South East Rapid Coastal Zone Assessment Survey
National Mapping Programme
Components 1&2

NHPCP Project Numbers
6105 and 6106

Results of NMP Mapping

CORNWALL COUNCIL

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Historic Environment Projects

South East Rapid Coastal Zone Assessment Survey
National Mapping Programme

Components 1&2
Results of NMP Mapping

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The views and recommendations expressed in this report are those of Historic Environment Projects, Cornwall Council, and Gloucestershire County Council Archaeology Service and are presented in good faith on the basis of professional judgement and on information currently available.

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Cover illustration

Oyster beds, wrecks and timber ponds at Emsworth.
Photograph: NMR RAF/58/75 5086 27th July 1948 English Heritage (NMR) RAF Photography.

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Abbreviations

ADS	Archaeology Data Service
AerSI	Aerial Survey and Investigation (English Heritage department)
AHBR	Archaeology and Historic Buildings Record
AMIE	Archives and Monuments Information, England
AONB	Area of Outstanding Natural Beauty
BGS	British Geological Survey
CC	Cornwall Council
CCO	Channel Coast Observatory
CUCAP	Cambridge University Collection of Air Photos
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EH	English Heritage
FCERM	Flood and Coastal Erosion Risk Management
GIS	Geographical Information System
GCCAS	Gloucestershire County Council Archaeology Service
HBSMR	Historic Buildings and Site and Monuments Record
HBSMR NMP	Cornwall Council NMP Projects team HBSMR database
HEEP	Historic Environment Enabling Programme
HER	Historic Environment Record
HLC	Historic Landscape Character
LIDAR	Light Detection and Ranging
MOD	Ministry of Defence
NGR	National Grid Reference
NHPCP	National Heritage Protection Commissions Programme
NMP	National Mapping Programme
NMR	National Monument Record
NMRC	National Monument Record Centre
OS	Ordnance Survey

PD	Project Design
PDF	Portable Document Format
PGA	Pan Government Agreement
RAF	Royal Air Force
RCHME	Royal Commission on the Historical Monuments of England
RNLI	Royal National Lifeboat Institution
SAC	Special Area of Conservation
SE RCZAS	South East Rapid Coastal Zone Assessment Survey
SMP	Shoreline Management Plans
SMR	Sites and Monuments Record
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UID	Unique Identifier
WSCC	West Sussex County Council

1 Summary

This report outlines the results of Component 1 (Blocks A, D, E and F) and Component 2 (Blocks G, H, J and K) of the National Mapping Programme (NMP) element of the South East Rapid Coastal Zone Assessment Survey (SE RCZAS). This was an archaeological survey involving the systematic interpretation, mapping and recording of archaeological sites from aerial photographs and Environment Agency lidar data across 364.5 square kilometres of the south east coast of England.

The analytical aerial survey was carried out using English Heritage's National Mapping Programme methodology. Historic Environment, Cornwall Council and the Gloucestershire County Council Archaeology Service carried out the project between January 2011 and August 2011. The project was funded by English Heritage through the National Heritage Protection Commissions Programme (NHPCP).

The primary aims of the project were to map and record the form and extent of all archaeological features visible on aerial photographs for the project area, in order to inform the phase 1 RCZAS assessment of the archaeological resource of the coastal areas being undertaken by Wessex Archaeology, and thereby provide the appropriate tools to assist strategic planning decisions and the management and preservation of archaeological sites and historic landscapes within the project area through Shoreline Management Plans (SMP).

The project achieved these aims by providing significant enhancement to existing baseline data, in both the NMR and HERs, through the mapping, interpretation and recording of archaeological sites ranging in date from the Neolithic to the twentieth century.

During the Component 1 and Component 2 mapping a total of 2,382 sites were mapped and recorded in the project databases. Of these, 76% were for sites previously unrecorded prior to the mapping. The results of the mapping have therefore significantly added to our understanding of the historic environment along the south east coast of England. Of particular note is the large number of Second World War sites across both Components; within Component 1, 46% of new sites relate to Second World War activity whilst for Component 2, 92.5% date to this period. This demonstrates the value of the primary aerial photographic sources used, particularly the early RAF coverage taken during or soon after the war. These images depict the wartime defences, many of which were still in use, or only recently abandoned, at the time the photographs were taken. Many of these buildings, structures and earthworks have since been demolished or levelled, particularly in the areas of the seaside resorts of Eastbourne, Bexhill, Folkestone and Brighton.

In addition within Component 1, particularly around Chichester Harbour, many new sites were identified within the intertidal area including groynes, jetties, wrecks and a small number of fish traps. Many other unspecified intertidal structures were also recorded, in the main using the digital imagery available from the Channel Coast Observatory. This geo-referenced on-line image source proved invaluable when locating sites within the large expanse of intertidal mud flats that would have otherwise had no other more conventional form of rectification control. These recent colour images, along with those available on-line from websites such as Google Earth and Bing, also proved an invaluable source of up to date data concerning the condition of sites recorded on earlier photography.

This report presents the project results; describing the project area, the methodology used and provides an overview of the character, diversity and distribution of archaeological sites encountered as well as a series of conclusions and recommendations.

2 Background to the project

2.1 Circumstances of and reasons for the project

Historic environment assets along the coast are vulnerable to threats from both natural changes as well as industrial, residential and recreational development. The Environment Agency and local authorities are jointly responsible for managing erosion and flooding risks in coastal areas, including the production of Shoreline Management Plans (SMPs). In recent years the emphasis of coastal management has shifted away from defence against erosion to longer term adaptation and sustainability in the light of issues such as climate change (Defra 2006). The SMPs take into account the developed, historic and natural environment within the shoreline areas and identify policies for managing those risks over the next 100 years.

The historic environment is only one factor amongst many considered when developing these management policies and it is therefore essential that a reliable record of the coastal historic environment is available at all stages of Flood and Coastal Erosion Risk Management (FCERM).

The lack of an adequate record of the coastal historic environment was identified by English Heritage (EH) and the Royal Commission on the Historical Monuments of England (RCHME) who published a joint policy statement on the management of coastal remains (1996) and a nationally-based assessment of English coastal archaeology (Fulford *et al* 1997). It noted that the records in the National Monument Record (NMR) did not provide an adequate record of coastal remains and recommended further studies of the historic environment in the coastal zone; consequently EH initiated the national Rapid Coastal Zone Assessment Survey (RCZAS) programme.

These surveys have two main phases; a Phase 1 desk-based assessment based on aerial photographs, lidar images where available and historic maps, followed by Phase 2 field assessments involving rapid walk-over surveys. The RCZAS programme thereby aims to provide an adequate level of baseline data around the entire coastline which can then feed into Defra's programme of shoreline and estuary management.

A RCZAS has already been carried out for much of the coastline and the South East of England is one of the last coastal areas to be addressed by this initiative.

The majority of the desk-based Phase 1 tasks of the SE RCZAS were carried out by Wessex Archaeology (WA). This included the completion of 258 kilometre squares of the NMP component between North Foreland and Dover in the east and between Lee-on-the-Solent and Eastoke Point, Hayling in the west. This work clearly demonstrated the high density of twentieth century defensive structures that are an important part of the record (Wessex Archaeology 2011).

Due to the scale of the NMP component within the SE RCZAS, it was necessary for English Heritage to open the remaining 364 kilometre squares of the aerial photo mapping element to tender. The remaining areas to be mapped were split into two Components (1 & 2) which were undertaken by the Cornwall Council Historic Environment Service (Component 1) and Gloucestershire County Council Archaeology Service (Component 2).

For management purposes the south east RCZAS project has been issued with three NHPCP project numbers, namely 5698 for the Wessex Archaeology work, 6105 for NMP Component 1 undertaken by Cornwall Council and 6106 for NMP Component 2 undertaken by Gloucestershire County Council. The project was financed through the EH National Heritage Protection Commissions Programme (NHPCP), formerly administered

as the Historic Environment Enabling Programme (HEEP) and Component 1 and 2 NMP were carried out between January and September 2011.

2.2 Overview of NMP methodology

Mapping from aerial photographs was carried out as part of the English Heritage (EH) funded National Mapping Programme (NMP). The aim of the NMP is '*to enhance our understanding about past human settlement, by providing information and syntheses for all archaeological sites and landscapes (visible on aerial photographs) from the Neolithic period to the twentieth century*' (Bewley 2001, 78).

To achieve this aim a methodology was developed from previous selective approaches to mapping from aerial photographs (e.g. Benson and Miles 1974). The guiding principle of the methodology is '*to map, describe and classify all archaeological sites recorded by aerial photography in England to a consistent standard*' (English Heritage 2010a).

The NMP applies a systematic methodology to the interpretation and mapping of archaeological features visible on aerial photographs (Winton 2010). 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 SE RCZAS followed NMP methodology, as amended in the tender brief, and involved the systematic examination of all easily accessible aerial photographs from the NMR. Archaeological features were digitally transcribed using the AERIAL (Version 5.29) rectification programme and AutoCAD Version Map3D 2008 (Component 2) and 2010 (Component 1). Details of each archaeological site mapped within Component 1 were recorded within the Cornwall Council NMP Projects team exeGesIS HBSMR (Historic Buildings, Sites and Monuments Record) database (HBSMR NMP). **These sites have MKM project numbers which are referred to below.** For Component 2, Gloucestershire County Council Archaeology Service recorded sites directly into the National Monuments Records (AMIE) database.

Upon completion of the mapping and recording of Components 1 and 2, the data was sent to Wessex Archaeology for use in Phase 1 of the SE RCZAS. For Component 1 this data included copies of the ESRI Shape files created by the exeGesIS Maplink module and a filtered copy of the HBSMR NMR database. For Component 2, digital mapping was exported as ESRI shape files, and records were exported from the NMR (AMIE) database as Excel (*xls) spreadsheets. Wessex Archaeology will be responsible for supplying data to the relevant HERs for the whole of the SE RCZAS project area upon completion of Phase 1.

Full details of the project methodology are contained in Appendix 1.

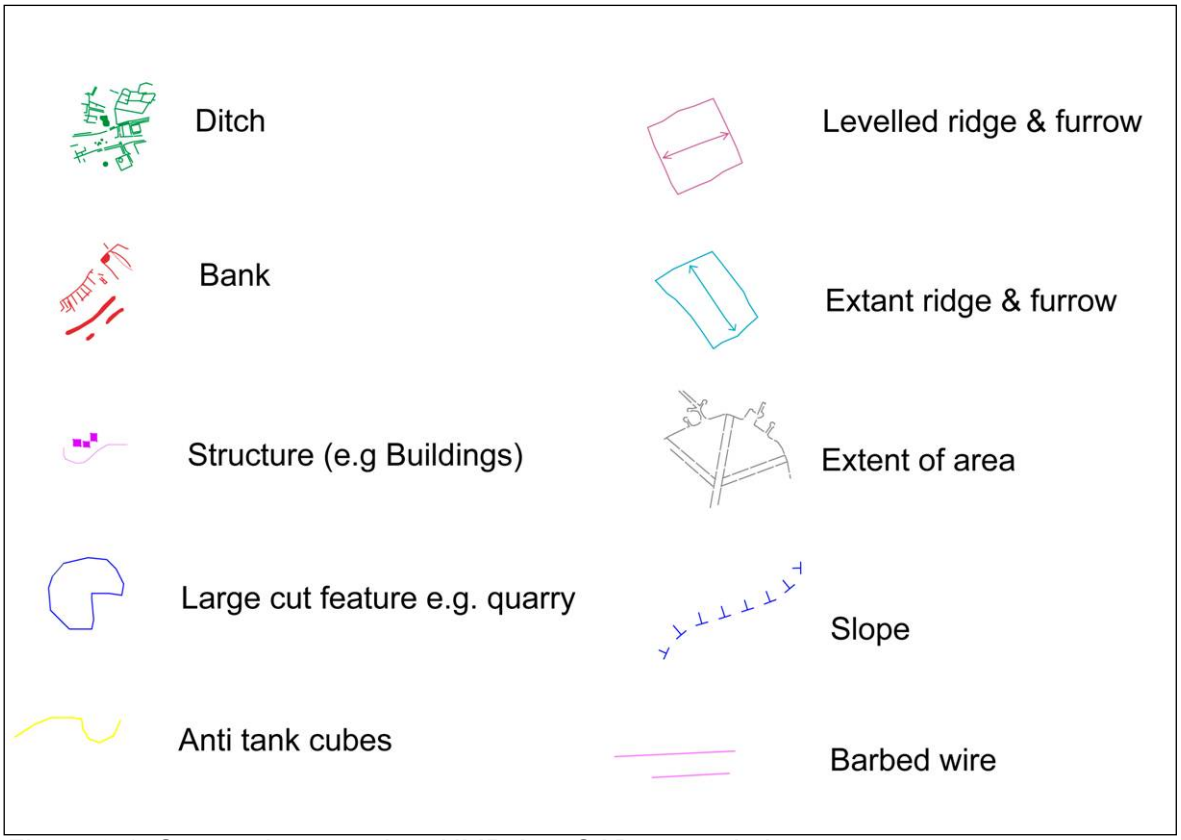

Figure 2.1: Conventions used on NMP AutoCAD transcriptions.

3 Aims and objectives

The main aim of the SE RCZAS was to improve knowledge of the archaeological resource of the project area.

The overarching aim of the National Mapping Programme is:

'to enhance our understanding about past human settlement, by providing information and syntheses for all archaeological sites and landscapes (visible on aerial photographs) from the Neolithic period to the twentieth century' (Bewley 2001, 78).

3.1 Aims

Further aims and objectives specific to this project are set out below:

1. To produce an NMP standard geo-referenced digital transcription of the form and extent of all archaeological features visible on aerial images for the project area.

2. To create NMP standard monument records with the location, indexed classification, archaeological description and analysis, and main sources of all archaeological sites visible on aerial photographs for the project area.

3. To incorporate or supply the above NMP data in a form suitable for use in the Wessex Archaeology SE RCZAS project database

4. To provide a report on the NMP mapping of the project area with an overview of methodology, sources, and archaeological highlights to assist the assessment of the wider SE RCZAS project area and inform future NMP projects.

By mapping and recording the form and extent of all archaeological features visible on aerial images within the project area, this desk-based archaeological assessment project aimed to improve our understanding of the archaeological resource within the coastal area and thereby provide the appropriate tools to assist strategic planning decisions and the management and preservation of those archaeological sites and historic landscapes through Shoreline Management Plans (SMPs).

4 The project area

The overall SE RCZAS NMP project area comprises a coastal and riverine strip between the north bank of the River Test at Millbrook, Southampton and North Foreland in Kent. The NMP component was split into blocks to accommodate aerial photograph loans from the NMR. The blocks run from west to east from A to M (there is no Block I).

Wessex Archaeology completed blocks B, C, L and M. These and the remaining blocks are shown in *Figure 4.1*. For monitoring purposes, the remaining SE RCZAS NMP areas were divided into two components. Component 1 (Blocks A, D, E and F) covering an area of 176.5 km squares and Component 2 (Blocks G, H, J and K) covering an area of 188 km squares.

Mapping of complete one kilometre squares is standard procedure for NMP projects. However, for RCZAS projects mapping can be restricted to the seaward side of a line drawn 100 metres inland from the mean high water where urban areas are involved.

Extensive stretches of the coastline covered by Components 1 and 2 of the SE RCZAS NMP project were urban or suburban in character and the number of kilometre squares where this limited mapping strategy might have been applied is summarised in *Table 4.1* below.

Block	Total number of km squares in which mapping and recording is required	Number of km squares requiring complete coverage	Number of km squares where the inland area can be reduced to a 100m coastal strip	Approximate total area to be mapped within the reduced km squares
A	47.5	40.5	7	4
D	65	64	0	0
E	40	29	11	6.3
F	24	15	9	4.7
G	30	18	12	3.7
H	39	29	10	5.4
J	59	54	5	2.3
K	60	53	7	2.6
Total	364.5	303.5	61	29

Table 4.1: Summary of the blocks making up Components 1 and 2 of the SE RCZAS, including the reduction of selected kilometres to a 100 metre coastal strip. Figures taken from the Project Brief (English Heritage 2010b, 14)

With regard to the optional reduction of the mapped area in urban contexts, it was proposed that the initial aim within Component 1 mapping would be to map complete kilometre squares. However if mapping and recording proceeded at a slower rate than expected, only the 100 metre coastal strip would be mapped in those kilometre squares where this was an option. In the event the project proceeded within the estimated timescale and therefore whole kilometre squares were mapped and recorded. Component 2 used the reduced 100 metre coastal strip in all urban areas.

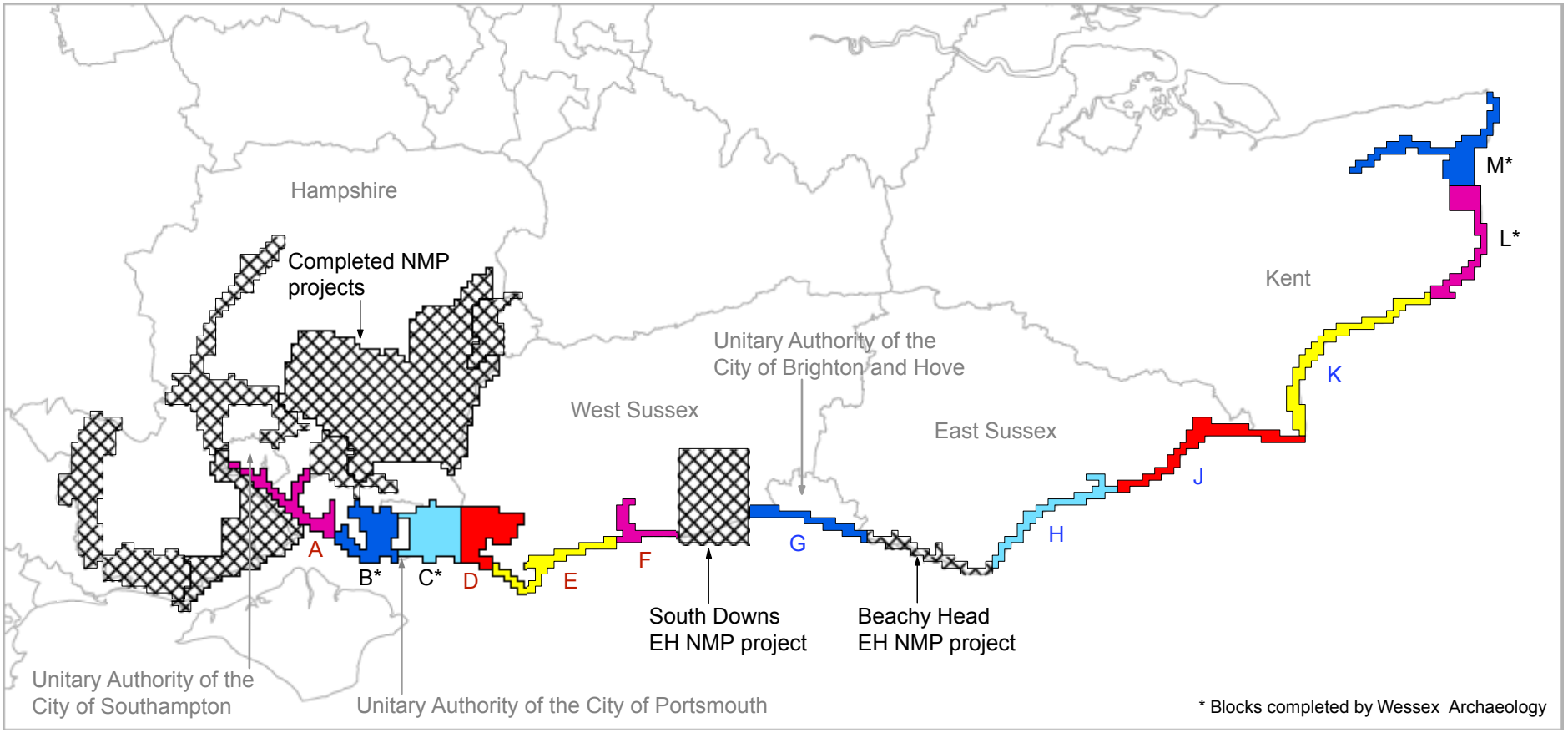

Figure 4.1: SE RCZAS NMP project area showing all the individual blocks of Components 1&2, as well as adjoining completed projects. Base map © Crown Copyright and database right 2011. All rights reserved. Ordnance Survey Licence number 100019088.

4.1 Mapping blocks

The aim of the RCZAS project was to assess the archaeological resource of a coastal and riverine strip up to one kilometre inland from the lowest astronomical tide level (LTM). NMP mapping is generally undertaken in whole kilometre squares and as a result the project area comprised an irregular polygon zigzagging along the coast. As a consequence of this irregularly shaped polygon, in some places mapping was undertaken up to one kilometre inland from the LTM but in most cases a much narrower strip was investigated.

For example in Block A within Southampton Docks, as a result of SU4012 not being included, the strip investigated above the high water mark (HWM) was reduced to less than 30 metres (see *Figure 4.2*) but budgetary constraints necessitated the approach used for the NMP components described in this report. Similar issues were also noted at several places within Block E (see *Figure 4.4*), for example at Bognor Regis (SU940990) and Bracklesham (SU810960) where the project area ended barely inland from the beach.

On the other hand within Block D, the entire area between Bosham and Fishbourne was included within the project area including four landlocked kilometre squares including areas up to 1.5 kilometres inland of the HWM.

In addition, whilst the course of the small non-tidal river of Titch Haven was mapped as far as Titchfield Abbey (five kilometres inland), only the first two kilometres of the River Itchen were included in the project area despite the river being tidal for further two to three kilometres.

4.1.1 Block A. Millbrook to Hill Head

This block includes part of nine 1:10,000 OS quarter map sheets and covers 47.5 square kilometres. Complete kilometre squares were mapped including those within the urban areas, the only exception to this was one half square at Hamble le Rice which extended the project area into the River Test. The relevant map sheets are: SU31SE, SU40NW, SU40NE, SU40SE, SU41SW, SU41SE, SU50SW, SU50NW and SU51SW.

The Project Area of Block A is shown in *Figure 4.2* below.

The block encompasses the eastern bank of Southampton Water between Millbrook, Southampton and Hill Head, Lee-on-the-Solent. It also includes the Hamble estuary and valley as far north as Hedge End.

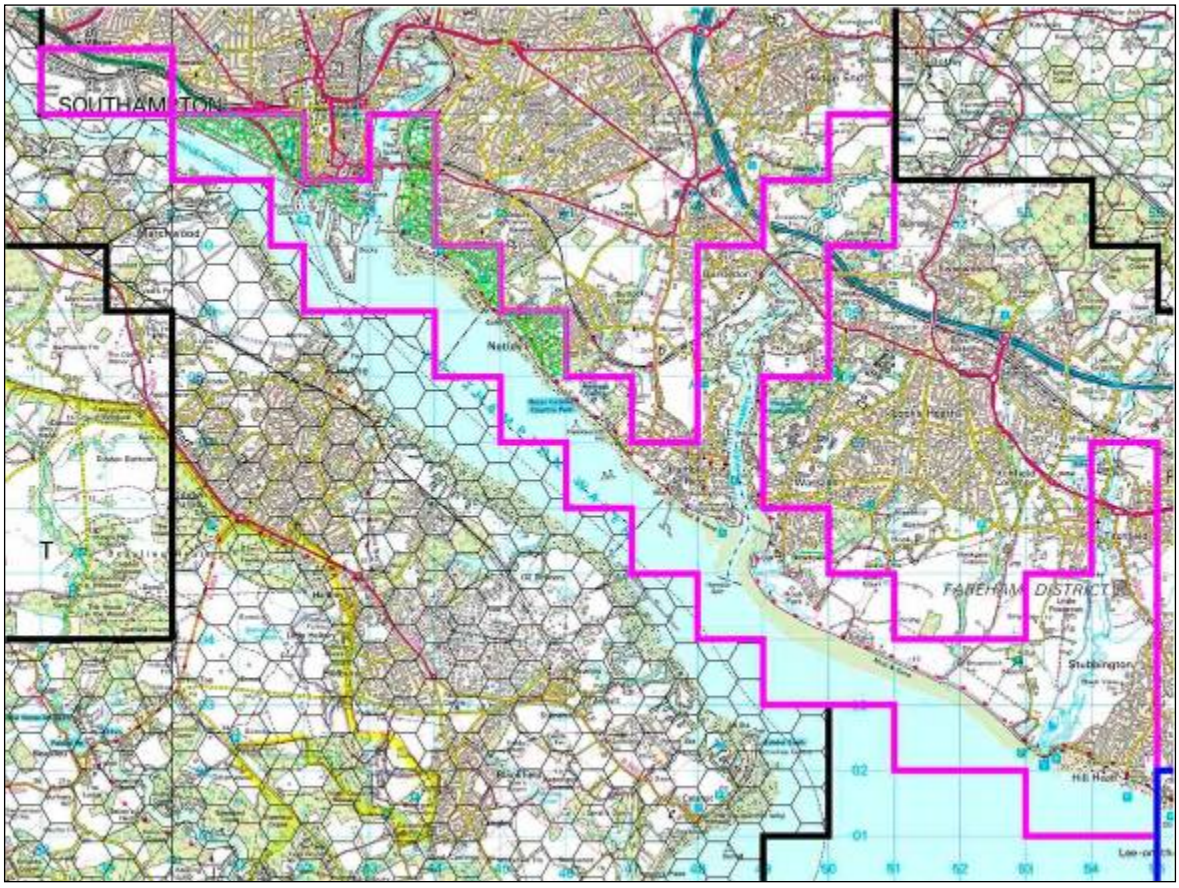

Figure 4.2: SE RCZAS NMP Block A with OS 1:50,000 scale background map. Green areas indicate where the mapping could have been reduced to the 100 metre coastal strip. Base map © Crown Copyright and database right 2010. All rights reserved. Ordnance Survey Licence number 100019088 (from English Heritage 2010b).

4.1.2 Block D. Chichester Harbour

This block includes part of five 1:10,000 OS quarter map sheets and covers 65 square kilometres. The map sheets are SU70NE, SU70SE, SU80NW, SU80SW and SZ79NE.

The block includes Chichester Harbour and the River Lavant as far north as Fishbourne. Chichester Harbour is designated as an Area of Outstanding Natural Beauty (AONB).

The western edge of Thorney Island lay within Block C (Hayling Island) which was undertaken by Wessex Archaeology. However as this portion of the Island had not been included in the Wessex Archaeology mapping of Block C, it was included in Block D and comprised the area from Marker Point to Wickor Point.

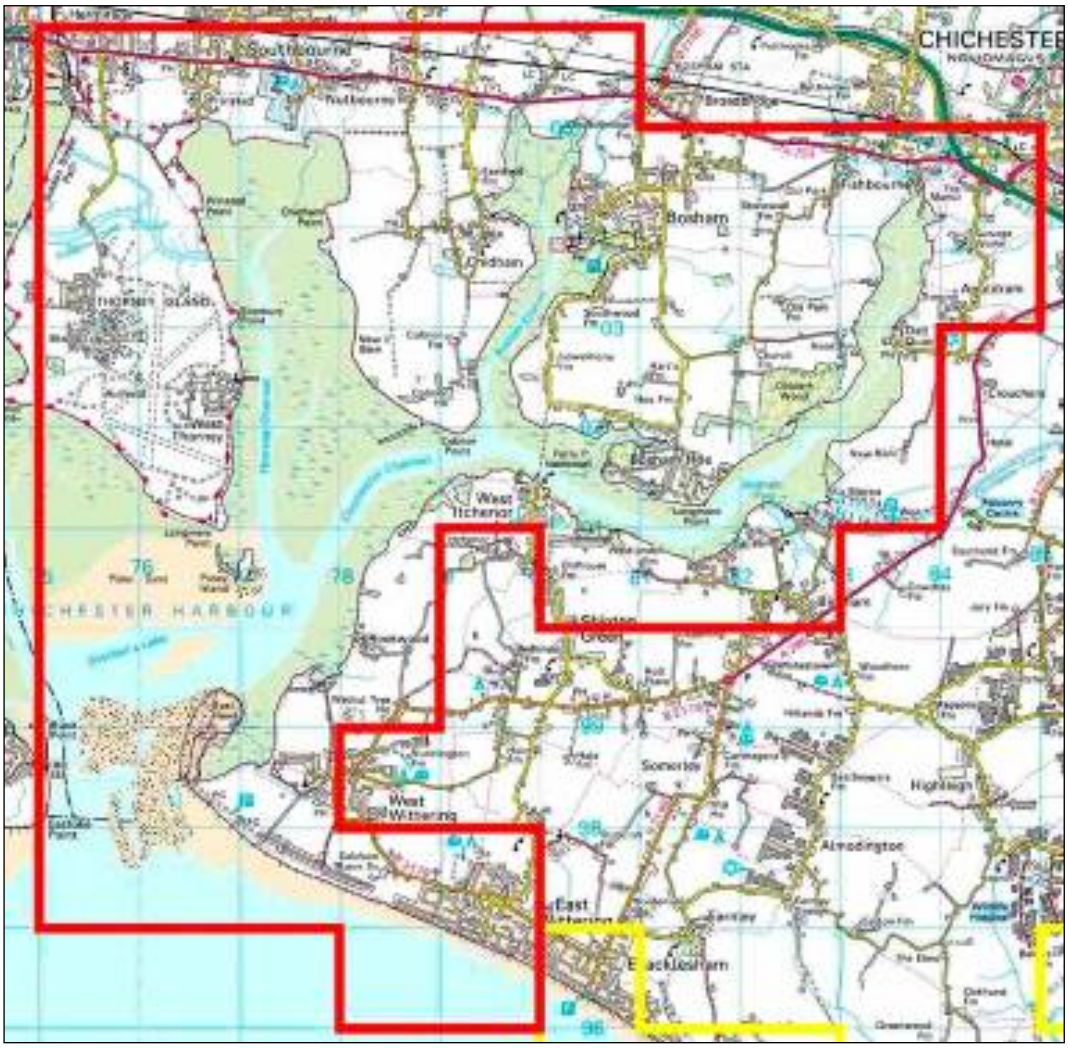

Figure 4.3: SE RCZAS NMP Block D with OS 1:50,000 scale background map. Base map © Crown Copyright and database right 2010. All rights reserved. Ordnance Survey Licence number 100019088 (from English Heritage 2010b).

4.1.3 Block E. East Wittering, Selsey Bill and Bognor Regis

This block includes part of seven 1:10,000 OS quarter map sheets. 40 complete kilometre squares were mapped including those within the urban areas. The map sheets are SU90SE, SZ89NE, SZ89NW, SZ89SE, SZ89SW, SZ99NE and SZ99NW. The block comprises the coast from East Wittering to Middleton-on-Sea.

Figure 4.4: SE RCZAS NMP Block E with OS 1:50,000 scale background map. Green areas indicate where the mapping could have been reduced to the 100 metre coastal strip. Base map © Crown Copyright and database right 2010. All rights reserved. Ordnance Survey Licence number 100019088 (from English Heritage 2010b).

4.1.4 Block F. Littlehampton and the Lower Arun Valley

This block includes part of three 1:10,000 OS quarter map sheets. 24 complete kilometre squares were mapped including those within the urban areas. The map sheets are TQ00NW, TQ00SE and TQ00SW.

The block comprises the seafront and coast at Littlehampton and the Arun Valley as far north as Arundel.

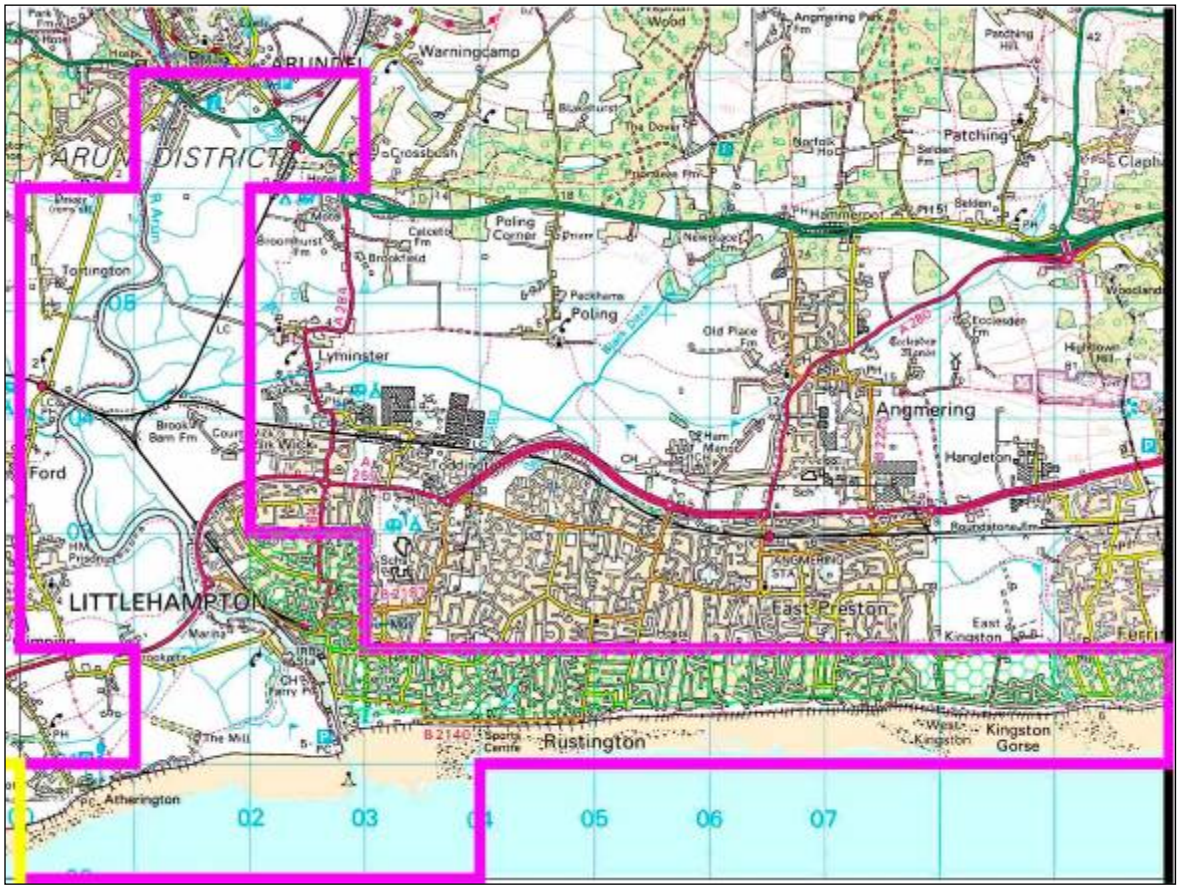

Figure 4.5: SE RCZAS NMP Block F with OS 1:50,000 scale background map. Green areas indicate where the mapping could have been reduced to the 100 metre coastal strip. Base map © Crown Copyright and database right 2010. All rights reserved. Ordnance Survey Licence number 100019088 (from English Heritage 2010b).

4.1.5 Block G. Shoreham-by-Sea and Brighton

This block includes part of six 1:10,000 OS quarter map sheets and covers 30 complete kilometre squares of which 12 were reduced to a 100 metre coastal strip. In total the area mapped comes to 21.69 square kilometres. The map sheets are TQ30SE, TQ30SW, TQ20SE, TQ20SW, TQ20NW and TQ20NE.

The block comprises the seafront and coast from Shoreham-by-Sea through Brighton and Hove to the western side of Peacehaven. Built up areas reduced to a 100 metre strip were at Shoreham-by-Sea, Hove and Brighton.

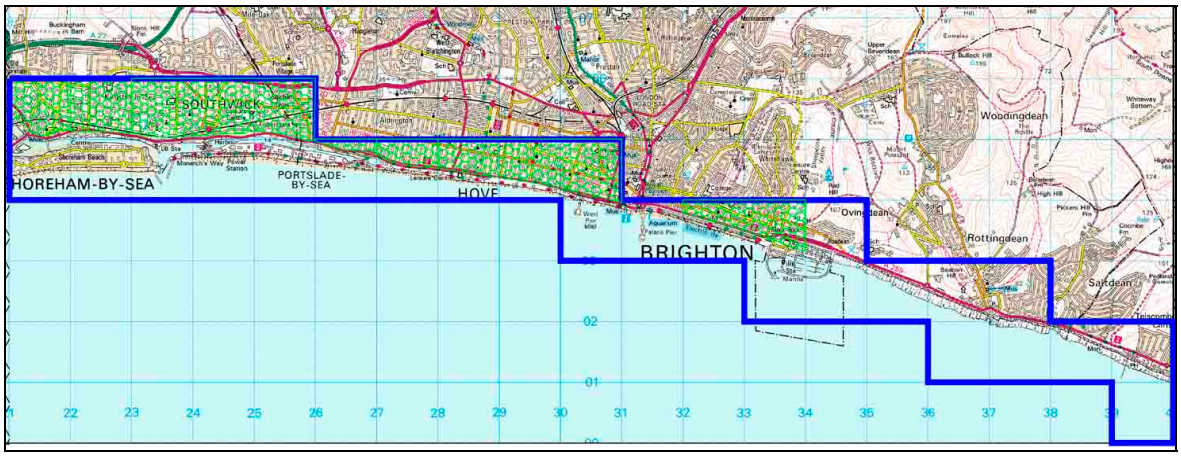

Figure 4.6: SE RCZAS NMP Block G with OS 1:50,000 scale background map. Green areas indicate reduction to a 100 metre coastal strip. Base map © Crown Copyright and database right 2010. All rights reserved. Ordnance Survey Licence number 100019088 (from English Heritage 2010b).

4.1.6 Block H. Eastbourne, Pevensey Bay and Bexhill

This block includes part of seven 1:10,000 OS quarter map sheets and covers 39 complete kilometre squares of which 10 were reduced to a 100 metre coastal strip. In total the area mapped was 34.36 square kilometres. The map sheets are TV69NW, TQ60SW, TQ60SE, TQ60NE, TQ70NW, TQ70NE, TQ71SE.

The block comprises the seafront and coast from Eastbourne through Bexhill to St Leonards. Built up areas reduced to a 100 metre wide strip were at Eastbourne, Bexhill and Bulverhythe.

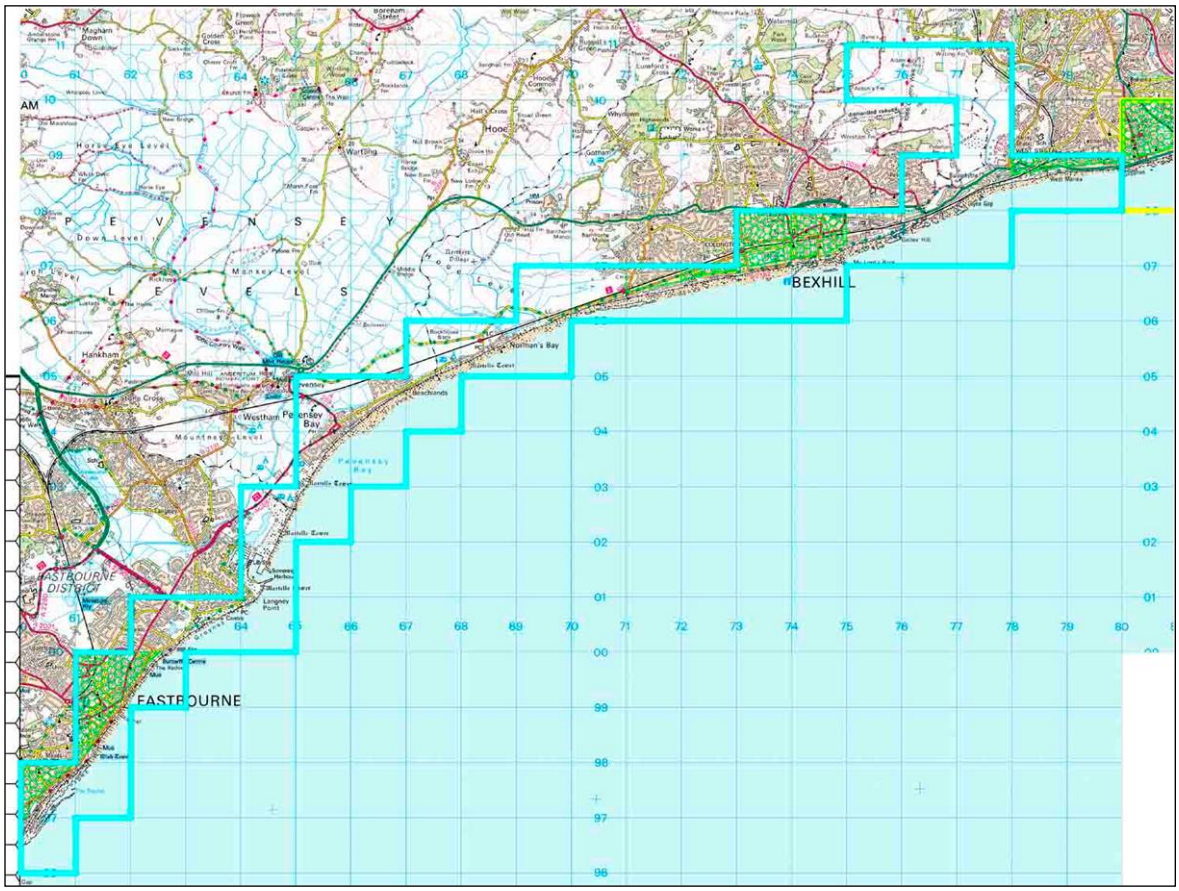

Figure 4.7: SE RCZAS NMP Block H with OS 1:50,000 scale background map. Green areas indicate reduction to a 100 metre coastal strip. Base map © Crown Copyright and database right 2010. All rights reserved. Ordnance Survey Licence number 100019088 (from English Heritage 2010b).

4.1.7 Block J. Rye Bay

This block includes part of eight 1:10,000 OS quarter map sheets and covers 59 complete kilometre squares of which five were reduced to a 100 metre wide coastal strip. In total the area mapped was 56.27 square kilometres. The map sheets are TQ81SW, TQ80NW, TQ81SE, TQ91SW, TQ91NW, TQ91NE, TR01NW, TR01NE.

The block comprises the seafront and coast from Hastings to Dungeness, with the 100 metre strip present at Hastings and Fairlight.

Figure 4.8: SE RCZAS NMP Block J with OS 1:50,000 scale background map. Green areas indicate reduction to a 100 metre inland coastal strip. Base map © Crown Copyright and database right 2010. All rights reserved. Ordnance Survey Licence number 100019088 (from English Heritage 2010b).

4.1.8 Block K. Dungeness to Folkestone

This block includes part of ten 1:10,000 OS quarter map sheets and covers 60 complete kilometre squares of which seven were reduced to a 100 metre coastal strip. In total the area mapped was 55.61 square kilometres. The map sheets are TR01NE, TR02SE, TR02NE, TR12NW, TR13SW, TR13SE, TR13NE, TR23SW, TR23NW, TR23NE.

The block comprises the seafront and coast from Dungeness to the western outskirts of Dover. Built up areas reduced to a 100 metre wide strip were at Hythe and Folkestone.

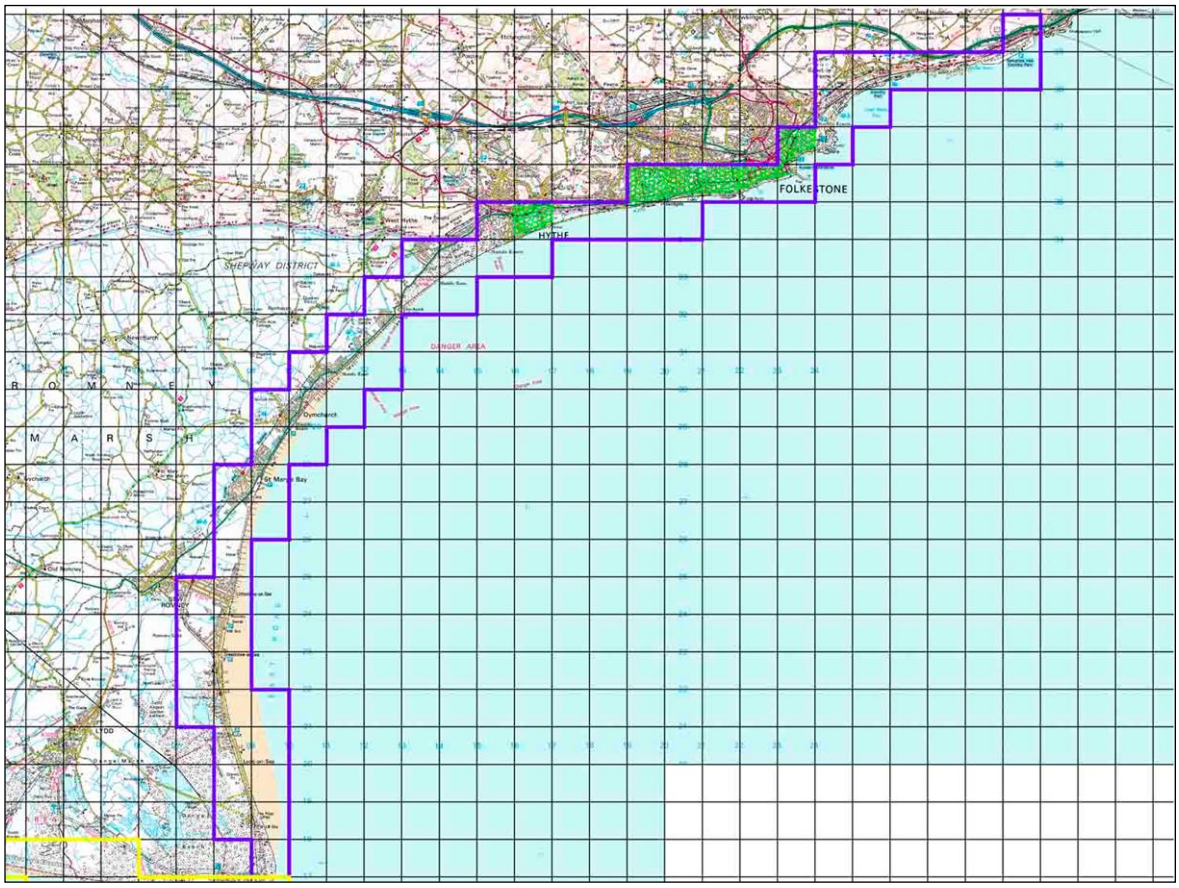

Figure 4.9: SE RCZAS NMP Block K with OS 1:50,000 scale background map. Green areas indicate reduction to a 100 metre inland coastal strip. Base map © Crown Copyright and database right 2010. All rights reserved. Ordnance Survey Licence number 100019088 (from English Heritage 2010b).

4.2 Geology and soils of the project area

The following geological information is taken from 1:625,000 scale British Geological Survey (BGS) digital mapping available at http://maps.bgs.ac.uk/geologyviewer/.

Basic soil information has been accessed from Cranfield University's Soilscapes website (http://www.landis.org.uk/soilscapes).

4.2.1 Block A. Millbrook to Hill Head

The bedrock geology to the north of Southampton water is dominated by the Middle and Upper Eocene beds of the Bracklesham Group and Barton Groups. These are sands, silts and clays which along the lower valley of the Rivers Hamble and Itchen and the coastal plain of Southampton Water include the Barton Clay, Marsh Farm, Selsey and Wittering Formations.

These are generally overlain by a superficial drift geology of Pleistocene plateau sands and gravels but these give way, along most of the coastline and the lower valleys, to tidal flat deposits of clay and silt giving rise to coastal mudflats and marshes.

Further up the Hamble Valley (up river of Brooklands) the Lower Eocene London Clay Formation of the Thames Group is overlain by alluvium.

The soils along the coastal fringe of Southampton Water are freely draining slightly acidic loamy soils. To the east of the River Hamble lie freely draining very acidic sandy and loamy soils with slow permeable seasonally wet loams and clays further inland. The banks of the River Itchen are characterised as naturally wet, loamy and clayey floodplain soils.

4.2.2 Block D. Chichester Harbour

Much of the underlying bedrock of Chichester Harbour comprises chalk formations of the Upper Cretaceous White Chalk Subgroup overlain by Brickearth. Along the northern edge of the mapping block the chalk gives way to Lower Eocene London Clay Formation of the Thames Group and to the south on the coastal plain at East and West Wittering, the Wittering Formation of the lower Bracklesham Group.

