY

GRAVEL PIT
GUN EMPLACEMENT
HANGAR
HARBOUR
HENGE
HILLFORT
HOLLOW
HOLLOW WAY
HOUSE
HUT
HUT CIRCLE
INCLINED PLANE
IRON WORKS
IRONSTONE WORKINGS
JETTY
KILN
LAMBING PEN
LAZY BEDS
LEAD MINE
LEAT
LIME KILN
LIME WORKS
LIMESTONE QUARRY
LINEAR EARTHWORK
LYNCHET
MACULA
MAGAZINE
MAUSOLEUM
MILECASTLE
MILEFORTLET
MILITARY AIRFIELD
MILITARY AIRFIELD SITE
MILITARY BUILDING
MILITARY CAMP
MILITARY DEPOT
MILITARY WAY
MILL DAM
MILL HOUSE
MILL POND
MILL RACE
MINE SHAFT
MINEFIELD
MITHRAEUM
MOAT
MOTTE
MOUND
MOUND/MIDDEN
MULTIVALLATE HILLFORT
NARROW RIDGE AND FURROW
NISSEN HUT
OBSERVATION POST
OPEN CAST MINE
ORDNANCE STORE
ORLIT POST
OVAL ENCLOSURE
PALISADED ENCLOSURE
PAPER MILL
PATH
PEAT CUTTING
PEAT MIRE
PELE TOWER
PEN
PILLBOX
PILLOW MOUND
PIT
PIT ALIGNMENT
PIT DEFINED ENCLOSURE
PLATFORM
PLOUGH HEADLAND
POND
PORT
PRAETORIUM
PRECINCT WALL
PRINCIPIA
PRISONER OF WAR CAMP
PROSPECTING PIT
QUARRY
RACECOURSE
RADAR BEACON
RADAR STATION
RADIO STATION
RADIO TELEGRAPHY STATION
RAILWAY
RECTANGULAR ENCLOSURE
RECTILINEAR ENCLOSURE
RESERVOIR
RIDGE AND FURROW
RIFLE BUTTS
RING CAIRN
ROAD
ROAD/LYNCHET
ROAD BLOCK
ROUND BARROW
ROUND BARROW/ROUND HOUSE (DOMESTIC)
ROUND CAIRN
ROUND HOUSE (DOMESTIC)
RUNWAY

SALT WORKS
SAND PIT
SANDSTONE QUARRY
SEA DEFENCES
SEARCHLIGHT BATTERY
SETTLEMENT
SHAFT
SHAFT/LEAD MINE
SHEEP DIP
SHEEP FOLD
SHEEP HOUSE
SHIELING
SHIPYARD
SIGNAL STATION
SLIT TRENCH
SOW KILN
SPOIL HEAP
SPOIL HEAP/LEAD MINE
SQUARE ENCLOSURE
STACK STAND
STACK STAND/PEAT STAND
STANDING STONE
STANEGATE
STANEGATE/TRACKWAY
STATUE
STOCK ENCLOSURE
STONE CIRCLE
STRUCTURE
SUB CIRCULAR ENCLOSURE
TANK TRAP
TEMPLE
TEMPORARY CAMP
TERRACED GROUND
TILE WORKS
TOFT
TOWER
TOWER HOUSE
TRACKWAY
TRACKWAY/AQUEDUCT
TRAMWAY
TRANSMITTER SITE
TREE ENCLOSURE RING
TURRET
UNDERGROUND MONITORING POST
VALLUM
VENTILATION SHAFT
VICUS
WAGONWAY
WALL
WALL BANK
WALL DITCH
WATCH TOWER
WATER CHANNEL
WATER TANK
WATERMILL
WELL
WINDMILL
WOOD BANK






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

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