

Hampshire Aggregate Resource Assessment: Aerial Photography Enhancement

Results of NMP Mapping



Historic Environment Projects

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Results of NMP Mapping English Heritage Project No. 5783

**Emma Trevarthen
March 2010**

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Geological data for the project was provided by the British Geological Survey.

The views and recommendations expressed in this report are those of the Historic Environment Projects team and are presented in good faith on the basis of professional judgement and on information currently available.

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Cover illustration

Snook's Farm: Iron Age/ Romano-British settlement. Photo: HCC 43400960; 2005 © Hampshire County Council

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Contents

Summary	10
1 Background to the project	11
1.1 Circumstances of and reasons for the project	11
1.2 Overview of NMP methodology	11
1.3 Conventions used on Hampshire NMP maps	12
2 Aims and objectives	13
2.1 Aims	13
2.2 Objectives	13
3 The project area	14
3.1 The aggregate landscape	14
3.2 Geology of the project area	14
3.3 Landscape Character	14
4 Overview of the aerial photographs	16
4.1 Specialist oblique photography	16
4.2 Vertical photographs	20
5 Results of NMP mapping	22
5.1 Overview of results	22
6 NMP results: prehistoric and Roman sites	25
6.1 Overview of prehistoric features	26
6.2 Bronze Age	27
6.3 Iron Age and Roman periods	29
7 NMP results: medieval and post medieval sites	31
7.1 The early medieval period	32
7.2 Overview of medieval and post medieval features	32
7.3 High Status Sites	32
7.4 Settlement Sites	32
7.5 Field Systems	32
7.6 Coastal and Maritime Sites	33
7.7 Parks and Gardens	34
7.8 Industrial activity	35
8 NMP results: twentieth century sites	37
8.1 The First World War	38
8.2 The Second World War	38
8.2.1 Military ports, bases and camps	39

8.2.2	Airfields: Lymington, Needs Ore	42
8.2.3	Defensive sites: Batteries, barrage balloons, obstructions and decoys	43
8.2.4	Civilian sites: water storage tanks, air-raid shelters	45
8.2.5	Operation Overlord: D-Day embarkation and the manufacture of Mulberry Harbours	47
8.3	Overview of twentieth century features	48
9	Conclusions	49
9.1	Outcomes	49
9.2	Recommendations	50
10	References	51
10.1	Primary sources	51
10.2	Publications	51
11	Project Archive	53
	Appendix 1 Methodology	54

List of Figures

Figure 1: *The project area showing the extent of the aggregate landscape and working blocks*

Figure 2: *An oblique photograph of Beaulieu Heath, taken in the 1920s or 1930s.*

Figure 3: *V-shaped structures likely to be medieval or post medieval fish weirs, visible beneath the water at Needs Ore Point*

Figure 4: *Distribution of sites in the project database mapped and recorded from specialist oblique photographs*

Figure 5: *A previously unrecorded settlement site, ring ditch, rectilinear enclosure and trackway*

Figure 6: *Distribution of cropmark sites in the project database mapped and recorded from vertical aerial photographs.*

Figure 7: *Distribution of all monuments recorded during the project.*

Figure 8: *Distribution of new sites of prehistoric or uncertain date*

Figure 9: *A range of sites of potentially prehistoric date were recorded for the first time during the project.*

Figure 10: *Distribution of known barrows and those recorded for the first time during the project.*

Figure 11: *Discrete single ring ditch at Browns Lane Wood and double ring ditch at Bampton's Farm*

Figure 12: *Settlement site at Snook's Farm.*

Figure 13: *Distribution of new sites of medieval or post medieval date*

Figure 14: *Post medieval fish traps at Needs Ore Point*

Figure 15: *Salt works and extensive drainage systems at Keyhaven, Pennington and Oxey Marshes*

Figure 16: *Designed park or woodland at Hotplots, near Boldre.*

Figure 17: *Buildings and a chimney visible in 1945 at the Test Valley Chemical Works.*

Figure 18: *Distribution of new sites of twentieth century date.*

Figure 19: *A potential First World War military site at Calshot.*

Figure 20: *Unusual defended military base at Brokenford, on the site of the Bramtoco sports ground.*

Figure 21: *A 1933 OS map of Marchwood Farm and the surrounding area*

Figure 22: *The same area shown on modern OS mapping, with extra detail recorded from 1940s RAF aerial photography.*

Figure 23: *A military camp, GL radar and barrage balloon base at Veal's Farm, near Marchwood.*

Figure 24: *Close-up of the baseball pitch that is visible in 1945 aerial photographs at the Veal's Farm military site.*

Figure 25: *The Advanced Landing Ground at Needs Ore. It was still visible, mostly as parchmarks, in 1946. Along the coast immediately to the south of the airfield are a line of anti-tank obstacles*

Figure 26: *The remains of an anti aircraft battery on Fields Heath. The concrete bases are visible as pale spheres on the dark heath*

Figure 27: *A Heavy Anti-Aircraft Battery at Hounslow, on the outskirts of the parish of Totton and Eling.*

Figure 28: *Aircraft obstruction trenches on Beaulieu Heath.*

Figure 29: *Starfish decoy site on Beaulieu Heath.*

Figure 30: *A group of eight communal street shelters in Eling.*

Figure 31: *Parchmarks, probably from rows of tents, in grass fields on the outskirts of Rushington.*

Figure 32: *Stone Point, one of the manufacturing sites of the Mulberry Harbours.*

Figure 33: *Various sections of the Mulberry Harbours, moored at Marchwood in 1947.*

Abbreviations

ADS	Archaeology Data Service
AHBR	Archaeology and Historic Buildings Record
AMIE	Archives and Monuments in England
ALSF	Aggregates Levy Sustainability Fund
AONB	Area of Outstanding Natural Beauty
BGS	British Geological Survey
CC	Cornwall Council
CUCAP	Cambridge University Committee for Aerial Photography
EH	English Heritage
GIS	Geographical Information System
HE	Historic Environment, Cornwall Council
HEEP	Historic Environment Enabling Programme
HER	Historic Environment Record
HCC	Hampshire County Council
HLC	Historic Landscape Characterisation
LiDAR	Light Detection and Ranging
MLP	Minerals and Waste Local Plan
NFNPA	New Forest National Park Authority
NMP	National Mapping Programme
NMR	National Monument Record
NMRC	National Monument Record Centre
OS	Ordnance Survey
PDF	Portable Document Format
RCHME	Royal Commission on the Historical Monuments of England

Summary

This report outlines the results of an archaeological survey, using all available aerial photographs and Environment Agency LiDAR data, of the New Forest and North West Solent coastal plain. The interpretation and mapping was carried out as part of English Heritage's National Mapping Programme.

Historic Environment, Cornwall Council carried out the project between March and December 2009 in partnership with Hampshire County Council's Environment Department and the New Forest National Park Authority. The project was funded through the Aggregates Levy Sustainability Fund.

The principal aim of the project was to define, characterise and analyse the historic environment of the New Forest and North West Solent Coastal Plain.

The project achieved this aim by providing significant enhancement to existing baseline data through the mapping, interpretation and recording of almost 800 previously unrecognised archaeological features ranging in date from the Neolithic period to the end of the Second World War.

The report presents descriptions of the project area and the methodology used, as well as an overview of the results of the mapping on a period by period basis and a series of conclusions and recommendations.

1 Background to the project

1.1 Circumstances of and reasons for the project

Between March 2006 and March 2007 the Historic Environment Service, Cornwall County Council, in partnership with Hampshire County Council Environment Department (HCC), carried out an archaeological assessment of the aggregate mineral-producing areas within the county of Hampshire. That project - The Aggregate Landscape of Hampshire: Assessment of the Archaeological Resource (English Heritage Project 4766) - was funded under Objective 2 of the Aggregates Levy Sustainability Fund (ALSF). It comprised a desk-based assessment of site records contained in the Hampshire Archaeology and Historic Buildings Record (AHBR) for those parts of the county identified as being within the aggregate resource (Young *et al* 2008). In four pre-selected parts of the aggregate resource AHBR baseline data was enhanced by the systematic mapping, interpretation and recording of archaeological features visible on aerial photographs. The aerial photography enhancement was carried out in accordance with nationally agreed standards as part of English Heritage's National Mapping Programme (NMP) and identified more than 1,000 previously unrecorded archaeological sites.

Six more aggregate-producing areas were identified during the desk-based assessment as being suitable for aerial photography enhancement (Young 2007). Therefore between March 2007 and March 2008 a second tranche of NMP interpretation and mapping was carried out, again with ALSF funding (Young *et al* 2008). Because of time constraints only five of these six areas were mapped.

The current project represents a third phase of aerial photography enhancement. It was commissioned by English Heritage (EH) on the basis of a project design submitted in March 2009 following discussions between Historic Environment, Cornwall Council (HE), EH and Frank Green, the New Forest National Park Authority Archaeologist. It comprises a programme of analytical aerial survey of the sixth area, the coastal plain to the south and east of the New Forest.

1.2 Overview of NMP methodology

The survey was carried out using NMP methodology. The NMP is a project devised by the Royal Commission on the Historic Monuments of England (RCHME), now part of EH, and is funded by EH. The aims of NMP are 'to enhance our understanding of the past, to help conserve, promote, and broaden access to the historic environment by providing primary information and synthesis for all archaeological sites and landscapes visible on aerial photographs from the Neolithic to the twentieth century' (Bewley 2001, 78). The objective of NMP, which has been ongoing since 1993, is to map, interpret and record all archaeological sites visible on aerial photographs in England to a consistent standard.

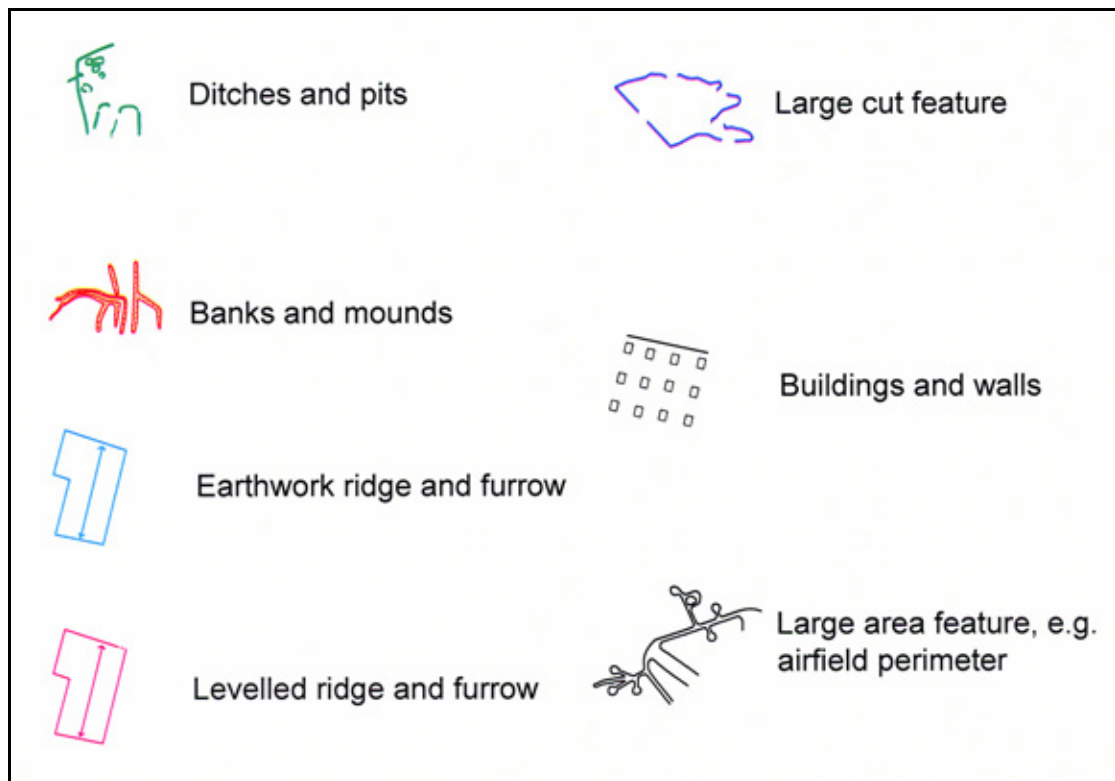
The NMP applies a systematic methodology to the interpretation and mapping of archaeological features visible on aerial photographs (English Heritage 2006). This includes not only recording sites visible as cropmarks and earthworks but also structures, such as those relating to twentieth century military activities. This comprehensive synthesis of the archaeological information available on aerial photographs is intended to assist research, planning and protection of the historic environment.

The project followed standard NMP methodology and involved the systematic examination of all aerial photographs available from the National Monuments Record (NMR), the Unit for Landscape Modelling (ULM) at Cambridge University (formerly the Cambridge University Committee for Aerial Photography) and the HCC Environment Department, as well as LiDAR data from the Environment Agency.

Archaeological features were digitally transcribed using the AERIAL 5 (version 5.29) rectification programme and AutoCAD Map 3D 2010. Each archaeological site was recorded in the project's Microsoft Access database.

Full details of the methodology for interpretation, mapping and monument recording carried out during the project are contained in Appendix 1.

1.3 Conventions used on Hampshire NMP maps



2 Aims and objectives

2.1 Aims

Project aims and objectives were drawn up with reference to the priorities published on the English Heritage website for ALSF projects (<http://www.english-heritage.org.uk/server/show/nav.1317>). The project aims and objectives fulfil one of the priorities listed under **Theme 1: Quarries**:

1.1 Identification and characterisation of the historic environment in key existing or potential areas of terrestrial extraction

The primary aim of the project was:

To define, characterise and analyse the historic environment of the New Forest and North West Solent coastal plain; an area identified as poorly represented in the Hampshire AHBR

The project achieved this by enhancing the amount and quality of archaeological information contained in the Hampshire AHBR and available to the New Forest National Park Authority (NFNPA) through mapping, interpreting and recording archaeological features from aerial photographs.

2.2 Objectives

These aims were achieved through the following objectives

1. Digital mapping and recording of the archaeological landscape within the New Forest and North West Solent coastal plain to current standards adopted by the National Mapping Programme.
2. The transfer of baseline data into the Hampshire AHBR and the NFNPA GIS system to inform strategic and management decisions.
3. Publication and dissemination of the project outcomes to raise awareness of the historic environment within the New Forest and North West Solent coastal plain.

3 The project area

3.1 The aggregate landscape

Much of Hampshire's current production of land-won mineral aggregates comes from the southwest of the county, including the coastal area to the south of the New Forest, around New Milton and Lymington. This was one of the areas where aerial photograph enhancement was carried out as part of the 2006–2008 projects. Extensive deposits of river valley sand and gravel occur elsewhere in and around the New Forest (Figure 1). For the most part these consist of plateau gravels comprising the upper terraces of the ancient Solent River. The deposits form a roughly continuous band running east to west, traversing the southern part of the forest and occupying the coastal plain to the south as well as the western banks of Southampton Water. Away from the coast there are deposits to the north and west of Brockenhurst, and in the northwest corner of the forest in the area east of Fordingbridge. In this latter location the gravels are accompanied by extensive deposits of Bracklesham sand.

In view of this, the survey area for the project included the western banks of Southampton Water (Block 1) and the coastal fringe of the New Forest National Park (Block 2). The western edge of the survey area joins up with the limit of previous NMP mapping at Lymington and the northern edge joins up with the limit of previous mapping at Totton (Figure 1). In total this comprises an area covering 173 kilometre squares.

3.2 Geology of the project area

Much of the area is characterised by extensive deposits of plateau gravel. These overlie Becton sands and Headon Bed clay, silt and sands along the southern coastal plain, and Barton sand around Southampton Water. There are deposits of alluvium in the main river valleys, most notably the Lymington and Beaulieu rivers. Along most of the coastline the gravels give way to coastal mudflats and marshes.

3.3 Landscape Character

The information presented below is taken from the New Forest District Landscape Character Assessment (New Forest District Council 2000) and 'The Hampshire Landscape a Strategy for the Future' (HCC 2000).

Three principal Landscape Character Areas are defined within the project area in the New Forest District Landscape Character Assessment.

- Lymington and Pennington Coastal Plain
- North West Solent Estates
- Waterside Parishes

There are also small tracts of Eastern Forest Heaths to the south of Hythe.