In terms of superficial drift geology, river terrace drift deposits of sand, silt and clay overlie much of the area although the northern half of Thorney Island comprises raised marine deposits of sand and gravel (alluvium). Raised beach deposits run down the coastal strip from West Itchenor to West Wittering; with beach and tidal flat deposits of clay, silt, sand and gravel within the harbour and along the coastal fringe. At the eastern side of the entrance to Chichester harbour is East Head, a sand and shingle spit formed by long-shore drift and wind-blown sand.

Much of this area is overlain by naturally wet loamy soils. Freely draining, slightly acidic loamy soils lie to the north at Chidham, Bosham and Hermitage. The northern portion of Thorney Island (coinciding with the alluvial deposits described above) are naturally wet loamy and clayey soils of coastal flats.

4.2.3 Block E. East Wittering, Selsey Bill and Bognor Regis

The underlying bedrock of this mapping block comprises Selsey Sand and Wittering Formation sands, silts and clays to the west giving way to London Clay in the vicinity of Pagham Harbour and Upper Cretaceous White Chalk to the east of Bognor Regis. This is generally overlain by Brickearth with alluvium deposits associated with the Broad, Bremere, Pagham and Aldingbourne Rifes.

As with Block E, the superficial drift deposits comprise river terrace sands, silts and clays with beach and tidal flat deposits along the coastal fringe.

The soils of this block are naturally wet, loamy soils with naturally wet loamy and clayey soils of coastal flats (coinciding with the alluvial deposits described above). There is a small band of freely draining slightly acidic loamy soils running roughly north eastward from the Broad Rife west of Selsey to Pagham Harbour. A second area of freely draining slightly acidic loamy soils lies to either side of Aldingbourne Rife at Bognor Regis. Sand dune soils are found on the coastal fringe to either side of Pagham Harbour.

4.2.4 Block F. Littlehampton and the Lower Arun Valley

The bedrock geology of this mapping block is entirely Upper Cretaceous White Chalk overlain by Brickearth.

As in other areas, the superficial drift deposits comprise river terrace sands, silts and clays with beach and tidal flat deposits along the coastal fringe. Superficial alluvial deposits are associated with the River Arun and Ferring Rife and raised beach deposits lie to the east of the River Arun at Littlehampton. There is small area of blown sand to the south of Littlehampton.

The soils of this block are generally freely draining, slightly acidic loamy soils. Small areas of naturally wet loamy and clayey soils of coastal flats coincide with the alluvial deposits described above. Sand dune soils lie to the south of Littlehampton.

4.2.5 Block G. Shoreham-by-Sea and Brighton

The underlying geology is almost entirely Upper Cretaceous White Chalk, with some small overliers of Paleocene clay, silts, sands and gravels of the Lambeth Group.

There are some drift deposits of sand and gravel of unknown origin through Shoreham and Brighton although surviving elements of these lie offshore through most of Brighton.

Where the project polygon extends inland outside the urban areas, the soils are shallow and lime-rich, over areas of the underlying Upper Cretaceous chalk. At Shoreham-by-Sea and Brighton the soils are freely draining and slightly acidic, but over the Paleocene clays are slightly acidic loamy and clayey soils with impeded drainage.

4.2.6 Block H. Eastbourne, Pevensey Bay and Bexhill

The underlying bedrock of Block H is more variable than Block G. The western part of Eastbourne is on the Upper Cretaceous White chalk, then eastwards successively on bands of Cretaceous Gault and Upper Greensand Formations and the Lower Greensand

Group, all of which are undifferentiated limestones, mudstones and sandstones. The remainder of the block lies on the Cretaceous Wealden Group Sandstones and Siltstones.

There are overlying superficial deposits of terrace gravels and river, estuarine and marine alluvium at Eastbourne and Bexhill, with storm beach deposits along Eastbourne's seafront and coast. There are also extensive alluvium deposits over the Pevensey Levels.

The soils inland largely comprise loamy and clayey soils with naturally high groundwater levels, but towards Bexhill acidic loamy and clayey soils dominate with impeded drainage. Sand dune soils dominate over the storm beach deposits at Eastbourne.

4.2.7 Block J. Rye Bay and Block K. Dungeness to Folkestone

The Lower Cretaceous Wealden Group sandstones and siltstones form the bedrock over all of Block J and Block K as far east as Hythe. From Hythe eastwards the bedrock is successively Wealden Mudstone, Lower Greensand (mudstone and siltstone) at Folkestone, Gault formation and Upper Greensand across the western half of East Wear Bay and the White Chalk of the North Downs to the eastern end of the project area.

The area of both blocks from Fairlight to Hythe is entirely covered with superficial deposits, mostly alluvium (including the inland area of Romney Marsh); but with raised marine deposits at Winchelsea beach, the Dungeness Peninsula and between Dymchurch and Hythe. There are some blown sand deposits around Greatstone-on-Sea and Dymchurch. Much of the eastern half of Block K contains superficial deposits of landslip material and clay with flints. The depositional and erosional history of Rye Bay and Dungeness is particularly complex and has been investigated by several research projects including those funded by English Heritage through the ALSF (Long *et al* 2004).

Loamy and clayey soils with a naturally high groundwater are found at Winchelsea, Camber and Dymchurch and dominate the two blocks, along with sand dune soils found at Rye, Dungeness and Hythe, over the raised marine deposits. Slightly acidic loamy and clayey soils are also found at Hastings and Folkestone, where some Quaternary landslips have taken place.

4.3 Landscape character

4.3.1 Block A. Millbrook to Hill Head

Information on the landscape character for this block is taken from Hampshire County Council's draft Integrated Character Assessment (Hampshire County Council 2010).

Much of the area is heavily built up, with extensive dockyards in Southampton and around the mouth of the Itchen. The non urban areas - between Warsash and Hill Head and, to a lesser extent, around Netley - are typical of the South Hampshire coastal plain; a flat or undulating landform with a gentle slope to the coast ending in a low cliff above a narrow shingle beach.

The underlying sandy clays and gravels associated with the Solent river terraces give rise to very fertile sandy silty loam which supports market gardening, nurseries and horticulture in the west and large scale arable fields around Hill Head. At its mouth the Hamble is characterised by extensive estuarine flats, in its southerly reaches there is a busy yachting scene, and further inland parts of the valley are heavily wooded.

There is a long history of coastal defence, especially from the twentieth century, and of ship building around the Hamble estuary. There were significant trading posts around Southampton Water and the Hamble in the Roman period and there is evidence of Roman salt working at the mouth of the Hamble.

4.3.2 Block D. Chichester Harbour

Information on the landscape character of the area is taken from the AONB website (Chichester Harbour AONB 2010 and the Landscape Character Assessment for West Sussex (West Sussex County Council 2011)).

Chichester Harbour is of national and international importance, being one of the largest enclosed expanses of marine water in Britain. Its large area offers a great diversity of tidal mudflats, shingle, marsh, wetland scrub and small creeks with numerous inlets and clusters of harbour-side settlement, boatyards, marinas and yachts. Whilst traffic and recreational activities have reduced its tranquillity in recent times, significant areas have a peaceful character and retain a sense of remoteness.

The harbour is fully tidal, draining to the sea through a narrow entrance between Hayling Island and the Manhood Peninsula. The coast is penetrated by distinctive tidal inlets that lead inland from the harbour mouth via an open water pool. Salt marsh and intertidal mudflats of the harbour pool and inlets are broken by a maze of intricate channels and rithes. These inlets are in turn interspersed by fairly open agricultural peninsulas with fields fringed by narrow woodland margins and open coastal plain. There is a varied pattern of land use, including large scale arable farming, market gardening, coastal grazing land and small hedged paddocks. On the coastal strip there is some linear urban development and holiday village and caravan park development.

There is a rich archaeological resource associated with Chichester Harbour, but in particular a large number of Roman sites associated with the town of Chichester (*Noviomagus*) and the Roman port (and palace) at Fishbourne. The harbour was equally important in medieval times and there is good survival of later features such as oyster beds, wooden quays, boatyards and twentieth century defensive installations such as the Second World War remains at Thorney Island.

4.3.3 Block E. East Wittering, Selsey Bill and Bognor Regis

Information on this block is taken from the Landscape Character Assessment for West Sussex (West Sussex County Council 2011).

The eastern part of this long narrow block is taken up by the urban areas of Bognor Regis and Middleton-on-Sea. A notable landscape feature is Selsey Bill – a protruding shingle headland. West of Selsey Bill the coastline consists of sandy beaches, sand dunes and grassland. To the east it is characterised by shingle banks and bands of sand and mud exposed at low tides. The block includes Pagham Harbour which, like Chichester Harbour is a sea inlet with similar historic features. Pagham Harbour is smaller than Chichester Harbour and is dominated by tidal mudflats and fringing marsh vegetation enclosed to the south by open shingle banks. Large parts of the area have been reclaimed from the sea, and remain below the current high spring tide level.

This area was important in medieval times; Church Norton to the south of Pagham Harbour was said to be the site of the pre Conquest Cathedral and an earthwork castle was constructed here in early Norman times. Historic and archaeological features include timber groynes and numerous Second World War structures including a bombing decoy at Pagham Harbour.

4.3.4 Block F. Littlehampton and the Lower Arun Valley

Information on this block is taken from the Landscape Character Assessment for West Sussex (West Sussex County Council 2011).

This part of the Arun Valley contains extensive areas of drained pasture and floodplain with a wide, wandering river course throughout. Stretches of the tidal river have been protected from flooding by the construction of high banks and where it reaches the sea it is flanked by wharves, jetties and moorings.

Historic features include the deserted medieval settlements of Atherington (which are visible at very low tide) and Church Farm, Climping, as well as extensive post-medieval water meadows.

4.3.5 Block G. Shoreham-by-Sea and Brighton

Information on this block is taken from the South Downs Joint Character Area Assessment (JCA 120) produced by Natural England (Natural England 1996a), from the NMR monument records and historical OS 1:2500 maps.

Block G includes the Brighton and Hove coast and small areas of West Sussex and East Sussex to either side, and is dominated by the seaside conurbations of Shoreham-by-Sea, Hove, Brighton and Peacehaven. Only a small strip of coastline between Brighton and Saltdean is devoid of urban sprawl, here the beaches of Brighton and Shoreham-by-Sea give way to chalk cliffs east of Brighton Marina, where the South Downs drop abruptly to the sea. Mudflats, which are very rare along the coastline of the Component 2 project area, are present along the lower reaches of the River Adur at Shoreham.

The coast between Brighton and Rottingdean is within the South Downs National Park, as is a stretch between Saltdean and Peacehaven. The area west of Brighton Marina to Newhaven Cliffs is a Site of Special Scientific Interest (SSSI).

The block includes Shoreham-by-Sea Harbour which has two arms. The western arm is essentially the River Adur as it flows to the sea, while the eastern arm is an extension of the River Adur which has been further canalised and widened and sits behind a spit of sand, which in the late nineteenth and twentieth century housed warehouses, as well as various works and wharfs.

Although the coastline has in general changed little from the early nineteenth century to the present day, major changes occurred earlier in the post-medieval period. This is demonstrated by the original medieval settlement of Hove, which was inundated by the sea and resettled between 1800 and1918.

4.3.6 Block H. Eastbourne, Pevensey Bay and Bexhill

Information on this block is taken from the Pevensey Levels and High Weald Joint Character Areas Assessment (JCA 124 & 122) produced by Natural England (Natural England 1996b&c), from the NMR monument records and historical OS 1:2500 maps.

Block H extends between the major urban centres of Eastbourne to the west and Bexhill and Hastings to the east. In between are the Pevensey Levels, a landscape relatively young in geological and historical terms. They are the largest tract of wetland in East Sussex, and result from a combination of natural sedimentation and depositional processes, as well as extensive reclamation of the wetland for agricultural use. As a result of their environmental importance the Levels have been designated as a SSSI, although this only extends up to the coast between Norman's Bay and Bexhill. Some parts are also designated National Nature Reserves, such as the area north east of Pevensey Bridge Level, and Combe Haven is an SSSI between Bexhill and St Leonards.

Along the coast the High Weald landscape further inland gives way to eroded sandstone and clay sea cliffs around Fairlight and disappears under the urban areas of Bexhill and Hastings to the south east.

4.3.7 Block J. Rye Bay

Information on this block is taken from the Romney Marshes & High Weald Joint Character Areas Assessment (JCA 123 & 122) produced by Natural England (Natural England 1996d&c), from the NMR monument records and historical OS 1:2500 maps.

The eastern 8.5 kilometres of Block J, to the east of Camber, is within Kent, the remainder is within East Sussex. The coast from the eastern side of Hastings to Winchelsea falls within the High Weald AONB. The eastern end of the High Weald is characterised by a series of broad, often flat bottomed river valleys opening out towards the coastal levels of Romney Marsh particularly at Fairlight and Rye Bay. The Dungeness, Romney Marsh and Rye SSSI covers almost the entire Block, with extra environmental protection given to the Pett Levels, which are also a Special Protection Area (SPA). The area between Winchelsea and Rye Harbour is also a SPA, and part of the area is additionally a Special Area of Conservation (SAC) as well as a Local Nature Reserve.

Block J covers the western and southern extent of the Romney Marshes, an area of reclaimed open marshland. The Marshes are bounded to the west by old sea cliffs cut into the Wealden and Lower Greensand beds of the Lower Cretaceous. Romney Marshes include within Block J the Walland and Denge Marshes, and the Broomhill, and Pett Levels. The Romney Marshes owe their current landscape appearance to the natural process of sediment deposition behind large shingle promontories, as well as to land

reclamation for agricultural use. As well as the marshes there are the extensive storm beach deposits and sand dunes at Dungeness Point and Camber Sands. Dungeness is the largest shingle foreland in Europe. As with the other Blocks in Component 2 there is not an extensive intertidal zone along this coastline but there is a wide beach across Rye Bay which has a tidal range of about six to seven metres.

4.3.8 Block K. Dungeness to Folkestone

Information on this block is taken from the Romney Marshes Joint Character Areas Assessment (JCA 123) produced by Natural England (Natural England 1996d), from the NMR monument records and historical OS 1:2500 maps.

Block K extends from the shingle foreland of Dungeness, across Romney Marsh proper to the urban centres of Hythe and Folkestone to the east. The Dungeness, Romney Marsh and Rye SSSI within Block K extends from Dungeness to St Mary's Bay, with most of the same stretch of coastline also being a SAC. Dungeness Point and part of Denge Marsh are also a National Nature Reserve.

Block K covers the eastern extent of the Romney Marshes, an area of reclaimed open marshland. Romney Marshes included within Block K are the Romney Marsh proper and the Denge Marshes. The Romney Marshes, as mentioned above, owe their present day appearance to the natural process of sediment deposition as well as man made reclamation which occurred in stages for agricultural use. From Hythe eastwards, as the bedrock changes from the Wealden Mudstone underlying the Romney Marshes, the Lower Greensand (mudstone and siltstone), Gault formation and Upper Greensand form steep cliffs with the beach and seaside promenades at Sandgate and Folkestone before the incised and eroded chalk cliffs rise sharply in the east to the end of the Block.

Holiday parks and beach houses have increased throughout the nineteenth and twentieth centuries to form an almost continuous narrow strip of urban sprawl from Lydd-on-Sea to Hythe.

5 Overview of the aerial images

The primary source of aerial photographs used during the course of this project was the NMR collection in Swindon. These comprised 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.

There were exceptionally high numbers of aerial photographs identified in the NMR collections cover search for the project area, therefore the numbers of vertical photos in the loans for each block were filtered and reduced by English Heritage staff to enable delivery of the SE RCZAS NMP project, alongside the national priorities for provision of NMP loans. The reduced loans included all oblique photographs and all vertical photographs taken up to 1950, and a single complete vertical layer for each subsequent decade (see Appendix for further details).

In addition photographs from the Channel Coastal Observatory (CCO), Google Earth and Bing were accessed via the internet. Environment Agency lidar jpegs were available for much of the project area but did not prove useful for the survey. Pan Government Agreement geo-referenced aerial photographs provided by EH were also used.

5.1 Specialist oblique photography

Some of the earliest oblique aerial photographs consulted during the project were from the Crawford collection which includes prints from flights undertaken in southern England in the 1920s and 1930s. The prints that cover the Component 1 area included some of the earliest from the collection and are dated to June 1919. These images are of considerable historic interest and provide a unique snapshot of the country in the inter-war years. In addition, within the Component 2 area, there were a number of early images from the RH Windsor collection taken in the 1930s; two from the Crawford collection taken in 1924 and 1925; as well as one from 1917 held by The Imperial War Museum.

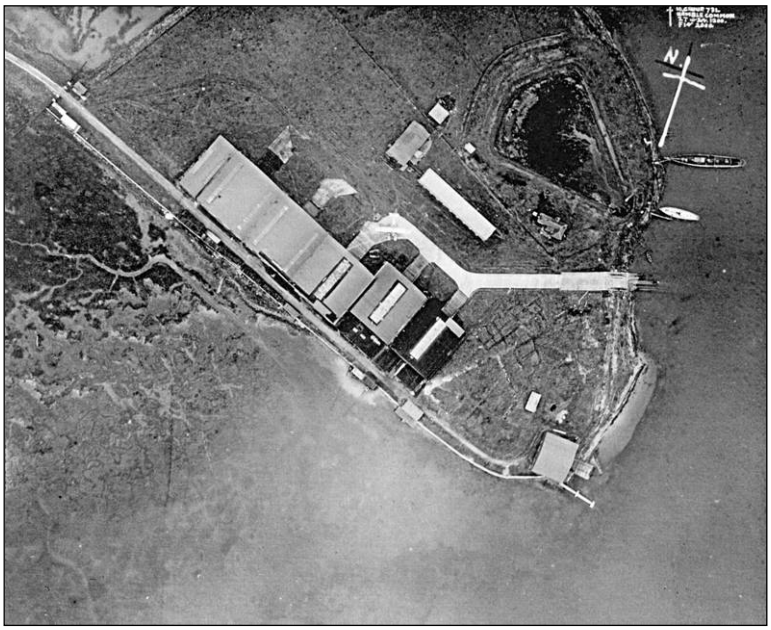

Figure 5.1: Hamble Point, Southampton. An early Crawford Collection aerial photograph taken in 1920. This photograph clearly shows buildings associated with Fairey Aviations seaplane factory (MKM760). To the top right of the image is a nineteenth century lobster pond (MKM752).

Photograph: CCC 8654/7926 SU 4805/2 27th October 1924. © English Heritage (NMR) Crawford Collection.

The Cambridge University Committee for Aerial Photography (CUCAP) has undertaken an aerial reconnaissance programme since 1947 but unfortunately due to temporary closure of their archive facility, there was no access to that collection for the duration of this project. A small number of duplicate prints were however available via the NMR collection in Swindon.

A systematic programme of reconnaissance has been carried out by the NMR since the 1970s and photographs from this collection provided the main source of oblique photographs to the project. Oblique coverage for the project was generally very sparse and in the main provided detail to sites already recorded in the NMR or HERs, or which had been primarily mapped from vertical aerial photographs. There were a small number of specific sites with higher numbers of NMR photographs available, for example within the Component 2 area many of the photographs were centred on Martello Towers, seafronts, piers and shipwrecks.

Oblique photographs taken in slanting sunlight (either during the winter months or in the early morning or late evenings of summer) are an ideal medium for defining low earthwork monuments. The site of Tortington Priory, Arundel provides a good example where fishponds and low earthworks are clearly picked out in the low winter sunlight (see Figure 5.2 below).

Figure 5.2: The low earthwork banks and fishponds associated with the medieval priory at Tortington, West Sussex. This site was recorded as part of ongoing aerial reconnaissance by the English Heritage Aerial Survey team.

Photograph: NMR TQ 0005/4 NMR 23346/22 18th January 2004. © English Heritage (NMR).

5.2 Vertical photographs

Vertical photographs provide coverage of all parts of the project area and have been taken at regular intervals from the early 1940s onwards. As part of the routine NMP process all the vertical aerial photographs provided by the NMR were examined with a hand held stereoscope. Viewing prints with a stereoscope provides 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 scale or times of day or year to maximise the visibility of archaeological features. Nonetheless the value of vertical

photography to the project cannot be overstated; the majority of all sites recorded in the project database were identified and transcribed from vertical aerial photographs.

A good range of sources of vertical aerial photographs were available to the project, and as a result a wide variety of archaeological site types were recorded. RAF vertical photographs from the 1940s to the early 1960s were an important source of information, particularly for sites relating to twentieth century military features.

Of particular importance were RAF photographs taken in 1941 and 1942. The photographs revealed the numerous wartime military defences that stretched along the coastline. Many of these were ephemeral features such as admiralty scaffolding and barbed wire defences, which were removed without trace at the war's end or not long after. The 1941 and 1942 photographs are therefore sometimes the only accurate record of the extent and layout of these defences.

There was a lack of aerial photography towards the end of the war, which meant that some military features such as the Diver anti-aircraft batteries within Component 2, which were not deployed until the summer of 1944, were often not visible on the aerial photographs. A further limitation was that the batteries themselves were sometimes very temporary and left little trace of their existence once removed.

Figure 5.3: Early RAF vertical photograph of Thorney Island, Chichester Harbour. Barbed wire entanglements encircle the sites of two Second World War gun emplacements. An anti-tank wall can be seen running along the coastline to the west.

Photograph: NMR RAF/S653 16 7th November 1941. English Heritage (NMR) RAF Photography.

A number of earthwork features were identified and transcribed from vertical photographs taken during the winter months, particularly in the years 1946 and 1968. The provision of a wide variety of sorties in addition to the RAF coverage (the Ordnance Survey and Meridian Airmaps collections as well as Channel Coastal Observatory and Google Earth digital images), ensured that coverage from vertical photography was extremely good.

Within Component 2, it was found that due to the narrow coastline strip of the project area, as well as the archaeology identified dating predominantly from the Second World War; the post-1950 photographs were not as useful as later photographs usually are in NMP contexts. Few monuments recorded as earthworks were recorded from these

photographs other than those associated with twentieth century military sites, and even fewer features visible as cropmarks were identified. An exception is the site of probably later prehistoric rectilinear enclosures to the west of Beacon Hill, Rottingdean (Block G).

Few plough-levelled features visible only as cropmarks were encountered during the project and of those that were recorded, the majority came from vertical aerial photographs taken from the 1960s onwards. These cropmark sites are indicative of the significant amount of ploughing that occurred in certain areas during and after the Second World War and demonstrates that there is potential for further discovery of subsurface remains through continuing programmes of specialist aerial reconnaissance in the summer months.

Recently taken PGA photographs were also consulted for Component 2 of the project. These digital images were supplied as geo-referenced one kilometre square tiles that therefore easily imported straight into the AutoCAD drawings. Most of the images however did not reveal archaeological features not already visible on earlier aerial photographs. An exception to this was the wreck site of the Veerman, a Dutch vessel (NMR: 1538168) which was wrecked in Rye Bay, south of Jury's Gap.

Unfortunately, for the whole of Block K we did not have access to many of the original prints of the wartime RAF vertical and oblique photographs, instead they were provided as laser copies. This affected the visibility of any archaeological features, which was further reduced once the image was scanned and rectified. Although large buildings and structures were still visible, it is quite possible that many smaller military features such as pillboxes or fine lines of barbed wire may have been 'missed' during this part of the survey.

5.3 Military oblique photographs

A large number of military obliques were available for each block of Component 2 and a lesser number within Component 1. The pattern of military obliques was such that at least one photograph covered almost every inch of coastline. The military photographs were mostly taken after the war in 1947 and 1949, when many of the Second World War features had already been cleared or demolished. However, where buildings or structures remained extant, the extremely low oblique angle of most of these photographs provided almost ground-level shots of features which in some cases had been camouflaged and therefore would have been difficult to identify from vertical photographs alone. A good example of this is the coastal battery at Norman's Bay, where the large gun emplacements were disguised as houses with pitched roofs. Although the military oblique photographs were sometimes not suitable for rectification purposes, they were found to be extremely useful in aiding interpretation.

A smaller number of military oblique photographs were taken during the Second World War. These covered the entire length of coast from West Wittering to Littlehampton in Component 1 and in Component 2; Denge Beach, the Lydd military ranges and Abbot's Cliff (the location of another military training site). Some were also concentrated on the urban areas of Brighton and Shoreham Harbour. Although these photographs were often unsuitable for rectification purposes due to the extreme angle of the shot, as outlined above they were found to be extremely useful in aiding interpretation of confusing and/or camouflaged twentieth century military structures identified on the vertical photographs.

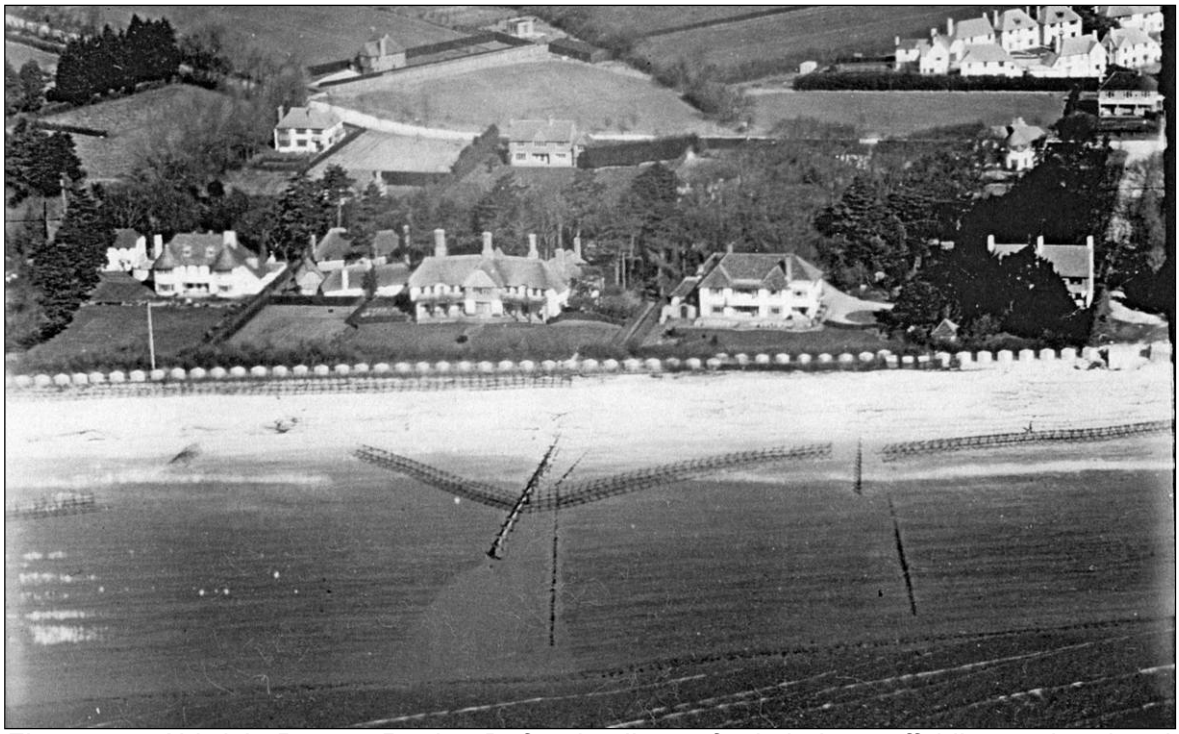

Figure 5.4: Aldwick, Bognor Regis. Defensive lines of admiralty scaffolding and anti-tank cubes are clearly visible on this 1942 photograph. Photograph: NMR SZ 9093/3 MSO 31188 PO3045 23rd March 1942. English Heritage (NMR) RAF Photography.

5.4 Digital images available over the internet (Channel Coastal Observatory and Google Earth)

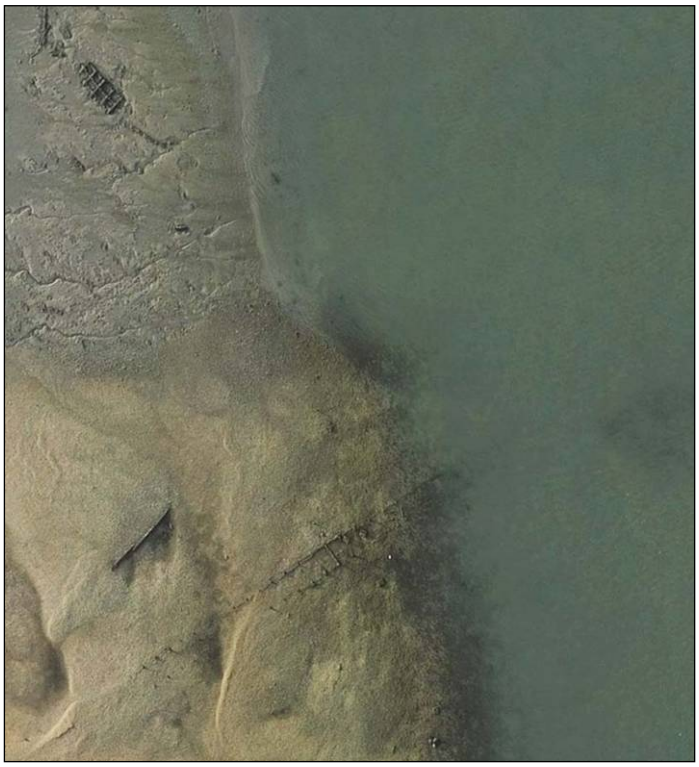

Figure 5.5: Channel Coastal Observatory photograph of intertidal structures at the low tide mark east of Thorney Island.

Photograph: Image courtesy of Channel Coastal Observatory SU7700nw_20080721ortho.jpg 21st July 2008. www.channelcoast.org.

The Google Earth, Bing and CCO aerial photographs were consulted for the entire project area. Whilst they generally did not prove useful in identifying new sites (other than within Chichester Harbour, see *Figure 5.5*), they were an important source in terms of showing the most recent state of survival of archaeological features. Google Earth was found to be the most useful of these web based digital sources due to the ease of use of the website, as well as the availability of their small range of 'historical' aerial photographs taken between 1999 and 2009.

Within Component 1 the images available from the Channel Coastal Observatory (CCO), particularly those from 2008, proved to be a particularly valuable photographic source within Chichester Harbour (see *Figure 5.5*). Numerous intertidal structures were identified on these images. The fact that these images are geo-referenced was particularly helpful, as the harbour with its large expanse of intertidal mud and silts provided little or no rectification control information.

5.5 Lidar

Light Detection and Ranging (lidar) is an airborne mapping technique which uses a laser to measure the distance between the aircraft and the ground. The technique allows the identification and recording of upstanding features on the ground to sub-metre accuracy. The benefits of using lidar for archaeological recording have been recognised and tested by the EH Aerial Survey Team (Bewley *et al* 2005, Devereux *et al* 2005, Crutchley and Crow 2009).

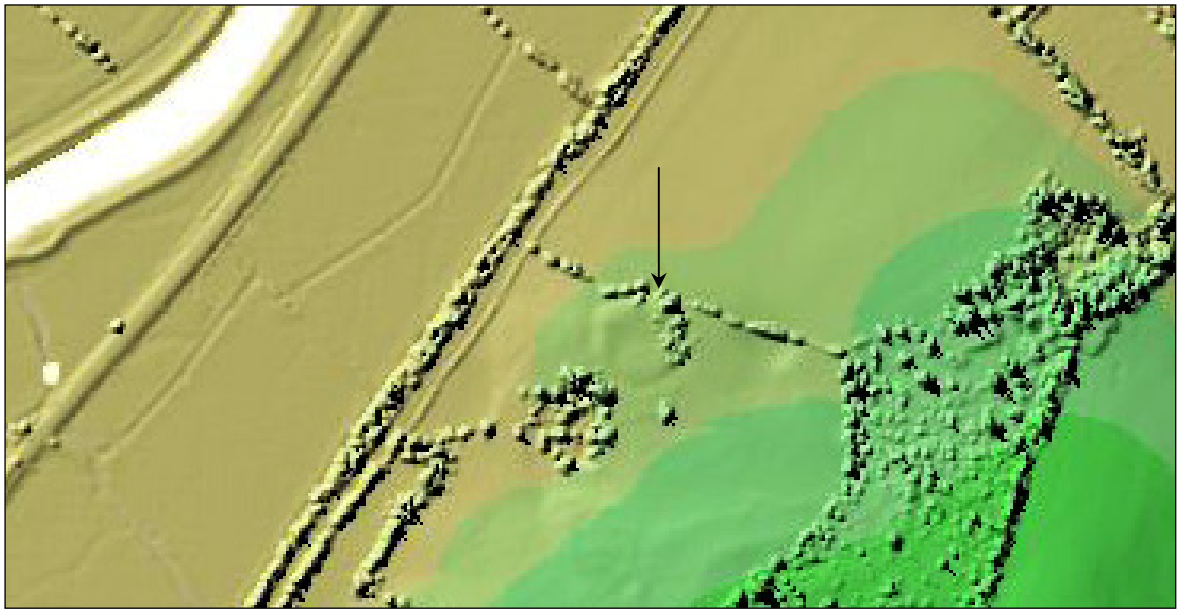

Figure 5.6: Lidar image showing a medieval ring-work to the east of the River Arun near Arundle. The low earthwork remains of one of Henry I's siege castles dating to AD 1102 (MKM2029) is clearly visible in the centre of this lidar image. LIDAR TQ0206 Environment Agency D0090939 January 2008 © Environment Agency copyright 2008. All rights reserved.

The Environment Agency (EA) have undertaken widespread lidar surveys of the country as the technique results in the production of a cost effective terrain map suitable for assessing flood risk, measuring land topography and surveying coastal erosion and geomorphology. This data was supplied to the SE RCZAS project team via EH as static .jpg images derived from the full data and was used in exactly the same way as conventional aerial photographs.

In general the lidar images did not reveal any new sites, or better images of sites previously mapped or recorded from other sources. This is mainly due to the nature of the archaeology, 91% of which was Second World War in date and had been either removed or demolished by 1946. Most of the EA lidar was also flown with a resolution of one to two points per metre and therefore did not reveal any detailed features. Occasionally however, the lidar imagery provided the best images of previously documented sites. For example in Block F where the remains of a medieval ring-work lie to the south west of Arundle. Dating to Henry I's siege of Arundle Castle in 1102; the earthworks associated with this site are much denuded and not easily identified on conventional photographs, they are however clearly visible on the lidar imagery flown in January 2008 (*Figure 5.6*).

6 Results of NMP mapping

6.1 Overview of results: Component 1

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 subsurface features. Historic photography also provides details of earthworks and structures which have been denuded or levelled by ploughing, or otherwise destroyed or removed in the last 70 years.

6.1.1 Numbers of sites previously recorded in the project area

Mapping Block	Database	Find spot	Monument/ Wreck	Total
Block A	Southampton HER	20	23	43
	Hampshire AHBR	94	314	408
	NMR	46	213	259
	Sub Total	**160**	**550**	**710**
Block D	Chi District HER	175	244	419
	West Sussex HER	104	202	306
	NMR	37	144	181
	Sub Total	**316**	**590**	**906**
Block E	Chi District HER	95	66	161
	West Sussex HER	121	128	249
	NMR	80	131	211
	Sub Total	**296**	**325**	**621**
Block F	West Sussex HER	53	135	188
	NMR	26	108	134
	Sub Total	**82**	**243**	**322**
Totals		**854**	**1,708**	**2,559**

Table 6.1: Summary of monument records listed in the NMR and various HERs for Component 1 prior to mapping.

A summary of the monument records listed in the various HERs and the NMR databases prior to the mapping is set out in *Table 6.1* above. Prior to the mapping 2,559 records were listed although how many of these are duplicated across the various datasets is not determinable. Of these records 854 were for find spots. The remaining 1,708 sites were for monuments such as wrecks, military features and other archaeological sites within the NMP remit and potentially identifiable on aerial photographs.

6.1.2 Block A

Figure 6.1 shows the distribution of those monument records existing prior to the NMP project.

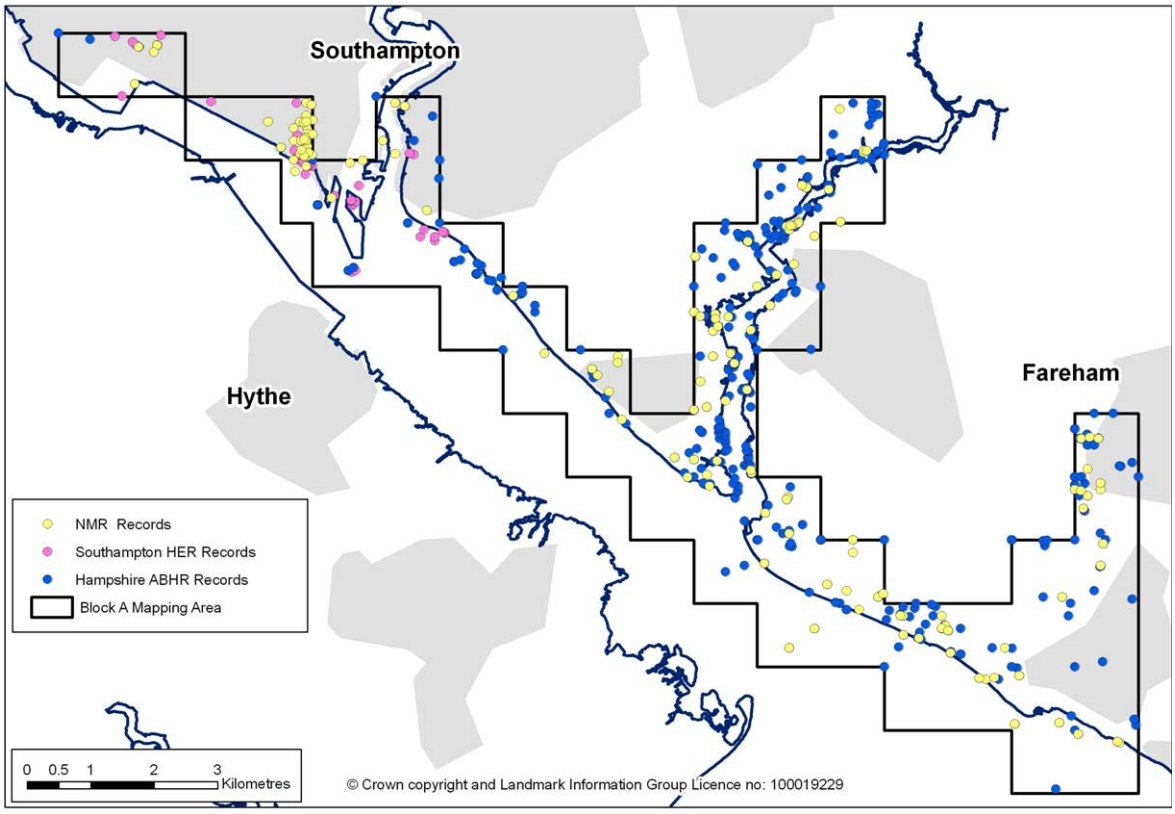

Figure 6.1: Distribution of all monuments recorded in Block A prior to the NMP project.

During the project 381 monument records were created in the Cornwall Council NMP Projects Team (HBSMR NMP) data base for Block A of which 285 were for sites previously unrecorded. Prior to the project 550 records for monuments and wrecks were previously known (see *Table 6.1* above). As some of these 550 sites may be duplicates (being recorded in both the NMR and HERs), the mapping project has resulted in a minimum increase of 52% in the archaeological record for these types of site, from 550 to 835. The numbers of sites recorded by period are listed in *Table 6.2* below.

Period	Existing Sites	New Sites	Total
Prehistoric	2	4	6
Roman	1	0	1
Historic	35	91	126
Medieval	4	0	4
Post-medieval	16	32	48
Modern (C20th)	37	151	188
Uncertain	1	7	8
Totals	**96**	**285**	**381**

Table 6.2: Numbers of sites recorded in the HBSMR NMP database for Block A.

The impact of the project on the known archaeological record must be seen not just in terms of the numbers of new sites, but also in terms of their distribution. Many of these new sites lie in the west of the project area within the built up areas around Southampton Docks, an area previously low in record numbers. The majority of these are sites associated with the Second World War such as air raid shelters, emergency water supply sites, barrage balloon mooring sites and pillboxes.

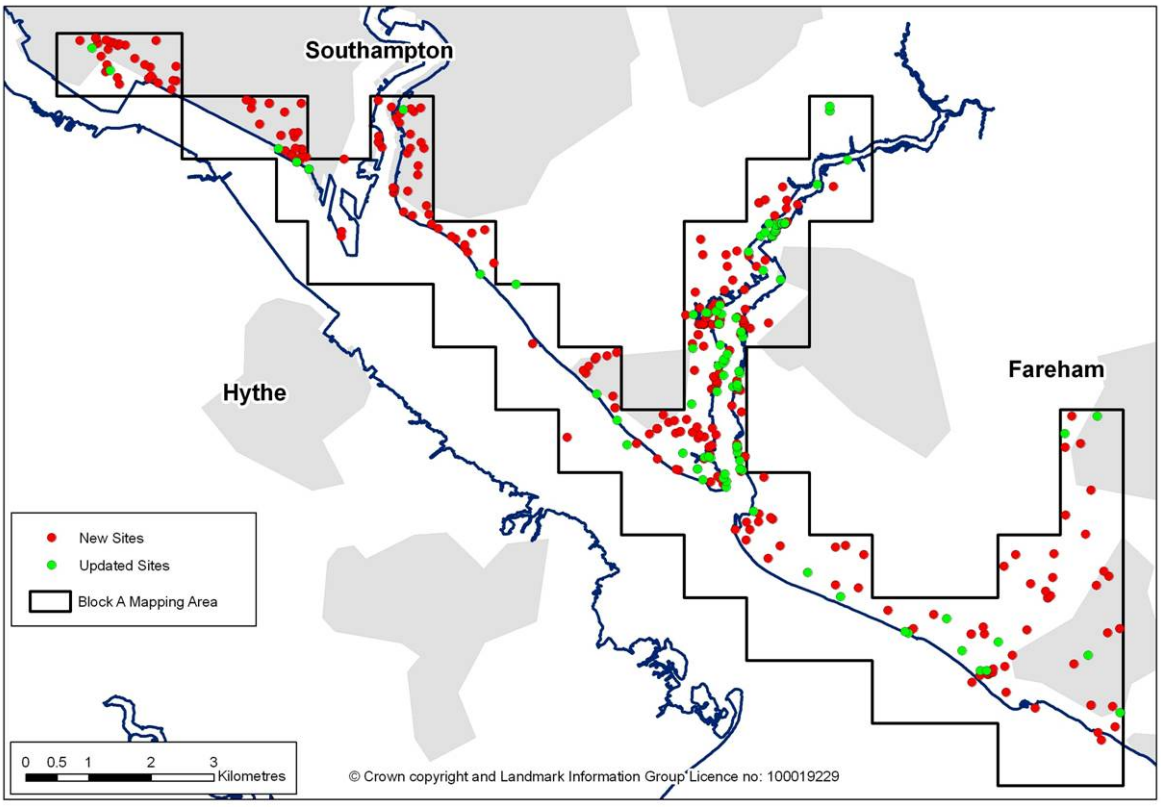

Figure 6.2: Distribution of all monuments recorded in Block A during the NMP project.

6.1.3 Block D

Figure 6.3 shows the distribution of those monument records existing prior to the NMP project.

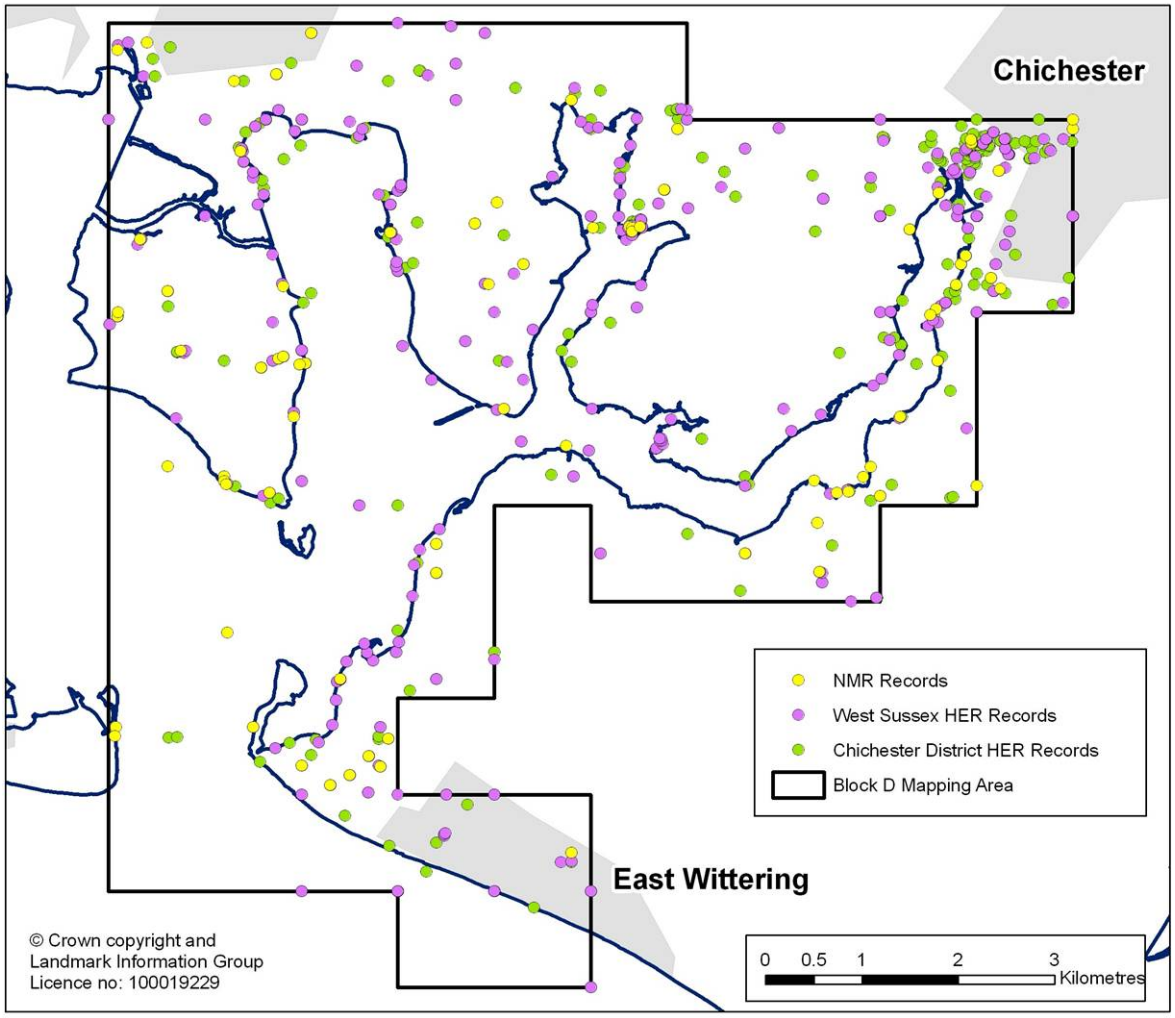

Figure 6.3: Distribution of all monuments recorded in Block D prior to the NMP project.

During the project 452 monument records were created in the HBSMR NMP data base for Block D of which 426 were for sites previously unrecorded. Prior to the project 590 records for monuments and wrecks were previously known (see *Table 6.1* above). As some of these 590 sites may be duplicates (being recorded in both the NMR and HERs), the mapping project has resulted in a minimum increase of 72% in the archaeological record for these types of site from 590 to 1016. The numbers of sites recorded by period are listed in *Table 6.3* below.

Period	Existing Sites	New Sites	Total
Prehistoric	2	0	2
Roman	1	0	1
Historic	2	185	187
Medieval	0	0	0
Post-medieval	7	40	47
Modern (C20th)	14	196	210
Uncertain	0	5	5
Totals	**26**	**426**	**452**

Table 6.3: Numbers of sites recorded in the HBSMR NMP database for Block D.

