## **INTRODUCTION AND OVERVIEW**

#### SUMMARY OF PROJECT AIMS AND OBJECTIVES

The Defence Areas Project was carried out between April 2002 and June 2004. Its overall aim was to build on the results of the Defence of Britain Project (April 1995-March 2002)<sup>1</sup> by examining in more detail anti-invasion defence works that form a coherent and legible grouping and survive well in landscapes largely unchanged from those of 1940/41. The purpose is to promote people's understanding and enjoyment of these defence landscapes, and to encourage them to think of World War Two archaeology at landscape scale. The aim is to ensure greater recognition of the value of these well-preserved landscapes and the need to conserve the components they include, while at the same time recognising that they represent a selection of a much larger number of such places. Some of the components surviving within the landscapes will be recommended for statutory protection. This project represents an original thematic approach to archaeological landscape survey.

The principal objectives of the project were represented by two tasks:

- 1. To use data of Second World War anti-invasion defences compiled by the Defence of Britain Project [DoB data] to identify exemplars of differing types of defence works that survive in a good condition, or lesser condition relative to their rarity, making them worthy of consideration for statutory protection.
- 2. To identify and survey, using documentary and field evidence, discrete areas of the English landscape where anti-invasion defence works, that can be seen to interrelate as components within the same defence scheme, survive well in landscapes largely unchanged from those of 1940/41.

Task 1 was completed by May 2002. Seventy-three differing types of anti-invasion defence works were identified and details of 7238 surviving structures relayed to English Heritage. Task 2 was begun in May 2002, and the documentary assessment and fieldwork covering 67 Defence Areas completed by March 2004.

#### THE HISTORY AND ARCHAEOLOGY OF ANTI-INVASION DEFENCE

#### Strategies

The building of defence works to protect the British homeland against German invasion began early in June 1940 as a consequence of the defeat of the British Expeditionary Force in France and the return through Dunkirk of 230,000 troops from that army, with an additional 110,000 French soldiers. Surveys of British beaches vulnerable to attack, and the establishment of Emergency Coast Defence Batteries had, in fact, been carried out from May.

The principal purposes of the defences were

• to prevent the enemy landing at all by defending the coastline.

<sup>&</sup>lt;sup>1</sup> A Review of the Defence of Britain Project (Council for British Archaeology, November 2002).



- to prevent the capture of ports through which reinforcements and supplies could be brought.
- to prevent enemy armoured columns 'running amok' along communication routes or across open country.
- to provide a defence in depth, based on the all-round defence of important communication centres
- to protect vulnerable points, including airfields and searchlights.
- to prevent airborne landings by glider or powered aircraft.

Several strategies of defence were developed for these purposes, involving a wide range of types of structure – see Table 1 at the end of this Chapter.

#### Coastal Defence

A continuous coastal defence on the south and east coasts, as well as on many parts of the west coast where an invasion through Ireland was feared, was made up of fixed defences (coast batteries), and hardened weapon emplacements, minefields, anti-tank concrete obstacles, anti-tank scaffolding, anti-tank ditches, slit trenches and other earthworks, and barbed wire entanglements. Beach defence guns were mounted along the shoreline, and Royal Artillery field guns positioned to the rear with fire tasks on the most vulnerable parts of the shore The coastal front-edge defence was normally backed by a stop line (see below) that itself joined with other inland stop lines.

Particular emphasis was placed on the all-round defence of ports, which had encircling perimeter defences consisting of hardened weapon emplacements, earthworks, and barbed wire. The main danger was perceived as special assault troops landing on parts of the coast that were considered to be less vulnerable to attack - in areas of cliffs, for example, - and then moving to attack a port from the flank or rear.

#### Stop Lines

A system of stop lines was established, these being in essence anti-tank lines with a continuous anti-tank obstacle formed by a waterway, an artificial ditch, a line of concrete obstacles, or a railway embankment. The principal stop line was the GHQ [General Headquarters] Line running from the North Somerset coast south and east of London, and then parallel with the east coast to Richmond in Yorkshire. Other branches linked with it, and also with a complex system of Corps and Division stop lines that themselves, in the most vulnerable parts of the south-east, were connected with a grid-pattern of 'fences' dividing up the countryside into boxes. Stop lines were also complemented by demolition belts where bridges and other important communication points were prepared for destruction.

The stop line was a prepared battlefield, with its crossing points of road and railway plugged by concrete and steel blocks, and its defences based on infantry fieldworks, including pillboxes, section posts, and slit trenches, with anti-tank gun emplacements to be manned by the Royal Artillery at the most vulnerable crossing points.

#### Area Defence

Throughout all regions of the country, a system of the all-round defence of communication points, based largely on towns, villages, and other settlements, and forming a defence in depth, was established. These were known variously as anti-tank islands, fortresses, nodal



points, focal points, centres of resistance, defended villages, and defended places. Anti-tank islands had an anti-tank defence capacity formed by lengths of artificial ditch or lines of concrete obstacles. Nodal points were categorised 'A', 'B', and 'C' according to how many days they were required to hold out without further supplies.

#### Airfields and Vulnerable Points

Airfields received all-round defence controlled from a battle headquarters [these defences fall beyond the remit of this Project]. Searchlights were often defended by a solitary pillbox. A system of Vulnerable Points was established, which were key communication points, such as bridges and viaducts, or key civilian services, such as gasworks, electricity generators, sewage works, and reservoirs: they could also be factories producing war materials, or key defence sites, such as radar stations. These were all categorised and referenced for defence, usually carried out by the Home Guard.

#### Open Areas

All open areas with a straight length in one direction of 500 yards or more (including some roads, as well as beaches uncovered at low tide), within five miles of the coast or within five miles of an airfield or vulnerable point, were required to be blocked against enemy aircraft landing. The particular concern was to stop powered transport aircraft landing, and taking off again to bring in further men and supplies. The blocking was done, either by machine-dug (and even hand-dug) trenches set out in a grid pattern, or by obstacles, such as old cars, sections of concrete pipe, or wooden and concrete posts, arranged across the open space. The trenches did great damage to agriculture, and blocking by obstacles became the preferred method. The deep ploughing of fields in the autumn of 1940 was also considered a sufficient obstacle.

#### Changes of Strategy

By early in 1941, the *stop line* defence strategy had largely been abandoned in favour of a greater concentration on *coastal* and *area* defence, with an increasingly powerful mobile force ready to move to any threatened point.

#### **Command and Control Structure**

The implementation of the various defence strategies involved a complex structure of command and control. In 1940, Home Forces was made up of four Army Commands within England - Northern, Western, Southern, and Eastern. From February 1941, a further Command - South East - was created, largely out of Eastern Command.

Within each Command was a complicated system of military areas, termed Areas, Sub-Areas, Sectors, and Sub-Sectors. By 1942, the former Areas were generally termed Districts. Area Command were responsible for the overall local area defence, in particular defence in depth, using Home Guard troops, based upon nodal points and roadblocks, as well as the defence of vulnerable points and airfields. It was also responsible for matters such as camp sites and accommodation, and administrative matters involving the interaction of the military with the civilian population. Regular troops based within the military area might also have a role as Area Troops, and could be allocated in an emergency to the defence of a nodal point, a section of stop line, or an airfield.

Field Army troops formed the core of Home Forces, being allocated to definite defensive positions, usually on the coast, or forming a mobile reserve. In September 1940, X Corps



was positioned in North East England, I Corps in Lincolnshire, East Yorkshire, and the East Midlands, II Corps in Cambridgeshire and Norfolk, XI Corps in Essex and Suffolk, XII Corps in South East England, VII Corps west and south-west of London, V Corps in Hampshire, VIII Corps in South West England, IV Corps in Oxfordshire and Northamptonshire, and III Corps in North West England and North Wales. London formed a separate independent Area directly under GHQ Home Forces.

Infantry brigades of the Field Army were the principal tactical units defending the coastline, usually with three battalions forward manning the front-edge defences. In May 1941, for instance, nineteen brigades defended the east coast of England from the Scottish border to the River Thames.

The landscape defended by the Field Army was divided into designated defence areas, in a system that gave specific area defence responsibility from the highest to the lowest unit. This system, based on the defending Corps, was separate from that of the Command military areas [see above], although confusingly using some of the same terms.

The defence area terms and definitions as generally applied were,

- *Sector:* area occupied by a division.
- *Sub-Sector:* area occupied by an infantry brigade.
- *Area:* area occupied by a battalion.
- *Sub-Area:* area occupied by a company.
- *Locality:* area occupied by a platoon.
- *Post:* area occupied by a section.

In Eastern Command, however, in particular in the part later to become South East Command, the terms *Sector* and *Area* were reversed, an *Area* being occupied by a division and a *Sector* by a battalion [see, for example, the report on the Royal Military Canal (DA 36)].

In addition to the above designations, *stop lines* were divided into designated sectors. All pillboxes and other defence works along their lengths were referenced, such references sometimes surviving as stencilled letters and numbers on interior walls.

The shoreline was also divided into sectors referenced by letters and numbers [see, for instance, Fig.4 of the report on Pevensey Castle (**DA 66**)].

The infantry method of defence of the coast was by establishing a series of *forward defended localities* (FDLs) at those points considered most vulnerable to attack (e.g. at exits from a beach). Each FDL aimed to cover the beach by fire interlocking with that of its neighbour. It was usually occupied at platoon strength, with its own command post (possibly set up within a pillbox or other purpose-built structure), and was ringed with coils of barbed wire. FDLs were manned on a 24 hour basis, with regular patrolling. Troops either slept in the field or were billeted in local buildings: sometimes Nissen huts were erected for the purpose [see report on Freiston Shore (**DA 35**)].