The coastline within the Lymington and Pennington Coastal Plain character area, centred on the Lymington River, has a flat open character dominated by a system of marshes and mudflats in the lee of the natural shingle bank of Hurst Spit. Inland the landscape becomes a gently undulating mainly arable landscape with remnants of ancient woodland.

The coastline between Sowley and Calshot, centred on the Beaulieu River, lies within the North West Solent Estates. Here the landscape consists of a very gently undulating coastal plain with a gradual slope down to the coastline. Many wooded stream and river valleys (most notably the Beaulieu River) flow to the Solent, interrupting the farmland character of the coastal plain. The character of the coast is

similar to that of the Lymington and Pennington Coastal Plain, with marshes, mudflats and saline lagoons. The farming landscape is one of mostly intensive arable production on medium-sized or large fields, but with some market gardening and numerous paddocks. Generally the landscape is more enclosed away from the coastline with ancient woodlands and hedgerows.

The Waterside Parishes stretch from Calshot, up Southampton Water to Redbridge. The coastline is characterised by marked contrasts – substantial urban and industrial development interspersed with undeveloped marshes and mudflats. Away from the coast is an undulating large-scale enclosed landscape with a well-wooded character.

The Eastern Forest Heaths are characterised by a mosaic of open heaths, grasslands, regenerating scrub and ancient woodland and, in places, a patchwork of small enclosed fields with well-treed hedgerows.

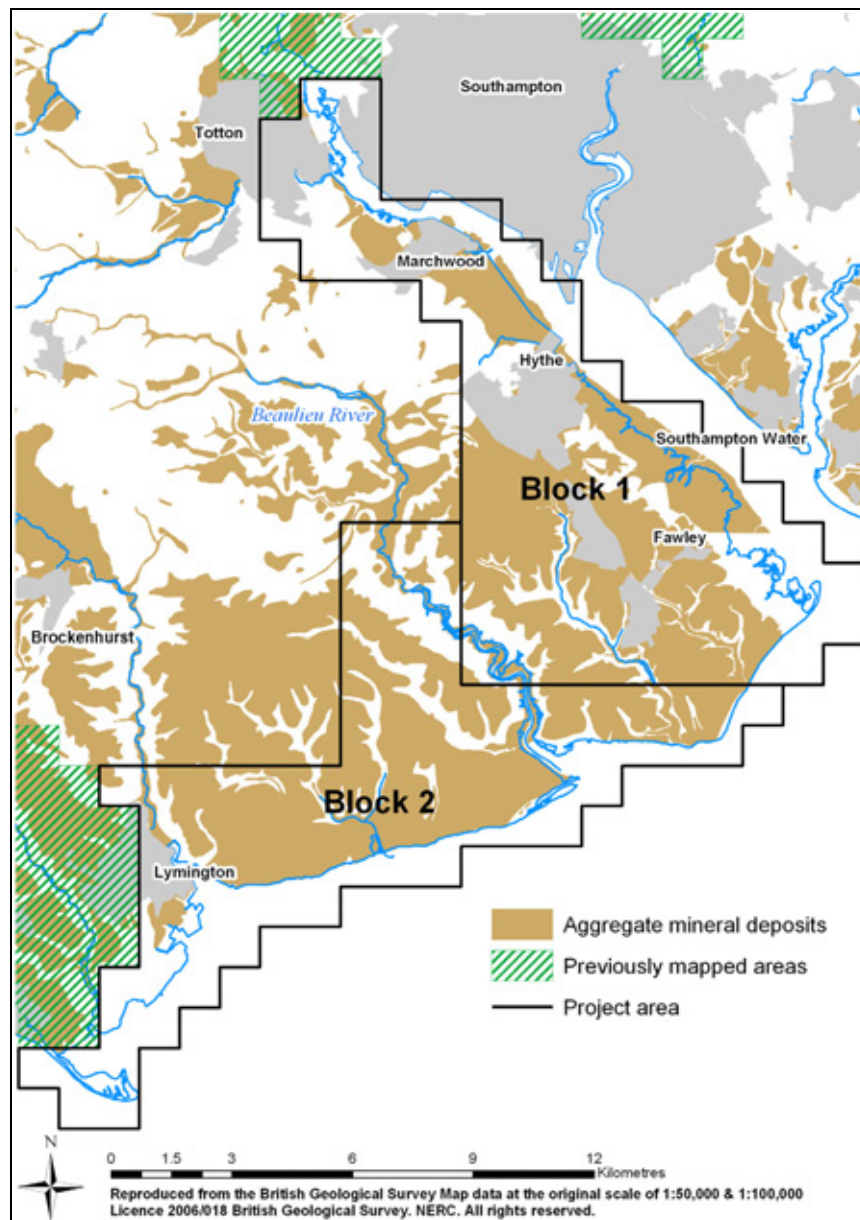


Figure 1. The project area showing the extent of the aggregate landscape and working blocks

4 Overview of the aerial photographs

More than 80 years of vertical and oblique photography have ensured that there is extensive aerial photographic cover of the project area. Available aerial photographs comprise specialist oblique photography, extensive programmes of vertical photography carried out from the 1940s onwards, and oblique photographs taken by the Ministry of Defence in the years during and after the Second World War. Three quarters of the project area, including the entire coastline, were covered by LiDAR imagery provided by the Environment Agency. LiDAR information was supplied as static .jpeg tiles, derived from the original survey data. This layer of information provided the project with 37 new records; it proved particularly useful in the accurate transcription of extant sites of post medieval and modern date such as sections of sea wall, salt works and extractive pits.

Details of available photographs are contained in Appendix 1.

4.1 Specialist oblique photography

The earliest oblique aerial photographs consulted during the project are from the Crawford collection and cover the period from 1923 to 1936. As well as being of considerable historic interest, these photographs provided the project with new information at seven different sites, and eleven new records were created as a result. These included Bronze Age barrows (Figure 2), military features likely to be of First World War date; fragments of field system not visible on later photography; and gravel pits that had been back-filled by the late 1930s.



Figure 2. An oblique photograph of Beaulieu Heath, taken in the 1920s or 1930s. By 1941 anti-aircraft obstructions had obscured many of the barrows on the Heath. Photo: CCC11753/9722 SU4003/1 c.1930's English Heritage. NMR (Crawford Collection).

Flights undertaken by Cambridge University Committee for Air Photography (CUCAP) from the 1950s onwards are another useful source; however during this project only one site was recorded from oblique aerial photography supplied by CUCAP. More systematic programmes of reconnaissance carried out by the NMR since the 1970s provide the bulk of the oblique coverage: 86% of all sites mapped from obliques were transcribed from NMR photography.

The sites mapped and recorded from oblique photography are almost exclusively levelled features visible as cropmarks. Among those that are extant, however, are a number of site types for which there were few or no records prior to the project, and the AHBR has therefore been enhanced due to aerial reconnaissance particularly along the coast. Features such as fish traps, wrecks and sea defences can become newly visible or alternatively disappear completely due to tidal changes and events such as the movement and re-deposition of sediment, coastal management and erosion.

A series of photographs taken in 2000 by the aerial reconnaissance team at English Heritage recorded the coastline at Needs Ore Point, at the mouth of the Beaulieu River, and these have revealed structures beneath the surface of the sea at low tide. They appear to be the remains of fish weirs of medieval or post medieval date (Figure 3). Their presence had not previously been recorded, due to the changing conditions along that section of coast, coupled with the fact that photography was often carried out at times of high tide. Sites such as Needs Ore Point demonstrate the potential for further discovery of coastal and maritime archaeology, since the visibility of such sites is subject to great variation, in a way similar to that of plough-levelled features.

An examination of the results from vertical photographic coverage in the blank areas in oblique distribution (Figure 4) suggests that there is good potential for the discovery of sub-surface remains through future targeted oblique reconnaissance. This is considered in detail in section 4.2.

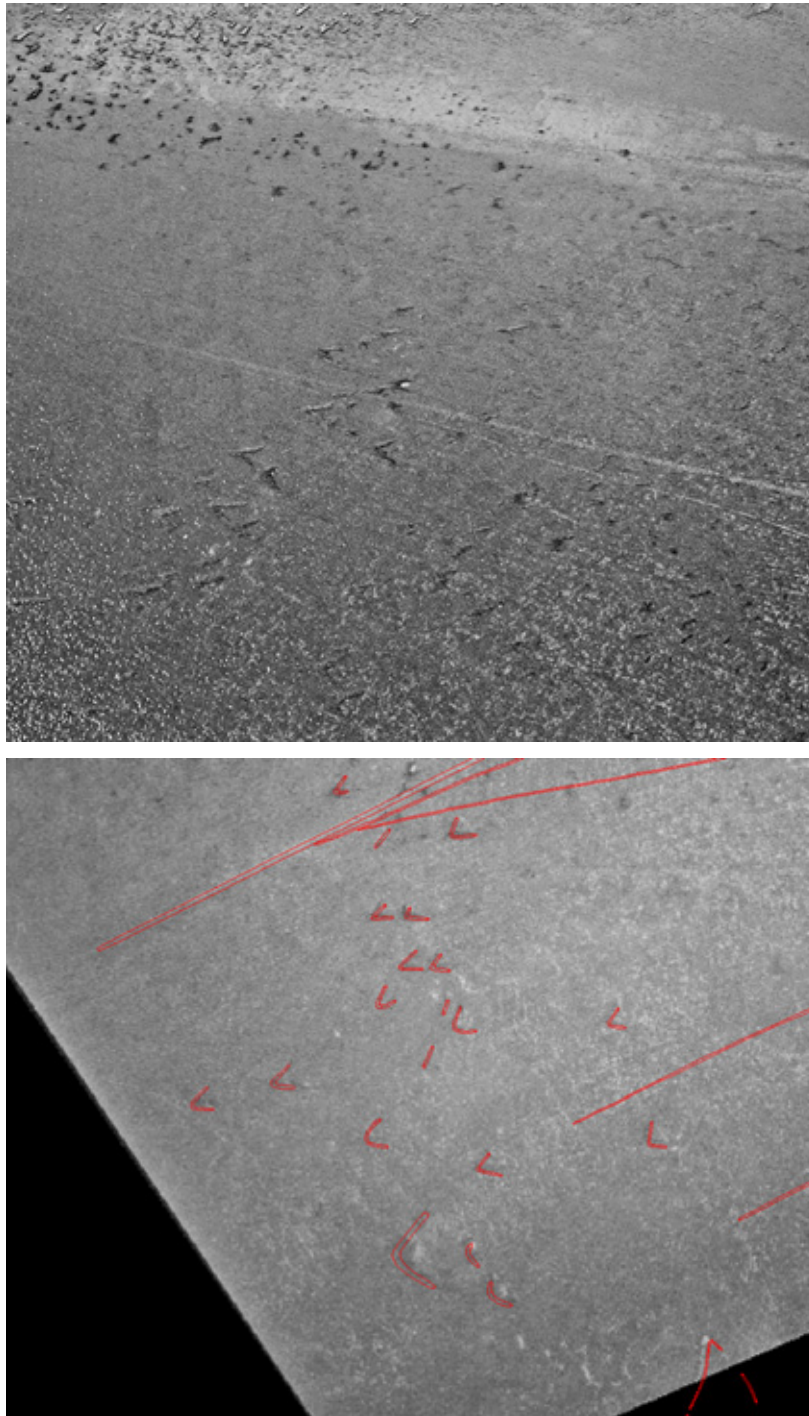


Figure 3. Original photograph (top) and rectified image showing V-shaped structures likely to be the remains of medieval or post medieval fish weirs (Site ID 173775), visible beneath the water at Needs Ore Point (see also figure 15). This site was photographed as part of ongoing aerial reconnaissance by the English Heritage Aerial Survey team. Photo: NMR 18870/33 SZ 4296/4 31 July 2000 © English Heritage. NMR

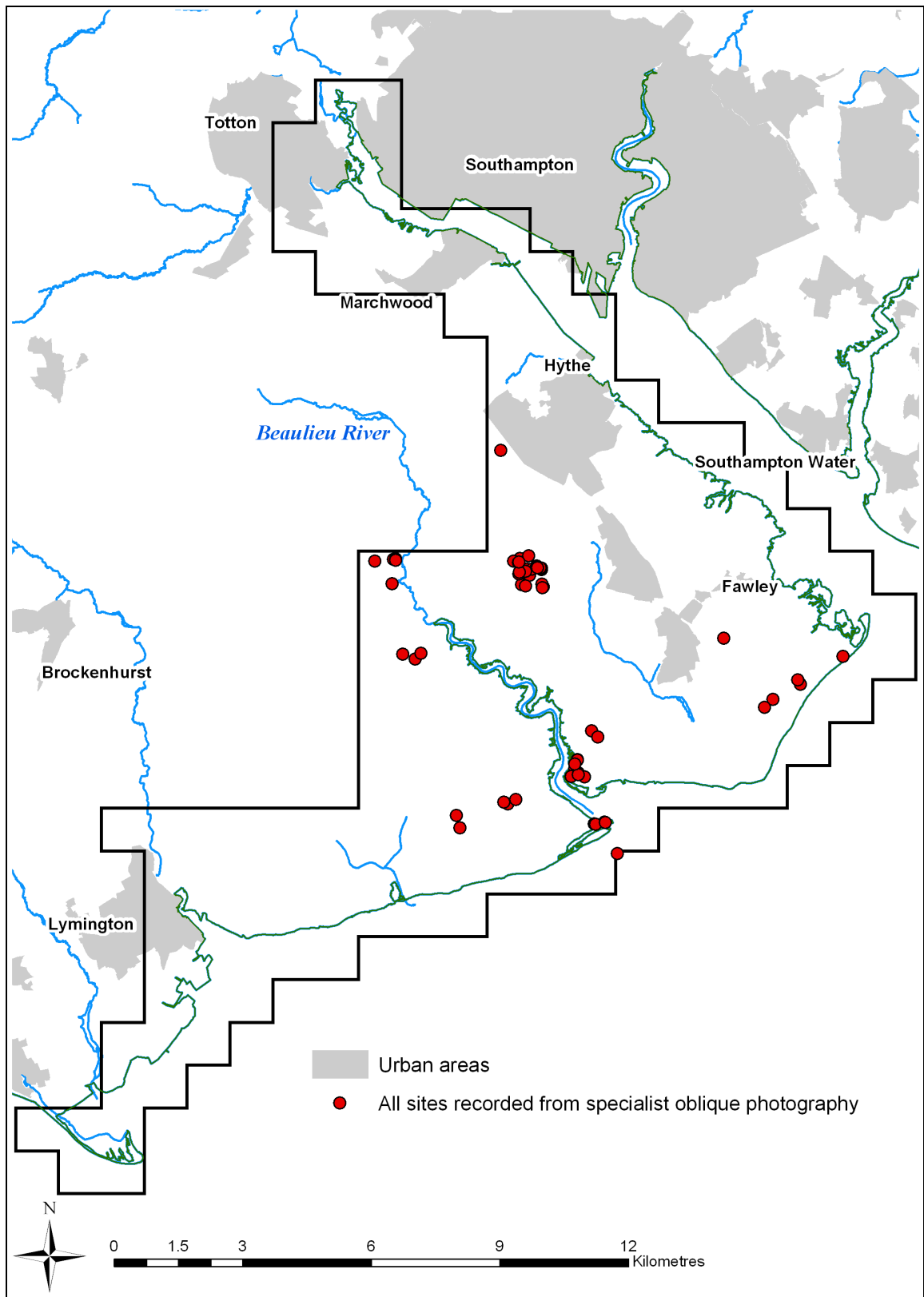


Figure 4. Distribution of sites in the project database mapped and recorded from specialist oblique photographs. © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

4.2 Vertical photographs

Vertical photographs provide coverage of all parts of the project area and were taken at regular intervals from the early 1940s until as recently as 2005. As part of the routine NMP process all the vertical photographs, with the exception of the HCC digital photo coverage from 2005, were examined using a hand-held stereoscope to provide a three-dimensional view of the landscape, including any extant archaeological features. The advantage of vertical photography is that large areas are usually surveyed; a potential disadvantage is that they are not always taken at the most favourable times of day or year to maximise the visibility of archaeological features. Nonetheless the value of vertical photography cannot be overstated; 93% of all sites recorded in the project database were identified and transcribed from vertical photographs.

