



ENGLISH HERITAGE

Military Buildings Selection Guide

Heritage Protection Department

March 2007

Selection Guide

Military Buildings

I INTRODUCTION AND DEFINITIONS

Britain's military buildings are eloquent witnesses to the impact of world events on our national story. They also represent the importance of the armed forces in the history of both nation and empire. The range is vast, from Hadrian's Wall to Cold War bunkers. Military sites are both offensive and defensive: they include fortifications designed to withstand assaults, and bases from which operations could be launched. The building types are numerous, and sometimes – particularly in modern times - many examples of some types were built (although these do not always survive in large numbers). Specialist knowledge will often be required to assess the relative significance of a site for designation.

Broadly speaking, military buildings can be divided into the operational and the ancillary (commonly known in the military as 'the teeth and the tail'): buildings for fighting, and buildings for living and working. Very few barracks or other buildings associated with the latter survive from before 1800, but they increase thereafter and became dominant over the next two hundred years. This selection guide provides a rapid survey over the range and chronology of military buildings, and sets out the salient principles of selection. The area is an intricate and complex one: more detailed guidance will often exist on specific topics, and all cases will have to be judged on their individual merits. This survey is biased towards more recent military structures, large numbers of which are considered for designation each year. It is these more recent sites that provide the greatest challenges for assessment.

The emphasis in this document is on buildings that are assessed for listing. It is vital to remember that other designation responses are sometimes appropriate too. Scheduling, the designation of archaeological monuments, has been applied to defensive structures for over a century, and a number of twentieth-century sites have been protected in this way too. Area designations have been put in place by local authorities as Conservation Areas, and this is the most satisfactory way of acknowledging an area of special interest, rather than just the key individual buildings within it.

The category of military buildings is a particularly broad one, and overlaps are inevitable with others. Naval buildings are deliberately excluded from this section: they are covered in the **Maritime and Naval** selection guide. Military hospitals are touched upon in the **Health and Welfare** selection guide, while drill halls are included in that for **Sport and Recreation**. There is also cross-over with places of military production in the **Industrial** selection guide, and with communications centres in the **Utilities and Communications** selection guide. War memorials and other monuments are considered under **Commemorative**.

2 SPECIAL CONSIDERATIONS CONCERNING THE DESIGNATION OF MILITARY BUILDINGS

Historical association Military sites are often evocative witnesses to past conflicts. Degrees of historical association will inevitably vary, however. Government policy is clear that candidates for designation ought to be well preserved in a form which directly illustrates and confirms their historical associations, if they are to be designated on historical grounds. Particularly close links with noted military actions may sometimes be significant.

Listing and scheduling More than in any other area, military remains have been the subject of complementary approaches to designation. Generally, listing has been applied to buildings in use: scheduling to those monuments where re-use is inappropriate, or in ruinous condition. In practice, there are listed inert buildings in ruinous condition, and scheduled monuments in use. The most appropriate designation regime will be applied to all candidates, and in some cases a review of the existing designation may be warranted.

Local and national significance Some categories of military structures, particularly from the twentieth century, are legion; others are rare despite large numbers having been built. Like war memorials, all have an emotive power which connects communities with world events of the greatest magnitude. Local significance should not be underestimated, but it will not be possible or desirable to accord statutory protection to all such structures, most of which will be recorded on Historic Environment Records and can be accommodated within the planning process. Conservation Area designation has been and will be appropriate for some ensembles, such as aerodromes. Some structures will have claim to listing or scheduling because of their manifest special interest, however.

Period Being strongly representative of a phase or activity, or where a building contributes to understanding defence policy, or technological developments are likely to be an important claim to special interest.

Rarity Being a rare survival of its type will strengthen the case. In some cases, for example with experimental sites, many buildings are by definition rare or unique. Where this is the case, structures with rarity and uniqueness may warrant designation if they survive relatively intact and represent developments of national significance. But it is a paradox that for a period so recent, some categories of building from World War II, and even from the Cold War era - albeit in some cases once quite common - are now extremely rare. It is not the case simply that old sites are rare survivals, and modern sites more common.