The occupation of a prepared stop line was also carried out by a system of FDLs. These were normally established at the vulnerable crossing points of a line by roads, railways, or rivers. Sometimes the term, FDL, referred to the line itself rather than its defended



localities, i.e. the linear anti-tank obstacle represented the front-edge defence, the whole length of which was considered an FDL.

Interior stop lines were *prepared battlefields*. Plans were drawn up for their occupation by troops from the Field Army. However, even in the key invasion danger period of August-September 1940, it is unlikely that their pillboxes and other defence works, other than for those at roadblocks, were ever fully manned or armed. Most anti-tank emplacements are also unlikely to have ever received the 2pdr. or 6pdr. guns for which they were built.

Home Guard troops were largely responsible for *area defence*, i.e. for that of nodal points, defended villages, and centres of resistance. Anti-tank islands and Category 'A' nodal points, however, usually had a garrison of regular troops drawn from Area Command. Particularly in coastal areas, the Home Guard played an important role in supporting the front line Field Army troops, by occupying defence positions to their rear, by manning roadblocks, and acting as a mobile force to counter enemy parachutists. The role of the Home Guard was generally written into division, brigade, and area defence schemes.

While the stop lines were still retained as part of the defence strategy, the local Home Guard unit was responsible for maintaining pillboxes and ensuring they were kept supplied with food, water, and ammunition. Some pillboxes had locked doors to ensure such stores were not pilfered. Home Guard troops were also designated as guides to Field Army units if an emergency had demanded that a stop line be defended. The particular value of the Home Guard lay in its knowledge of its local landscape, much of which in front-line areas was prepared and measured for defence.

#### **RESOURCES AVAILABLE FOR STUDY**

The resources available for the identification and study of anti-invasion defences, which contributed to the examination of the sixty-seven defence areas chosen for this study were

- Documents (including contemporary maps)
- Ordnance Survey plans
- Air photographs
- Previous surveys
- Publications
- Photographs and moving film.
- Oral testimony

#### **Documents:** [See individual defence area reports for precise archival references] The National Archives [previously Public Record Office]

Relevant documentation held by The National Archives is extensive. Of the greatest value for the identification of individual sites and the units manning them, together with the overall strategy of the defence, are the Home Forces Unit War Diaries (Record Class WO 166). Many of these contain Operational Instructions and Defence Schemes, sometimes with maps, which enable a detailed reconstruction of the defended landscape to be made. Valuable files are also to be found in the Record Class WO 199 - Home Forces Headquarters Papers.

#### Imperial War Museum



The Department of Documents holds papers and maps pertaining to Operation Sea Lion, as well as copies of German mapping at the 1:50,000 and 1:25,000 scales (on an Ordnance Survey base) of the results of the Luftwaffe's reconnaissance of British defences in the south of England. It also has German manuals on the British defences and on the economic and strategic geography of Britain in general.

#### British Library Map Library

Holds German mapping of British defences at the 1:100,000, 1:50,000 and 1:25,000 scales. The series of maps is more complete than that held by the Imperial War Museum.

#### Royal Air Force Museum

Holds 1:50,000 German mapping (in four parts) of the defences of the south-east coast from Margate to Selsey.

#### Local Record Offices

Local record offices often hold relevant documentation, in particular that concerning the Home Guard and the clearance of defence works after the war.

## Bundesarchiv-Militärarchib, Freiburg [German military archives, not visited for this study]

Holds German mapping of British defences at the 1:100,000, 1:50,000, and 1:25,000 scales, with certain sheets not available at the British Library Map Library.

#### Ordnance Survey plans:

Post-war Ordnance Survey mapping at the 1:2500 scale, issued from the late 1950s and throughout the 1960s and 1970s, can be very useful in showing the positions of pillboxes and other defence works because their sites, and shape in plan, were often (but not always) included by the surveyors. The British Library Map Library holds all published Ordnance Survey mapping, although large-scale plans can also be consulted in local record offices and libraries.

#### Air photographs

#### National Monuments Record

Has the principal holding of air photographs of England, of exceptional value being the series of wartime RAF verticals and obliques, largely covering coastal areas. Post-war air photographs, in particular series of 1946 and 1947, are also important, and later series taken in the 1950s or 1960s can sometimes reveal defence works that up to that time were still hidden by their original camouflage.

#### Imperial War Museum

Holds a volume of annotated German air reconnaissance photographs [uncatalogued] at its Duxford Airfield site.

## National Archives at College Park, Maryland [United States archives, not visited for this study]

Has the main holding of captured German Luftwaffe photographs, with a substantial number for Britain. The extent of this holding, and its exact composition, is not currently known, but it is potentially a most important source.



#### Previous surveys:

#### Defence of Britain Project

Records of the surveys carried out for the Defence of Britain Project are held at the National Monuments Record, Swindon. The Project's database is also available on line.<sup>2</sup> Part of the Project archive, in particular copies of Area defence schemes and maps obtained from The National Archives during earlier research, were retained for the benefit of the current study: eventually they will be united with the rest of the archive. Records created by surveys for the book, 'Pillboxes' are held, with much related material, in the Wills Collection at the National Monuments Record. Also forming part of this Collection are the only known surviving Royal Engineers formal record plans of anti-invasion defences - those for the Taunton Stop Line and its related anti-tank islands.

#### Local and other surveys

Other surveys have been carried out in various parts of the country since the 1970s. Of especial note are those in Essex, Worcestershire, Herefordshire, Surrey, Cornwall, Berkshire, Norfolk, and Hampshire, the records of which have fed both into the Defence of Britain Project database and also the County Sites and Monuments Records (SMRs), (termed recently, Historic Environment Records (HERs)), which will hold the most complete records for the particular county.

#### **Publications:**

Despite the general interest in this subject, there have been few publications to represent popular or academic interest. Works which provide an overall background are given in the Bibliography [Appendix B], and those which have been consulted for each defence area are included in the 'Published sources' section of each relevant report. Books on the Home Guard, individual regimental histories, local histories, and topographical works can also sometimes provide useful information. The library of the Imperial War Museum has a comprehensive holding of books, pamphlets, leaflets, and maps on every aspect of the Second World War. The Royal Engineers Library, Chatham has copies of War Office training pamphlets on field fortifications [see 'Appendix B: Bibliography'].

#### Photographs and moving film:

The photographic collection of the Imperial War Museum provides a vast resource of visual evidence for the subject, which has yet to be fully exploited. Moving film has also been little researched. Other major picture libraries, including those of both national and local newspapers, should also be consulted.

#### Oral history:

The recording process for the Defence of Britain Project involved at times the gathering of oral testimony, the result of which was built into the database and used, where available, for the defence area surveys. Other oral testimony was obtained during the course of the present project's programme of fieldwork. Much more - from army veterans, construction workers, and local residents - remains to be gathered. This precious resource is steadily diminishing as the months go by, and will be extinguished within a few years. In any local study, a determined effort to take advantage of this surviving resource should be made. This is one of the most important potential projects for the immediate future [see 'Recommendations for Future Work'].

<sup>&</sup>lt;sup>2</sup> <u>http://ads.ahds.ac.uk/catalogue/specColl/dob/ai\_q.cfm</u>



#### METHODOLOGY

The primary source of data that acted as the starting point for the Defence Areas survey was the Defence of Britain Project database of anti-invasion sites [DoB database], now available on line through the Archaeology Data Service<sup>3</sup>. The database had been collated largely through public fieldwork that had involved the work of some 600 recorders, both amateur and professional. It carried forward the site recording work of the late Henry Wills whose book, 'Pillboxes', published in 1985, was seminal in developing the subject.

#### Selection of Individual Defence Sites for Possible Designation

To fulfil Task 1 of the Project - to identify individual types of defence structures for consideration for protection - 73 different types of anti-invasion defence works were originally identified from the DoB database. Of these, 65 are also represented in the sixty-seven defence areas covered by this report, with a further five types identified and added in the course of Task 2. The resulting total of 70 types of anti-invasion defence works are listed in Table 1 at the end of this Chapter. The remaining terms from Task 1 relate to coast batteries, airfield defence, and sites associated with the Auxiliary Units which were excluded from Task 2.

Individual sites and structures were recommended to English Heritage as potentially worth considering for designation on the basis of the initial trawl through the DoB database. They were selected to provide a representative sample of the overall range of types of structure, skewed to include a high proportion of the rarer types and only the best preserved examples of the commoner ones.

#### **Defence Area selection criteria**

For Task 2 – the selection and study of Defence Areas – the DoB data on anti-invasion sites and structures, coupled with secondary sources of information (such as other field surveys and known documentary sources) enabled an initial list of some 300 potential defence areas to be identified, based mainly on the criterion of good site survival. This list was then reduced to 78 initially selected for documentary and field study by application of one or more of the other criteria listed below. At various stages (desk study or fieldwork) some areas were then rejected as not adequately fulfilling the criteria after all, reducing the total to 67 that were fully studied and included in this report [see 'List of Defence Areas'].

The criteria for selecting Defence Areas worthy of inclusion in the survey were as follows:

- Areas with differing types of defence works.
- Areas including rare types of defence works.
- Areas with very good survival of defence works.
- Areas representing the different strategies of anti-invasion defence [see above].
- Areas representing particular overall defence constructions, e.g. the GHQ Line.
- Areas representing the different regions of England.
- Areas representing different types of landscape and topography.
- Areas with good surviving documentary (or published) sources [where this was previously known].
- Areas with good inter-visibility, where the defence works can be seen within clear viewsheds.

<sup>&</sup>lt;sup>3</sup> <u>http://ads.ahds.ac.uk/catalogue/specColl/dob/ai\_q.cfm</u>



• Areas with good public access.

The 67 defence areas finally selected for full study were arranged into five regions.

- London and South East (24 areas)
- South West (15 areas)
- Eastern (13 areas)
- Midlands (5 areas)
- Northern (10 areas)

The fact that some regions have more study areas than others is a reflection of the intensity of the defences in differing parts of the country as well as the completeness (or otherwise) of their removal. [See also 'Criteria'].