A wide range of sources of vertical photography were available, and a wide variety of archaeological site types were recorded. RAF photographs from the 1940s and early 1950s were the principal source of information for sites relating to twentieth century military features of which there are substantial numbers. Three Luftwaffe vertical photographs were available: taken over Southampton Docks, Marchwood and Lymington in 1942 and 1943; these provided new records in the Marchwood area.

A large number of cropmark features were identified and transcribed from vertical photographs taken during the summer months, particularly in the years 1979, 1983, 1984 and 2005. The provision of a wide variety of sorties: the four census surveys carried out for HCC; the 2005 HCC aerial digital photo tiles; the Ordnance Survey (OS) and the Meridian Airmaps collections ensured that coverage from vertical photography was extremely good. In some cases the cropmarks on these photographs are as clear and detailed as those on oblique photography (Figure 5).



Figure 5. A previously unrecorded settlement site (Site ID 173557), ring ditch (Site ID 173555), rectilinear enclosure (Site ID 173556) and trackway located at Snook's Farm, Lymington. Photo: HCC 43400960 2005 ©Hampshire County Council

The distribution of cropmark sites recorded from vertical photographs (Figure 6) reinforces the suggestion made in section 4.1 - that the project area would benefit greatly from further specialist aerial reconnaissance. There is particularly high potential in the area to the east of Lymington, where a number of important cropmark sites were recorded (Figure 6).

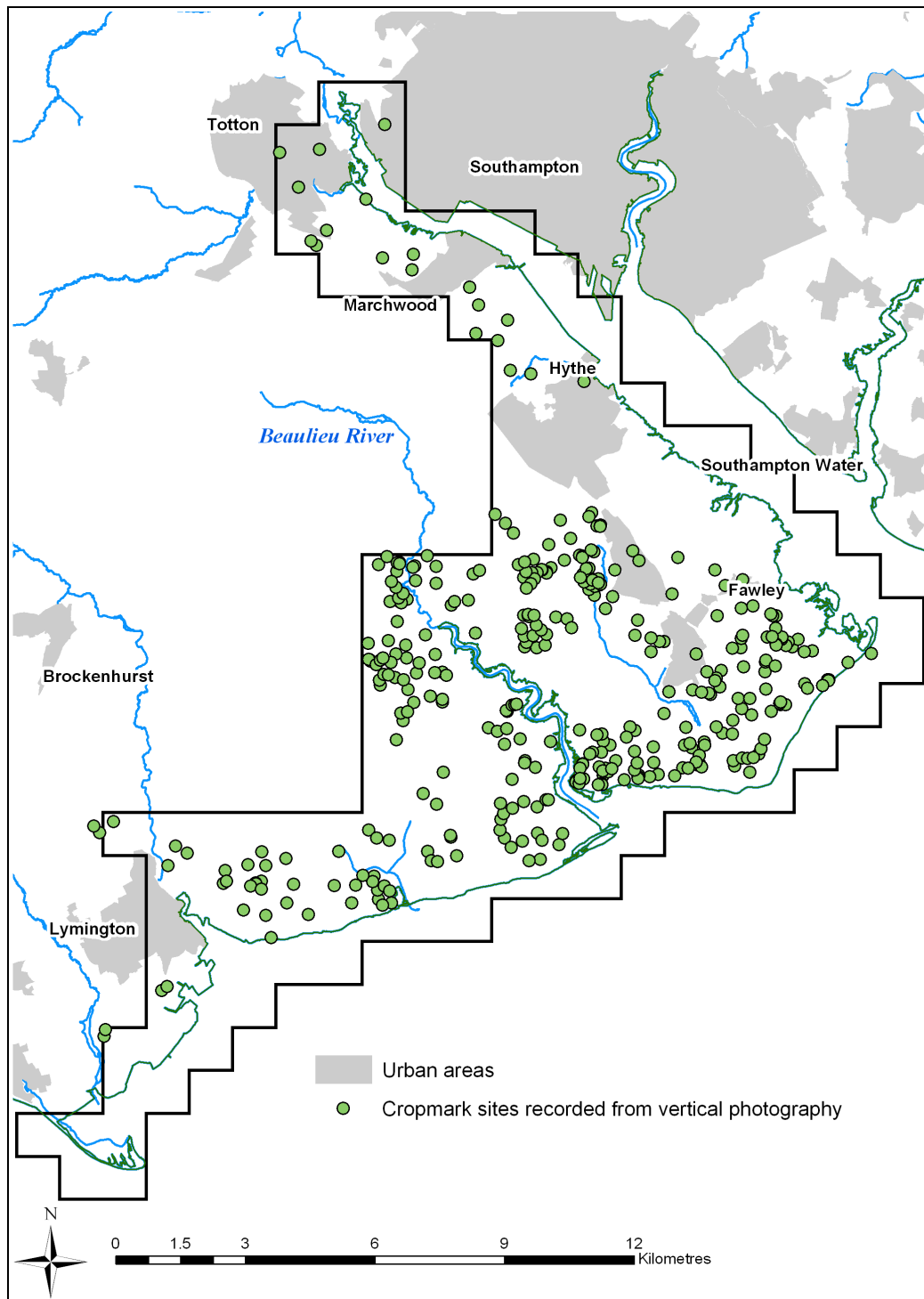


Figure 6. Distribution of cropmark sites in the project database mapped and recorded from vertical aerial photographs. © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

5 Results of NMP mapping

5.1 Overview of results

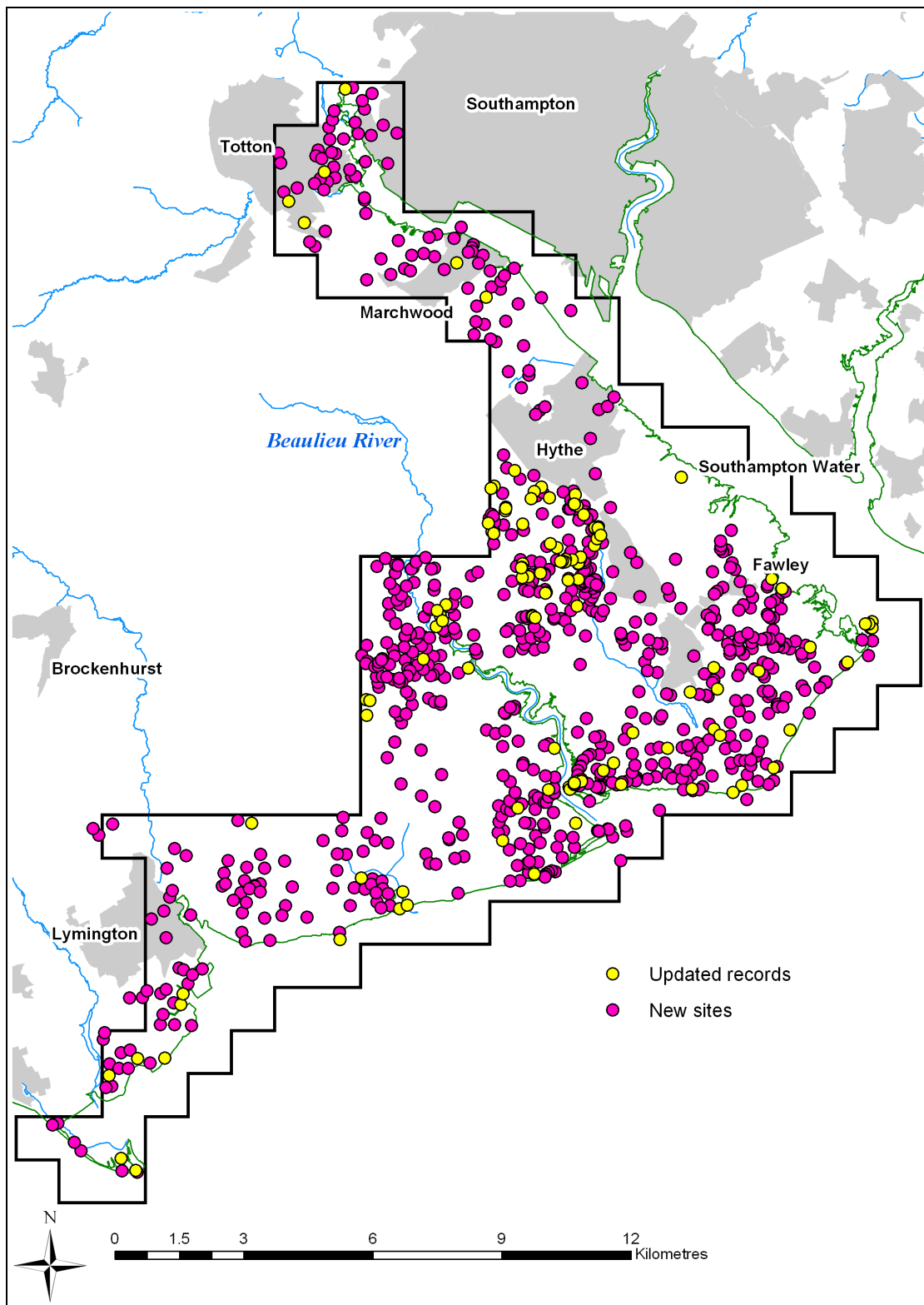


Figure 7: Distribution of all monuments recorded during the project. © **Crown Copyright 2006HCC 100019180**. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

In general terms the nature of archaeological evidence available from aerial photographs determines the types of site recorded as part of NMP. Usually these are relatively substantial ditched or banked features either visible above ground as earthworks, or as cropmarks of sub-surface features. Historic photography provides details of earthworks and structures which have been denuded or levelled by ploughing, or otherwise destroyed or removed in the last 80 years.

There are a number of nationally important historic sites within the study area, most notably the abbey and palace at Beaulieu; the Henrician artillery forts at Hurst and Calshot Spits; tidal mills at Eling and Beaulieu; Buckler's Hard, where many of the ships of Nelson's fleet were built; embarkation hards for the D-Day invasions at various points along the coastline; and the remains of Mulberry Harbour construction works at Fawley, Lepe and in the Beaulieu River.

Prior to the project, there were 57 existing records in the AHBR for Bronze Age barrows within the project area. Most of these are located in the Forest Heath landscape character area to the south of Hythe, where three burnt mounds are also recorded. The Dibden to Lepe Roman road (Margary no. 423) runs through the eastern part of the project area and a number of find spots for rich Roman assemblages as well as a large Iron Age midden suggests that the area around Lepe was of some importance in the Iron Age/Roman period. There are also the remains of a once extensive medieval and internationally important post medieval salt industry along the coastline.

In general terms, however, there were only a small number of site records within the project area compared with other parts of Hampshire. The AHBR contained 418 records for this area which, in broad terms, equates to 2.4 site records per square kilometre, compared with an average site density of five records per square kilometre for the aggregate resource area as a whole (Young *et al* 2008, 119-125). In particular there were very few records for prehistoric or Roman settlement and little evidence for field systems from these periods.

Analytical aerial survey of the adjoining area to the west of Lymington (Figure 1) resulted in the recording of more than 140 sites visible as cropmarks, where prior to the there had been only six (Young *et al* 2008). Based on the results of this mapping, it was suggested that there was a high possibility that aerial photography enhancement in the New Forest and North West Solent Coastal Plain would produce comparable results (Young 2009), and this was indeed the case.

During the project 793 new monument records were created and 119 existing records for archaeological sites were updated. Prior to the NMP a total of 418 records existed in the AHBR for archaeological sites and artefacts within the project area. Thus the results of NMP mapping constitute a 189% increase in the record for the archaeology of the aggregate landscape.

The site distribution pattern was not greatly compromised by gaps resulting from extensive tree cover or urban development. There is, however, a significant gap on the western bank of Southampton Water between Hythe and Fawley due to the major oil refinery at that location.

Forty two percent of the monuments recorded were plough-levelled sites that were only visible as cropmarks. These were primarily in the central parts of the study area. To the far south below Lymington were extensive drainage systems and salterns and in the north, between Totton and Fawley, twentieth century military activity dominated the record.

The majority of prehistoric and Roman features, with the exception of barrows and barrow groups on Beaulieu Heath, were plough-levelled. The settlement site at Snook's Farm, Lymington is of particular interest, but there also were a good number

of discrete enclosures and fragments of field systems. In this way the survey has demonstrated that there is greater potential for later prehistoric and Roman archaeology in this area than hitherto understood and further archaeological investigation is warranted.

Few traces of medieval or post medieval settlement were recorded but small groups of cultivation remains from these periods are numerous. Post medieval water meadows were recorded from the Lower Test valley above Totton. Salt extraction works, oyster beds and fish traps were also recorded during the project, along the shores of the Solent between Hurst and Calshot.

Hampshire is very rich in twentieth century military and defensive remains and the New Forest Coast is no exception. Almost 150 new sites from this period were recorded, most notably along the western bank of Southampton Water.

6 NMP results: prehistoric and Roman sites

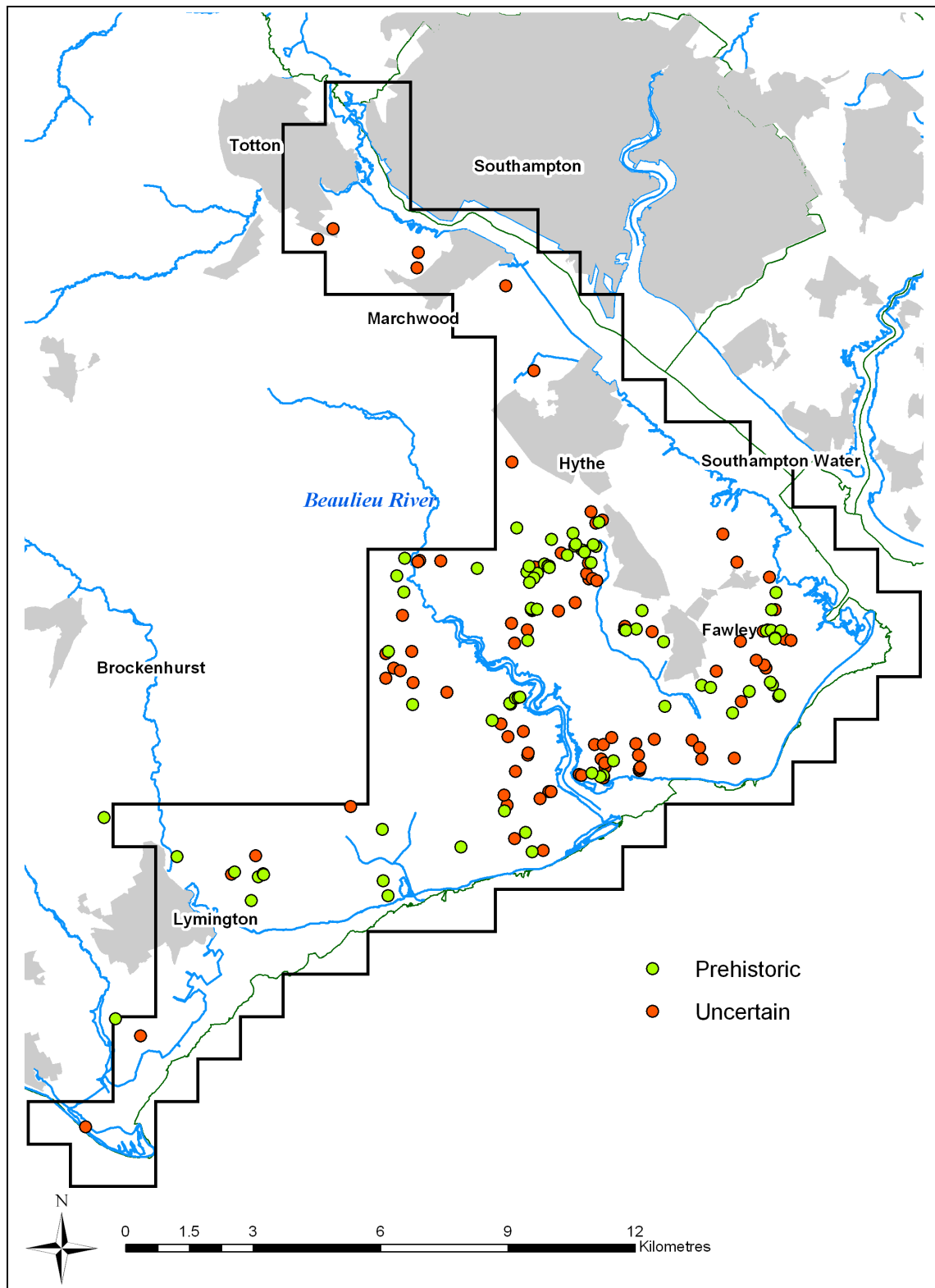


Figure 8: Distribution of new sites of prehistoric or uncertain date. © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

While many features visible on aerial photographs can be confidently interpreted as prehistoric in date, others - for example a group of three ring ditches at Hotplots near Lymington (Site ID 173878) - might potentially be prehistoric features (round barrows in the Hotplots example) or alternatively could be the remains of later agricultural or ornamental features, (the Hotplots features may be tree rings). During the project a total of 82 new prehistoric or potentially prehistoric sites were identified. This represents an increase in the record for the prehistoric resource of over 100% since the existing database contained 67 monument records of prehistoric date. This is a significant enhancement of the archaeological resource in the project area.