Selectivity Government policy is clear that in cases of mass-produced or frequently encountered structures, a selection of the best and most representative examples is the approach to follow.

Site significance and group value Military structures often do not stand alone: they form parts of ensembles, such as fortification lines, camps, barracks or aerodromes. The claim to designation can often be greatly strengthened by group value factors, when survival of complementary structures creates a legible ensemble, in which the functioning of

various parts is strongly sensed and where the military experience is readily captured. With aerodromes the approach has been to concentrate designations at exemplary sites, which survive well. Such an approach may also be relevant to army camps, prisoner of war camps, barracks, and defence areas where pillboxes and associated works form a coherent group. Conservation area designation is sometimes warranted too and will often be the best way of registering area significance.

Survival Listing should be considered where the structural integrity of buildings remains, with evidence of internal configuration and occasionally plant and fittings, or where the building retains its contemporary setting, character and relationship to other buildings, sites and monuments.

Sustainability Many modern defensive structures were erected quickly in response to immediate needs. They were never intended to be permanent, which creates challenges in terms of their endurance as monuments. For short-life structures, such as huts, the best approach may be to encourage their removal to museum sites where they can receive appropriate care. The survival of footings and plan-form, and of service roads and overall plan, can aid the legibility and coherence where such structures survive as parts of larger sites, such as prisoner of war camps.

3 HISTORY

The development of military architecture is intricate and impressively well documented. For works of synthesis, Saunders (1989) and Osborne (2004) are recommended. What follows is a very cursory overview of the field by date categories. Because of the complexity of the subject and its sensitivity concerning designation issues, fuller treatment is given at the end about twentieth-century military buildings.

Military buildings up to 1700

Defence was the rationale behind many of our finest archaeological sites, both pre-Roman (such as hillforts) and Roman: Hadrian's Wall remains one of the great linear defence structures in the world. Early structures have only survived where of massive construction, and they have invariably been scheduled as ancient monuments. Town defences and coastal fortifications (memorably combined at Berwick-upon-Tweed) have enjoyed similar protection, but some shorter stretches of wall (as in Bath) have been listed instead.

Early artillery fortifications and coastal defence date from the fourteenth to the early sixteenth century. They range from castles and town walls with gun ports to purpose built stone towers such as that at Dartmouth (Devon), and later with ditch defences and outworks. From the sixteenth century (and specifically in the period 1539-43) a national defence policy emerged under Henry VIII, intended to deny the enemy a harbour or anchorage from which to base an invasion. Individual forts protected harbour entrances, and where distances were too great for effective artillery range, castles or blockhouses were sited to support each other. The major castles were self-contained, self-defensible, and carefully sited. Numerous examples survive along the east and south coasts, at Hurst and Calshot castles in the Solent (Hampshire), for example. The reign of Henry VIII was a period of transition, and during the final years of his life,

one of dramatic and rapid development. The great defence programme of 1539-43 marks a high point of the progression from the mural tower to the *rondelle*, from simple gun-tower to concentric fort. Within two or three years however, there was a move from the round to the square or rectangular, with the bastioned systems derived from Renaissance Italy visible for example at Yarmouth and Carisbrooke castles (both Isle of Wight) and Pendennis (Cornwall).

The Civil War saw further developments in the seventeenth century with siegeworks and earthwork fortifications predominant, while Charles II's reign saw massive expansion of permanent fortification, partly due to naval and mercantile rivalry with the Dutch. Most visible and impressive survivals today are the fortifications of Portsmouth and Plymouth, Thames and Medway based on the design principles of Sir Bernard de Gomme, with regular bastions, demi-bastions, ravelins and ditches. As well as the dockyard defences, de Gomme spent much of his time designing and building defences for the towns themselves. Tilbury Fort (Essex) is an outstanding example of this category of defence.