The study was undertaken by carrying out all the necessary research, from documentary assessment via fieldwork to write-up, in sequence of the regions. For this purpose, London and the South East was also divided into two. It was considered that to attempt to undertake the research for all the defence areas by particular resource, for instance, air photographs, would place too much strain on that resource (i.e. the National Monuments Record) and lead to a multitude of data that would soon become confused, thereby imperilling other research processes. By proceeding in stages it was also possible to test the full methodology, and to refine it, as necessary, for later regions.

At the start of the Project, draft maps at the 1:10,000 scale were prepared for each defence area showing the extent of the existing site references obtained from the DoB data. These maps were generated using the GIS programme, MapInfo Professional Version 6.

#### Desk-based assessment

#### Map Sources

The research resource consulted first were the 1:2,500 Ordnance Survey plans at the British Library Map Library. Hexagonal pillboxes, where drawn on the maps, were straightforward to spot. Very often their direction of fire could be determined. Square and rectangular defence structures, however, were more difficult to identify as they could easily be confused with other free-standing buildings, such as sheds and barns. Lines of anti-tank blocks were sometimes shown, usually being termed 'stones'. All defence works identified were measured in and their exact ten-figure grid reference calculated, enabling a first check to be obtained on some of the DoB data. The speed of this work was limited to the Map Library's rule of only fifteen map productions in a day to a reader. An estimated 450 Ordnance Survey plans were consulted for the Project.

For defence areas known to be covered by German mapping at the 1:50,000 and 1:25,000 scales, use of the British Library Map Library's holding of these maps was made during the same visits as for the Ordnance Survey plans. Keys to these map sheets are held by the Map Library, and it is possible to obtain colour Xerox copies. As part of the resource of the Defence of Britain Project archive (retained at the conclusion of that Project for the benefit of the current work), black and white copies of certain German maps obtained from the Imperial War Museum were already available. Similarly, a colour copy had been obtained of the maps held by the Royal Air Force Museum. Use of the German maps enabled many



defence sites, now destroyed, to be plotted, and the course of anti-tank ditches to be determined.

Data obtained from these main map-based sources were entered onto the Project database.

#### Documentary sources

The National Archives were consulted next. Earlier research for the Defence of Britain Project had already identified many record sources relating to certain of the defence areas, and copy documents and maps were on loan from that project archive. In particular, trawls had been made of Area War Diaries and those of Infantry Brigades, which were very useful in providing information on certain defence areas, as well as identifying infantry battalions, and other units including Royal Engineers companies, that had been based in those areas. Corps, Division, and Brigade War Diaries in Record Class WO 166 often contain Location Lists that provide the names of all units making up a higher echelon unit. In addition, documents within a War Diary, such as a Defence Scheme, usually have distribution lists that can provide the same information.

An invaluable document at The National Archives that was used extensively is an unpublished monograph entitled, 'Defence Plans for the United Kingdom 1939-45', produced by the Historical Section of the Cabinet Office in 1948 (TNA: PRO WO 277/37). This includes maps of the disposition of Home Forces in 1940 and 1941, enabling Corps, Divisions, and Brigades to be determined for particular areas at different periods.

Extensive use was also made of The National Archives' on-line search facility http://catalogue.pro.gov.uk/

The prime documentary source for this study were Defence Schemes and Operational Instructions held amongst Home Forces Unit War Diaries (TNA: PRO WO 166). These can provide detailed information on the defence positions occupied by a unit, with lists of defence works positioned using six-figure (and sometimes eight-figure) references from the military [Cassini] grid. Some war diaries also contain maps, some printed but others hand-drawn, often in exceptional detail. A number of war diaries of Royal Engineers companies were located that provided documentation on the progress of construction works, showing the extent of the records that were made but which are now largely lost. An estimated 1,200 documents were consulted at The National Archives.

Where exceptional defence detail of particular places or districts was noted amongst War Diaries, beyond the areas covered by this Project, these were noted in an index of place names that is available in Appendix B.

Notes were made from The National Archives documents, or sections of documents copied, and these were later analysed. Cassini grid defence site references were converted to the National Grid and entered on the database.

#### Air photography

The third major documentary resource consulted were the air photographs held by the National Monuments Record. Prior searches were carried out by NMR staff of all the defence areas, and the photographs pulled and produced for each research visit. Of particular value were the series of military obliques from 1940 and 1941 on which defence works could sometimes be made out under construction. Comparison between photographs



for 1940 and 1941 could also often determine the date when certain works were built, for example anti-tank scaffolding erected from the early spring of 1941.

The vertical air photographs were particularly useful for determining the courses of antitank ditches, as well as lines of concrete anti-tank obstacles. Earthworks such as slit trenches, and barbed wire perimeters, also show clearly. Photographs of 1945-1947 can sometimes show defence works at a time shortly before these were cleared away, for example blocking plinths on bridges or anti-tank pimples at the road crossings of stop lines. Anti-tank ditches filled in before the end of the war can still show clearly as soil marks in air photographs as late as the 1960s, and sometimes as crop marks in very recent photographs. Some 15,000 prints were produced by NMR staff for the Project. Photographic copies were obtained for later reproduction, and laser copies for subsequent analysis.

The air photographs were also important for the evaluation of the topography of a defence area, and for enabling an assessment to be made of landscape change over the past sixty years. More recent photographs allowed the dates, for example, of road construction and housing development to be determined.

The sites of defence structures obtained from the air photographs were plotted onto the 1:10,000 mapping, and grid references determined to be entered on the database. Where uncertain defence detail had been noted, notes of this were kept for later field checking.

#### Fieldwork

While identification and recording of sites was possible at all seasons, it was found that, because of the overgrown condition of many sites, late autumn through to spring when vegetation is lower, is the optimum time of year for effective fieldwork.

It proved possible to complete the field recording of most areas within a day, although in some cases (where this was practical) return visits were made to check on sites omitted in error or where new evidence had been obtained. The first task was to establish the best point for parking, a practical consideration not only to carry out the fieldwork but to be able to provide this information when considering public accessibility.

Most defence areas were approached without any prior access permission, this often being obtained during the course of the work as necessary. In some cases it was impossible to obtain permission because there was no clear evidence of the landowner or time to seek him or her out. Sometimes land was entered without permission, where this was considered a reasonable thing to do, although great care was taken to avoid fields in crop. Some structures could be adequately recorded from a distance, in particular where a previous fuller record had been obtained from DoB data. For certain areas where full access was essential, permission was sought in writing - for example, at Bawdsey Manor, Audley End, St. Michael's Mount, and Braemore Mill. No requested permission was never forthcoming.

Many landowners and occupiers, and other local residents, showed considerable interest in the survey, and were helpful with information on sites and local wartime history. No one showed any hostility to the defence structures, seeking their removal, although it was clear in some areas that recent destruction had been carried out, mainly by farmers for field



clearance. A local pride in the defence works in some areas was met with, with the view expressed that it was good to know that 'something was going to be done' to protect them.

A ten-figure grid reference for a defence work was obtained using a hand-held GPS receiver. This, where checked, for example, against a measured reference from an Ordnance Survey plan, proved accurate to within thirty metres, the principal error being in the Northing figure rather than the Easting. GPS references obtained under poor reception conditions, for example under trees, had a wider margin of error.

Each defence structure was recorded by its type, its main direction of fire (if relevant), its size, its construction materials, any interior fittings, its condition, its public accessibility (externally and internally), and by any unusual features. The completeness (or otherwise) of the defence works within a given area was also estimated. Considerable efforts were made to locate structures known only from documentary sources, sometimes with striking successes. Some 500 miles were walked to field record approximately 750 sites.

A photographic record of each defence area was made, many of the defence works being individually photographed together with noteworthy features of the landscape.

After comparison with the evidence from the documentary research, the results of each batch of fieldwork were entered on the Project database.

#### Map preparation

The complete site data for the defence areas within the particular region were now used to produce a second draft of the 1:10,000 maps. The data were entered onto spreadsheets and imported into MapInfo as separate layers. The printed maps were then checked for accuracy, in terms of site positions, symbols [see below], and defence area boundaries. Much of the fine positioning had to be done by hand as even an accurate ten-figure grid reference was often not precise enough. Problems of the placement of closely adjacent sites had also to be overcome, as well as the display of database reference labels. Location maps for the defence areas were also produced, together with regional index maps and an overall index map for England.

A system of symbols for the 1:10,000 defence maps was drawn up at an early stage in the Project: this was developed further in the light of experience as the Project continued. The Map Key defines the symbols used. Red represents surviving sites (in all conditions), Yellow, destroyed sites, and White unknown. A question mark alongside a symbol indicates a site whose existence (whether surviving or destroyed) is likely but not certain.

With the symbols for hardened weapon emplacements, the decision was made to distinguish between those of infantry pillboxes, Vickers machine gun emplacements, and anti-tank gun emplacements, as had been done on the Royal Engineers' record mapping of the Taunton Stop Line. Symbols were also chosen that distinguished clearly between other major groups of defence works, e.g concrete anti-tank obstacles and sites with explosives. The symbols selected for pillboxes and concrete obstacles are the same as those used on the 1940/41 German maps. Continuous linear defences, such as anti-tank ditches, scaffolding, and barbed wire, were joined by lines representing their course. A roadblock symbol is generally used where there is no surviving field evidence, otherwise the extant remains are indicated by their type: sometimes, however, both are shown.