An additional 92 sites recorded during the project are classed as being of uncertain date: between 2200BC and AD1900. More than half of these are sections of linear bank or ditch that may reasonably be interpreted as the remains of field boundaries or fragments of enclosures of prehistoric or Roman date.

6.1 Overview of prehistoric features

Although a small number of features representing Neolithic communal or ceremonial monuments are recorded from other parts of Hampshire, none were positively identified during this project. It is possible that later features have obscured traces of Neolithic activity.

Roughly one sixth of features identified as field boundaries or field systems during the project were ascribed a tentative prehistoric date: 28 sites in total. The majority of these lie in close proximity to other prehistoric site types, such as ring ditches and enclosures. One potential remnant of prehistoric cultivation is a group of parallel linear ditches and banks on Beaulieu Heath. These are visible as earthworks on 1940s aerial photographs, though obscured somewhat by twentieth century aircraft obstruction trenches.

Bronze Age barrows dominated the prehistoric portion of the project database: either as upstanding monuments, such as the clusters of bowl barrows on Beaulieu Heath; or as discrete cropmark or soilmark sites throughout the project area. In all 112 barrows were identified from aerial photographs; 64 of these were new sites.

Other notable prehistoric sites recorded for the first time during the project included five discrete single-ditched square enclosures, a square enclosure at Lower Exbury that appears to enclose and respect a potential barrow site, and a D-shaped enclosure at Inchmery Clump (Site ID 173733), where the River Exbury meets the coast. The remains of a small settlement at Snook's Farm near Lymington (Site ID 173557) are also considered likely to be of prehistoric date.

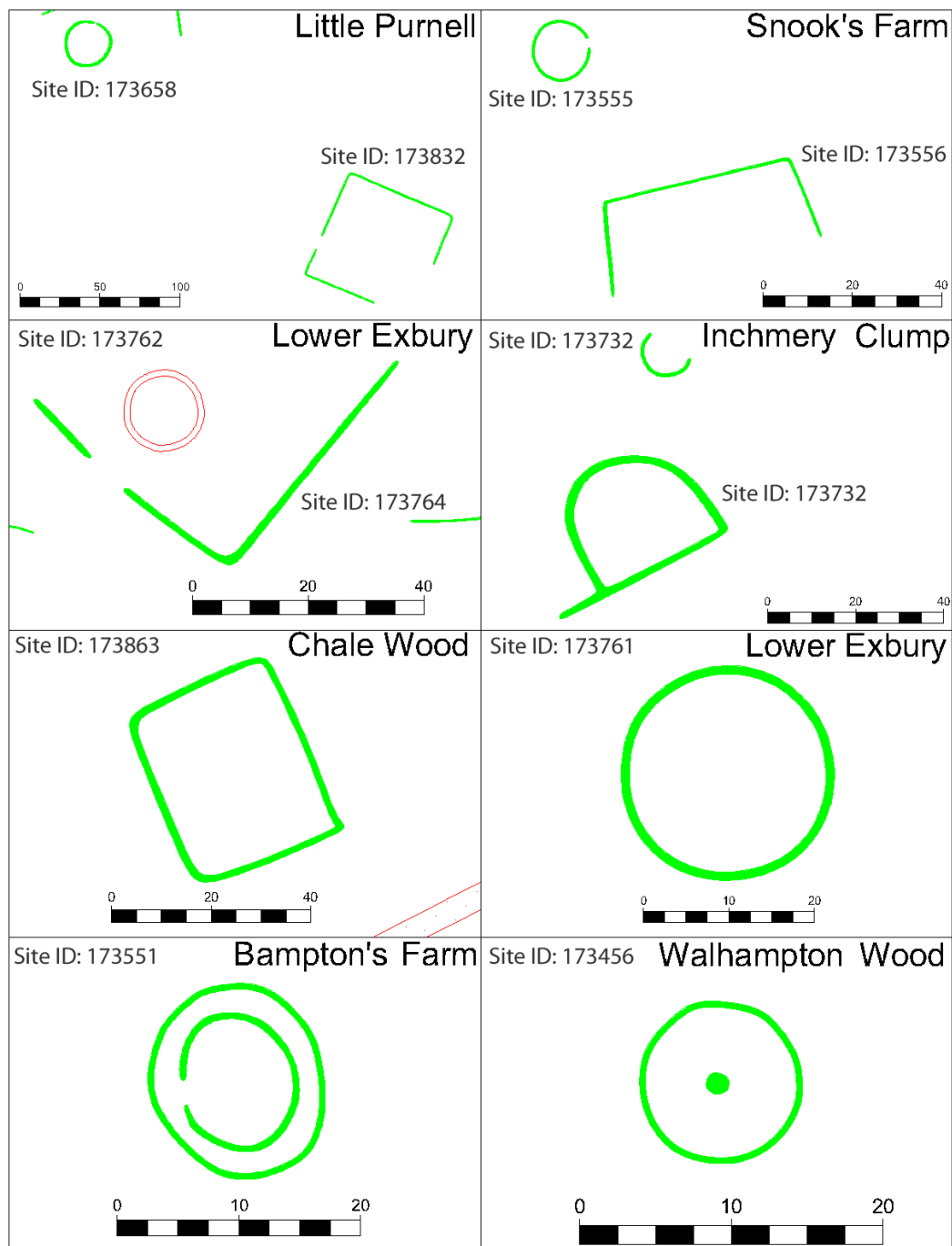


Figure 9: A range of sites of potentially prehistoric date were recorded for the first time during the project.

6.2 Bronze Age

The Bronze Age in the project area is indicated almost exclusively by the remains of round barrows. The exceptions are three boiling mounds and two cremations, all of which were previously recorded in the AHBR. Evidence for Bronze Age settlement, as in other parts of the county, is scarce.

The New Forest contains large numbers of barrows: there were 57 existing records in the AHBR, many of which are on Beaulieu Heath including a cemetery of seven bell barrows. The distribution of fancy barrows in this area has led to the suggestion that

the Beaulieu and Lymington Rivers were foci for early Bronze Age settlement (Tomalin 1996, 14).

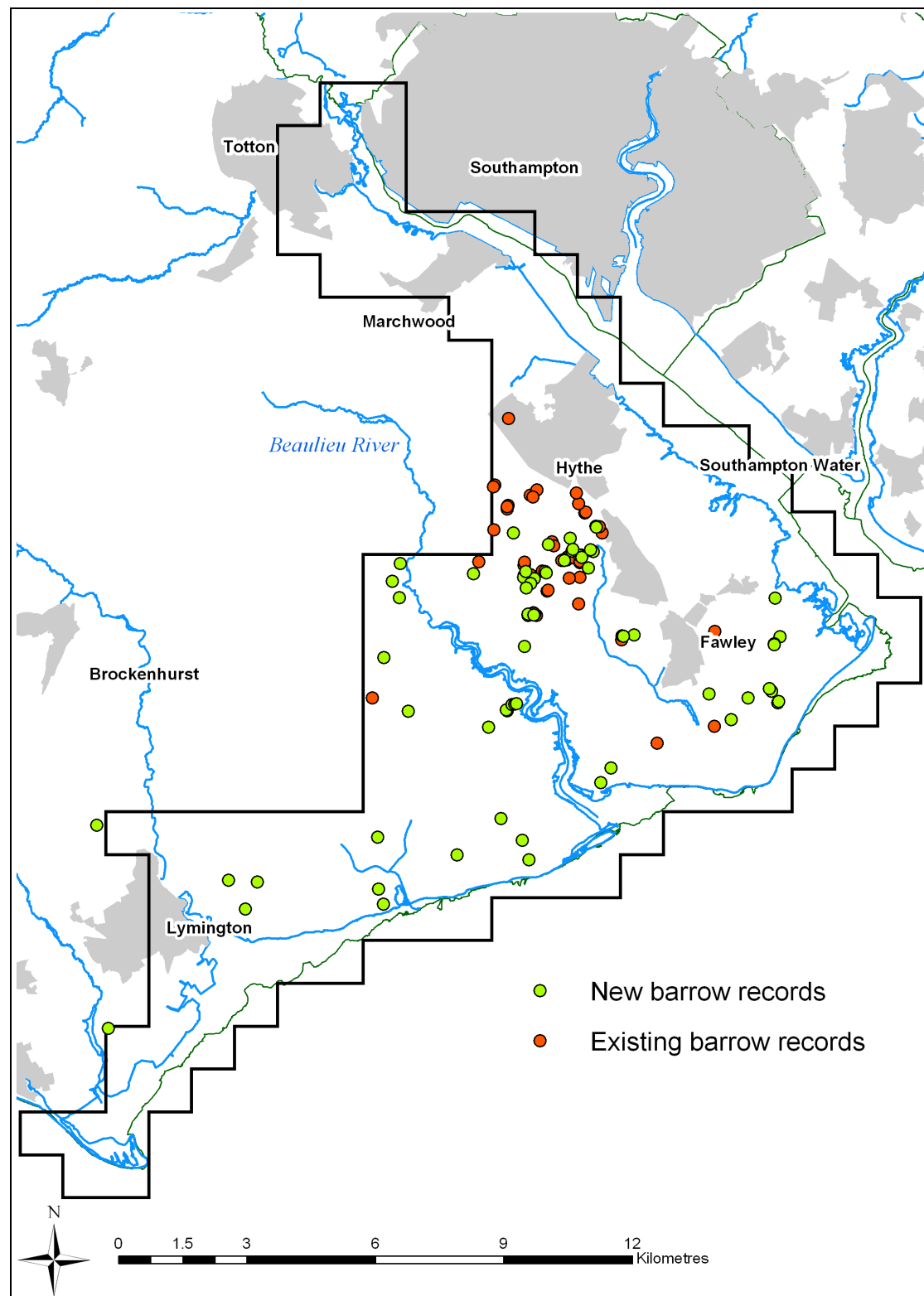


Figure 10: Distribution of known barrows and those recorded for the first time during the project. The new records show that the project has extended barrow distribution into the coastal areas. © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

During the project more than 100 Bronze Age barrows were identified, almost all of which were interpreted as round barrows, and 64 of which are new to the record. All but nine of the new sites are plough levelled; the majority are visible as ring ditches although roughly a third are cropmarks of mounds. Their diameters range from 10m to 30m and approximately half are single, discrete features such as those at Lower Exbury, Bampton's Farm and Walhampton Wood (both the latter on the eastern outskirts of Lymington).



Figure 11: Discrete single ring ditch (Site ID 173603) to the west of Sowley Marsh at Browns Lane Wood (left) and a double ring ditch (Site ID 173551) at Bampton's Farm (right). Photos: Left: HCC 43700950; Right: HCC 43400950 Both ©Hampshire County Council, 2005

A number do lie in close proximity to other potentially prehistoric sites, however. These include Snook's Farm, where a ring ditch (Site ID 173555) is visible only 70m from a small Iron Age/ Romano-British farmstead and a ditched rectilinear enclosure; a field at Little Purnell, near Boldre, which boasts a ring ditch (Site ID 173658) and a square ditched enclosure (Site ID 173832) in close proximity to fragments of a field system; and Inchmery Clump, a site where a D-shaped ditched enclosure (Site ID 173733) is approximately 20m from a small ring ditch (Site ID 173732).

In terms of settlement, there are so far no known Bronze Age settlement sites to accompany the large number of barrows and barrow cemeteries in the New Forest area. It has been suggested however that Bronze Age settlement types in Hampshire include rectilinear enclosures (Lambrick *et al* forthcoming), and therefore an earlier date for some of the sites described in section 6.3 cannot be entirely ruled out. One example of particular note is that at Lower Exbury (Figure 9).

6.3 Iron Age and Roman periods

Five newly recorded sites were considered likely to date to the Iron Age/ Romano-British periods; a further 11 were recorded as uncertain/ prehistoric in date, with a tentative interpretation of Iron Age or Roman based on their morphology. The sites included four ditched rectilinear enclosures and a group of polygonal ditched enclosures at Snook's Farm (Site ID 173557). Only one of the new sites was interpreted as exclusively Roman. This was a previously projected 50m stretch of the Dibden to Lepe Roman road (Margary no. 423) which was visible as a cropmark bank at Langley (Site ID 173179).

The Snook's Farm settlement comprises three polygonal ditched enclosures, the fragments of two further potential enclosures, and the edge of a large, single ditch enclosure that appears to respect the line of the most northerly feature. A small pit, possibly a storage pit, is visible within the eastern enclosure. The two other enclosures both possess annexes or later phases of enclosure ditch, suggesting a degree of continuity of use of the site (Figure 12).

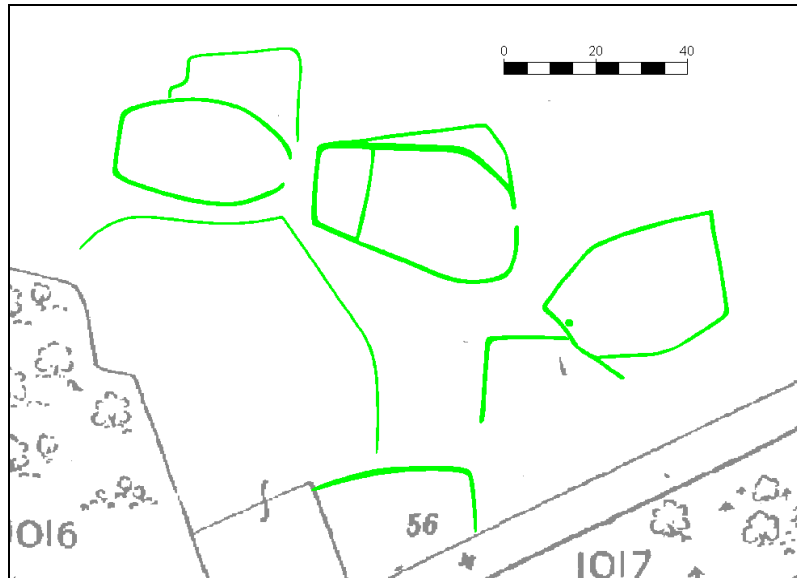


Figure 12: Settlement site at Snook's Farm (Site ID 173557). © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

Although enclosure complexes of this kind are characteristic of the later Iron Age/Romano-British period on the chalklands, few were previously known from the non-chalk areas of Hampshire and none had been identified on the New Forest coast. This project and previous NMP surveys of the aggregate landscape have shown that enclosure complexes do occur away from the chalk, and it is likely that more await discovery. The distribution of cropmark sites, including Snook's Farm, recorded from vertical photographs (Figure 6) suggests that further specialist aerial reconnaissance carried out in optimum conditions would have the potential to reveal more evidence of Iron Age and Romano-British settlement.

7 NMP results: medieval and post medieval sites

More than 400 medieval or post medieval sites were identified during the project. This amounts to almost half of all site records in the project database. Of these 378 were for new sites. Although the majority are concerned with agricultural activity, a number were associated with coastal industries, and a few with the ornamentation of the post medieval landscape.