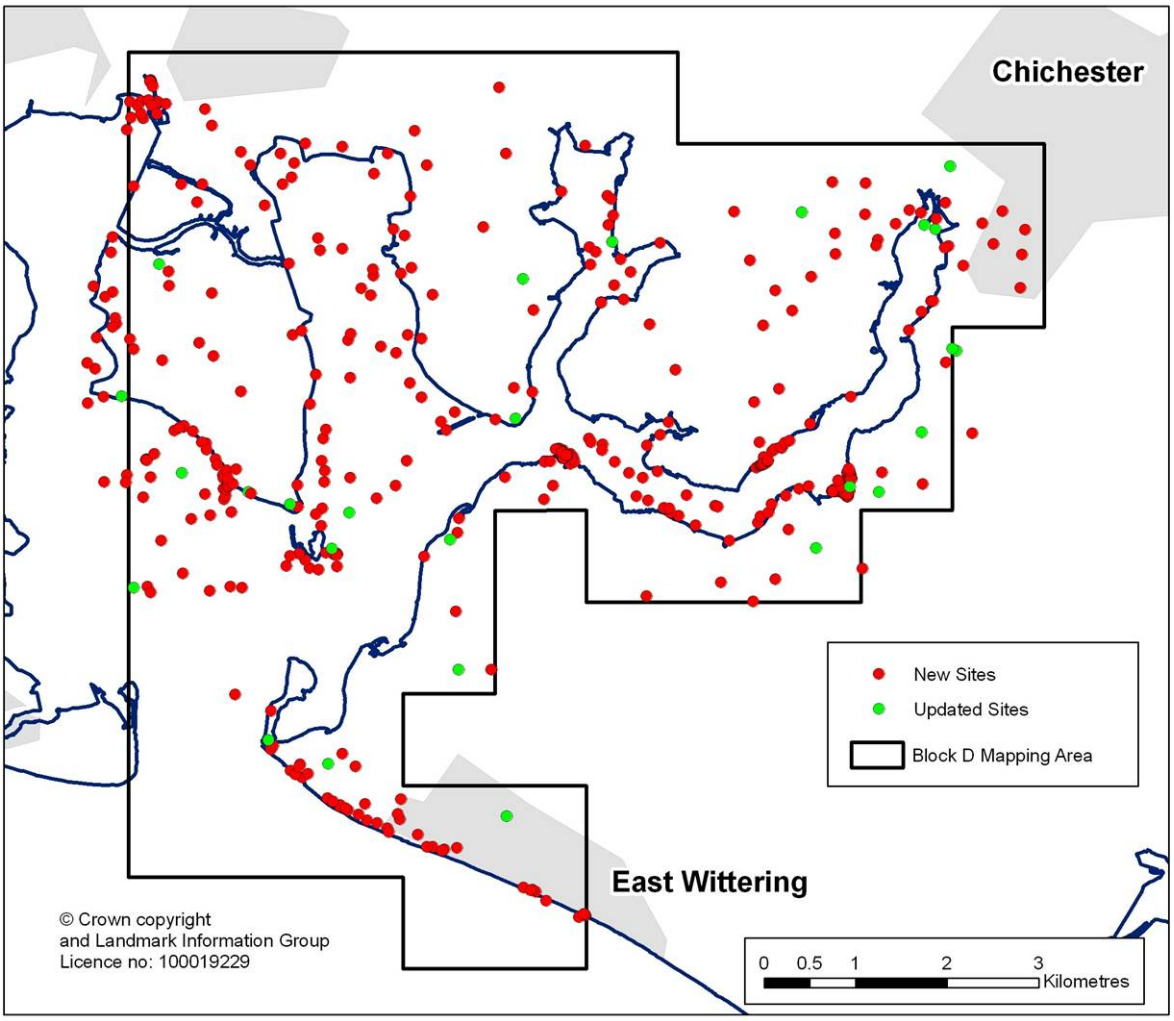

Figure 6.4: Distribution of all monuments recorded in Block D during the NMP project.

The Component 1 mapping has greatly enhanced the known distribution of archaeological sites. Many of the new sites lie below the high tide mark within the intertidal flats, particularly those surrounding Thorney Island, to the south of Emsworth and along the Chichester Channel. Many of these features were wrecks, or other maritime structures

(such as groynes, jetties or potential fish traps); however the majority of records were for single or scattered groups of intertidal debris or collapsed structures of uncertain provenance and were described simply as submerged structures in the HBSMR NMP database. More secure interpretations of these features may be possible during the phase 2 fieldwork stage of the SE RCZA project. Significant numbers of new sites were also mapped along the coastal fringe between East Head and East Wittering; in the main modern sites relating to coastal defence during the Second World War.

6.1.4 Block E

Figure 6.5 shows the distribution of those monument records existing prior to the NMP project.

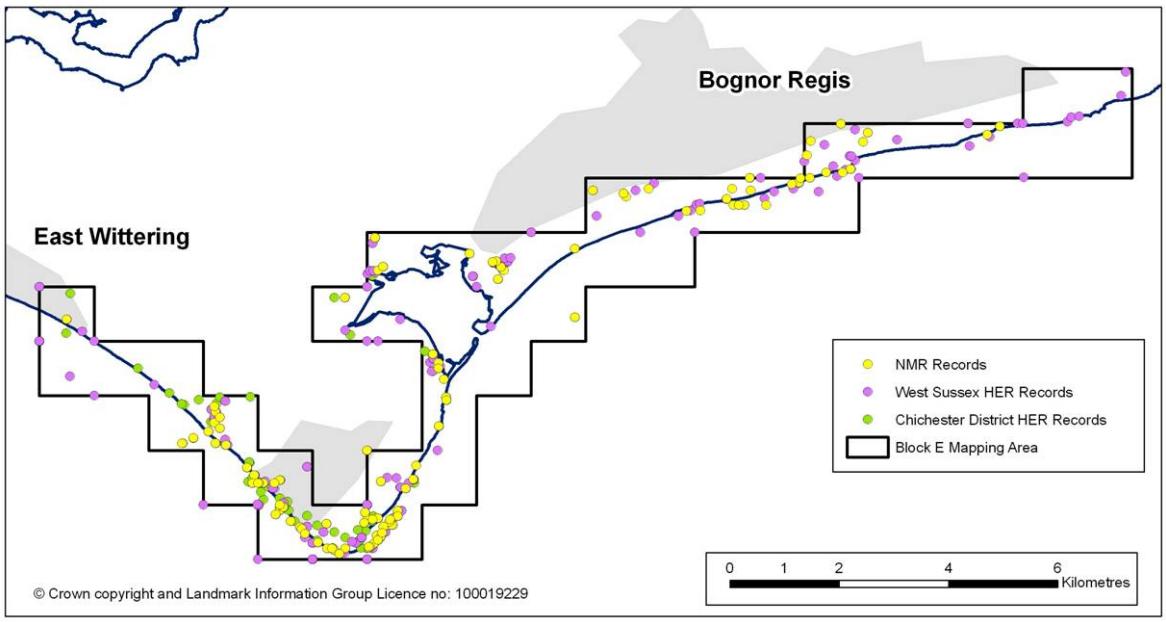

Figure 6.5: Distribution of all monuments recorded in Block E prior to the NMP project.

During the project 333 monument records were created in the HBSMR NMP project data base for Block E of which 299 were for sites previously unrecorded. Prior to the project 325 records for monuments and wrecks were previously known (see *Table 6.1* above). As some of these 325 sites may be duplicates (being recorded in both the NMR and HERs), the mapping project has resulted in a minimum increase of 92% in the archaeological record for these types of site from 325 to 624. The numbers of sites recorded by period are listed in *Table 6.4* below.

Period	Existing Sites	New Sites	Total
Prehistoric	1	0	1
Roman	0	0	0
Historic	1	46	47
Medieval	1	0	1
Post-medieval	1	34	35
Modern (C20th)	30	213	243
Uncertain	0	6	6
Totals	**34**	**299**	**333**

Table 6.4: Numbers of sites recorded in the HBSMR NMP database for Block E.

Many of these new sites were modern Second World War coastal defence sites (anti-tank and anti-landing obstacles) which were recorded along much of the coastal strip. A number of sites were also mapped within Pagham Harbour itself including possible wrecks and post-medieval drainage systems. The distribution of known sites was also increased between Selsey and Bracklesham, where a number of Second World War anti-landing obstacles have been identified on the flat low-lying ground inland of the Broad Rife.

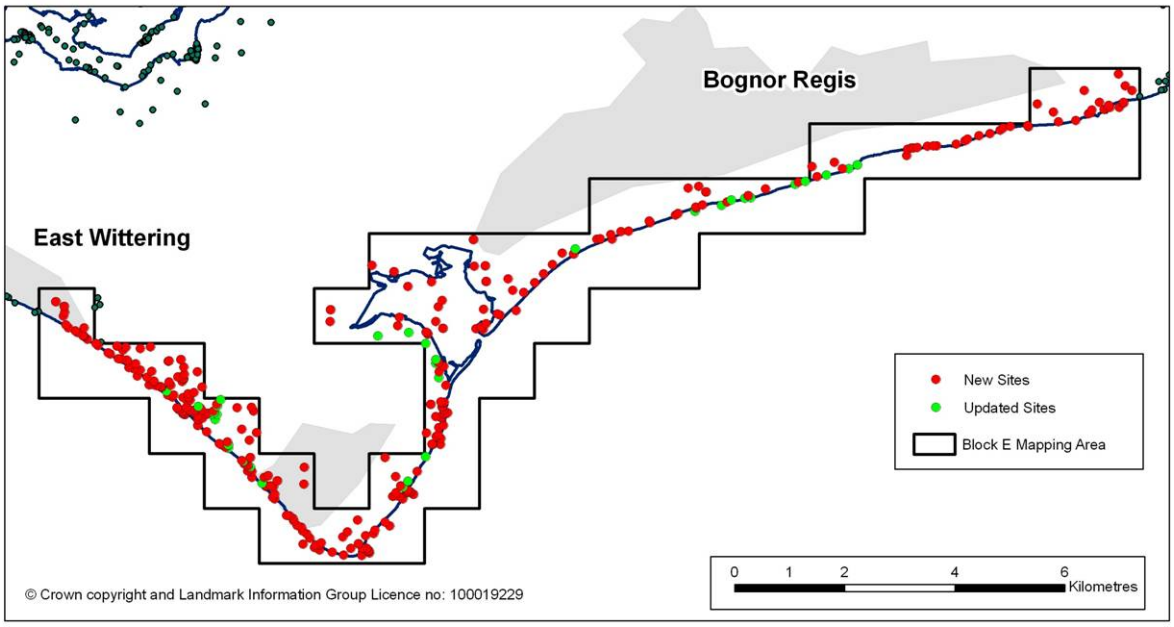

Figure 6.6: Distribution of all monuments recorded in Block E during the NMP project.

6.1.5 Block F

Figure 6.7 shows the distribution of those monument records existing prior to the NMP project.

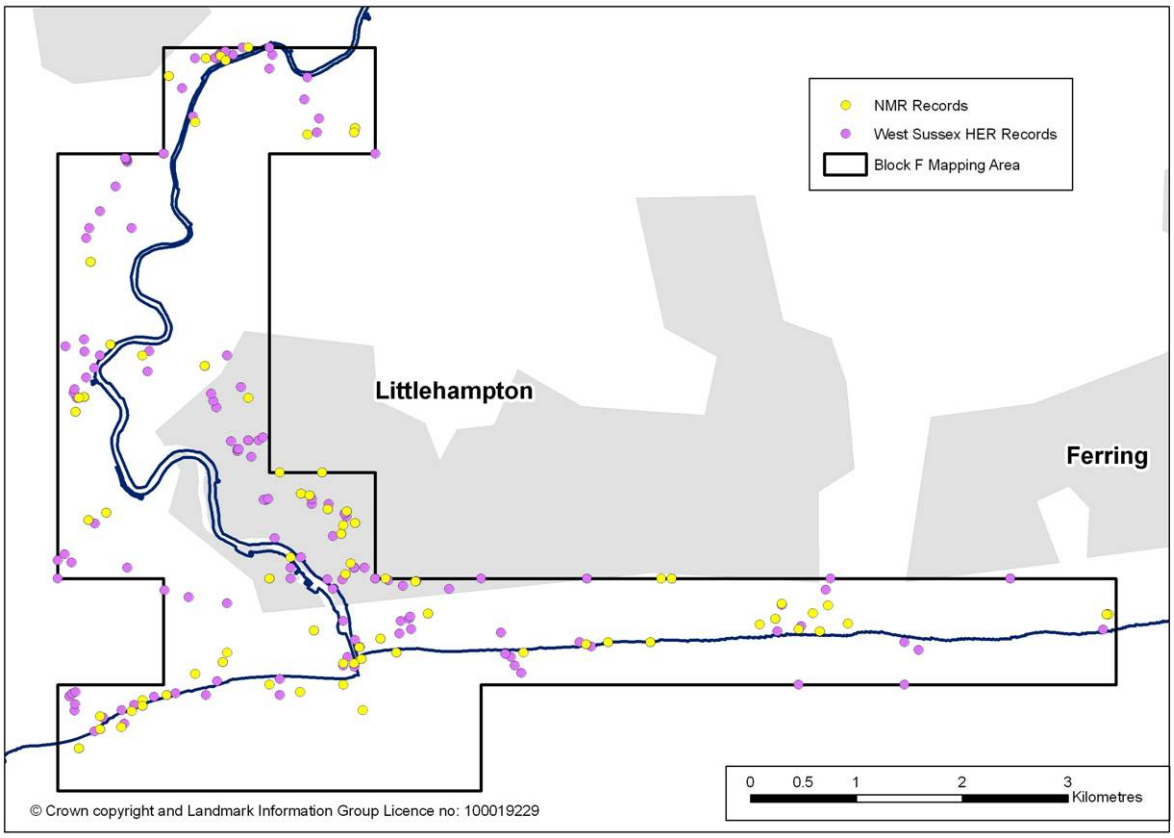

Figure 6.7: Distribution of all monuments recorded in Block F prior to the NMP project.

During the project 183 monument records were created in the HBSMR NMP data base for Block E of which 165 were for sites previously unrecorded. Prior to the project 243 records for monuments and wrecks were previously known (see *Table 6.1* above). As some of these 243 sites may be duplicates (being recorded in both the NMR and HERs), the mapping project has resulted in a minimum increase of 68% in the archaeological record for these types of site from 243 to 408. The numbers of sites recorded by period are listed in *Table 6.5* below.

Period	Existing Sites	New Sites	Total
Prehistoric	0	1	1
Roman	0	0	0
Historic	0	22	22
Medieval	3	0	3
Post-medieval	3	34	37
Modern (C20th)	13	88	101
Uncertain	0	19	19
Totals	**19**	**164**	**183**

Table 6.5: Numbers of sites recorded in the HBSMR NMP database for Block F.

In terms of their distribution, considerable numbers of new sites were identified to either site of the River Arun. In the main these were post-medieval or later drainage features and water meadows as well as military sites associated with the Second World War airfield at Ford which lies just to the west of the project area.

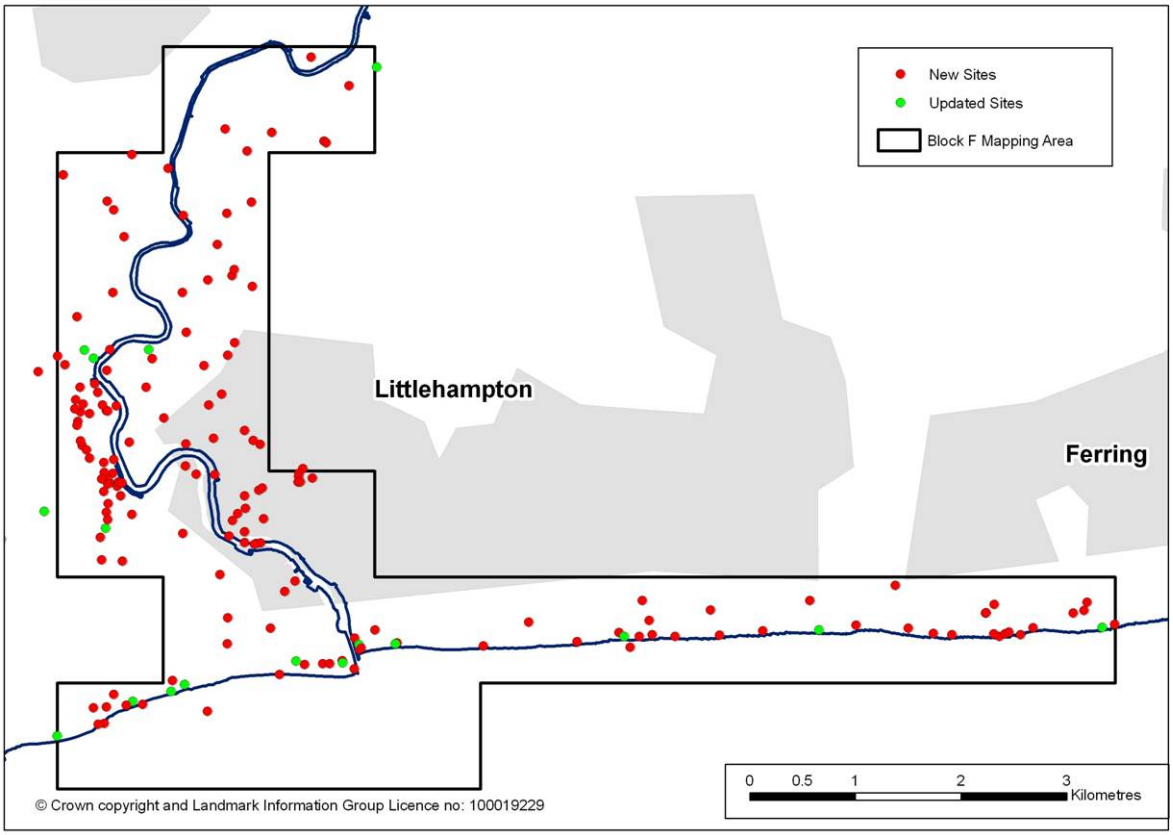

Figure 6.8: Distribution of all monuments recorded in Block F during the NMP project.

As in previous blocks, significant numbers of new sites dating to the Second World War were also mapped along the coastal fringe. These included coastal defence sites such as scaffolding, barbed wire obstructions and pillboxes.

6.1.6 Form and survival of sites

Of the 1,349 sites mapped during Component 1 of the project, 249 (18.5%) were recorded as earthworks and levelled earthworks. A further 161 (11.9%) were plough-levelled and visible only as cropmarks. The cropmarks are shown in green on *Figures 6.9* and *6.10* below and as would be expected, they are generally located on the agricultural areas away from the coastal fringe, particularly along the River Meon (Block A), River Arun (Block F) and around Chichester Harbour (Block D).

Two hundred and forty eight sites (18.4%) were recorded as vessel structures (either intact, coherent, collapsed or scattered). The majority of these lie on the banks of the Hamble River (Block A) with smaller numbers along the Chichester Channel of Chichester Harbour (Block D).

One hundred and fifty four (11.4%) of sites were recorded as submerged structures, the majority of which lay in Chichester Harbour but small numbers were also recorded off the coast between Bracklesham and Selsey.

The large numbers of Second World War features within Component 1 are reflected in the high numbers of sites recorded as Structure including 476 (35.3%) Extant Structure (including ruined structures) and 60 (4.5%) Demolished Structure.

Although some monuments or sites were described as demolished or removed, it may be that some part of the site is still visible on the ground, or as a subsurface feature that was not discernable on the available aerial photographs.

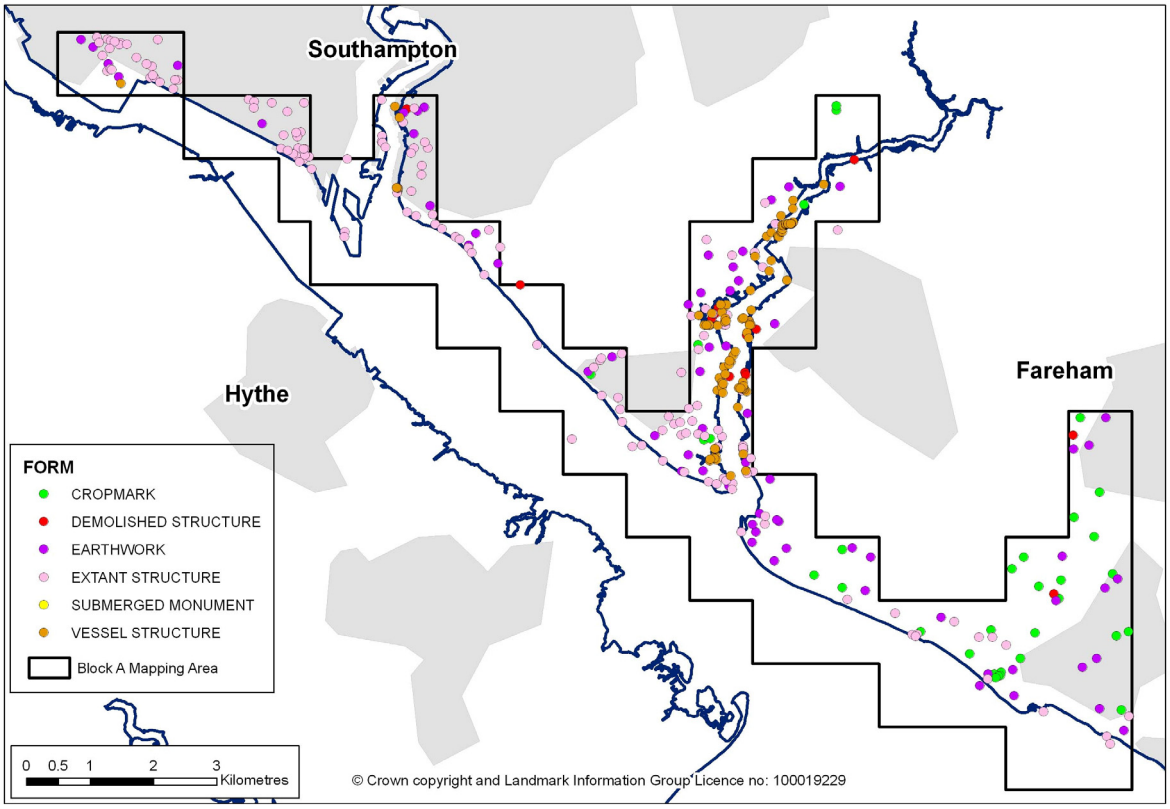

Figure 6.9: Distribution of sites recorded by form within Block A.

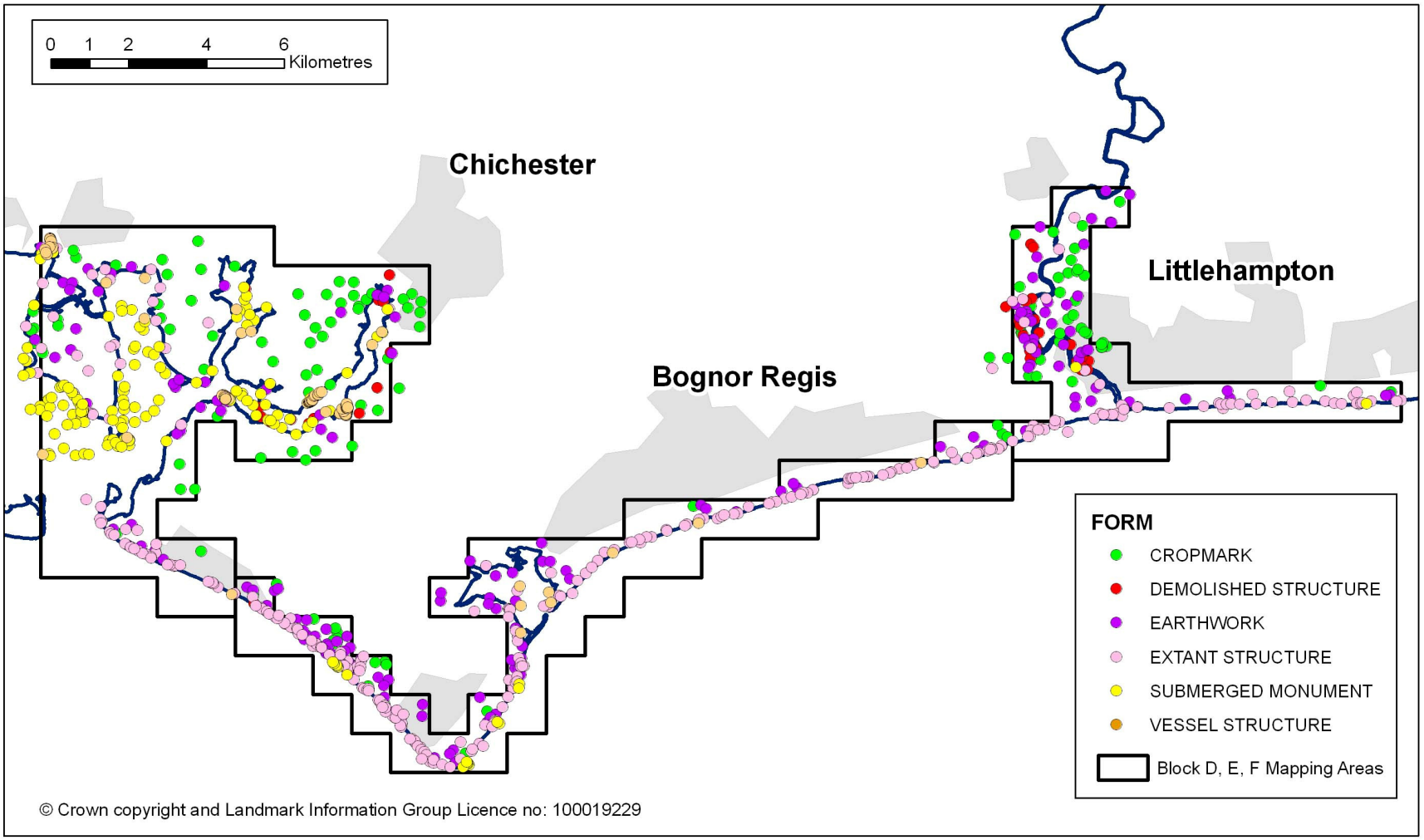

Figure 6.10: Distribution of sites recorded by form within Blocks D, E and F.

6.2 NMP results: Component 1

6.2.1 NMP results Component 1: Later prehistoric and Roman sites (4000BC to AD409)

During the mapping project, ten prehistoric or Roman sites were mapped, of which five were new to the record.

6.2.1.1 Neolithic sites (4000BC to 2351BC)

Numerous intertidal features were identified for the first time during the mapping project and one site was tentatively given a late Neolithic or Bronze Age date. It is a loosely circular arrangement of nine timber posts positioned on the west bank of the River Hamble within Block A (MKM714). Partially buried in the intertidal silts close to the low tide mark, it was recorded in the database as potentially the remains of a timber circle. Whilst the site is most likely to be the dispersed remains of a post-medieval or modern wreck or jetty, some further investigation is required.

Figure 6.11: Potential site of a prehistoric timber circle on the banks of the River Hamble (MKM714). Photograph: Image courtesy of Channel Coastal Observatory. SU807ne_20080722ortho.jpg. 22nd July 2008. www.channelcoast.org.

6.2.1.2 Bronze Age sites (2350BC to 701BC)

Five ring ditches identified during the project were given a tentatively Bronze Age or Iron Age date, being the probable remains of Bronze Age barrows or later prehistoric round houses.

Four circular ditched enclosures lie within Block A to the south west of Meon and are associated with a scatter of pits (*Figure 6.12*). One of the ring ditches (MKM499) had been previously noted in the Hampshire AHBR. The ring ditches range from 9.5m to 15.5m across and are all visible as indistinct cropmarks. They indicate the possibility that

this area may have had a long use as a Bronze Age barrow cemetery, later prehistoric settlement or possibly both. The field boundaries which lie in the vicinity of the ring ditches (see Figure 6.12) are of partially are marked on the OS 1st Edition map and therefore likely to be of post-medieval origin.

Figure 6.12: Prehistoric ring ditches to the south west of Meon. Potential site of a Bronze Age barrow cemetery or later prehistoric round house settlement with associated pit features (MKM499, MKM526-528).

In addition to the Meon site, a number of other circular features were identified in Block F which are potentially of prehistoric origin. These include a circular cropmark approx 11m across at Ferring (MKM1787). The feature is visible on aerial photographs taken in August 1945 and whilst a prehistoric origin is possible it may be a modern fungus ring.

Further north at Wick, Littlehampton five circular features were identified (MKM1971-MKM1975). They include two possible ring ditches and three circular mounds, each between 9m and 16m across (*Figure 6.13*). The NMR lists the location of a find spot of a Bronze Age collared urn less than 100m to the south of these features and recovered during the development of the Wick Estate between 1949 and 1952 (NMR: 392837). Whilst recorded in the database as of uncertain date, the close proximity of these features to the find spot does give a reasonable likelihood that they are the remains of a small Bronze Age barrow cemetery.

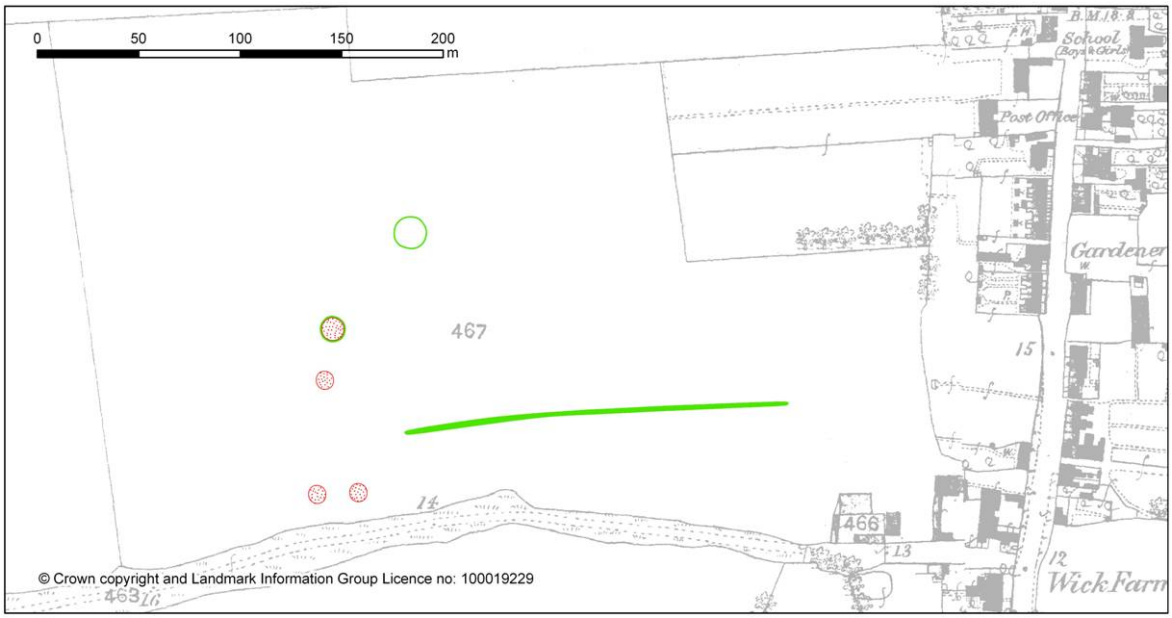

Figure 6.13: Potential site of a Bronze Age barrow cemetery at Wick, Littlehampton.

Two further circular features lie just over 1 kilometre from those described above at Wick. The first (MKM1996) is 30m across and is 1.1km to the north west immediately to the north of the bend in the River Arun. The second (MKM1960) is 11m across and lies 1.2km to the south west immediately adjacent to a small tributary stream within a large post-medieval drainage system (MKM1959). Both sites have been interpreted as fungus rings in the project database, being in potentially waterlogged areas unlikely to produce cropmarks. However an earlier prehistoric origin is possible and therefore further investigation in terms of field survey is recommended.

6.2.1.3 Iron Age sites (700BC to 42AD)

Two sites recorded in the HBSMR NMP database were dated to the Iron Age period, both previously recorded in the HERs and NMR. The first is the site of a possible Iron Age promontory fort at Hamble Common (MKM797) within Block A. Here the earthwork remains of a singe rampart are visible on aerial photographs, cutting off the eastern portion of the promontory formed where the River Hamble reaches Southampton Water (*Figure 6.14*).

Figure 6.14: Hamble Common, possible site of an Iron Age promontory fort. Photograph: NMR RAF/S653 16 7th November 1941. English Heritage (NMR) RAF Photography.

The second potentially Iron Age site was a 65m length section of ditch recorded within Block E (MKM1182) to the west of Selsey. A ditch was visible on aerial photographs taken in 1945 and is considered likely to be a section of the Iron Age curving gully excavated here during a watching brief in 1999 (Chichester District HER 4080). As well as the gully, pits and postholes indicating the presence of Iron Age occupation were recorded here during the watching brief.

6.2.1.4 Roman sites (43AD to 409AD)

Two sites recorded in the HBSMR NMP database were dated to the Roman period; both previously recorded in the HERs and NMR. The first was in Block A where fragments of the Roman road from Bitterne (*Clausentum*) to Chichester (*Noviomagus*) (RR421) are visible as two parallel lengths of bank and ditch on aerial photographs taken in 1946 and 1970 (MKM653, *Figure 6.27*).

The high status Roman palace at Fishbourne lies within the study area towards the north east of Block D. Whilst no additional information was identified during the mapping in terms of the extent and layout of the site – it having been excavated and partially reconstructed since its discovery in 1960 - the oblique aerial photographs provided

excellent illustrative images of the modern visitor centre and replanted formal gardens (MKM1928, *Figure 6.15*).

Figure 6.15: Fishbourne Roman Palace. Photograph: NMR SU 8304/028 NMR 24771/01 17th October 2007 © English Heritage (NMR)

In addition to the above sites, two field systems were recorded at West Wittering which may be of Iron Age or Romano British date (MKM1435 and MKM1438).

6.2.2 NMP results Component 1: early medieval, medieval and post-medieval sites (AD410 to AD1900)

6.2.2.1 Early medieval sites (AD410 to AD1065)

No sites dating to the Saxon period were identified on the aerial photographs during the mapping project.

6.2.2.2 Medieval sites (AD1066 to AD1539)

Only eight sites were allocated a definite medieval date within the Component 1 project database, of which all had been previously recorded in the NMR and HERs. Many other sites were given a more general medieval or post-medieval origin and these are included in the Historic section below. The medieval sites included the ruins of Titchfield Abbey (MKM582) and Netley Abbey (MKM662) in Block A and earthworks associated with Tortington Priory (MKM2019, *Figure 5.2*) and Climping DMV in Block F (MKM1953, *Figure 6.16*).

Figure 6.16: Medieval earthworks at Climping.

A series of earthworks associated with the medieval settlement are visible to the south and east of St Mary's Church (MKM1953).

Photograph: NMR RAF/CPE/UK1751 3202 21st September 1946. English Heritage (NMR) RAF Photography.

Two medieval ring-works were included in the study area, the first at Church Norton in Block E (MKM1267). Here the remains of a circular earthwork are positioned to the south of Selsey old church. It was initially dated to the Elizabethan period during excavation in 1911 and was traditionally thought to have been constructed in 1587 as a defensive fortification against the Armada (Salzman, 1912). However, later field work undertaken in 1965 and 1980 and a re-evaluation of the finds from the 1911 excavations have indicated an 11th century origin supporting the suggestion that the site is an early Norman ring-work of 11th century origin (Aldsworth and Garnett, 1989).

The second medieval ring-work is situated 28m to the south east of the River Arun to the north of Batworthpark Plantation (MKM2029). The low sub circular earthwork is 58m across and most clearly visible on lidar imagery. It is considered to be one of Henry I's siege castles used in the siege of Arundle in 1102 (See *Figure 5.6* above).

A large rectilinear enclosure (MKM788) lies on Hamble Common to the west of the possible Iron Age promontory fort described above. It encloses an area of over 2 hectares and previous fieldwork confirmed that it was formed by a bank with outer ditch. A second outer bank is visible on the aerial photographs along the southern edge of this enclosure which is considered likely to be the remains of a medieval stock enclosure on the common.

The known site of a protected wreck lies on the east bank of the River Hamble near Bursledon (MKM711). The wreck was identifiable on Channel Coast Observatory photographs taken in 2008 (*Figure 6.17*). The faint outline of the prow is visible as a submerged feature on the image with scattered timbers presumably relating to the vessel lying to the north of the main wreck site.

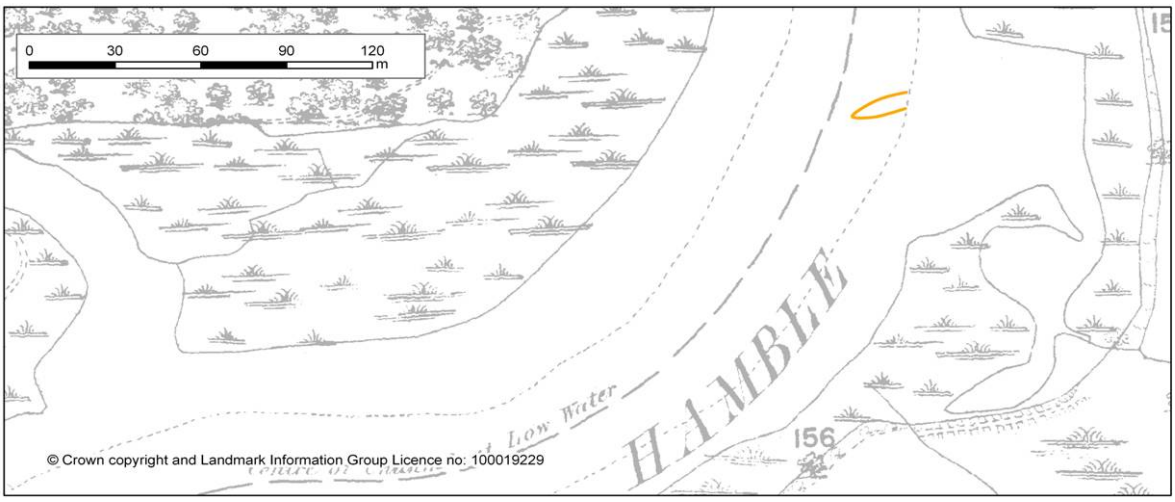

Figure 6.17: Site of the wreck of the Grace Dieu, submerged on the east bank of the River Hamble. Photograph: Image courtesy of Channel Coastal Observatory. SU5010nw_20080722ortho.jpg. 22nd July 2008. www.channelcoast.org.

There have been various theories as to the date and origin of the vessel but it is now generally accepted to be the remains of the English warship the Grace Dieu which was completed in 1418 for Henry V. After being moored at Hamble for several years, the vessel was finally towed up the River Hamble in 1434 and laid up in a mud dock. The vessel was struck by lightening and burnt on its moorings in 1439. A number of excavations have been undertaken on the wreck site over the years, most recently by the Time Team in 2004, (EH 2011).

6.2.2.3 Post-medieval sites (AD1540 to AD1900)

One hundred and sixty seven (12%) of the 1,349 sites mapped and recorded as part of Component 1 were of specific post-medieval origin. Many more sites were given a broader date range and these are described separately in the Historic section 6.2.2.4 below. For the purposes of this report, the post-medieval sites have been split into five broad functional categories although there may be some overlap between these groupings.

6.2.2.3.1 Agricultural and drainage sites

The majority of post-medieval sites encountered relate to agricultural and drainage features; including 21 field boundaries and 56 drainage features. The former marshy ground adjacent to the River Arun was drained and reclaimed in the later medieval and post-medieval periods and the extensive drainage systems along the valley between Littlehampton and Arundel have been mapped and recorded, two of which (MKM1983 and MKM1959) have been recorded as possible water meadows.

Figure 6.18: Post-medieval drainage features and water meadows at Climping. Extensive post-medieval drainage features and water meadows along the River Arun at Climping (MKM1959).

Photograph: NMR RAF/CPE/UK/1947 3060 22nd January 1946. English Heritage (NMR) RAF Photography.

At Brook Barn Farm, to the north west of Littlehampton an interrupted section of linear bank runs for approximately 0.5km (MKM2004). It has been cut by the West Coast Line (Brighton to Portsmouth Railway) which was constructed between 1844 and 1847 and has been interpreted as part of a post-medieval river levee or flood defence.

One new record was created for a series of parallel linear banks and ditches in Block A near Solent Court Farm (MKM481). They were interpreted as cultivation marks of post-medieval origin.

6.2.2.3.2 Coastal and intertidal sites

Thirty three sites recorded are of a general coastal or intertidal nature, of which 22 were new to the record. These records included six sites associated with the mooring, loading and landing of ships such as hards, landing stages and jetties (MKM506, MKM710, MKM745, MKM1708, MKM1714, and MKM1717).

Wrecks

Seven post-medieval wrecks were identified, five of which are along the River Hamble and had been previously recorded in the NMR and HERs (MKM681, MKM715, MKM720, MKM721 and MKM722). The remaining two lie within Chichester Harbour.

The Royal George was an English cargo vessel outward-bound from London for Guinea and said to have been bound for a slaving voyage (NMR: 902591). The vessel was stranded on Chichester Flats in 1757. The site of a dispersed wreck was recorded on NMR oblique photography (MKM1670). Lying on Pilsey Sand, 1.5km to the south west of Thorney Island, it is no doubt the final resting place of the Royal George.

One new site of a potential post-medieval wreck was recorded in the Bosham Channel on 2008 CCO images (MKM1810). It appears to have been stranded on the north of the nineteenth century sea wall or mole described below (MKM1809).

Figure 6.19: Possible post-medieval wreck site within Bosham Channel (MKM1810). Photograph: Image courtesy of Channel Coastal Observatory. SU8003nw_20080721ortho.jpg. 21st July 2008. www.channelcoast.org.

Fishing

The exploitation of marine resources, such as fish and shell fish has always been important in coastal areas from prehistoric times. This is especially true within Chichester Harbour with its large expanse of intertidal water. In this area, oyster fishing was an important industry in the medieval and post-medieval periods, the oysters being dredged up and then stored in holding ponds prior to lifting for sale.

Five sets of post-medieval oyster beds were recorded during Component 1 mapping, of which four were previously unrecorded. Two lie to the west of the project area within Block A. MKM627 was a small sub square pond-like structure lying in the intertidal mud and has now been destroyed by the container terminal at Millbrook. The second, MKM872, had previously been recorded by the Hampshire AHBR and is a rectangular enclosure positioned within the mouth of the River Hamble at Hamble Rice.

The remaining three sites are within Chichester Harbour, Block D. MKM1542 comprises two conjoined enclosures lying in the intertidal flats of the Chichester Channel to the north of West Itchenor. They are only visible on 1946 RAF imagery and appear to have been destroyed on later images.

The most extensive series of oyster beds lie to either side of Thorney Island. The first site is to the east of Thorney Island (MKM1629). Here a series of rectilinear enclosures are located within an intertidal pool to the south of Prinstead. In addition to the enclosures, an attempt to control the tidal flow of water within the pool itself An attempt to control the tidal flow of water with the pool itself is evidenced by the presence of a post medieval breakwater (MKM1628), marked as 'Hard' on the 1st Edition OS map..

The second site (MKM1365), is to the south of Emsworth and comprises up to 50 individual beds (*Figure 6.20*). Whilst many are marked on the OS 1st Edition map the site was previously unrecorded in the NMR and HERs. The Emsworth oyster beds were the focus of an important post-medieval industry and it is reputed that at the end of the nineteenth century 100,000 oysters were landed at Emsworth each week (Reger 1967 and 1996). The industry however fell into rapid decline after 1902 after a new sewer was built which discharged near the beds. Several guests at a banquet in Winchester fell ill with typhoid and the Dean of Winchester died. These tragedies resulted in a twelve year ban of oysters from the harbour from which the industry never fully recovered (ibid).

Figure 6.20: Post-medieval oyster beds to the south of Emsworth (MKM1365). Photograph: NMR RAF/58/75 5086 27th July 1948. English Heritage (NMR) RAF Photography.

Tidal control and sea defence

A number of features associated with the control of sea, tides and coastal erosion were recorded during the project such as groynes, breakwaters and sea walls. Many were allocated a general historic date range and are therefore described in section 6.2.2.4. Within Chichester Harbour five new breakwaters were identified and allocated a specific post-medieval date. In three cases the linear embankments appear to have been constructed to form or control the tidal flow of natural tidal pools. The site at Prinstead (MKM1628) has already been described above and may have been a contemporary construction with the oyster beds (MKM1629). Additional sites lie on the west side of Thorney Island (MKM1664) and to the east of the Chichester Channel at West Itchenor (MKM1534).

Figure 6.21: Post-medieval timbers associated with a breakwater at Bosham (MKM1809). Photograph: Image courtesy of Channel Coastal Observatory. SU8003nw_20080721ortho.jpg. 21st July 2008. www.channelcoast.org.

A large breakwater or mole was constructed across the Bosham Channel in the early nineteenth century between Bosham and Chidham. According to the Chichester Harbour HER (7904) the intention was to reclaim land in the northern portion of the channel. A massive bank is marked on the OS 1st Edition map; the remains of the bank and multiple lines of timber posts are clearly visible on CCO images (MKM1809, *Figures 6.19 and 6.21*).

A similar construction of timber posts and planks is visible on the CCO images running east west across the mouth of Chichester Harbour (MKM1598). Aerial photographs from 1946 show this site to be a long thin structure more than 1km in length. It has been recorded in the project database as post-medieval breakwater but may alternatively be the remains of the boom which was strung across the mouth of the harbour during the Second World War (Museum of London Archaeology Service 2004, 92).

6.2.2.3.3 Industrial and extractive sites

Sites associated with post-medieval industry and extraction include 27 extractive pits and quarries.

Three sites were identified associated with ship building including a probable sawpit at Warsash at the mouth of the River Hamble (MKM866). The sites of two timber ponds were also recorded at New Slipper Mill, Emsworth (MKM1414 and MKM1415) where large numbers of timbers are visible as submerged features lying within the mill pond associated with New Slipper Mill (see cover illustration). They are likely to be timbers associated with the timber yards and ship building yards marked on the OS 1st Edition Map which lie to the north west of the mill pond which appears to have been used as a timber pond. The site is now under a modern marina.

Five sites associated with the post-medieval salt industry were identified. These included salterns at Hamble-Le-Rice (MKM708), Newtown (MKM765), Hook Park and Newton (MKM875) as well as a linear boundary bank possibly associated with the coastal saltworks at Pagham harbour (MKM1218). The saltworks recorded during Component 1 are large salt evaporation ponds (rather than the salt mounds as recorded by Wessex Archaeology in Phase I of this project (WA 2011, para 4.17.12)) where the sea water is let

into large ponds and drawn out through natural evaporation. One of the largest was at Apuldram (MKM1875) where salt manufacture was carried out until 1840 (*Figure 6.22*). Chichester Marina was excavated from the marshy remains of the evaporation pond in the 1960s.

Figure 6.22: Site of the post-medieval saltworks at Apuldram, now Chichester Marina (MKM1875). Photograph: NMR RAF/CPE/UK/1843 3001 18th November 1946. English Heritage (NMR) RAF Photography.

At the head of Fishbourne Channel are two post-medieval tide mills. One is marked as Old Salt Mill (Corn) on the OS 1st Edition Map (MKM1930) and the other recorded as Barnet's Mill or Burnt Mill by the Chichester HER (4410) (MKM1932). The two breakwaters forming the millponds for these mills are still partially extant (MKM1931 and MKM1933) and the foundations of the mill buildings associated with Old Salt Mill are clearly visible on photographs taken in 1982 (*Figure 6.23*).

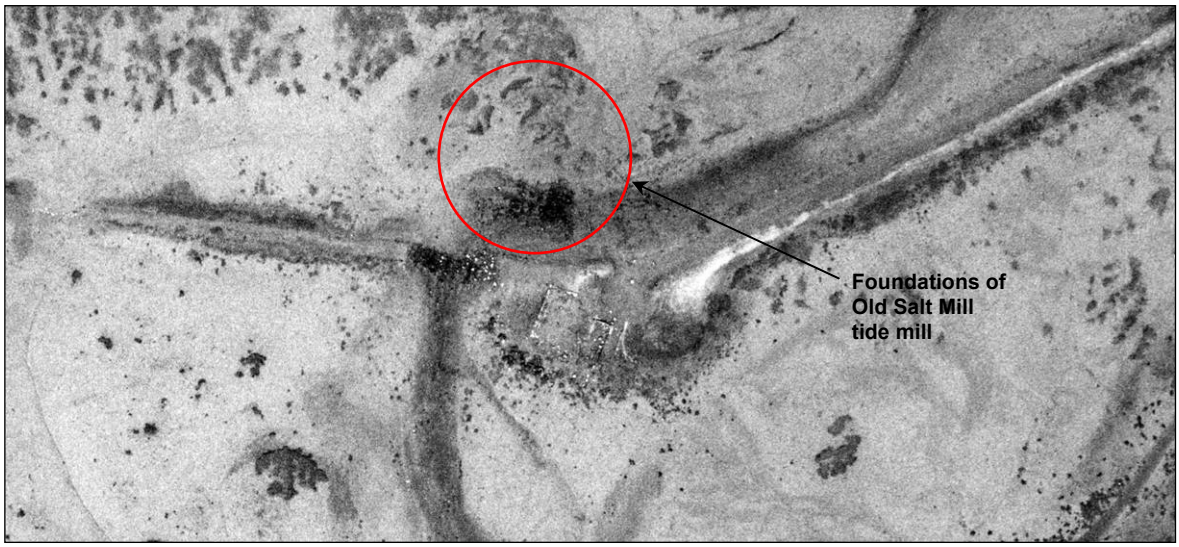

Figure 6.23: Site of a post-medieval tide mill at Fishbourne (MKM1331 and MKM1332) Photograph: NMR 2120/1155 SU8304 13, 15th June 1982. © English Heritage. NMR.