On some maps, the scale has been increased for clarity from 1:10,000 to 1:5,000. Sometimes, two maps showing the defences for an area are given, the second being at a larger scale for a particularly detailed part, where its presence is indicated on the smaller scale map by a dotted red box. For some maps, the whole area of the displayed defence works is the extent of the defence area. For others, it is the area within the continuous red lines that is the study area. On such maps, sites beyond the study area may also be shown as often these are relevant and are referred to in the report text. They may also be included in a suggested wider 'pillbox walk'. Generally, however, these extra sites have not been field checked, and it is possible that some of their positions may be inaccurate. The section, 'Components', within a defence area report only includes the sites in the study area, not the wider defence landscape beyond.

#### **Report preparation**

The reports on each Defence Area studied were compiled, in conjunction with the mapping, for each regional grouping in turn. Then the whole sequence of desk assessment, fieldwork mapping and report preparation was repeated for the next group of areas.

The reports were prepared to a common structure agreed with English Heritage on the basis of a pilot example prepared at the beginning of the project.<sup>4</sup> In describing the sites and assessing their significance, each report follows a standard format. This reflects the main issues that relate to the non-statutory criteria for scheduling without the need for each to be detailed in turn.

As the last step, the present final report was compiled and edited from these drafts, with the addition of this Introduction and Overview, with its Appendices, and national and regional mapping.

#### Archive

The main project archive of materials covering each defence area is to be deposited with the National Monuments Record, Swindon. Copies of the project database and GIS mapping are also to be deposited with the National Monuments Record as well as the relevant Historic Environment Records (HERs). Copies of some documents, maps, and photographs that were used for the Defence of Britain Project, and were relevant to this study, are retained by the Council for British Archaeology.

The total record of the sites recorded from documentary evaluation and fieldwork is available as Section 5: 'Components of Defence' with each Defence Area Report. This forms part of the CD of the overall project report.

<sup>&</sup>lt;sup>4</sup> William Foot, Second World War Defence Landscapes in England: Report for English Heritage on a Pilot Project [etc] (Council for British Archaeology, July 2001).



#### **RESULTS OF THE PROJECT**

#### **Components of the Defence Areas Studied**

Under Task 1, 7238 surviving individual anti-invasion defence structures were identified as potentially worth considering for designation. Of this figure, some 570 (8%) were highlighted at the end of Task 1 as potentially falling within the initial seventy-eight defence areas to be assessed in Task 2. The true figure of surviving structures within the sixty-seven areas that were fully studied was, in fact, close to 850.

During the work of Task 2, approximately 1,000 new sites were added to the original Defence of Britain Project database, and a further 1,000 records of existing sites greatly enhanced. This data is made available as 'Components of Defence' for each defence area on the CD of the project results, and can be used to upgrade SMR (HER) and NMR records.

Within the sixty-seven defence areas there are 1682 anti-invasion defence sites, of which approximately 850 structures survive, including some 580 hardened weapon emplacements [primarily pillboxes]. The most common defence work type is the type 24 infantry pillbox, of which 244 survive in the study areas. There are 60 surviving examples of anti-tank gun emplacements [mainly, types 28 and 28A pillboxes], 29 Vickers machine gun emplacements, 39 spigot mortar emplacements, and 76 type 22 pillboxes.

#### Defence areas at the coast

Twenty defence areas have a coastal frontage, and the principal purpose of the defence works built within them was to defend that coast. Four of these areas, however, had an additional prime function - that of Porthcurno (**DA28**), the defence of the cable station; of Bawdsey Point (**DA29**), the defence of the radar station; of Barrow Island (**DA43**), the defence of the dockyard and port; and of Freshwater Bay (**DA73**), the defence of the southern sector of a stop line. The area of Farthingloe, Dover (**DA78**), which stretches to the cliffs west of Dover and was for the protection of that port, is considered under 'Defence Lines'.

Some of the coastal defence areas show the characteristic of having been defended by forward defended localities (FDLs). At Druridge (**DA60**), the names used by the military for two of the FDLs still survive in the landscape. At Walberswick (**DA40**), the FDLs are indicated by the surviving anti-tank blocks and pillboxes.

Four defence areas include a coast battery within their boundaries - Freiston Shore (**DA35**), where the surviving structures are in excellent condition; Winterton-on-Sea (**DA56**), where some buildings survive; Abbotsbury (**DA49**), with few remains; and Druridge (**DA60**), where earthworks and a few concrete fragments can be made out. In addition, Studland Bay (**DA6**) includes the observation bunker, Fort Henry; Weybourne (**DA 41**), the site of an army camp and heavy anti-aircraft battery; and Dunster Beach (**DA63**), an army camp. The sites of anti-aircraft batteries can also be found at Atwick (**DA53**) and Walberswick (**DA40**).

At Cuckmere Haven (**DA14**) is perhaps the finest group of surviving coastal defence works, with pillboxes of differing types dug into the cliff sides, large anti-tank cubes, an anti-tank wall, and open sections of anti-tank ditch.



Two defence areas - Abbotsbury (DA49) and Winterton-on-Sea (DA56) - contain double lines of massive anti-tank cubes, making these significant monuments that now provide a focus to the landscape around them. These remains, and others more fragmentary at Speeton (DA52), Walberswick (DA40), Druridge (DA60), Studland Bay (DA6), Bawdsey Point (DA29), and Atwick (DA53), as well as at Cuckmere Haven (DA14), show the importance attached to blocking all possible exits from the shore as well as preventing the lateral movement of armoured fighting vehicles along the beach. In addition to Cuckmere Haven (DA14), remains of anti-tank ditches can be seen at Druridge (DA60) and Weybourne (DA41).

Anti-tank scaffolding was erected at both the head of the beach and the high-water mark of many of the defence areas. In all cases, this was not put in place until the spring of 1941. At Weybourne (**DA41**), some lengths of the scaffolding base can still be seen emerging from the shingle, and similar remains may survive at Bawdsey Point (**DA29**).

Even in areas where cliffs were at the front-edge of the defence, defence works were still constructed in depth. The principal threat at such points was perceived as attack by specially-trained cliff assault troops, who would then move to attack the perimeter defences of a port or possibly seize the flanks of a more open adjacent beach. Such defended cliff top areas are Hollicombe Beach (DA64), Atwick (DA53), Speeton (DA52), and Cayton Bay (DA26). The flat marshland seamed by drainage dykes of Lincolnshire was also not considered a sufficient protection against attack, and sea banks were extensively fortified and certain drained areas re-flooded. Lawyers' Creek, Holbeach (DA55), Freiston Shore (DA35), and Saltfleetby (DA30) provide excellent examples of this type of defended landscape.

A number of the defence areas provide evidence of separate lines of pillboxes that continued the defence for several miles into the interior from the sea edge. Good examples of such defence in depth are Dunster Beach (DA63), Speeton (DA52), Cayton Bay (DA26), Weybourne (DA41), and Studland Bay (DA6).

There are several distinctive styles of pillboxes on the coast in the area of Northern Command from Lincolnshire to Northumberland. The three-bay 'Lincolnshire' infantry pillbox can be seen at Lawyers' Creek, Holbeach (**DA55**), Freiston Shore (**DA35**), and Saltfleetby (**DA30**). In East Yorkshire, a lozenge-shaped pillbox with four small embrasures side by side in its forward face appears, and this was constructed also in North Yorkshire where it can be found at Speeton (**DA52**). Also found on the coast of North Yorkshire is a strong medium machine gun pillbox with external projecting sills beneath its embrasures and two doorways facing forward, one at each end. It can be seen at Cayton Bay (**DA26**) and Speeton (**DA52**). A further distinctive pillbox type can be found on the Dorset coast at Studland Bay (**DA6**) and Abbotsbury (**DA49**). It is of a basically square shape, with a large forward embrasure for medium machine gun fire. At Barrow Island (**DA43**), there is a unique variant of the type 24 pillbox with a projecting doorway.

The rare pillbox type, the Ruck Machine Gun Post, was evidently relatively widely constructed on the east coast. An example in very good condition survives at Lawyers' Creek, Holbeach (**DA55**), but other remains were located during fieldwork at Freiston Shore (**DA35**), Saltfleetby (**DA30**), and at Reighton, north of Speeton (**DA52**).



Examples of the concrete infantry section post, which probably developed out of revetted earthworks of the same type [a fine USAAF air photograph shows one of the latter near Frilford - see **DA 59**], can be found at the coast at Cayton Bay (**DA26**) and Dunster Beach (**DA63**). The Dunster examples appear to be of a unique type which are only known from air photographs, although it is possible that examples survive beyond the defence area. Concrete section posts can also be found inland at Fordingbridge and Greatham Creek [see also Area Defence below].

Hardened weapon emplacements for anti-tank guns are rarely found within the study defence areas at the coast. The only certain example is at Weybourne (DA41). Beach defence guns were probably sited within earthworks, possibly on concrete platforms, as were field artillery guns to the rear.

Field evidence shows that the spigot mortar was used in the defence of the Norfolk coast as it can be found both at Winterton-on-Sea (**DA56**) and Weybourne (**DA41**). There is no documentary information on its precise role, but as surviving pedestals stand on the beach of the eroding coastline it must have had a front-edge purpose against armoured landing craft or disembarking tanks.

#### **Defence Areas on Stop Lines and Other Defence Lines**

Thirty-three defence areas studied are concerned primarily with linear defence, the great majority being positioned on stop lines. Bramling (**DA1**) is set on part of a defence line forward from the main Corps stop line, and Farthingloe, Dover (**DA78**) is on the perimeter defence line of Dover garrison. Four of the stop line defence areas incorporate aspects of nodal point defence as well - Sudbury (**DA9**), Penshurst (**DA16**), Semington / Whaddon (**DA27**), and Littleport (**DA75**).