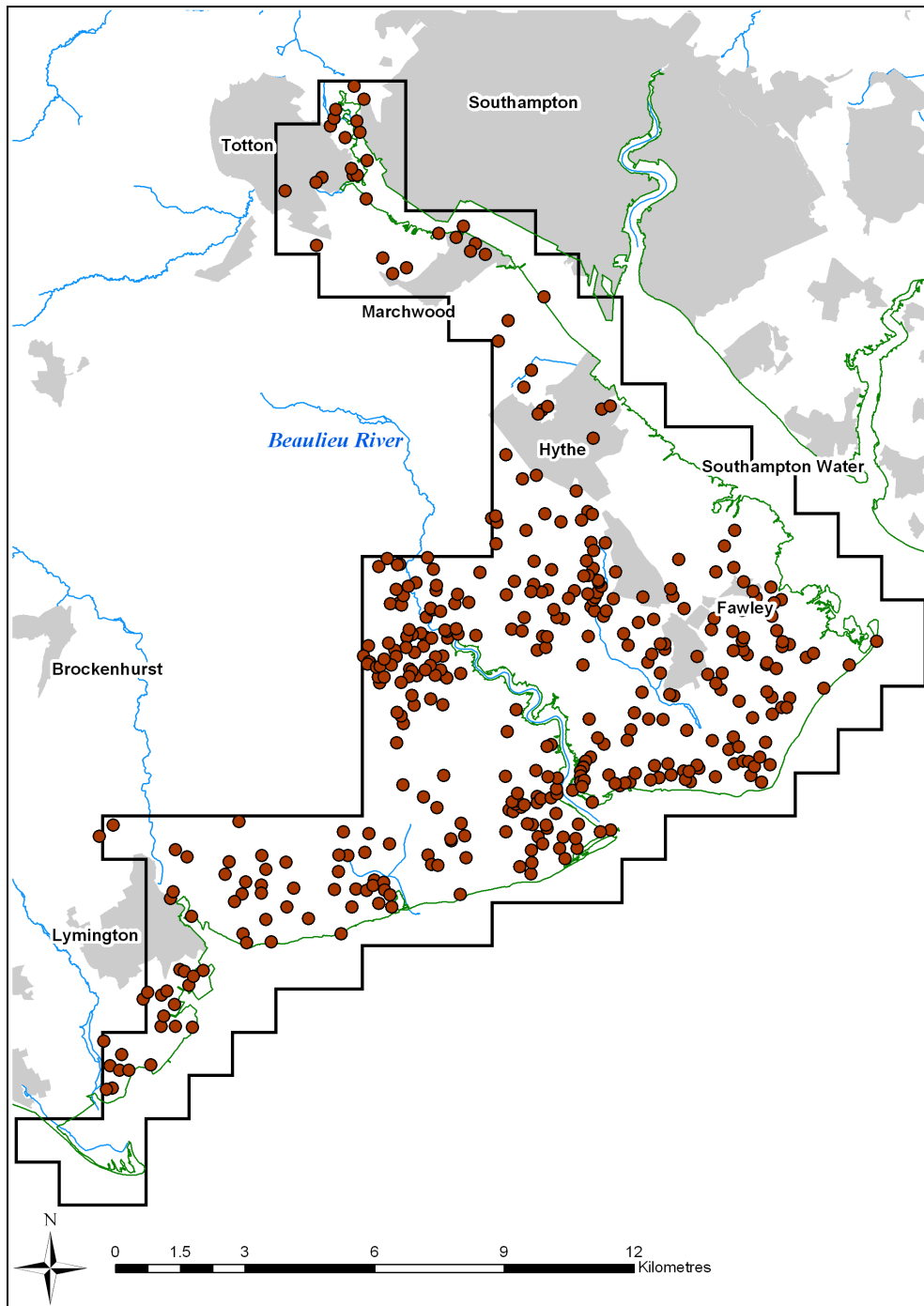


Figure 13: Distribution of new sites of medieval or post medieval date. © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

7.1 The early medieval period

This period is defined in the database (following the definition in the AHBR) as being from AD 410 to 1065. There were no features which could be positively identified as originating in the early medieval period, although a previously recorded group of barrows on Beaulieu Heath includes examples that are in a style considered likely to date to the early medieval period (Langley Heath, field investigation 1965).

7.2 Overview of medieval and post medieval features

The medieval and post medieval periods are here defined as 1066-1539 and 1540-1900 respectively. The nature of much of the evidence recorded during the project means that it is difficult to ascribe a more precise date than medieval and/or post medieval for many sites, particularly for site types such as field boundaries, field systems and areas of ridge and furrow.

Of the 412 records dated to the medieval or post medieval periods, 151 are for features such as field boundaries and ridge and furrow that relate to cultivation and subsistence. As well as field boundaries, water meadows were recorded in the far north of the project area, beyond Totton and Eling. In the Lymington area, extensive drainage systems and the remains of salt works and oyster beds were recorded. Evidence of assarts, clearance of woodland to create open arable or pasture, was noted in the southern half of the project area, between Lymington and the Beaulieu River.

Although five abandoned or shrunken settlement sites are recorded in the AHBR, no new examples were recorded. There has been little specialist aerial reconnaissance in this area specifically targeting earthwork sites and it is likely that reconnaissance carried out in favourable conditions or, indeed, a LiDAR survey might record low earthwork sites not visible on vertical photographs.

7.3 High Status Sites

Within the project area, there are a number of high status sites including the ecclesiastical establishments of Beaulieu Abbey and St Leonard's Grange and a moated site at Holbury Manor. New information was added to the transcribed record for Beaulieu Abbey where the course of the precinct wall was still visible on RAF photographs from 1946.

7.4 Settlement Sites

No new records for shrunken or deserted settlement were created but at Lower Exbury new detail in the form of linear features and a rectilinear enclosure was added to the previously recorded deserted medieval village (Site ID 41028). It is not clear whether these new features relate to medieval settlement or to a later phase of the site, such as the post medieval house and garden.

7.5 Field Systems

The 151 records for features relating to agriculture and subsistence, including field boundaries, fragments of field systems, trackways and areas of parallel cultivation marks (including ridge and furrow), formed the largest group of site types for the medieval and post medieval periods.

Few lynched field systems were identified, the best example being on the edge of Beaulieu village, where parallel field banks were observed within a group of strip fields of likely medieval date. The great majority of agricultural features recorded were isolated banked or ditched field boundaries. These are distributed widely throughout the project area although no extensive systems were identified. In many cases it was difficult to date these boundaries more precisely than medieval/post

medieval because in parts of the project are the process of enclosure began at a relatively early date. In some instances, however, where the boundaries fit into the present day field pattern Hampshire's Historic Landscape Characterisation (HLC) was used to inform their interpretation. Typically field boundaries that are sinuous in character and fit into land classed as *Wavy fields* in the HLC represent late medieval enclosure whereas the straight surveyed boundaries classed as *Parliamentary type enclosures* are post medieval in origin.

7.6 Coastal and Maritime Sites

A wide variety of coastal and maritime sites were recorded during the project. Almost 40 of these had not previously been recorded. Of particular interest were the remains of a probable medieval or post medieval fish weir off the coast at Needs Ore Point (Site ID 173775). These were photographed in 2000, and were initially interpreted as the remains of anti-landing posts, of either First or Second World War date (D. Grady 2009, pers comm.). The remains consist of V-shaped structures approximately 10m long, below the surface of the sea roughly 400m from the current shoreline. It is possible that the structures are the remains of timber frames which would have held numerous conical woven baskets, similar to those referred to on the Severn Estuary as 'putts' or 'putcher baskets' (Godbold et al 1994). It was in these baskets that shoals of fish were trapped and collected.

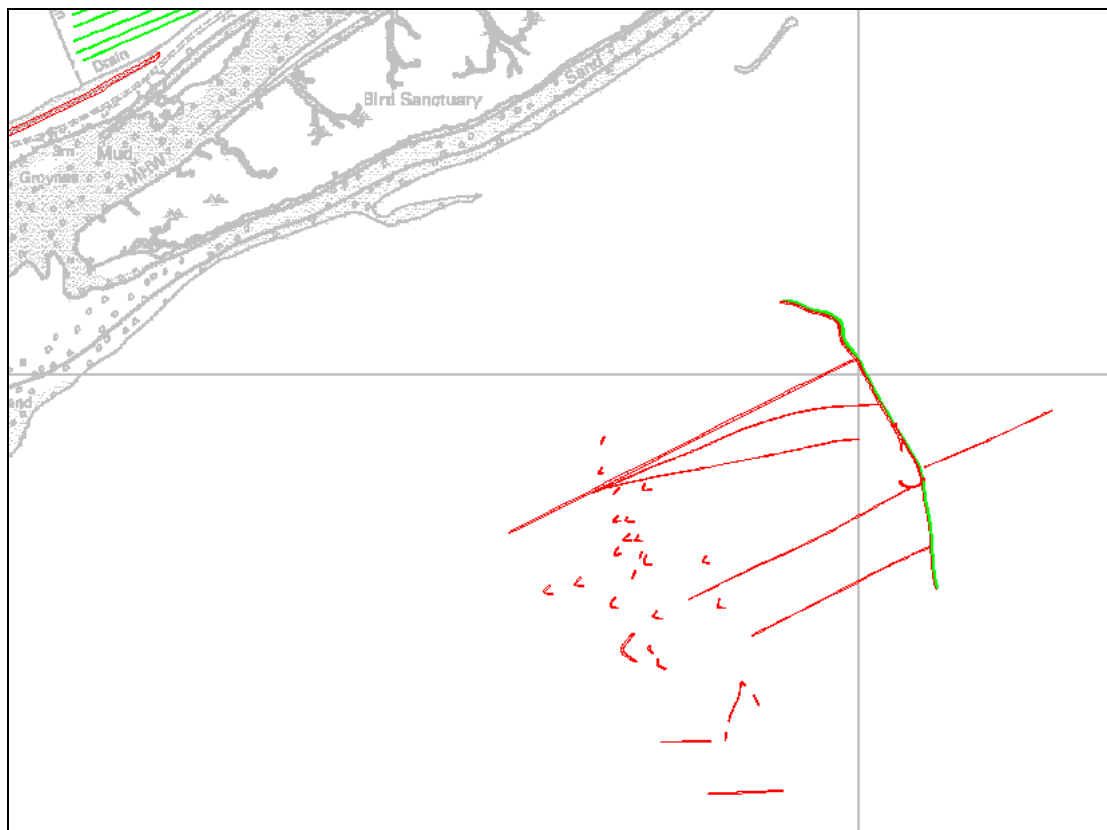


Figure 14: Medieval or post medieval fish weir at Needs Ore Point. © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

Five new wreck sites were recorded. The shape and structure of three of the craft (Site IDs 173851, 173852, 173853) suggest that they are metal-hulled and probably of nineteenth or early twentieth century date. The other two however are not as clearly defined (Site IDs 173856, 172925) and could potentially be of earlier date.

Along the coast between Lepe and Hurst Spit are numerous salterns and complex drainage systems. Twenty two salt working sites were recorded, thirteen of which were new to the AHBR. These were particularly well defined in the marshes between Lymington and Keyhaven. Many of the individual sites in this area had previously been recorded but a great amount of detail was added which shows a variety of styles of drains ranging from formal herringbone systems to sinuous, organic ditches that might be semi-natural features. It is possible that the various styles of drainage system represent different periods of working and drainage in this area.

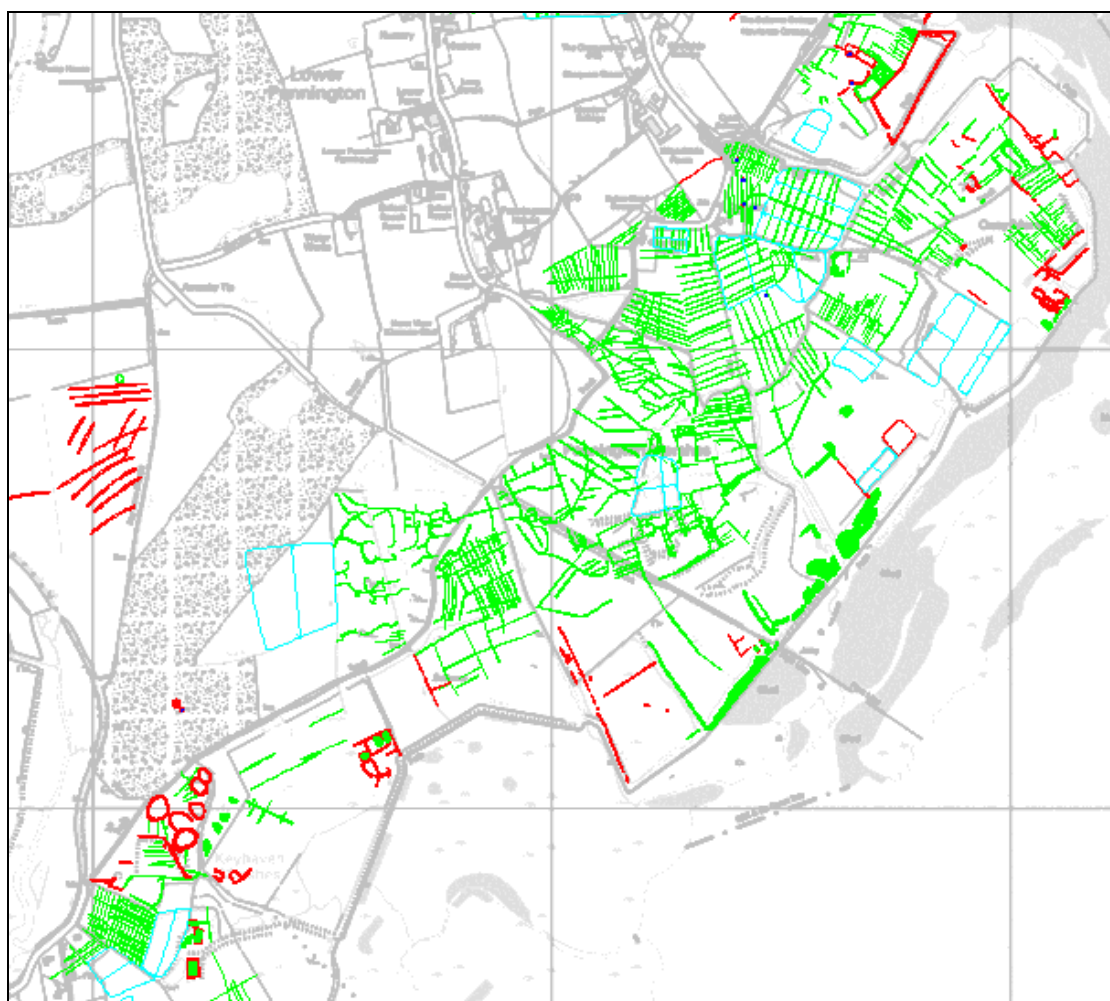


Figure 15: Salt works and extensive drainage systems at Keyhaven, Pennington and Oxe Marshes. © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

One further site of interest is a late nineteenth or early twentieth century timber pond in the channel opposite Eling Saw Mill at Totton. Such ponds were constructed to hold logs or planks to prevent them from becoming seasoned and thus more difficult to saw. The pond would also have been used to organise groups of logs by ownership. Although the pond is visible on aerial photographs for almost twenty years, and is likely to have been in place for far longer, it is not marked on historic or modern OS maps.

7.7 Parks and Gardens

Three park or garden sites were recorded for the first time during the project. Two sites were observed within the designed park landscape at Hotplots: the remains of

avenues (Site ID 173877) and also a group of three possible tree rings (Site ID 173878). Although fragments of the park layout were marked on historic OS maps, the overall design was not apparent until it was viewed as a complex of ditches visible as cropmarks on vertical aerial photographs taken in July 1984.

The other garden feature is a parterre garden at Eaglehurst (Site ID 173866). The parterre was marked on OS historic maps from 1868, along with three other formal flower beds in the grounds of Eaglehurst. The outlines of the other beds were not visible on aerial photographs, but the parterre design is very clear suggesting that it was an older, more established feature.