6.2.2.3.4 Transportation sites

Seven sites associated with transportation were mapped during the project and allocated a post-medieval date. These included two possible trackways and a sinuous length of deeply cut ditch at Millbrook considered to be the remains of the eighteenth century canal that ran from Alderbury Common to Southampton (MKM629).

Figure 6.24: Post-medieval road or causeway across the Thorney Channel (MKM1500 and MKM1501). Photograph: NMR MAL/78026 058 17th August 1978. © English Heritage.

Within Chichester Harbour five sections of roadways and submerged causeways were identified. They run from Cobnor Point along the northern edge of the Chichester Channel before crossing the Thorney Channel westward to Pilsey Island and north westward to Thorney Island at Longmere Point. The Chichester HER describes the site as harbour piles associated with the remains of an aborted attempt to construct a road and sea bank from Chidham to Pilsey (Chichester HER UID 177). Parallel lines of poles and piles associated with the road are clearly visible on aerial photographs taken between 1946 and 2008.

6.2.2.3.5 Military sites

Five eighteenth or nineteenth century military sites were identified of which four had been previously recorded in the NMR or HERs. These included the remains of a nineteenth century rifle range target butt partially submerged near Crableck Lane along the River Hamble (MKM803) and the site of a coastal battery at Selsey (MKM1306) which was probably constructed around 1794. A second coastal battery lies further down the coast at Littlehampton (MKM1825), its interior now occupied by a mini golf course.

Two further important sites are situated at Littlehampton including the remains of a rifle range (MKM1819) marked on the OS 1st Edition map and a Palmerston Fort (MKM1824). The Palmerston Fort is situated on the west bank of the River Arun at the entrance to Littlehampton Harbour and was constructed in 1854. The site is now partially buried by sand and was refortified during the Second World War with multiple lines of beach defence including admiralty scaffolding, anti-tank cubes and barbed wire being visible on aerial photographs taken in 1946 (*Figure 6.25*).

Figure 6.25: Nineteenth century Palmerston Fort at Littlehampton (MKM1824). Site later embellished with Second World War anti-tank cubes. Photograph: NMR RAF/106G/UK/598 5064 30th August 1945. English Heritage (NMR) RAF Photography.

6.2.2.4 Historic sites (AD1066 – AD1900)

Three hundred and eighty one (28%) of the 1,349 sites mapped and recorded as part of Component 1 were attributed broad date ranges of medieval/post-medieval or post-medieval/modern. In most cases this was because it was not possible to give a more specific date without field investigation due to the broad similarity of features across these date ranges. In the main these features related to inland agricultural or coastal subsistence activities as well as significant numbers of wrecks and unspecified intertidal structures. In some cases the broad date range was due to the site being in use across more than one period (for example, the isolation hospital at Millbrook Point (MKM828) which was initially constructed in the late nineteenth century but continued in use throughout the twentieth century).

These historic sites have been split into three main functional categories although there is some overlap between these groupings

6.2.2.4.1 Agricultural and drainage sites

Nearly a quarter of all sites allocated an historical date range related to inland agricultural subsistence activities. These included ditches, drains, drainage systems, field systems, field boundaries and banks.

At three sites, the field boundaries appear to be associated with parallel ridge and furrow type cultivation marks, perhaps indicating a medieval origin. These included features at Manor Farm, (MKM1924) and a field system at West Itchenor within what is now Itchenor Park (MKM1198). In addition ridge and furrow cultivation of medieval or later date was recorded at Bursledon (MKM702 and MKM878, *Figure 6.26*).

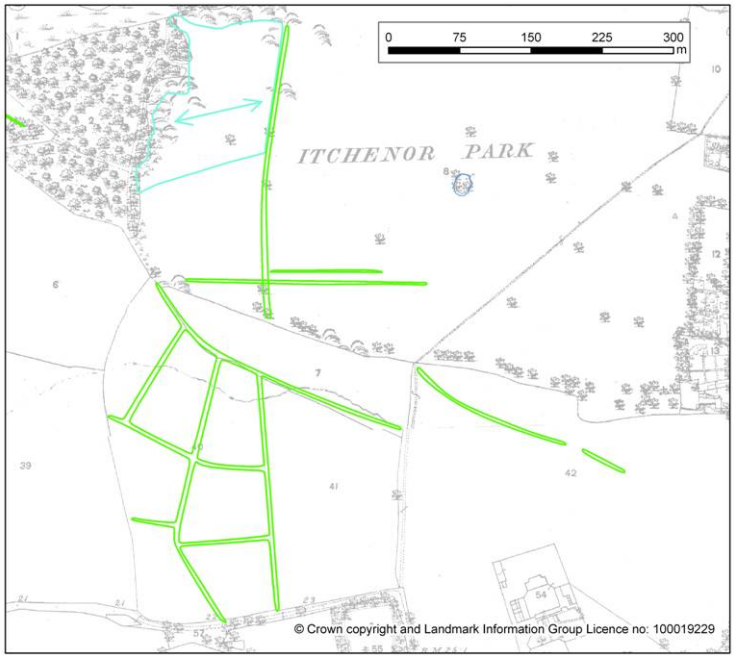

Figure 6.26: Medieval or later field system at West Itchenor.

Field boundaries and cultivation marks of potentially medieval origin lie to the south west of the modern village of West Itchenor. Some of the field boundaries are marked on the OS 1st Edition map and predate the construction of the landscape park which was laid out for the third Duke of Richmond in the late eighteenth century.

Field boundaries and cultivation marks were visible as low earthworks on aerial photographs taken in 1946 immediately to the south of the village of West Thorney on Thorney Island (MKM1658). Now completely engulfed in the Second World War airfield (MKM1643) the village dates back to the medieval period (the church being built in the 12th century). The earthworks identified may relate to late medieval shrinkage of the village however many have now been destroyed, the area being overlain by modern housing development.

6.2.2.4.2 Industrial and extractive sites

A small number of sites are of an industrial or extractive origin. These include four extractive pits or quarries and a brickworks at Swanwick which, although constructed in 1897, is still in production today (MKM712).

A number of potential charcoal burning sites had been previously identified near Hedge End (see NMR: 234737). Circular patches of dark soil had been noted in the 1960s during ploughing in an area believed to have once been “The Kings Forest” The features

were clearly visible on aerial photographs taken in 1946 and 1970 and in all 23 were plotted (MKM654, *Figure 6.27*). They may be the remains of medieval or later charcoal burning platforms or the result of assarting – the clearance and burning of woodland for arable farming.

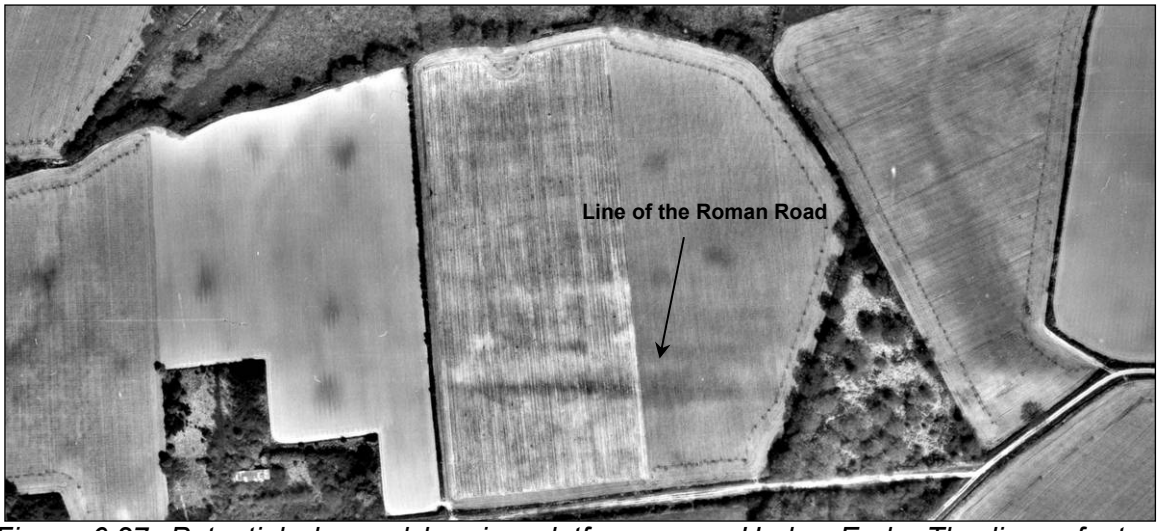

Figure 6.27: Potential charcoal burning platforms near Hedge End. The linear feature running from left to right across this image is the Roman Road from Bitterne to Chichester (RR421) (MKM653 and MKM654). Photograph: NMR OS/70091 089 8th May 1970. © Crown Copyright. Ordnance Survey.

6.2.2.4.3 Coastal and intertidal sites

Sixty nine percent of all historic sites are of a coastal or intertidal nature. These included 140 submerged structures and 96 wrecks. Some of the submerged features were given specific interpretations such as groyne or jetty but many other were of uncertain function and given a more broad description such as structure and post or stake alignment.

Two possible breakwaters were identified at Pagham Harbour (MKM1265) and on the south side of Thorney Island (MKM1665). Other intertidal features included potential mooring features such as stone blocks, mooring bollards and lines. Sites associated with the landing and loading of vessels included three hards (MKM755, MKM850 and MKM1439), a landing stage (MKM2034) and nine possible slipways (MKM701, MKM785, MKM786, MKM853, MKM873, MKM1293, MKM1539, MKM1540 and MKM1726).

The original lifeboat house and associated slipways at Selsey were mapped from aerial photographs taken in the 1940s (MKM1246). Whilst the lifeboat house is marked on historic OS mapping for the area, the aerial photographs show that slipway had been extended since it was last mapped by the OS, most likely a response to the rapid coastal erosion suffered by this coastline. The whole structure has now been removed and rebuilt as Selsey RNLI Lifeboat Station (NGR SZ 86284 92668).

Figure 6.28: Post-medieval or early twentieth century jetty or groyne on the intertidal flats to the north of Westlands, Birdham. It is 93m long and appears to comprise a line of rubble foundation running from the end of a modern jetty directly down to the low tide mark. It is possibly the line of a eighteenth or nineteenth century jetty or groyne. (MKM1959)

Photograph: Image courtesy of Channel Coastal Observatory. SU8100ne_20080721ortho.jpg. 21st July 2008. www.channelcoast.org.

Several structures were flagged as being the remains of possible fish traps, particularly within Chichester Harbour and around Thorney Island. These were generally linear arrangements of stakes running into the intertidal region perpendicular to the coastline. One 'V'-shaped structure was identified within the Thorney Channel (MKM1524). Its orientation, pointing downstream, would have made it an ideal location for catching fish on the retreating tide.

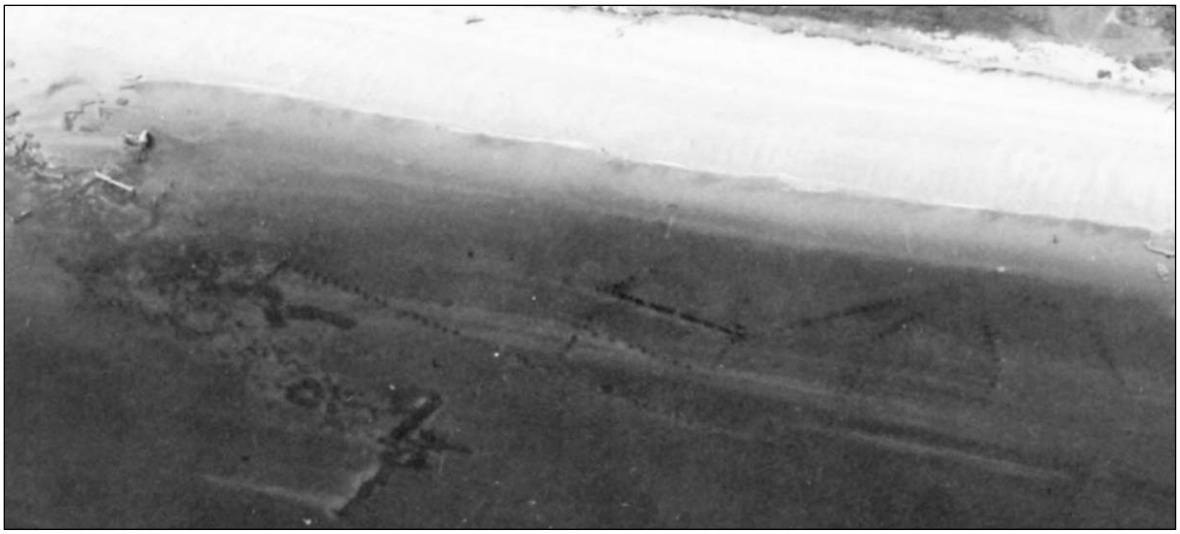

Figure 6.29: Possible groynes submerged off the coast at Selsey Bill. The parallel lines of submerged posts are clearly visible on RAF oblique imagery taken in 1947 (MKM1236). Photograph: NMR SZ 8692/7 RAF/30091 PO-0005 14th August 1947. English Heritage (NMR) RAF Photography.

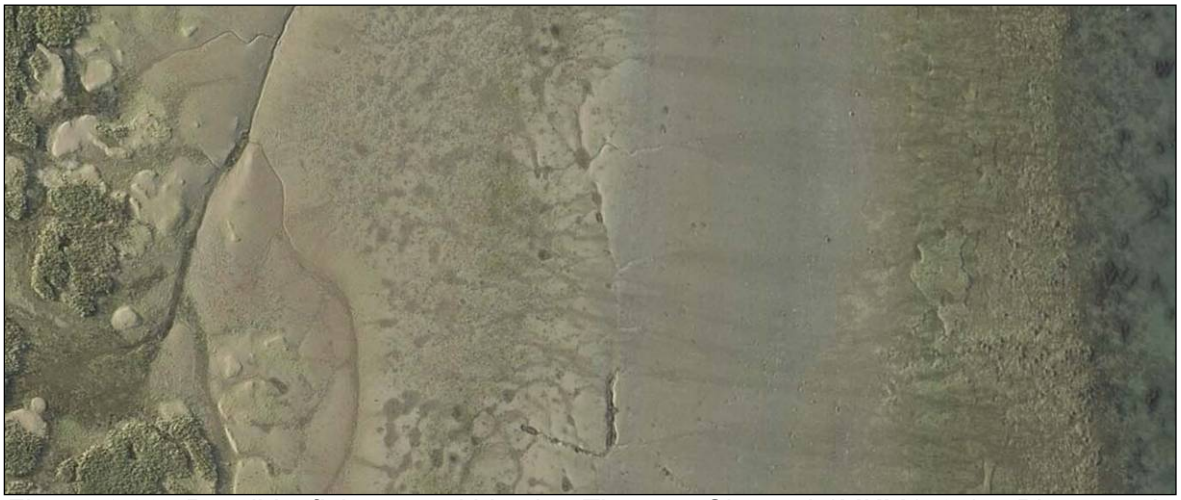

Figure 6.30: Possible fish trap within the Thorney Channel (*MKM1524).* Photograph: Image courtesy of Channel Coastal Observatory. SU7701nw_20080721ortho.jpg. 21st July 2008. www.channelcoast.org.

In addition to the possible fish traps, two lobster ponds were identified to either side of the mouth of the River Hamble at Hamble Point (MKM752) and Warsash (MKM753).

6.2.2.4.4 Miscellaneous sites

Two small rectilinear banked enclosures were identified on the south bank of the Chichester Channel within 2.6km of each other. The first is 7m by 5m in size and lies to the north of Itchenor Park overlooking Chichester Harbour (MKM1537). The second site is located at Birdham Pool just above the high tide line and is almost identical to the first (MKM1880). The enclosures are of uncertain date but an eighteenth, nineteenth of early twentieth century origin seems most likely. They are possibly the sites of lookout posts, (*Figure 6.31*).

Figure 6.31: The possible sites of two eighteenth, nineteenth or early twentieth century lookout posts at West Itchenor and Birdham. West Itchenor (MKM1537, left) and Birdham (MKM1880, right). Photographs: NMR RAF/3G/TUD/UK156 PTII 5122 20th April 1946. English Heritage (NMR) RAF Photograpy (left). NMR RAF/CPE/UK1843 3003 18th November 1946. English Heritage (NMR) RAF Photography (right).

6.2.3 NMP results Component 1: Twentieth century sites

742 (55%) of all sites plotted and recorded during Component 1 were modern (twentieth century) sites and of these 85% are related specifically to the Second World War and modern military activity. No sites were identified dating to the First World War.

6.2.3.1 Beach defences

The majority of sites encountered relate to anti-invasion defences associated with the fortification of Britain in 1940 and 1941 after the evacuation of British troops from Dunkirk in June 1940. Whilst most personnel were brought back, much of the army's heavy equipment including vehicles, tanks and artillery were left behind in France and Belgium. At this time there was an urgent need to restructure and reinforce army supplies and at the same time build defences in response to the threat of invasion from occupied France (Dobinson 1996b).

On 27 May 1940 a Home Defence Executive was formed to organize the defence of Britain under Field Marshall Ironside, Commander-in-Chief of the Home Forces. His plan was to create defences which could hold firm in the event of invasion and included those focused on the coastline or 'coastal crust' and a series of inland anti-tank 'stop' lines (Osbourne 2004). The beaches of the south and east coasts became crucial in delaying any potential attack or invasion until this could be achieved (ibid).

Much of the coastline of southern England was fortified at this time with the construction of multiple lines of beach defences. The low-lying areas between West Wittering and Ferring were deemed particularly vulnerable to invasion. In part due to its relatively low population (in comparison to Southampton and Portsmouth close by) but also its long sandy beaches which were potentially good places for the safe landing of enemy troops

and equipment. This coastline was therefore heavily defended with obstacles placed on the beaches to impede the progress of enemy soldiers, vehicles or watercraft landing from the sea. Obstacles included lines of scaffolding, barbed wire entanglements and concrete anti-tank blocks or cylinders; often they were deployed in combination with each other.

As the distribution map in *Figure 6.32* shows, the majority of these beach defences were located on the coastal strip between West Wittering and Ferring with all bar one of the beach defences encountered within Component 1, lying along the sandy coastal strip of Blocks D, E and F. The one exception was recorded at Weston Point, Southampton (MKM637) where three parallel lines of posts, flanking Weston Point jetty were noted. They are considered likely to be Second World War beach defences and are probably a continuation of the stakes described in the Southampton HER as the reputed "remains of a cart track used by seaweed gatherers in the early 20th century" (MSH1005).

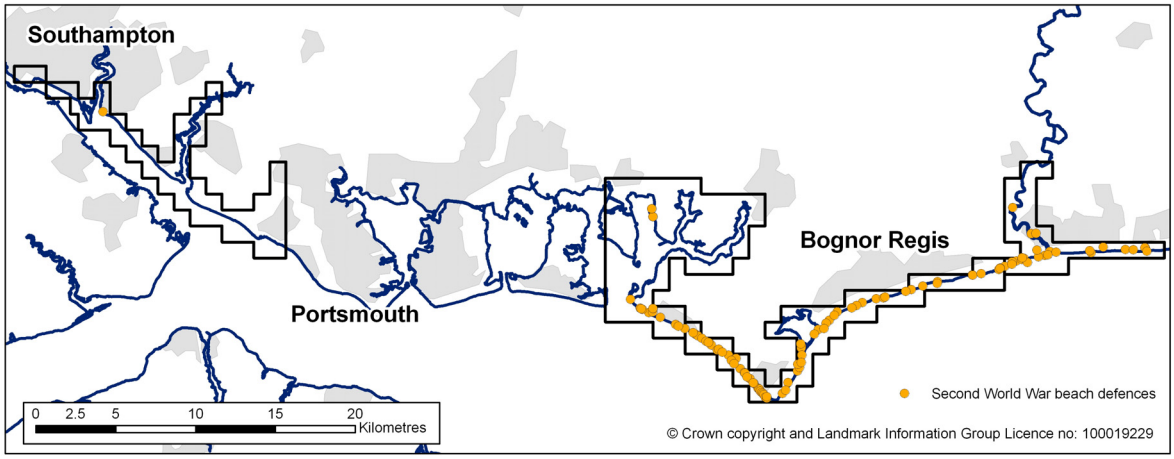

Figure 6.32: Distribution of Second World War beach defences within Component 1.

6.2.3.1.1 Anti-tank obstacles

The use of concrete obstacles as an impediment to tanks was appreciated before the Second World War however between 1940 and 1941 staggering quantities were made and positioned in a variety of forms and they are probably the most plentiful type of defensive structure still surviving today (Dobinson 1996b, Lowry 1995).

Fifty six lines of anti-tank obstacle were plotted during the Component 1 mapping. In the main these were anti-tank blocks and walls however one anti-tank ditch was recorded at Selsey (MKM1244) and lines of posts at Bracklesham (MKM941), Elmer (MKM1323) and East Beach (MKM1403). The concrete blocks were between 1.5-2m across and on average spaced with gaps between of 1-2m. In some places more than one line of cubes was identified. The lines of concrete blocks or cubes run for miles along the coast, from West Wittering to Ferring in Block D, E and F (*Figures 5.4, 6.25 and 6.40*). In most cases the blocks were removed soon after the end of the war but in a few places, particularly around Selsey, the original lines of blocks were moved and reused as sea defences, their new positions being identified on recent CCO and GE imagery (*Figure 6.33*).

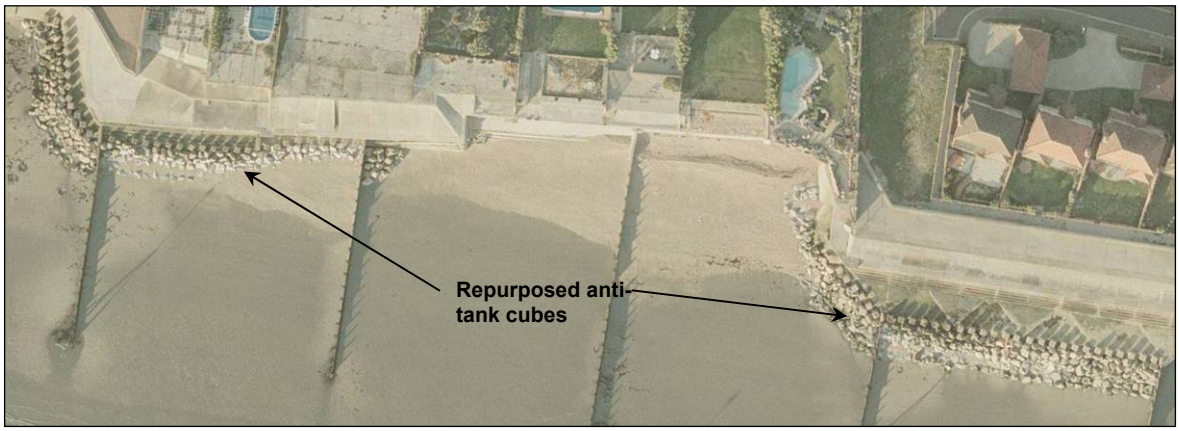

Figure 6.33: Second World War anti-tank blocks reused in the sea defences at Selsey (MKM1205 and MKM1206). Photograph: Channel Coast Observatory SU8492NE.jpg, 18th September 2005. © CCO.

In addition to the anti-tank blocks, sections of anti-tank walling were identified, particularly around Chichester Harbour but also at Atherington (MKM1740) and Church Norton (MKM1269). Much of Thorney Island was protected with an anti tank wall in the most part an earlier repurposed and strengthened sea wall (MKM1640, MKM1641, MKM1668 and MKM1668). Seawalls providing anti-invasion protection to the harbour were also identified at Chidham (MKM1610-12 and MKM1620), Prinstead (MKM1631), Nutbourne Mill (1623) and Fishbourne (MKM1936).

6.2.3.1.2 Beach scaffolding

Also known as Admiralty Scaffolding or Obstacle Z.1, beach scaffolding was widely deployed on beaches in southern England. It comprised parallel lines of upright tubular steel connected by horizontal tubes and braced by diagonal tubes to the rear (*Figure 6.34*). Initially designed as an obstacle to boats, the sections were preassembled and positioned at the half tide mark. By early 1941 however, tubular steel scaffolding was adopted as an anti-landing or anti-tank barrier and constructed above the high tide mark on particularly vulnerable beaches (Dobinson 1996b). In many places multiple lines of scaffolding were identified during the project at both at the half tide mark and above the high tide mark.

In many places multiple lines of scaffolding were identified during the project at both at the half tide mark and above the high tide mark.

The Second World War air to ground gunnery range at Medmerry lies just inland on the flat low-lying land around the Broad Rife between Bracklesham and Selsey. Here two lines of scaffolding were identified, the first lying close to the high water mark and the second up to 100m inland (MKM971, MKM981, MKM1140). Additional defences along this stretch of beach included possible barbed wire and a small minefield (MKM1423 and MKM1000, *Figure 6.37*).

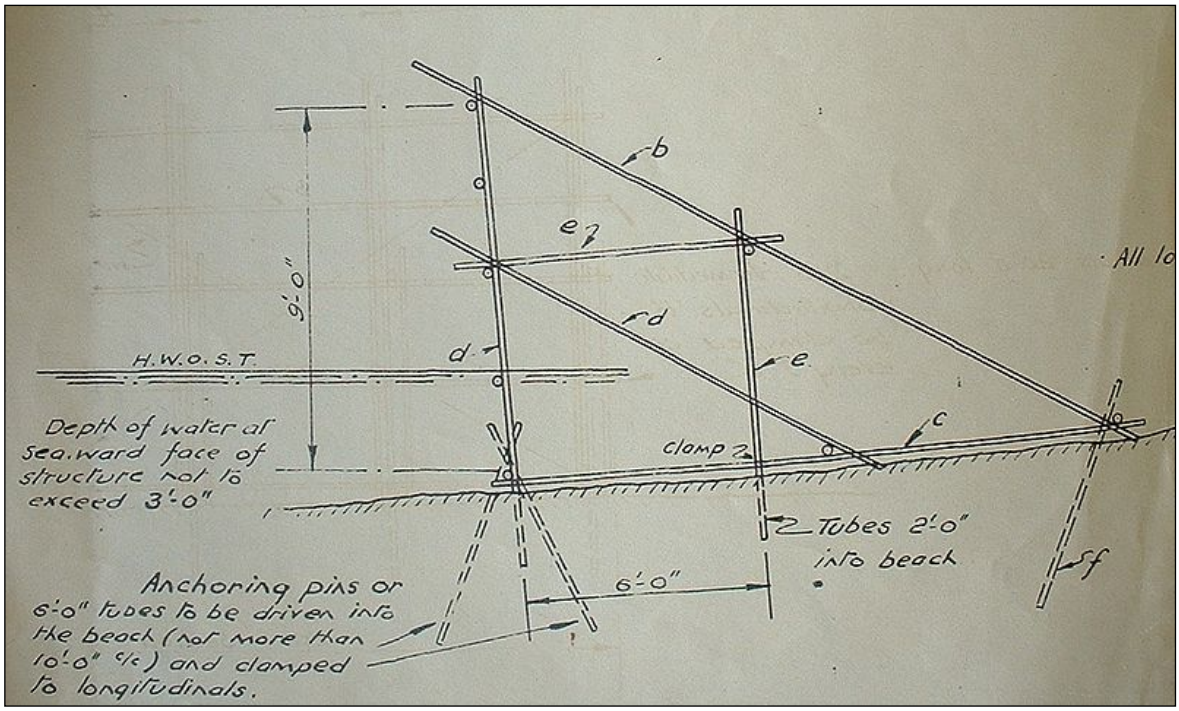

Figure 6.34: Drawing of beach scaffolding defence, type Z.1, also known as Admiralty Scaffolding. (HM Government 1940 UK National Archives: WO 199/1618)

To the east of Pagham harbour, the beaches were protected by multiple lines of defence. As well as multiple lines of scaffolding and anti-tank blocks running along the beach; additional scaffolding and barbed wire defences were constructed running at right angles, inland. This was presumably to act as a stop line to potential invasion from the landward side to the west, i.e. from within Pagham Harbour itself.

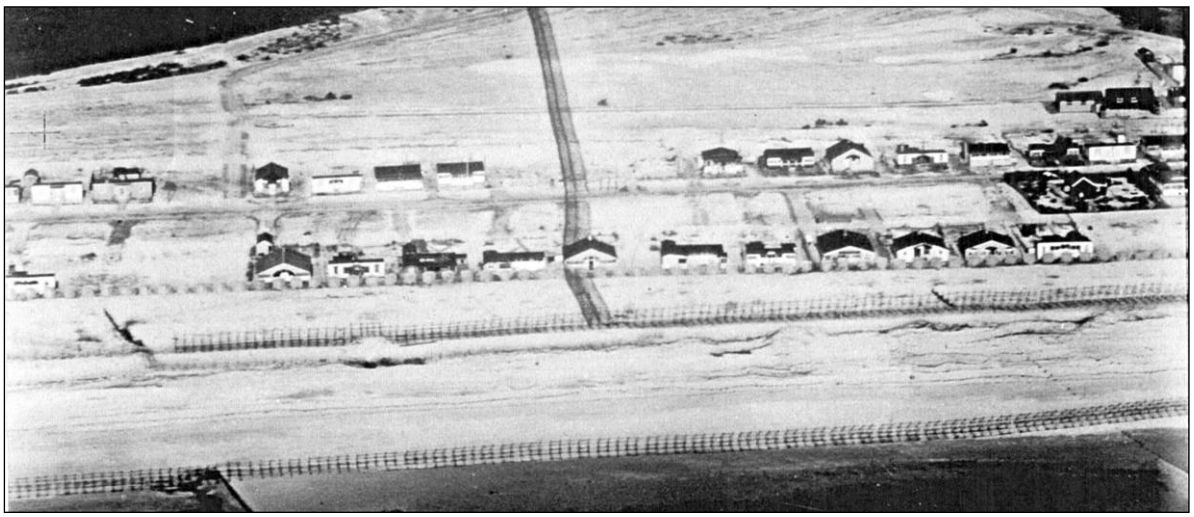

Figure 6.35: Pagham, multiple lines of admiralty scaffolding and anti-tank cubes. Photograph: NMR SZ 9298/1 MSO 31188 PO-3032 23rd March 1942. English Heritage (NMR) RAF Photography.

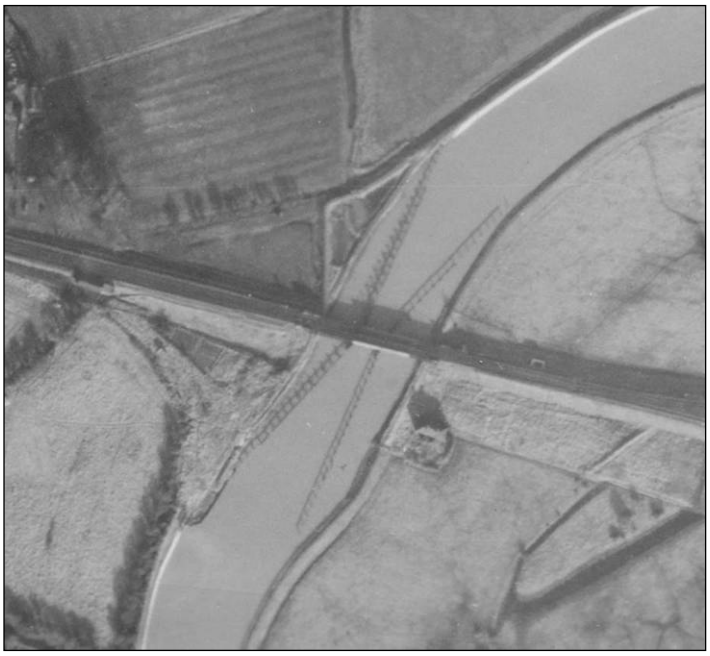

Figure 6.36: Scaffolding protecting the railway crossing of the River Arun at Ford Junction.

As well as protecting the beaches, scaffolding was also identified at Ford Junction where it appears to be protecting the railway bridge and river crossing along the River Arun. (MKM1990)

Photograph: NMR RAF/CPE/UK1947 2061 22nd January 1947. English Heritage (NMR) RAF Photography.

6.2.3.1.3 Minefields.

In addition to the scaffolding and anti-tank obstructions, some coastal defences were supplemented with the setting of anti tank and anti personnel land-mines. The sites of three minefields were identified at West Wittering (MKM1585) Atherington (MKM1818) and Medmerry (MKM1000).

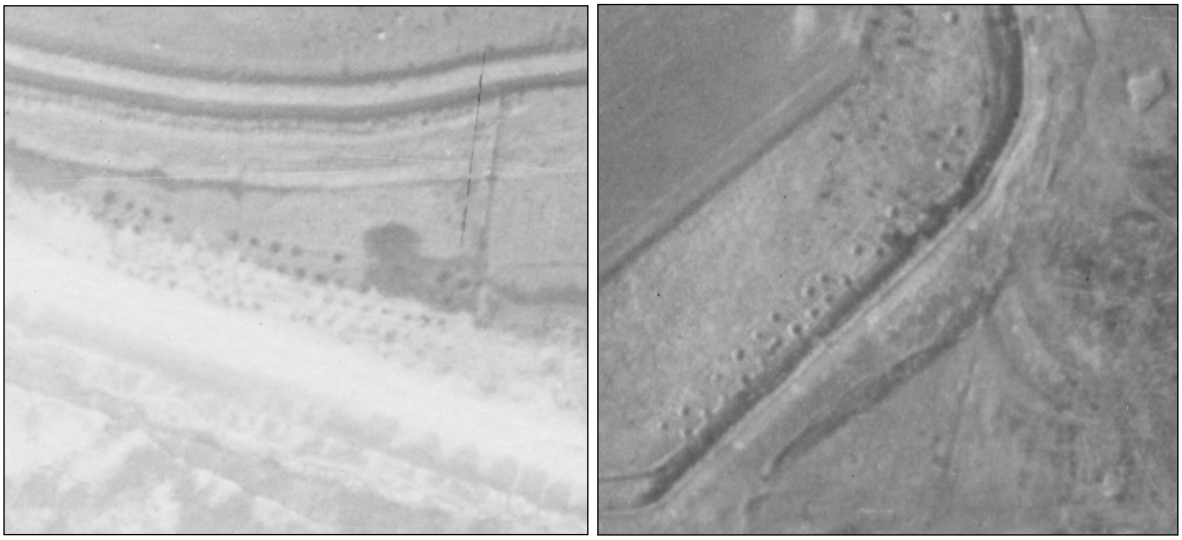

Figure 6.37: Two Second World War minefields at Medmerry and Atherington. Medmerry (MKM1000, left) Atherington (MKM1818, right). Photographs: NMR RAF/541/466 3076 1st March 1950 English Heritage (NMR) RAF Photograph (left). NMR RAF/3G/TUD/UK/162 5030 20th April 1946 English Heritage (NMR) RAF Photography (right).

The Chichester District HER lists the site of a minefield at Medmerry, Selsey (8328) which was recorded on Clearance Certificates and maps issued by military authorities at the end of the war. The mines were laid along the top of the beach clear of the maximum high tide line and would have been surrounded by barbed wire barriers with warning signs. Four parallel lines of circular hollows were visible as earthworks on aerial photographs taken five years after the end of the war in 1950 (*Figure 6.37*). They are considered to be the remains of Serial No. 1a minefield which ran from east of Bracklesham to the west end of what is now West Sands Caravan Park.

6.2.3.1.4 Barbed wire obstructions

Two main forms of barbed wire obstruction were deployed during the war. Barbed wire fences comprised several lengths of barbed wire affixed to posts and were most commonly used at the coast as part of a linear beach defence. Barbed wire entanglements comprised three coils of barbed wire stacked upon each other and fixed by metal picket fencing; this construction was more generally used around defended positions such as pillboxes (Foot 2006).

Barbed wire obstructions were not easily identifiable on the aerial photographs, being visible only as darker lines cutting across the landscape, caused by the longer growth of vegetation and weeds within the entanglements themselves (the barbed wire prohibiting access to grazing animals or other means of maintenance). At ten sites these darker lines were identified as barbed wire. At sites such as Atherington (MKM1740) and Rustington (MKM1742, MKM1744 and MKM1745) fencing provided additional lines of beach defence along with scaffolding and anti-tank cubes. At Thorney Island however, the sites of several previously recorded gun emplacements appear to have been protected by barbed wire entanglements which are visible on photographs taken in 1941 (see *Figure 5.3* above).

6.2.3.1.5 Flame fougasse.

The flame fougasse was developed as an anti-tank weapon during the 1940 invasion crisis and used an explosive charge to project burning liquid on the target. Over 7000 batteries are documented in Britain (Banks 1946) and the site of a flame fougasse had been noted in the NMR and West Sussex HER at Church Norton immediately to the south of Medieval ring-work described in section 6.2.2.2 above. A group of six small rectangular buildings, likely to be associated with the site were identified on aerial photographs taken in 1945 (MKM1268).

6.2.3.2 Other anti-invasion defences

6.2.3.2.1 Pillboxes

In addition to the physical barriers set up on the beaches, numerous pillboxes were constructed all along the south coast. These small fortified structures were constructed at defensive locations right across Britain and by 8th October 1940 14,163 shuttered concrete examples had been built (Dobinson 1996b, 157) . Whilst most pillboxes were built in a range of standard types, the term is used to cover a diverse range of features in both size and construction as well as tactical function. In general pill boxes were provided for infantry and artillery defence of strategic positions and were defended with rifle and light

machine guns; however there were also pillbox like structures for various other purposes including coastal batteries, light anti-aircraft batteries and searchlights.

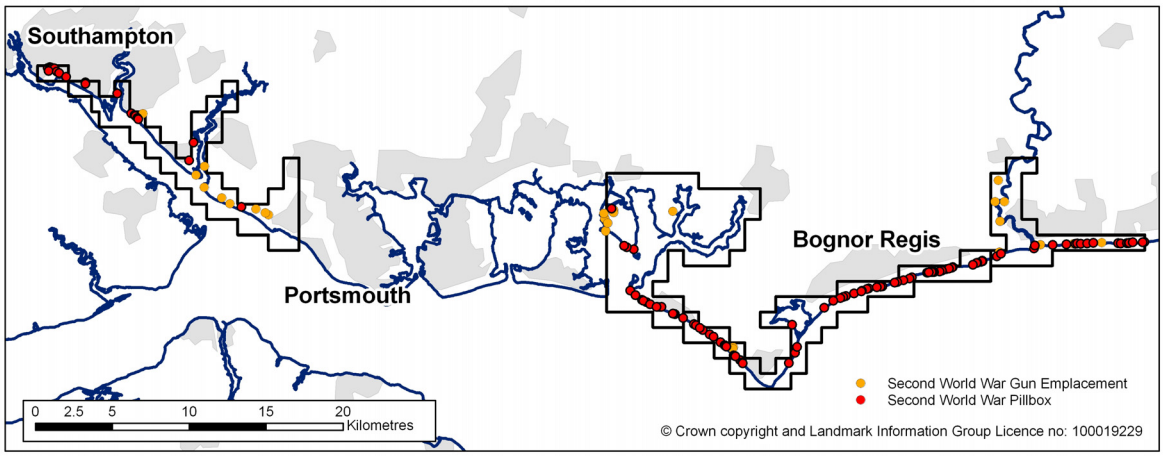

Figure 6.38: Distribution of Second World War gun emplacements, anti-aircraft batteries and pillboxes.

One hundred and twenty one pillboxes were identified on the aerial photographs, of which only 13 have been previously recorded in the HERs or NMR. Figure 6.36 shows the location of these pillboxes and additional gun emplacements and batteries.

Unlike the beach defences described in section 6.2.3.1 above, pillboxes were not restricted to the coastal strip to the east of West Wittering. A small number were identified in the vicinity of Thorney Island specifically protecting the important Second World War airfield. In addition, a significant number were positioned at strategic locations along Southampton Water, these included a concentration of ten identified around Millbrook and Tanner's Bridge protecting the Western Docks, the railway line and the main A33 road artery (Figure 6.39).

Those that formed integral parts of the beach defences of Blocks D, E and F were located either on the beach itself or in slightly elevated positions on the ground behind. The pillboxes included hexagonal (Type 22 and Type 24) and square (Type 26) structures and are in various states of repair. Many are now completely destroyed but are visible on historic RAF photographs taken during or soon after the war (*Figure 6.40*).

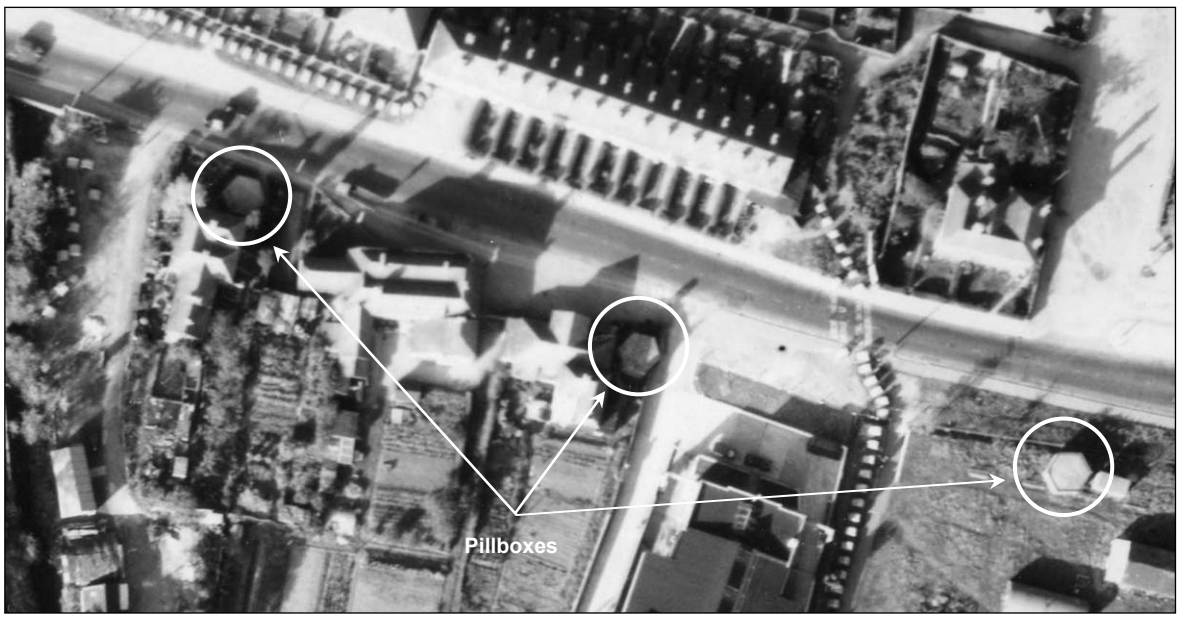

Figure 6.39: A line of three pillboxes along the A33 at Tanners Bridge (MKM531, MKM532, MKM533). Photograph: RAF 106G/UK/917 5454, 11th October 1945. English Heritage (NMR) RAF Photography.

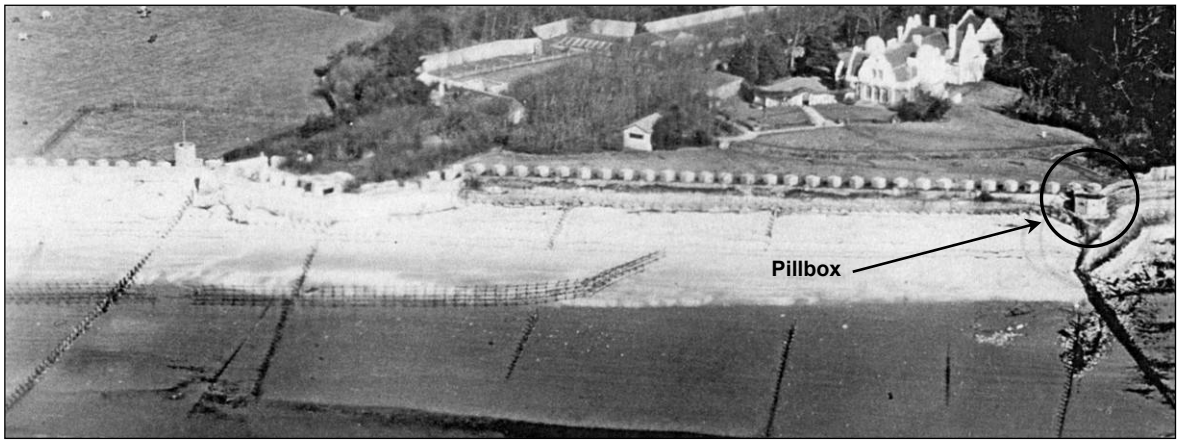

Figure 6.40: An hexagonal Type 22 pillbox supplements the multiple lines of beach defence at Aldwick. Photograph: NMR SZ 9198/7 MSO 31188 PO-3044 23rd March 1942. English Heritage (NMR) RAF Photography.

6.2.3.2.2 Coastal and anti-aircraft batteries

In addition to the defended pillboxes described above, 26 gun emplacements including coastal batteries and anti-aircraft batteries were identified.

During the war the entrance to Southampton Water was heavily defended with coastal batteries at Calshot Castle and Stone Point on the New Forest coast being augmented by a battery at Brownwich Farm near Meon. The site, disguised as a two storey house, was known as Bungalow Battery. It opened in 1941 and operated as an anti-torpedo boat battery. The gun emplacements and auxiliary buildings associated with the site were identified during the project (MKM483). It lies within 400m of a heavy anti-aircraft battery at Brownwich Farm (MKM493) (*Figure 6.41*) with a second heavy anti-aircraft battery lying 2km to the east at Meon (MKM497).

Figure 6.41: Sites of two Second World War gun batteries near Meon. The site of a heavy anti-aircraft battery lies to the left (MKM493) adjacent to a concealed coastal battery (MKM483). Photograph: NMR RAF/106G/UK/917 5454 11th October 1945. English Heritage (NMR) RAF Photography.

Four other heavy anti-aircraft batteries were identified during the project, two of which were previously recorded; at Chidmere Farm (MKM1578) and Warsash Nature Reserve (MKM482). In addition the potential site of a previously unrecorded heavy anti-aircraft battery was identified at Weston (MKM634). At West Wittering a series of five gun emplacements, two ancillary buildings and at least four small dugouts, as well as a tower (considered possibly a radar station) were identified on aerial photographs taken in 1945. The site was recorded as a coastal battery although the arrangement of the gun emplacements is suggestive of it being a heavy anti-aircraft battery. It is probably part of the Chichester VA (Vulnerable Area) defences and is possibly the site of CH9 which is listed by Dobinson (1996a, 340) as lying half a kilometre to the north west.

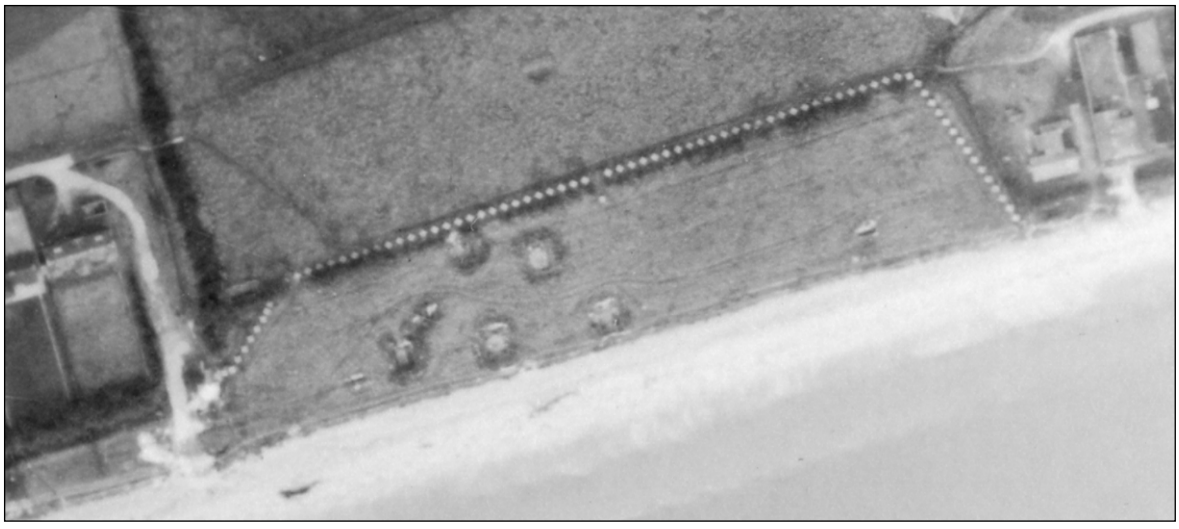

Figure 6.42: Possible Second World War heavy anti-aircraft battery at West Wittering (MKM483). Photograph: RAF 106G/UK/1015 4063, 16th November 1945. English Heritage (NMR) RAF Photography.