Eighteen defence areas studied are on one of the five branches of the GHQ Line, with Penshurst (**DA16**) being at the junction of the Wealden branch with that of GHQ Line 'B', and Semington / Whaddon (**DA27**) at the junction of GHQ Line Green and GHQ Line Blue. Four other defence areas are on GHQ Line Green - River Brue: Cripp's Bridge (**DA20**), Godney (**DA68**), Hog Wood (**DA32**), and Avening (**DA58**) - and one other on GHQ Line Blue - Dunmill Lock (**DA21**). There are two defence areas on GHQ Line Red - Frilford / Fyfield (**DA59**) and Sulham Valley (**DA9**). In addition to Penshurst (**DA16**), the Wealden branch of the GHQ Line has two defence areas - Barcombe Mills (**DA23**) and Old Lodge Warren (**DA17**) - and GHQ Line 'B', five - Waverley Abbey (**DA13**), Dorking Gap (**DA12**), Sidlow Bridge (**DA38**), River Medway: Maidstone (**DA67**) and Deangate Ridge, Hoo (**DA39**). GHQ Line 'A' has one defence area at its junction with a further defence line - Chequers Bridge (**DA51**). North of the River Thames, the GHQ Line is represented in three defence areas - Hartford End (**DA8**), Audley End (**DA70**), and Littleport (**DA75**).

The well-documented Taunton Stop Line has three defence areas - Weycroft (DA3), Wadbrook (DA4), and Pawlett Hill (DA19). The anti-tank island of Ilton (DA25) on this stop line is considered under 'Area Defence'.

Complete, or nearly complete, runs of infantry pillboxes survive in several defence areas. The type 24 pillbox predominates in many areas, for example Barcombe Mills (DA23), Penshurst (DA16), Sidlow Bridge (DA38), Old Lodge Warren (DA17), Hopwas Bridge (DA31), and the River Brue (DA20), but other types of pillboxes are also found as the main



stop line defence component. At Sudbury (**DA9**), for example, it is the type 27 pillbox that predominates, and this type was also used widely on the Outer London Anti-Tank Line – as at Cheshunt (**DA61**) and Drift Bridge (**DA37**).

In Essex and Cambridgeshire, a strong infantry pillbox known as the 'Eastern Commandtype' was built extensively, and can be seen at Hartford End (**DA8**) and Audley End (**DA70**). A further local pillbox type is found at Dover, where it is characterised by an overhanging roof slab and wide embrasures. It was built as part of the Dover perimeter defences - Farthingloe, Dover (**DA78**).

On the Taunton Stop Line, the Vickers machine gun emplacement was constructed widely, being shown separately from the lighter infantry pillboxes on the surviving Royal Engineers mapping. Examples can be seen at Weycroft (DA3), Wadbrook (DA4), and Pawlett Hill (DA19). This type was also built within Aldershot Command and can be found at Chequers Bridge (DA51) and also Ewshot (DA34) [see as well under 'Area Defence'].

Amongst the study defence areas, the stop line following the Leeds & Liverpool Canal in the area of Burscough (**DA36**) is unique in having been defended primarily by machine gun posts established within buildings along its bank. Such a fortification of houses and other buildings is generally found within the defence of urban areas [see 'Area Defence].

On stop lines, important crossing points of roads, railways, and rivers were generally defended with heavy emplacements for 2pdr. and 6pdr. anti-tank guns. Many fine examples of these survive - for example at Dunmill Lock (DA21), Semington / Whaddon (DA27), Penshurst (DA16), Wakes Colne Viaduct (DA72), River Medway: Maidstone (DA67), Deangate Ridge, Hoo (DA39), Hartford End (DA8), Barcombe Mills (DA23), and River Lark: Jude's Ferry Bridge (DA5). The fullest deployment of the anti-tank gun emplacement can be seen on GHQ Line Red where it was often constructed in twos at regularly-spaced locations. The greatest concentration of these emplacements is in the Sulham Valley (DA7), which was undoubtedly the most heavily fortified section of a stop line in the country.

The main purpose of a stop line was as a continuous anti-tank obstacle, such a defence being provided by a natural waterway, by a machine-dug ditch, or by rows of anti-tank obstacles. It is rare for an artificial anti-tank ditch to have been left unfilled, but occasionally its course can be made out as a crop mark or as a slight hollow, such as at Chequers Bridge (**DA51**) and Deangate Ridge, Hoo (**DA39**). At Avening (**DA58**), when the ditch was infilled it was left as a ridge which can be traced clearly today. At Hog Wood (**DA32**) is the remarkable survival of 300 metres of ditch at its full depth and width.

Lines of blocks forming the front-edge anti-tank barrier can be seen at Wakes Colne Viaduct (DA72), Drift Bridge (DA37), Cheshunt (DA61), River Medway: Maidstone (DA67), and Godney (DA68). An outstanding survival are double lines of cylinders running through a wood at Chequers Bridge (DA51).

Concrete blocks were also used to strengthen sections of river bank as an anti-tank obstacle. Good examples can be found at Dorking Gap (**DA12**), Sidlow Bridge (**DA38**), and Weycroft (**DA3**).



Remains of the concrete plinths of roadblocks, or of blocks and 'dragon's teeth' at the road side, are rare. Good examples of plinths survive at Deangate Ridge, Hoo (**DA39**), Audley End (**DA70**), and Wadbrook (**DA4**), and of blocks at Semington / Whaddon (**DA27**) and Sulham Valley (**DA7**). 'Dragon's teeth' [pimples], once as synonymous with anti-invasion defence works as the pillbox, survive only very rarely, being easier to remove than bigger obstacles. The best examples are at Waverley Abbey (**DA13**) and Chequers Bridge (**DA51**).

Evidence of roadblocks formed by vertical rails or posts is also very rare. Examples can be found at Godney (**DA68**), Sulham Valley (**DA7**), and Dunmill Lock (**DA21**).

Evidence of the depth of the defence set back from the front-edge of the anti-tank obstacle can be seen in several defence areas. Bramling (**DA1**) on a forward defended line illustrates this strategy, as does Ewshot (**DA34**) [considered under 'Area Defence']. At Hartford End, stronger type 24 and Eastern Command-type pillboxes were built close to the river anti-tank obstacle, with lighter type 22 pillboxes on the slopes behind. At Wadbrook (**DA4**), however, this tactical positioning was reversed, with the lighter defence works close to the river and the Vickers machine gun emplacements dominating the high land.

#### Area defence

Fourteen defence areas are concerned with differing types of area defence - that of antitank islands or 'fortresses' - Ilton (**DA25**), Pevensey Castle (**DA66**), and Cripp's Corner (**DA18**); of nodal points - Sarre (**DA2**), Acle (**DA15**), and Wooler (**DA76**); and of Defended Localities - Pershore Bridges (**DA10**), Greatham Creek (**DA33**), Breamore Mill (**DA45**), and Ludham Bridge (**DA65**). The defence purposes of a further four areas are exceptional - Ewshot (**DA34**), which combines a defence in depth behind the GHQ Line with a more localised area defence (reason unknown); Canewdon (**DA48**), the defence of a Chain Home Radar Station [Bawdsey Point (**DA29**) provides a comparison]; Kirkleatham (**DA57**), the defence of an army headquarters; and Bromborough Pool (**DA71**), the defence of a road bridge, dock, and war production works.

The use of existing buildings as defence positions, because of their strength, their position, and their usefulness as camouflage, is well illustrated by certain defence areas. Pevensey Castle (**DA66**) provides an outstanding example of a historic building converted to Second World War defence. Breamore Mill (**DA45**) is an excellent illustration of a house and its grounds forming a defended locality in defence of the river crossing of a stop line, with various buildings converted to defence or added and disguised as part of the overall building. At Ludham Bridge (**DA65**), a water pump tower was similarly converted, with a spigot mortar emplacement placed alongside it. Because of the detailed surviving documentation, the buildings at Sarre (**DA2**) that were adapted for defence are known, showing how extensive was this practice, although there appears to be no external surviving evidence today. At Acle (**DA15**), a pillbox disguised as an addition to the Manor House shows how buildings in an urban setting were prepared for defence.

The anti-tank island of Ilton (**DA25**) set on the Taunton Stop Line, with its anti-tank gun emplacement, and especially strengthened pillboxes, contrasts with the 'fortress' established at Cripp's Corner, where the defence relied simply on denying the area to enemy armoured vehicles by an all-round perimeter of massive concrete obstacles and dense woodland, with no in-place provision to engage them with anti-tank fire.



Pershore Bridges (**DA10**) provides a further illustration of a defended river crossing on a stop line. Because of the extent of the research that has been carried out here by local historians [see the references in the report on this defence area], it has been possible to reconstruct in detail the overall defence based on an anti-tank gun emplacement, pillboxes, and roadblocks, adding to this the evidence of spigot mortar emplacements that illustrate the use of this important Home Guard weapon.

At Greatham Creek (**DA33**) is a remarkable, and unique, concentration of concrete section posts, providing, if fully manned, a strength of infantry fire that appears out of proportion to the assumed defence task. More research is necessary here. The concentration of defences at Ewshot (**DA 34**), with their placement around a wood, and air photographic evidence of a barbed wire perimeter and earthworks, also forms an unusual defence area where further research is required. The role of Kirkleatham (**DA57**), with its defences, known from documentary sources, might also be explored through further work. If this was purely an army headquarters, its defence, partly by a machine-dug anti-tank ditch, is unusual.

#### SUMMARY OF FINDINGS, INTERPRETATION, AND SIGNIFICANCE

Anti-invasion defence works of the Second World War (in particular, those hardened weapon emplacements more popularly termed pillboxes) are arguably the most readily identifiable 20th century military works in the English landscape. Despite the clearance of many thousands of them over the past sixty-five years, very many survive, prolific in some types, rare in others.

In the remainder of this section the results of the study are reviewed first under headings reflecting the broad criteria for determining national importance (referred to in PPG16 as 'criteria for scheduling'), and then discussed in relation to some popular associations and misconceptions about the subject.