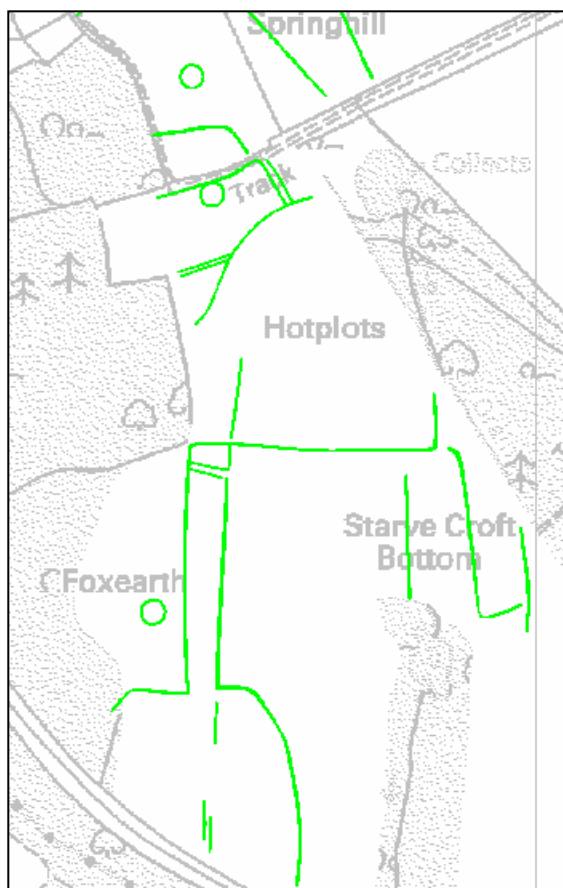


Figure 16: Designed parkland at Hotplots, near Boldre (Site IDs 173877, 173878). © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

7.8 Industrial activity

As well as evidence of coastal and riverside industries such as salt works, fish traps and the timber mill described in section 7.5, industrial complexes and areas of extraction were recorded during the project.

A number of industrial sites were already recorded in the AHBR: two ironworks; a chemical works; a creosote works; one pottery kiln; eleven brickworks and a single gravel pit. Some remnants of these works were visible on aerial photographs, such as the sluices at Sowley iron-workings (Site ID 22744), visible as earthwork hollows, and the remains of buildings at the brickworks of Rushington, Exbury and Bailey's Hard (Site IDs 33808, 55140, 33805). At Yarnsey, remains of structures at the Test Valley Chemical Works were mapped and recorded for the first time (Site ID 172827).



Figure 17: Buildings and a chimney visible in 1945 at the Test Valley Chemical Works (Site ID 172827) Photo: RAF 106G/UK/600 Frame 6010. 4 August 1945 English Heritage (NMR) RAF Photography

In addition to industrial works 42 gravel pits, and five clay pits were recorded for the first time. A number of smaller features considered likely to be extractive pits were also mapped. Almost all of these were small, isolated features likely to have been used for agricultural purposes or for localised road and house-building. Two exceptions to this are the extensive workings across Beaulieu Heath, and quarrying near Marchwood (Site ID 172909), now overlain by a recycling centre and recreation ground.

There is also possible evidence for charcoal production in the area between East End and Lower Exbury. Here, in fields adjacent to land classed as Assarted Woodland in Hampshire's Historic Landscape Characterisation, there are several groups of circular features resembling cropmark pits. These may be the remains of charcoal burning platforms, possible associated with the nearby ironworks at Sowley. Similar groups of features have been recorded elsewhere in Hampshire, notably in the parishes of West Meon, East Tisted and Froxfield (A Young 2009, pers comm.). This is a subject that would greatly benefit from further work that could encompass a number of disciplines, for example: research into local history and place-name evidence; field survey to establish the causes of the negative cropmark areas, either from the digging of pits, burning or tree-removal; and also perhaps a study of the association between these groups of feature and areas of Assarted Woodland across the county.

8 NMP results: twentieth century sites

Almost 200 twentieth century sites were recorded in the course of the project, which amounted to over a fifth of the total number of site records in the project database. Of these, 20 are updates of existing AHBR records. The remainder are new sites, and almost 90% have been interpreted as military in function. 148 sites have been dated to the Second World War.

Non-military twentieth century site types include 12 sections of groynes or sea defences, a gravel pit, a salt works and four non-military sports grounds or pitches.

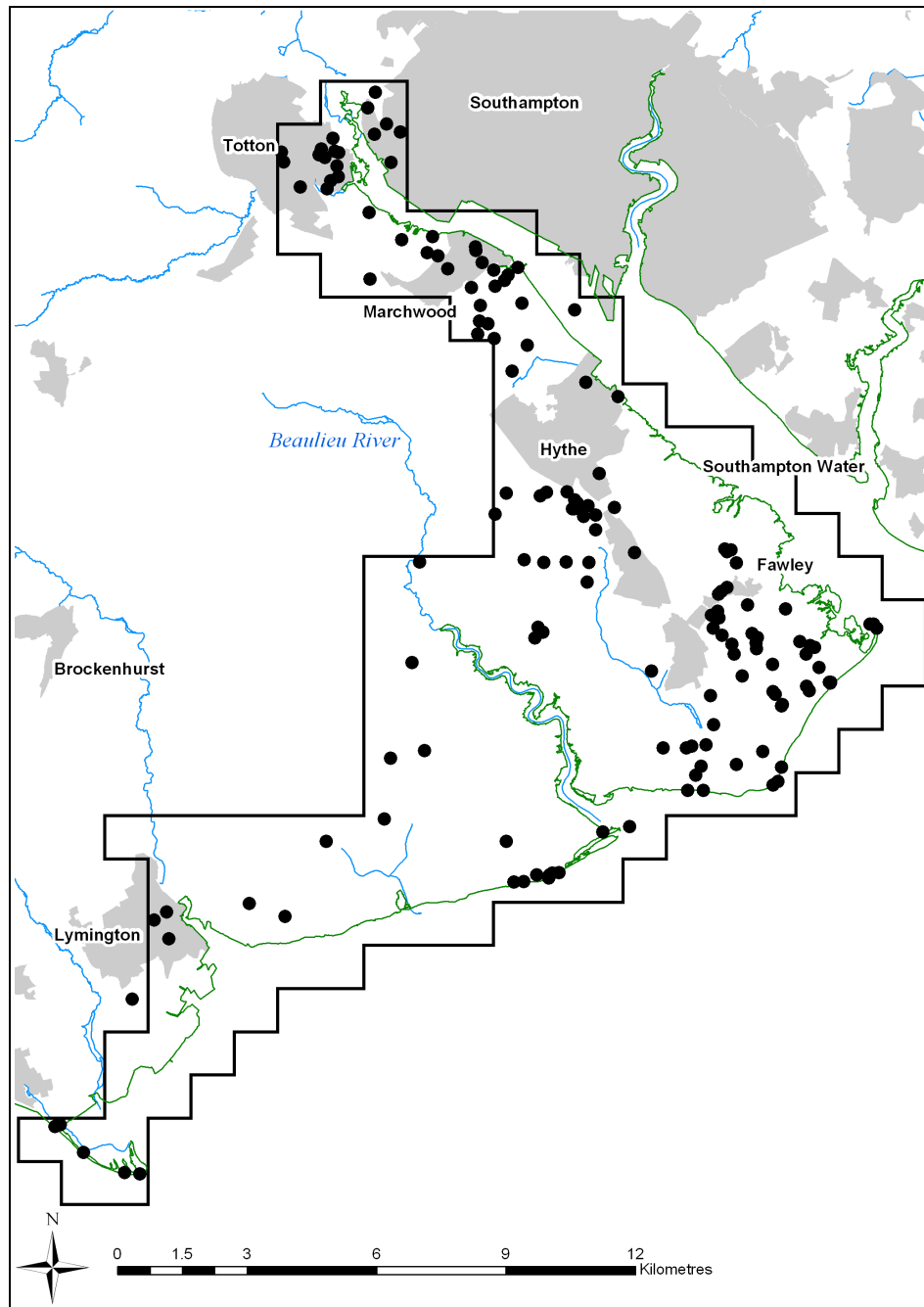


Figure 18: Distribution of new sites of twentieth century date. © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

8.1 The First World War

Early twentieth century military sites are typically hard to identify on aerial photographs due partly to their often ephemeral nature and partly to re-use, if the site has survived, during the Second World War.

Although it is not covered by this project area, Southampton has had an enormous influence on the amount of twentieth century military activity in the project area. In 1914, Southampton was declared the 'Number One' military embarkation port for troops despatched to fight on the Front (Rance 1986). Its status in 1914 to 1918 as a military port, as well as a target for German attacks by air and sea, should not be underestimated. Although there is not as much evidence of the affects of the First World War in the project area as there is of the Second World War more than 20 sites were recorded that are likely to date to that period, including sections of training trenches and military buildings. This is an important finding because few remains of 1914 -1918 training activities are currently recorded from Hampshire, despite the presence of military bases in the county at that time (D. Hopkins *pers. comm.*).

Known First World War sites such as the battery at Stone Point (Site ID 41605) and the flying boat station at Hythe (Site ID 173858) were recorded in detail. One site of particular note is a large military camp at Eaglehurst, Calshot, which is visible on 1924 aerial photographs. This is the accommodation camp, built during the First World War for personnel serving at the nearby Calshot flying boat station. This site was still in use during the Second World War and this later phase is marked by the addition of defensive features such as zigzag trenching (Figure 19).

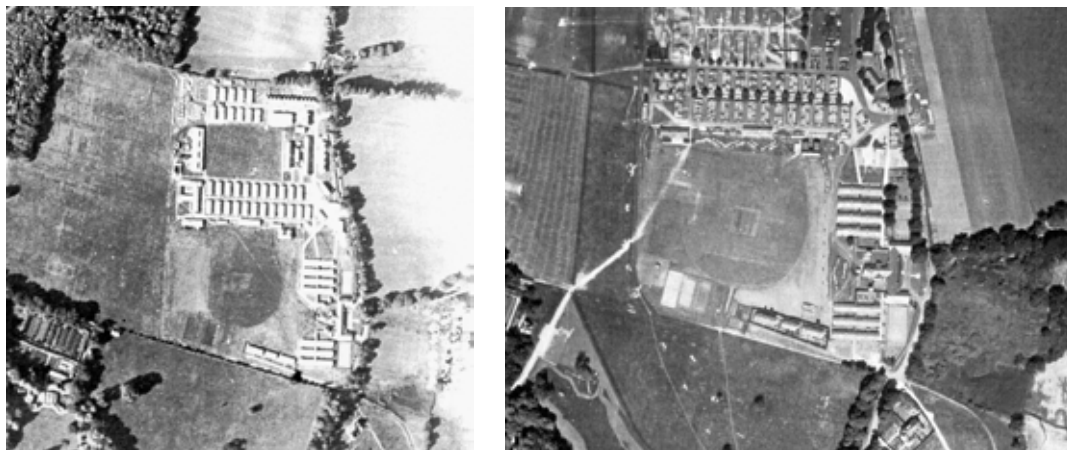


Figure 19: First World War military camp at Eaglehurst, Calshot (Site ID 172865). The photograph on the left was taken in 1924. By 1941, when the photograph on the right was taken, the buildings' roofs have been camouflaged and fire trenches have been dug. Photos: (left) CCC11772/852 SU4701/1 c.1930's English Heritage. NMR (Crawford Collection). (right) RAF S/260/H6/1416 Frame 82. 27 June 1941 English Heritage (NMR) RAF Photography

8.2 The Second World War

Southampton was, in the 1930s and 1940s, as great a commercial and industrial centre as it is today: vitally important as a major port and dockyard as well as a strategic embarkation point for troops and supplies.

Across Southampton Water and within the project area the oil refineries at Fawley would have been an important target for the Luftwaffe; the numerous New Forest airfields also required constant protection. Hampshire's coastline, characterised by sheltered bays and low sandy beaches was a prime target for a ground invasion and the calm waters of the Solent, considered a potential target for attack by submarine during the First World War, now required even greater defences.

Along the coast between Hurst Point and Calshot, gun batteries built in the nineteenth and early twentieth centuries were re-fortified and expanded during the Second World War, and the beaches and heaths were heavily protected against potential invasion with anti-aircraft and anti-tank obstacles.

Southampton's environs, including the suburbs of Totton and Eling and the small villages on the fringe of the New Forest, such as Marchwood, would be forever transformed by their proximity to the city and its role in the Second World War.

8.2.1 Military ports, bases and camps

A number of Second World War sites recorded during the project consisted of groups of buildings and infrastructure with a variety of possible functions. Some have retained a military function right up until the present; others, such as the Royal Naval Armaments Depot, have been re-used for domestic purposes, and a few have reverted to farmland or disappeared beneath later housing or industrial developments.

Some of these sites were previously recorded in the AHBR; others such as the port at Marchwood, are extant but have not retained all their wartime features. A third group consists of sites not previously listed in the AHBR nor shown on any OS maps. The project has demonstrated the value of aerial photographs as a source for the identification of these short-lived and often ephemeral features.

An unusual site that falls into the third category is a complex at Brokenford on the edge of Totton (Site ID 172875). It comprises a group of buildings including Nissen huts, surrounding a large central structure. The complex is enclosed, perhaps defended, by an earthwork bank that has been styled to form very low earthwork redoubts. In 1933 OS mapping shows the site to be occupied by the Bramtoco (The British American Tobacco Company) Sports Ground. The military complex is then visible in aerial photographs from 1941 to 1945 and by the 1950s it has disappeared beneath housing.



Figure 20: Unusual defended military base at Brokenford (Site ID 172875), on the site of the Bramtoco sports ground. Photo: RAF 225C/UK852/3 Frame 02. 14 May 1941. English Heritage (NMR) RAF Photography. Map: 1933 © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

Marchwood military port is an excellent example of how aerial photography can convey the history of a small area. In this case, the tiny village of Marchwood, which in 1933 consisted of a row of houses and a farmstead, had become by 1945 a busy railway depot and port. It was also one of the bases for production and embarkation of the Mulberry harbours that were used in the Normandy landings.

Features that were visible on aerial photographs from 1941 including a barrage balloon site (Site ID 172822) and bomb craters (Site ID 172819) around Marchwood

farm, had disappeared by 1944 and a second layer of information was recorded. This included buildings within the area of the railway depot that have since been demolished and a military camp, including groups of Nissen huts and bell tents (see Figure 22).

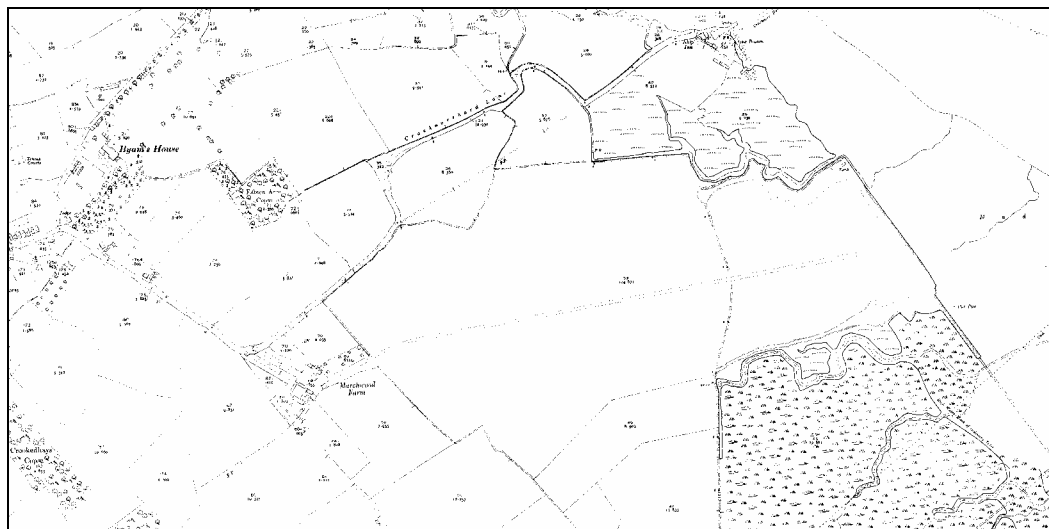


Figure 21: A 1933 OS map of Marchwood Farm and surrounding area. © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

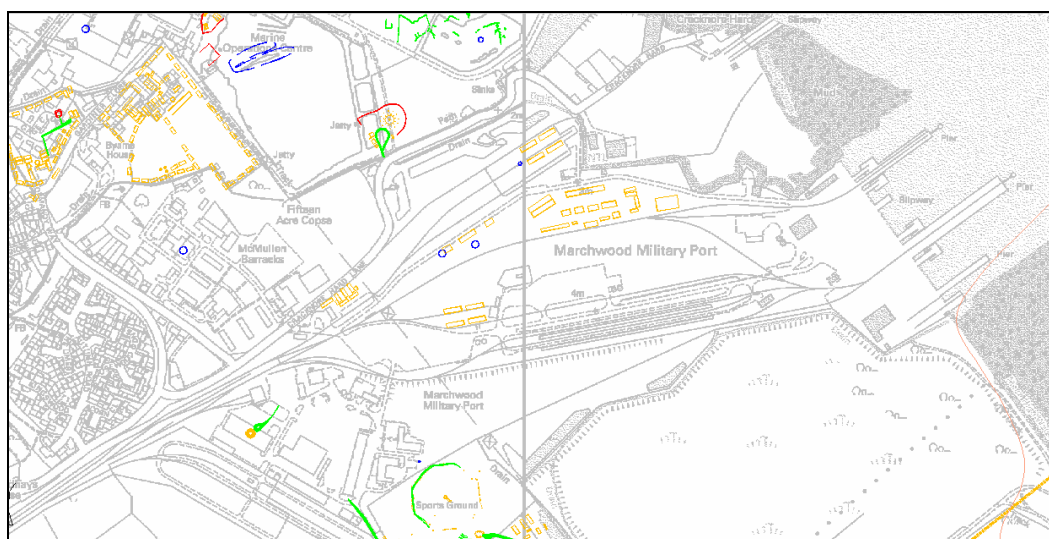


Figure 22: The same area shown on modern OS mapping, with extra detail (in colour) recorded from 1940s RAF aerial photography. © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office

To the south of Marchwood at Veal's Farm is a rather more ephemeral site (Figure 23): a military camp (Site ID 173005) that is visible on aerial photographs between 1942 and 1950. By 1955, faint traces of trackways are visible in some fields, but the site has reverted to farmland. The camp contains a barrage balloon site (Site ID 173004), accommodation blocks and trackways, gun emplacements, a sports field with a baseball diamond (visible in 1945; Site ID 173006), and a transmitter station. The appearance of the baseball pitch (Figure 24) suggests that for at least some of its life, the camp was occupied by American troops. A Ground-Locating (GL) radar station and mat appear to be associated with the camp.