Political unease at the concept of a standing army discouraged the construction of any permanent military building, bar fortifications. Permanent quarters for troops were exceedingly rare. Military and naval hospitals at Chelsea and Greenwich are the most grandiose military structures in this category of the later period (more information can be found in the **Health and Welfare** selection guide).

Most military buildings and structures from this period have been scheduled. Extent of survival, and their potential for yielding further information, are key determinants. Where buildings continue to be in use, listing may be more appropriate.

Military buildings 1700-1840

This period saw the rise of empire and the considerable expansion of Britain's armed forces. Naval dockyards generally eclipsed in scale Army sites throughout the period, but structures set in expansive new grounds such as Woolwich Arsenal (1717 on) and the Royal Artillery Barracks, Woolwich (1775-1802) show the arrival of a permanent military architecture of huge impressiveness. The Board of Ordnance, the Government department responsible for the equipment and accommodation of the Army, oversaw a steadily growing programme of works. Permanent barracks continued to be rare and confined to forts but with the outbreak of the protracted Revolutionary and Napoleonic Wars (1793-1815) came a major increase in military building, funded (for the first time) by direct taxation. This included fortifications (such as the chain of Martello Towers along the south and east coasts, which together with detached redoubts (Maker Heights, Cornwall) exemplify the move away from bastioned defences) to infantry and cavalry barracks (Christchurch, Exeter, Weymouth), gunpowder magazines (Purfleet, Essex, and Marchwood, Hants.) and defended inland depots Weedon Bec, Northants.).

Listing is increasingly applied to structures from this period, and there will be a presumption in favour of designating all buildings that survive in anything like their original form. Architectural interest is often present alongside functional interest in structures of this period.

Military buildings 1840-1914

This period saw the creation of much of the modern built infrastructure of the Army, and saw the first developments of military flight. It also witnessed the strengthening of coastal defences and the creation of the most powerful complex of permanent fortifications ever seen, prompted by rivalry with France during the 1850s and the arrival of the steam-powered iron-clad warship, armed with increasingly powerful ordnance. This led to a major expansion of the defence system, especially around naval bases of Chatham, Portsmouth, Sheerness and Devonport. Rifled and later breech-loading guns had a major impact on the design of fortifications, as did more powerful versions of gunpowder and new explosives such as cordite and guncotton. By the early 1900s, forts were typically low in profile, with concrete gun emplacements, and with barracks and other support functions housed at a safe distance away rather than being integrated into the overall design.

The move to permanent depots for regiments led to the construction of barracks across Britain, as well as the construction of permanent training depots and teaching institutions. Britain's imperial commitments grew continuously, necessitating the creation of a home establishment capable of replenishing forces in the field with trained and rested replacements. The Cardwell reforms of the 1870s ushered in a new epoch of planning for military needs. On a local level, the volunteer movement of the 1850s onwards led to the appearance in towns of a new building type, the drill hall (for which see the **Sport and Recreation** selection guide).

More selection is required for buildings from this period on account of their greater survival. Many fortifications were overhauled during this period, with artillery housing undergoing extensive reconfiguration to accommodate rifled and quick-firing ordnance. Such changes added another chapter to the evolution of Britain's defences, and are regarded as significant interventions, deserving of inclusion in designations. Some barracks were designed with attention to architectural effect, such as the Peninsula Barracks of c.1900 at Winchester and the naval barracks at Plymouth, Chatham and Devonport, while the majority followed type-designs produced by the War Office. Architectural quality, planning interest, degree of alteration and group value with other related structures will be key considerations. Specialist buildings, such as military medical quarters, unusual training facilities, and novel forms of structures (such as the naval gun-training platform, shaped like a boat, at Mount Wise in Plymouth), may deserve designation too.

Military buildings 1914-1945

The broad developments of this short but intense period can be summarised under three main headings. Firstly, the rise of air power and the creation of a huge infrastructure associated with it. Secondly, the move away from monumentalised permanent quarters and permanent fortification towards temporary accommodation and more specialist technical premises. Thirdly, the arrival of the home front, and the greatly increased threat posed to civilians as a result of aerial bombing.