#### Criteria

This report was commissioned mainly as an assessment of areas of significance for antiinvasion defences to inform potential management and designation. It is relevant, therefore, to discuss the results in relation to the criteria for determining national importance. The individual area reports expand on many of these issues for particular cases.

The criterion of *Period* (i.e. describing sites that characterise a period or category) is covered in the introductory section above explaining the history of anti-invasion defence strategy focusing on the years 1940-1941. The issues of *Group Value* have already been extensively covered above in explaining the rationale for the selection of the Defence Areas and the part they played within the defence strategy of the time. An overview of *Documentation* and how the defence structures relate to documented history has been given in the section covering the resources available for study. The *Diversity* of individual components and how they contributed to different types of defence has also been explained above and in Table 1. General issues of *Potential* are principally covered first by points made in Table 1 and accompanying notes regarding the types of structure (e.g. filled in slit trenches or anti-tank ditches which have greater archaeological potential than more



ephemeral surface structures that have been removed); and second, by the question of survival (see below) in terms of evidence of where structures have been removed but may have left some sub-surface remains.

The findings of the project in relation to other scheduling criteria are discussed in the following sections.

#### Rarity

The overall figures for different types of anti-invasion defence structure and individual cases identified as being of potential importance were examined as part of Task 1. Their relationship to Defence Areas has been discussed above (see 'Results of the Project: Components of the Defence Areas Studied').

From the sixty-seven defence areas, those with the most important, and unusual, defence structures are considered to be,

- Abbotsbury (**DA49**) double line of anti-tank blocks crossing the Chesil Bank.
- Acle (DA15) disguised pillbox addition to the Manor House.
- Bawdsey Point (**DA29**) pillboxes formed from Victorian grottos amongst the cliffs.
- Breamore Mill (DA45) defended mill buildings [no access].
- Cayton Bay (**DA26**) concrete section post on top of cliff, with one recently fallen.
- Chequers Bridge (**DA51**) double line of concrete cylinders through wood [no access].
- Cripp's Corner (DA18) perimeter lines of anti-tank cubes.
- Cuckmere Haven (DA14) anti-tank wall and open anti-tank ditch.
- Deangate Ridge, Hoo (DA39) roadblock plinths.
- Dorking Gap (DA12) anti-tank gun emplacement dug into the side of Box Hill.
- Druridge (**DA60**) pillbox disguised as cottage.
- Dunmill Lock (DA21) two anti-tank gun emplacements side by side.
- Dunster Beach (DA63) pillbox with chimney from wartime camouflage.
- Ewshot (**DA34**) densest concentration of pillboxes of any area.
- Farthingloe, Dover (**DA78**) unique Dover-type pillboxes, with remains of HAA and coast batteries, and camp.
- Freiston Shore (DA35) complete Ruck Machine Gun Post.
- Frilford / Fyfield (**DA59**) anti-tank gun emplacements and re-excavated section of anti-tank ditch [latter by permission only].
- Greatham Creek (DA33) concentration of concrete section posts.
- Hartford End (**DA8**) virtually 'complete' stop line landscape with two lines of defence works and excellent access.
- Hog Wood (DA32) unfilled lengths of anti-tank ditch.
- Ilton (**DA25**) double-decker pillbox.
- Leeds & Liverpool Canal: Burscough (DA42) buildings adapted for defence.
- Ludham Bridge (**DA65**) fortified wind pump.
- Penshurst (DA16) largely 'complete' stop line landscape at junction of two stop lines.
- Pevensey Castle (DA66) re-fortified Roman and medieval defences.
- River Medway: Maidstone (DA67) lines of massive anti-tank cubes.



- Sidlow Bridge (**DA38**) lines of anti-tank cubes on river banks.
- Studland Bay (**DA6**) Fort Henry with 6 in. gun emplacement and type 25 pillbox below cliffs.
- Sulham Valley (DA7) densest concentration of anti-tank gun emplacements of any area.
- Wadbrook (DA4) bridge roadblock plinths.
- Wakes Colne Viaduct (**DA72**) lines of anti-tank cubes and cylinders, with antitank gun emplacement and spigot mortar pedestals.
- Waverley Abbey (**DA13**) castellated and loopholed courtyard to anti-tank gun emplacement.
- Weybourne (DA41) open section of anti-tank ditch.
- Winterton-on-Sea (DA56) two joining lines of massive anti-tank cubes.

#### Survival, Vulnerability, and Threats

Of the overall category of pillboxes (including all hardened weapon emplacements erected as fieldworks, but excluding fixed defences), it is estimated from the DoB data that some 28,000 individual structures were constructed in the United Kingdom of which about 6,500 (23%) survive.<sup>5</sup> The equivalent figures for England are around 23,000 built, of which some 5,500 (24%) survive.

Hardened weapon emplacements represent the best overall category of survival. The other categories [see Table 1 below] survive much less well, with 'Sites with Explosives' virtually not at all.<sup>6</sup> Earthworks were almost all infilled many years ago (even before the end of the war), but some do survive, mainly because of their position in woodland, or on moorland and rough grazing land. Concrete obstacles, particularly those beside roads and railways, are disappearing fast as ever-growing travel pressure means that routes are widened. This is the category of defence work, being relatively easy to displace, that is most vulnerable to further loss.

Concerted efforts were made to remove defence works at the end of the war, the greatest emphasis being placed on those that threatened public safety or interfered with the economic life of the nation.<sup>7</sup> Urban defence sites, and those affecting agriculture, were given a high priority. Most roadblocks had been removed, and anti-tank ditches infilled, by 1947/48. Public recreation was also considered a priority and the principal beaches were soon cleared of scaffolding and concrete, although much still remained in place in more remote areas until the early 1950s. Later, the removal of defence works, perceived as eyesores, was carried out on a local basis, although some larger schemes were abandoned

<sup>&</sup>lt;sup>7</sup> The Ministry of Works was responsible for this work that was undertaken on a county basis. For the purpose, War Department Land Agents supplied complete lists of all military works, documentation which only survives - as far as is known - in Essex. Surveys of defence works on the coast were carried out to ascertain the extent of the removal and restoration that would be necessary - that for Norfolk survives in part at the Norfolk Record Office, Norwich.



<sup>&</sup>lt;sup>5</sup> A Review of the Defence of Britain Project (Council for British Archaeology, November 2002).

<sup>&</sup>lt;sup>6</sup> At the time of the writing of this Report (May 2004), a flame fougasse site complete with its drum of petroleum and explosive charge is said to have been located in Northamptonshire. In recent years, a bridge at Sarre was also discovered with its detonation explosives still in place. Such was the quantity of explosives laid down in the 1940/41 period that other examples are almost certain to remain unrecognised.

owing to lack of resources.<sup>8</sup> It is perhaps ironic that inland stop lines, forming part of the linear defence strategy that was first abandoned, generally survive best. In many cases, farmers have found these structures a help rather than a hindrance, and they have now become, to some extent at least, an accepted part of the landscape.

Anti-invasion defence works are still vulnerable to destruction by the clearance of agricultural land, by the development of roads, railways, and buildings, by deliberate vandalism, and by natural erosion. In the latter regard, structures on the east coast of England, in particular in Norfolk and in East and North Yorkshire, are especially threatened, most of the front-edge defences having long been lost and the second line now in immediate danger. [See, for example, Atwick (DA53) and Cayton Bay (DA26)].

#### Condition

For the purposes of this study, a defence structure was adjudged to be in 'Good' condition if it survives intact as a clear exemplar of its type, is largely clear of vegetation, and is in a reasonably clean condition internally. Occasionally, structures that are more heavily overgrown were also rated as 'Good', in particular rarer types, where it can be seen that, other than for the overgrowth which could be removed relatively quickly, they are in a clean, undamaged condition.

From the DoB data it is estimated that of the c5,500 pillboxes surviving in England about 2,000 are in 'Good' condition (8% of the total built). Of this last figure, some 350 in 'Good' condition (1.5% of those built) lie within the sixty-seven Defence Areas covered by this survey, out of a total of 580 surviving in all conditions within those areas (10% of the total surviving for England). Hence, it is fair to suggest that the Defence Areas Project survey represents a 10% sample of surviving anti-invasion defence works in England, but includes 17% of hardened weapon emplacements that are in 'Good' condition. The difference in the last two percentage figures is explained by the fact that the defence areas were deliberately selected for their good survival of defence works.

The condition of a very high proportion (up to 75%) of defence structures is overgrown. In many cases, the overgrowth is such that the site cannot be approached at all, in summer or winter, being surrounded by impenetrable thickets of thorn and bramble. Some structures are so covered in vegetation that they can scarcely be made out, not even at a distance of a few feet. Even defence works close to built up areas are liable to be covered by creepers or hidden by bushes. Such overgrowth disguises the historic value of the structure: its form cannot be made out or its purpose appreciated. The neglected condition of many of the works, when despoiled internally as well by the attention of vandals or used as rubbish dumps, does little to help in their preservation. Landowners see little to commend in structures so evidently abandoned by responsible authority, and will be unconcerned about their future survival: indeed, just the opposite, they may be motivated to remove them as a lure to undesirable elements entering their land.

<sup>&</sup>lt;sup>8</sup> For example, in Surrey. The Surrey Record Office at Woking contains a map of defence works proposed for removal in 'areas of outstanding natural beauty'.



#### Access and Amenity

Although a large number of defence works stand on, or immediately adjacent, to public rights of way, the majority lie on private land to which there will be no access without permission.

Because of the widespread nature of anti-invasion defence sites, and because of the popular interest in the subject, the question of access is probably as pertinent for these sites as for any other classification of archaeological site for any period. In many cases, viewing from a distance without the need for close inspection is an acceptable alternative. In the course of the surveys for this Project, landowners were without exception helpful and interested. However, that situation could well change if thoughtless individuals abused the rights of private owners, or large numbers arrived to stare across a hedge. The whole question of the publicity of sites hinges upon correct behaviour being shown.