6.2.3.2.3 Airfields

The sites of four Second World War airfields were included in the Component 1 project area, these are Hamble Airfield (MKM718), Thorney Island (MKM1643), Ford (MKM1671) and Appledram (MKM1868-9).

Appledram Airfield was a short lived military airfield which opened in 1943 and closed in 1944. It was an Advanced Landing Ground for the Royal Air Force 11th Fighter Group comprising an area of 1600 by 1400 yards equipped with a steel matting landing surface of a type known as Sommerfeld Track, which also served as hard standing (Willis and Holliss 1987 and Francis 1996). Advanced landing grounds were temporary airfields constructed to provide forward operating bases to support the preparation of the Allied advance in Europe (Lowry 1995).

They could be quickly constructed using prefabricated runway material and those constructed on the continent could be abandoned or repurposed once the front-line moved. Willis and Holliss list one "E.O. blister" type hangar although the probable sites of three are visible as cropmarks on aerial photographs taken in April 1946 (*Figure 6.43*). As the photograph shows, the airfield appears to have made little impact on the landscape, only short sections of field boundaries being removed. The airfield reverted back to agriculture immediately after the war and the current layout of fields as marked on modern OS maps is largely the same as that on the late nineteenth century OS 1st Edition. Appledram was one of a number of Advanced Landing Grounds constructed in this part of southern England, two others were identified within the New Forest near Lymington (Trevarthen 2010).

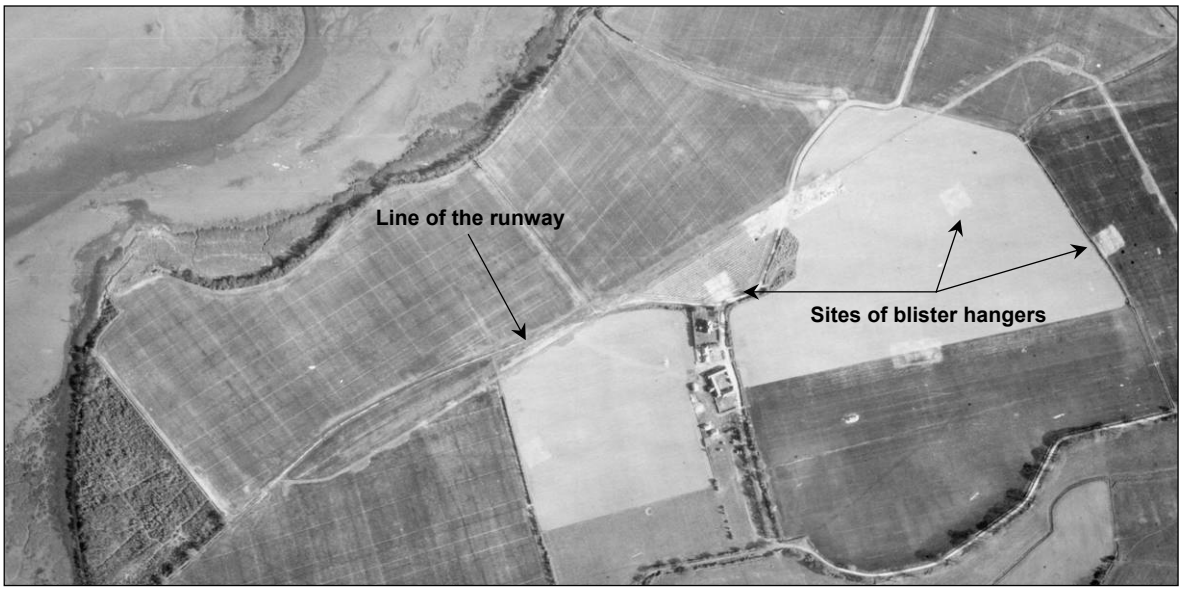

Figure 6.43: Site of Appledram Advanced Landing Ground (MKM1868-9). Photograph: RAF 3G/TUD/UK162 Part II 5128, 20th April 1946. English Heritage (NMR) RAF Photography.

The Second World War airfield on Thorney Island (MKM1643) was constructed in 1938 and consisted of three concrete runways equipped with aircraft hangars of Type C and Blister designs and by 1944 had sufficient permanent accommodation for 3636 male and 508 female personnel (Willis and Holliss, 1987). The airfield had a key role in the Battle of Britain when it was used by fighter aircraft of 236 Squadron of 11 Group, Royal Air Force

which was the most heavily engaged Group in the battle. Its later wartime role was as an operational airfield for Royal Air Force Coastal Command. Flying ceased at the airfield in 1975 when the site became a naval base. It is now a barracks for the Royal Artillery (Baker Barracks) and lies within Chichester Harbour AONB.

Prior to the runways being metalled in 1942, an attempt was made to disguise the airfield, the field boundaries which had been ripped out to make way for the runways being painted back on the ground surface (*Figure 6.44*). During the Second World War, the airfield was protected by a ring of defence including an anti-tank wall surrounding the island, pill boxes and gun emplacements. There was also dummy airfield (bombing decoy) at West Wittering to draw enemy fire away from Thorney Island Airfield (*Figure 6.46*).

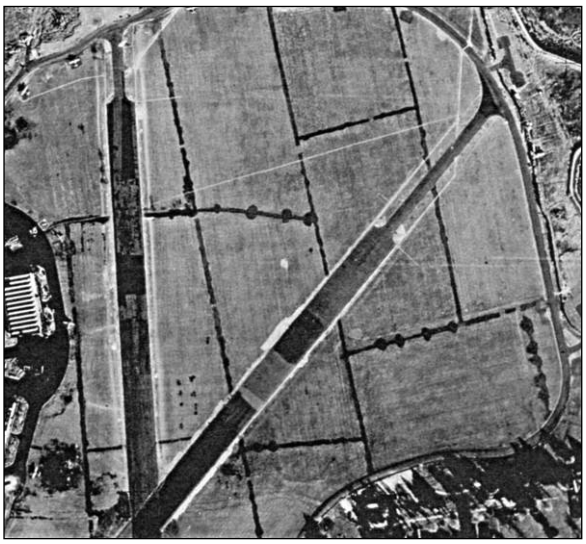

Figure 6.44: Thorney Island, camouflaged Second World War Airfield (MKM1643 and MKM1656). In an effort to conceal the airfield, the runways, roadways and open ground between were camouflaged during the war with the field boundaries of the earlier removed field system being painted back on over the tarmac and grass. These painted hedges are visible on this aerial photograph taken in 1941.

Photograph: NMR RAF/S653 14 7th November 1941. English Heritage (NMR) RAF Photography.

6.2.3.2.4 Bombing decoys

During the Second World War a nationally coordinated system of decoy targets was put in place with the construction of a number of bombing decoy sites. These formed part of Britain's war of deception against German attacks and were designed to protect specific targets (towns and airfields) by drawing away enemy fire. The decoy sites included day and night dummy airfields (K and Q sites), diversionary fires (QF and SF (Starfish) sites), simulated urban lighting (QL sites) and dummy factories (Dobson 1996c).

Starfish decoy sites were designed to give the appearance of cities 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). The cities of Southampton and Portsmouth both had permanent Starfish decoys during the war and Chichester a temporary (TSF) decoy.

Six bombing decoys were identified during the Component 1 mapping of which one at Pagham harbour (MKM1227) comprised three rectilinear enclosures, considered to be the remains of a temporary Starfish bombing decoy, possibly that of TSF76(a) (Chichester); the last starfish site to be lit during World War Two (Dobinson 2000, 196). Additional decoys were identified at West Itchenor (MKM1533), Cobnor Point (MKM1574) and West

Wittering (MKM1571) which are listed as the sites of Naval Coast decoys (QL) under the Portsmouth Command, (Dobinson 1996c).

In addition, an unusual site was identified as earthworks on aerial photographs taken in 1946 and 1948 to the north end of Thorney Island (MKM1639, *Figure 6.45*). The site appears to be that of a diversionary fire installation (QF or SF) comprising a linear feature (possible a flare path) running west east across the site to two square enclosures containing installations (possibly fuel and water tanks). A building at the west end of the site may be a shelter. The site's close proximity to Thorny Airfield make it a doubtful location for a working night bombing decoy and it is possibly a test or training site. A number of other night decoy sites are known in this area, particularly around Hayling Island drawing fire from Portsmouth and Chichester.

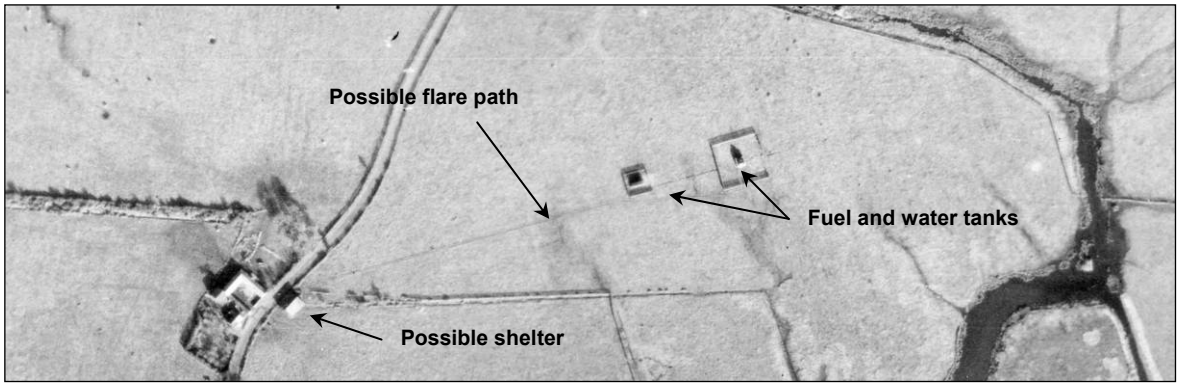

Figure 6.45: Possible site of a night bombing decoy installation on Thorney Island (MKM1639). Photograph: RAF CPE/UK1843 4016 18th November 1946. English Heritage (NMR) RAF Photography.

A Second World War 'K site' or dummy airfield was constructed at West Wittering to draw fire away from Thorney Island Airfield (MKM1525). The decoy included at least seven dummy aircraft (likely to be fake Blenheims, built by Sound City studios at Shepperton), runways and taxiways, gun emplacements and four water tanks or reservoirs. A line of buildings visible between the beach and the southern edge of the airfield are likely to be nissen huts erected during the airfield's construction period. The aerial photographs indicate that the dummy aircraft were moved around the airfield at regular intervals and two of their positions were plotted as part of the mapping project (*Figure 6.46*). As an act of double deception, false field boundaries were painted across the false runways on the eastern side of the airfield, in an apparent attempt to mimic the camouflaging of the runways at Thorney Island (section 6.2.3.2.3 above).

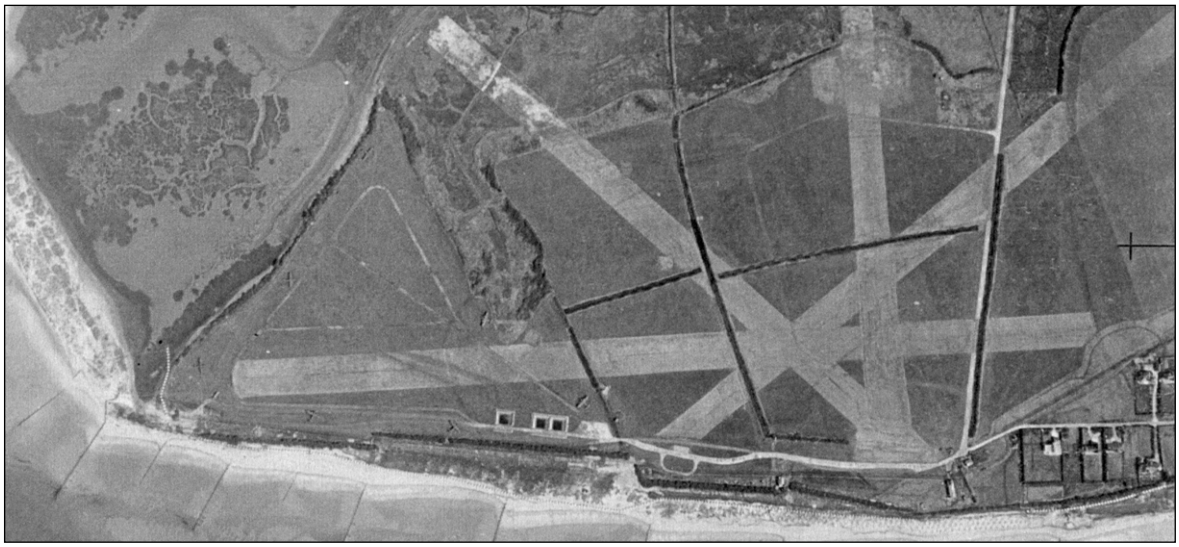

Figure 6.46: Decoy airfield at West Wittering (MKM1525). Photograph: NMR RAF/S444 2 27th August 1941. English Heritage (NMR) RAF Photography.

6.2.3.2.5 Anti-landing obstacles

The low-lying flat ground around the Broad Rife between Bracklesham and Selsey would have made an ideal landing place for enemy aircraft. During the Second World War it was therefore defended with anti-aircraft obstructions. These comprised linear groups of circular mounds 2-3m across which were constructed in a loose grid pattern effectively cutting up the larger fields between Marsh Farm and Northcommon Farm (MKM985, MKM987, MKM990, MKM992 and MKM994). The features were only visible on RAF photographs taken in 1941.

6.2.3.2.6 Barrage balloons

Tethered air balloons were used to prevent low-flying bombing, forcing aircraft higher and making bombing less accurate. Twelve barrage balloon mooring sites were recorded during the project, all located between Tanner's Bridge and Weston Point, Southampton. This is a significant addition to the military record for the area as none had been previously recorded.

Of the sites recorded eight lie within half a kilometre of each other at the western end of King George V Dock (*Figure 6.47*). A number of barrage balloon sites have previously been recorded on the opposite bank of the Southampton Water (Trevarthen 2010) and it is likely that the all the balloons formed part of the outer defences of Southampton docks.

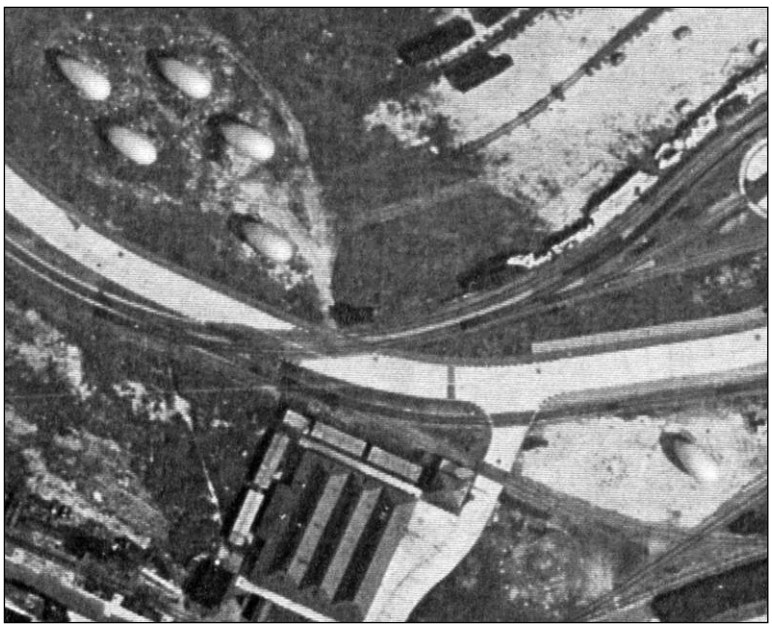

Figure 6.47: Six barrage balloons moored at the King George V Dock, Southampton.

(MKM601, MKM602 and MKM604).

Photograph: NMR RAF/NLA/45/IPRU 5024 S444 2 12th September 1942. English Heritage (NMR) RAF Photography.

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

The planning for Operation Overlord, the codename for the invasion of German occupied mainland Europe by 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 at Lansdowne Hill where a number of camps comprising both bell tents and nissen huts were identified (*Figure 6.48*). It is probable that large numbers of troops and equipment were gathered in the open area adjacent to the docks prior to D-Day.

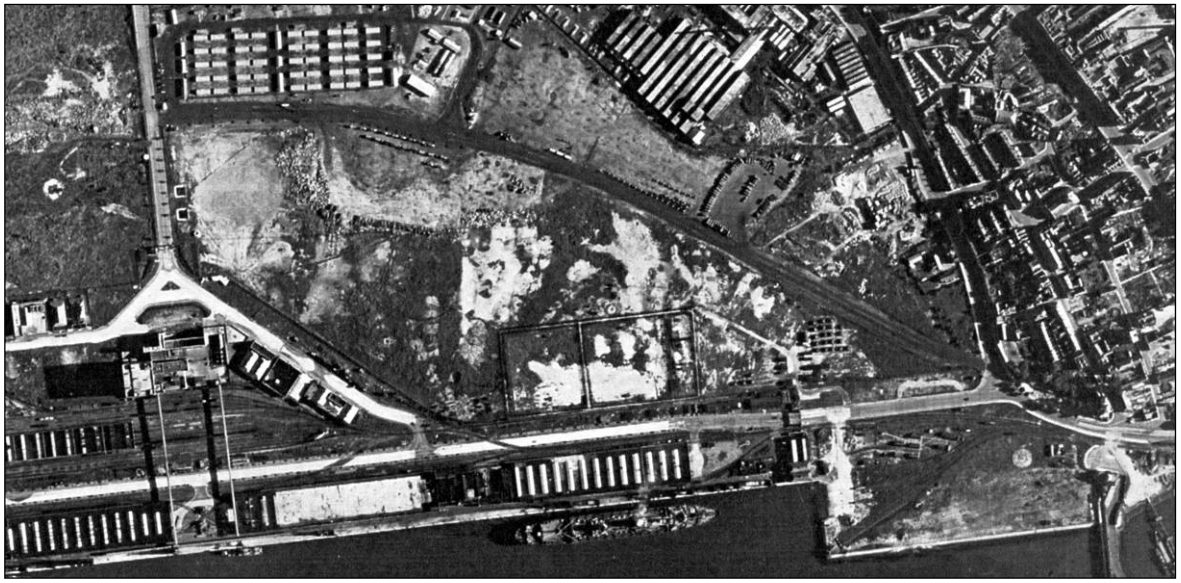

Figure 6.48: D-Day embarkation Point at Lansdowne Hill, Southampton. Remains of military camps and storage depots. Photograph: NMR RAF/106G/UK/827 5005 S444/2 23rd September 1945. English Heritage (NMR) RAF Photography.

Four purpose-built D-Day embarkation hards were located at Southampton under the control of Portsmouth Command. Three of these (S1-S3) were located at Lansdowne Hill (MKM613, MKM614 and MKM615). These were two berth embarkation points for Landing Ships carrying tanks (LST hards) and consisted of concrete loading ramps equipped with steel framed mooring points or dolphins.

Figure 6.49: D-Day embarkation hards S2 and S3 Lansdowne Hill, Southampton. MKM614 and MKM615. The concrete loading ramps and associated dolphins were used in Operation Neptune, the assault phase of Operation Overlord. Photograph: NMR RAF/106G/UK/650 5291 12th August 1945. English Heritage (NMR) RAF Photography.

A mulberry harbour was a temporary harbour developed for the D-Day invasion. 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. 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. The individual Mulberry harbour sections were built at a number of locations around the south coast including Southampton and several were identified along the shoreline (*Figure 6.50*).

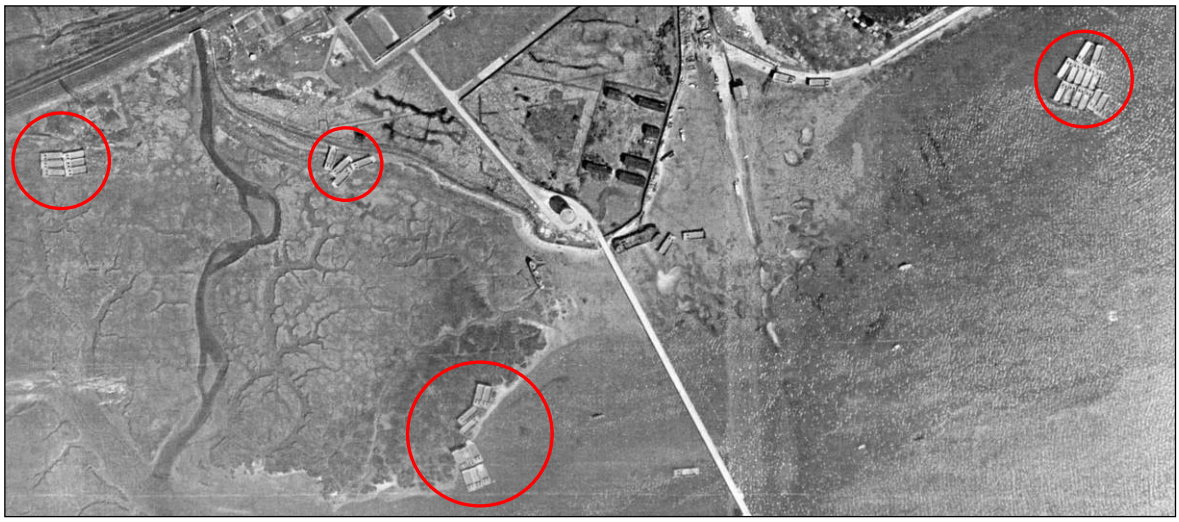

Figure 6.50: Sections of Mulberry Harbour at Millbrook Marsh, Southampton. Photograph: NMR RAF/CPE/UK/1977 5357 11th April 1947. English Heritage (NMR) RAF Photography.

6.2.3.4 Military vessels

Birdham Pool was taken over by the Admiralty during the Second World War and landing craft were made here (Museum of London Archaeology Service 2004, 93). After the end of the Second World War, numerous military vessels (including landing craft) were taken out of service and moored up in Chichester Harbour, particularly at Birdham. The positions of 85 military vessels were plotted during the project, the majority within the Chichester Channel between West Itchenor and Birdham, at the entrance to the Chichester and Arundel Canal. Many of these vessels can be seen on the photographs to change their location from one side of the channel to the other during the immediate post-war period. Many were completely removed from the channel by 1959, presumably for scrap or refitting although a small number were left and by 1960 were listed as hulks in the Hydrographic Office wreck index.

Figure 6.51: Military vessels moored in the Chichester Channel after the end of the Second World War. Photograph: RAF 3G/TUG/UK 162 PTI 5059, 20th April 1947. English Heritage (NMR) RAF Photography.

6.2.3.5 Military camps and depots

Large numbers of unspecified military installations were recorded during the project including 15 groups of military buildings, 12 groups of nissen huts and 42 unspecified military sites. Four groups of features were recorded as military camps including one at Littlehampton (MKM1856). Three were identified at Lansdowne Hill, of which all probably relate to the D-Day embarkations (*Figure 6.48*). Five sites were interpreted as military bases, all within Southampton.

Figure 6.52: Possible military base at Millbrook. The camouflaged roof and stars and stripes pattern mowed into the lawn may be indicative of a United States military residency (MKM631). Photograph: NMR RAF/106G/UK/917 PTV 5451 11th October 1945. English Heritage (NMR) RAF Photography.

Two military sites lie in close proximity to each other at Millbrook (*Figure 6.52*) and at Tanners Bridge, adjacent to Southampton Docks. At Tanners Bridge a heavily defended site was identified (MKM630) comprising a rectilinear area 266 by 180m across, protected by a variety of features such as anti-tank obstacles, slit trenching and road blocks (*Figure 6.53*). At least seven pillboxes, a barrage balloon site and a row of air raid shelters appear to be closely associated with this site, implying a high status use (*Figure 6.56*). The site lies at Brooklands on the site of a sawmill marked on the OS 1st Edition map and was interpreted as a possible military base (possibly a command post).

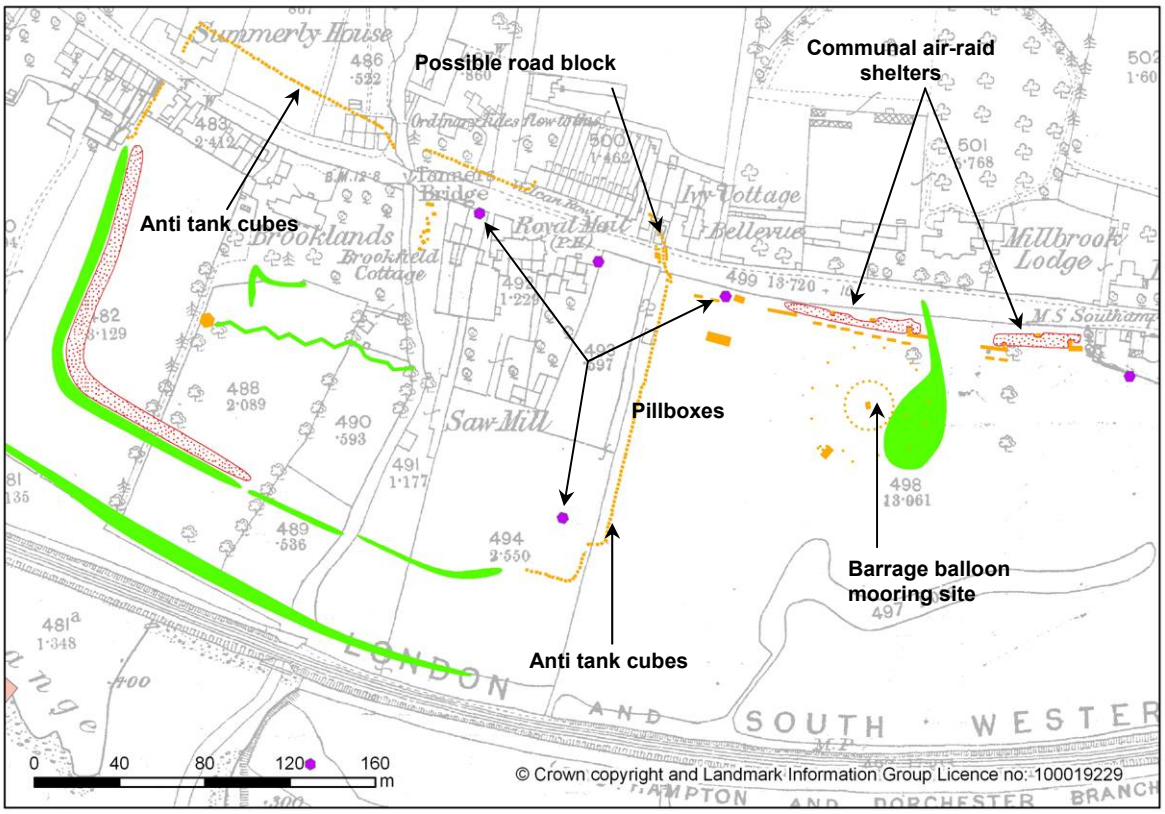

Figure 6.53: Heavily defended military site at Tanner's Bridge. (MKM630).

6.2.3.6 Civilian sites

6.2.3.6.1 Factories

A number of important civilian sites were located within Southampton during the Second World War, two of which were particularly important to the war effort. These included the Spitfire factory of the Supermarine Aviation Works at Woolston on the east bank of the River Itchen (MKM618) and Fairey Aviation's seaplane factory at Hamble Point (MKM760). As with many important factory sites during the war, an attempt was made to disguise these factories by camouflaging their roofs.

The Supermarine Spitfire was heavily used by the RAF during the war and played a key role in the battle of Britain against the German Luftwaffe. The Woolston Works factory itself therefore became an important enemy target leading to the city being heavily bombed in 1940. The factory is visible on aerial photographs taken in April 1940 with its camouflaged roof, however, by December 1940 the factory was a roofless shell (MKM618, *Figure 6.54*). The site of Fairey Aviation's seaplane factory at Hamble Point (MKM760) was luckier and its camouflaged roofs are clearly still intact on photographs taken in 1946 (*Figure 6.55*).

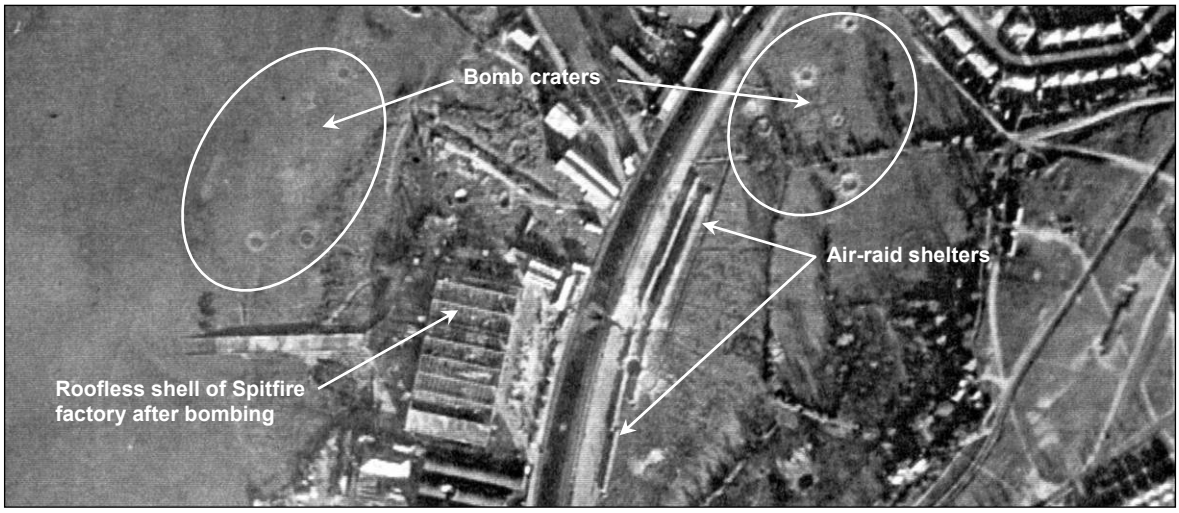

Figure 6.54: Spitfire Quay shortly after the bombing of the spitfire factory in 1940 (MKM618). Numerous bomb craters are visible in the vicinity including several in the River Itchen itself. Photograph: RAF 110E/BR8 15295, 17th December 1940. English Heritage (NMR) RAF Photography.

Figure 6.55: The site of Fairey Aviation's seaplane factory at Hamble Point (MKM760). Photograph: NMR RAF/CPE/UK/1821 2378 4th November 1946. English Heritage (NMR) RAF Photography.

6.2.3.6.2 Air-raid shelters

Southampton was a key target for enemy bombing during the war and 26 individual sites or groups of air raid shelters were identified during the project. In the main these were within Southampton to either side of the River Itchen. However, smaller numbers were identified around Bursledon and Hamble le Rice. The shelters were all communal, earth covered oblong structures (*Figure 6.56*). The spitfire factory at Woolston was a key enemy target and large numbers of air-raid shelters were constructed to either side of the railway line behind the aviation works. These are visible (alongside bomb craters) on aerial photographs taken during and immediately after the war (*Figure 6.54*).

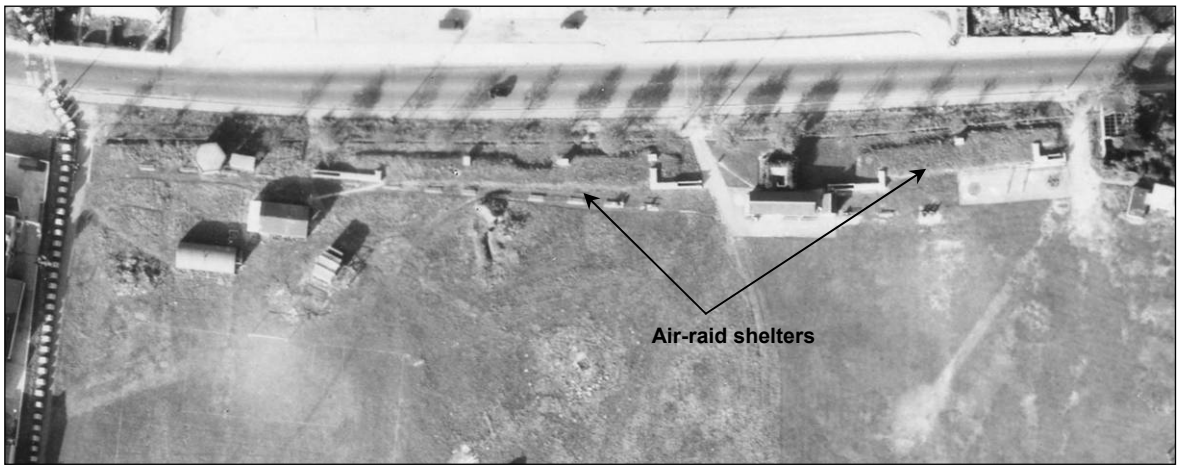

Figure 6.56: Communal air-raid shelters near Tanner's Bridge (MKM585). Photograph: RAF 106/GUK/917 5453, 12th Aug 1945. English Heritage (NMR) RAF Photography.

In addition to the air-raid shelters, 17 emergency water supplies were identified within the greater Southampton area as well as within Bognor Regis and Littlehampton. The circular tanks were generally 8 to 10 metres in diameter and were used to store water for putting out fires resulting from air-raids. The fact that parts of this area were subjected to enemy bombing during the war is evidenced by the numbers of bomb craters encountered. Whilst many of these were within the environs of Southampton (see *Figure 6.54* above), craters were also plotted right along the coastline (*Figure 6.57*).

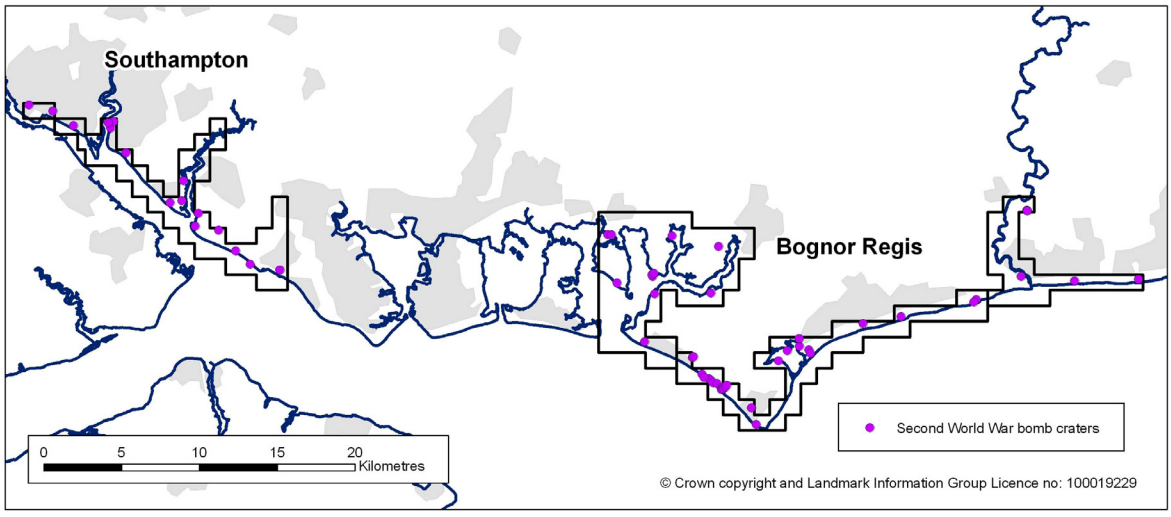

Figure 6.57: Distribution of Second World War bomb craters within Component 1.

6.2.3.7 Cold War sites

The Royal Observer Corp (ROC) was a civil defence organisation that operated in the UK between 1925 and 1995. It was composed mainly of part-time volunteers whose primary task was the detection, identification, tracking and reporting of aircraft over Britain. From 1955 the ROC were given an additional task in the form of defending against the effects of nuclear weapons by detecting and reporting nuclear explosions and associated radioactive fall-out. The ROC continued until the early 1990's when the end of the Cold War substantially reduced the threat of nuclear attack (Dobinson, 2000b).

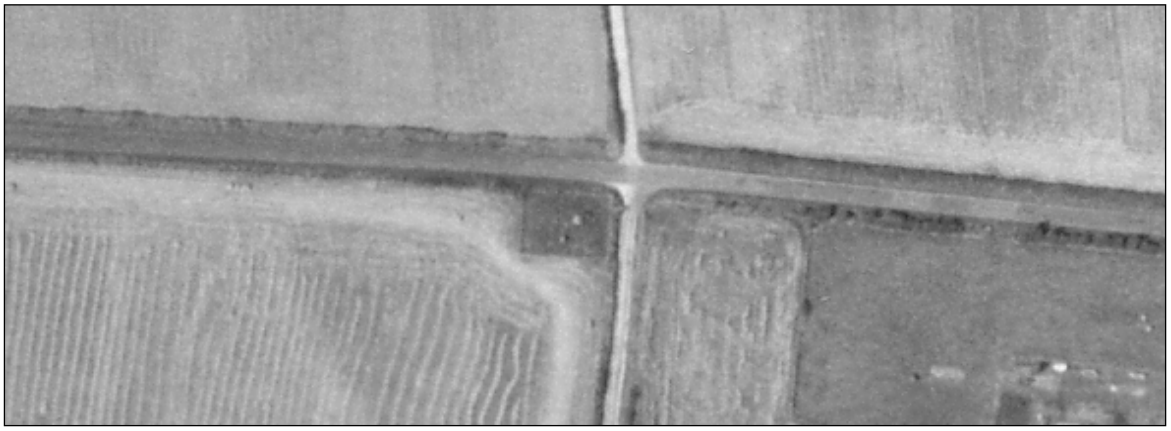

Figure 6.58: Chichester ROC monitoring post at Dell Quay. The site of the underground bunker with its entrance hatch and ventilation shaft are visible on this vertical image from 1967, fourteen months before the post was closed (MKM1865). Photograph: NMR MAL/67081 182 26th August 1967. © English Heritage.

The ROC monitoring posts were bomb proof nuclear protected buildings, usually semi-sunk blockhouse buildings of standard layout and providing accommodation, life support systems, decontamination facilities and a communications centre. These underground bunkers were often hidden away in the corners of fields and two such ROC monitoring posts were identified within the Component 1 project area. The first at Meon (MKM501) lay in the north east corner of a small paddock adjacent to cliff cottage and was only in use for seven years between 1961 and 1968. The site of the post was identified as earthworks on photographs taken in 1962.

The second site is at Dell Quay (MKM1865) just north of the Appledram Airfield described in section 6.2.3.2.3 above. This is the site of the Chichester ROC monitoring post and like the Meon site, it too was closed in 1968 (Figure 6.58).

6.2.4 NMP results Component 1: Undated sites

Where possible all sites were given a general date range if accurate dating was unfeasible however 38 sites (3% of the 1,349 sites mapped and recorded) remain undated. These are sites of ambiguous function or of site types that could range in date from the prehistoric through to the historic periods.

Sites include unspecified mounds, hollows, pits and banks as well as ten trackways or field boundaries. The mounds and ring ditches described in section 6.3.2. above at Littlehampton (Figure 6.11) remain undated and whilst they may be the remains of a

Bronze Age barrow cemetery, a much later agricultural or extractive origin is possible. Fragments of two further ring ditches were identified at West Wittering (MKM1607 and MKM1608). Visible only on CCO images taken in 2008 they remain undated being potentially of prehistoric, modern agricultural or Second World War origin.

Figure 6.59: Possible salt making site at Old Park, Fishbourne (MKM1943). Photograph: EARTH.GOOGLE.COM 31-DEC-2005. ACCESSED 07-OCT-2011.

Two undated sites are of particular interest. The first lies at Old Park, Bosham (MKM1943) where a linear mound (24m by 8m) is visible as earthworks on aerial photographs taken in 1946. It is later visible as a bare soil mark on 2005 Google Earth images and is associated with a spread of reddish soil which may indicate that the site had been used for salt production (Figure 6.59). The features lies just over kilometre from the Roman Palace at Fishbourne (Section 6.2.1.4); on an area of low-lying ground adjacent to the Fishbourne Channel. This area was probably once an intertidal creek and the site is potentially the remains of a Red Hill. A Red Hill is a mound found in coastal areas, formed as a result of generations of salt making. Red Hills can date from the Bronze Age to Anglo Saxon periods. Their distribution is generally restricted to the coast of East Anglia and Essex and therefore a natural origin for this site is possible..

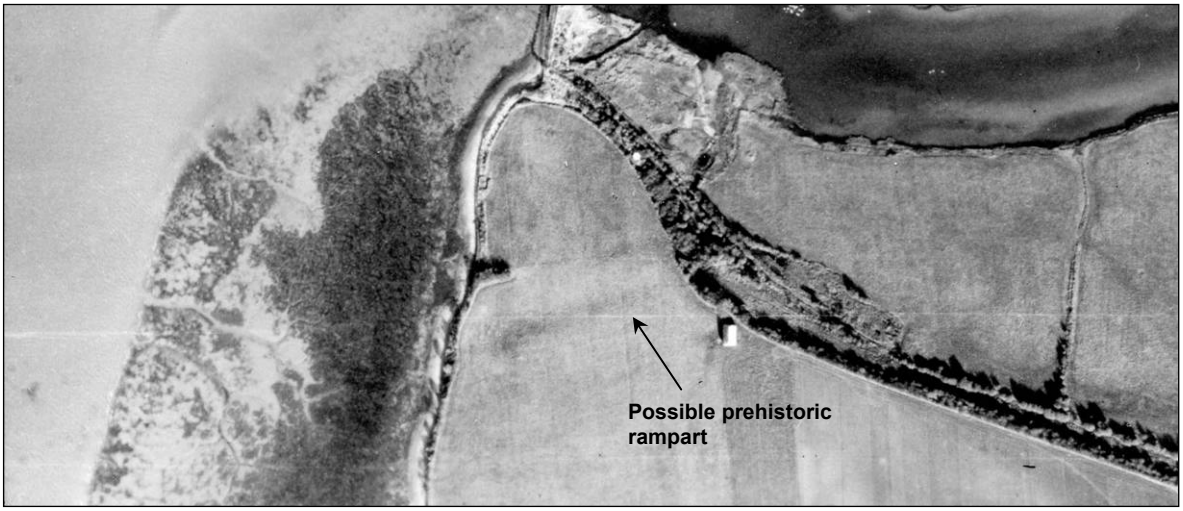

Figure 6.60: Wickor Point, Thorney Island, potential site of a prehistoric promontory enclosure (MKM1644). Photograph: RAF CPE/UK/1843 4016, 18th November 1946. English Heritage (NMR) RAF Photography.

The second site of interest is situated along the western coast of Thorney Island (within Block C Hayling Island see section 4.1.2 above). Here a wide linear ditch (up to 7m wide and 120m long) is visible as cropmarks and low earthworks on aerial photographs taken in 1946 (*Figure 6.60*). Whilst it may be may be an historic field boundary, as the feature effectively cuts off the headland of Wickor Point (which is the location of several prehistoric/occupation sites), it may alternatively be an ancient rampart possibly forming a semi-natural promontory enclosure (MKM1644).

6.3 Overview of results: Component 2

6.3.1 Numbers of sites in the project area

Prior to the NMP survey, the NMR (AMIE) database contained 1,721 records for archaeological sites within Component 2. The area also contained 1,810 HER records, although many of these are for find spots, place names and extant buildings (site types which are outside of the NMP remit). These figures are shown in *Table 6.6* and *Table 6.7* below. In addition, the number of pre-existing records which actually fall within the Component 2 project area was significantly less than the figure cited above, due to the reduced 100 metre coastal strip applied to urban areas.

Block	Prehistoric and Roman	Post-Roman to 1900	Modern	Total
G	53	31	218	302
H	23	23	171	217
J	57	83	465	605
K	49	52	496	597
Total	**182**	**189**	**1,350**	**1,721**

Table 6.6: Pre-project NMR monument records (by period) for Component 2 (excluding linears). These figures do not take account of the 100 metre strip that the project area was reduced to in places. Figures taken from the project design (Catchpole & Dickson 2010, 23).

Block	Prehistoric and Roman	Post-Roman to 1900	C20th	No date	Total (revised)
G	38	120	18	7	183 (275)
H	22	139	80	13	254
J	55	158	77	240	530
K	19	440	130	162	751
Total	**134**	**857**	**305**	**422**	**1,718 (1,810)**

Table 6.7: Numbers of pre-project monument records (by period) in the local HERs (West Sussex estimated) for Component 2. Figures in brackets were estimated for the Unitary Authority of Brighton & Hove. Figures taken from the project design (Catchpole & Dickson 2010, 23).

During Component 2 of the project, 393 monument records were updated in the NMR AMIE database, and 640 were new sites previously unrecorded. The mapping project has therefore resulted in a 42% increase in the archaeological record from 1,516 to 2,156 (the total number of pre-project monument records listed in Table 6.6 is 1,721, which doesn't

take account of the fact that the project area was reduced to a 100 metre-wide strip in places. 1,516 is the true number of pre-project monument records for the actual project area mapped in Component 2). The numbers of sites recorded by period are listed in Table 6.8 below and show that 93% of all new sites recorded were related to the military defence of the country during the Second World War. It should be noted however that the figures produced in Table 6.8 total more than the true number of unique records, due to some monuments being recorded with multiple periods.

111 Kent HER records, 166 for East Sussex and 3 for West Sussex will also be updated when the data is fed into their respective HBSMR databases by Wessex Archaeology. New HER records for these areas as a result of this project are as follows: Kent 341, East Sussex (including Brighton) 371, West Sussex 37.

Period	Updated Sites	New Sites	Total
Later Prehistoric	4	2	6
Roman	4	2	6
Medieval	9	12	21
Post-medieval	74	31	105
20th Century (modern)	324	608	932
Uncertain	2	2	4

Table 6.8: Summary (by period) of existing NMR monument records updated and new NMR monument records created during Component 2 of the project. It should be noted that the figures in this table total more than the true number of unique records, due to some monuments being recorded with multiple periods.

Due to the fact that the project area comprised only a narrow strip along this coastline, it was difficult to interpret the pre-twentieth century archaeological results in a meaningful way without the context of archaeology further inland. An appreciation of the archaeological landscapes, particularly for the medieval through to the twentieth century, was skewed towards military fortifications and defences. However, the impact of mapping Second World War sites as part of this survey has been significant in terms of increasing the extent of the known archaeological record, as 295 NMR records were updated for sites of this period, and 592 were newly created. The mapping has complemented and enhanced the existing records, many of which were sourced from documentary evidence or created as part of the Defence of Britain project. It has therefore been possible to fill in large ‘blanks’ using aerial photographs as the main survey source.

6.3.2 Form and survival of sites

Of the 1,033 sites recorded during the mapping project, only about 39% (excluding wrecks) are still recorded as being extant on recent aerial photographs as buildings, structures or earthworks. By the 1950s the remainder of these sites originally visible as extant, especially the majority of Second World War sites, had either been removed, demolished, destroyed or levelled. Few sites were visible as cropmarks. The distribution

of extant versus levelled sites for Component 2 is shown in red and black on the map below, *Figure 6.61*.

Although some monuments or sites are described as demolished or removed, it may be that some part of the site is still visible on the ground, or as a subsurface feature that was not discernable on the available aerial photographs. A good example of this is the Second World War Capel Battery (NMR: 1416952), southwest of Capel-le-Ferne. The battery comprised sunken-level buildings that were buried after the war and therefore could not be seen on later aerial photographs. However, recent excavation work has revealed that the buildings and one gun emplacement still exist.

Similar further targeted research is recommended in other areas where previously extant earthworks, structures or buildings have been shown by aerial photographs to have been levelled, demolished or removed. These areas, shown by the black dots in *Figure 6.1* include Rye Bay, Greatstone-on-sea and St Mary's Bay.