The twentieth century was the age of flight. Military aviation was of critical importance in its development: the first powered flight took place in 1908 when Col. S.F. Cody flew

a British Army aeroplane at Farnborough (Hants.). In 1910 a permanent flying school and factory was opened at Larkhill, on Salisbury Plain; an expanded Central Flying School was opened at nearby Upavon shortly after. Separate naval and army services formed before the First World War (the Royal Flying Corps and the Royal Naval Air Service) merged to form the Royal Air Force (RAF) in 1918. This occupied 301 sites by the end of the war.

Military architecture acquired much of its monumental character in the inter-war period, especially after 1934 as the RAF was placed in the front line of deterrent power. The RAF College at Cranwell, Lincolnshire (1929-33, by J.G. West of the Office of Works) was an old-fashioned homage to Sir Christopher Wren, while the RAF training base at Hullavington (Wilts.) was carefully designed and built in local materials in order not to disrupt the landscape setting. Hullavington forms perhaps the most outstanding example, as a whole, of the way in which the planners of new air powers had to take account of political and public concerns over rearmament and the impact of these huge sites on the environment. Some building types, like officers' housing, barracks and officers' messes, were executed in a pleasing neo-Georgian style, while other technical buildings were executed in a Moderne style. The officers' mess at RAF Biggin Hill (London Borough of Bromley), for example, is a fine example of Neo-Georgian architecture and shows the lengths the youngest branch of the armed forces went to in creating premises that provided a sense of tradition and helped to attract new recruits. Most Army buildings - officers' messes excepted - were comparatively functional and unassertive from this period: temporary barracks were a widely accepted building type, the RAF, having more economically-designed structures from 1938 did not build temporary quarters in large numbers until the Second World War

4 MILITARY BUILDINGS 1914-1945

Operational structures

Perhaps the largest category of modern military buildings in England is *aviation sites*. Powered flight has had a profound influence on the human experience of the twentieth century, and on the landscape. Military airfields are typically large and complex sites that were built in great numbers: about 250 flying stations or aerodromes existed in the summer of 1918, a number that had increased to 740 during the Second World War. Their former ubiquity should not be taken for granted, however, as many sites continue to be cleared and adapted for new uses. Many aerodromes which were subject to rebuilding in the inter-war period were front-line operational places, playing a role for example in the Battle of Britain and the Strategic Bomber Offensive, which adds to their significance in terms of the richness and poignancy of historical association.

Types of aerodrome varied considerably, from operational stations to training bases; from bomber aerodromes to home defence or fighter use. Layouts and categories of buildings varied accordingly, and specialist interpretation is often needed to understand the component structures. Airfields were increasingly given concrete runways for all-weather flying: the scale of the wartime construction enterprise in this area was vast. The component elements range from architecturally polite messes, station HQs and guard houses, to more functional technical blocks, hangars and control towers. Almost all were standard Air Ministry designs, repeated - with variations - across the country.

Aerodromes of 1939-45 and before have received considerable study, and a thematic listing has identified the outstanding survivals. While all aerodrome sites have strong local resonance, national designation will only be appropriate for a selection of sites, given the huge numbers involved and the degree of standardisation of structure. The thematic survey focused on the identification of those key sites which best reflect the development of military aviation from 1910 to 1945, and those which are most strongly representative of functionally distinct airfield types: at these selected sites, designations are numerous and statutory protection is of a high order. The relationship of built fabric to the flying field, its character and development, has also been fundamental to the selection process. Outside these key sites, it is only groups (of buildings, fighter pens and defences) and individual examples of strong intrinsic or associational importance, particularly those with key historical episodes of the Second World War, which have been recommended for protection. Selection principles will include rarity; technical or structural interest; group value with related structures; and operational importance (such as direct involvement in an important campaign such as the Battle of Britain or the Battle of the Atlantic). Judgment will be required to assess such candidates for designation. Certain non-adaptable structures have been designated by scheduling, such as blast pens, as have certain defence structures (like the Pickett Hamilton fort) and bomb stores. The totality of an aerodrome cannot be captured through statutory designation alone, and other approaches such as conservation area protection have been shown to be appropriate.