It is considered that there is a clear need for popular publications that provide information on the subject of anti-invasion defences and describe sites and the access to them. Many of the defence areas considered in this study provide admirable scope for a 'pillbox walk' to be conducted through them. Anti-invasion defences represent recent 'people's history', for which there is great interest, not least for the symbolism they evoke of 1940 - 'Britain's finest hour' - and her last-ditch resistance to Nazism.

#### Associations and Misconceptions: The anti-invasion period and popular perspective

A number of myths about the anti-invasion period of 1940/41 have grown up since the Second World War - indeed they may even have originated during it - and these have become embedded in the public mind by their repetition in publications and television programmes. They may be set out, and challenged, as follows,

#### The Home Guard was manned largely by old men, and was something of a joke -

The core of the Home Guard in fact consisted of men in their 40s and 50s, including a large number of veterans of the armies that had defeated Germany twenty-two years earlier. Many young men were also in its ranks, either exempted from military service by reason of their occupation (such as farm workers and miners) or awaiting their call-up.

#### The Home Guard was the main front line force defending the country against invasion -

The Home Guard (at that time called the Local Defence Volunteers) had been raised in mid-May 1940, before the defeat in France, principally as local forces to act against the danger of enemy parachutists. As the invasion danger deepened after Dunkirk, the Home Guard was given an important role in support of the regular army, mainly manning roadblocks and inland area defences, and acting as guides to the front line Field Force.

## *Pillboxes and other defences were badly sited, often the wrong way round, and would not have lasted five minutes in the event of a German attack -*

The anti-invasion defences were planned and built under the control of the Royal Engineers, one of the most professional Corps of any European army of the period. Because of the speed demanded for their construction, and the inadequacies of materials and labour, mistakes were certainly made, and much was later corrected, but overall the



defences were a remarkable achievement that would have been increasingly difficult for German forces to overcome after the autumn of 1940. The main weakness of the defences in the critical anti-invasion danger period of June-September 1940 was not the works that were built, or the intricate defence strategy they formed part of, but the lack of weapons to arm them.

## Britain's defence thinking was based on the First World War concepts of General Ironside, and quite out of touch with the new warfare, blitzkrieg -

Britain's army returning from Dunkirk had experienced blitzkrieg at first hand. General Ironside had been one of the few commanders who had predicted the German attack through the Ardennes. With dangerously weak resources in arms and materials, he put in place a defence system designed to implement the lessons learnt in France - the need to prevent the breakout of German tank columns, the need to bottle up and destroy enemy airborne forces, the need to keep roads free for the movement of troops, and the need, above all, to defend the coast and its ports.

There was little else General Ironside could have done in the immediate invasion danger period, given the problems he was faced with and the inadequacy of his resources. The stop lines were primarily anti-tank obstacles designed to check the advance of the fast-moving armoured columns that had swept through France. They were also prepared battlefields that the Field Army could move to in the event of invasion. They were not manned, or armed, by troops that should otherwise have been defending the coast or forming mobile forces.

The evidence from German air reconnaissance and mapping shows how seriously the British defences were taken. Technical manuals were also produced by the Germans identifying the different types of British defence works. Germany herself employed defence lines later in the war, in Italy and North West Europe, much delaying Allied forces, and her system of defence and its terminology, and the types of defence works, in many respects match those built by the British. Germany, however, had much more time to prepare and a forced labour construction force.

General Ironside was replaced by General Brooke, not because what he had done was wrong or inadequate as such for the situation he found himself in, but because a new offensive spirit had to be created for the British Army, with new ideas, new strategies, and new commanders. Ironside was perceived as one of 'yesterday's men', tainted by an association, whatever he did, with near-defeat.

#### **RECOMMENDATIONS FOR FUTURE WORK**

The main direct need arising from this study is to take forward three initiatives:

- Developing programmes to conserve the areas and sites identified through designation, management agreements and/or planning controls, both at national and local level
- Publishing the results of the study in a CBA research report (project proposal agreed)
- Piloting examples of 'pillbox walks' as a means of broadening public access and understanding (project proposal submitted).



This study has done much to improve the detailed locational and other information about the sites covered within the Defence Areas studied, and this data is now made available to Historic Environment Records, who it is recommended should endeavour to maintain full and complete records of World War Two defence sites as part of their normal record enhancement role

Certain defence structures, in particular earthworks, demand professional surveying. Some examples noted in this study are the anti-tank ditches at Hog Wood (**DA32**) and the coast battery at Hemscott near Druridge (**DA60**).

Future research should be by local study - by place or defence group [e.g. a section of stop line] - using all the resources detailed in this study. An important component would be to build up a fuller oral history from personal testimony while this rapidly diminishing resource is still available. Several defence areas in this report include recommendations for further documentary and fieldwork [see, for instance, Ilton (DA25), Sarre (DA2), and River Medway: Maidstone (DA67)].

The Worcestershire Defence of Britain Project [see Pershore Bridges (**DA10**)] has shown the way as an example of a detailed local study of this nature, combining field evidence with documentary research and oral history, as well as research into individual units, weaponry, and tactics. A current project examining the defences of the Taunton Stop Line shows the value of detailed research into a total defence line running over many miles.<sup>9</sup>

A local defence area study might look as well at aspects of the military landscape into which as yet there has been little research - for example the accommodation of troops, requisitioned buildings for headquarters, designated military roads, and civilian restrictions and eviction.

A major documentary resource, little touched upon for this study, are Unit War Diaries (TNA: PRO WO 166), for the period 1942-1945. Most of the current research was carried out using war diaries for 1940-1941, but a sample looked at for later dates shows that anti-invasion defences were being maintained and extended, and adapted against the threat of German raids.

Appendix B at the end of this report is an index of place names where details of individual sites were noted amongst documents held by The National Archives. This varies from a few references to very detailed defence schemes with maps. The index was compiled quickly during the course of research, and there has been no opportunity to check it further. Hence, it will probably contain some errors, but it is hoped it will provide a useful start for projects of research into the anti-invasion defence of a particular local area.

Two areas with particular potential for research brought to the attention of the writer during the course of this Project are that traversed by the Coquet Stop Line in Northumberland and the coast of Essex at Bradwell-on-Sea. Other areas can be identified by using the DoB data as described above

<sup>&</sup>lt;sup>9</sup> See John Schofield, *Modern Military Matters* (Council for British Archaeology, 2004), p42.



#### CONCLUSION

A consideration of whether Britain would have been successful in repelling a German ground attack launched from the sea and the air in 1940/41 is beyond the scope of this Project. What is certain is that the defence works - the anti-tank ditches, the concrete obstacles, the scaffolding, the flame fougasses, the depth charge craters, the pillboxes - would have succeeded in their principal objective of holding up the attack and altering its direction. Defence works themselves, however, do not win battles. At their best, they provide time for counter-attack by well-led armies with the requisite arms and equipment

Winston Churchill's famous speech delivered on the 4th June 1940 - "We shall fight on the beaches, we shall fight on the landing grounds, we shall fight in the fields and the streets, we shall fight in the hills; we shall never surrender" - defines the areas of English landscape today where the remains of the extensive defence systems built in 1940/41 can still be found. Although no ground fighting took place on British soil, the relics of these defences seen in lines across the countryside can be viewed as reflecting the high water mark of Nazi expansion - battlefields that were prepared but to which, thankfully, the contesting armies never came.

Despite the passing of sixty-five years, and all the clearance of the defence works that has been carried out, very much survives as an evocative reminder of the desperate days of 1940. These concrete and earthwork remains, often hidden by vegetation and abandoned in farmyard and garden, in hedgerow and river valley, on ridge and cliff top, represent more than archaeology, more than illustrations of mid-twentieth century fortification - they are recent history, history that is closely identified with by all manner of people, part of the nation's endurance and suffering still within the lifetime of many, or the immediate memory of their children.

The landscape is given added meaning by the continuing presence of these defences. Through them, in the rise and fall of the land, the course of the valley, the line of the road, and the junction of road and railway, can be seen the movements of armies, the battles that so nearly happened. Time does not destroy the razor-edge immediacy of the events that came so perilously close. It is important that these defence structures are given protection: the preservation of complete landscapes of defences is vital for our continuing understanding of the strategies that gave them their purpose.



# Table 1: TYPES OF ANTI-INVASION DEFENCE WORKS (with notes on the application of certain terms)

### Hardened weapon emplacements

Pillbox	Infantry field fortification, principally for rifle and light machine gun fire. The term is used if the precise type is not known.
Pillbox (Variant)	A pillbox of a non-standard type, often built to suit its site.
Pillbox (Type FW3/22)	Small hexagonal pillbox.
Pillbox (Type FW3/23)	Rectangular pillbox with attached open section for anti-aircraft fire.
Pillbox (Type FW3/24)	Hexagonal pillbox, often strengthened with thickened walls and roof to make shell-proof. The most commonly-found pillbox in southern England.
Pillbox (Type FW3/25)	Small circular pillbox, also known as the Armco, the name given by the company manufacturing it.
Pillbox (Type FW3/26)	Square pillbox.
Pillbox (Type FW3/27)	Octagonal pillbox with central open well for anti-aircraft fire.
Pillbox (Type FW3/28)	Artillery emplacement with a single chamber to mount a 2pdr. or 6pdr. anti- tank gun.
Pillbox (Type FW3/28A)	As the type 28, only with one (or more) additional side chambers for infantry fire. Some examples have two main embrasures set at right angles.
Anti-Tank Gun Emplacement	An emplacement for anti-tank gun fire, the exact type of which is not known.
Pillbox (Type CP/6/40/111)	Small circular pillbox, also known as the Norcon, the name given by the company manufacturing it.
Pillbox (Prefabricated)	Pillbox, usually rectangular, built with prefabricated walls brought to the site and bolted in place.
Ruck Machine Gun Post	Pillbox with a curving concrete-shingled roof usually built over a rectangular pit.
Allan Williams Turret	Pillbox formed of a revolving metal turret set above a steel and brick-lined pit.
Tett Turret	Two-man pillbox with a revolving concrete turret set above a cylindrical concrete pit.
Machine Gun Emplacement	Pillbox, usually square, with wide embrasures for medium machine gun fire.
Vickers Machine Gun Emplacement	Square, thick-walled pillbox with large main embrasure for the fire of the Vickers medium machine gun.
Section Post	A development from the revetted infantry earthwork [see 'Earthworks'], forming an elongated rectangular concrete pillbox, with embrasures to front and rear, sometimes built with two wings extending from a sharply-angled centre.
Gun Emplacement	Emplacement for artillery gun whose precise type is not known
Spigot Mortar Emplacement	Unroofed emplacement, often concrete but sometimes a revetted earthwork, with a central concrete pedestal for the fire of the spigot mortar anti-tank weapon used predominantly by the Home Guard
Fortified House	A house that has been converted for defence by the addition of concrete ceilings and walls, the latter loopholed for infantry fire.
Defended Building	A building other than a house that has been adapted for defence with firing positions.