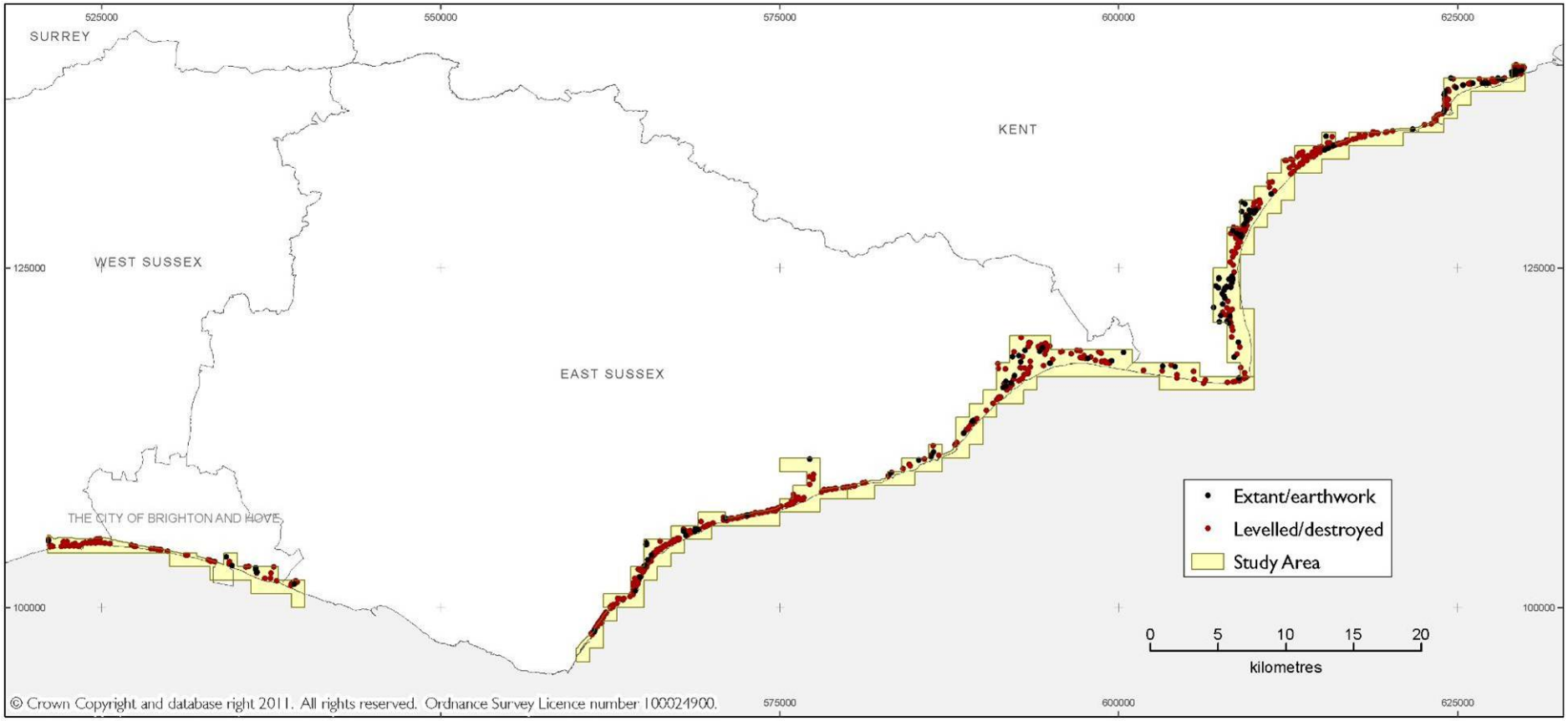

Figure 6.61: Distribution of extant vs levelled monuments recorded during Component 2 of the project. Crown Copyright and database right 2011. All rights reserved. Ordnance Survey Licence number 100024900.

6.4 NMP results: Component 2

6.4.1 NMP results Component 2: Later prehistoric and Roman sites (4,000BC to AD409)

Later prehistoric and Roman NMR records numbered 182, representing 10% of the NMR pre-project database. Only eight later prehistoric or Roman NMR records were updated. Four new records of this period were added to the NMR, but of these one already had an HER record (NMR: 1544646), one had previously been recorded as one cropmark site, but was found to actually comprise two separate features during this project (NMR: 1544648, previously recorded as part of 618380), and one is extremely uncertain in date and may in fact be later in origin (NMR: 1544643). Similarly the number of HER records dated to the Prehistoric and Roman periods was 134, about 7% of the total number of HER records.

The lack of newly recorded later prehistoric or Roman archaeological features within Component 2 of the project is attributable to, amongst other things, the complex sequence of land reclamation and drainage throughout certain areas of the project area. This can be seen in places such as the Pevensey and Pett Levels and Romney Marsh. Earlier archaeological sites are likely to have been located on the higher, drier ground, which happens to mostly fall outside the project area. The relatively recent superficial deposits found at Rye Bay, Dungeness and the Romney Marsh (Catchpole & Dickson 2010, 22) suggests that any archaeological evidence indentified in these areas is likely to be medieval or later.

6.4.1.1 Neolithic sites (4000BC to 2351BC)

Neolithic sites are relatively rare in archaeological aerial surveys on most landscapes. The only two Neolithic sites recorded during Component 2 of this project were a pair of long barrows at Beacon Hill, Rottingdean. The larger of the two was previously identified from cropmarks of the flanking side ditches, visible during the dry summer of 1995 (NMR: 1081164). It is thought this barrow was levelled in 1863 to make way for a cricket pitch. The second, smaller possible long barrow is visible on aerial photographs as an extant earthwork located further to the north on Beacon Hill (NMR: 402239). Its origin is less certain than the first long barrow, as it may alternatively consist of two conjoined Bronze Age bowl barrows.

6.4.1.2 Bronze Age sites (2350BC to 700BC)

Apart from the pair of possible conjoined bowl barrows mentioned above (NMR: 402239), which may alternatively be a Neolithic long barrow; there was only one other Bronze Age site identifiable from aerial photographs within Component 2. This is a previously recorded bowl barrow, visible on aerial photographs of 2007 as an extant earthwork at Capel-le-Ferne, Folkestone (NMR: 465671).

6.4.1.3 Iron Age and Roman sites (700BC to AD409)

A Roman Villa at East Wear Bay, Folkestone (NMR: 465716) was visible on aerial photographs of 1945. The foundation walls had been left exposed following an excavation in 1924. The site was backfilled in 1957. Although the villa was mapped as part of this project; no new information was added to the existing NMR record.

There were two discrete areas of possible Iron Age or Roman period remains at Telscombe, near Peacehaven and Ovingdean, east of Brighton. The two sites are similar in appearance, consisting of field systems demarcated by banks which have been plough-levelled to a considerable width (up to 16 metres wide in places). The example at Telscombe Cliffs (NMR: 1544646) is visible as faint earthworks on aerial photographs as recently as 2009. Although this site is new to the NMR, it was previously recorded in the East Sussex HER (MES2053).

The field system slightly further to the west near Ovingdean is visible as cropmarks rather than earthworks (NMR: 1544648). This is explained by the fact that it is located within arable fields, rather than on an area of currently uncultivated, unenclosed cliff-top common land, as at Telscombe. The possible Iron Age or Roman date is based not only on the form of the field system at Ovingdean, but also finds of that date from one of the modern fields it occupies. These were recorded in the East Sussex HER as a Romano-British pottery scatter (MES7319).

The Ovingdean field system has an additional feature in the form of two conjoined rectilinear enclosures nestled against one of its banks (NMR: 618380). They are visible as particularly clear cropmarks on aerial photographs of 2006. This possible settlement enclosure and the multiple pit features it contains have been interpreted as being contemporary with the Iron Age or Roman period field system which surrounds it. The NMR record which previously existed for this site was vague and it is not clear whether it was intended to include the field system as well as the possible settlement enclosure. It was decided as part of this project to record them separately, so a new record was created for the field system, even though it was not a ‘new discovery’ (NMR: 1544648, discussed above).

The sites at both Telscombe and Ovingdean occupy high ground on tall cliffs above the sea. This fits with the model discussed in the introduction to this section, which pointed out that the more recent land reclamation and drainage of areas such as the Pevensey and Pett Levels and Romney Marsh means that we would not expect to find later prehistoric or Roman period sites in these low-lying regions. It is worth noting that the concentration of possible Iron Age or Roman period activity at Ovingdean and Telscombe lies adjacent to the area to the east which was mapped and recorded separately by English Heritage as the Beachy Head NMP project (English Heritage forthcoming). In order to construct a meaningful analysis of the distribution of sites of this period along the coastal fringe it would be necessary to analyse the results of that project in conjunction with the findings discussed here.

6.4.2 NMP results Component 2: early medieval, medieval and post-medieval sites (AD410 to AD1900)

The total number of pre-project medieval and later NMR records was only 189 (11% of the total number of records); only marginally more than the number of pre medieval sites. In contrast to this the HER databases showed that records of the post-Roman period up to AD 1900 made up 49% of the total number for the project area. This disparity probably reflects the nature of HER recording methodology; for instance documentary sources and map studies may have been used more often in creation of the HER records than for the NMR database. This was certainly the case with the post-medieval Reed's Battery (NMR: 1539746; ESHER: MES8100), north of Winchelsea Beach, which had been recorded in the East Sussex HER from map analysis but wasn't recorded in the NMR.

Twelve new NMR records assigned a medieval date were created and 31 post-medieval NMR records were added to the NMR database as a result of this survey within Component 2. Nine NMR records from the medieval period and 74 from the post-medieval period were also updated, which included 46 Martello Towers.

Of the twelve new features identified as being of medieval in date, one, a probable medieval settlement at Upper Wilting Farm near Hastings was already recorded in the East Sussex HER (MES7160). Three others relate to probable medieval and/or post-medieval field boundaries (NMR: 1541797, 1539291 and 1534530) and at Abbot's Cliff seven probably medieval chalk pits (NMR: 1534394) were mapped. South of Warren Farm, Fairlight a possible medieval building platform (NMR: 1539306) and other associated earthworks were also recorded.

The nature of the archaeological evidence gleaned from aerial photographs is such that that it is often difficult to assign a more precise date than medieval or later in origin to the remains identified. This was particularly the case with field boundaries. Similarly, extractive pits could be nineteenth century (post-medieval) or earlier, or alternatively early twentieth century. Where a precise date could not be determined the features were double-indexed in the NMR (AMIE) database but for the object data table attached to all mapping, the earliest date or the most likely date was used.

6.4.2.1 Medieval sites

There were no features which could be positively identified as originating in the early medieval period (AD 410-AD 1065) and only one NMR record was updated which dated to this period. An 'ancient' clinker-built boat of coracle shape (NMR: 414455), was identified and excavated in 1887 on the foreshore at Bexhill and although no remains of the boat were visible on any aerial photographs, the probable wreck site location was updated. This was due to Martello Tower Number 48, which was mentioned in the original description, being given the wrong NGR and placed in the position that Martello Tower No. 49 actually occupied.

Where the project polygon extended further inland at Dymchurch, a medieval moat was mapped and recorded (NMR: 1158276). The location of this Scheduled Monument may hint at further potential identification of medieval and post-medieval earthwork sites on nearby Romney Marsh proper. The number of medieval saltworks or salterns that are known just outside the project area supports this possibility. This is particularly noticeable on the Pevensey Levels, where 19 salterns (NMR: 411759 and 411764) from existing NMR records, are located in a small area north of Norman's Bay. The remains of one saltworks (NMR: 411860) were identified within the project area and were still visible on recent lidar imagery taken in 2008, north of Pevensey Bay railway station.

The earthworks surrounding Camber Castle, (NMR: 419206), located to the south of Rye, are of particular note (see *Figure 6.62*). While the 16th century castle itself has been thoroughly surveyed and investigated over the years, little work has been carried out on the substantial earthworks adjacent to the castle. The aerial survey recorded a number of associated earthworks, some of which were not visible on any earlier plans identified in the available archives.

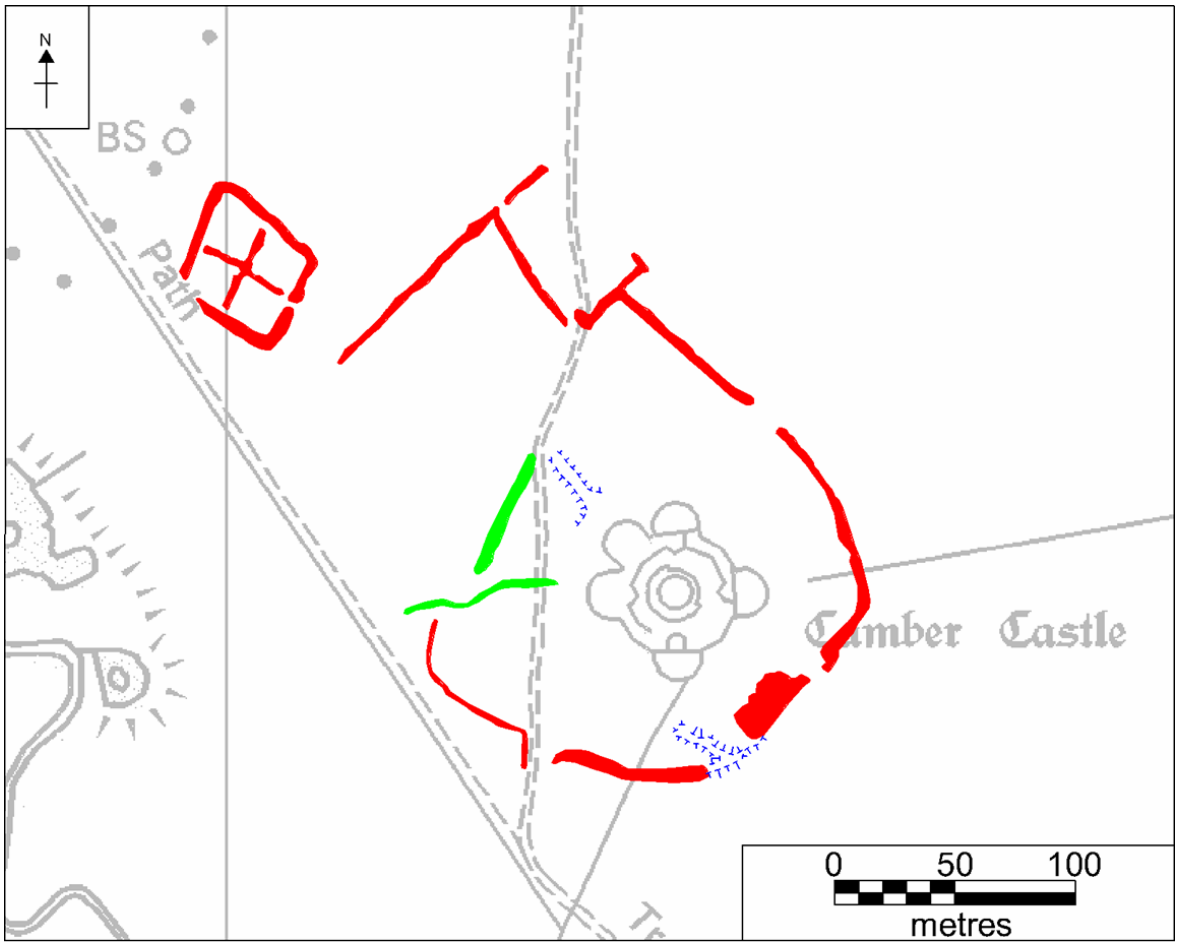

Figure 6.62: The medieval earthworks that surround Camber Castle (NMR: 419206). OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2011.

The main earthworks comprise a roughly D-shaped enclosure around the southern and eastern sides of the castle (see *Figure 6.62*). These are likely to have been sea defences, as the coast was very close to this side of the castle when it was built (Biddle *et al* 2001, 10). This outer bank also extends around the northern side of the castle to the point where it abuts a banked rectilinear enclosure. On the south western side of the castle, a further low bank is visible as an earthwork on aerial photographs. However, it is unclear if these banks are contemporaneous, and it is possible that some may be later agricultural field boundaries. Perhaps the most intriguing of the earthworks is the rectangular enclosure located to the north west of the castle, which was not visible on any previous archaeological plans available at the NMR. Excavations on part of this enclosure in 1974 revealed that it is likely to be contemporary with the castle, but the function of the earthworks is still unknown (ibid). Further archaeological investigations would be useful in order to fully understand the history of the castle and its surrounding earthworks.

6.4.2.2 Post-medieval sites

The majority of the new archaeological features mapped that were assigned a post-medieval date were agricultural in function, such as field boundaries, stack stands and ponds. There are additionally four records pertaining to military remains of this period; three are batteries and the other is a firing range. The two batteries known as Strand Bridge Battery (NMR: 1539748) and Reeds Battery (NMR: 1539746) are located not far from each other, to the east of Winchelsea. They are also in close proximity to the Greedy Gut Battery (NMR: 1539835) at Winchelsea Beach. Although they were already recorded in the East Sussex HER; all are new to the NMR. All three batteries were probably constructed sometime in the nineteenth century and are likely to have complemented the numerous Martello Towers which were constructed along the coastline in 1805-1806 to defend the UK from a possible French invasion. Many of the NMR records relating to these sites have also been updated as part of the project.

The other new post-medieval military site was the firing range at Hythe (NMR: 1531850). It was established in 1853 as the practice range for the newly established Hythe School of Musketry (renamed Small Arms School in 1919). The site is still used for military training and has been through many alterations over the years. The development of the site is documented on the 1st to 4th edition Ordnance Survey maps (1873, 1898, 1907 and 1938) and these stages were therefore not mapped as part of this project (see project brief, English Heritage 2010b).

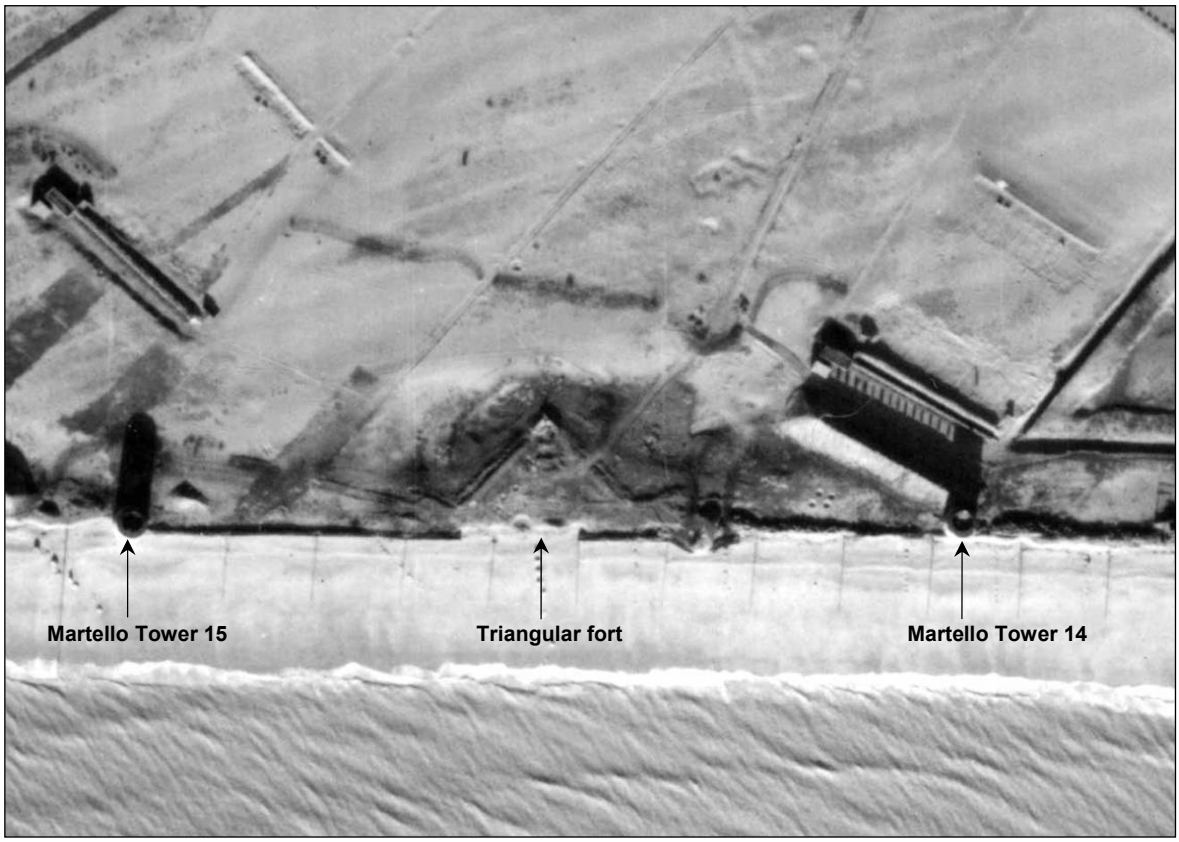

Figure 6.63: The triangular Fort Sutherland (NMR: 463977) flanked on either side by Martello Towers 14 (NMR: 463954) and 15 (NMR: 463960) in 1946. Photograph: NMR RAF/106G/UK/1112 4099 12th January 1946. English Heritage (NMR) RAF Photography.

Almost all the post-medieval records that were updated as part of the aerial survey related to Martello Towers or coastal batteries, reflecting the importance of nineteenth century defence of this coastline against a potential invasion from Napoleonic France. In most cases the existing records were updated to correct the national grid references, with little other new information available from the aerial photographs.

The coastal battery of Fort Sutherland (NMR: 463977, see *Figure 6.63*) is located on the beach at Hythe. The fort was constructed in 1798 and although largely demolished, the apex of the outer fort wall foundations were still clearly visible on recent aerial photographs taken in 1983 and 2011.

A sixteenth century coastal battery was previously recorded north of Pevensey Beach (NMR: 411856). However no trace of this battery was found on the aerial photographs or lidar imagery. The documentary evidence cited in the record was confusing and as such this record may in fact be a duplicate of another sixteenth century battery located approximately 430 metres to the north (NMR: 411728) or alternatively the sixteenth century battery at Rockhouse Bank (NMR: 411702). These two batteries are both still clearly visible on the aerial photographs. The documentary source (Lower 1870, 5) seems to indicate more than one battery, although only one grid reference is given in this record. The battery located further to the north also has this same documentary evidence as a source but no grid reference is given in that instance.

6.4.3 NMP results Component 2: Twentieth century sites

There were a total number of 592 newly created records and 295 updated records dated to the twentieth century within the Component 2 project area. These include the re-use of earlier sites, such as Martello Towers which were re-used as Second World War battery observation posts. There were only 305 pre-project HER records dated to the 'modern' period (the twentieth century), a lot less than the 1350 pre-project NMR records. This may be attributable to the large number of Second World War NMR records created from documentary sources, such as the numerous DIVER batteries taken from Dobinson's gazetteer of these sites (Dobinson 1996d).

The overwhelming majority of the twentieth century sites visible on aerial photographs are those dating to the Second World War period, with 857 records updated and created during Component 2 of the project. The 572 newly created records represent a 67% increase in the number of Second World War records now within the NMR (AMIE) database.

6.4.3.1 First World War sites

Four First World War sites were mapped as part of Component 2 of the project. Two of these were previously unrecorded in the NMR AMIE database.

The First World War Rye Rifle Range (NMR: 1539744), east of Camber Castle was already recorded within the East Sussex HER (MES16348) but not in the NMR. The rifle range was visible as earthworks on aerial photographs taken in 1946 and comprises two adjacent ranges. The westernmost range has two firing positions visible on aerial photographs, as well as its target butts. The easternmost range has two firing positions visible, although a third one recorded on the 4th edition Ordnance Survey Map (1929) was not visible on the aerial photographs. Most of the rifle range has subsequently been destroyed by sand and gravel extraction and only the target butts and one firing point are still visible as earthworks on the most recent aerial photographs taken in 2011.

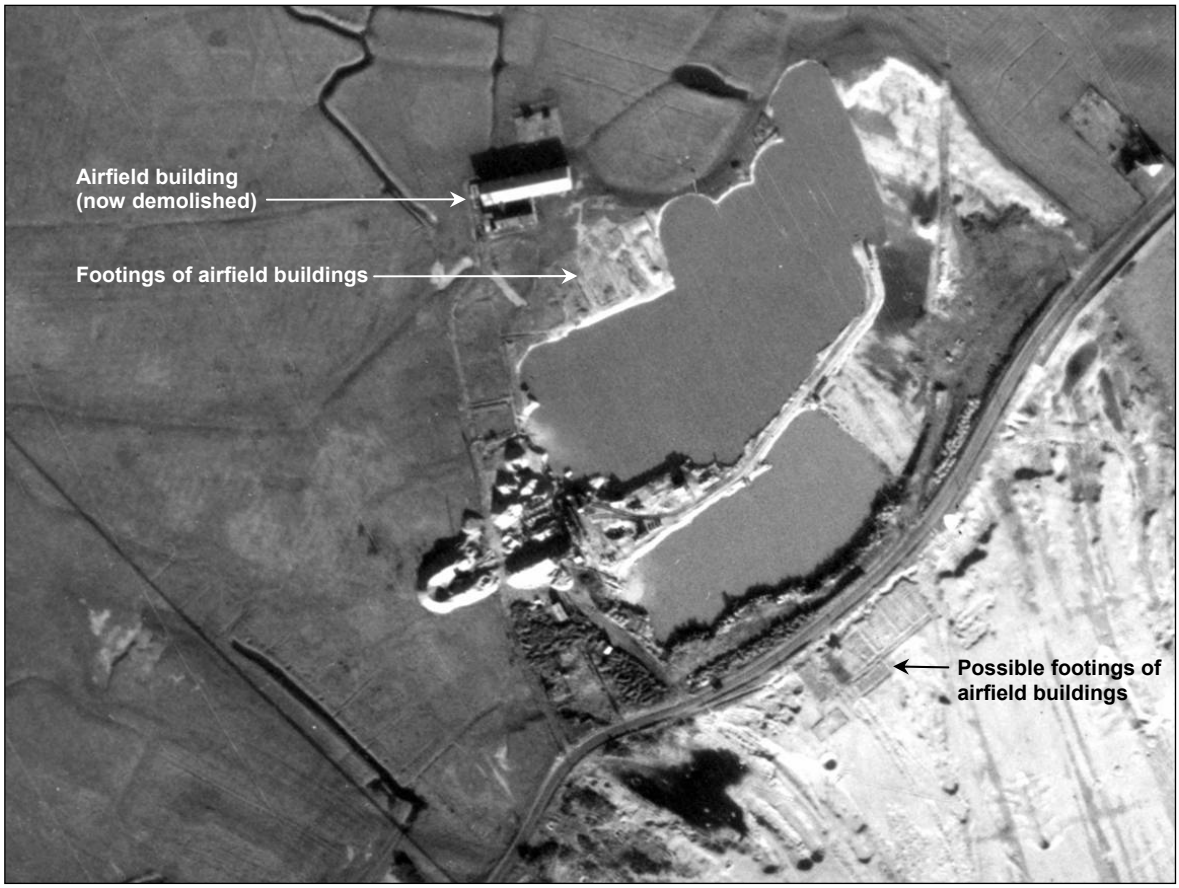

Figure 6.64: The remains of the First World War airfield RFC Hythe/Palmarsh (NMR: 1515332). Photograph: NMR RAF/106G/UK/1112 3098 12th January 1946. English Heritage (NMR) RAF Photography.

The First World War airfield (NMR: 1515332) near Dymchurch, also known as Hythe or Palmarsh was established in 1917 due to the increased use of the Hythe ranges by the School of Aerial Gunnery. The airfield was equipped with a number of Bessonneau hangars and other hutted accommodation, but by 1918 the school had been moved to New Romney airfield. The airfield was maintained as an Emergency Landing Ground, in addition to continued use by aircraft training on the ranges, but was finally closed in 1919 (Delve 2005, 255).

Only one possible First World War building was still standing at the airfield on the earliest available aerial photographs from 1941 and on the 4th edition Ordnance Survey Map (1938), although it was demolished after 1966. Other nearby pre\First World War buildings may have been commandeered for airfield use. The structural footings and outlines of other buildings, possibly the barracks for the aircrews, are also visible on aerial photographs from 1941. The majority of the site appears to have been subsequently destroyed to make way for the quarry north of Dymchurch Road which has expanded from 1938 to the present day (see *Figure 6.64*, above).

A group of First World War practice trenches (NMR: 1531564) were identified on the cliff edge at Folkestone. These were visible on a rare aerial photograph taken in 1917 and show a short section of trench in a stepped pattern. Trenches were rarely dug in straight lines partly so that the entire trench could not be enfiladed if the enemy gained access, as well as offering increased blast protection, i.e. if a shell landed in the trench, the blast would be deflected at the 'steps' (Keene 2006,135). Smaller straight sections of ditch are also visible on these 1917 aerial photographs, and may be practice slit trenches.

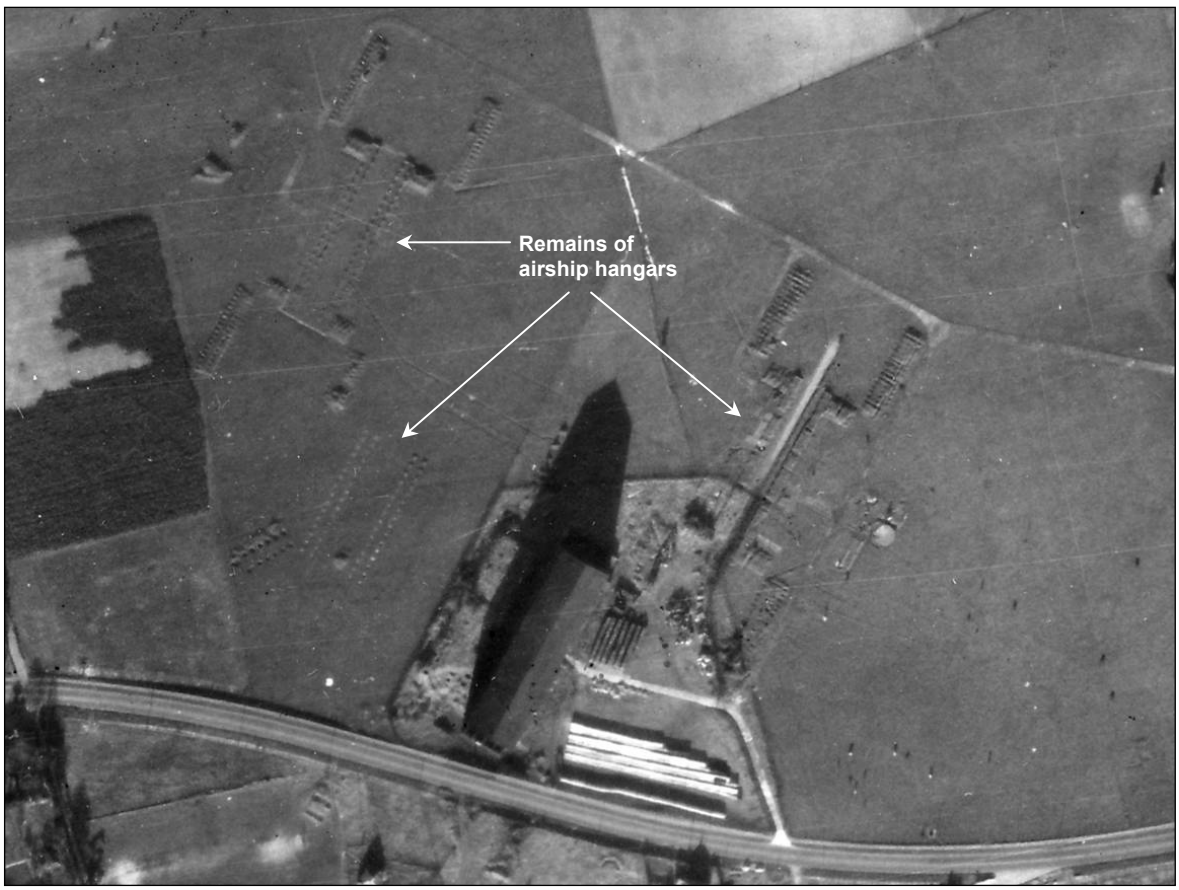

Figure 6.65: The remains of the First World War Airship Station at Capel-le-Ferne, Dover (NMR: 1413688). Photograph: NMR RAF/106G/UK/1093 4002 3rd January 1946. English Heritage (NMR) RAF Photography.

Perhaps the most interesting site mapped from this period within Component 2 is the Capel-le-Ferne/Folkestone Airship station (NMR: 1413688). The station opened in 1915 and was operational until 1919. A number of airships were based here that carried out anti-submarine operations. Still visible on the aerial photographs taken in 1946 were the remains of three airship hangars (see *Figure 6.65*). one of which was demolished by 1966. A possible fourth hangar was also indicated by a similar arrangement of concrete foundation piles, although the absence of associated earthworks may suggest that this hangar was never completed. The earthworks and foundations of a number of workshops and accommodation huts were also visible. Although part of the site is now a caravan park, some earthwork features remain visible. Some of the footings for the airship hangars are visible as cropmarks on aerial photographs taken in 2007 in the cultivated field which now occupies the other half of the site.

6.4.3.2 Inter-war rifle ranges

Three twentieth century rifle ranges were recorded for the first time as part of this project. Although they are depicted on historic and modern Ordnance Surveys maps they had not been recorded in the NMR or the relevant HERs. The ranges in Kent at Lydden Spout, Hougham Without (NMR: 1534487, see *Figure 6.66*) and Round Down, Dover (NMR: 1534670) are still visible as partly extant on Google Earth photographs taken in 2009. At Lydden Spout some substantial buildings and earthworks survive. The range at Covehurst Bay, Hastings (NMR: 1539286) seems to have been partly levelled. Lydden Spout and Covehurst Bay seem to have continued in use for small arms training during the Second World War.

Figure 6.66: Lydden Spout rifle range (NMR: 1534487), adjacent to Lydden Spout battery.

Photograph: NMR RAF/106G/UK/1093 4006 3rd January 1946 English Heritage (NMR) RAF Photography.

6.4.3.3 Sound mirrors on the Kent Coast: The Denge and Abbot's Cliff sites

Sound mirrors were an early system of detecting aircraft by listening to the reflected engine sound using specially designed structures. Army experiments began during the First World War, and progressed through the 1920s and 1930s before being abandoned in the mid 1930s as radar began to replace acoustic detection. Early experiments were carried out at Fan Bay, north of Dover, but were moved to the Romney Marsh coast in 1923. This was partly because the area was on the commercial airline route between London and Paris which provided regular aircraft to practice on (Scarth 1999, 73).

Three 20 foot wide mirrors were constructed at Abbot's Cliff (NMR: 1413672), Hythe (NMR: 464039) and Denge (or Greatstone, NMR: 462809) in 1928, although the one at Hythe collapsed in the 1970s. A series of experiments to determine the direction, type and speed of approaching aircraft gave positive results, but determining altitude was more problematic, even when the information from all three sites was combined. The 30 foot

wide dish at Denge was constructed in 1929, and was followed by the 200 foot long wall in 1930 (ibid, 88-95).

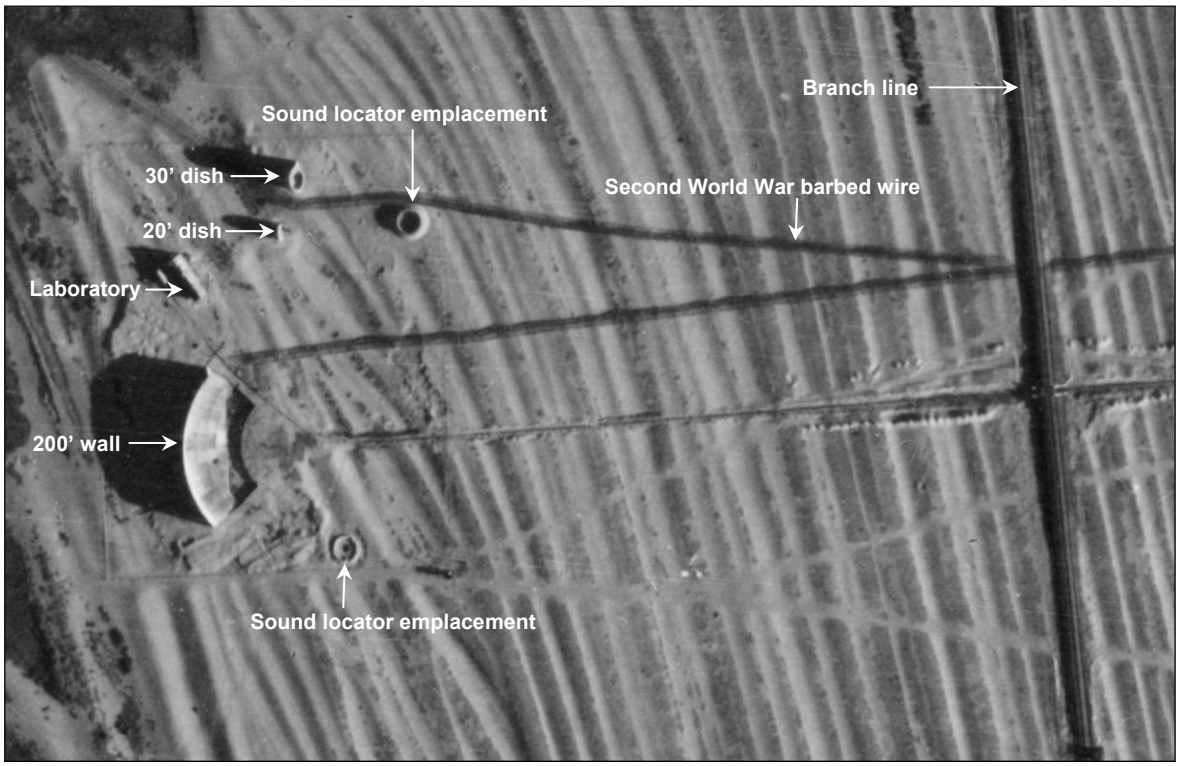

Figure 6.67: Denge or Greatstone sound mirror research site. Only the 200 foot long wall and the pair of dishes are extant today, and shingle extraction extends right up to these monuments. Photograph: NMR RAF/CPE/UK/1752 3002 21st September 1946. English Heritage (NMR) RAF Photography.

Both Denge and Abbot's Cliff had a number of buildings and structures which were associated with the acoustic experiments. At Denge a pair of possible sound locator emplacements are visible as circular structures, as well as a laboratory. It seems likely that mobile sound locator designs were tested here as the results could be compared with the larger detectors.

At Abbots Cliff the building platform of the laboratory is still extant, although the pillar shown in the photograph (see *Figure 6.68* and *Figure 6.69*, below) has been removed. The antenna array (NMR: 1534419) visible in the background of the photograph was still extant on aerial photographs taken in the 1940s, when it was surrounded by a Second World War site. There were also some possibly associated earthworks of buildings to the east of the sound mirror (NMR: 1534413), which may be related to the acoustic experiments.

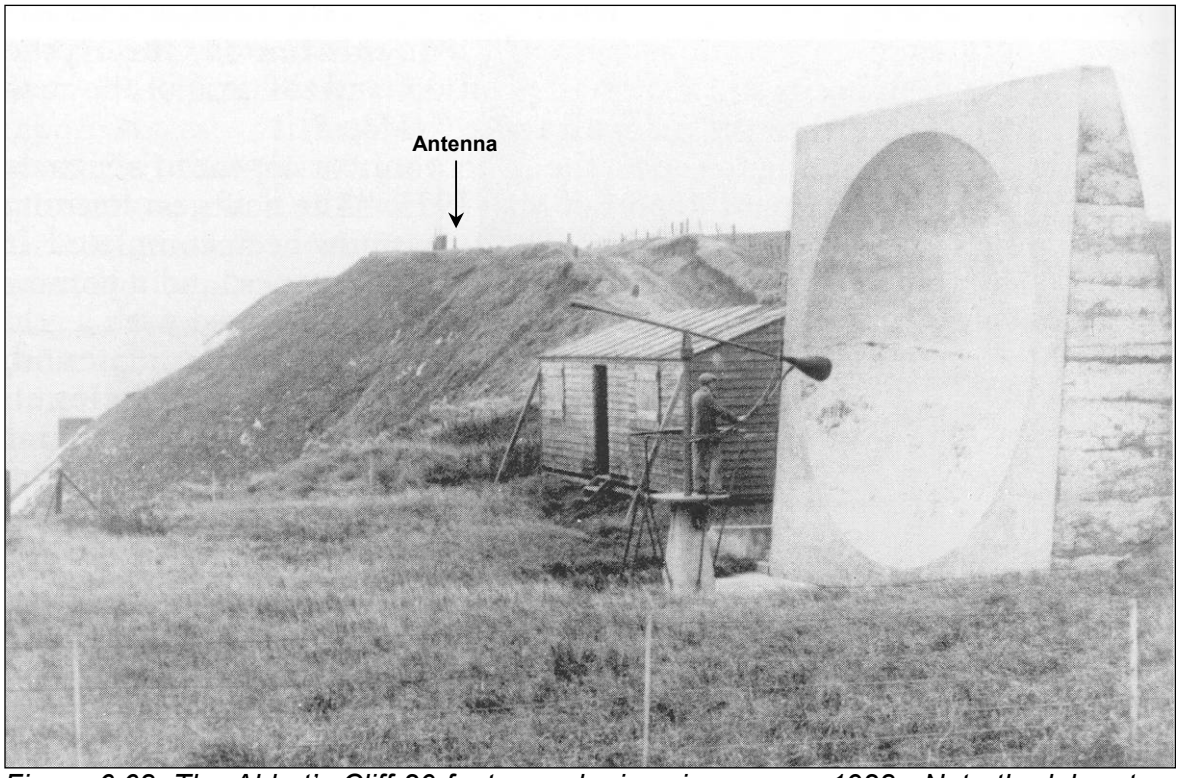

Figure 6.68: The Abbot's Cliff 20 foot sound mirror in summer 1928. Note the laboratory on the building platform and the antenna in the background. Crown Copyright National Archives, reproduced with permission.

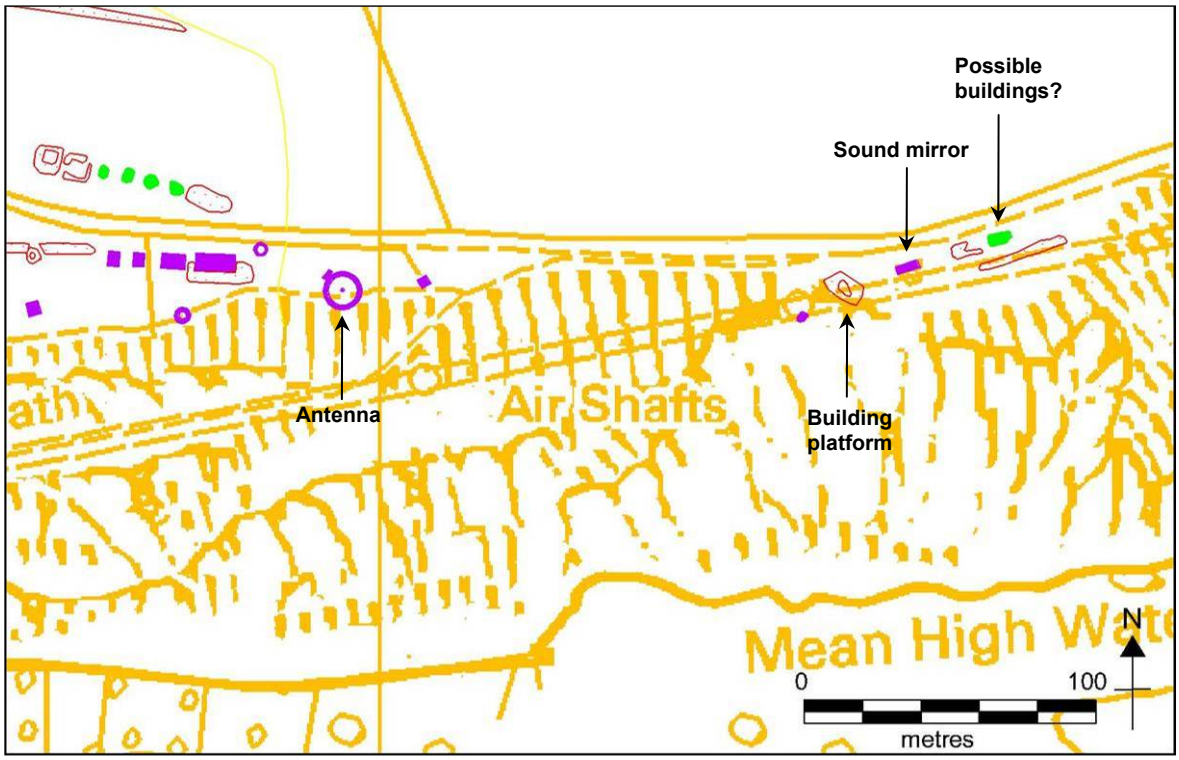

Figure 6.69: The Abbot's Cliff sound mirror site and surrounding features. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 1000191342011.

6.4.3.4 Second World War sites

The project has been able to map the almost continuous defences which were rapidly constructed at the start of the Second World War. These mostly comprise barbed wire obstructions and beach scaffolding. In contrast to the defensive fortifications which pre date them; the majority of the Second World War sites and features mapped are no longer visible on recent aerial photographs, having been removed and demolished not long after the war.

Any significant gaps in the mapped defences can be explained either by the local geography, or the project area excluding defences which were placed further inland, or by gaps in the coverage of particular aerial photographic sorties. The cliffs between Fairlight and the eastern edge of Hastings made this stretch of coastline a less likely landing site, so it is not unexpected that there were no anti-landing defences here. Similar patterns can be seen on either side of Beachy Head, in southern Eastbourne and in the Rottingdean to Brighton area.

The sea wall which protects Pett Level was deliberately breached in three places during the war, flooding the Level as far inland as the Military Canal and thereby making a landing in this section of Rye Bay impractical. Dymchurch's beach defence was a substantial concrete sea wall with anti-glider defences and the Military Canal further inland.

Folkestone was surrounded to the east and north by a system of anti-tank ditches. Part of one of these was recorded during the course of this project (NMR: 1533049). Although the harbour was defended, most of Folkestone's seafront seems not to have had anti-landing obstacles. Perhaps it was considered that a combination of the steep slope to much of the seafront; defence sites just outside the project area; and the wider system of anti-tank ditches was adequate protection for the town.

Hastings seafront was defended by five rows of anti-tank cubes, the spacing of which suggests that they were added in more than one phase. However, these are only visible on a sortie flown in May 1941 and had been removed by the time of later photographs. This sortie did not cover the whole of the seafront, so it is not known whether or not these anti-tank cubes may have been continuous.

6.4.3.4.1 Beach defences

As previously mentioned (section 6.2.3.1), after the evacuation of British troops from Dunkirk in June 1940 the beaches of the south and east coast became crucial in delaying any potential attack or invasion. A rapid fortification process began in earnest in May 1940 and its progress is evident on aerial photographs of the period. For example, there are areas photographed in 1940 which had few defences, although sometimes coastal batteries were visible as building sites (see *Figure 6.70*, below), but which when subsequently re-photographed in 1942 were fully equipped with a variety of defences. A similar chronology was identified during the Suffolk's Defended Shore project (Hegarty & Newsome 2007) where the photographs told a story of largely defenceless shores in 1940 which had evolved into well defended ones by 1942.