Army buildings of this period range from permanent barracks and officers' messes, to temporary - even tented - structures. Vast amounts of short-life hutted accommodation was erected, particularly in the Second World War, most of which no longer survives but which can be identified through documentation and archaeology. Permanent structures will need to be judged against criteria such as architectural interest, associations with significant military events, and rarity. More impermanent structures will often have undergone alteration over time, and assessment will have to take this into account. Army camps have often continued in use, with early examples of prefabricated hutting being repeatedly modernised and upgraded to suit modern needs. Many army camps however were transient – often tented - affairs, built in preparation for D-Day embarkation for example and only surviving today in buried or earthwork form. Certain training sites, such as the First World War practice trench complexes on Cannock Chase (Staffs.) have even been scheduled as archaeological monuments. Ancillary structures can be of special interest if they are an integral part of outstanding groups or if they have direct historical associations with specific events, well-known individuals or of broader developments and aspects of the war. Military efficiency and morale is heavily dependant upon logistical support, and the United States Army postal sorting office at Sutton Coldfield, West Midlands, directly illustrates the volume of personal communication between families and servicemen in the European theatre.

Prisoner of war camps, mostly of Second World War date, either made use of existing buildings, or were purpose-built, using standard types of hutting but arranged in a distinctive plan form, designed for the control and easy administration of prisoners. Some of these remain standing, but far more now exist as sites: a study undertaken for English Heritage has shown that their overall footprint and impact on the landscape is more readily discernible than might at first be thought. Designation of buildings is exceptional. The camp at Harperley (Co. Durham) has been scheduled in its entirety,

whereas several huts at Lippitts Hill (Herts.) have been listed. In both cases, the interest of individual buildings and of the group as a whole was enhanced by the survival of murals and other artefacts and works of art.

Military sites do not have to be in the front line to be of the foremost significance. *Intelligence and Communications*, for example, play an ever-growing part in modern defence and security. The development of radio communication led to new signals complexes and networks. Radar is discussed below. Bletchley Park, in Buckinghamshire, was the wartime location of the Government Code and Cypher School, and became a renowned centre for decryption and the early development of computing machines: these included the world's first stored programme computer, the Colossus, built here in 1944. Its seemingly unremarkable huts and wartime buildings exemplify the site's development from a cryptography school to a global information hub, receiving and processing information for dispatch to strategic commands and units in the field. It witnessed extraordinary events which influenced the course of the war.

The Home Front: military structures

Twentieth-century defensive structures survive in very considerable numbers, especially from the Second World War. All bear witness to the greatest conflict of world history, but claims to special interest vary widely. Discretion is thus required when assessing them for designation: designs were often standardised; construction was often rushed, and materials were often not durable. Our understanding has advanced considerably in recent years.

Early warning systems developed from the First World War. Early sites were based on acoustic detection and the rare surviving complexes of sound mirrors along the south and east coasts at Denge, East Sussex, and Fulwell, Sunderland are designated. Radio Direction Finding (later known as *Radar*) developed in the early 1930s from experiments conducted at Orfordness and at Bawdsey Manor, Suffolk. Radar transmitter masts, in lines of four, 350 ft high, carried aerials which sent out electronically generated signals: wooden towers brought signals to the receiver blocks. The original twenty Chain Home stations stretched from the Orkneys to the Isle of Wight, and were considerably augmented, most notably by separate systems that had developed to detect aircraft at high and low levels (the Chain Home High and Chain Home Low systems) during the war. While various sites have retained elements of the ground structures and accommodation quarters, surviving examples of the iconic masts are very rare: a designated example remains at Stenigot, (Lincs.). Surviving ancillary structures will warrant consideration. *Royal Observer Corps posts* provided another layer of defence, passing visual observations up to the RAF chain of command. Survivals are few and intactness will be a crucial consideration in assessment. Many ROC posts took advantage of existing buildings.