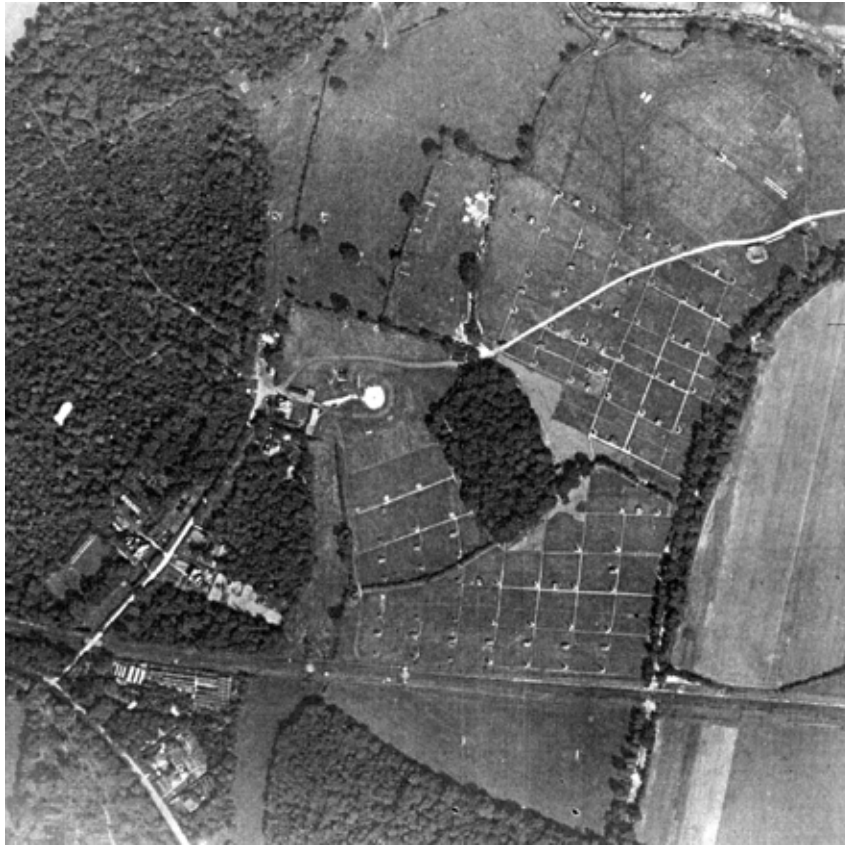


Figure 23: A military camp and GL radar (polygonal feature, top right: Site ID 173005) and barrage balloon base (centre, with airborne balloon visible centre left: Site ID 173004) at Veal's Farm, near Marchwood. Photo: RAF NLA/45/IPRU Frame 5007 12 September 1942 English Heritage (NMR) RAF Photography



Figure 24: A close-up of the baseball pitch diamond (centre of triangular field, below railway line: Site ID 173006) that is visible in 1945 aerial photographs at the Veal's Farm military site. Photo: RAF 106G/UK/585 Frame 6194 2 August 1945 English Heritage (NMR) RAF Photography

8.2.2 Airfields: Lymington, Needs Ore

The majority of the New Forest airfields are situated slightly further inland, beyond the confines of the project area. Only two airfields were recorded during the project. Both were short-lived Advanced Landing Grounds, a special type of airfield constructed to provide forward operating bases to support the prepared for the Allied advance in Europe (Lowry 1995). Today no visible remains of these airfields survive. Both were situated between Lymington and Needs Ore, in the southern part of the project area. Lymington Advanced Landing Ground (Site ID 173559) is clearly visible on aerial photographs between 1942 and 1946; it was used as a storage area at the end of the war and this is clear in later photographs from 1945 and 1946 when large numbers of sheds and containers appear on the site. Needs Ore Advanced Landing Ground (Site ID 173704) was an even more temporary site, used only during 1944. Both airfields, however, appear to have had a small influence on the landscape since some of the taxi-tracks and perimeter roads are shown as farm tracks on modern OS maps.



Figure 25: The Advanced Landing Ground at Needs Ore (Site ID 173704). Still visible in 1946 were a hangar (top centre below the road), as well as the perimeter track and dispersal pens. Photo: RAF 3GTUD/UK/163 Frame 5207 (pt3) 20 April 1946. English Heritage (NMR) RAF Photography

8.2.3 Defensive sites: Batteries, barrage balloons, obstructions and decoys

Two of the anti-aircraft batteries recorded for the project were new sites. One of these was at Fields Heath: the denuded remains of a typical half-moon style battery with a central command post and four gun emplacements (Lowry 1995, 48-59).



Figure 26. The remains of an anti-aircraft battery on Fields Heath (Site ID 172960). The concrete bases are visible as pale spheres on the dark heath. Photo: RAF 3G/TUD/UK/163 Frame 5086 (pt1) 20 April 1946. English Heritage (NMR) RAF Photography

A feature of many of the batteries was the presence of a GL (gun laying or ground locating) radar platform and mat. These typically consisted of a central concrete radar platform surrounded by a wire fence forming an octagonal enclosure. The wire fence created an artificial horizon and helped eliminate interference (Lowry 1995, 59). In the area between Marchwood and Totton three such sites were clearly visible: two, at Hounslow (Site ID 37729) and Marchwood (Site ID 37749), were directly associated with heavy anti-aircraft batteries and a third appears to be associated with a military camp at Veal's Farm (Site ID 173005), described in section 8.2.1 (Figure 23).

Eleven barrage balloon sites were recorded, all located between Totton and Hythe. This is a substantial addition to the military record for the project area, since no records previously existed for this particular site type. All the balloon bases were for single barrage balloons: tethered air balloons used to prevent low-flying bombing, forcing aircraft higher and making bombing less accurate. Barrage balloon sites in the project area appear to have been located in a line along the coast; it is likely that a similar line exists on the opposite bank of the Southampton Water and that the balloons formed part of the outer defences of Southampton docks.

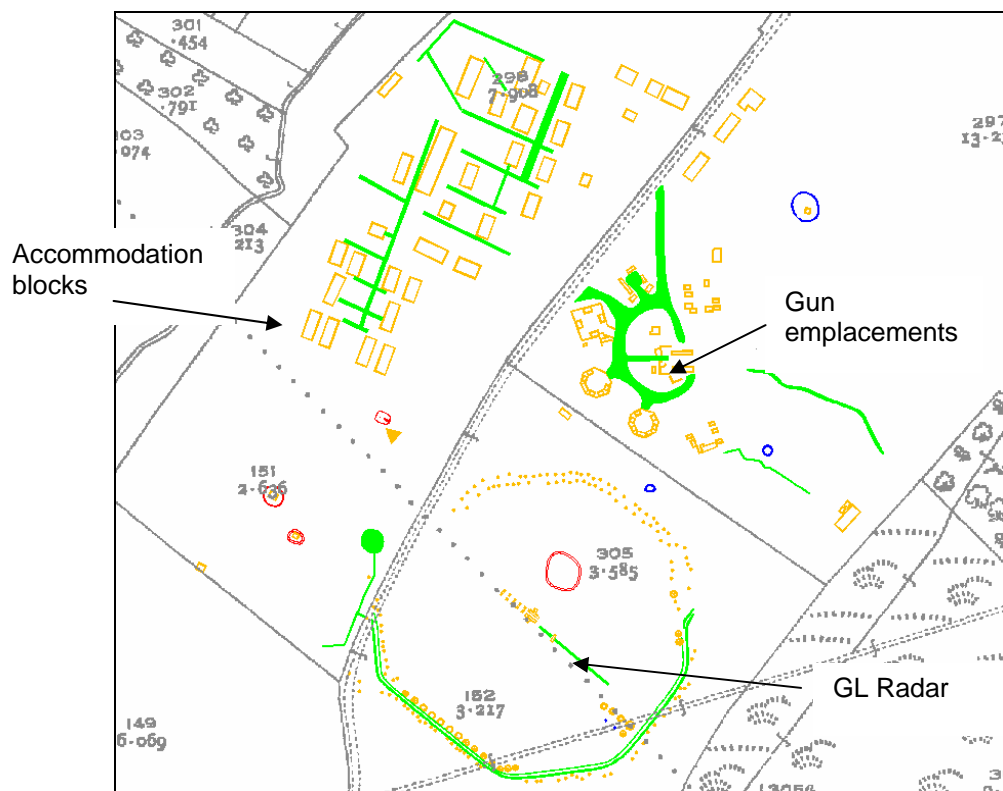


Figure 27: A heavy anti-aircraft battery at Hounslow (Site ID 37729), on the outskirts of the parish of Totton and Eling. The GL radar and mat are located at bottom centre of the drawing. © Crown Copyright 2006HCC 100019180. Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationary Office



Figure 28: Aircraft obstruction trenches on Beaulieu Heath. Photo: RAF HLA/344 IPRU Frame 636 30 October 1941 English Heritage (NMR) RAF Photography

A different type of aircraft obstruction, designed to prevent landing of gliders or planes (Dobinson 1996a), was visible on Beaulieu Heath. The lattice of aircraft obstruction trenches, visible in 1941, still survives in patches across the heath.

Also on Beaulieu Heath amongst this lattice-work of trenches are the remains of a Starfish bombing decoy. Starfish decoy sites were designed to give the appearance of cities (in this case Southampton) during a night time bombing raid. Initially a few glimmers of light would be turned on to resemble a city under 'blackout' conditions. Once a bombing raid started a series of displays consisting of oil-filled tanks and trenches would be set alight, fooling enemy bombers into believing that their target had been successfully attacked (Dobinson 1996c).



Figure 29: Starfish decoy site (Site ID 34149) on Beaulieu Heath. The irregular enclosures are formed by firebreak trenches surrounding each of the displays. Photo: RAF CPE/UK/1842 Frame 4073 18 November 1946 English Heritage (NMR) RAF Photography

8.2.4 Civilian sites: water storage tanks, air-raid shelters

Eight groups of communal air-raid shelters were recorded during the project: seven in Totton and Eling, and one in Lymington. Only one of these sites, in Totton, had been previously recorded (Site ID 51004). The shelters are all communal, earth-covered oblong structures and each would have held up to 50 people. Five emergency water-storage tanks were also newly recorded in the same two areas of Lymington and the Totton/ Eling suburbs. The circular tanks were all roughly 10m in diameter and were used to store water for putting out fires caused during air-raids.

The number of air-raid shelters, in groups of between three and eight individual shelters, is testament to the continuous danger that would have been part of the daily existence of the residents of Totton and Eling. Due to the strategic importance of Southampton, the whole area around Southampton Water experienced heavy bombardment and more than 40 bomb craters were recorded as part of the project.



Figure 30: A group of eight communal street shelters in Eling located on an allotment, centre of photograph (Site ID 172885). Photo: RAF 106G/UK/585 Frame 6122 2 August 1945. English Heritage (NMR) RAF Photography

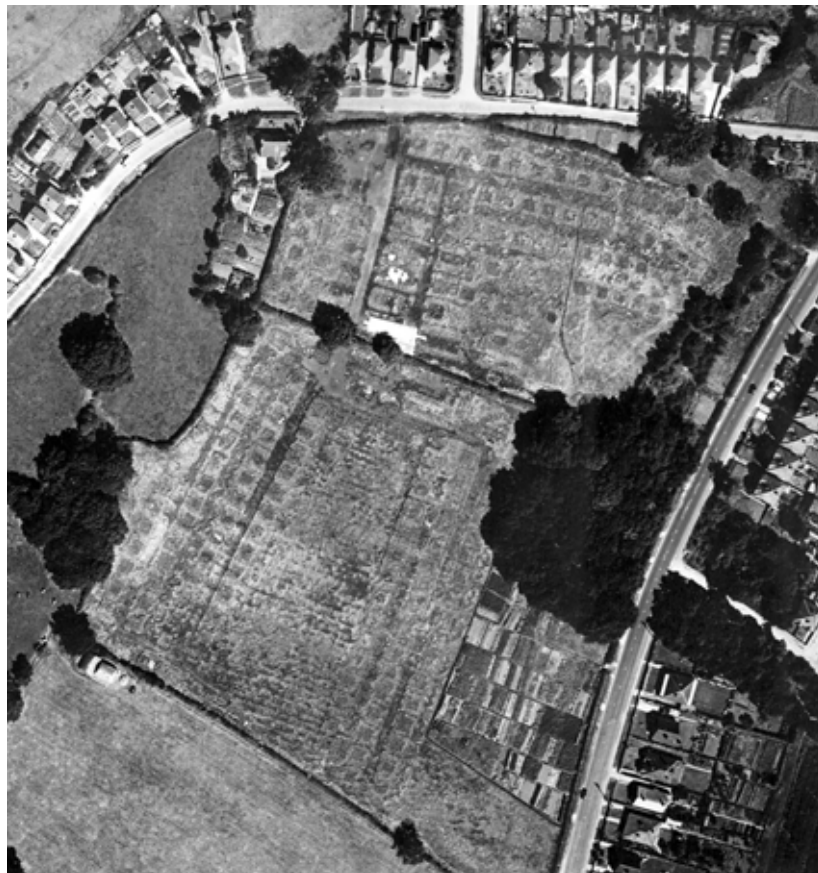


Figure 31: Parchmarks, probably from rows of tents, in grass fields on the outskirts of Rushington (Site ID 172876). Photo: RAF 106G/UK/725 Frame 6129 (Vpt2) 26 August 1945 English Heritage (NMR) RAF Photography

8.2.5 Operation Overlord: D-Day embarkation and the manufacture of Mulberry Harbours

The planning for Operation Overlord, the codename for the return to mainland Europe of Allied troops, began in the spring of 1943. The port of Southampton with its four high tides a day was a perfect location to cope with the huge numbers of troops and vessels required to carry out a sustained invasion (Doughty 1994). Within the project area the evidence for the gathering of troops in preparation for the D-Day invasion is clearest around Marchwood. Probable sites of temporary D-Day camps include two rows of small, circular parchmarks close to the Veal's Farm camp (Site ID 173007), (see section 8.2.1), and two adjoining fields of small regular parchmarks at Rushington (Site ID 172876), shown in Figure 31.

A number of purpose-built embarkation hards used for the launching of the landing craft and supply vessels were located along the Hampshire coast. Two of these, at Stone Point and Lepe, are within the project area.

The Stone Point site (Figure 32) was not just a point for troops to embark, but also one of the sites of manufacture of the Mulberry Harbours (Site ID 22747). These floating harbours were required to ensure the safe unloading of large numbers of troops, vehicles and supplies once the initial assault had taken place in Normandy (Jordan *et al* 2005). The harbours consisted of a variety of different vessel types with purposes ranging from the creation of a breakwater to the carriage of trucks and tanks and artificial beaches. The most easily recognised sections are Phoenix *caissons*, rectangular hollow concrete units that were strung out in a line across the Normandy beaches to give shelter to ships and temporary piers.