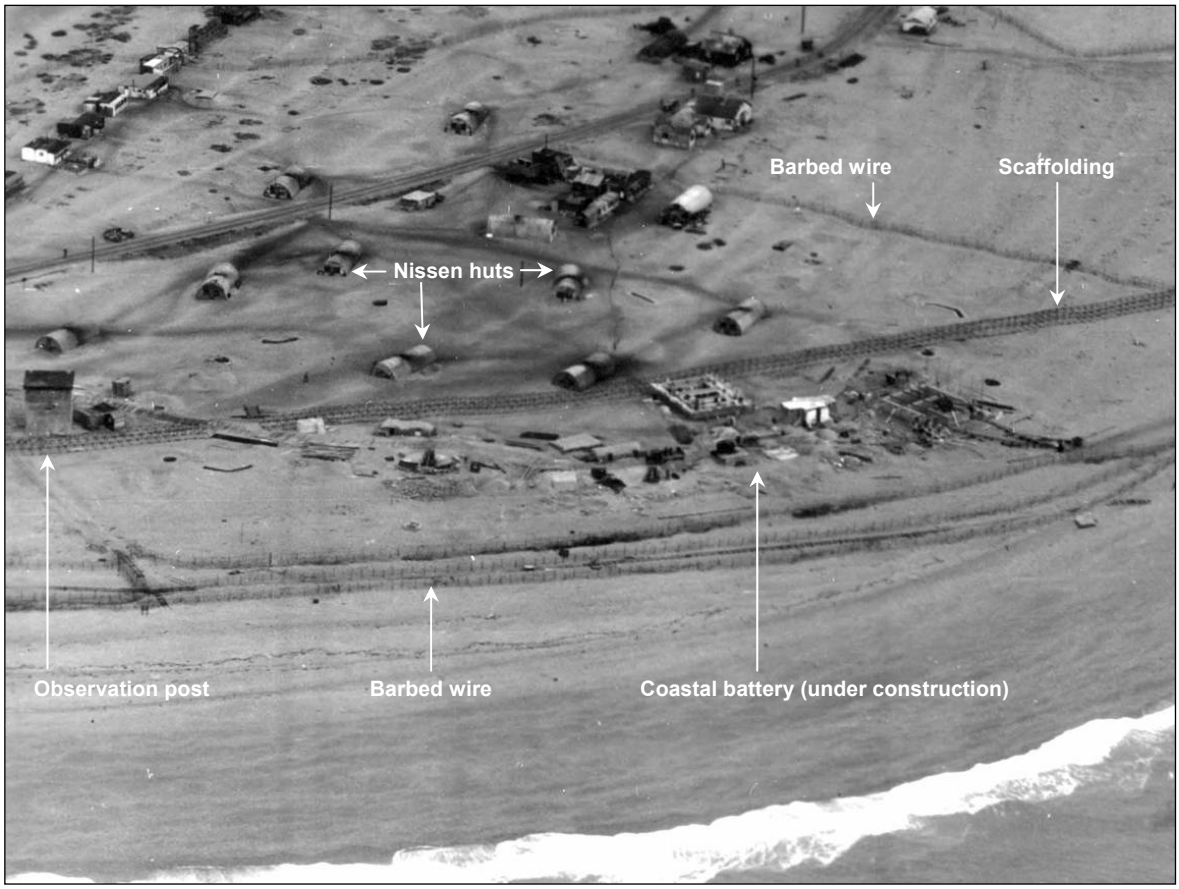

Figure 6.70: Dungeness West Coastal Battery under construction in 1941 (NMR: 1485941). Photograph: NMR TR 0917/2 RAF/GHQ/156 0653 27th May 1941. English Heritage (NMR) RAF Photography.

The beach defences included long sections of beach scaffolding, often complemented with barbed wire entanglements on the beach and with gun emplacements and pillboxes nearby. Long lines of anti tank obstacles, in the form of concrete blocks, cylinders, concrete anti-tank 'pimples' and concrete anti-tank 'coffins' were also visible. These were also supplemented with pillboxes, gun emplacements, machine gun pits and minefields as well as the coastal batteries discussed in Section 6.4.3.4.4 below.

The low-lying area of Pevensey Bay offers a strategically good landing place for invading forces, and extra layers of Second World War defences are visible in the area on the aerial photographs. Between Cooden, Bexhill and The Redoubt, Eastbourne, a double row of 'coffins' were placed in a continuous line (NMR: 1542279, 1541186, 1542839, 1542837, 1541151, 1542834 and 1542836). The concrete blocks were spaced at 40 per 100 metre stretch. Extrapolating this for the 11.7 kilometres between Bexhill and Eastbourne results in a total of approximately 9394 concrete coffins along the coast at Pevensey Bay.

In some areas, such as at Bexhill, two separate lines of beach scaffolding were visible on the aerial photographs. It seems that the beach scaffolding was initially placed about 100 metres out to sea, but was later supplemented by extra scaffolding along the head of the beach. As already mentioned (section 6.2.3.1.2) the scaffolding was initially designed as an obstacle to boats and was therefore constructed at the half tide mark, but it was later adopted as an anti-landing or anti-tank barrier and therefore additional lines were constructed above the high tide mark on vulnerable beaches. This also served to protect the scaffolding from the tide. Much tidal and wave damage was caused to the lower

sections of scaffolding, as is evident in some of the aerial photographs (see *Figure 6.71*, below).

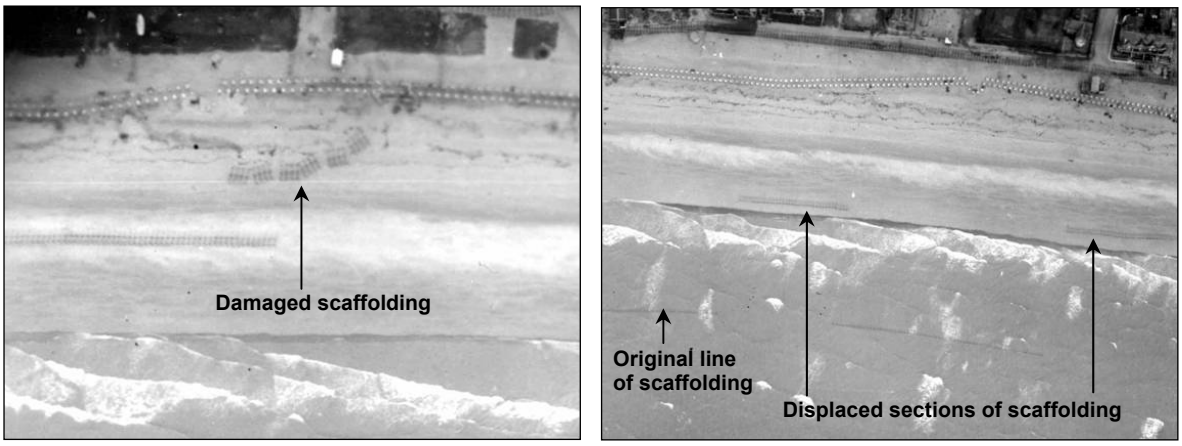

Figure 6.71: Beach scaffolding 'dislocated' by the tide at Pevensey Bay. Photographs: NMR RAF/GHQ/156 17 27th May 1941 (left) and NMR RAF/GHQ/156 18 27th May 1941. English Heritage (NMR) RAF Photography.

The various lines of physical barriers were protected by pillboxes, gun emplacements, and slit trenches. These structures varied in size and design, although in many cases it is difficult from the aerial photographs alone to clearly distinguish their specific details. Many were camouflaged, some were sunken or partially covered in sand (see *Figure 6.73*) and some were only visible on poorer quality photographs. However, some similarities in many of the pillboxes or gun emplacements were discernable, such as the repetition of squat L-shaped pillboxes visible on aerial photographs of Pevensey Bay (*Figure 6.72*). These seem to fit the design of what Osbourne calls a 'beach defence pillbox', extant examples of which have also been identified along the beach at Tywyn in Gwynedd (Osbourne 2004, 269).

Figure 6.73 below shows a section of beach east of Norman's Bay, with many forms of defences. The centre of the image shows a sand-covered feature which resembles an infantry section post, beside a possible partially sunken polygonal pillbox to which it may have been connected via a covered trench (NMR: 1541224). To the east of these is a further group of structures (NMR: 1541222), which comprise a possible gun emplacement and polygonal pillbox beside an open structure which may have served as an ammunition dump or store. Due to the fact that these structures do not fit clearly into any standard design and we only have vertical aerial views of them, it is very difficult to determine their exact function. However, their position on the beach in front of and in between the anti-tank blocks clearly suggests an active defensive role. In other examples within the project area, documentary sources allowed more accurate interpretations to be assigned to these sorts of buildings and structures. However, in most cases they have had to be classed as gun emplacements, which is likely to have been the main use for them.

The local variations and unique designs along this stretch of coastline (most of which do not survive) were probably formulated on site to meet particular needs or to suit the locally available construction materials. Royal Engineers' officers, garrison commanders and builders may all have had input into the design, siting and tactical use of these fixed defences (Osbourne 2004, 39).

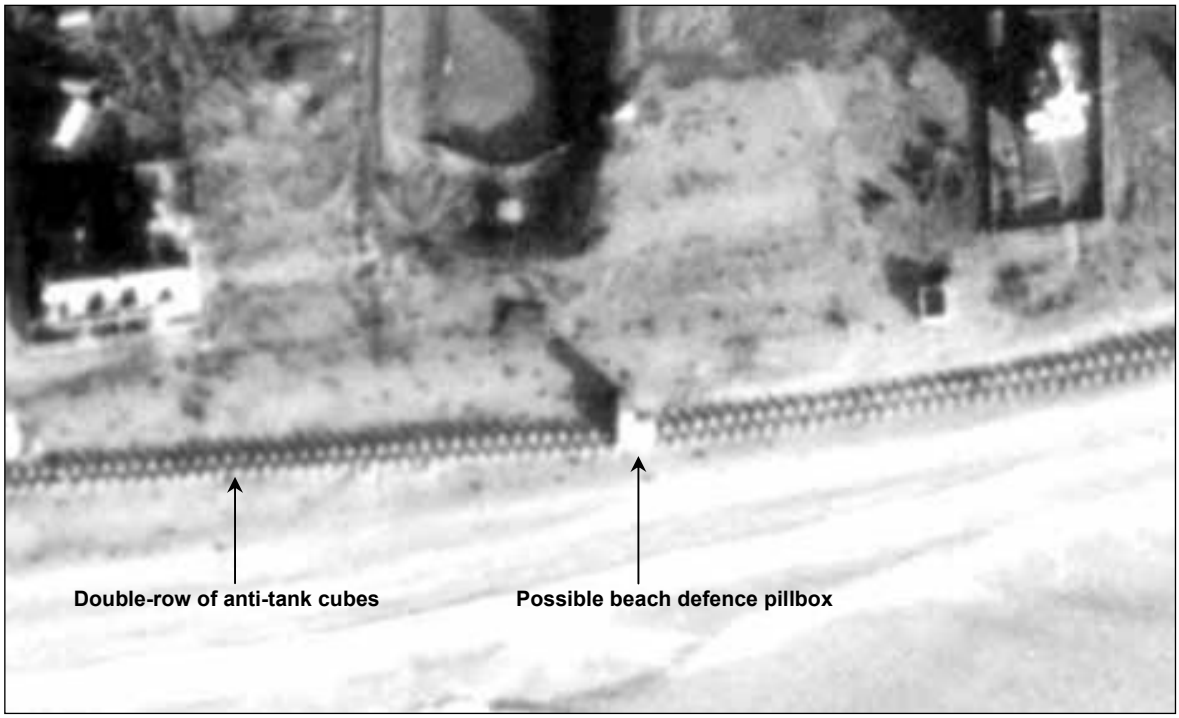

Figure 6.72: Fixed beach defences at Pevensey Bay (NMR: 1542804). Photograph: NMR RAF/CPE/UK/1751 4009 21st September 1946. English Heritage (NMR) RAF Photography.

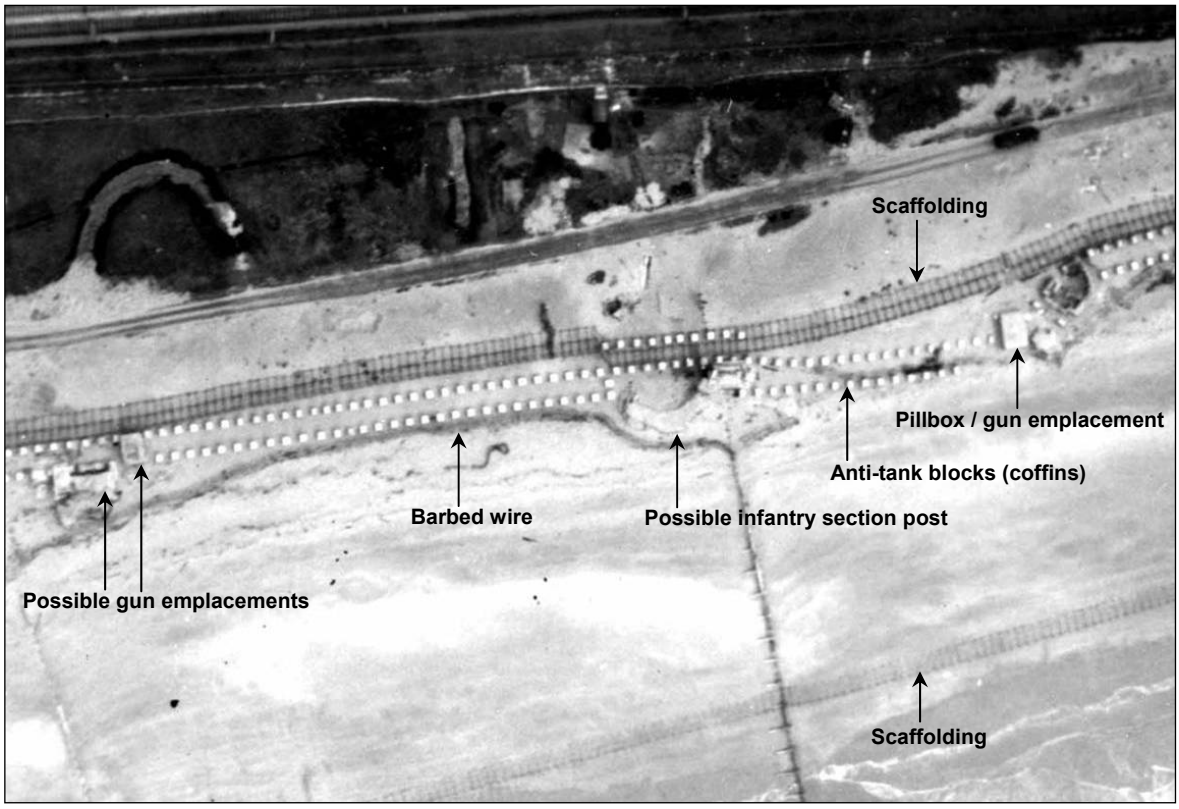

Figure 6.73: Various types of beach defences at Norman's Bay (NMR 1541222, 1541224). Photograph: NMR RAF/GHQ/156 36 17th May 1941. English Heritage (NMR) RAF Photography.

More standard designs of pillboxes and gun emplacements were identified around Rye Harbour, where most are local variations on the Type 28 design. Some of these had very long, narrow embrasures, whereas some, as at Rye, had large open embrasures (NMR: 1421421, see *Figure 6.74*, below). A large number of both these types were located on Camber Sands.

Figure 6.74: Two surviving Type 28 pillbox variations also known as machine gun emplacements located at Willow Lane, Winchelsea Beach (left, NMR: 1539740) and Rye Harbour (right, NMR: 1421421). Others were located on Camber sand dunes, but most of these are now buried beneath new dune formations. Photographs: © Simon Carey (left) and © Cathy Cox (right) and licensed for reuse under the Creative Commons Licence.

6.4.3.4.2 Other anti-invasion defences

The majority of anti-invasion features were located on or near the beach, but many other anti-invasion defences were visible further inland. These defences were needed to hold an invasion at bay long enough to mobilise an appropriate force. Therefore anti-aircraft obstructions, anti-tank obstacles, road blocks, and pillboxes were all constructed behind the coastal crust beach defences, adding an extra layer of fortification.

In low-lying regions within the project area eleven aircraft obstructions were recorded, all of which were new to the NMR (AMIE) database. At Camber (NMR: 1537839), around St Mary's Bay (NMR: 1535075), Dymchurch (NMR: 1532810) and Hythe (NMR: 1532810) the aircraft obstructions were visible in the form of anti-glider poles. Lines of poles formed criss-cross and honeycomb patterns across areas with the potential to be used for landing enemy aircraft (see *Figure 6.75*, below). It is likely that the poles covered a much more extensive area across Romney Marsh, but only small areas were faintly visible on the available aerial photographs. An example can be seen on the golf course located north of

New Romney where incomplete hexagonal shapes are defined by poles (NMR: 1535072; 1535073; 1535074). It seems likely that these would have covered the whole golf course.

There was also an extensive gridded network of anti-glider poles (NMR: 1535077) on the early twentieth century civilian airfield at Littlestone. An anti-aircraft ditch (NMR: 1535108) also cuts across the name of the airport within the large landing circle. The airport name had been cut into the turf in letters roughly six metres tall (NMR: 1535604). As the airfield was located near to the coast, it was probably deemed too vulnerable to attack to be used as an RAF Emergency Landing Ground.

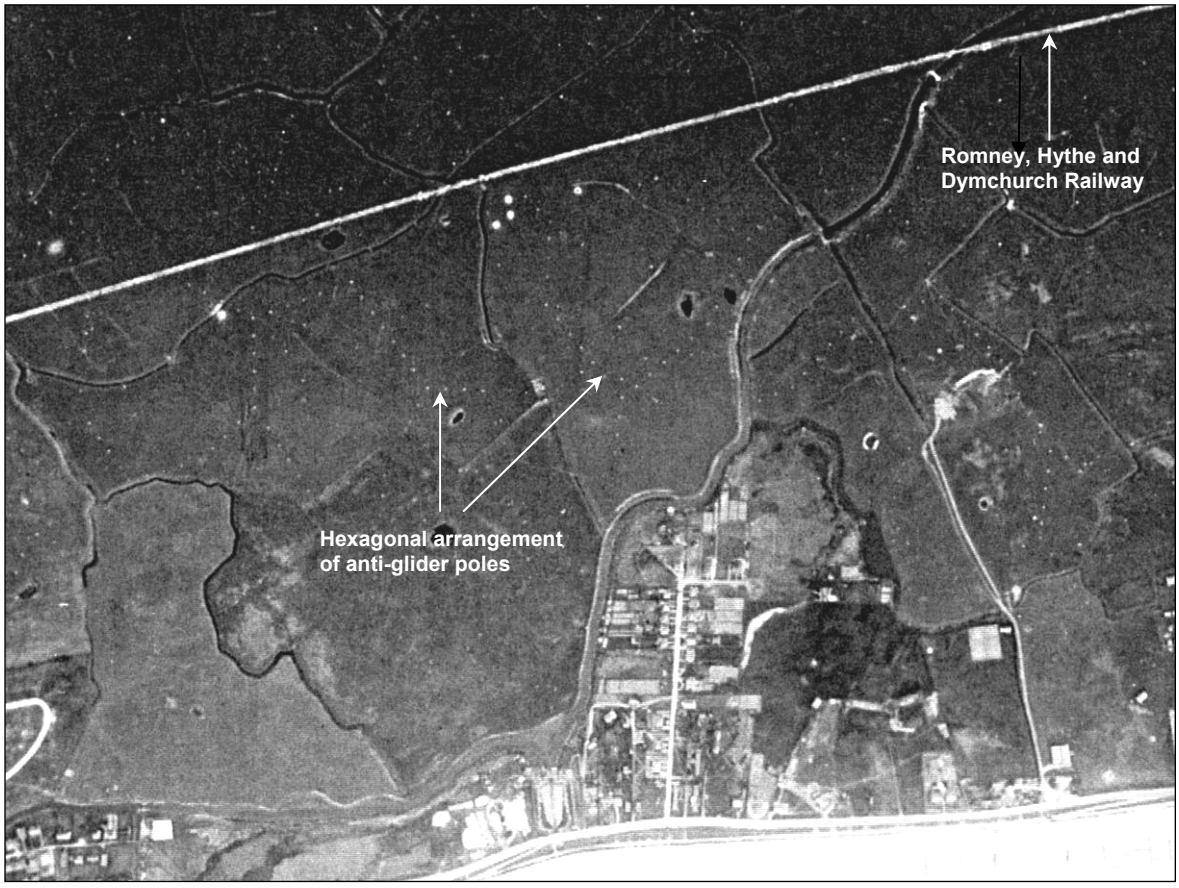

Figure 6.75: Anti-glider poles in a 'honeycomb' pattern at Dymchurch (NMR: 1532810). Photograph: NMR RAF/GHQ/106 28 14th May 1941. English Heritage (NMR) RAF Photography.

St Mary's Bay was also defended by a large anti-aircraft or anti-tank ditch (NMR: 462723 and 1535103) which cut through the western side of the town between the natural obstacles of New Sewer drain in the south and Clobsden Sewer drain in the north. Anti-tank ditches were generally used on the inland GHQ stop lines which were designed as a major obstacle to enemy progress should the coastal crust defences fail (Osbourne 2004, 45). The location of the anti-tank ditches reinforced natural obstacles and other military defences, and were largely dictated by local geography and military strategies. Other large anti-tank ditches were located at Langney Point (NMR: 1429820, see *Figure 6.78*, below), Winchelsea Beach (NMR: 1539742) and Hythe (NMR: 1536355). At Dymchurch (NMR: 1531497) the anti-tank ditch formed an enclosure breaking up an open and flat area within the village. At Cooden, Bexhill, a zigzag ditch was visible with its spoil heaped

in circular mounds along the sides of the ditch, forming a further obstruction to invading forces. Before the project only one anti-tank ditch had been recorded in the NMR database in the Component 2 area but seven more have been added as a result of the aerial survey.

Within the towns and other built up areas, road blocks and anti-tank pimples were the preferred anti-tank obstructions. Roadblocks were constructed on most of the roads extending northwards away from the sea at Bexhill, Hastings, Hythe and Eastbourne. These mainly consisted of an obstruction which extended across the road, sometimes with a short gap to permit pedestrian access. Some were probably movable to allow access by civilian and military vehicles, but some were clearly far more permanent. At Eastbourne it has been suggested by Butler (2007, 66) that the roadblocks were in fact requisitioned beach huts laid on their sides and filled with pebbles. This can be clearly seen on aerial photographs from 1940 showing rectangular blocks stacked across the road (see *Figure 6.76*, below). Many roadblocks were only visible as concrete pimples either side of the road, with markings which may indicate possible hedgehog or hairpin arrangements. These comprised bent steel girders that could be slotted into concrete sockets set into the road surface (Lowry 1996, 88). Although all the road blocks were removed after the war, it is possible that some evidence for these sockets may still be visible on the road surface, subject to modern road improvements.

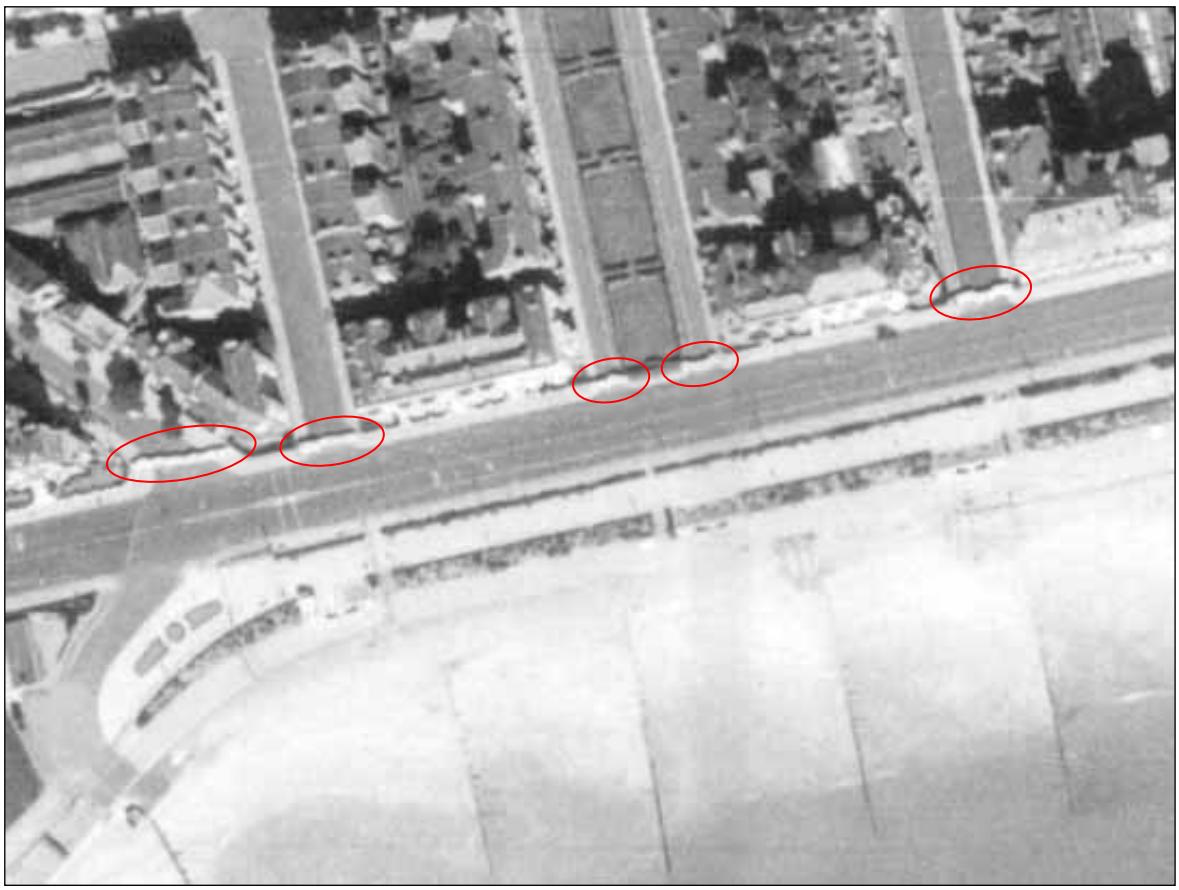

Figure 6.76: The possible beach hut roadblocks at Eastbourne (ringed in red). Photograph: NMR RAF/26J/UK/1058 A19 29th July 1940. English Heritage (NMR) RAF Photography.

As mentioned above, anti-tank concrete blocks were placed along many of the sandy beaches along the East Sussex coastline, but smaller concrete 'pimples' were also placed further inland at locations which were also deemed vulnerable. These more closely spaced anti-tank obstructions were identified at Beachlands, Pevensey Bay (NMR: 1417606), where gaps between buildings adjacent to the beach were filled with rows of closely packed pimples. Similar arrangements were also visible at The Crumbles, Pevensey Bay (NMR: 1542828, see *Figure 6.77*, below), parallel to The Grande Parade, Hastings (NMR: 1427026) and west of Hythe (NMR: 1536360). Most of the anti-tank pimples were removed after the war but some seemed to have been reused, often not in their original location. The Defence of Britain project recorded anti-tank pimples (NMR: 1417606) along the edge of the Coast Road, east of Marine Avenue at Beachlands, but the 1940s aerial photographs show that they were not originally placed that far east.

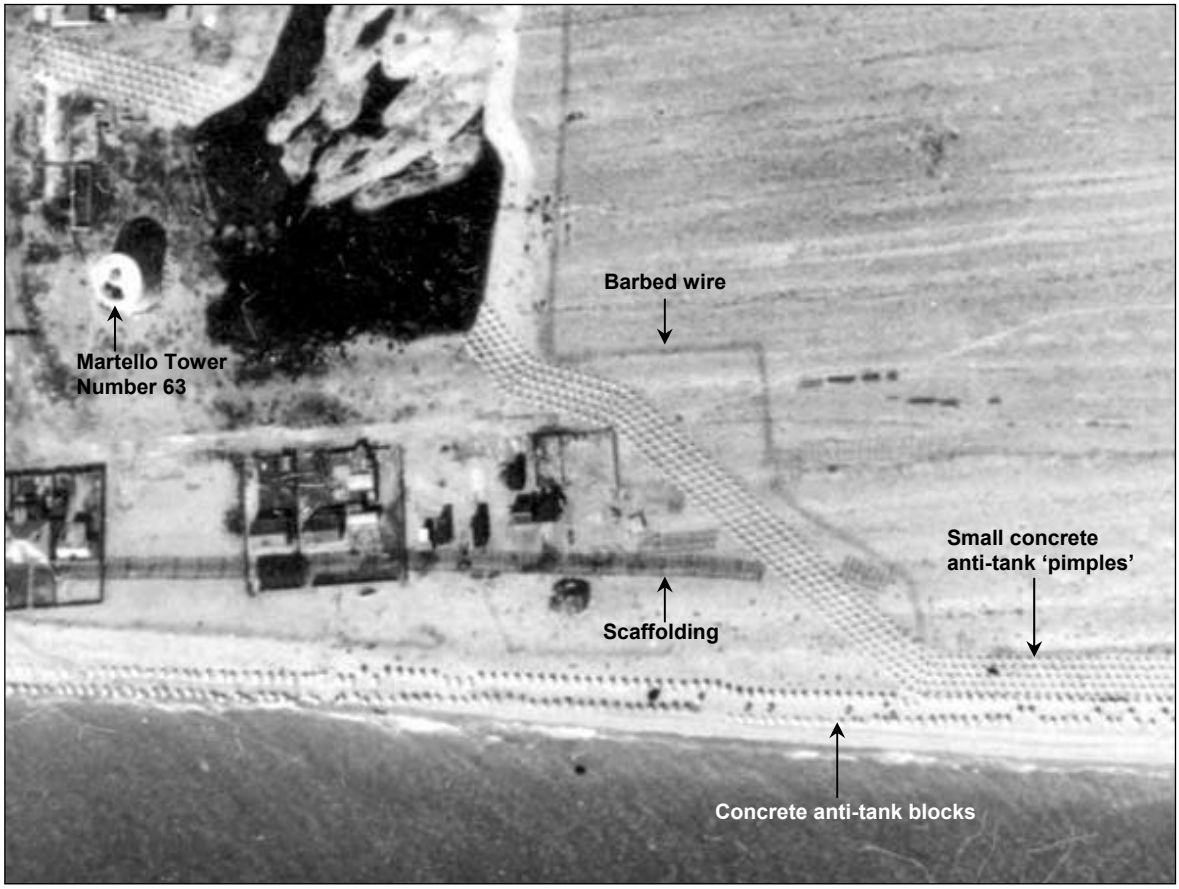

Figure 6.77: Anti-aircraft pimples on The Crumbles, Pevensey Bay (NMR: 1542828). Photograph: NMR RAF/S428 22 21st August 1941. English Heritage (NMR) RAF Photography.

As well as the anti-tank blocks, pimples and ditches, the anti-tank wall at Langney Point was also mapped and recorded. During the war this was an open area of bare coastal shingle, and the four metre wide wall extended across it for about 394 metres. *Figure 6.78*, below, shows that the anti-tank wall was part of a much larger defensive network across the vulnerable low-lying area of Langney Point and Pevensey Bay.

During the project a large number of pillboxes and or gun emplacements were recorded, many of which were newly created in the NMR database as a result of the aerial survey. In many cases the type of pillbox was identifiable, either from the shape of building or from

supporting documentary sources. In some cases however it was not possible to use a more precise monument type than PILLBOX or GUN EMPLACEMENT; terms which cover a range of varied building and structure types.

Many strategically placed pillboxes were visible along potential routes which an invasion force could use to push inland. These included numerous pillboxes recorded along the nineteenth century Royal Military Canal at Hythe, typically of the standard Type 24 design (e.g. NMR: 1424679 and 1424677). Many were also placed on higher ground, with a good field of fire over the surrounding beaches, such as one near Rockhouse Bank Farm, Normans Bay (NMR: 1541210) and at Sandgate Esplanade, Folkestone (NMR: 1422554). Some were also located at crossroads or bridge crossings as at Botolph's Bridge Road, Hythe (NMR: 1427423) and at Wallsend Road railway bridge, Pevensey (NMR: 1542652), both of which were also accompanied by other defences.

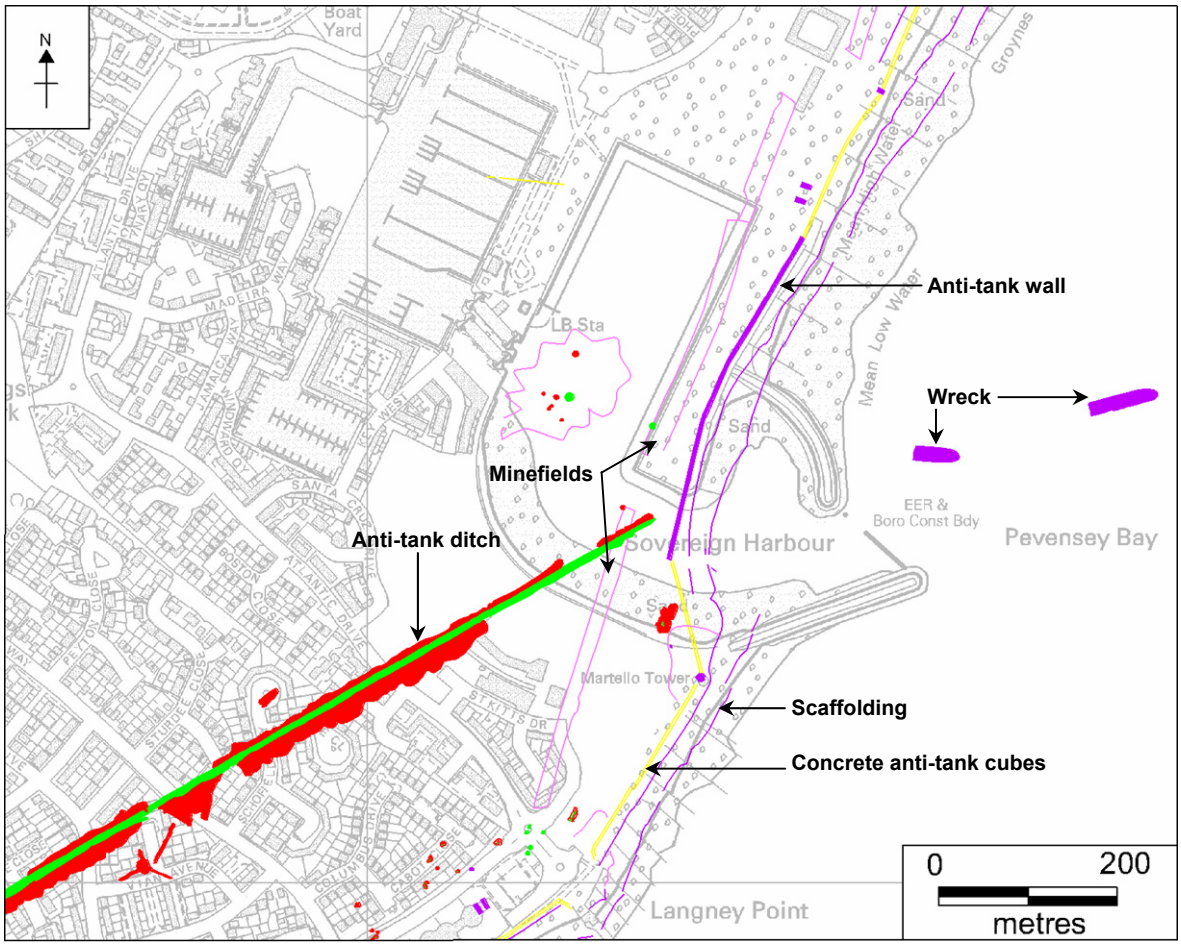

Figure 6.78: Second World War anti-tank defences at Langney Point, Eastbourne. OS Map Base © Crown Copyright. All rights reserved. Gloucestershire County Council 100019134 2011.

6.4.3.4.3 Minefields

Minefields were integrated into the Second World War anti-invasion defence schemes in order to cover gaps or to reinforce their overall strength. These were only visible on aerial photographs if the sortie was flown either shortly after the mines were buried, or shortly after they were removed after the end of the war. These minefields were intended to be subsurface structures which were as unobtrusive as possible. The mines that were removed often left behind holes up to 2.5 metres wide, suggesting that they were anti-tank, rather than anti-personnel mines.

Minefields do not seem to have been common along the south east coast, with only fifteen recorded in Component 2. Perhaps this is because of the proximity of civilian populations. There were three minefields on the Hythe Ranges (NMR: 1532929, NMR: 1532865 and NMR: 1533044). These were integrated into the wider network of defensive features, with barbed wire obstructions extending right up to some of them (see *Figure 6.79*, below).

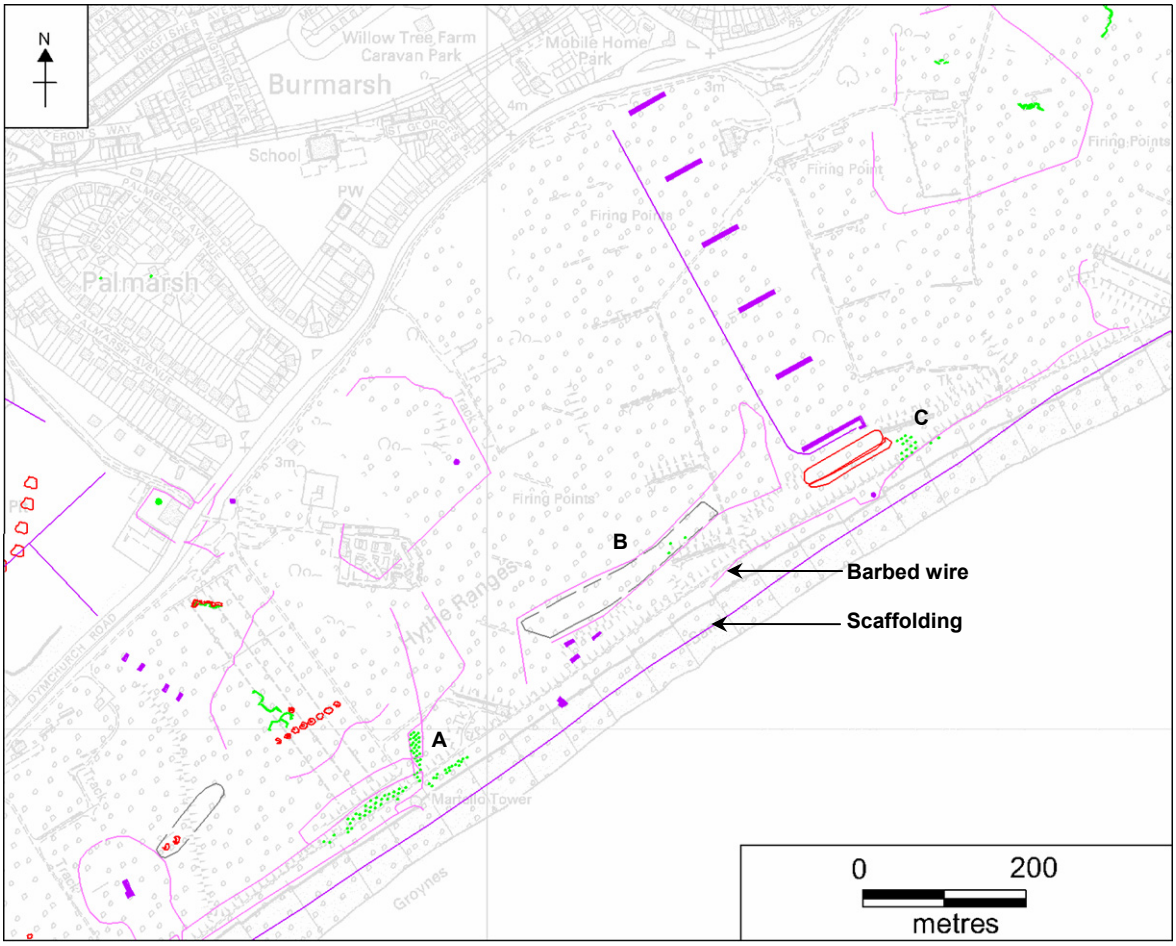

Figure 6.79: Minefields in the Hythe Ranges (labelled A,B & C). They provided a secondary layer of defence behind the beach scaffolding, and to some extent prevented movement parallel to the coast. OS Map Base © Crown Copyright. All rights reserved. Gloucestershire County Council 100019134 2011.

In other areas, minefields were relatively isolated defensive sites used to provide passive cover to a vulnerable defile or protect a strategic objective. At Rye a minefield (NMR: 1539789) was sited to cover the only approach to the town across the salt marshes which

crosses relatively dry-looking land. Another minefield (NMR: 1539798) was located on the eastern bank of the River Rother close to the entrance to Rye Harbour. This was to reinforce a system of barbed wire obstructions and banks preventing a landing on Camber Sands. Minefields also extended along the southern side of the railway embankment crossing Pevensey Level (NMR: 1542795).

6.4.3.4.4 Coastal batteries

During the survey 24 NMR records for Second World War coastal batteries were updated in the Component 2 area. Three new coastal batteries were also recorded along with a further three possible sites, which may have housed smaller anti-aircraft guns. It was often not possible to tell from the aerial photographic evidence alone the exact function of the military installations.

Like the nineteenth century Martello Towers before them, the coastal batteries were placed at strategic defensive locations. For example the low-lying and potentially vulnerable area of Dungeness had three batteries (NMR: 1485942; 1485941 and 1533417), as did Folkestone (NMR: 1421772, 1485854 and 1485863).

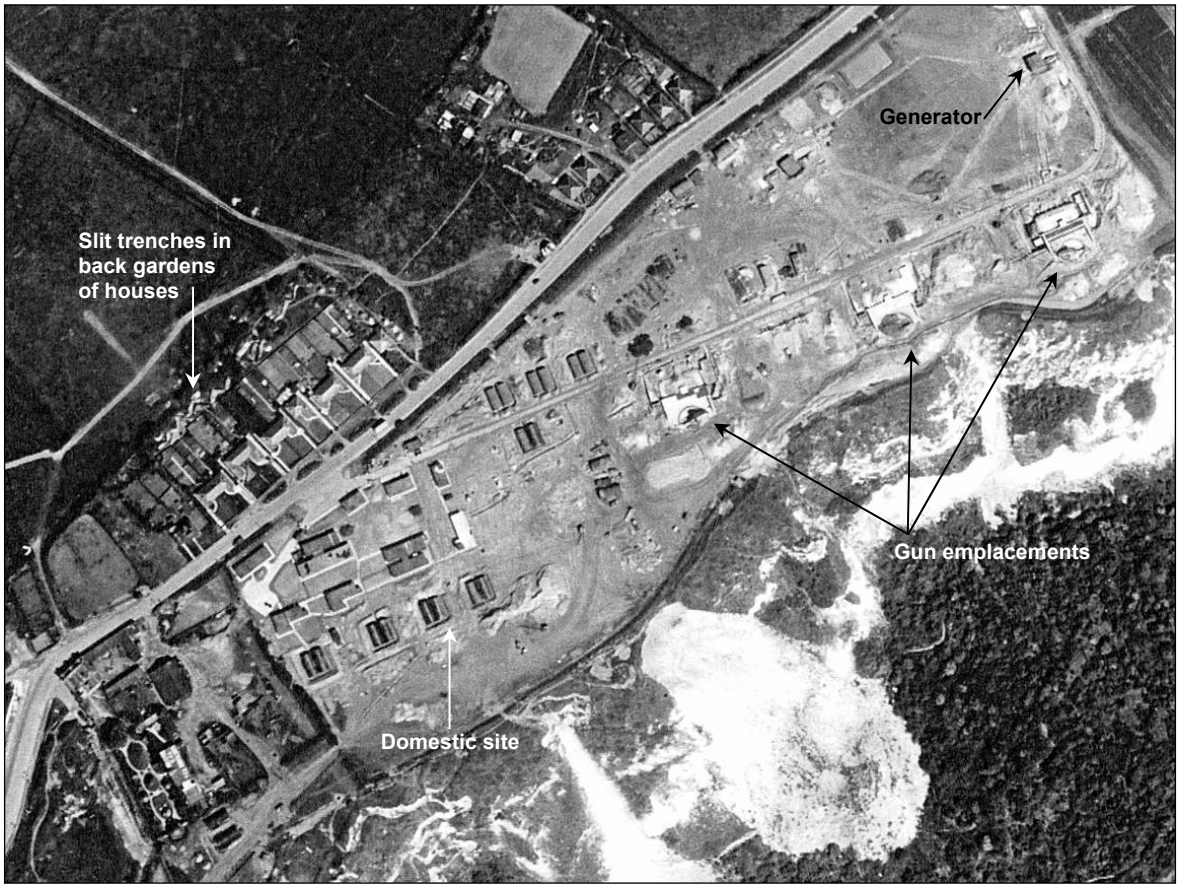

Figure 6.80: Capel Battery, east of Folkestone, with the three gun emplacements, and adjacent purpose-built barracks (NMR: 1416952). Photograph: NMR RAF/HLA/549 6031 1st June 1942. English Heritage (NMR) RAF Photography.

The coastal batteries differed slightly in their layout, depending on the size of gun used or geographical and topographical location, but they usually comprised two to three large gun emplacements. Many, such as that at Normans Bay (NMR: 1429229) also comprised two searchlight emplacements, located either side of the battery (see *Figure 6.81*, below). The batteries also had at least one observation post, but sometimes two, as at Winchelsea (NMR: 1485951). The observation posts differed in construction, especially where they made use of earlier military structures. Many nineteenth century Martello Towers (e.g. Martello Tower No. 61 at Pevensey Bay; NMR: 411836) were topped with Second World War battery observation posts. These pre-existing structures were ideal for this purpose, due to the elevated position they provided in otherwise very flat locations.

Barracks were often constructed beside or near to the guns, as at the Capel Battery, (NMR: 1416952). This example had purpose-built barracks buildings in a self-contained area (see *Figure 6.80*, above), but many, for example Cooden (NMR: 1485960) and Pevensey Bay (NMR:1429228) batteries used existing houses, requisitioned during the war. At Toot Rock (NMR: 1429235), between Fairlight and Wichelsea, the gun emplacements were built between three existing houses, and the eastern gun emplacement was reused as a house after the war.

The batteries were complemented by additional firepower, in many cases provided by Type 23 pillboxes (often two), which would have had anti-aircraft positions as well as embrasures for machine guns. Evidence of machine gun pits and spigot mortar emplacements are also visible at some of the coastal batteries such as at Dungeness West Battery (NMR: 1485942) and at Norman's Bay (NMR: 1429229).

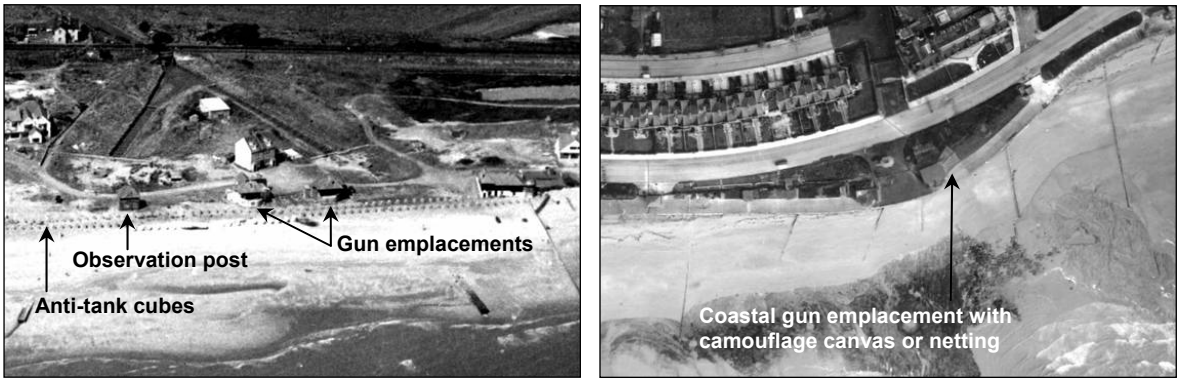

Figure 6.81: Norman's Bay Battery (left, NMR: 1429229) and Marine Parade Battery, Bexhill (right). Photographs: NMR RAF/CAL/UK 0095 14th August 1947 (left) and NMR RAF/GHQ/156 58 27th May 1941. English Heritage (NMR) RAF Photography.

Camouflage was an important part of these defensive structures. Many had pitched roofs resembling houses from above, helping them blend into the surrounding landscape, or were covered with camouflage netting, breaking up their blocky silhouettes (see *Figure 6.81*). At the Norman's Bay battery, both the accompanying searchlight emplacements were concealed by being incorporated into the sites of existing houses. The two gun emplacements themselves were also painted to look like houses from a ground level perspective (see *Figure 6.81*, above).

Two possible new beach defence batteries (which may alternatively be coastal batteries or anti-aircraft batteries depending on the interpretation) were also identified. One was located southeast of Winchelsea (NMR 1539745) and the other was at St Mary's Bay (NMR: 1535091). Interestingly they appear to adhere to an almost identical standard

design, with two seaward facing gun emplacements and a possible command post to the rear, which were all connected by trenches (see *Figure 6.82*, below).

Figure 6.82: Possible beach defence batteries at St Mary's Bay, (right) (NMR: 1535091), and south east of Winchelsea (NMR 1539745 (left). OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2011.

6.4.3.4.5 Diver batteries

Operation Diver was instigated to counter the threat of the German V1 flying bomb. The flying bomb offensive against the UK began on 13th of June 1944, but British military intelligence was such that the defensive operation against the V1 was conceived in the Spring of 1944, before any of these rockets were launched. The Diver operation employed not only anti-aircraft guns, but also searchlights, balloon barrages, fighter aircraft, bombers, radar, visual early warning and intelligence to meet its aims (Dobinson 1996d, 1).