Anti-aircraft batteries were once very numerous, particularly in the south-east. Survivals are rare, especially for the First World War. Some Heavy Anti-Aircraft sites (e.g., Whalebone Lane, London Borough of Havering) have been designated where plan, fabric and the functioning of the battery remains evident. Light Anti-Aircraft sites rarely survive on account of their mobility and impermanence. The most unusual anti-aircraft structures of all were the four Maunsell Forts of the Thames estuary: massive oil

rig-like platforms moored far out to sea. As offshore structures they are not eligible for listing, and their unsuitability for monumentalisation renders them unsuitable for scheduling: a state of affairs that belies their interest. Many associated *searchlight sites* survive as earthwork or cropmark remains, while numerous concrete barrage-balloon tethering points are also extant.

Bombing decoys were intricate systems of deception, laid out away from urban areas to draw enemy raiders away from their intended targets. Dummy systems of lighting, simulating cities under aerial assault, were laid out on less vulnerable sites. No fewer than eight hundred sites were constructed: of these, three hundred attracted bombs – a testament to their effectiveness. Because of their impermanence, survival levels are often low; control houses, for orchestrating the effects, are the most likely to remain. Some of these sites, which can be most clearly appreciated from the air, may deserve designation as archaeological landscapes and some have thus been scheduled.

Pillboxes were strong-points, generally of reinforced concrete, placed at strategic locations, such as at river crossings, or along coastal and inland anti-invasion 'stop lines' which were intended to slow down the progress of an attacking force. Some were designed for machine guns; others, more unusually, housed artillery. Examples date from the First World War, but many thousands were built in the early stages of the Second: 28,000 are thought to have been erected, and a recent survey calculated that some 6,500 survive. They frequently formed parts of defence lines, which were belts of defensive structures intended to delay the invader. Claims to special interest will include rarity of type; group relationship with other defence structures (including *tank traps* and *road blocks*); survival; and their built form. Group value with other historic items (from hillforts to bridges) may be relevant too: that at Bodiam Castle, East Sussex, creates an instructive contrast with its grander medieval neighbour. Others, as at Dover Castle, can be cut into earlier fortifications. Some pillboxes were disguised as civilian buildings: where this camouflage survives the case for designation is much stronger. Given the very considerable numbers of items that survive, considerable discretion should be used in their selection, particular attention being justified for those which directly illustrate their intended function as part of a key defensive line or nodal point.

The preparations for the Allied invasion of France in 1944, *Operation Overlord*, led to the construction of many buildings and sites. These include pumping stations for the Pipe Line Under the Ocean – PLUTO - as encountered at Shanklin, Isle of Wight; embarkation slipways, at Torbay, Devon; and mooring posts or 'Dolphins' and the construction sites for floating harbours, at Lepe, Hampshire. Far more sites associated with the renowned event, such as tented camps, have left no visible traces.

5 THE HOME FRONT: CIVILIAN STRUCTURES

Intact *air raid shelters* are comparatively rare survivals. Proven First World War examples are sufficiently rare to warrant serious consideration for designation but much greater discretion is required for Second World War examples and ordinary domestic shelters are unlikely to be listed. From the later 1930s all new factories were obliged to provide purpose-built shelters, so their survival is not unusual. Determinant factors will include rarity of type; relationship to other listed buildings; and significance for overall understanding of the development of the category. Painted signs will not generally be enough to warrant designation. The more common domestic Anderson Shelter was

provided to millions of urban and suburban homes during the Second World War Two. While many survive today as garden sheds, the great majority of these are ruinous and no longer retain original details of their construction. *Air Raid Precaution (ARP) Centres* were built to co-ordinate local government responses to air raids and contained control centres, air filtration plants and other features: sometimes located within municipal buildings, these can be of particular interest when survival is good and warrant serious consideration for designation. *Evacuation Camps* opened from 1939 onwards, both to remove vulnerable town children from bombing and to create outdoor rural complexes for their better development. Certain key structures at such places as Sayers Croft (Surrey) may warrant designation in their own right but generally the best designation for such complexes will be as conservation areas.