Figure 32: Stone Point, one of the manufacturing sites of the Mulberry Harbours (Site ID 22747). Photo: RAF 3G/TUD/UK/163 Frame 5117 (pt2) 20 April 1946 English Heritage (NMR) RAF Photography

Another section type, the 'beetle', is visible in large numbers along the shoreline in many RAF photographs from 1945 and 1946. The beetles are small, squat tube-like craft that were used to hold sections of roadway together between embarkation ships and the shore. From 1946 onwards the remains continue to appear in aerial photographs but there are gradually fewer of them.



Figure 33: Various sections of the Mulberry Harbours, moored at Marchwood in 1947 (Site ID 173837). The small white oval craft are 'beetles', used to connect sections of roadway that stretched between supply ships and the French shoreline. Photo: RAF CPE/UK/2060 Frame 6250 11 May 1947 English Heritage (NMR) RAF Photography

8.3 Overview of twentieth century features

Previous coverage of twentieth century military archaeology was more comprehensive than for other parts of Hampshire, where work to record military sites, particularly Second World War sites, has been inconsistent (Young 2008). The exceptions to the generally good level of recording were smaller, isolated sites such as barrage balloon bases and bomb craters; and short-lived sites such as tented camps and air-raid shelters.

The main advantage of projects such as the NMP for the military record is that large numbers of sites are recorded for the first time as part of the survey process and although there was already reasonable coverage, a large number of military sites were recorded for the first time. A second advantage is that where perhaps a single military feature has been recorded, for example through documentary research, the amount of photographs available will bring together many other aspects of the previously recorded site. A good example is at Totton, where two air-raid shelters were noted in a single record in the AHBR. Aerial photographs showed there to be three shelters grouped together at this location and a further six groups of shelters within 500m of the existing record.

The recording of civilian Second World War sites has greatly benefited from the NMP survey. Recording for posterity the effect of the Second World War on the local population has been given much time in recent years, by way of oral history and documenting of wartime diaries. At the same time, the locations of many of the physical remains of bombing raids and the attempts to prevent or survive them have

often gone unrecorded. Out of 64 records for air raid shelters, water storage tanks, bomb craters and barrage balloons bases, for example, only one site had previously been recorded in the AHBR.

Sites that date to the First World War were far harder to interpret confidently. One positive result of the project however is the use of pre-Second World War photography, such as the Crawford collection, to date military sites more accurately.

9 Conclusions

The NMP survey identified 793 previously unrecognised archaeological features, almost trebling the number of recorded sites in the project area. In this respect the survey fulfilled its aim of providing a fuller awareness of the range and extent of archaeological remains in the New Forest and North West Solent coastal plain.

The enhanced awareness of the archaeological resource will facilitate management of the area's historic environment on two levels. Firstly at the site specific level; reviews of existing minerals planning permissions and the assessments of new applications for permission can be made from a better-informed position. Secondly at a strategic level; the NMP will help define those parts of the project area most sensitive to development proposals.

The enhancement of the baseline data will ensure more effective evaluations and will enable the development of a research framework which will provide a context into which future archaeological interventions are undertaken.

The main outcomes of the NMP and recommendations for further survey and research are set out below.

9.1 Outcomes

Substantial numbers of twentieth century military and defensive sites were identified during the project and their sheer number and variety meant that they dominated both the record and this report. This represents a significant increase in our knowledge of the nature and extent of twentieth century military features in the county and is consistent with the outcome of previous NMP surveys of the aggregate landscape in Hampshire (Young *et al* 2008).

A large number of late medieval and post medieval field boundaries were mapped and recorded during the project. These, and also the areas of possible assarts that were recorded, will inform any future research into the development of the historic landscape based on analysis of field patterns in conjunction with documentary evidence and Historic Landscape Characterisation.

The mapping demonstrates that the distribution of Bronze Age funerary monuments extends beyond the heathland, reaching almost to the coast and along the Beaulieu River. Although no settlements interpreted as Bronze Age were recorded, a number of discrete enclosures were identified and it possible that some of these may be Bronze Age in origin.

The results for the later prehistoric and Roman periods have improved understanding of the nature and extent of the settlement pattern in the New Forest and North West Solent coastal plain during that period. The mapping demonstrates that the settlements on the coastal plain were more numerous than hitherto thought and that settlement types not previously recorded here, such as enclosure complexes, do exist in this area.

A number of coastal and maritime sites, mainly from the medieval and post medieval periods, were recorded. Further investigation in the form of field survey, including

intertidal survey and diving, as well as further flying would greatly benefit understanding of these sites, in particular the potential fish traps at Needs Ore Point.

9.2 Recommendations

- **Continuing aerial reconnaissance.** Specialist reconnaissance has been limited compared with other parts of the county. The large number of plough-levelled remains identified from vertical photographs suggests there is potential for further cropmark features to be identified through continuing programmes of targeted aerial reconnaissance. There is also good potential for locating sites surviving as low earthworks, and for intertidal features.
- **Further investigation of sites recorded from aerial photography.** Although a large number of sites were recorded from aerial photographs, a relative lack of field work and excavation means that little is known about them. In particular a programme of ground-truthing of a representative sample of the sites recorded by NMP, involving field walking, geophysical survey and limited excavation, would significantly enhance current knowledge of the prehistoric and Romano-British rural settlement. Also the features recorded as 'assarts' might benefit from further investigation to establish whether the negative cropmarks result either from tree removal and burning or from charcoal production.
- **Further NMP projects.** The number of newly recorded sites, some of which are of county or national significance, demonstrates the great potential of continuing the NMP into areas not covered by the current project.
- **Additional aerial surveys.** The limited remit of NMP means that some sites of interest were not recorded during this project. These include the various stages of development at Marchwood Military Port after 1945 and the post-war beaching of vessels that formed the Mulberry Harbours to create sea defences. A specialist survey to record post-war activity around Southampton Water would make excellent use of the available photographic resource.

10 References

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10.2 Publications

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11 Project Archive

The HES project number is **20109025 (Hampshire Aggregate Resource Assessment: Aerial Photography Enhancement)**

The project's documentary and drawn archive is housed at the offices of the Historic Environment, Cornwall Council, Percuil Building, Old County Hall, Station Road, Truro, TR1 3AY. The contents of this archive are as listed below:

1. A project file (20109025) containing the project design, project correspondence and administration.
2. This report held in digital form as: G:\Historic Environment (Documents)\NMP DATA\New Forest\New Forest Report
3. The AutoCAD drawings held in digital form by OS quarter sheet as: R:\Historic Environment (CAD)\CAD Archive\NMP Archive\New Forest Coast

Appendix 1 Methodology

Sources

Aerial photographs

All relevant aerial photographs housed at the two collections listed below were consulted during the project.

The NMR collection

The National Monuments Record Centre (NMRC)

Kemble Drive

Swindon

SN2 2GZ

The NMR collection contains a large number of vertical photographs. These were taken at various scales for non-archaeological purposes, such as military and cartographic reconnaissance and civil engineering projects. The collection also contains specialist oblique photography resulting from archaeological reconnaissance, and oblique photography taken by the RAF during the 1940s and 1950s for military purposes.

The CUCAP collection

Air Photo Library

Cambridge University

Unit for Landscape Modelling

Sir William Hardy Building

Tennis Court Road

Cambridge

CB2 1QB

The CUCAP collection contains a small number of vertical photographs taken for a range of non-archaeological purposes. The collection also contains specialist oblique photography resulting from archaeological reconnaissance.

The third major collection of relevant photographs is housed at the offices of Hampshire County Council. This collection was consulted during the mapping in 2009. The collection consists of vertical prints dating from four Census Surveys (1971, 1984, 1991 and 1995), and vertical digital photography from 2005. The address of the collection is:

Hampshire County Council

Environment Department

Room 210

Ashburton Court West

The Castle

Winchester

SO23 8UD

In total 7027 aerial photographs were consulted during the project. These consist of 6020 vertical prints, 577 specialist oblique photographs, and 430 military obliques.

173 1km square digital photo tiles and 129 1km square tiles of LiDAR data were also consulted.

The main photographic collection is that at the NMRC. Available photographs consisted of 5276 verticals, 501 specialist obliques, 430 military obliques and 129 1km square tiles of LiDAR data. A loan arrangement was put in place enabling the consultation of these photographs at Cornwall Council's offices in Truro. Under the terms of this arrangement photographs were loaned to the project team one block at a time.

Photographs contained in the collection held at CUCAP consisted of 309 verticals and 76 specialist obliques; these were loaned out at up to 100 photographs per loan.

Photographs in the HCC collection amounted to 435 verticals; and 173 1km square tiles. The vertical prints were consulted at the HCC offices in Winchester; scans were made of photographs as necessary and transcriptions made from the scanned images.

Full details of the photographs from these collections are contained in the project archive.

Archival sources

Three archival sources were consulted to further understand the archaeology of the project area and to aid interpretation of specific sites.

- Hampshire AHBR and HLC data
- Epoch historic Ordnance Survey mapping from 1868 to 1947
- The NMR Archives and Monuments in England (AMIE) database (containing monument, event and archive records)

Previous Survey Work and Research

The Hampshire cropmark ArcGIS shapefile was consulted on an ongoing basis during the project.

Archaeological scope of the project

All visible archaeological features, dating from the Neolithic to the twentieth century (pre-1946), were recorded. These include both plough-levelled sites and those with upstanding remains. Sites appearing on OS maps which have not been photographed or which are completely obscured by vegetation were not recorded. Features still in use or fossilized by later structures that are still in use, e.g. buildings, field walls, canals, railways, leats and hedges, were not recorded.

- **Plough-levelled features and earthworks**

All cropmarks and soilmarks representing buried 'negative' features (i.e. ditches and pits) or plough-levelled earthworks were recorded. All upstanding earthwork sites visible on aerial photographs were recorded, whether or not they had been previously surveyed (including those marked on the OS maps), and whether or not they are still extant on the most recent photography. The project database recorded which elements of any particular archaeological site survive or have been levelled and/or destroyed.

- **Ridge and furrow**

All areas of medieval and post medieval ridge and furrow were mapped using a standard convention to indicate the extent and direction of the furrows. The same convention was used to map areas of pre-1945 cultivation marks. The standard convention distinguishes between plough-levelled and upstanding ridge and furrow

but not differences in date. Suggested dates were, however, recorded in the project database.

- **Water meadows**

Areas of extensive water meadows thought to pre-date 1945 were transcribed and recorded. The lines of the main drains and leats were mapped in full, plus a sufficient sample of the minor water courses to give a true feel for the extent and pattern of the whole.

- **Buildings and structures**

The foundations of buildings and structures appearing as ruined stonework, earthworks, cropmarks, soilmarks or parchmarks were recorded. Standing roofed or unroofed buildings and structures were not, except in a few instances in which no other adequate map record existed. A specific exception was the recording of military installations (see twentieth century military features, below).

- **Industrial features and extraction**

All extractive features believed to pre-date 1945 were mapped. These included large-scale features such as quarries and pits, as well as small-scale extraction of resources for local use (e.g. minor stone quarries and gravel extraction).

- **Twentieth century military features**

Twentieth century military features were recorded to an appropriate level of detail. Major buildings and structures within military complexes as well as isolated structures, e.g. pillboxes or slit trenches, were fully mapped and recorded.

- **Field boundaries and field systems**

Removed field boundaries and field systems were plotted if they were considered to predate the OS First Edition map (1870-1880) and were not already recorded on that or any other OS map.

- **Parkland, landscape parks, gardens and country houses**

All park and garden landscape features (including deer parks) visible on aerial photographs but not previously recorded by the OS were plotted.

- **Transport features**

Major transport features (i.e. disused canals and main railways) are included in the Ordnance Survey sphere of interest and subsequently appear on OS mapping; these were therefore not mapped. Smaller features (e.g. local trackways associated with quarries), which were outside the Ordnance Survey sphere of interest, were mapped as were trackways, pathways and roadways considered to be post medieval or earlier in origin and not already recorded by the OS.

- **Natural features**

Geological, geomorphological, and other natural features were not mapped except in a few cases when alternative, archaeological interpretations were possible. In these cases the site records were double-indexed with both interpretations.

Transcription

The results of the mapping were produced entirely in digital format using AutoCAD Map 3D 2010. Transcription comprised the following processes.

1. Information was derived from the photographs available in the collections identified above.

2. Oblique and vertical photographs were scanned.
3. Rectified transformations of archaeological features visible on the scanned photographs were produced using AERIAL 5.29. Digital copies of current OS 1:10,000 maps were used for control information and as a base for mapping in AutoCAD. Where necessary digital terrain models (DTM) were created using digital contour data prior to rectification of the photographs.
4. The rectified images were imported into the relevant AutoCAD drawings.
5. Archaeological features were digitally transcribed in AutoCAD according to a specified layer structure and using agreed line and colour conventions (see section 1.3).
6. Polygons were drawn around each separate monument to define its extent.
7. Quality assurance checks were carried out by each member of the project team on selected map sheets to ensure that all sheets were completed to NMP standards.

Data processing

Project database

A repurposed version of the Cornwall HER Access database was used as a stand-alone project database. A few minor changes were made to certain fields to bring it in line with current national standards and background tables were populated with Hampshire information, such as Parish and District lists.

Monument records with automatically generated unique site record numbers were created in the project database for each site mapped.

Where the site was already recorded in the Hampshire AHBR, the existing AHBR record number was recorded as were any relevant AMIE Hob UID numbers.

AutoCAD attached object data

Three object data tables were incorporated into each AutoCAD drawing to enable concordance with the Hampshire GIS and to facilitate basic analysis of the drawings.

The Project ID number generated by the Project Database, the AHBR number of any site with an existing Hampshire AHBR record and the AMIE Hob UID of each site (where it existed) was recorded in the first table.

The second table recorded basic interpretative information and contained four fields; period, type, form, and photo number as well as including a comment field.

The third table recorded the date, surveyor, scale of survey, and copyright information.

These tables were attached to all plotted features and the relevant polygon defining the monuments.

GIS shapefiles

Each AutoCAD drawing was exported as an ArcGIS shapefile to the project GIS. Each mapped site could then be linked to the project database through the attached Project ID number.

Selected fields in the project database were attached to the individual features within the shapefiles; these fields are set out below.

Project ID number

AHBR number

AMIE Hob UID number

Site type

Form (cropmark/earthwork)

Date

Short description

Photograph serial number

Easting

Northing

Data exchange

The data mapped during this stage of the project was provided to HCC and to the NFNPA as a series of ArcGIS shapefiles to be incorporated as a layer into the county GIS with the attributes contained in the Access database attached. This layer can function immediately as a data source in the Hampshire GIS. The creation of new records in the Hampshire AHBR will be carried out by HCC as part of a wider data entry programme in the future.

Copies of the shapefiles will also be provided to the NMR for incorporation in to the NMR GIS. A copy of the project database will also be sent to the NMR so that the data can be transferred to the NMR AMIE database. Proposed fields for data migration are in line with EH minimum standards for monument recording and are tabled below.

PROJECT DATABASE FIELD(s)	AMIE DATABASE FIELD(s)
OS Map	Quarter Sheet
AHBR no	Assign other monument Identifiers <i>Identity Method:</i> AHBR Number <i>Value:</i> AHBR monument HOB UID
Summary Text	Summary Long Text
District/Parish	Automatically generated by GIS
Period	Period NB tables will need to be correlated.
Site Type	Class scheme <i>Monument Type</i> Term
Form	Class scheme <i>Evidence</i> Term NB tables will need to be correlated.
NGR	Needs discussion to ascertain how to fill minimum fields
OS Number	This field could be used to automate concordance,

Populated with NMR number where one exists.	or pull out records which require concordance
Photos Date Source Serial Number	General Archive References Title: GAM number (may need some data concordance) Source number
	References of Archives to Monuments? Object Title and Object Number from NMR
	Associated Events: Generated from the NMR
Created By Created	Roles attached to Monument Name Date Organisation: automatically tag all records with Cornwall HES.
PRN	Other Monument Identifiers

Project outcome

A series of AutoCAD drawings was produced showing all archaeological features visible on aerial photographs for each of the four sub-units.

The project Access database containing information and descriptions of all archaeological sites mapped during the project was populated with 912 records.

The AutoCAD drawings with Access data attached were exported as ArcGIS shapefiles.

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