Of the 161 Diver batteries (these included heavy anti-aircraft batteries as well as Rocket Projector Batteries) and light anti-aircraft (Diver) batteries that were previously recorded within the project area, only 14 were visible in some form on the aerial photographs. Dobinson states that the Diver batteries were all temporary, and whilst many were occupied for several months, the most transient were in action for only two days (ibid). Therefore it is not unexpected that the majority of the Diver batteries, particularly the mobile Light Anti Aircraft units, left little or no visible trace of their presence. Many were

sited on roads or other areas of hard-standing, which would have borne no sign of the former battery sites once they were removed.

The Coastal Belt Diver Batteries (which make up all of those identified within Blocks K, G, H and J) were deployed between July 1944 and August 1944 and closed or redeployed a month later. Unfortunately there were no available aerial photographs of the relevant sites taken in 1944. There was good vertical coverage of the project area for 1946, but the majority of these types of battery sites had been levelled or cleared by 1945. With all these limitations it was surprising that we found any evidence at all of the Diver batteries on the 1946 aerial photographs, as in the example at Palmarsh, in *Figure 6.83* below.

Figure 6.83: Typical layouts of heavy anti-aircraft Diver batteries visible as cropmarks (left) at Palmarsh and earthworks (right) at Littlestone (NMR: 1477216 and NMR: 1477203). Photographs: NMR RAF/106G/UK/1112 3098 12th January 1946 (left) and NMR RAF/106G/UK/1439 9025 30th April 1946. English Heritage (NMR) RAF Photography.

Remains of the heavy anti-aircraft Diver batteries made up the majority of the Diver batteries visible on aerial photographs. *Figure 6.83* shows the typical layouts of the Diver batteries mapped within the Component 2 project area, which were most often visible as cropmarks or parch marks. The battery at Littlestone (NMR: 1477216) is interesting in that it was still visible as earthworks in 1946.

All of the pre-project Diver battery records within the NMR were taken from Dobinson's gazetteer (1996). Although this source provides grid references for each of the sites, most are slightly inaccurate, having been converted from Cassini Map coordinates which were in use during the war. The NMR has been greatly enhanced by this aerial survey in that Diver batteries which were visible on aerial photographs now have much more accurate locations recorded, as well updating the records for which no features were visible on the available aerial photographs.

6.4.3.4.6 Embarkation hards

Three embarkation hards were visible on the aerial photographs and were mapped and recorded as part of the project. The embarkation hards were known from documentary evidence but the aerial survey has updated these records with precise locations. The three embarkation points were located on the seafront at Hythe (NMR: 1470634; NMR: 1535881 and NMR: 1470627).

They were all built by the Admiralty between 1942 and 1943 under the control of Dover Command in preparation for D-Day. They were temporary quays comprised of four berths for landing craft carrying troops and a concrete loading ramp equipped with steel framed mooring points. Nothing now remains of the hards, which demonstrates the value of historic aerial photographs in enhancing the NMR and HERs (see *Figure 6.84*, below).

Figure 6.84: Two of the embarkation hards on the seafront at Hythe (NMR: 1470634 and 1535881). Photograph: NMR RAF/106G/UK/541 3069 24th July 1945. English Heritage (NMR) RAF Photography.

6.4.3.4.7 Bomb craters

That the south east coastline was a target for German bombing is evidenced by a total of 88 bomb crater records newly created in the NMR database. These include single craters, as well as large clusters. From the available aerial photographs taken during and after the war, there appear to be particular concentrations of bombing activity around Rye Harbour, Dungeness Point and Greatstone-on-Sea. As there are no obvious strategic targets here, with the exception of the coastal batteries at Jury's Gap and Dungeness Point, this cluster of bomb craters possibly reflects the flight paths of the German Luftwaffe; releasing bombs prior to their return back to base. Alternatively it may reflect the areas where there was less urgency to repair craters. Those craters visible on farmland or near urban areas were, on the whole, filled in and levelled but on the marshes they were left and some are still visible as earthworks on recent aerial photographs.

However, the groups of bomb craters visible at Shoreham-by-Sea are more likely to reveal a genuine target of the Luftwaffe. In addition, most of the rows of houses near the beach seem to have been levelled deliberately by the British military (see *Figure 6.85*, below), to form a better field of fire for the artillery guns (Butler 2008, 51). Shoreham-by-Sea was a fairly substantial harbour which included dockside warehouses and factories, so it was probably thought to be a potential enemy invasion point as well as a strategic target.

Butler (ibid) refers to this area as a Shanty Town (or Bungalow Town), which may partly explain the attitude to these houses; this wholesale demolition of seaside properties was not a strategy that was employed anywhere else along this stretch of coastline. Although it is likely that the urban towns, such as Eastbourne, Hastings and Folkestone also suffered much from German bombs, the 100 metre reduction of the project area was too narrow to gauge the density of bombing in these areas.

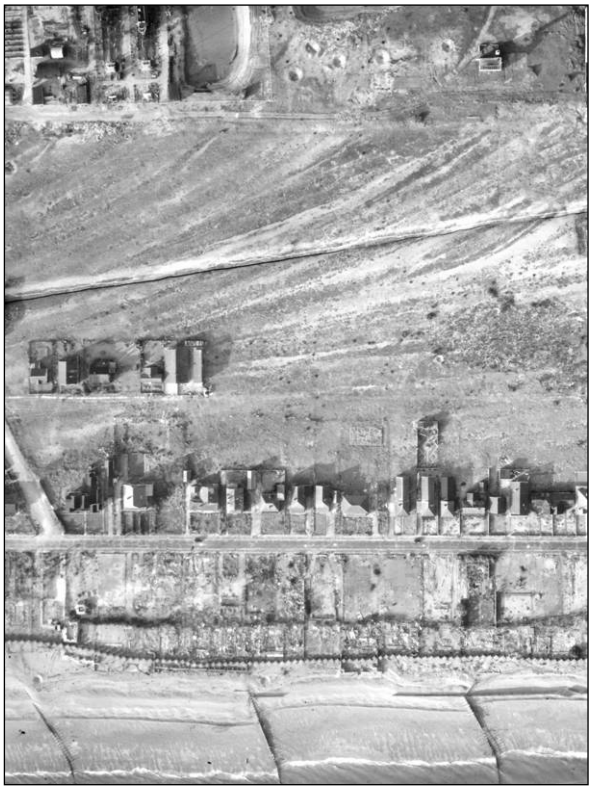

Figure 6.85. Shoreham-by-Sea, with a cluster of bomb craters at the top of the photograph and the flattened homes of the 'shanty town' that were demolished to allow a clear field of fire for artillery at the bottom.

Photograph: NMR RAF/106G/UK898 (PART I) 6055 8th October 1945. English Heritage (NMR) RAF Photography.

6.4.3.4.8 Other military features: Operation PLUTO

Four sites were identified within the Component 2 project area which have been interpreted as having been associated with Operation PLUTO of the Second World War. The acronym stands for Pipeline Under The Ocean. It was an ambitious, imaginative and hugely successful plan to safely and reliably supply fuel across the bottom of the English Channel to Allied forces in Northern France and beyond (Searle 1995).

These sites were all within Block K, and included three pumping stations and a stranded pipe-laying drum (see *Figure 6.86* and *Figure 6.87*, below). The three pumping stations (NMR: 1533387, 1533740, 1533384), all located on the coast just north of Dungeness consisted of pumping houses, tall upright cylindrical storage tanks of some sort, and large pits in the shingle (of unknown function). The pumping houses were disguised as residential houses and a chapel (Greatstone Website 2011, Romney Deanery 2011, Geograph 2011, Romney Marsh Guest Houses 2011).

The fuel pipelines which ran from these sites on the Kent coast, to Boulogne, France were unravelled from enormous cylindrical drums pulled behind specially adapted pipeline-laying ships. During this process, one of the drums broke free and washed up on the beach at Greatstone-on-Sea (NMR: 1533741, see *Figure 6.87*, below) (Greatstone Website 2011).

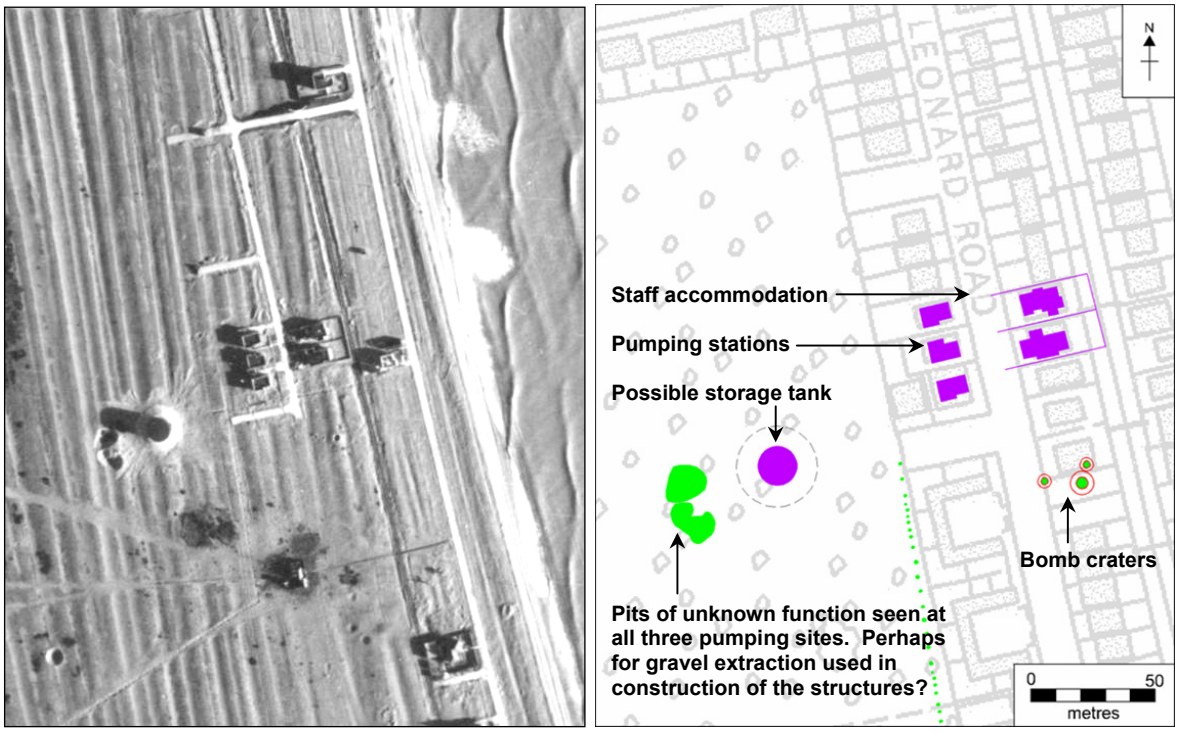

Figure 6.86: The PLUTO pumping station north of Lade, Dungeness (NMR: 1533740). Photograph: NMR CPE/UK/1752 3002 21st September 1946. English Heritage (NMR) RAF Photography. OS Map Base © Crown copyright. All rights reserved. Gloucestershire County Council 100019134 2011.

Prior to this project, none of these sites had been recorded in the NMR or the local HER, even though they were known through documentary evidence. As the pumping stations' buildings all survive to this day, their identification in the record will be a valuable resource in heritage protection.

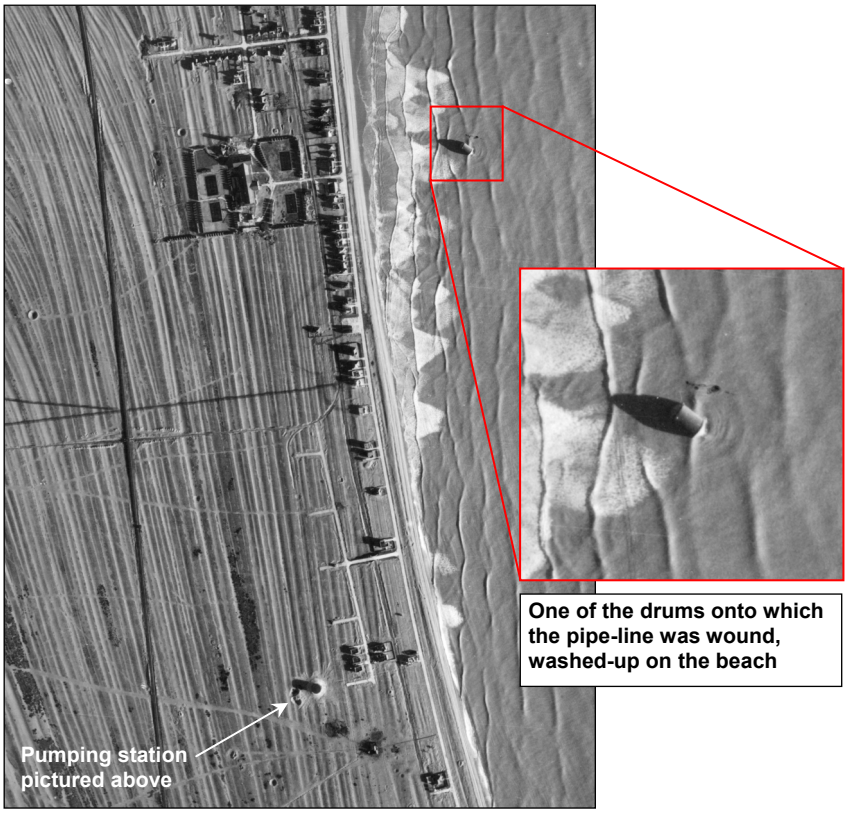

Figure 6.87: The beached pipeline-laying drum at Greatstone-on-Sea (NMR: 1533741).

Photograph: NMR RAF/CPE/UK/1752 3002 21st September 1946. English Heritage (NMR) RAF Photography.

7 Conclusions

During the Component 1 and Component 2 mapping a total of 2,382 sites were mapped and recorded in the project databases. Of these, 76% were for sites previously unrecorded prior to the mapping. Of particular note is the large number of Second World War sites across both Components; within Component 1 46% of new sites date to this period and for Component 2, 92.5%. Many of the existing records were sourced from documentary evidence or created as part of the Defence of Britain project and have been enhanced and more accurately located. This shows the importance of the primary aerial photographic source for depicting the wartime defences, as the photographs were taken at the time when many of these structures were still in use. Many of these buildings, structures and earthworks have since been demolished or levelled, particularly in the areas of the seaside resorts of Eastbourne, Bexhill, Folkestone and Brighton.

In addition within Component 1, particularly around Chichester Harbour, many new sites were identified within the intertidal area including groynes, jetties, wrecks and a small number of fish traps. Many other unspecified intertidal structures were also recorded, in the main using the digital imagery available from the Channel Coastal Observatory. This geo-referenced on-line image source proved invaluable when locating sites within the large expanse of intertidal mud flats that would have otherwise had no other more conventional form of rectification control. These recent colour images, along with those available on-line from web sites such as Google Earth and Bing, also proved an invaluable source of up to date data concerning the condition of sites recorded on earlier photography.

The results of the mapping have therefore significantly added to our understanding of the historic environment along the south east coast of England and has fulfilled the project aim of enhancing existing records and providing a more complete overview of the range and extent of archaeological remains from this period.

The enhancement to the NMR database as well as the local HER records will assist strategic planning decisions and in the management and preservation of archaeological sites and historic landscapes through Shoreline Management Plans (SMP).

The mapping and monument record descriptions will also assist the Phase 2 fieldwork stage of the SE RCZAS project, providing details about the extent and survival of all the archaeological features identified on the aerial photographs.

7.1 Outcomes

Component 1

The large numbers of sites recorded during the project were primarily dated to the later historical and modern twentieth century periods; however a small number of significant sites were identified for the first time that are possibly prehistoric in origin. These included a possible timber circle on the banks of the River Hamble, a potential barrow cemetery at Littlehampton, the site of a prehistoric round-house settlement or barrow cemetery at Meon and the potential site of a later prehistoric promontory enclosure on the west side of Thorney Island.

556 sites were dated to the medieval and post-medieval periods, over half of which were coastal or intertidal features. Numerous previously unrecorded structures were mapped, particularly within Chichester Harbour, including jetties, groynes and other linear arrangements of posts which may be the sites of fish traps.

The majority of sites encountered date specifically to the Second World War and twentieth century military activity. The coastline between West Wittering and Ferring was identified as particularly vulnerable to invasion during the war being heavily defended with multiple lines of beach defences including pillboxes, anti-tank cubes and beach scaffolding. Most of the sites identified had not previously been recorded in the NMR and HERs and therefore the project has resulted in a significant increase in knowledge of the extent and range of these features.

Component 2

The large number of twentieth century military sites identified by Component 2 dominate the record and this report. Although the high number of Second World War defensive features was predicted before the project, their sheer number and extent, even in areas of coastline where mapping was reduced to a 100 metre strip, has allowed the project to add significantly to our understanding of military defences employed on the south east coastline.

Although few later prehistoric and Roman sites were visible on the aerial photographs, monument records of these periods were updated and clarified. Of note is the possible Iron Age or Roman field system at Beacon Hill near Ovingdean, which was previously recorded as a Romano British pottery scatter in the East Sussex HER, but with no mention of the presumably associated field system. The prehistoric and Roman features which were mapped tended to occupy high ground above sea cliffs, which tallies with expectations that the more recent land reclamation and/or drainage of areas such as the Pevensey and Pett Levels and Romney Marsh meant that we should not expect to find later prehistoric or Roman period sites in many of the low-lying regions.

Despite the low tidal range along much of the project area, a few intertidal features were identified during the survey, the majority of which were known wrecks. It is likely however, that further investigation in the form of more detailed intertidal and marine surveys will reveal further archaeological features not visible on the available aerial photographs.

7.2 Recommendations

Continuing aerial reconnaissance. New specialist aerial reconnaissance has been fairly limited in both the Component 1 and Component 2 project areas compared to many other parts of the country, although there are concentrations of photographs of built structures such as piers and Martello towers. There were very few archaeological features visible as cropmarks or earthworks within the project area, so the potential for further sites to be identified through new aerial reconnaissance is not great, but targeting the small upland areas similar to Beacon Hill, where prehistoric and Roman activity were visible as cropmarks and earthworks could be beneficial.

Further Investigation of sites recorded from aerial photography. It is essential that those sites within Component 1 highlighted as of potentially prehistoric origin be investigated further, particularly the Thorney Island promontory enclosure, ring ditches and mounds at Littlehampton and the timber feature on the River Hamble. Numerous timber features were also mapped within Chichester Harbour which are assumed to be post-medieval or twentieth century in origin but in many cases no definite function or date could be established and further fieldwork is recommended. The Prehistoric and Roman archaeology mapped east of Brighton along with sites recorded by the adjacent Beachy

Head NMP survey (English Heritage forthcoming) may benefit from further field survey and analysis.

The majority of twentieth century military features mapped and recorded from aerial photographs were either removed or demolished by 1946. Therefore little remains of the vast number of military structures and buildings which defended this coastline. However, further ground-truthing using complementary archaeological techniques could significantly enhance knowledge and understanding of military sites where some remains survive.

Further NMP projects. The number of newly recorded sites, some of which are of regional or national importance, demonstrates the great potential of continuing the NMP survey further inland, which would also allow the archaeology mapped and recorded along the coast by this project more context from which to draw meaningful conclusions. In addition the limited coastal strip examined in urban areas of Component 2 resulted in some sites of interest visible on the aerial photographs not being mapped and recorded. Future surveys in these areas would further enhance the existing NMR and HER databases.

8 References

8.1 Map sources

Ordnance Survey Epoch 1, 1843-1893. 1:10,560

Ordnance Survey Epoch 2, 1891-1912. 1:10,560

Ordnance Survey Epoch 3, 1904-1939. 1:10,560

Ordnance Survey Epoch 4, 1919-1943. 1:10,560

Ordnance Survey, 2008. MasterMap

8.2 Publications

Aldsworth, F. & Garnett,E.D. 1989. *Sussex Archaeological Society, Sussex archaeological collections: relating to the history and antiquities of the counties of East and West Sussex*, Vol 119, 1989, Page(s) 217-21

Atkins, J. 2007. Early history of the Army School of Musketry in Hythe, Kent. *Black Powder: The Quarterly Journal of the Muzzle Loaders Association of Great Britain.* Winter 2007: 35-37. [Also online] Available at http://www.mlagb.com/blackpowder/200704_hythe.pdf [Consulted 07-SEPT-2011].

Banks, D. 1946. *Flame Over Britain.* Sampson Low, Marston and Co.

Benson, D. & Miles, D. 1974. *The Upper Thames valley: An Archaeological Survey of the River Gravels.* Oxford: Oxford Archaeological Unit.

Bewley, R. 2001. Understanding England's historic landscapes: an aerial perspective. *Landscapes* 2: 74-84.

Bewley, R.H., Crutchley, S.P. & Shell, C.A. 2005. New light on an ancient landscape: lidar survey in the Stonehenge World Heritage Site. *Antiquity* 79: 636-647.

Biddle, M., Hiller, J., Scott, I. & Streeten, A. 2001. *Henry VIII's Coastal Artillery Fort at Camber Castle, Rye, East Sussex: An Archaeological, Structural and Historical Investigation.* Oxford: Oxford Archaeological Unit.

Catchpole, T. & Dickson, A. 2010. *South East Rapid Coastal Zone Assessment Survey NMP (Component 2): Project Design for English Heritage (NHPCP Project Number 5698).* Gloucester: Gloucestershire County Council (unpublished document).

Crutchley, **S. & Crow P**. 2009. *The Light Fantastic: Using airborne laser scanning in archaeological survey.* English Heritage Guidelines. English Heritage, Swindon.

Defra 2006. *Shoreline Management Plan Guidance. Volume 1: Aims and Requirements* and *Volume 2: Procedures.* London: Defra

Delve, K. 2005. *The Military Airfields of Britain. Southern England: Kent, Hampshire, Surrey and Sussex.* Crowood Press, Marlborough

Devereux, B.J., Amable, G.S., Crow, P. & Cliff, A.D. 2005. The potential of airborne lidar for detection of archaeological features under woodland canopies. *Antiquity* 79: 648-660.

Dobinson, C.S. 1996a. *Twentieth Century Fortifications in England Vol I.3, Anti-aircraft artillery, 1914-46.* York: Council for British Archaeology.

Dobinson, C.S. 1996b. *Twentieth Century Fortifications in England Vol II, Anti-invasion defences of WWII,* York: Council for British Archaeology.

Dobinson, C.S. 1996c. *Twentieth Century Fortifications in England Vol III, Bombing decoys of WWII. England's passive air defence 1939-45,* York: Council for British Archaeology.

Dobinson, C.S. 1996d. *Twentieth Century Fortifications in England, Volume IV. Operation Diver: England's defence against the flying-bomb, June 1944-March 1945.* York: Council for British Archaeology.

Dobinson, C.S. 2000. *Fields of Deception. Britain's Bombing Decoys of World War II.* English Heritage

Dobinson, C.S. 2000b. *Twentieth Century Fortifications in England Vol XI, The Cold War,* York: Council for British Archaeology.

Doughty, M. 1994. *Hampshire and D-Day.* Hampshire Books.

English Heritage. *Grace Dieu.* [Online] Available at: http://www.english-heritage.org.uk/discover/maritime/map/grace-dieu/ [Consulted 07-Sep-2011]

English Heritage. Forthcoming. *The South Downs NMP: Beachy Head to the River Ouse.* [Online] Available at: http://www.english-heritage.org.uk/professional/research/landscapes-and-areas/national-mapping-programme/south-downs-nmp/south-downs-nmp-beachy-head/

English Heritage & RCHME. 1996. *England's Coastal Heritage: A Statement on the Management of Coastal Archaeology.* London.

English Heritage. 2010a. *National Heritage Protection Commissions Programme. Guidance for Applicants.* Release 4 June 2010.

English Heritage. 2010b. *Brief to complete South East Rapid Coastal Zone Assessment Survey National Mapping Programme Component.* NHPCP Project Number. 5698.

Foot, W. 2006. *Beaches, fields, streets, and hills: the anti-invasion landscapes of England, 1940.* CBA Research Report 144, York: Council for British Archaeology.

Francis, P. 1996. *British military airfield architecture; from airships to the jet age.*

Fulford, M., Champion, T. & Long, A. 1997. *England's Coastal Heritage: A Survey for English Heritage and the RCHME.* London: English Heritage & RCHME.

Geograph. 2011. *TR0917: The Sanctuary, Dungeness.* [Online] Available at: http://www.geograph.org.uk/photo/449509 [Consulted 07-SEPT-2011].

Greatstone Website. 2011. *History: Greatstone and PLUTO.* [Online]. Available at: http://www.greatstone.net/history/pluto.htm [Consulted 07-SEPT-2011].

Hampshire County Council. 2010. *Hampshire Integrated Character Assessment: Landscape, Townscape and Seascape Character Assessment for Hampshire.* Hampshire County Council. [Online] Available at: http://www3.hants.gov.uk/landscape-and-heritage/planning-the-landscape/landscape-character/hampshire-integrated-character-assessment.htm [Consulted 07-SEPT-2011].

Hegarty, C. & Newsome, S. 2007. *Suffolk's Defended Shore: Coastal Fortifications from the Air.* Swindon: English Heritage.

Jordan W, Knappett G and Noel-Johnson T. 2005. *The Normandy Mulberry Harbours.*

Keene, J.D. 2006. *World War I.* Greenwood Publishing Group.

Long, A.J., Plater, A.J., Waller, M.P., Roberts, H., Laidler, P.D., Stupples, P. & Schofield, E. 2004. *The Depositional and Landscape Histories of Dungeness Foreland and the Port of Rye: Understanding Past Environments and Coastal Change.* University of Durham: Research Publication No.7

Lowry, B (ed). 1995. *Twentieth Century Defences in Britain, An Introductory Guide.* Council for British Archaeology. York.

Lowry, B. 1996. *20th Century Defences in Britain: An Introductory Guide.* York: Council for British Archaeology. CBA Practical Handbooks in Archaeology No. 12.

Lower, M.A. 1870. *A Survey of the Coast of Sussex, 1587.* Lewes: W. E. Baxter Sussex Agricultural Express.

Museum of London Archaeology Service. 2004. *Chichester Harbour AONB 'Archaeological Research Framework'* [Online] Available at: http://www.conservancy.co.uk/page/Research-Frameworks/361/ [Consulted 07-SEPT-2011].

Natural England. 1996a. *120 Wealden Greensand.* Natural England unpublished document. [Online] Available at: http://www.naturalengland.org.uk/ourwork/landscape/englands/character/areas/wealden_greensand.aspx [Consulted 07-SEPT-2011].

Natural England. 1996b. *124 Pevensey Levels.* Natural England unpublished document. [Online] Available at: http://www.naturalengland.org.uk/ourwork/landscape/englands/character/areas/pevensey_levels.aspx [Consulted 07-SEPT-2011].

Natural England. 1996c. *122 High Weald.* Natural England unpublished document. [Online] Available at: http://www.naturalengland.org.uk/ourwork/landscape/englands/character/areas/high_weald.aspx [Consulted 07-SEPT-2011].

Natural England. 1996d. *123 Romney Marshes.* Natural England unpublished document. [Online] Available at: http://www.naturalengland.org.uk/ourwork/landscape/englands/character/areas/romney_marshes.aspx [Consulted 07-SEPT-2011].

Osbourne, M. 2004. *Defending Britain: Twentieth Century Military Structures in the Landscape.* Stroud: Tempus.

Reger, A.J.C. 1967. *A Short History of Emsworth and Warblington.* Chichester: Phillimore

Reger, A.J.C. 1996. *Chichester Harbour – a history.* Chichester: Phillimore

Romney Deanery. 2011. *Dungeness, The Sanctuary.* [Online] Available at: http://romneydeanery.org.uk/index.php?option=com_content&task=view&id=22&Itemid=81 [Consulted 07-SEPT-2011].

Romney Marsh Guest Houses. 2011. *Pluto Bed & Breakfast.* [Online] Available at: http://www.romneymarshguesthouses.co.uk/pluto.html [Consulted on 07-SEPT-2011].

Salzman, L.F. 1912. *Sussex Archaeological Society, Sussex archaeological collections: relating to the history and antiquities of the counties of East and West Sussex*, Vol 55, 1912, Page(s) 56-62, 317

Scarth, R. 1999. *Echoes from the Sky: A Story of Acoustic Defence.* Hythe: Hythe Civic Society.

Searle, A. 1995. *PLUTO: Pipe-Line Under the Ocean. The Definitive Story.* Shanklin: Shanklin Chine.

Tevarthen, E. 2010. *Hampshire Aggregate Resource Assessment: Aerial Photography Enhancement. Results of NMP Mapping.* Cornwall Council (unpublished document)

Wessex Archaeology. 2011. *South East Rapid Coastal Zone Assessment Survey. Phase 1: National Mapping Programme Report – Blocks B, C, L and M.* Wessex Archaeology Report Number 71330.

Willis, S & Holliss, B. 1987. *Military airfields in the British Isles 1939-1945.*

Winton, H. 2010. *National Mapping Programme Draft Transcription Guidelines.* Version 0.5. March 2010.

9 Project Archive

Component 1

The HES project number is **2011011**

The project's documentary and drawn archive is housed at the offices of the Historic Environment Service, 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 containing the project design, project correspondence and administration.
2. This report held in digital form at: G:\Historic Environment (Documents)\NMP DATA\Dorset\Report
3. The AutoCAD drawings held in digital form at: R:\Historic Environment (CAD)\CAD Archive\NMP Archive\Dorset

Component 2

The project's documentary and drawn archive is held by English Heritage at the Engine House, Fire Fly Avenue, Swindon, SN2 2EH. The contents of this archive are as listed below:

1. A project file containing the project design, project correspondence and administration
2. The completed AutoCAD drawings are held in digital form at English Heritage's NMR archive, Swindon.
3. The project records are accessible through http://pastscape.org.uk/textpage.aspx, or by contacting Enquiry and Research Services at English Heritage, Swindon.
4. This report is held in a digital form at English Heritage's NMR archive, Swindon, and will be available as a .pdf download on the English Heritage website's NMP Project page at http://www.english-heritage.org.uk/professional/research/landscapes-and-areas/national-mapping-programme/se-coast-rczas-nmp/. A hard copy will also be available at the English Heritage library in Swindon.

10 Appendix 1: Methodology

10.1 Sources

10.1.1 Aerial photograph collections

All readily available aerial photographs were consulted during the project. These were primarily from the NMR national collection which kindly provided the project with photographic loans sent to the CC project teams' offices in Truro and the GCC project team in Swindon.

The National Monuments Record (NMR) in Swindon which holds large numbers of aerial photographs of the project area. These include vertical prints taken by the Royal Air Force (RAF) and Ordnance Survey (OS) ranging in date from the 1940s to 1999. The NMR also holds a large collection of oblique prints; including military obliques taken by the Ministry of Defence (MOD) between 1941 and 1950 and a collection of specialist oblique prints, slides and digital images which were taken for archaeological purposes and range in date from the 1960's to the present day. In addition a small number of earlier oblique images taken in the 1920s and 30s by OGS Crawford are held in the NMR collection.

In total 11,898 (6202 Component 1 and 4621 Component 2) NMR aerial photographs were consulted during the project. These consist of 7621 (4618 Component 1 and 3003 Component 2) vertical prints, 1157 (509 Component 2 and 648 Component 2) specialist oblique photographs, and 2045 (1075 Component 1 and 970 Component 2) military obliques.

It is not known how many CCO photos were viewed as they were used as reference when needed and not all were viewed, likewise the same with GoogleEarth and Bing imagery. 220 PGA photos were also consulted.

10.1.2 Lidar

The Environment Agency has undertaken lidar surveys of the country as the technique results in the production of a cost-effective terrain map suitable for assessing flood risk, measuring land topography and assessing coastal erosion and geomorphology.

The Environment Agency has agreed to provide EH with their complete catalogue of lidar data. The data is supplied as static .jpeg images derived from the full data. This data has no height information incorporated within it; each pixel is graded purely by colour. However these colour elements can be manipulated and enhanced in exactly the same way as conventional aerial photographs.

All readily available lidar tiles of the project area, held by EH during the lifetime of this mapping project were consulted.

10.1.3 Data sources

10.1.3.1 Data from the SMR/HBSMR

Data from the Kent, Southampton and West Sussex HERs was provided by Wessex Archaeology. This included details of all archaeological sites within the project area and was provided digitally in a series of pdf files and ESRI shapefiles. Hampshire AHBR was supplied by Alex Gidden of HCC as a series of ESRI shape files with attached summary

monument data. Chichester District HER data was supplied by Mr Scrivener-Lindley of CDC as a series of ESRI shape files with attached summary monument data. Gregory Chuter supplied data from the East Sussex HER as ESRI shapefiles. Further details of the archaeological sites were viewed via English Heritage's Heritage Gateway website (http://www.heritagegateway.org.uk).

10.1.3.2 Data from the National Monuments Record

Data from the National Monuments Record (NMR) Archives and Monuments in England (AMIE) database was provided to the project team for the study area. This data included details of all archaeological sites and was provided digitally in a series of pdf files and Arcview shapefiles. For Component 2 the full monument records were viewable directly from the NMR AMIE database.

10.1.4 Map sources

In addition to the current OS MasterMap data which was used as the primary source of control for the rectification and mapping, the historic mapping from the nineteenth and twentieth centuries (Epochs 1 to 4) was consulted to further understand the archaeology of the project area and to aid interpretation of specific sites.

10.2 NMP Sphere of interest

(Taken from the project brief and project design).

This document seeks to clarify and standardise the NMP Sphere of Interest with particular regard to specific classes of feature. These guidelines provide a consistent approach appropriate to a national survey, whilst allowing for professional judgement on some issues. They should be applied with reference to NMP Standards and Guidelines which set out the aims and methodology of NMP.

The NMP Sphere of Interest is defined as all archaeological features visible on aerial photographs as cropmarks, soilmarks, parchmarks or earthworks and, in certain cases, structures. The earliest sites recognised on aerial photographs usually date from the Neolithic onwards. NMP projects therefore routinely record all archaeological features visible on aerial photographs with a date range from the Neolithic to the mid twentieth century.

The primary level of survey involved in the NMP requires some selectivity in recording, particularly for the more recent periods. Guidelines for the most commonly encountered examples of such variations to the Sphere of Interest are detailed below.

NMP mapping is designed to be viewed against an OS map and therefore features marked on the OS map should not be mapped. Therefore NMP will not usually record some structures still in use, or fossilized in later structures that are still in use, e.g. buildings / field walls / canals / railways / leats / hedges / airfields. It may be appropriate to map structures visible on historic maps in the context of some projects and exceptions to the general NMP guidance should be defined in the project design. Only in exceptional cases will additional categories of sites be recorded such as standing buildings, or some military features (see below).

The project database will record which elements of any particular archaeological site survive or have been levelled and/or destroyed.

10.2.1 Previous surveys

Where a previous survey (of cropmarks or earthworks) has resulted in the production of a plan it is necessary to assess the sources used and the quality of the resultant plan. To minimise the work necessary for NMP purposes such surveys should, where possible, be accepted and merely updated from any additional sources available to the NMP surveyor. Where an existing survey has been done to a higher specification and larger scale than NMP, this can be used as the basis for a simplified plan appropriate to the NMP project specification.

If an existing survey does not reach NMP standards, the area should be re-mapped from aerial photographs. However, if it has relied on sources unavailable to the NMP surveyor then professional judgement will be necessary to decide whether to include specific features, which it is not possible to verify or discount. Normally a textual reference in the monument record to such features is sufficient. Where it is not possible to verify a pre-existing survey, for example, when trees mask the site, it should not normally be mapped, although on occasion it may be necessary to provide a textual record.

Plans resulting from excavation and geophysical survey of sites visible on aerial photographs should be treated in the same manner as those from field and aerial survey and used to aid mapping and interpretation.

10.2.2 Cropmarks, parchmarks, soilmarks

All subsurface archaeological remains are recorded when visible as cropmarks, parchmarks or soilmarks.

Cropmarks and parchmarks.

Different colours and tones, and sometimes height differences, in crops can reveal the presence of buried archaeological features. Where this occurs in grass it is called a parchmark. Marks formed in a similar way may also reveal details of geology and agricultural history.

Soilmarks.

Different colours and tones in bare soil can reveal the presence of an archaeological feature. The main factors affecting visibility are the type of material present and relative moisture levels. The clearest marks are from freshly ploughed fields when the top of the buried archaeological deposit is brought to the surface by the plough, but with substantial features a diffuse effect may survive in the plough soil for many years and it is possible that moisture effects may be transmitted through the plough soil. Marks seen in bare fields formed in a similar way may also reveal details of geology and agricultural history.

10.2.3 Earthworks

Map and record all earthwork sites visible on aerial photographs, even if previously surveyed (including those marked on the OS maps), or extant on the most recent photography.

10.2.4 Buildings and structures

Map and record all foundations of buildings visible as cropmarks, soilmarks, parchmarks, earthworks or ruined stonework. Standing roofed or unroofed buildings are usually more appropriately recorded by other methods, so will not normally be mapped. Buildings etc will be recorded and mapped in specific archaeological contexts (e.g. industrial and military complexes and country houses), or when associated with other cropmark and earthwork features (even if depicted by the Ordnance Survey). If buildings have been demolished since the photography, then it may be appropriate to map them, in order to make an association explicit. Alternatively, they may be recorded solely in the text record.

Map and record other structures (designed originally without a roof) not depicted on the OS base, particularly twentieth century military structures. Structures depicted by the Ordnance Survey (e.g. sheepfolds and shooting butts) can be mapped if considered to be of archaeological significance to the project. (See below for more detail, section 9.10 Twentieth century military features).

10.2.5 Ridge and furrow

Record all medieval and post-medieval ridge and furrow, regardless of preservation, according to NMP conventions. The unit of record for ridge and furrow has varied in the past but wherever possible the archaeological context of the remains should remain the basis for recording strategy. The record may relate to a medieval township/parish if known, or a modern Civil Parish, or a discrete archaeologically significant area. The text should include brief comment on preservation and visibility over the area mapped as well as any archaeological assessment. Prehistoric cord rig should be mapped and recorded on a separate layer.

10.2.6 Post-medieval field boundaries

Exclude post-medieval field boundaries, whether seen as cropmarks, earthworks, or still extant, with the exception of circumstances when they may be of particular archaeological significance (e.g. when field systems are not mapped by the Ordnance Survey).

10.2.7 Parkland, landscape parks, gardens and country houses

The English Heritage Register of Parks and Gardens includes parks and gardens of special historic interest. Early vertical photographs often show Country Houses in their landscape settings which have often undergone significant change or may even have disappeared entirely. Map all man made garden or landscape features, but not major landscaping. If appropriate map and/or record former Country Houses either completely or partially demolished within the date range of the available aerial photographs. Make or amend a monument if the house is depicted by the Ordnance Survey. In some cases it may be appropriate to depict and record features normally outside the scope of NMP such as tree avenues. Map and record all vestigial earlier features preserved within parkland and gardens (e.g. prehistoric features or medieval deer parks).

Treat significant parks and gardens in an urban context (originally or since engulfed) in the same manner.

Modern century parks and gardens are not normally recorded unless they are relevant to the project specification, for example in military contexts.

10.2.8 Industrial features and extraction

The aim of NMP is to provide a rapid, basic level, comprehensive survey of the extent and character of industrial remains in a landscape context. The scope for industrial recording is immense and some data already exists within national databases, local specialist recording groups and literature. Assess this at the project design stage to formulate a strategy for the level of detail to be mapped. For regions with a significant eighteenth and nineteenth century industrial archaeological component, first edition Ordnance Survey maps often provide essential aids to interpretation. Only map or record twentieth century industrial remains when of particular archaeological interest, or when associated with earlier features. Urban industrial areas should generally be excluded from NMP recording.

Mapping and recording of industrial features should focus on groups of features (i.e. complexes with extraction, spoil, buildings and transport features) and should distinguish only the main features and industrial processes. Depiction should use appropriate NMP conventions dependent on the size and extent of features, highlighting and mapping the main features within the complex. Map roofed or unroofed buildings, when they are associated with industrial complexes.

The mapping and recording of extractive features (quarries, pits, mines, peat working etc) should follow the same guidelines as those above for industrial features, with the exception of widespread and common small scale extraction of resources for immediately local use (e.g. chalk pits, marl pits, and minor or modern stone quarries and gravel extraction). Any variation from this should be agreed and specified in the project design. Where possible, at sites where extraction and processing are closely associated (e.g. lime quarries and associated limekilns, clay pits and associated brick works), a single monument record should be used to explain the relationships between the various elements of the site.

10.2.9 Transport

Major transport features (i.e. disused canals and main railways) were included in the Ordnance Survey Archaeology Division sphere of interest, appear on various editions of OS maps, and were subsequently recorded in AMIE; they should not be mapped unless considered archaeologically significant in the context of the project. Smaller features (e.g. local tramways), which were outside the Ordnance Survey sphere of interest, should normally be mapped and recorded, especially in the context of associated features.

10.2.10 Twentieth Century military features

NMP military recording includes First and Second World War as well as Cold War features. Data in national and local heritage databases, local specialist recording groups and literature, should be assessed at the project design stage and a strategy must be included for the level of detail to be mapped. The aim of NMP should be to provide a rapid, basic level, comprehensive survey of the extent and character of the major military remains of the twentieth century. Military structures (originally designed without a roof) and roofed, or unroofed, military buildings, particularly when associated with other mapped features, are therefore usually mapped, especially when they have been

removed or destroyed. Where an extensive site is already mapped by the OS use a minimalist approach to transcription.

Normally NMP mapping of military sites should aim to be a “snapshot” of the main features of the site in 1945 or 1946. Significant changes to the site recorded on aerial photographs during the war should be briefly described in the monument record. Military structures to be mapped include outlines of extensive features such as airfield perimeter and runways, camp perimeters as well as significant buildings and earthwork structures, and all ephemeral features such as barbed wire, lines of tank cubes, etc. The NMP monument record for military sites should highlight the best source photographs and briefly describe the main elements, or unusual features, and any major changes to the site.

10.2.11 Coastal archaeology

The coastal zone comprises inshore waters, the intertidal zone, and the seashore and river estuaries and is recognised by English Heritage as under represented in the archaeological record (English Heritage 1998, 2.1). In coastal areas covered by NMP, recording will continue to identify features within the intertidal zone and to depict them using appropriate conventions. Wrecks are mapped using a simple plan outline and minimum textual recording. Record any movement of features in the inter-tidal zone and whether covered over with mud or sand.

10.2.12 Urban areas

Major conurbations (Greater London, Manchester, and Birmingham) are currently a low priority for NMP projects. Smaller urban centres (e.g. Lincoln, Carlisle, and York) are included within NMP project areas. Elements of the urban landscape (e.g. factories, housing, transport termini), and particularly twentieth century development, will not normally be mapped. However, they may be mapped in exceptional cases, for example where there is a direct association with features being mapped outside the urban area.

In areas built up in the twentieth century, historic aerial photographs (most are from the 1940s onwards) may record archaeological features, or aspects of the landscape not recorded on historic maps. All archaeological features visible on aerial photographs of the pre-urban landscape are mapped and recorded. Where there are no archaeological features the historic photographs may illustrate landscape change relevant to the historic environment in a project area and can be useful for report writing.

For Rapid Coastal Zone Assessment Survey projects recording may be limited to the seaward side of a line 100m above mean high water rather than the usual full OS 1 km sq required by NMP. Any km squares treated in this way will be counted as “unmapped” for NMP purposes.

10.2.13 Natural features

Exclude all natural features which are geological or geomorphological in origin. If there is risk of confusion in contexts with other archaeological features, then the natural features should be mentioned in the text record; they should not be mapped. In exceptional landscape areas some natural features may need to be mapped to fully understand the archaeology (e.g. Fenland areas).

10.3 Transcription

The results of the mapping were produced entirely in digital format using AutoCAD.

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

Oblique and vertical photographs were scanned.

1. Digital transformations of the archaeological features visible on the photographs were produced using AERIAL (Version 5.29). Digital copies of current OS 1:2500 MasterMap were used for control information and as a base for mapping in AutoCAD (Version Map3D 2010). For Component 2 the GCC team used AutoCAD Version Map3D 2008.

The aerial photographs were transformed using specialist rectification software (Aerial 5.29) with Ordnance Survey MasterMap 1:2,500 scale mapping and a digital terrain model. This provided an accuracy of less than two metres to the 1:2,500 scale map for the rectified photographs. The Ordnance Survey advise that their 1:2,500 scale map data has an accuracy of ±0.4 metres for rural towns, and ±1.1 metres in all other rural areas. Therefore the archaeological features transcribed for the National Mapping Programme will on average be accurate to within two to three metres of true ground position.

The rectified images were imported into the relevant AutoCAD drawings.

Archaeological features were digitally transcribed in AutoCAD according to a nationally agreed layer structure and using agreed line and colour conventions as specified by Aerial Survey and Investigation (Winton 2010).

Monument polygons were drawn around each separate monument to define its extent or around the separate elements of a dispersed monument. Object data was attached to the monument polygons and archaeological features in AutoCAD recording information about the mapped archaeological features as well as the unique Monument identifiers in the two project databases (for Component 1, the HBSMR UID and for Component 2 the Monarch UID from the NMR (AMIE) database).

The GCC project team used a Monument Data table and a Monarch table, which recorded information about the mapped archaeological features as well as the unique NMR Monument identifier (Monarch UID), used in the NMR (AMIE) database.

Map Note Sheets (MNS) were maintained for each OS quarter sheet within the survey area. MNS record the progress of each sheet and the sources used.

For Component 1 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. English Heritage quality assurance was carried out by Helen Winton, (Senior Investigator with the Aerial Survey & Investigation team in EH) for both components of the project.

10.4 Data processing

10.4.1 Project database

Component 1 was carried out by the NMP Team of Cornwall Historic Environment and data was input into their exegesis NMP HBSMR v3 database (Monument Prefix MKM)

Component 2 was carried out by Gloucestershire County Council's NMP Team who recorded all monuments directly into the NMR's AMIE database and therefore did not require a separate project database.

10.4.2 AutoCAD attached object data

Component 1.

Three object data tables were incorporated into each AutoCAD drawing to enable concordance with the NMR, various HERs and to facilitate basic analysis of the drawings.

The first table (Record) recorded the PRN from the project (NMR HBSMR) database as well as (where relevant) the NMR MONARCH AMIE Hob UID number and the HER numbers from the Hampshire AHBR, the Southampton HER, the West Sussex HER and the Chichester Harbour AONB HER. .

The second table (Index) recorded basic interpretative information and contained five fields; period, type, evidence, photograph reference number and date photographed as well as including a comment field.

The third table (Survey) 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.

Component 2

The first table, The Monument Data table, was attached to all mapping (except Monument polygons) with the unique NMR Monument identifier (Monarch UID), as well as Period, Photo, Evidence and Monument Type information.

The second, Monarch Table is attached to all mapping (including the Monument Polygons) and displays the unique NMR Monument identifier (Monarch UID) only.

As per the project brief (2010) a third table was attached to all mapping which included the transcribers initials, copyright details and date the mapping was created and/or updated.

10.4.3 GIS shapefiles

Component 1.

Each AutoCAD drawing was exported as an ESRI shapefile and imported into ArcView using the exeGesIS MapLink Software. This automatically linked each mapped site to the relevant record in the project database through the attached PRN number.

Component 2.

The GCC team exported all AutoCAD mapping to WA as ESRI shapefiles for integration in their project GIS.

10.4.4 Data exchange

Component 1.

The mapped data was provided to Wessex Archaeology as AutoCAD drawings as well as GIS data in the form of Mon.mdb and mxd files.

Copies of the mapping were provided to the NMR in AutoCAD format suitable for incorporation in to the EH Corporate GIS.

All data supplied to the NMR and WA was to NMP monument recording standards and in line with EH minimum standards for monument recording.

Copies of the Project Design, Final Report and all other relevant project documentation will be deposited with the NMR. The PDF version of the report will be deposited with Archaeology Data Service (ADS).

Component 2

NMP mapping was exported from AutoCAD as ESRI shape files for export to WA. Attribute information includes the layer name and AutoCAD Object Data as specified above. Monument records were exported from the NMR (AMIE) database using Oracle Discoverer. Data tables were exported as Excel (*.xls) spreadsheets. All core monument fields, as specified in the SE RCZAS NMP brief (11.3), were exported in a series of tables.

Copies of the Project Design, Final Report and all other relevant project documentation will be deposited at the NMR and provided to WA. The PDF version of the report will be deposited with Archaeology Data Service (ADS) and will be available to download via the English Heritage's project website at:

http://www.english-heritage.org.uk/professional/research/landscapes-and-areas/national-mapping-programme/se-coast-rczas-nmp/