Loopholed Wall A wall, not part of a building, which has been loopholed for rifle and light machine gun fire.

### **Concrete and Metal Obstacles**

Cube	Concrete anti-tank obstacle in the shape of a cube, often with a pyramidal top. Can stand as high as 7ft. Often placed in one or more lines as a continuous anti-tank barrier.
Cylinder	Anti-tank obstacle made from a drainage pipe filled with concrete. Usually 4ft in diameter and 5-6ft high. Often placed in one or more lines as a continuous anti-tank barrier.
Pimple	Concrete anti-tank obstacle in a pyramidal shape, otherwise known as a tetrahedron, usually placed in lines or groups at roadblocks, bridges, or other defended gaps in a stop line. Popularly termed 'dragons' teeth', or, at the coast, 'sharks' teeth'. Usually stand 3ft high.
Anti-Tank Block	Anti-tank obstacle whose form is not certainly known, but probably a Cube
Anti-Tank Wall	Continuous concrete anti-tank barrier built as a wall.
Anti-Tank Hairpin	Bent steel rail anti-tank obstacle with one end set into concrete sockets in a road surface. Also placed beside railway lines.
Anti-Tank Horizontal Rail	Anti-tank obstacle, usually forming a roadblock, consisting of one or more steel rails (or RSJs) placed horizontally between supporting concrete plinths.
Anti-Tank Vertical Rail	Rails (or sometimes wooden posts) set vertically into concrete sockets in a road or bridge surface to form a block.
Roadblock	The site of the blocking of a road where the exact form of the obstacles used is not known.
Railblock	The site of the blocking of a railway line where the exact form of the obstacles used is not known.
Anti-Tank Scaffolding	Anti-tank obstacle formed from tubular building scaffolding, usually erected in continuous lengths at the head of a beach.
Beach Scaffolding	As anti-tank scaffolding, but erected at the high water mark against the landing of enemy invasion craft.
Barbed Wire Entanglement	Usually three coils of barbed wire [Dannert wire], laid one above and fixed by metal picket posts, around a defended position such as a pillbox or a defended locality.
Barbed Wire Fence	Fence formed of several lengths of barbed wire affixed to posts surrounding a defended position, and most commonly used at the coast as part of the linear beachfront defence or forming the perimeter of a minefield.

### Earthworks

Anti-Tank Ditch	Machine-dug ditch of sufficient depth and width to prevent the crossing of enemy armoured vehicles. Usually dug in continuous, sharply-angled lengths.
Anti-Tank Ditch (Natural Improved)	Anti-tank ditch formed by a natural waterway, the banks of which have been artificially steepened, and possibly revetted, as a more effective anti-tank obstacle.
Slit Trench	Infantry firing position for two or three men, usually dug in short, narrow angled lengths.
Fire trench	Infantry trench usually larger than a slit trench with communicating trenches
Trench	Trench whose precise form and purpose is not known
Section Post	Deep revetted trench, dug in angled lengths, providing fire positions for an infantry section [see also 'Hardened Weapon Emplacements'].
Infantry Post	Sandbagged or earthwork position for two or three men.



Machine Gun Post	Sandbagged or earthwork position for infantry troops with a light or medium machine gun.
Weapon Pit	Small, rectangular or circular earthwork, often revetted, within which a machine gun, mortar, or other weapon is positioned.
Artillery Gun Position	Earthwork for the siting of an artillery gun, often as a prepared secondary position.
Anti-Tank Gun Position	Earthwork for the siting of an anti-tank gun, often as a prepared secondary position.
Anti-Landing Trench	Trench dug across open land, usually in short lengths as part of a grid pattern, with the mounds of earth left as extra obstacles, intended to prevent enemy aircraft landing and taking off again.

## Sites with Explosives

Mined Bridge	A bridge prepared for demolition, the explosives often being placed in specially prepared chambers.
Depth Charge Crater	Prepared site with buried explosives, to be blown up to form a deep crater as an anti-tank obstacle. In Eastern Command, popularly called 'Bosche Bumps'.
Canadian Pipe Mine	A particular method developed by Canadian Engineers of preparing a Depth Charge Crater site by a bored pipe packed with explosives. Also called a McNaughton Tube.
Minefield	A set area laid with anti-tank or anti-personnel mines, most commonly found as part of coastal defences, but also on interior stop lines or as part of anti- tank island or nodal point defences.
Petroleum Warfare Site	A site on the coast where a petroleum mixture was piped to the shore to be ignited in the event of invasion.
Barrel Flame Trap	A site prepared for petroleum to be discharged from a barrel, usually across a road, and then ignited.
Flame Fougasse	A barrel filled with a mixture of petrol, oil, and rubber to be fired by an explosive charge. Usually dug into banks at the side of roads.

### **Command and Observation**

Army Headquarters	The location, usually in a large house or other building, of the headquarters of an army unit - whether Command, Corps, Division, Brigade, Battalion (or other).
Army Battle Headquarters	Prepared locations for the headquarters of an army unit under battle conditions. Those for higher units, from Command down to Brigade, were often placed in especially bored underground tunnels.
Home Guard Headquarters	The headquarters location of a Home Guard unit, often in a village hall or public house.
Command Post	Hardened defence work, often a pillbox, serving as the command post for a particular sector or defended locality. Usually found at the coast.
Observation Post	Observation position on a high point of land or making use of a tall structure such as a church tower.
Coastal Observation Post	Purpose-built roofed structure on the coast, with wide viewing apertures.
Home Guard Observation Post	As 'Observation Post', but used specifically by the Home Guard
Beach Defence Light	Searchlight set at the head of the beach to illuminate the shoreline at night
Lyon Light Emplacement	A square concrete structure housing a beach defence light of a particular type. Often used by Emergency Coast Batteries before the introduction of coast artillery searchlights (CASLs).



### **Miscellaneous Sites**

Home Guard Shelter	Usually a rectangular brick building, with a concrete roof and set with benches, for the temporary shelter of a Home Guard unit, perhaps during an air raid.
Home Guard Store	Usually a square brick building with a locked door for the storage of Home Guard equipment and provisions.
Defence Work	A structure likely to have had an anti-invasion defence role, but the exact purpose of which is not known.
Defence Site	A site involved with some aspect of anti-invasion defence, but the exact function of which cannot be determined.

NB The sites of airfields, coast batteries, and structures connected with the Auxiliary Units [secret resistance army] were excluded from this study, but, where they are known and lie within defence areas, they are usually referred to. Symbols that represent these sites and structures are included in the Map Key.

#### Further notes on pillboxes:

- Pillboxes were field fortifications, not intended to be permanent, but part of the defence provision of infantry in the field. They had been widely used in the fighting in France in 1940.
- Pillboxes were usually surrounded by slit trenches from which infantry could act in a role supportive to the sheltered machine gun and rifle fire behind them.
- Pillboxes generally had an all round perimeter of barbed wire.
- Pillboxes were camouflaged in a variety of ways
  - by a particular complete camouflage scheme that might disguise them, e.g. as a cottage, a shed, or a haystack: extraordinary lengths were gone to in order to make such schemes as convincing as possible, a practice matched by German troops.
  - by placing earth and grass on their roofs, often with pillboxes sunk in the ground to embrasure level.
  - by painting them in camouflage colours.
  - by draping them with camouflage netting fixed by hooks that often survive on exterior walls.
- Many pillboxes built with walls 15ins, thick were later strengthened to be resistant to shell fire, their walls being thickened to 42ins.
- Pillboxes, in particular at the coast, that were no longer occupied were often filled with barbed wire to prevent them being occupied by assaulting enemy troops.
- Pillboxes in front-line areas were furnished with stores of food, water, and ammunition.
- Machine guns within pillboxes were generally set up on fixed lines, i.e. they were placed on special mounts [Turnbull mountings] so that they could be fired without aiming to cover the most likely points of enemy attack. This was usually a general requirement at the coast so fire could be maintained at night and through smoke. Ranges and arcs of fire were often set up on boards or sometimes painted on the interior pillbox walls.

#### Further note on anti-tank obstacles:

Coastal anti-tank obstacles were given the following increasing order of effectiveness<sup>10</sup>

- 1. Tubular scaffolding.
- 2. Minefields
- 3. Sea wall already present, 5ft. plus.
- 4. Vertical cliff, 7ft. plus.
- 5. Artificial ditches.
- 6. Rows of steel girders.
- 7. Concrete blocks.

<sup>&</sup>lt;sup>10</sup> 133rd Infantry Brigade War Diary, 1941 - TNA: PRO WO 166/988.