Numerous towns and cities still bear the marks of the impact of *bombing*. Ruined churches have long been listed for their memorial value as much as for their intrinsic historical importance, most famously at Coventry Cathedral: other examples are to be seen in Canterbury, Dover, Portsmouth, Southampton, Exeter, Plymouth, Bristol, Hull, York and, of course, the City of London. Other listed buildings may well retain the scars from bomb damage as part of their special interest, such as the Victoria and Albert Museum. Exceptionally, some buildings have been designated solely because of their war-damaged appearance (as in Milk Street, Bath). Bomb sites were once all too common; sixty years on and more, this is no longer the case. Designation will only be warranted after careful consideration of the case. Factors such as the visible evidence elsewhere of bombing (i.e., wholesale rebuilding or gaps in the urban fabric), and the intrinsic appearance of the ruin and any strong commemorative associations will need to be weighed up.

Sites of *commemoration* range from war memorials to monuments commemorating aerodromes. The separate selection guide on **Commemoration** sets out our approaches in more detail for funerary and memorial structures. A wide range of objects has been permanently installed in this way, from defused floating mines now installed as Royal National Lifeboat Institute collecting boxes, to aircraft – generally now replaced with replicas - placed outside aerodromes as Gate-Guardians. Listing will be warranted for memorials of aesthetic quality; recent ones are generally unlikely to warrant this.

6 POST 1945: THE COLD WAR AND BEYOND

Throughout the Cold War the threat of mutually-assured nuclear destruction overshadowed spheres of national life – political, economic, scientific and cultural. Some sites were purpose-built, but it was more common to adapt existing defence sites, from naval dockyards to barracks, munitions factories to airfields. But there was also a significant amount of new building. Cold War (and now post-Cold War) architecture is distinguished by its severely functional appearance, largely constructed from concrete, steel and earth. Many of the buildings have strikingly innovative form, such as the massive Rotor (radar) bunkers and War Rooms of the 1950s and the Regional Seats of Government (some of which absorbed earlier War Rooms) of the early 1960s. Centralised planning and the deployment of standardised weapons systems resulted in near-identical site and structural types across the country, as had been the case during the Second World War with anti-aircraft artillery for example.

Airfields also formed a significant part of the military estate during the Cold War, and beyond. For much of the 1950s and 60s, for example, Britain's airborne nuclear deterrent was carried by the so-called V-force (Victor, Valiant and Vulcan aircraft) for which ten main airfields were provided in the east of England. This made use of pre-war buildings for the most part, although the airfields themselves were provided with extended runways, hard-standings and other features such as concrete walls and later Hardened Aircraft Shelters for protection and servicing of the aircraft themselves. Related to these airfields were the bomb stores and Thor intermediate-range ballistic missiles, for which some distinctive buildings survive.

Also from the 1950s some airfields were used by the United States Air Force Strategic Air Command (SAC). SAC airfields saw a considerable amount of new building, much of it distinctively American in style and execution, and some to NATO design. This ushers in a new development in English military architecture: the presence of permanent installations by an allied, yet foreign, power. Airfields were typically hardened in the 1970s and 1980s, including the construction of Hardened Aircraft Shelters dispersed at sites like Alconbury (Cambs.) and Upper Heyford (Oxon.), while two sites – Greenham Common (Berks.) and Molesworth (Cambs.) were updated to accommodate ground-launched cruise missiles. This phase of activity can be most clearly seen at the (now scheduled) cruise missile shelters at Greenham Common. This, the final phase of the Cold War, produced very distinctive military landscapes which will be seen as encapsulating approaches to the defence of the realm, just as Expansion Period aerodromes of the 1930s embody the pre-war period.

Radar has continued through the Cold War and beyond. Perhaps best known is the modernisation programme initiated in the late 1940s, seeking to re-establish an effective air defence radar network (known as Rotor). Not only was this the most ambitious military engineering project of the 1950s, but also required the coordination of a massive manufacturing effort to produce the radar sets, consoles and plant. The largest structures built were the twenty-nine underground operations blocks. A fully computerised air defence scheme known as Linesman was developed in the 1960s, and a more integrated and flexible system (United Kingdom Air Defence Ground Environment or UKADGE) in the 1970s. Early warning during the Cold War era is also evident in the Ballistic missile early warning system (or BMEWS), developed in the United States in the 1950s and introduced in Britain in the early 1960s.

Cold War sites represent challenges for designation. Some buildings were short-lived; others were designed with very specific functions in mind, and may be challenges for re-use. Other categories were built to standard designs, and may survive on various sites (such as Royal Observer Corps posts). Some buildings will still be in operational use. For many, this represented a fearsome epoch in modern history. However, recent research by English Heritage has set out the context in which the buildings and structures were created, and with the passing of time, the historical significance of this period of armed peace becomes ever clearer. Careful assessment has produced recommendations for designation which will be used as the basis for decisions. Rarity, group value, military and technological significance, and architectural or structural interest, will be the principal considerations in most cases. Wall art, representing the buildings' former use, or the reaction of servicemen to the spaces in which they worked, may also be a factor in determining significance. Military sites where survival

levels are high, as at RAF Upper Heyford, for instance, are likely to warrant particularly close attention.

Many Cold War structures are as significant for the technological innovations they housed as for their new functional architecture. Other considerations however include the centrality of buildings to British and/or NATO defence policy and their representing distinct phases of the Cold War.

7 SELECT BIBLIOGRAPHY

General

Dobinson, C., Lake, J. and Schofield J., 'Monuments of War: Defining England's 20th-Century Defence Heritage' *Antiquity* 71 (1997), 288-99

English Heritage, *Monuments of War: The Evaluation, Recording and Management of Twentieth Century Military Sites* (1997)

Longmate, N., *Island Fortress* (1991)

Lowry, B., (ed.), *20th-Century Defences in Britain. An Introductory Guide* Council for British Archaeology Practical Handbooks in Archaeology 12 (1996)

Osborne, M., *Defending Britain: Twentieth-Century Military Structures in the Landscape* (2004)

Saunders, A., *Fortress Britain* (1989)

SAVE Britain's Heritage, *Deserted Bastions* (1993)

Schofield, J. (ed.), *Modern Military Matters: Studying and Managing the Twentieth-Century Defence Heritage in Britain: A Discussion Document* (2004)

Aviation

Francis, P., *British Military Airfield Architecture* (1996)

Hawkins, B., Lechner, G. and Smith, P., (eds.), *Historic Airports. Proceedings of the International 'L'Europe de l'Air' Conferences on Aviation Architecture* (2005)

Lake, J. and Schofield, J., 'Conserving the Remains of The Battle', pp. 229-42 in Crang, J. and Addison, P., (eds.), *The Burning Blue: A New History of The Battle of Britain* (2002)

Ramsey, W.G., (ed.), *The Battle of Britain Then and Now* (1987 edn.)

Army

Barnett, C., *Britain and her Army* (1970)

Douet, J. *British Barracks 1600-1914: Their Architecture and Role in Society* (1998)

Wills, H., *Pillboxes: A Study of UK Defences 1940* (1985)

Navy

Evans, D., *Building the Steam Navy: The Royal Dockyards and the Victorian Battle Fleet 1830-1906* (2004)

Evans, D., *Arming the Fleet: The Development of the Royal Ordnance Yards, 1770-1945* (2006)

Military architecture

The literature on military architecture is particularly large. The following are but a selection of some of the key works.

Cocroft, W. and Thomas, R.J.C., *Cold War: Building for Nuclear Confrontation 1946-1989* (2003)

Fortress: the magazine of the Fortress Study Group

Monument Class Descriptions: fortifications, Martello Towers, etc. available on the English Heritage website: <http://www.eng-h.gov.uk/mpp/mcd/index.htm>